```
!pip install pmdarima --quiet
```

```
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```

```
from google.colab import files
files.upload()
```

```
Choose Files kaggle.json
```

- **kaggle.json**(application/json) - 64 bytes, last modified: 4/11/2025 - 100% done

```
Saving kaggle.json to kaggle.json
{'kaggle.json': b'{"username":"madhunvn","key":"c83b896293dd89b4e241625407cb69a6"}'}
```

```
!mkdir -p ~/.kaggle
!cp kaggle.json ~/.kaggle/
!chmod 600 ~/.kaggle/kaggle.json
```

```
!kaggle datasets download -d berkeleyearth/climate-change-earth-surface-temperature-data

!unzip climate-change-earth-surface-temperature-data.zip
```

```
Dataset URL: https://www.kaggle.com/datasets/berkeleyearth/climate-change-earth-surface-temperature-data
License(s): CC-BY-NC-SA-4.0
Archive:  climate-change-earth-surface-temperature-data.zip
  inflating: GlobalLandTemperaturesByCity.csv
  inflating: GlobalLandTemperaturesByCountry.csv
  inflating: GlobalLandTemperaturesByMajorCity.csv
  inflating: GlobalLandTemperaturesByState.csv
  inflating: GlobalTemperatures.csv
```

```
import pandas as pd
import numpy as np
import os
from sklearn.metrics import mean_squared_error
from sklearn.preprocessing import MinMaxScaler
from tqdm import tqdm
import matplotlib.pyplot as plt

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense
from statsmodels.tsa.arima.model import ARIMA

# Load and clean data
df = pd.read_csv("GlobalLandTemperaturesByCity.csv")
df['dt'] = pd.to_datetime(df['dt'])
df = df[df['AverageTemperature'].notnull()]
df['City_Country'] = df['City'] + ', ' + df['Country']
cities = df['City_Country'].unique()

results = []

for city in tqdm(cities, desc="Processing cities"):
    city_data = df[df['City_Country'] == city].copy()
    city_data.set_index('dt', inplace=True)
    # city_data = city_data.resample('M').mean()
    city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})


    if city_data['AverageTemperature'].isnull().sum() > 0 or len(city_data) < 100:
        continue

    try:
        # Scale
        scaler = MinMaxScaler()
        y_scaled = scaler.fit_transform(city_data[['AverageTemperature']])

        # Supervised learning
        def create_sequences(data, look_back=12):
            X, y = [], []
            for i in range(len(data) - look_back):
                X.append(data[i:i+look_back])
                y.append(data[i+look_back])
            return np.array(X), np.array(y)

        look_back = 12
        X, y = create_sequences(y_scaled, look_back)
        split = int(len(X) * 0.8)
        X_train, X_test = X[:split], X[split:]
        y_train, y_test = y[:split], y[split:]

        # LSTM
        model = Sequential()
        model.add(LSTM(50, input_shape=(X_train.shape[1], X_train.shape[2])))
        model.add(Dense(1))
        model.compile(optimizer='adam', loss='mse')
        model.fit(X_train, y_train, epochs=10, batch_size=32, verbose=0)

        # ARIMA
        arima_series = city_data['AverageTemperature']
        arima_model = ARIMA(arima_series, order=(3,1,2))
        arima_fitted = arima_model.fit()
        arima_forecast = arima_fitted.forecast(steps=len(y_test))

        # Combine
        y_test_actual = scaler.inverse_transform(y_test)
        arima_forecast_flat = arima_forecast.squeeze()
        residual_correction = model.predict(X_test)[:len(arima_forecast_flat)]
        residual_correction = scaler.inverse_transform(residual_correction)

        hybrid_forecast = arima_forecast_flat + residual_correction.squeeze()

        # RMSE
        arima_rmse = np.sqrt(mean_squared_error(y_test_actual, arima_forecast_flat))
        lstm_rmse = np.sqrt(mean_squared_error(y_test_actual, residual_correction))
        hybrid_rmse = np.sqrt(mean_squared_error(y_test_actual, hybrid_forecast))

        results.append({
            "City": city,
            "ARIMA_RMSE": arima_rmse,
            "LSTM_Residual_RMSE": lstm_rmse,
            "Hybrid_RMSE": hybrid_rmse
        })

    except Exception as e:
        continue
```

```
# Save
results_df = pd.DataFrame(results)
results_df.to_csv("citywise_forecast_rmse.csv", index=False)
print("✅ Saved to citywise_forecast_rmse.csv")

# Visualization: Top 10 cities by Hybrid RMSE
results_df_sorted = results_df.sort_values(by="Hybrid_RMSE")

plt.figure(figsize=(12, 6))
plt.barh(results_df_sorted['City'].head(10), results_df_sorted['Hybrid_RMSE'].head(10), color='green')
plt.xlabel("Hybrid RMSE")
plt.title("Top 10 Cities with Lowest Hybrid Forecast Error")
plt.gca().invert_yaxis()
plt.tight_layout()
plt.show()
```

```
Processing cities:   0%|          | 0/3490 [00:00<?, ?it/s]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME' instead.
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   0%|          | 3/3490 [00:01<32:39,  1.78it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` a
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
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Processing cities:   0%|          | 4/3490 [00:12<4:30:52,  4.66s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME' i
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   0%|          | 11/3490 [00:17<58:31,  1.01s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
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15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:   0%|          | 12/3490 [00:23<2:32:55,  2.64s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   1%|          | 28/3490 [00:34<32:47,  1.76it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
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  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:   1%|          | 29/3490 [00:43<3:02:59,  3.17s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
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/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:   1%|          | 30/3490 [00:50<4:06:40,  4.28s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   2%|▏         | 53/3490 [01:08<42:08,  1.36it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   2%|▏         | 54/3490 [01:15<2:16:50,  2.39s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   2%|▏         | 55/3490 [01:15<1:45:25,  1.84s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   2%|▏         | 56/3490 [01:22<3:19:23,  3.48s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   2%|▏         | 77/3490 [01:35<32:51,  1.73it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:   2%|▏         | 78/3490 [01:45<3:14:38,  3.42s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
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/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:   2%|▏         | 79/3490 [01:53<4:34:47,  4.83s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   2%|▏         | 83/3490 [01:57<1:43:37,  1.83s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:   2%|▏         | 84/3490 [02:06<3:47:18,  4.00s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   3%|▎         | 89/3490 [02:10<1:18:31,  1.39s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:   3%|▎         | 90/3490 [02:18<3:21:55,  3.56s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   3%|▎         | 109/3490 [02:30<31:23,  1.80it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   3%|▎         | 110/3490 [02:37<2:17:05,  2.43s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   3%|▎         | 116/3490 [02:40<43:21,  1.30it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:   3%|▎         | 117/3490 [02:48<2:50:43,  3.04s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
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  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:   3%|▎         | 118/3490 [02:55<3:49:23,  4.08s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
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/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
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15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:   3%|▎         | 119/3490 [03:03<4:58:21,  5.31s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   3%|▎         | 122/3490 [03:05<2:02:10,  2.18s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:   4%|▎         | 123/3490 [03:12<3:34:52,  3.83s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   4%|▎         | 127/3490 [03:14<1:15:15,  1.34s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
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13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:   4%|▎         | 128/3490 [03:21<2:41:58,  2.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
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13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   4%|▎         | 129/3490 [03:28<3:55:57,  4.21s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   4%|▎         | 130/3490 [03:29<2:54:22,  3.11s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
```

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/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   4%|▌          | 131/3490 [03:37<4:20:59,  4.66s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   4%|▌          | 132/3490 [03:38<3:12:10,  3.43s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
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18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:   4%|▌          | 133/3490 [03:46<4:37:33,  4.96s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   4%|▌          | 134/3490 [03:47<3:28:06,  3.72s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   4%|▌          | 135/3490 [03:54<4:26:13,  4.76s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   4%|▌          | 136/3490 [03:55<3:15:32,  3.50s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:   4%|▌          | 137/3490 [04:03<4:34:26,  4.91s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   5%|▌          | 159/3490 [04:16<36:06,  1.54it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   5%|▌          | 160/3490 [04:23<2:15:32,  2.44s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   5%|▌          | 170/3490 [04:29<36:41,  1.51it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:   5%|▌          | 171/3490 [04:35<2:05:56,  2.28s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   5%|▌          | 185/3490 [04:44<31:09,  1.77it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:   5%|▌          | 186/3490 [04:54<2:56:18,  3.20s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   5%|▌          | 190/3490 [04:56<1:05:22,  1.19s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step
Processing cities:   5%|▌          | 191/3490 [05:04<3:05:46,  3.38s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   6%|▌          | 223/3490 [05:23<30:34,  1.78it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   6%|▌          | 224/3490 [05:31<2:31:11,  2.78s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   7%|▋          | 227/3490 [05:33<1:11:25,  1.31s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:   7%|▋          | 228/3490 [05:39<2:37:00,  2.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   7%|▋          | 230/3490 [05:41<1:39:14,  1.83s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   7%|▋          | 231/3490 [05:48<3:00:51,  3.33s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   8%|▊          | 266/3490 [06:09<33:50,  1.59it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:   8%|▊          | 267/3490 [06:15<1:59:11,  2.22s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   8%|▊          | 280/3490 [06:23<31:49,  1.68it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:   8%|▊          | 281/3490 [06:29<1:57:46,  2.20s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   9%|▊          | 305/3490 [06:44<42:53,  1.24it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:   9%|▊          | 306/3490 [06:52<2:33:41,  2.90s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   9%|▊          | 307/3490 [06:53<1:56:11,  2.19s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:   9%|▊          | 308/3490 [07:00<3:17:29,  3.72s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   9%|▊          | 310/3490 [07:01<1:51:29,  2.10s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:   9%|▊          | 311/3490 [07:10<3:40:34,  4.16s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   9%|▊          | 312/3490 [07:10<2:43:12,  3.08s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:   9%|▊          | 313/3490 [07:17<3:31:12,  3.99s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:   9%|▊          | 328/3490 [07:26<31:07,  1.69it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
```

```
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
16/16 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:   9%|▉         | 329/3490 [07:34<2:26:14,  2.78s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:   9%|▉         | 330/3490 [07:41<3:29:28,  3.98s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  10%|▉         | 337/3490 [07:44<43:14,  1.22it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  10%|▉         | 338/3490 [07:51<2:22:01,  2.70s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  10%|▉         | 343/3490 [07:54<47:53,  1.10it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  10%|▉         | 344/3490 [08:02<2:28:57,  2.84s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  11%|▉         | 386/3490 [08:27<30:58,  1.67it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  11%|▉         | 387/3490 [08:33<2:01:16,  2.35s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  11%|▉         | 397/3490 [08:40<31:56,  1.61it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  11%|▉         | 398/3490 [08:46<2:00:45,  2.34s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  11%|▉         | 400/3490 [08:48<1:24:49,  1.65s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  11%|▉         | 401/3490 [08:55<2:42:52,  3.16s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  12%|▉         | 422/3490 [09:07<28:17,  1.81it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  12%|▉         | 423/3490 [09:15<2:15:35,  2.65s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  12%|▉         | 432/3490 [09:20<31:52,  1.60it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  12%|▉         | 433/3490 [09:28<2:23:07,  2.81s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  13%|▉         | 442/3490 [09:33<32:29,  1.56it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  13%|▉         | 443/3490 [09:41<2:22:12,  2.80s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  14%|▉         | 481/3490 [10:03<39:16,  1.28it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  14%|▉         | 482/3490 [10:10<2:08:37,  2.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  14%|▉         | 495/3490 [10:18<31:41,  1.58it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  14%|▉         | 496/3490 [10:25<2:00:00,  2.41s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  14%|▉         | 497/3490 [10:35<3:51:23,  4.64s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  14%|▉         | 506/3490 [10:41<47:27,  1.05it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  15%|▉         | 507/3490 [10:50<2:52:30,  3.47s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  15%|▉         | 517/3490 [10:57<33:43,  1.47it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 26ms/step
Processing cities:  15%|▉         | 518/3490 [11:11<3:50:22,  4.65s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  15%|▉         | 522/3490 [11:13<1:17:42,  1.57s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  15%|▉         | 523/3490 [11:21<2:44:48,  3.33s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  15%|▉         | 525/3490 [11:22<1:34:31,  1.91s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  15%|▉         | 526/3490 [11:28<2:45:50,  3.36s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  15%|▉         | 536/3490 [11:35<32:24,  1.52it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
```

```
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  15%|█▍        | 537/3490 [11:42<2:09:04,  2.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  16%|█▍        | 552/3490 [11:51<27:24,  1.79it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  16%|█▍        | 553/3490 [11:59<2:08:19,  2.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  16%|█▍        | 561/3490 [12:03<32:26,  1.50it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  16%|█▍        | 562/3490 [12:10<2:06:51,  2.60s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  16%|█▍        | 573/3490 [12:16<32:34,  1.49it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  16%|█▍        | 574/3490 [12:24<2:17:42,  2.83s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  17%|█▌        | 584/3490 [12:30<29:38,  1.63it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  17%|█▌        | 585/3490 [12:37<2:07:19,  2.63s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  17%|█▌        | 586/3490 [12:43<3:00:00,  3.72s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  18%|█▋        | 620/3490 [13:04<26:12,  1.82it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  18%|█▋        | 621/3490 [13:13<2:23:29,  3.00s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  18%|█▋        | 622/3490 [13:13<1:48:13,  2.26s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  18%|█▋        | 623/3490 [13:19<2:41:32,  3.38s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  18%|█▋        | 624/3490 [13:20<2:00:51,  2.53s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  18%|█▋        | 625/3490 [13:28<3:17:41,  4.14s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  18%|█▋        | 633/3490 [13:32<36:07,  1.32it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  18%|█▋        | 634/3490 [13:40<2:11:28,  2.76s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  18%|█▋        | 637/3490 [13:41<1:01:43,  1.30s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  18%|█▋        | 638/3490 [13:49<2:38:39,  3.34s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  18%|█▋        | 644/3490 [13:53<41:42,  1.14it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step
Processing cities:  18%|█▋        | 645/3490 [14:01<2:24:41,  3.05s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  19%|█▋        | 646/3490 [14:07<3:03:31,  3.87s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  19%|█▋        | 647/3490 [14:15<4:02:52,  5.13s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  19%|█▋        | 650/3490 [14:16<1:40:17,  2.12s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  19%|█▋        | 651/3490 [14:23<2:41:24,  3.41s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  19%|█▋        | 658/3490 [14:28<42:31,  1.11it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  19%|█▋        | 659/3490 [14:34<2:04:50,  2.65s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
```

```
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  19%|██        | 660/3490 [14:42<3:15:41,  4.15s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  19%|██        | 677/3490 [14:53<30:15,  1.55it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  19%|██        | 678/3490 [14:59<1:50:18,  2.35s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  20%|██        | 683/3490 [15:02<48:14,  1.03s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  20%|██        | 684/3490 [15:09<2:10:59,  2.80s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  20%|██        | 685/3490 [15:10<1:39:12,  2.12s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  20%|██        | 686/3490 [15:18<3:01:02,  3.87s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  20%|██        | 696/3490 [15:23<29:47,  1.56it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  20%|██        | 697/3490 [15:30<2:00:23,  2.59s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  20%|██        | 698/3490 [15:31<1:31:55,  1.98s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  20%|██        | 699/3490 [15:38<2:38:25,  3.41s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  20%|██        | 700/3490 [15:45<3:31:22,  4.55s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  20%|██        | 703/3490 [15:46<1:28:56,  1.91s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  20%|██        | 704/3490 [15:55<3:00:18,  3.88s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  20%|██        | 706/3490 [15:56<1:41:11,  2.18s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  20%|██        | 707/3490 [16:02<2:31:27,  3.27s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  20%|██        | 708/3490 [16:09<3:31:59,  4.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  20%|██        | 709/3490 [16:10<2:35:57,  3.36s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  20%|██        | 710/3490 [16:19<3:59:58,  5.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  20%|██        | 712/3490 [16:20<2:10:26,  2.82s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  20%|██        | 713/3490 [16:26<2:51:39,  3.71s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  21%|██        | 716/3490 [16:28<1:15:15,  1.63s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  21%|██        | 717/3490 [16:35<2:28:39,  3.22s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  21%|██        | 726/3490 [16:40<30:10,  1.53it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  21%|██        | 727/3490 [16:47<1:59:56,  2.60s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  21%|██        | 735/3490 [16:51<30:23,  1.51it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  21%|██        | 736/3490 [16:59<2:00:48,  2.63s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  22%|██        | 753/3490 [17:09<29:41,  1.54it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  22%|██        | 754/3490 [17:15<1:40:48,  2.21s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  22%|██        | 755/3490 [17:22<2:54:20,  3.82s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
```

```
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  22%|██▏       | 756/3490 [17:23<2:09:24,  2.84s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
16/16 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  22%|██▏       | 757/3490 [17:31<3:19:17,  4.38s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  22%|██▏       | 759/3490 [17:32<1:54:29,  2.52s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  22%|██▏       | 760/3490 [17:38<2:41:02,  3.54s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  22%|██▏       | 782/3490 [17:51<24:44,  1.82it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  22%|██▏       | 783/3490 [18:00<2:12:42,  2.94s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  23%|██▎       | 786/3490 [18:02<1:01:38,  1.37s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  23%|██▎       | 787/3490 [18:10<2:34:01,  3.42s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  23%|██▎       | 809/3490 [18:23<29:34,  1.51it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  23%|██▎       | 810/3490 [18:29<1:36:35,  2.16s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  24%|██▎       | 826/3490 [18:39<25:17,  1.76it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step
Processing cities:  24%|██▎       | 827/3490 [18:45<1:45:57,  2.39s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  24%|██▎       | 828/3490 [18:46<1:28:06,  1.99s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  24%|██▎       | 829/3490 [18:53<2:30:47,  3.40s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  24%|██▍       | 830/3490 [19:01<3:28:34,  4.70s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  24%|██▍       | 832/3490 [19:02<1:54:29,  2.58s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  24%|██▍       | 833/3490 [19:12<3:35:29,  4.87s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  24%|██▍       | 836/3490 [19:14<1:29:56,  2.03s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  24%|██▍       | 837/3490 [19:20<2:22:44,  3.23s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  24%|██▍       | 851/3490 [19:29<25:26,  1.73it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  24%|██▍       | 852/3490 [19:35<1:40:55,  2.30s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  25%|██▍       | 860/3490 [19:40<29:42,  1.48it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  25%|██▍       | 861/3490 [19:46<1:37:24,  2.22s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  25%|██▍       | 862/3490 [19:47<1:15:23,  1.72s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  25%|██▍       | 863/3490 [19:54<2:27:29,  3.37s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  25%|██▍       | 864/3490 [19:54<1:50:27,  2.52s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  25%|██▍       | 865/3490 [20:03<3:06:29,  4.26s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  25%|██▍       | 879/3490 [20:10<24:41,  1.76it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  25%|██▍       | 880/3490 [20:18<1:51:56,  2.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  26%|██▌       | 892/3490 [20:24<24:47,  1.75it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  26%|██▌       | 893/3490 [20:32<1:59:41,  2.77s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  26%|██▌       | 895/3490 [20:33<1:10:43,  1.64s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  26%|██▌       | 896/3490 [20:41<2:26:11,  3.38s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  26%|██▌       | 903/3490 [20:44<33:43,  1.28it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim`
  super().__init__(**kwargs)
```

super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 14ms/step
Processing cities: 26%|██ | 904/3490 [20:50<1:41:06, 2.35s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 26%|██ | 917/3490 [20:58<24:37, 1.74it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 26%|██ | 918/3490 [21:06<1:56:51, 2.73s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 26%|██ | 919/3490 [21:07<1:29:10, 2.08s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 26%|██ | 920/3490 [21:13<2:24:18, 3.37s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 27%|██ | 933/3490 [21:21<25:38, 1.66it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ **0s** 8ms/step
Processing cities: 27%|██ | 934/3490 [21:32<2:28:45, 3.49s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 27%|██ | 944/3490 [21:37<27:00, 1.57it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 27%|██ | 945/3490 [21:44<1:50:17, 2.60s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 27%|██ | 950/3490 [21:47<37:43, 1.12it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ **0s** 8ms/step
Processing cities: 27%|██ | 951/3490 [21:55<2:12:34, 3.13s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 27%|██ | 952/3490 [21:56<1:39:43, 2.36s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 27%|██ | 953/3490 [22:02<2:26:08, 3.46s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 28%|██ | 960/3490 [22:07<42:45, 1.01s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 9ms/step
Processing cities: 28%|██ | 961/3490 [22:13<1:52:11, 2.66s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ **0s** 9ms/step
Processing cities: 28%|██ | 962/3490 [22:21<3:02:30, 4.33s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 28%|██ | 963/3490 [22:28<3:27:03, 4.92s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 28%|██ | 971/3490 [22:33<43:12, 1.03s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 28%|██ | 972/3490 [22:40<1:49:50, 2.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 28%|██ | 973/3490 [22:40<1:23:41, 2.00s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 11ms/step
Processing cities: 28%|██ | 974/3490 [22:47<2:20:49, 3.36s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 28%|██ | 978/3490 [22:49<50:58, 1.22s/it] /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 28%|██ | 979/3490 [22:55<1:53:27, 2.71s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ **0s** 8ms/step
Processing cities: 28%|██ | 980/3490 [23:03<2:55:14, 4.19s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 28%|██ | 981/3490 [23:12<3:53:54, 5.59s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 28%|██ | 982/3490 [23:18<3:59:27, 5.73s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 29%|██ | 996/3490 [23:26<25:45, 1.61it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 29%|██ | 997/3490 [23:33<1:35:50, 2.31s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
super().__init__(**kwargs)

```
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  29%|███       | 998/3490 [23:40<2:34:32,  3.72s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  29%|███       | 999/3490 [23:40<1:55:00,  2.77s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  29%|███       | 1000/3490 [23:46<2:30:12,  3.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  29%|███       | 1001/3490 [23:47<1:58:19,  2.85s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  29%|███       | 1002/3490 [23:54<2:49:13,  4.08s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  30%|███       | 1055/3490 [24:27<27:59,  1.45it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
11/11 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
Processing cities:  30%|███       | 1056/3490 [24:31<1:17:31,  1.91s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  30%|███       | 1058/3490 [24:32<49:04,  1.21s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  30%|███       | 1059/3490 [24:41<2:17:54,  3.40s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 2s 110ms/step
Processing cities:  30%|███       | 1060/3490 [24:49<3:20:52,  4.96s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  31%|███       | 1075/3490 [24:58<23:00,  1.75it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  31%|███       | 1076/3490 [25:05<1:40:23,  2.50s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step
Processing cities:  31%|███       | 1077/3490 [25:12<2:42:42,  4.05s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  31%|███       | 1091/3490 [25:21<23:10,  1.73it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  31%|███       | 1092/3490 [25:28<1:39:14,  2.48s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  31%|███       | 1093/3490 [25:34<2:18:58,  3.48s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  32%|███       | 1108/3490 [25:43<23:19,  1.70it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  32%|███       | 1109/3490 [25:50<1:34:46,  2.39s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  32%|███       | 1113/3490 [25:53<41:58,  1.06s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  32%|███       | 1114/3490 [25:59<1:43:51,  2.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  32%|███       | 1120/3490 [26:03<40:39,  1.03s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  32%|███       | 1121/3490 [26:10<1:47:27,  2.72s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  32%|███       | 1123/3490 [26:11<1:03:42,  1.62s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
16/16 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  32%|███       | 1124/3490 [26:19<2:19:01,  3.53s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  32%|███       | 1125/3490 [26:19<1:43:46,  2.63s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step
Processing cities:  32%|███       | 1126/3490 [26:27<2:37:58,  4.01s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  32%|███       | 1127/3490 [26:34<3:21:07,  5.11s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  32%|███       | 1129/3490 [26:35<1:49:33,  2.78s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  32%|███       | 1130/3490 [26:42<2:39:09,  4.05s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  33%|███       | 1140/3490 [26:48<25:31,  1.53it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
```

```
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
Processing cities:  33%|███▎      | 1141/3490 [26:55<1:45:19,  2.69s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  33%|███▎      | 1144/3490 [26:57<50:20,  1.29s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  33%|███▎      | 1145/3490 [27:03<1:47:35,  2.75s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  33%|███▎      | 1146/3490 [27:04<1:27:58,  2.25s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  33%|███▎      | 1147/3490 [27:11<2:19:15,  3.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  33%|███▎      | 1148/3490 [27:19<3:12:47,  4.94s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  33%|███▎      | 1154/3490 [27:22<41:45,  1.07s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  33%|███▎      | 1155/3490 [27:31<2:11:09,  3.37s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  33%|███▎      | 1162/3490 [27:35<30:31,  1.27it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  33%|███▎      | 1163/3490 [27:43<1:53:33,  2.93s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  33%|███▎      | 1165/3490 [27:44<1:07:31,  1.74s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  33%|███▎      | 1166/3490 [27:50<1:58:57,  3.07s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  33%|███▎      | 1167/3490 [27:58<2:46:22,  4.30s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  33%|███▎      | 1168/3490 [27:58<2:02:56,  3.18s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  33%|███▎      | 1169/3490 [28:05<2:40:37,  4.15s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  34%|███▎      | 1172/3490 [28:06<1:11:38,  1.85s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  34%|███▎      | 1173/3490 [28:13<2:02:54,  3.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  34%|███▎      | 1179/3490 [28:16<33:07,  1.16it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  34%|███▎      | 1180/3490 [28:23<1:46:47,  2.77s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  34%|███▎      | 1185/3490 [28:26<35:43,  1.08it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  34%|███▎      | 1186/3490 [28:34<2:02:15,  3.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  34%|███▎      | 1190/3490 [28:37<45:41,  1.19s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  34%|███▎      | 1191/3490 [28:43<1:40:55,  2.63s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  34%|███▎      | 1192/3490 [28:50<2:31:59,  3.97s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  34%|███▎      | 1196/3490 [28:52<52:17,  1.37s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  34%|███▎      | 1197/3490 [29:00<2:09:49,  3.40s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  34%|███▎      | 1198/3490 [29:01<1:37:18,  2.55s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  34%|███▎      | 1199/3490 [29:08<2:29:07,  3.91s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  34%|███▎      | 1200/3490 [29:08<1:50:57,  2.91s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  34%|███▎      | 1201/3490 [29:15<2:37:57,  4.14s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  34%|███▎      | 1202/3490 [29:25<3:44:01,  5.87s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  35%|███▍      | 1210/3490 [29:30<32:41,  1.16it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
```

```
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  35%|███       | 1211/3490 [29:37<1:48:00,  2.84s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  35%|███       | 1217/3490 [29:40<30:51,  1.23it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 16ms/step
Processing cities:  35%|███       | 1218/3490 [29:48<1:49:35,  2.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  35%|███       | 1219/3490 [29:54<2:25:52,  3.85s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  35%|███       | 1220/3490 [30:02<3:13:08,  5.11s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  35%|███       | 1221/3490 [30:09<3:31:13,  5.59s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  35%|███       | 1224/3490 [30:11<1:25:56,  2.28s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  35%|███       | 1225/3490 [30:17<2:16:21,  3.61s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 16ms/step
Processing cities:  35%|███       | 1226/3490 [30:24<2:48:57,  4.48s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  35%|███       | 1227/3490 [30:31<3:17:28,  5.24s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  35%|███       | 1230/3490 [30:33<1:21:08,  2.15s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  35%|███       | 1231/3490 [30:41<2:37:22,  4.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  35%|███       | 1232/3490 [30:42<1:56:23,  3.09s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step
Processing cities:  35%|███       | 1233/3490 [30:49<2:36:20,  4.16s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  35%|███       | 1234/3490 [30:50<2:01:47,  3.24s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  35%|███       | 1235/3490 [30:57<2:44:36,  4.38s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  35%|███       | 1236/3490 [31:05<3:27:34,  5.53s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  35%|███       | 1237/3490 [31:06<2:31:27,  4.03s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  35%|███       | 1238/3490 [31:11<2:49:29,  4.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  36%|███       | 1239/3490 [31:12<2:04:49,  3.33s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  36%|███       | 1240/3490 [31:19<2:46:06,  4.43s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  37%|███▏      | 1278/3490 [31:42<22:21,  1.65it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  37%|███▏      | 1279/3490 [31:49<1:27:38,  2.38s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  37%|███▏      | 1288/3490 [31:55<25:08,  1.46it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  37%|███▏      | 1289/3490 [32:00<1:20:13,  2.19s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  37%|███▏      | 1296/3490 [32:05<32:23,  1.13it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  37%|███▏      | 1297/3490 [32:12<1:31:56,  2.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
```

```
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  37%|███▋      | 1298/3490 [32:12<1:10:26,  1.93s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  37%|███▋      | 1299/3490 [32:21<2:22:36,  3.91s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  37%|███▋      | 1301/3490 [32:22<1:20:03,  2.19s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
16/16 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  37%|███▋      | 1302/3490 [32:31<2:35:10,  4.26s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  37%|███▋      | 1304/3490 [32:32<1:26:09,  2.36s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  37%|███▋      | 1305/3490 [32:39<2:17:15,  3.77s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  37%|███▋      | 1306/3490 [32:40<1:42:05,  2.80s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  37%|███▋      | 1307/3490 [32:46<2:21:56,  3.90s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  37%|███▋      | 1308/3490 [32:52<2:47:57,  4.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  38%|███▊      | 1317/3490 [32:58<26:49,  1.35it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  38%|███▊      | 1318/3490 [33:09<2:14:17,  3.71s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  38%|███▊      | 1333/3490 [33:17<20:18,  1.77it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  38%|███▊      | 1334/3490 [33:24<1:31:57,  2.56s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  38%|███▊      | 1336/3490 [33:26<55:01,  1.53s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  38%|███▊      | 1337/3490 [33:34<2:09:02,  3.60s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  38%|███▊      | 1338/3490 [33:35<1:36:28,  2.69s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  38%|███▊      | 1339/3490 [33:43<2:43:54,  4.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  38%|███▊      | 1341/3490 [33:46<1:39:10,  2.77s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  38%|███▊      | 1342/3490 [33:55<2:48:00,  4.69s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  39%|███▉      | 1369/3490 [34:12<23:16,  1.52it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
16/16 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  39%|███▉      | 1370/3490 [34:19<1:30:56,  2.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  39%|███▉      | 1374/3490 [34:22<42:59,  1.22s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  39%|███▉      | 1375/3490 [34:31<2:03:31,  3.50s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  40%|███▉      | 1383/3490 [34:36<31:54,  1.10it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|███▉      | 1384/3490 [34:42<1:26:12,  2.46s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  40%|███▉      | 1385/3490 [34:43<1:06:07,  1.89s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  40%|███▉      | 1386/3490 [34:50<1:57:58,  3.36s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|███▉      | 1387/3490 [34:56<2:27:17,  4.20s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  40%|███▉      | 1389/3490 [34:57<1:22:04,  2.34s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|███▉      | 1390/3490 [35:05<2:25:07,  4.15s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
```

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13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|████      | 1391/3490 [35:14<3:08:27,  5.39s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|████      | 1392/3490 [35:20<3:19:54,  5.72s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  40%|████      | 1393/3490 [35:28<3:41:11,  6.33s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  40%|████      | 1398/3490 [35:31<53:04,  1.52s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|████      | 1399/3490 [35:39<2:05:17,  3.59s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  40%|████      | 1402/3490 [35:41<55:22,  1.59s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|████      | 1403/3490 [35:47<1:40:37,  2.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  40%|████      | 1404/3490 [35:47<1:16:06,  2.19s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|████      | 1405/3490 [35:54<2:05:11,  3.60s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  40%|████      | 1406/3490 [35:55<1:33:24,  2.69s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  40%|████      | 1407/3490 [36:01<2:08:20,  3.70s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|████      | 1408/3490 [36:08<2:44:57,  4.75s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  40%|████      | 1412/3490 [36:10<53:51,  1.56s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  40%|████      | 1413/3490 [36:17<1:50:11,  3.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  41%|████      | 1414/3490 [36:18<1:22:53,  2.40s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  41%|████      | 1415/3490 [36:24<2:02:33,  3.54s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  41%|████      | 1418/3490 [36:26<59:35,  1.73s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  41%|████      | 1419/3490 [36:33<1:47:56,  3.13s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  41%|████      | 1434/3490 [36:42<21:41,  1.58it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  41%|████      | 1435/3490 [36:48<1:20:51,  2.36s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  41%|████      | 1446/3490 [36:55<21:07,  1.61it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  41%|████      | 1447/3490 [37:02<1:18:42,  2.31s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  41%|████      | 1448/3490 [37:08<2:02:45,  3.61s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  42%|████      | 1452/3490 [37:11<43:30,  1.28s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  42%|████      | 1453/3490 [37:19<1:53:15,  3.34s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  42%|████      | 1456/3490 [37:20<51:09,  1.51s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  42%|████      | 1457/3490 [37:29<2:03:34,  3.65s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  42%|████      | 1478/3490 [37:42<26:21,  1.27it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  42%|████      | 1479/3490 [37:48<1:20:56,  2.41s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  43%|████      | 1485/3490 [37:51<25:32,  1.31it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  43%|████      | 1486/3490 [37:59<1:33:46,  2.81s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  43%|████      | 1499/3490 [38:07<27:49,  1.19it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
```

Processing cities: 43%|████ | 1500/3490 [38:13<1:19:24, 2.39s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 43%|████ | 1513/3490 [38:22<21:29, 1.53it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
18/18 ━━━━━━━━━━━━━━━━━━━━ **0s** 8ms/step
Processing cities: 43%|████ | 1514/3490 [38:30<1:35:33, 2.90s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 44%|████ | 1522/3490 [38:35<24:45, 1.32it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ **0s** 14ms/step
Processing cities: 44%|████ | 1523/3490 [38:44<1:37:45, 2.98s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
11/11 ━━━━━━━━━━━━━━━━━━━━ **0s** 3ms/step
Processing cities: 44%|████ | 1524/3490 [38:50<2:16:43, 4.17s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ **0s** 7ms/step
Processing cities: 44%|████ | 1525/3490 [39:00<3:10:25, 5.81s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 44%|████ | 1528/3490 [39:02<1:18:10, 2.39s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ **0s** 15ms/step
Processing cities: 44%|████ | 1529/3490 [39:10<2:14:31, 4.12s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 44%|████ | 1546/3490 [39:20<17:58, 1.80it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ **0s** 9ms/step
Processing cities: 44%|████ | 1547/3490 [39:27<1:22:28, 2.55s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 45%|████ | 1557/3490 [39:32<19:20, 1.67it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ **0s** 8ms/step
Processing cities: 45%|████ | 1558/3490 [39:39<1:21:32, 2.53s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 45%|████ | 1577/3490 [39:51<18:22, 1.74it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 11ms/step
Processing cities: 45%|████ | 1578/3490 [39:57<1:12:41, 2.28s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 45%|████ | 1579/3490 [40:04<1:58:58, 3.74s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 45%|████ | 1587/3490 [40:08<23:18, 1.36it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 46%|████ | 1588/3490 [40:15<1:22:26, 2.60s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 46%|████ | 1602/3490 [40:24<25:17, 1.24it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 46%|████ | 1603/3490 [40:31<1:19:18, 2.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 47%|████ | 1624/3490 [40:43<17:34, 1.77it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ **0s** 9ms/step
Processing cities: 47%|████ | 1625/3490 [40:50<1:18:16, 2.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 47%|████ | 1647/3490 [41:04<19:35, 1.57it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 47%|████ | 1648/3490 [41:10<1:12:00, 2.35s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 47%|████ | 1649/3490 [41:17<1:54:17, 3.72s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 47%|████ | 1651/3490 [41:18<1:04:35, 2.11s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 47%|████ | 1652/3490 [41:24<1:43:31, 3.38s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 47%|████ | 1657/3490 [41:28<34:22, 1.13s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ **0s** 9ms/step
Processing cities: 48%|████ | 1658/3490 [41:34<1:21:31, 2.67s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 48%|████ | 1659/3490 [41:35<1:02:14, 2.04s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ **0s** 9ms/step
Processing cities: 48%|████ | 1660/3490 [41:42<1:51:45, 3.66s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 48%|████ | 1662/3490 [41:44<1:03:13, 2.08s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ **0s** 13ms/step
Processing cities: 48%|████ | 1663/3490 [41:52<1:59:34, 3.93s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})

```
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 2s 182ms/step
Processing cities:  48%|████▊     | 1664/3490 [42:00<2:37:37,  5.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  48%|████▊     | 1665/3490 [42:07<2:55:50,  5.78s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  48%|████▊     | 1666/3490 [42:13<3:00:42,  5.94s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  48%|████▊     | 1667/3490 [42:14<2:11:35,  4.33s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  48%|████▊     | 1668/3490 [42:22<2:41:53,  5.33s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  48%|████▊     | 1669/3490 [42:22<1:58:14,  3.90s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  48%|████▊     | 1670/3490 [42:31<2:39:28,  5.26s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  48%|████▊     | 1676/3490 [42:34<33:22,  1.10s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  48%|████▊     | 1677/3490 [42:41<1:28:38,  2.93s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  48%|████▊     | 1678/3490 [42:47<1:58:43,  3.93s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  48%|████▊     | 1685/3490 [42:51<24:52,  1.21it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  48%|████▊     | 1686/3490 [42:58<1:17:41,  2.58s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  49%|████▊     | 1695/3490 [43:03<18:39,  1.60it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  49%|████▊     | 1696/3490 [43:11<1:26:50,  2.90s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  49%|████▊     | 1703/3490 [43:15<22:10,  1.34it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  49%|████▊     | 1704/3490 [43:22<1:20:59,  2.72s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  49%|████▊     | 1720/3490 [43:32<19:42,  1.50it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  49%|████▊     | 1721/3490 [43:39<1:18:30,  2.66s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  49%|████▊     | 1726/3490 [43:43<33:51,  1.15s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  49%|████▊     | 1727/3490 [43:49<1:18:11,  2.66s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  50%|████▊     | 1728/3490 [43:50<59:45,  2.03s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  50%|████▊     | 1729/3490 [43:57<1:43:58,  3.54s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  50%|████▊     | 1739/3490 [44:03<18:22,  1.59it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  50%|████▊     | 1740/3490 [44:10<1:15:19,  2.58s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  50%|████▊     | 1742/3490 [44:11<45:02,  1.55s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  50%|████▊     | 1743/3490 [44:17<1:24:26,  2.90s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  50%|████▊     | 1744/3490 [44:17<1:03:51,  2.19s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  50%|████▊     | 1745/3490 [44:24<1:45:45,  3.64s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  50%|████▊     | 1752/3490 [44:28<23:18,  1.24it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  50%|████▊     | 1753/3490 [44:36<1:26:56,  3.00s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  50%|████▊     | 1755/3490 [44:38<50:56,  1.76s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
```

```
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 16ms/step
Processing cities:  50%|████▉     | 1756/3490 [44:45<1:44:01,  3.60s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  51%|████▉     | 1767/3490 [44:52<17:33,  1.64it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  51%|████▉     | 1768/3490 [44:59<1:13:37,  2.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  51%|████▉     | 1769/3490 [44:59<56:11,  1.96s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  51%|████▉     | 1770/3490 [45:06<1:35:49,  3.34s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  51%|████▉     | 1771/3490 [45:14<2:18:05,  4.82s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  51%|████▉     | 1774/3490 [45:16<57:25,  2.01s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  51%|████▉     | 1775/3490 [45:24<1:49:08,  3.82s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  51%|████▉     | 1776/3490 [45:29<2:05:55,  4.41s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  51%|████▉     | 1777/3490 [45:30<1:32:45,  3.25s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  51%|████▉     | 1778/3490 [45:38<2:10:48,  4.58s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  51%|████▉     | 1784/3490 [45:41<29:12,  1.03s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
Processing cities:  51%|████▉     | 1785/3490 [45:51<1:45:53,  3.73s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  51%|████▉     | 1786/3490 [45:57<2:08:39,  4.53s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  52%|█████     | 1798/3490 [46:05<17:13,  1.64it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  52%|█████     | 1799/3490 [46:13<1:19:02,  2.80s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  52%|█████     | 1800/3490 [46:19<1:46:40,  3.79s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  52%|█████     | 1801/3490 [46:27<2:20:13,  4.98s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  52%|█████     | 1810/3490 [46:32<20:26,  1.37it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  52%|█████     | 1811/3490 [46:41<1:30:42,  3.24s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  52%|█████     | 1812/3490 [46:50<2:18:47,  4.96s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  52%|█████     | 1813/3490 [46:57<2:33:57,  5.51s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  52%|█████     | 1817/3490 [46:59<48:31,  1.74s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  52%|█████     | 1818/3490 [47:06<1:34:51,  3.40s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  52%|█████     | 1825/3490 [47:10<21:52,  1.27it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  52%|█████     | 1826/3490 [47:17<1:15:00,  2.70s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  53%|█████     | 1849/3490 [47:31<15:57,  1.71it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
11/11 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step
Processing cities:  53%|█████     | 1850/3490 [47:36<51:14,  1.87s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
```

```
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  54%|█████▍    | 1882/3490 [47:56<15:42,  1.71it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  54%|█████▍    | 1883/3490 [48:03<1:07:23,  2.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  54%|█████▍    | 1884/3490 [48:10<1:48:06,  4.04s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  54%|█████▍    | 1885/3490 [48:11<1:19:53,  2.99s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  54%|█████▍    | 1886/3490 [48:19<1:59:30,  4.47s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  54%|█████▍    | 1888/3490 [48:20<1:06:04,  2.47s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  54%|█████▍    | 1889/3490 [48:26<1:34:08,  3.53s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  54%|█████▍    | 1897/3490 [48:32<23:00,  1.15it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  54%|█████▍    | 1898/3490 [48:40<1:24:39,  3.19s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  55%|█████▍    | 1913/3490 [48:49<14:43,  1.79it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  55%|█████▍    | 1914/3490 [48:57<1:10:54,  2.70s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  56%|█████▌    | 1940/3490 [49:12<14:28,  1.79it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  56%|█████▌    | 1941/3490 [49:19<1:03:39,  2.47s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  56%|█████▌    | 1945/3490 [49:22<27:22,  1.06s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  56%|█████▌    | 1946/3490 [49:28<1:07:27,  2.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  56%|█████▌    | 1947/3490 [49:29<51:31,  2.00s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  56%|█████▌    | 1948/3490 [49:35<1:23:51,  3.26s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  56%|█████▌    | 1951/3490 [49:37<38:08,  1.49s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  56%|█████▌    | 1952/3490 [49:43<1:14:09,  2.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  56%|█████▌    | 1957/3490 [49:47<26:28,  1.04s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  56%|█████▌    | 1958/3490 [49:55<1:20:53,  3.17s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  56%|█████▌    | 1959/3490 [50:02<1:53:50,  4.46s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  56%|█████▌    | 1960/3490 [50:03<1:23:53,  3.29s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step
Processing cities:  56%|█████▌    | 1961/3490 [50:11<2:00:46,  4.74s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  57%|█████▋    | 1973/3490 [50:18<15:05,  1.67it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  57%|█████▋    | 1974/3490 [50:25<1:04:03,  2.54s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  57%|█████▋    | 1984/3490 [50:30<15:11,  1.65it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  57%|█████▋    | 1985/3490 [50:40<1:22:34,  3.29s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  57%|█████▋    | 1987/3490 [50:41<47:21,  1.89s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  57%|█████▋    | 1988/3490 [50:49<1:35:00,  3.80s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  57%|█████▋    | 1991/3490 [50:51<41:27,  1.66s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
```

```
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  57%|█████▋    | 1992/3490 [50:57<1:16:54,  3.08s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  58%|█████▊    | 2016/3490 [51:13<20:07,  1.22it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  58%|█████▊    | 2017/3490 [51:18<58:03,  2.36s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  59%|█████▊    | 2053/3490 [51:41<14:20,  1.67it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  59%|█████▊    | 2054/3490 [51:52<1:28:24,  3.69s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  59%|█████▊    | 2064/3490 [51:57<15:18,  1.55it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  59%|█████▊    | 2065/3490 [52:05<1:06:00,  2.78s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  59%|█████▊    | 2072/3490 [52:09<17:20,  1.36it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  59%|█████▊    | 2073/3490 [52:17<1:09:40,  2.95s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  59%|█████▊    | 2075/3490 [52:18<40:45,  1.73s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  59%|█████▊    | 2076/3490 [52:24<1:14:24,  3.16s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  60%|█████▉    | 2077/3490 [52:31<1:40:45,  4.28s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  60%|█████▉    | 2083/3490 [52:35<23:25,  1.00it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  60%|█████▉    | 2084/3490 [52:42<1:09:02,  2.95s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  60%|█████▉    | 2085/3490 [52:48<1:30:17,  3.86s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  60%|█████▉    | 2087/3490 [52:49<50:49,  2.17s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  60%|█████▉    | 2088/3490 [52:57<1:27:25,  3.74s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  60%|█████▉    | 2099/3490 [53:03<14:06,  1.64it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  60%|█████▉    | 2100/3490 [53:10<59:36,  2.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  61%|██████    | 2112/3490 [53:17<18:36,  1.23it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  61%|██████    | 2113/3490 [53:24<1:01:01,  2.66s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  61%|██████    | 2116/3490 [53:26<29:06,  1.27s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
16/16 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  61%|██████    | 2117/3490 [53:34<1:14:55,  3.27s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 17ms/step
Processing cities:  61%|██████    | 2118/3490 [53:40<1:35:53,  4.19s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  61%|██████    | 2133/3490 [53:49<12:47,  1.77it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  61%|██████    | 2134/3490 [53:57<59:21,  2.63s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  61%|██████    | 2139/3490 [54:00<20:08,  1.12it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  61%|██████    | 2140/3490 [54:08<1:12:30,  3.22s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  61%|██████    | 2142/3490 [54:09<41:40,  1.86s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  61%|██████    | 2143/3490 [54:16<1:10:54,  3.16s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  61%|██████    | 2146/3490 [54:17<32:19,  1.44s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  62%|██████    | 2147/3490 [54:25<1:12:56,  3.26s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  62%|██████    | 2159/3490 [54:33<18:37,  1.19it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
```

```
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  62%|██████    | 2160/3490 [54:39<53:44,  2.42s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  62%|██████    | 2165/3490 [54:41<19:14,  1.15it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  62%|██████    | 2166/3490 [54:49<1:02:28,  2.83s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  62%|██████    | 2168/3490 [54:50<36:49,  1.67s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
Processing cities:  62%|██████    | 2169/3490 [54:59<1:24:34,  3.84s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  62%|██████    | 2170/3490 [54:59<1:02:54,  2.86s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  62%|██████    | 2171/3490 [55:05<1:22:43,  3.76s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  63%|██████    | 2182/3490 [55:12<14:40,  1.48it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  63%|██████    | 2183/3490 [55:20<56:40,  2.60s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  63%|██████    | 2185/3490 [55:21<36:52,  1.70s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  63%|██████    | 2186/3490 [55:29<1:14:43,  3.44s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  63%|██████    | 2195/3490 [55:34<19:00,  1.14it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  63%|██████    | 2196/3490 [55:41<57:41,  2.68s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  63%|██████    | 2203/3490 [55:45<15:28,  1.39it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  63%|██████    | 2204/3490 [55:52<52:18,  2.44s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  64%|██████    | 2228/3490 [56:06<11:38,  1.81it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  64%|██████    | 2229/3490 [56:14<59:57,  2.85s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  64%|██████    | 2232/3490 [56:16<28:08,  1.34s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  64%|██████    | 2233/3490 [56:22<59:32,  2.84s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  64%|██████    | 2238/3490 [56:26<24:01,  1.15s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  64%|██████    | 2239/3490 [56:32<52:59,  2.54s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  64%|██████    | 2241/3490 [56:33<31:51,  1.53s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  64%|██████    | 2242/3490 [56:41<1:09:42,  3.35s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  64%|██████    | 2249/3490 [56:45<16:08,  1.28it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  64%|██████    | 2250/3490 [56:53<1:02:04,  3.00s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  65%|██████    | 2256/3490 [56:56<17:25,  1.18it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  65%|██████    | 2257/3490 [57:04<1:02:43,  3.05s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  65%|██████    | 2259/3490 [57:05<36:24,  1.77s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  65%|██████    | 2260/3490 [57:12<1:03:46,  3.11s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  65%|██████    | 2269/3490 [57:18<14:47,  1.38it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  65%|██████    | 2270/3490 [57:24<47:01,  2.31s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  65%|██████    | 2280/3490 [57:30<13:21,  1.51it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
```

```
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  65%|██████    | 2281/3490 [57:37<48:12,  2.39s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  66%|██████    | 2297/3490 [57:47<11:05,  1.79it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  66%|██████    | 2298/3490 [57:55<59:01,  2.97s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  66%|██████    | 2299/3490 [57:56<44:34,  2.25s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  66%|██████    | 2300/3490 [58:02<1:05:34,  3.31s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  66%|██████    | 2318/3490 [58:13<10:52,  1.80it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  66%|██████    | 2319/3490 [58:22<1:02:05,  3.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  67%|██████    | 2327/3490 [58:26<13:40,  1.42it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  67%|██████    | 2328/3490 [58:33<50:11,  2.59s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  68%|██████    | 2357/3490 [58:50<10:17,  1.83it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  68%|██████    | 2358/3490 [58:59<54:33,  2.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  68%|██████    | 2389/3490 [59:17<10:16,  1.79it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  68%|██████    | 2390/3490 [59:24<46:22,  2.53s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  69%|██████    | 2393/3490 [59:26<22:20,  1.22s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  69%|██████    | 2394/3490 [59:33<57:58,  3.17s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  69%|██████    | 2404/3490 [59:39<11:16,  1.60it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  69%|██████    | 2405/3490 [59:46<48:23,  2.68s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  69%|██████    | 2418/3490 [59:54<10:13,  1.75it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_di
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  69%|██████    | 2419/3490 [1:00:00<41:50,  2.34s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  70%|██████    | 2432/3490 [1:00:08<11:58,  1.47it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step
Processing cities:  70%|██████    | 2433/3490 [1:00:14<41:40,  2.37s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  70%|██████    | 2444/3490 [1:00:21<13:05,  1.33it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  70%|██████    | 2445/3490 [1:00:28<45:50,  2.63s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  70%|██████    | 2460/3490 [1:00:37<10:46,  1.59it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  71%|██████    | 2461/3490 [1:00:49<1:09:25,  4.05s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use '
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  71%|██████    | 2466/3490 [1:00:52<19:19,  1.13s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  71%|██████    | 2467/3490 [1:00:58<44:47,  2.63s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  71%|██████    | 2469/3490 [1:01:00<30:16,  1.78s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  71%|██████    | 2470/3490 [1:01:06<53:21,  3.14s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME'
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  71%|██████    | 2472/3490 [1:01:07<30:53,  1.82s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  71%|██████    | 2473/3490 [1:01:15<1:00:51,  3.59s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use '
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
```

```
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  71%|███████   | 2474/3490 [1:01:21<1:12:58,  4.31s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use '
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  71%|███████   | 2478/3490 [1:01:24<29:02,  1.72s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  71%|███████   | 2479/3490 [1:01:31<53:16,  3.16s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  71%|███████   | 2486/3490 [1:01:35<13:25,  1.25it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  71%|███████   | 2487/3490 [1:01:42<44:23,  2.66s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  71%|███████   | 2489/3490 [1:01:43<26:22,  1.58s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  71%|███████   | 2490/3490 [1:01:52<1:02:59,  3.78s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  71%|███████   | 2495/3490 [1:01:55<18:10,  1.10s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  72%|███████   | 2496/3490 [1:02:03<56:13,  3.39s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  72%|███████   | 2497/3490 [1:02:04<42:04,  2.54s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  72%|███████   | 2498/3490 [1:02:10<59:54,  3.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  72%|███████   | 2499/3490 [1:02:17<1:17:30,  4.69s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  72%|███████   | 2500/3490 [1:02:18<56:55,  3.45s/it]  /usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`inpu
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  72%|███████   | 2501/3490 [1:02:24<1:11:02,  4.31s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  72%|███████   | 2502/3490 [1:02:32<1:28:18,  5.36s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  72%|███████   | 2503/3490 [1:02:40<1:39:36,  6.06s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  72%|███████   | 2511/3490 [1:02:44<14:12,  1.15it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  72%|███████   | 2512/3490 [1:02:54<57:26,  3.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  72%|███████   | 2517/3490 [1:02:56<17:00,  1.05s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 18ms/step
Processing cities:  72%|███████   | 2518/3490 [1:03:05<53:23,  3.30s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  72%|███████   | 2522/3490 [1:03:07<19:32,  1.21s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  72%|███████   | 2523/3490 [1:03:16<56:39,  3.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  73%|███████   | 2537/3490 [1:03:24<09:09,  1.74it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
16/16 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  73%|███████   | 2538/3490 [1:03:32<43:10,  2.72s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  73%|███████   | 2541/3490 [1:03:34<20:29,  1.30s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  73%|███████   | 2542/3490 [1:03:40<44:16,  2.80s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  73%|███████   | 2543/3490 [1:03:41<36:02,  2.28s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  73%|███████   | 2544/3490 [1:03:48<55:47,  3.54s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  73%|███████   | 2545/3490 [1:03:48<41:36,  2.64s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  73%|███████   | 2546/3490 [1:03:57<1:08:26,  4.35s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  74%|███████   | 2576/3490 [1:04:14<08:35,  1.77it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
```

/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 11ms/step
Processing cities: 74%|███████▍ | 2577/3490 [1:04:21<37:34, 2.47s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 74%|███████▍ | 2581/3490 [1:04:23<15:17, 1.01s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ **0s** 9ms/step
Processing cities: 74%|███████▍ | 2582/3490 [1:04:30<39:00, 2.58s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 74%|███████▍ | 2588/3490 [1:04:34<13:10, 1.14it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ **0s** 11ms/step
Processing cities: 74%|███████▍ | 2589/3490 [1:04:40<37:08, 2.47s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 74%|███████▍ | 2593/3490 [1:04:43<15:48, 1.06s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 74%|███████▍ | 2594/3490 [1:04:50<42:29, 2.85s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 74%|███████▍ | 2596/3490 [1:04:51<24:57, 1.68s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 74%|███████▍ | 2597/3490 [1:04:59<53:25, 3.59s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 75%|███████▍ | 2604/3490 [1:05:03<11:55, 1.24it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ **0s** 11ms/step
Processing cities: 75%|███████▍ | 2605/3490 [1:05:11<45:56, 3.11s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 75%|███████▍ | 2612/3490 [1:05:15<11:23, 1.28it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ **0s** 15ms/step
Processing cities: 75%|███████▍ | 2613/3490 [1:05:23<44:02, 3.01s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 75%|███████▍ | 2614/3490 [1:05:24<33:19, 2.28s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 75%|███████▍ | 2615/3490 [1:05:30<49:24, 3.39s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 76%|███████▌ | 2639/3490 [1:05:44<08:01, 1.77it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ **0s** 7ms/step
Processing cities: 76%|███████▌ | 2640/3490 [1:05:52<39:45, 2.81s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 76%|███████▌ | 2641/3490 [1:05:53<30:09, 2.13s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 76%|███████▌ | 2642/3490 [1:06:01<56:37, 4.01s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 76%|███████▌ | 2643/3490 [1:06:02<41:54, 2.97s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ **0s** 7ms/step
Processing cities: 76%|███████▌ | 2644/3490 [1:06:10<1:03:14, 4.49s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use '
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 76%|███████▌ | 2645/3490 [1:06:17<1:12:49, 5.17s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use '
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 76%|███████▌ | 2660/3490 [1:06:26<11:13, 1.23it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 11ms/step
Processing cities: 76%|███████▌ | 2661/3490 [1:06:32<34:05, 2.47s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 76%|███████▌ | 2662/3490 [1:06:33<26:07, 1.89s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
11/11 ━━━━━━━━━━━━━━━━━━━━ **0s** 12ms/step
Processing cities: 76%|███████▌ | 2663/3490 [1:06:40<46:29, 3.37s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 77%|███████▋ | 2670/3490 [1:06:44<10:44, 1.27it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 11ms/step
Processing cities: 77%|███████▋ | 2671/3490 [1:06:52<42:35, 3.12s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 77%|███████▋ | 2672/3490 [1:06:53<32:02, 2.35s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ **0s** 12ms/step
Processing cities: 77%|███████▋ | 2673/3490 [1:06:59<47:46, 3.51s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 77%|███████▋ | 2686/3490 [1:07:07<08:07, 1.65it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ **0s** 10ms/step
Processing cities: 77%|███████▋ | 2687/3490 [1:07:13<29:12, 2.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ **0s** 11ms/step
Processing cities: 77%|███████▋ | 2688/3490 [1:07:20<48:45, 3.65s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.

```
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 16ms/step
Processing cities:  77%|███████   | 2689/3490 [1:07:27<59:42,  4.47s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  77%|███████   | 2691/3490 [1:07:29<36:10,  2.72s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  77%|███████   | 2692/3490 [1:07:34<47:26,  3.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  77%|███████   | 2693/3490 [1:07:35<35:19,  2.66s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  77%|███████   | 2694/3490 [1:07:43<57:35,  4.34s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  77%|███████   | 2695/3490 [1:07:44<42:28,  3.21s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  77%|███████   | 2696/3490 [1:07:50<53:21,  4.03s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  77%|███████   | 2697/3490 [1:07:57<1:05:00,  4.92s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  77%|███████   | 2698/3490 [1:08:02<1:07:44,  5.13s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  77%|███████   | 2702/3490 [1:08:05<23:31,  1.79s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  77%|███████   | 2703/3490 [1:08:11<41:35,  3.17s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  77%|███████   | 2704/3490 [1:08:19<1:00:39,  4.63s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  78%|███████   | 2705/3490 [1:08:25<1:04:36,  4.94s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  78%|███████   | 2706/3490 [1:08:33<1:16:59,  5.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  78%|███████   | 2709/3490 [1:08:35<31:05,  2.39s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  78%|███████   | 2710/3490 [1:08:41<47:20,  3.64s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  78%|███████   | 2712/3490 [1:08:43<28:11,  2.17s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  78%|███████   | 2713/3490 [1:08:50<47:57,  3.70s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  78%|███████   | 2716/3490 [1:08:52<21:02,  1.63s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  78%|███████   | 2717/3490 [1:08:58<40:43,  3.16s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  78%|███████   | 2719/3490 [1:09:00<23:31,  1.83s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  78%|███████   | 2720/3490 [1:09:05<38:30,  3.00s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  78%|███████   | 2721/3490 [1:09:06<29:02,  2.27s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  78%|███████   | 2722/3490 [1:09:14<50:23,  3.94s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  78%|███████   | 2723/3490 [1:09:21<1:02:32,  4.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  78%|███████   | 2728/3490 [1:09:24<16:45,  1.32s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  78%|███████   | 2729/3490 [1:09:30<33:19,  2.63s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  78%|███████   | 2730/3490 [1:09:30<25:25,  2.01s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
```

```
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  78%|███████▊  | 2731/3490 [1:09:38<46:25,  3.67s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 16ms/step
Processing cities:  78%|███████▊  | 2732/3490 [1:09:44<57:13,  4.53s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  78%|███████▊  | 2733/3490 [1:09:51<1:05:58,  5.23s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  78%|███████▊  | 2736/3490 [1:09:53<27:05,  2.16s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  78%|███████▊  | 2737/3490 [1:10:03<55:48,  4.45s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  79%|███████▊  | 2742/3490 [1:10:06<15:03,  1.21s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  79%|███████▊  | 2743/3490 [1:10:16<49:23,  3.97s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  79%|███████▊  | 2746/3490 [1:10:18<21:21,  1.72s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  79%|███████▊  | 2747/3490 [1:10:26<45:46,  3.70s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  79%|███████▊  | 2749/3490 [1:10:27<25:50,  2.09s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  79%|███████▊  | 2750/3490 [1:10:34<45:25,  3.68s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  79%|███████▉  | 2751/3490 [1:10:42<58:32,  4.75s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  79%|███████▉  | 2766/3490 [1:10:51<08:07,  1.48it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  79%|███████▉  | 2767/3490 [1:10:57<27:49,  2.31s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  80%|███████▉  | 2784/3490 [1:11:08<06:40,  1.76it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  80%|███████▉  | 2785/3490 [1:11:16<33:57,  2.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  80%|███████▉  | 2787/3490 [1:11:17<19:54,  1.70s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  80%|███████▉  | 2788/3490 [1:11:24<37:22,  3.19s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  80%|███████▉  | 2795/3490 [1:11:29<10:09,  1.14it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
Processing cities:  80%|████████  | 2796/3490 [1:11:37<36:49,  3.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  80%|████████  | 2799/3490 [1:11:40<19:17,  1.68s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  80%|████████  | 2800/3490 [1:11:47<37:34,  3.27s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  80%|████████  | 2801/3490 [1:11:56<56:29,  4.92s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  80%|████████  | 2803/3490 [1:11:57<30:54,  2.70s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  80%|████████  | 2804/3490 [1:12:05<47:28,  4.15s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  81%|████████  | 2810/3490 [1:12:08<11:07,  1.02it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  81%|████████  | 2811/3490 [1:12:14<29:34,  2.61s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
```

```
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  81%|████████  | 2812/3490 [1:12:22<46:00,  4.07s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  81%|████████  | 2813/3490 [1:12:30<58:28,  5.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  81%|████████  | 2815/3490 [1:12:31<32:10,  2.86s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  81%|████████  | 2816/3490 [1:12:37<43:04,  3.84s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  81%|████████  | 2817/3490 [1:12:44<54:14,  4.84s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  81%|████████  | 2818/3490 [1:12:51<59:14,  5.29s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  81%|████████  | 2819/3490 [1:12:57<1:04:09,  5.74s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use '
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  81%|████████  | 2834/3490 [1:13:07<09:14,  1.18it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  81%|████████  | 2835/3490 [1:13:13<27:02,  2.48s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  81%|████████  | 2843/3490 [1:13:18<08:46,  1.23it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  81%|████████  | 2844/3490 [1:13:25<29:50,  2.77s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  82%|████████  | 2845/3490 [1:13:33<46:50,  4.36s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  82%|████████  | 2847/3490 [1:13:34<25:56,  2.42s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  82%|████████  | 2848/3490 [1:13:41<38:25,  3.59s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  82%|████████  | 2859/3490 [1:13:48<06:45,  1.56it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  82%|████████  | 2860/3490 [1:13:54<23:52,  2.27s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  84%|████████  | 2919/3490 [1:14:30<05:14,  1.82it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  84%|████████  | 2920/3490 [1:14:37<23:48,  2.51s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  84%|████████  | 2925/3490 [1:14:40<08:16,  1.14it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  84%|████████  | 2926/3490 [1:14:49<30:16,  3.22s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  84%|████████  | 2928/3490 [1:14:50<17:24,  1.86s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  84%|████████  | 2929/3490 [1:14:57<31:54,  3.41s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  84%|████████  | 2944/3490 [1:15:06<05:07,  1.77it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  84%|████████  | 2945/3490 [1:15:14<25:39,  2.82s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  84%|████████  | 2946/3490 [1:15:15<19:26,  2.14s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
16/16 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  84%|████████  | 2947/3490 [1:15:22<32:39,  3.61s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  85%|████████  | 2958/3490 [1:15:29<05:36,  1.58it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  85%|████████  | 2959/3490 [1:15:35<19:53,  2.25s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  85%|████████  | 2970/3490 [1:15:42<05:13,  1.66it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  85%|████████  | 2971/3490 [1:15:52<29:23,  3.40s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  85%|████████  | 2978/3490 [1:15:56<06:40,  1.28it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
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  super().__init__(**kwargs)
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  85%|████████▌ | 2979/3490 [1:16:04<26:11,  3.08s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  85%|████████▌ | 2983/3490 [1:16:06<09:45,  1.16s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  86%|████████▌ | 2984/3490 [1:16:13<22:08,  2.63s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  86%|████████▌ | 2985/3490 [1:16:19<32:27,  3.86s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  86%|████████▌ | 2991/3490 [1:16:23<07:49,  1.06it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  86%|████████▌ | 2992/3490 [1:16:30<23:27,  2.83s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  86%|████████▌ | 2999/3490 [1:16:34<06:00,  1.36it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  86%|████████▌ | 3000/3490 [1:16:42<24:01,  2.94s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  86%|████████▌ | 3001/3490 [1:16:48<33:10,  4.07s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  86%|████████▌ | 3015/3490 [1:16:57<04:48,  1.65it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 16ms/step
Processing cities:  86%|████████▌ | 3016/3490 [1:17:04<19:04,  2.41s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  86%|████████▌ | 3017/3490 [1:17:05<15:49,  2.01s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
11/11 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
Processing cities:  86%|████████▌ | 3018/3490 [1:17:10<22:43,  2.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  87%|████████▋ | 3021/3490 [1:17:12<10:34,  1.35s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  87%|████████▋ | 3022/3490 [1:17:21<28:53,  3.70s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  87%|████████▋ | 3027/3490 [1:17:24<08:22,  1.09s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  87%|████████▋ | 3028/3490 [1:17:32<25:20,  3.29s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  87%|████████▋ | 3031/3490 [1:17:34<11:23,  1.49s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  87%|████████▋ | 3032/3490 [1:17:40<21:50,  2.86s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  87%|████████▋ | 3033/3490 [1:17:40<16:30,  2.17s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  87%|████████▋ | 3034/3490 [1:17:50<33:53,  4.46s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  87%|████████▋ | 3035/3490 [1:17:57<39:52,  5.26s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  87%|████████▋ | 3041/3490 [1:18:01<08:16,  1.11s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  87%|████████▋ | 3042/3490 [1:18:09<24:22,  3.26s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  87%|████████▋ | 3045/3490 [1:18:10<10:57,  1.48s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
Processing cities:  87%|████████▋ | 3046/3490 [1:18:17<22:24,  3.03s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  87%|████████▋ | 3053/3490 [1:18:22<06:16,  1.16it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  88%|████████▊ | 3054/3490 [1:18:28<17:13,  2.37s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  88%|████████▊ | 3061/3490 [1:18:33<06:47,  1.05it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  88%|████████▊ | 3062/3490 [1:18:39<18:19,  2.57s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  88%|████████▊ | 3063/3490 [1:18:40<13:59,  1.97s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  88%|████████▊ | 3064/3490 [1:18:47<24:49,  3.50s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  88%|████████▊ | 3073/3490 [1:18:52<04:40,  1.49it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
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/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  88%|████████▊ | 3074/3490 [1:19:00<19:29,  2.81s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  88%|████████▊ | 3075/3490 [1:19:06<26:39,  3.85s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  88%|████████▊ | 3086/3490 [1:19:13<04:25,  1.52it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  88%|████████▊ | 3087/3490 [1:19:19<15:31,  2.31s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  89%|████████▊ | 3090/3490 [1:19:21<08:44,  1.31s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  89%|████████▊ | 3091/3490 [1:19:29<20:31,  3.09s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  89%|████████▊ | 3093/3490 [1:19:30<11:54,  1.80s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  89%|████████▊ | 3094/3490 [1:19:36<21:19,  3.23s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  89%|████████▊ | 3105/3490 [1:19:42<03:51,  1.66it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  89%|████████▊ | 3106/3490 [1:19:50<16:41,  2.61s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  89%|████████▊ | 3111/3490 [1:19:52<05:37,  1.12it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  89%|████████▉ | 3112/3490 [1:20:01<19:35,  3.11s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  89%|████████▉ | 3118/3490 [1:20:04<05:16,  1.17it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  89%|████████▉ | 3119/3490 [1:20:10<14:53,  2.41s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  89%|████████▉ | 3120/3490 [1:20:11<12:13,  1.98s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  89%|████████▉ | 3121/3490 [1:20:19<22:27,  3.65s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  90%|████████▉ | 3125/3490 [1:20:21<07:54,  1.30s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  90%|████████▉ | 3126/3490 [1:20:28<18:12,  3.00s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  90%|████████▉ | 3130/3490 [1:20:30<06:53,  1.15s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  90%|████████▉ | 3131/3490 [1:20:38<18:56,  3.16s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  90%|████████▉ | 3132/3490 [1:20:44<23:52,  4.00s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  90%|████████▉ | 3134/3490 [1:20:45<13:18,  2.24s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  90%|████████▉ | 3135/3490 [1:20:52<22:18,  3.77s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  90%|████████▉ | 3140/3490 [1:20:55<06:24,  1.10s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  90%|████████▉ | 3141/3490 [1:21:03<18:40,  3.21s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  90%|████████▉ | 3146/3490 [1:21:06<05:43,  1.00it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  90%|████████▉ | 3147/3490 [1:21:12<14:13,  2.49s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  90%|████████▉ | 3151/3490 [1:21:15<07:09,  1.27s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  90%|████████▉ | 3152/3490 [1:21:23<18:03,  3.21s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  91%|█████████ | 3161/3490 [1:21:29<04:09,  1.32it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  91%|█████████ | 3162/3490 [1:21:36<13:20,  2.44s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  91%|█████████ | 3164/3490 [1:21:37<08:05,  1.49s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
```

```
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
Processing cities:  91%|█████████ | 3165/3490 [1:21:44<17:39,  3.26s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  91%|█████████ | 3177/3490 [1:21:51<04:08,  1.26it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  91%|█████████ | 3178/3490 [1:21:58<13:01,  2.51s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  91%|█████████ | 3182/3490 [1:22:00<05:14,  1.02s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  91%|█████████ | 3183/3490 [1:22:08<14:58,  2.93s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  92%|█████████ | 3197/3490 [1:22:16<03:53,  1.25it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  92%|█████████ | 3198/3490 [1:22:23<12:15,  2.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  92%|█████████ | 3215/3490 [1:22:33<02:36,  1.76it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  92%|█████████ | 3216/3490 [1:22:40<11:02,  2.42s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  92%|█████████ | 3224/3490 [1:22:45<03:02,  1.46it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step
Processing cities:  92%|█████████ | 3225/3490 [1:22:57<17:11,  3.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  93%|█████████ | 3229/3490 [1:22:59<05:53,  1.35s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  93%|█████████ | 3230/3490 [1:23:07<15:14,  3.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  93%|█████████ | 3231/3490 [1:23:14<19:29,  4.52s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  93%|█████████ | 3245/3490 [1:23:23<02:30,  1.63it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  93%|█████████ | 3246/3490 [1:23:30<10:09,  2.50s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  94%|█████████ | 3266/3490 [1:23:42<02:12,  1.69it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:966: UserWarning: Non-stationary starting autoregressive parameters found. Using zeros as starting parameters.
  warn('Non-stationary starting autoregressive parameters'
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  94%|█████████ | 3267/3490 [1:23:50<09:58,  2.69s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  94%|█████████ | 3276/3490 [1:23:55<02:42,  1.31it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  94%|█████████ | 3277/3490 [1:24:02<09:18,  2.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  94%|█████████ | 3294/3490 [1:24:13<01:55,  1.70it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  94%|█████████ | 3295/3490 [1:24:19<07:31,  2.32s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  94%|█████████ | 3297/3490 [1:24:21<05:15,  1.63s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
Processing cities:  94%|█████████ | 3298/3490 [1:24:30<12:51,  4.02s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
Processing cities:  95%|█████████ | 3299/3490 [1:24:38<16:36,  5.22s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  95%|█████████ | 3304/3490 [1:24:41<04:08,  1.34s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  95%|█████████ | 3305/3490 [1:24:51<11:38,  3.78s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  95%|█████████ | 3315/3490 [1:24:56<02:06,  1.38it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  95%|█████████ | 3316/3490 [1:25:04<07:35,  2.62s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  95%|█████████ | 3317/3490 [1:25:11<11:47,  4.09s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  95%|█████████ | 3319/3490 [1:25:12<06:32,  2.30s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
```

```
  warnings.warn("Maximum Likelihood optimization failed to "
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
Processing cities:  95%|█████████| 3320/3490 [1:25:20<11:26,  4.04s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  95%|█████████| 3321/3490 [1:25:27<13:38,  4.84s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  95%|█████████| 3322/3490 [1:25:33<14:30,  5.18s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  95%|█████████| 3324/3490 [1:25:35<08:15,  2.99s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  95%|█████████| 3325/3490 [1:25:42<11:24,  4.15s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  95%|█████████| 3330/3490 [1:25:44<03:04,  1.15s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  95%|█████████| 3331/3490 [1:25:52<07:59,  3.01s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  96%|█████████| 3348/3490 [1:26:02<01:31,  1.56it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  96%|█████████| 3349/3490 [1:26:08<05:09,  2.20s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  96%|█████████| 3350/3490 [1:26:16<08:49,  3.78s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  96%|█████████| 3351/3490 [1:26:22<10:49,  4.67s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  96%|█████████| 3352/3490 [1:26:29<12:17,  5.34s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  96%|█████████| 3354/3490 [1:26:30<06:34,  2.90s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_d
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  96%|█████████| 3355/3490 [1:26:39<10:21,  4.60s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  96%|█████████| 3356/3490 [1:26:45<11:26,  5.13s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  96%|█████████| 3357/3490 [1:26:52<12:34,  5.68s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'ME
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  96%|█████████| 3365/3490 [1:26:57<01:46,  1.17it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  96%|█████████| 3366/3490 [1:27:04<05:40,  2.75s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  96%|█████████| 3367/3490 [1:27:10<07:37,  3.72s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  97%|█████████| 3368/3490 [1:27:10<05:38,  2.78s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  97%|█████████| 3369/3490 [1:27:18<08:19,  4.13s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  97%|█████████| 3372/3490 [1:27:19<03:30,  1.78s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 15ms/step
Processing cities:  97%|█████████| 3373/3490 [1:27:27<06:46,  3.48s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  97%|█████████| 3374/3490 [1:27:33<08:22,  4.33s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  97%|█████████| 3375/3490 [1:27:34<06:08,  3.21s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  97%|█████████| 3376/3490 [1:27:42<08:42,  4.58s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  97%|█████████| 3378/3490 [1:27:43<04:43,  2.53s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
```

```
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  97%|█████████▋| 3379/3490 [1:27:49<06:45,  3.65s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  97%|█████████▋| 3380/3490 [1:27:56<08:34,  4.68s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  97%|█████████▋| 3381/3490 [1:28:02<09:14,  5.09s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  97%|█████████▋| 3385/3490 [1:28:05<03:15,  1.86s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  97%|█████████▋| 3386/3490 [1:28:12<05:46,  3.34s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  97%|█████████▋| 3389/3490 [1:28:14<02:32,  1.51s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  97%|█████████▋| 3390/3490 [1:28:21<05:25,  3.25s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  97%|█████████▋| 3391/3490 [1:28:27<06:46,  4.11s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  97%|█████████▋| 3392/3490 [1:28:28<05:11,  3.18s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  97%|█████████▋| 3393/3490 [1:28:35<06:56,  4.30s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  97%|█████████▋| 3394/3490 [1:28:36<05:04,  3.17s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  97%|█████████▋| 3395/3490 [1:28:44<07:16,  4.59s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  97%|█████████▋| 3398/3490 [1:28:45<02:58,  1.94s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  97%|█████████▋| 3399/3490 [1:28:51<04:50,  3.19s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  98%|█████████▊| 3409/3490 [1:28:58<00:54,  1.49it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  98%|█████████▊| 3410/3490 [1:29:05<03:21,  2.51s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  98%|█████████▊| 3411/3490 [1:29:12<05:06,  3.88s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  98%|█████████▊| 3417/3490 [1:29:15<01:08,  1.06it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  98%|█████████▊| 3418/3490 [1:29:23<03:22,  2.81s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  98%|█████████▊| 3421/3490 [1:29:24<01:32,  1.34s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 14ms/step
Processing cities:  98%|█████████▊| 3422/3490 [1:29:31<03:18,  2.91s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  98%|█████████▊| 3427/3490 [1:29:34<01:04,  1.02s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  98%|█████████▊| 3428/3490 [1:29:41<02:37,  2.54s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  98%|█████████▊| 3431/3490 [1:29:42<01:13,  1.24s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  98%|█████████▊| 3432/3490 [1:29:49<02:56,  3.03s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  98%|█████████▊| 3433/3490 [1:29:50<02:10,  2.29s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 16ms/step
Processing cities:  98%|█████████▊| 3434/3490 [1:29:58<03:46,  4.05s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  98%|█████████▊| 3437/3490 [1:30:00<01:33,  1.76s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  99%|█████████▊| 3438/3490 [1:30:06<02:43,  3.14s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  99%|█████████▊| 3439/3490 [1:30:07<02:00,  2.37s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step
Processing cities:  99%|█████████▊| 3440/3490 [1:30:14<03:15,  3.92s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
```

```
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  99%|█████████▉| 3446/3490 [1:30:18<00:41,  1.06it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  99%|█████████▉| 3447/3490 [1:30:25<02:00,  2.80s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  99%|█████████▉| 3454/3490 [1:30:29<00:26,  1.35it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step
Processing cities:  99%|█████████▉| 3455/3490 [1:30:37<01:41,  2.89s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  99%|█████████▉| 3457/3490 [1:30:38<00:56,  1.71s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  99%|█████████▉| 3458/3490 [1:30:44<01:36,  3.01s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  99%|█████████▉| 3459/3490 [1:30:51<02:14,  4.34s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
15/15 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step
Processing cities:  99%|█████████▉| 3460/3490 [1:30:58<02:36,  5.21s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  99%|█████████▉| 3461/3490 [1:31:05<02:42,  5.61s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  99%|█████████▉| 3462/3490 [1:31:06<01:54,  4.09s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  99%|█████████▉| 3463/3490 [1:31:14<02:25,  5.38s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
/usr/local/lib/python3.11/dist-packages/statsmodels/base/model.py:607: ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  warnings.warn("Maximum Likelihood optimization failed to "
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  99%|█████████▉| 3464/3490 [1:31:20<02:27,  5.67s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  99%|█████████▉| 3466/3490 [1:31:21<01:13,  3.06s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  99%|█████████▉| 3467/3490 [1:31:28<01:38,  4.27s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities:  99%|█████████▉| 3468/3490 [1:31:29<01:09,  3.15s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities:  99%|█████████▉| 3469/3490 [1:31:35<01:24,  4.03s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  99%|█████████▉| 3470/3490 [1:31:43<01:41,  5.08s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step
Processing cities:  99%|█████████▉| 3471/3490 [1:31:51<01:53,  5.99s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities:  99%|█████████▉| 3472/3490 [1:31:57<01:48,  6.02s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 10ms/step
Processing cities: 100%|██████████| 3473/3490 [1:32:05<01:51,  6.56s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 100%|██████████| 3474/3490 [1:32:05<01:16,  4.76s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities: 100%|██████████| 3475/3490 [1:32:12<01:18,  5.24s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 100%|██████████| 3485/3490 [1:32:18<00:03,  1.34it/s]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities: 100%|██████████| 3486/3490 [1:32:25<00:09,  2.40s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
13/13 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step
Processing cities: 100%|██████████| 3487/3490 [1:32:32<00:11,  3.91s/it]<ipython-input-7-328d46eed31c>:26: FutureWarning: 'M' is deprecated and will be removed in a future version, please use 'M
  city_data = city_data.resample('M').agg({'AverageTemperature': 'mean'})
Processing cities: 100%|██████████| 3488/3490 [1:32:33<00:05,  2.91s/it]/usr/local/lib/python3.11/dist-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_
  super().__init__(**kwargs)
/usr/local/lib/python3.11/dist-packages/statsmodels/tsa/statespace/sarimax.py:978: UserWarning: Non-invertible starting MA parameters found. Using zeros as starting parameters.
  warn('Non-invertible starting MA parameters found.'
20/20 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
```