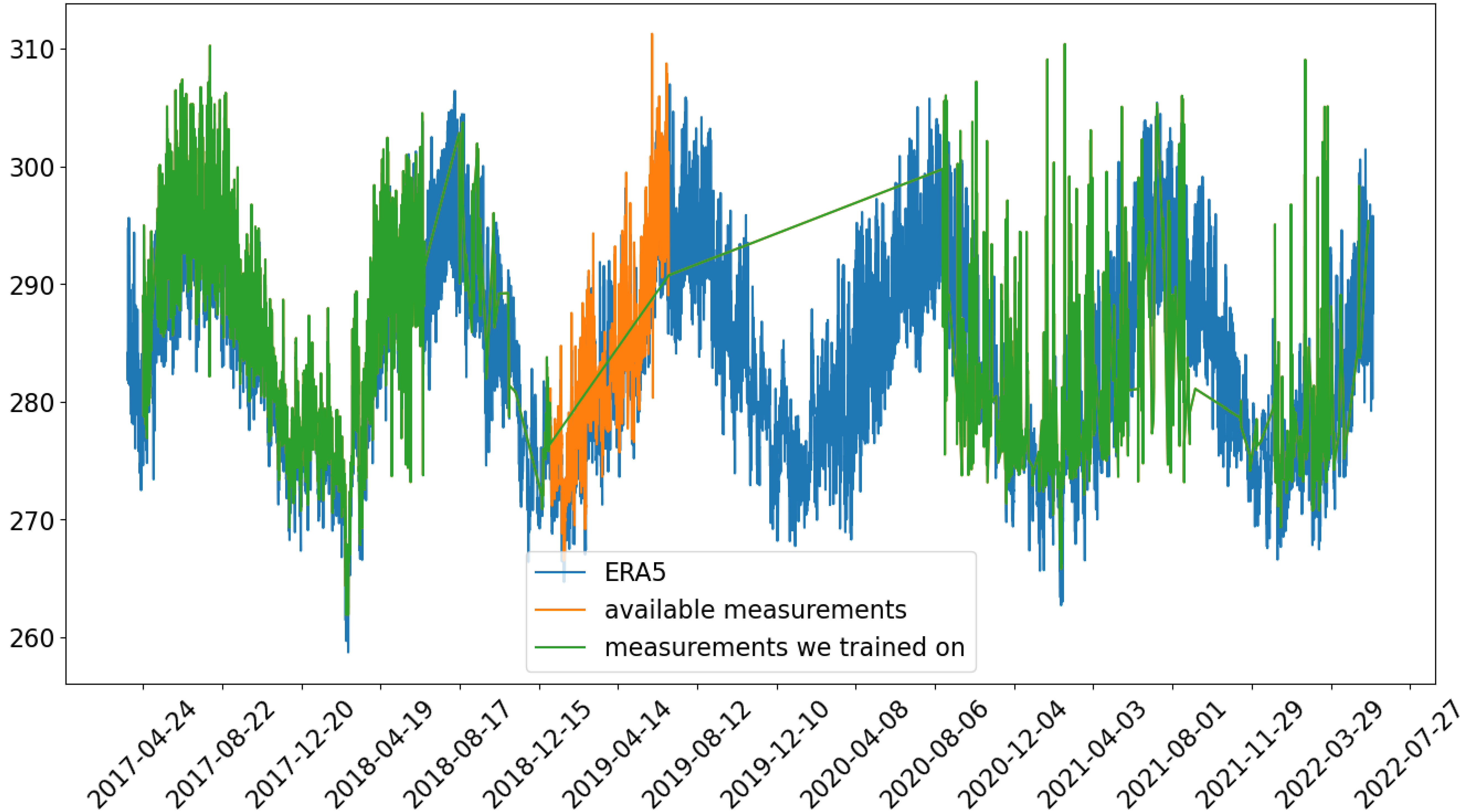
In [ ]:
```python
import matplotlib.pyplot as plt
```

In [ ]:
```python
station_name = "Vienna"
test_year = 2019
at_iterations = "700000"
has_no_time_context = False
```

In [ ]:
```python
from climatereconstructionai import evaluate
import os
import regex as re

def evaluate_wrapper(use_time_context = True, iter = "final", station = station_name, reconstruct_gaps=False):

    snapshot_folder_name = f"snapshots_{station.lower()}"
    if not use_time_context:
        snapshot_folder_name += "_backup"

    # copy "test_args_template.txt" to "test_args_temp.txt"
    # while replacing:

    assert not (use_time_context and reconstruct_gaps), "Cannot use time context and reconstruct gaps at the same time yet, because we don't split the gap files yet by vatiab

    replace_dir = {
        "STATIONNAME" : station.lower() if not reconstruct_gaps else f"the_gaps_{station.lower()}",
        "ITERATION" : str(iter),
        "SNAPSHOTDIR" : snapshot_folder_name,
    }

    if reconstruct_gaps:
        replace_dir["_leading_trailing"] = ""
        replace_dir["cleaned_"] = "cleaned_era5_for_"


    template_file = "test_args_template_trailing.txt" if use_time_context else "test_args_template_no-time.txt"
    temp_file = "test_args_temp.txt"


    with open(template_file, "r") as f:
        lines = f.readlines()
        with open(temp_file, "w") as f2:
            for line in lines:
                for key in replace_dir:
                    line = re.sub(key, replace_dir[key], line)
                f2.write(line)

            # save and close
            f2.close()

    evaluate(temp_file)

    os.remove(temp_file)
```

In [ ]:
```python
import xarray as xr
from utils import DataSet, DatasetPlotter
import numpy as np
import os
```

```python
test_folder_path = "/work/bm1159/XCES/xces-work/k203179/data/test"
train_folder_path = "/work/bm1159/XCES/xces-work/k203179/data/train"
output_file_path = "outputs/output_output.nc"
era5_file = test_folder_path + f"/era5_for_{station_name.lower()}_leading_trailing.nc"
era5_full_file = f"/work/bm1159/XCES/xces-work/k203179/data_sets/era5_for_{station_name.lower()}.nc"
era5_gaps_file = f"/work/bm1159/XCES/xces-work/k203179/data_sets/era5_gaps_for_{station_name.lower()}.nc"

# get measurements values

measurements_data = xr.open_dataset(test_folder_path + f"/{station_name.lower()}.nc")
era5_data = xr.open_dataset(era5_file)
measurements_data_trained = xr.open_dataset(train_folder_path + f"/expected_{station_name.lower()}.nc")

era5_full_data = xr.open_dataset(era5_full_file)

plt.plot(era5_full_data["time"], era5_full_data["tas"].mean(axis=(1,2)), label = "ERA5")
plt.plot(measurements_data["time"], measurements_data["tas"].mean(axis=(1,2)), label = "available measurements")
plt.plot(measurements_data_trained["time"], measurements_data_trained["tas"].mean(axis=(1,2)), label = "measurements we trained on")
plt.legend()

# rotate x-axis labels, and show them every 6 months
plt.xticks(rotation=45)
plt.gca().xaxis.set_major_locator(plt.MultipleLocator(120))

# figure size A4 landscape
plt.gcf().set_size_inches(16, 8)
plt.show()
```



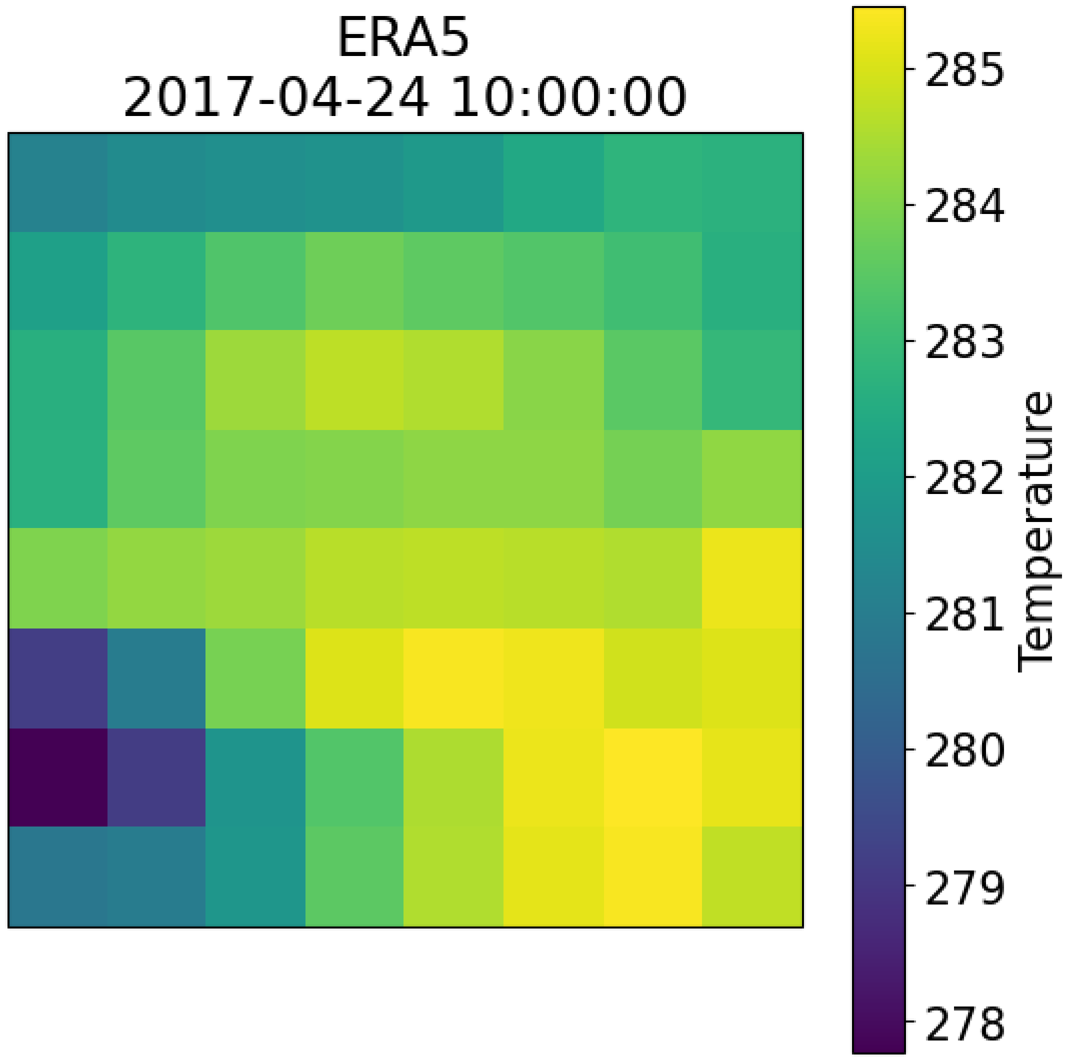
Evaluate with no timecontext

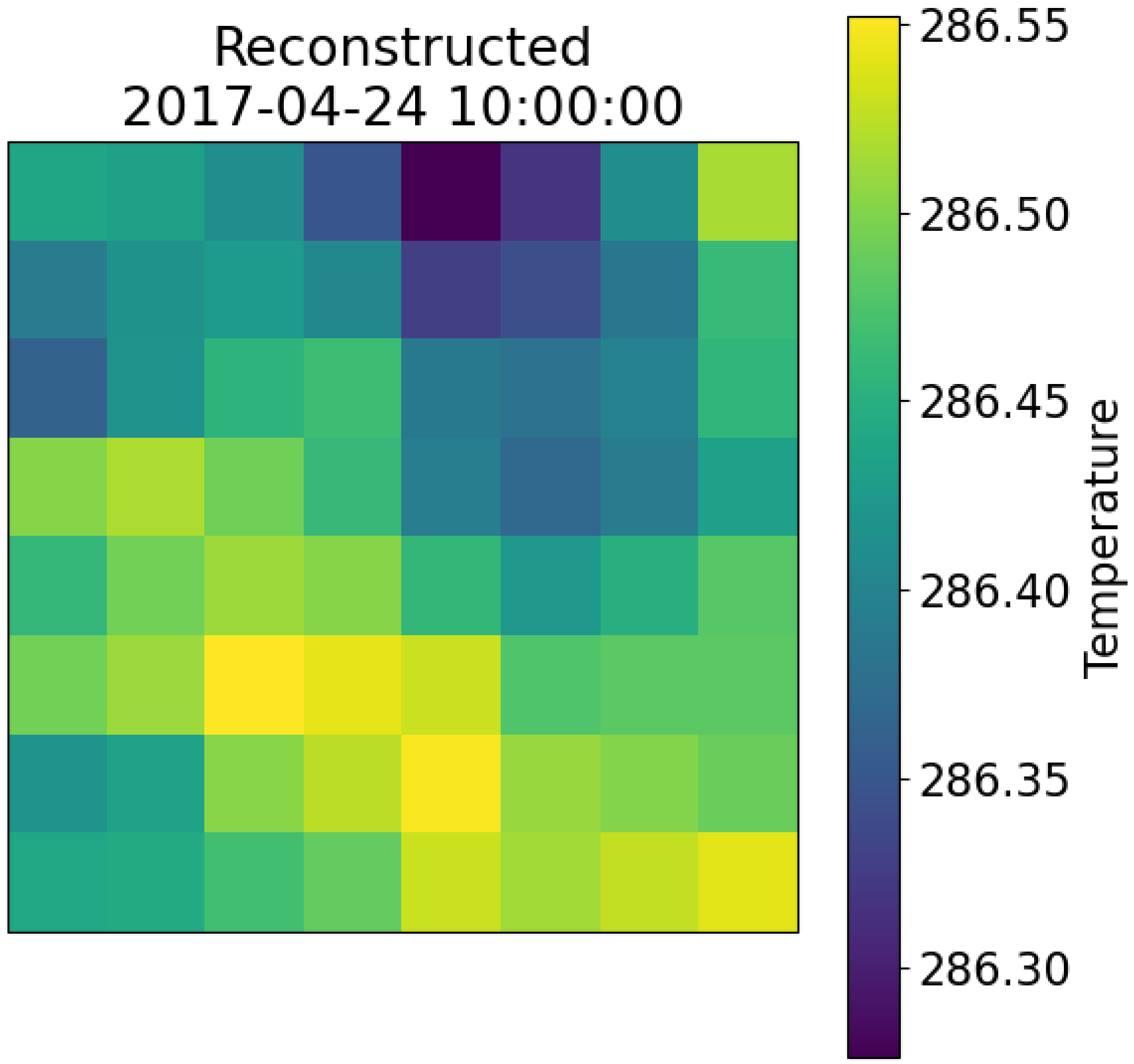
In [ ]:
```
evaluate_wrapper(use_time_context = False, iter = "final", station = station_name)
output_no_time_ds = DataSet(output_file_path, name = "Reconstructed")
output_no_time_data = xr.open_dataset(output_file_path)
```

```
/home/k/k203179/.conda/envs/crai/lib/python3.10/site-packages/climatereconstructionai/utils/normalizer.py:10: RuntimeWarning: Mean of empty slice
  img_mean.append(np.nanmean(np.array(img_data[i])))
/home/k/k203179/.conda/envs/crai/lib/python3.10/site-packages/numpy/lib/nanfunctions.py:1879: RuntimeWarning: Degrees of freedom <= 0 for slice.
  var = nanvar(a, axis=axis, dtype=dtype, out=out, ddof=ddof,
100%|██████████| 1/1 [00:08<00:00,  8.26s/it]
```

In [ ]:

```
plotter1 = DatasetPlotter(DataSet(era5_file, name = "ERA5"))
plotter1.plot()
plotter2 = DatasetPlotter(output_no_time_ds)
plotter2.time_index_list = plotter1.time_index_list
plotter2.plot()
```





Evaluate with time contex

In [ ]:
```
if has_no_time_context:
    output_with_time_data = output_no_time_data
else:
    evaluate_wrapper(use_time_context = True, iter = at_iterations, station = station_name)
    output_with_time_ds = DataSet(output_file_path, name="Reconstructed with time context")
    output_with_time_data = xr.open_dataset(output_file_path)
```

```
/home/k/k203179/.conda/envs/crai/lib/python3.10/site-packages/climatereconstructionai/utils/normalizer.py:10: RuntimeWarning: Mean of empty slice
  img_mean.append(np.nanmean(np.array(img_data[i])))
/home/k/k203179/.conda/envs/crai/lib/python3.10/site-packages/numpy/lib/nanfunctions.py:1879: RuntimeWarning: Degrees of freedom <= 0 for slice.
  var = nanvar(a, axis=axis, dtype=dtype, out=out, ddof=ddof,
100%|██████████| 1/1 [00:10<00:00, 10.54s/it]
```

In [ ]:
```
# get coordinates from measurements nc file
import numpy as np

station_lon, station_lat = measurements_data.lon.values[0], measurements_data.lat.values[0]
print(f"station is at {station_lon}, {station_lat}")

# get nearest coordinates in era5
def get_left_right_nearest_elem_in_sorted_array(array, value):
    length = len(array)
    left = len(list(filter(lambda x: x <= value, array))) - 1
```

```python
    right = length - len(list(filter(lambda x: x >= value, array)))
    nearest = min(left, right, key=lambda x: abs(array[x] - value))
    return left, right, nearest

test_array = [1, 2, 3, 4, 5, 6, 7, 8]
test_search = 5.51

print(f"searching for {test_search} in {test_array}")
left_idx, right_idx, nearest_idx =  get_left_right_nearest_elem_in_sorted_array(test_array, test_search)
print(f"idx left to {test_search} is {left_idx}, idx right to {test_search} is {right_idx}, nearest idx is {nearest_idx}")
print(f"mid crop: {test_array[left_idx:right_idx+1]}")
```

```
station is at 16.3609, 48.2303
searching for 5.51 in [1, 2, 3, 4, 5, 6, 7, 8]
idx left to 5.51 is 4, idx right to 5.51 is 5, nearest idx is 5
mid crop: [5, 6]
```

In [ ]:
```python
def era_vs_reconstructed_comparision_to_df(era5_data, reconstructed_with_time_data, reconstructed_no_time_data, measurements_data):

    lon_left_idx, lon_right_idx, lon_nearest_idx = get_left_right_nearest_elem_in_sorted_array(era5_data.lon.values, station_lon % 360)
    lat_left_idx, lat_right_idx, lat_nearest_idx = get_left_right_nearest_elem_in_sorted_array(era5_data.lat.values, station_lat)

    era5_nearest_values = era5_data.variables["tas"][:, lon_nearest_idx, lat_nearest_idx]

    reconstructed_with_time_data_values = reconstructed_with_time_data.variables["tas"].stack(grid=['lat', 'lon']).values
    reconstructed_no_time_data_values = reconstructed_no_time_data.variables["tas"].stack(grid=['lat', 'lon']).values

    measurements_data_values = measurements_data.variables["tas"][...].mean(axis=(1,2))


    # timeaxis
    time = era5_data.variables["time"][:]

    import pandas as pd

    # create dataframe with all values
    df = pd.DataFrame()

    df["time"] = time

    # index should be time
    df.set_index("time", inplace=True)

    df["era5_nearest"] = era5_nearest_values
    df["reconstructed_median"] = [np.median(x) for x in reconstructed_no_time_data_values]
    df["reconstructed_with_time_context_median"] = [np.median(x) for x in reconstructed_with_time_data_values]
    df["measurements"] = measurements_data_values

    return df
```

Generate Dataframe

- makes resampling easier

In [ ]:
```python
hourly_df = era_vs_reconstructed_comparision_to_df(era5_data, output_with_time_data, output_no_time_data, measurements_data)


# print a section of the df
```

```
start_date = test_year.__str__() + "-01-01"
end_date = test_year.__str__() + "-12-31"

hourly_df = hourly_df[start_date:end_date]
```

Implement plotting method of dataframe

In [ ]:
```
def plot_n_steps_of_df(df, as_delta, n=None, title=None, plot_trailing_time=False):

    plot_trailing_time = plot_trailing_time and not has_no_time_context

    time = df.index.values
    if n is None:
        n = len(df)

    # random slice of n consecutive datapoints
    import random
    slice_start = random.randint(0, len(time) - n)
    time_slice = slice(slice_start, slice_start + n)

    time = time[time_slice]

   # era5_mid_values = df["era5_mid"].values -273.15
    era5_nearest_values = df["era5_nearest"].values - 273.15
    reconstructed_median_values = df["reconstructed_median"].values - 273.15
    reconstructed_median_with_time_context_values = df["reconstructed_with_time_context_median"].values - 273.15

    measurements_values = df["measurements"].values - 273.15

    rmse_reconstructed = np.sqrt(np.sum((reconstructed_median_values[time_slice] - measurements_values[time_slice])**2) / len(time))
    rmse_reconstructed_with_time_context = np.sqrt(np.sum((reconstructed_median_with_time_context_values[time_slice] - measurements_values[time_slice])**2) / len(time))
    rmse_era5_nearest = np.sqrt(np.sum((era5_nearest_values[time_slice] - measurements_values[time_slice])**2) / len(time))

    correlation_reconstructed = np.corrcoef(reconstructed_median_values[time_slice], measurements_values[time_slice])[0,1]
    correlation_reconstructed_with_time_context = np.corrcoef(reconstructed_median_with_time_context_values[time_slice], measurements_values[time_slice])[0,1]
    correlation_era5_nearest = np.corrcoef(era5_nearest_values[time_slice], measurements_values[time_slice])[0,1]

    if as_delta:
     #   era5_mid_values = era5_mid_values - measurements_values
        era5_nearest_values = era5_nearest_values - measurements_values
        reconstructed_median_values = reconstructed_median_values - measurements_values
        reconstructed_median_with_time_context_values = reconstructed_median_with_time_context_values - measurements_values
        measurements_values = measurements_values - measurements_values

        # y-axis title, temperature difference
        plt.ylabel("Delta calculated by subtracting measurement data [C°]")

    else:
        plt.ylabel("Temperature at surface [C°]")


    plt.plot(time, era5_nearest_values[time_slice], label="ERA5 nearest point", color="red")
    # plt.plot(time, era5_mid_values[time_slice], label="ERA5 nearest 4 points")


    plt.plot(time, reconstructed_median_values[time_slice], label="Reconstructed for validation", color="blue")
    if plot_trailing_time:
```

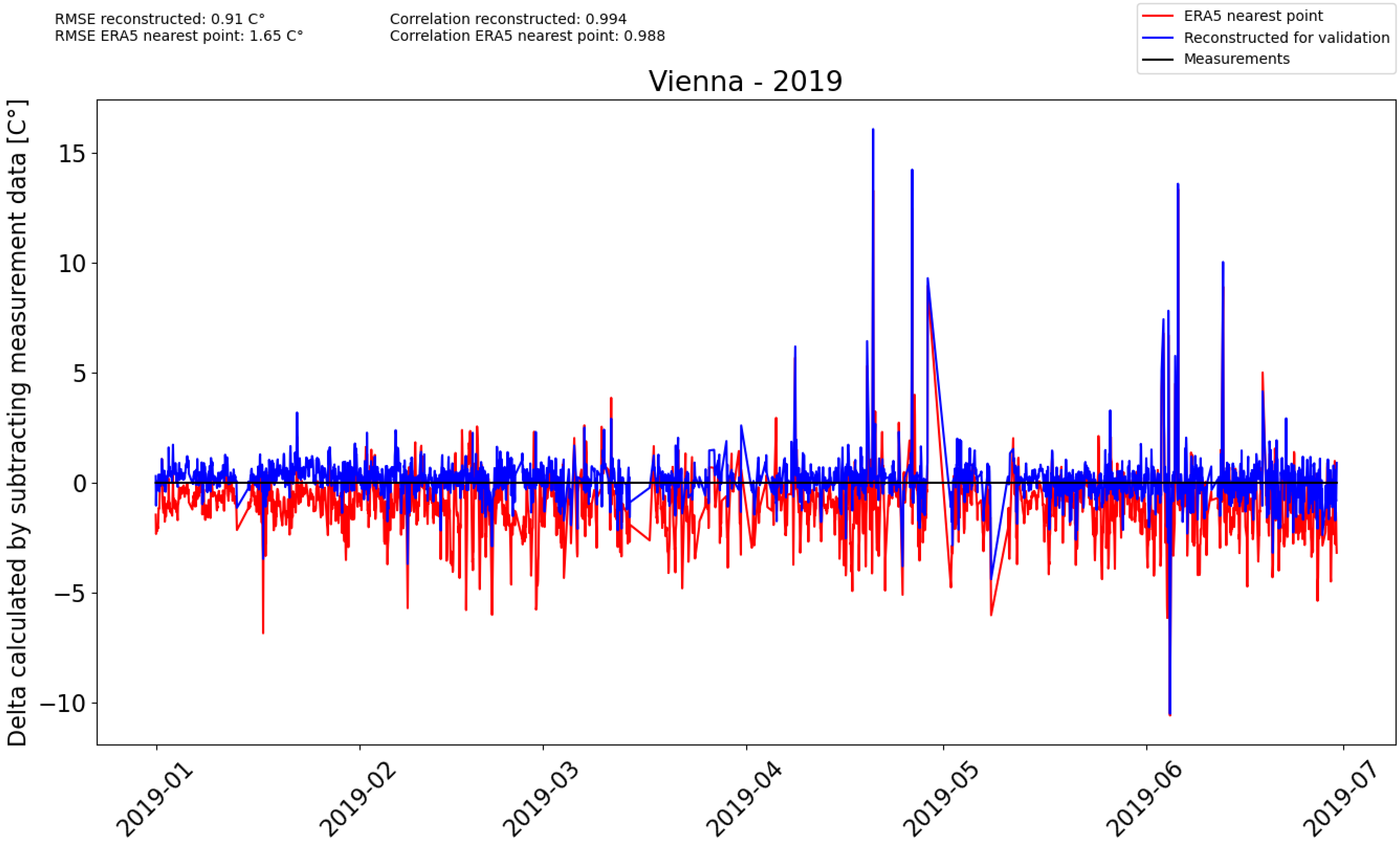
```
        plt.plot(time, reconstructed_median_with_time_context_values[time_slice], label="Reconstructed for val. using also ERA5 step before & after", color="green")

    plt.plot(time, measurements_values[time_slice], label="Measurements", color="black")

    # x-axis labels 90 degrees
    plt.xticks(rotation=45)

    # title
    if title is not None:
        plt.title(title)


    # font size of legend
    plt.rcParams.update({'font.size': 10})

    # font size of axis labels
    plt.rcParams.update({'axes.labelsize': 12})

    # font size of title
    plt.rcParams.update({'axes.titlesize': 26})

    plt.legend()
    # position legend below chart to the right
    plt.legend(bbox_to_anchor=(1, 1.15), loc='upper right', borderaxespad=0.)


    # text below diagram with RMSE and Correlation in fontsize 10
    plt.text(0.1,0.95, f"RMSE reconstructed: {rmse_reconstructed:.2f} C°\n" +
             (f"RMSE reconstr. (time context): {rmse_reconstructed_with_time_context:.2f} C°\n" if plot_trailing_time  else "") +
             f"RMSE ERA5 nearest point: {rmse_era5_nearest:.2f} C°",

             fontsize=10, transform=plt.gcf().transFigure)

    plt.text(0.3, 0.95, f"Correlation reconstructed: {correlation_reconstructed:.3f}\n" +
             (f"Correlation reconstr. (time context): {correlation_reconstructed_with_time_context:.3f}\n" if plot_trailing_time  else "") +
             f"Correlation ERA5 nearest point: {correlation_era5_nearest:.3f}",

             fontsize = 10, transform=plt.gcf().transFigure)

    # figure size A4 landscape
    plt.gcf().set_size_inches(16, 8)

    plt.show()
```

Hourly Analysis

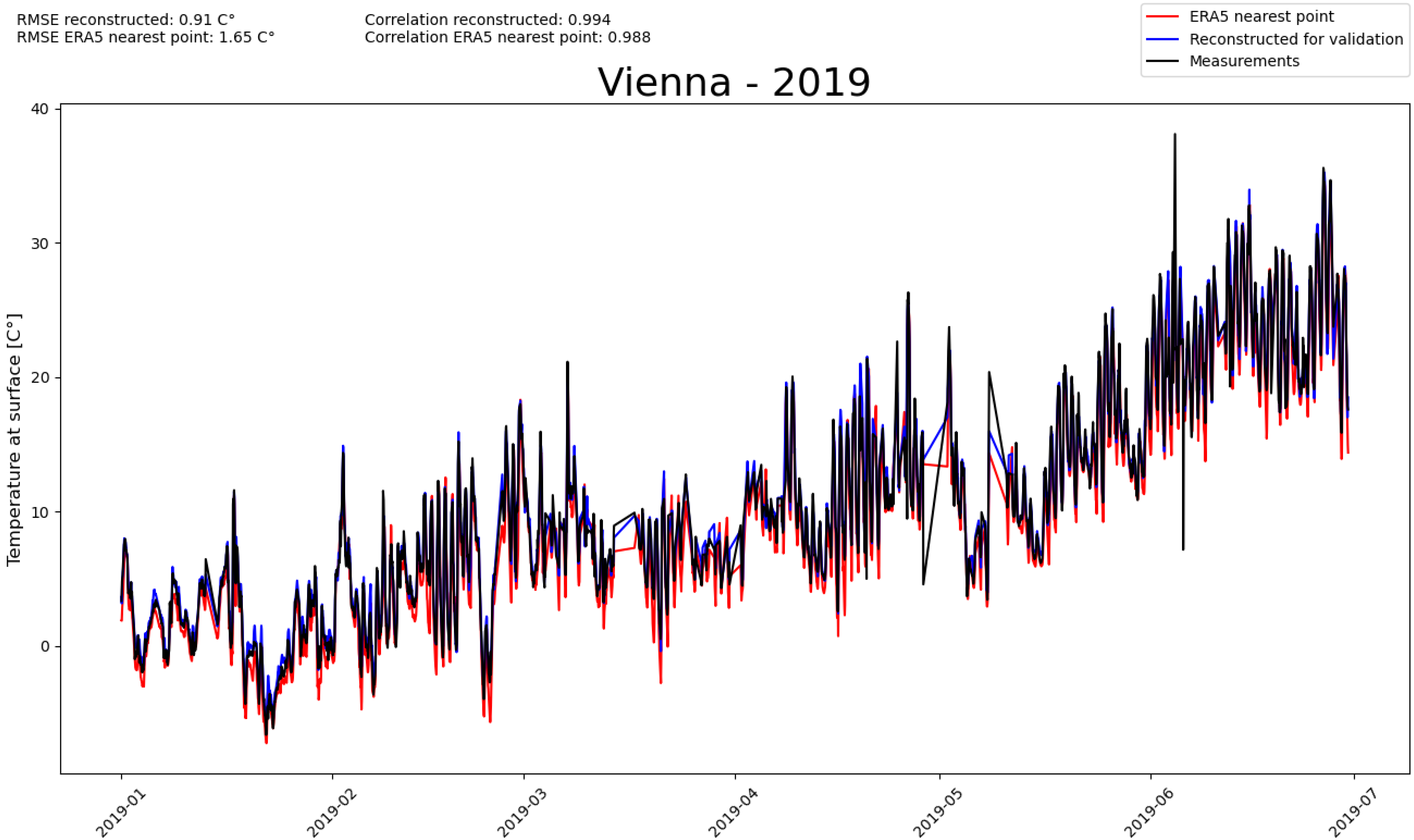
...over the full year

In [ ]:

```
title = f"{station_name} - {test_year}"
plot_n_steps_of_df(hourly_df, as_delta=True, title=title)
plot_n_steps_of_df(hourly_df, as_delta=False, title=title)
```

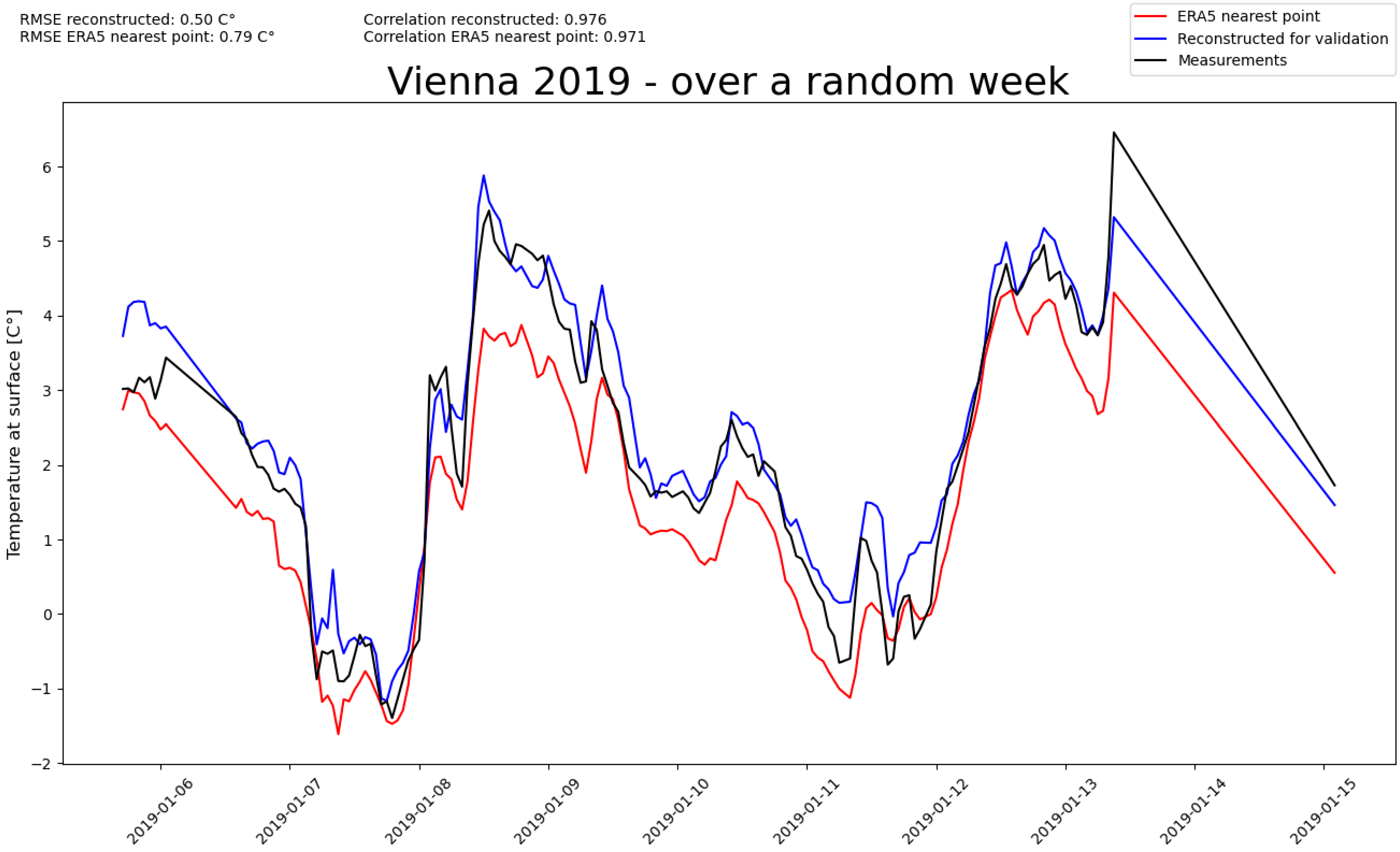


RMSE reconstructed: 0.91 C°
RMSE ERA5 nearest point: 1.65 C°
Correlation reconstructed: 0.994
Correlation ERA5 nearest point: 0.988
ERA5 nearest point
Reconstructed for validation
Measurements
Vienna - 2019
Delta calculated by subtracting measurement data [C°]
15
10
5
0
−5
−10
2019-01
2019-02
2019-03
2019-04
2019-05
2019-06
2019-07

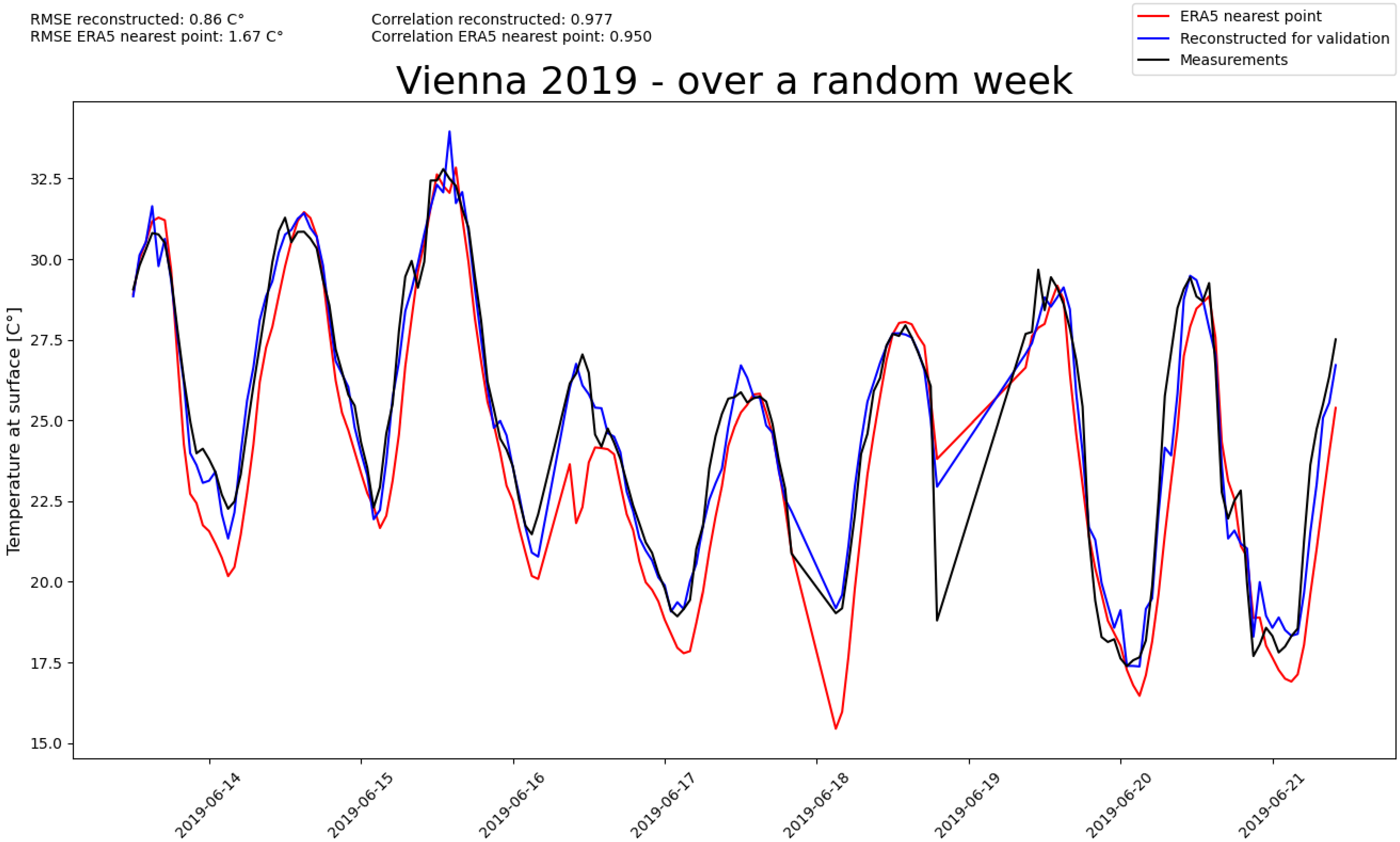


...over random weeks

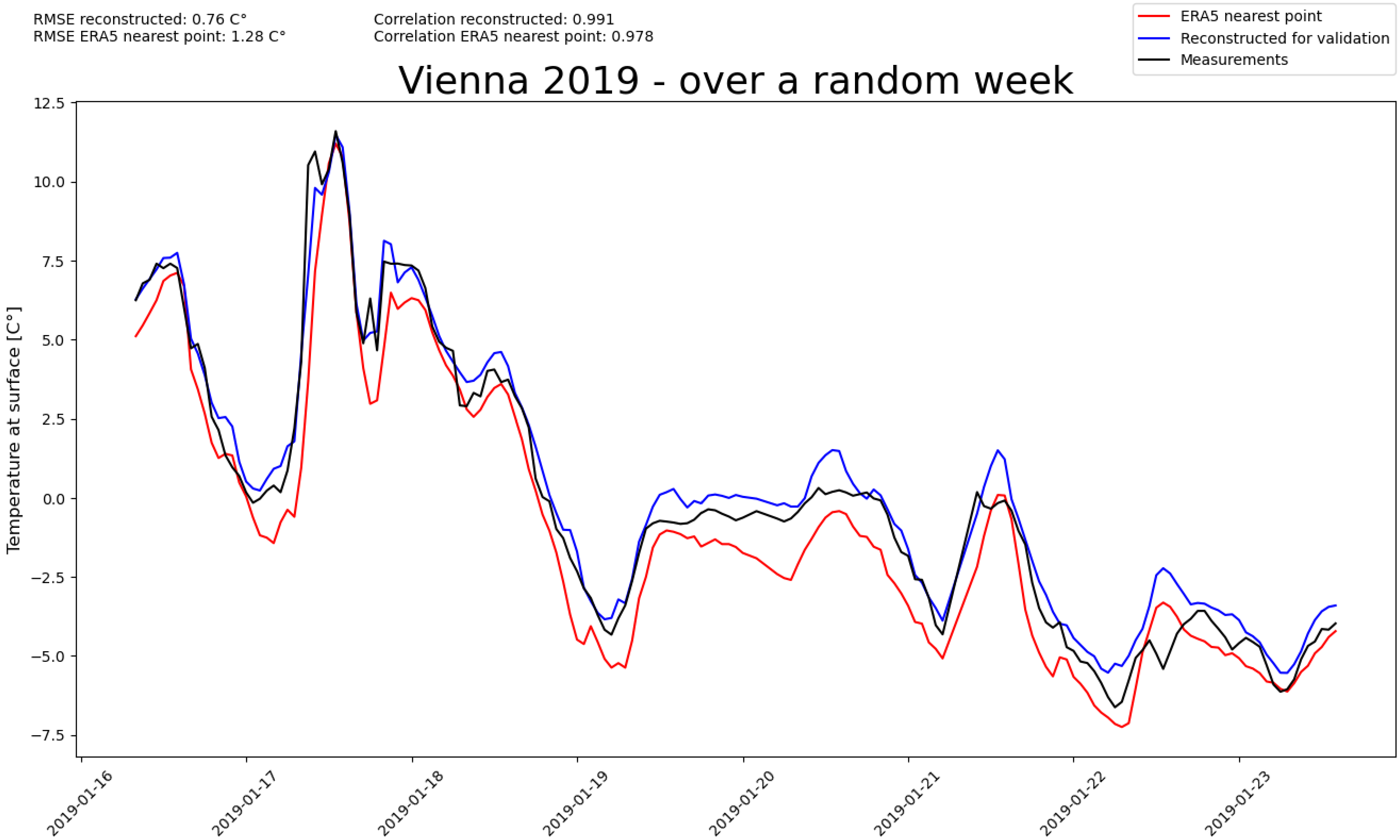
In [ ]:
```
n = 168
if n == 168:
    title = f"{station_name} {test_year} - over a random week"
else:
    title = f"{station_name} {test_year} - {n} random consecutive hourly steps"
plot_n_steps_of_df(hourly_df, as_delta=False, n=n, title=title)
plot_n_steps_of_df(hourly_df, as_delta=False, n=n, title=title)
plot_n_steps_of_df(hourly_df, as_delta=False, n=n, title=title)
```



RMSE reconstructed: 0.50 C°
RMSE ERA5 nearest point: 0.79 C°
Correlation reconstructed: 0.976
Correlation ERA5 nearest point: 0.971
ERA5 nearest point
Reconstructed for validation
Measurements
Vienna 2019 - over a random week
Temperature at surface [C°]
6
5
4
3
2
1
0
−1
−2
2019-01-06
2019-01-07
2019-01-08
2019-01-09
2019-01-10
2019-01-11
2019-01-12
2019-01-13
2019-01-14
2019-01-15

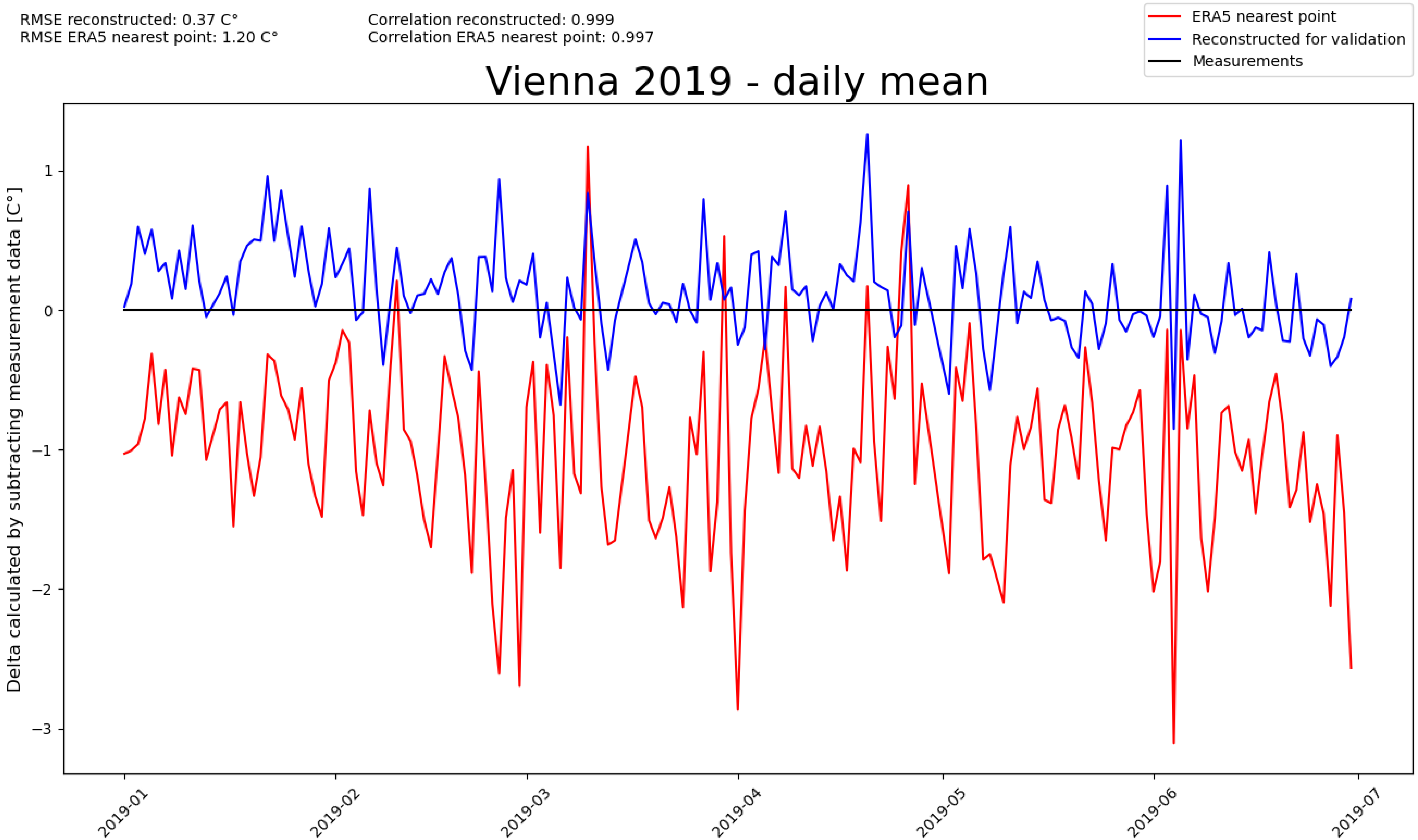


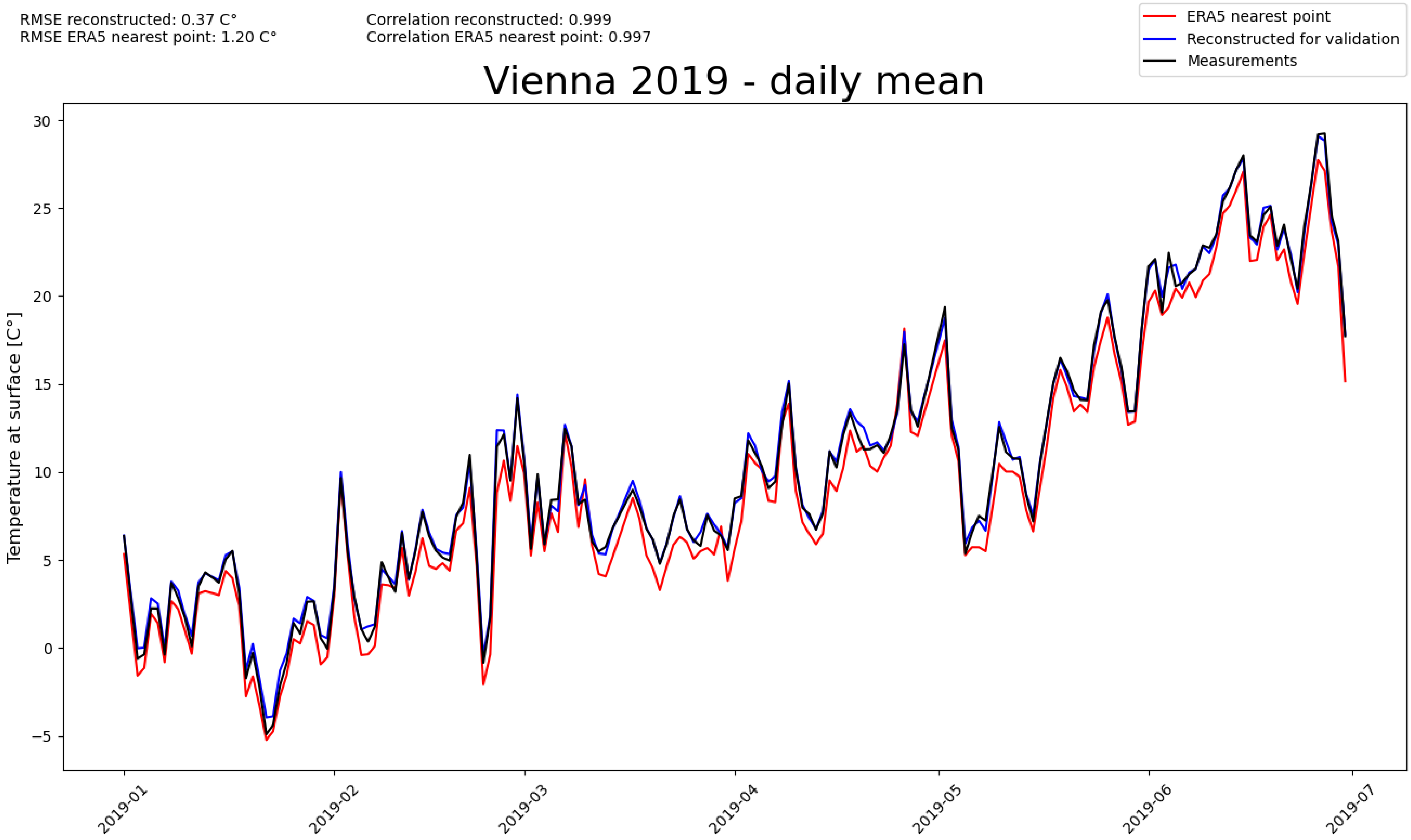
RMSE reconstructed: 0.86 C°
RMSE ERA5 nearest point: 1.67 C°
Correlation reconstructed: 0.977
Correlation ERA5 nearest point: 0.950
ERA5 nearest point
Reconstructed for validation
Measurements
Vienna 2019 - over a random week
Temperature at surface [C°]
15.0
17.5
20.0
22.5
25.0
27.5
30.0
32.5
2019-06-14
2019-06-15
2019-06-16
2019-06-17
2019-06-18
2019-06-19
2019-06-20
2019-06-21



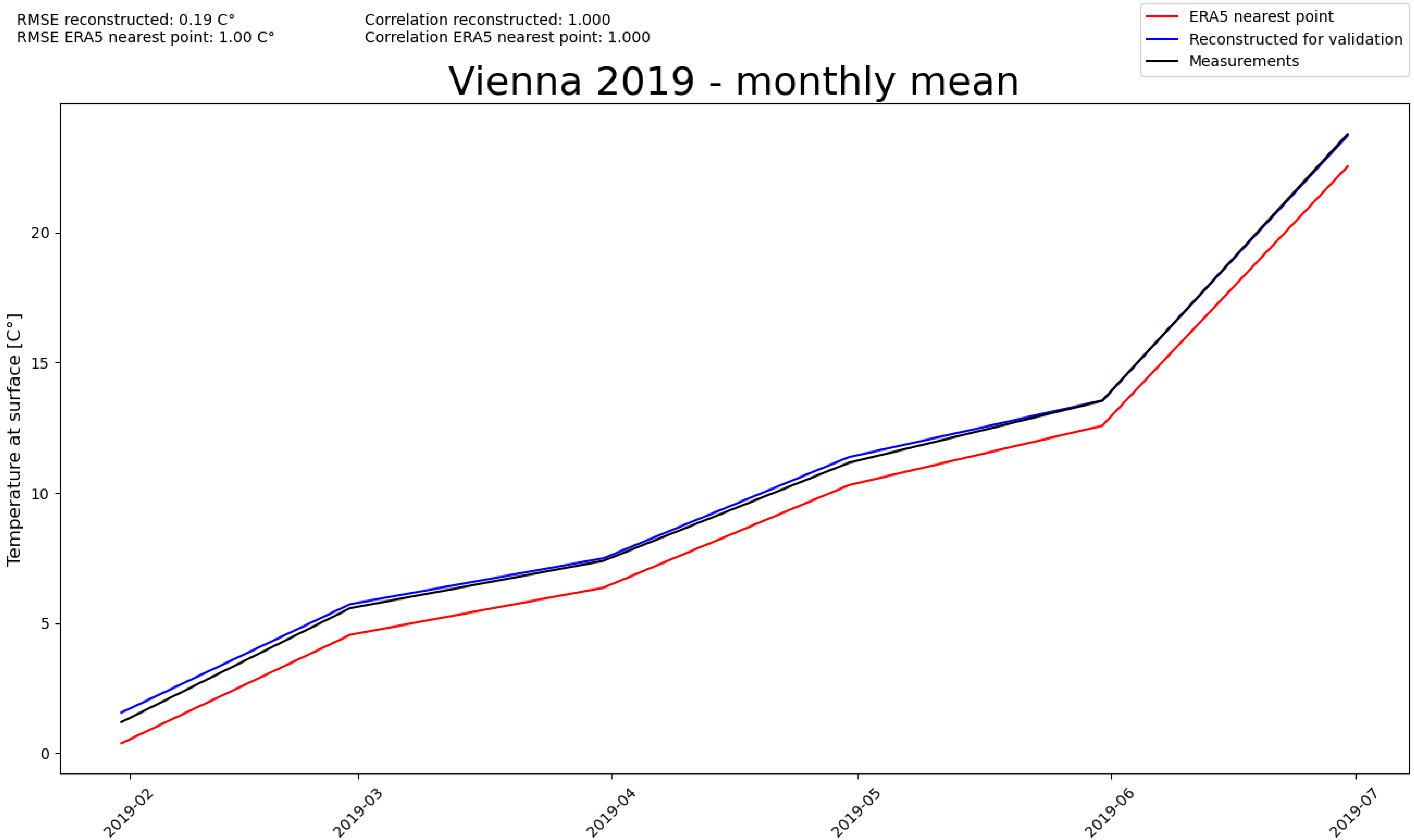
Resample Data from hourly to daily or monthly

In [ ]:
```
# resample to daily mean
daily_df = hourly_df.resample("D").mean()
# drop nans
daily_df = daily_df.dropna()
title = f"{station_name} {test_year} - daily mean"
plot_n_steps_of_df(daily_df, as_delta=True, title=title)
plot_n_steps_of_df(daily_df, as_delta=False, title=title)
```


RMSE reconstructed: 0.37 C°
RMSE ERA5 nearest point: 1.20 C°
Correlation reconstructed: 0.999
Correlation ERA5 nearest point: 0.997
ERA5 nearest point
Reconstructed for validation
Measurements
Vienna 2019 - daily mean
Delta calculated by subtracting measurement data [C°]
1
0
−1
−2
−3
2019-01
2019-02
2019-03
2019-04
2019-05
2019-06
2019-07



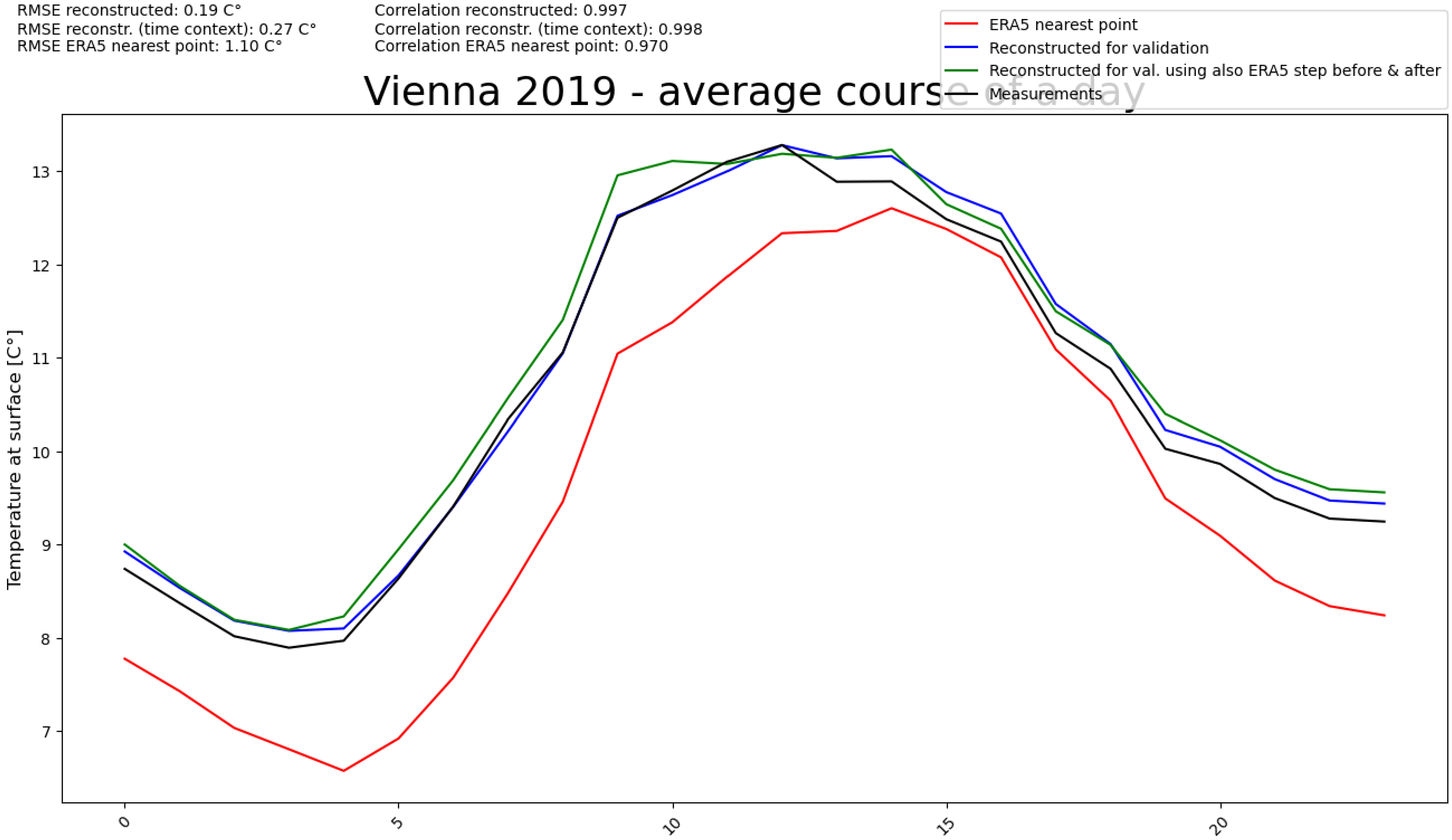
In [ ]:
```
# resample rows to monthly mean
df = hourly_df.resample("M").mean()
title = f"{station_name} {test_year} - monthly mean"
plot_n_steps_of_df(df, as_delta = False, title=title)
```



Average Course of the day

In [ ]:

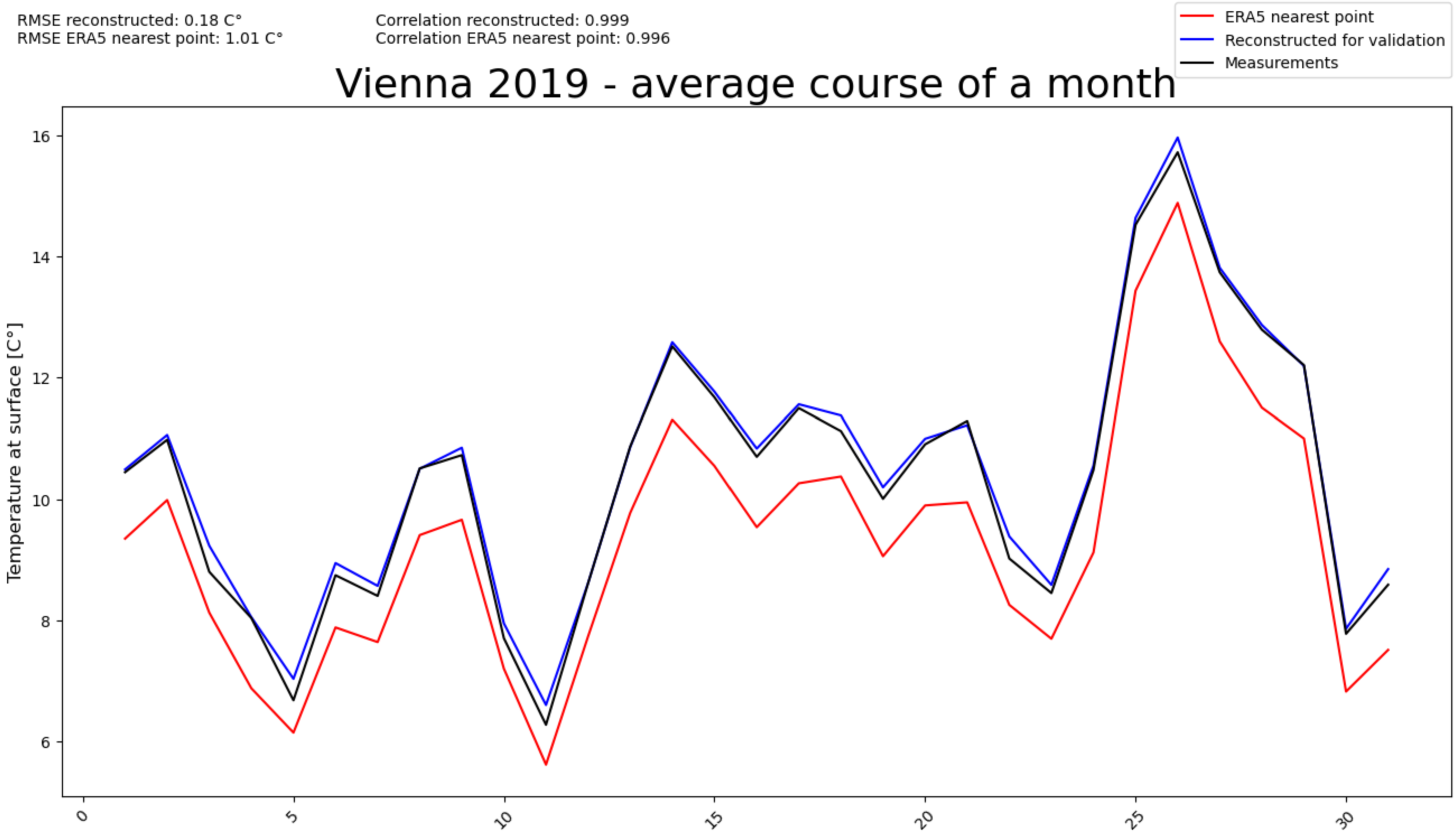
```
# calculate the mean of each 24 hours over the whole year

day_course_df = hourly_df.groupby(hourly_df.index.hour).mean()
title = f"{station_name} {test_year} - average course of a day"
plot_n_steps_of_df(day_course_df, as_delta = False, title=title, plot_trailing_time=True)
```



Average Course of the month

In [ ]:

```
# calculate the mean of each day of a month over the whole year

month_course_df = hourly_df.groupby(hourly_df.index.day).mean()
title = f"{station_name} {test_year} - average course of a month"
plot_n_steps_of_df(month_course_df, as_delta = False, title=title)
```



Evaluate for the actually missing time steps

In [ ]:

```
evaluate_wrapper(use_time_context = False, iter = "final", station = station_name, reconstruct_gaps=True)
output_filled_gaps_ds = DataSet(output_file_path, name="Reconstructed gaps")
output_actual_gaps_data = xr.open_dataset(output_file_path)
```

```
/home/k/k203179/.conda/envs/crai/lib/python3.10/site-packages/climatereconstructionai/utils/normalizer.py:10: RuntimeWarning: Mean of empty slice
  img_mean.append(np.nanmean(np.array(img_data[i])))
/home/k/k203179/.conda/envs/crai/lib/python3.10/site-packages/numpy/lib/nanfunctions.py:1879: RuntimeWarning: Degrees of freedom <= 0 for slice.
  var = nanvar(a, axis=axis, dtype=dtype, out=out, ddof=ddof,
100%|██████████| 1/1 [00:15<00:00, 15.80s/it]
```

In [ ]:

```python
def create_filled_in_gaps_df(full_era5_data, filled_gaps_data, measurements_data):

    import pandas as pd

    def single_df(time, tas, name):
        df = pd.DataFrame()
        df["time"] = time
        df.set_index("time", inplace=True)
        df[name] = tas
        return df

    lon_left_idx, lon_right_idx, lon_nearest_idx = get_left_right_nearest_elem_in_sorted_array(era5_data.lon.values, station_lon % 360)
    lat_left_idx, lat_right_idx, lat_nearest_idx = get_left_right_nearest_elem_in_sorted_array(era5_data.lat.values, station_lat)

    era5_nearest_values = full_era5_data.variables["tas"][:, lon_nearest_idx, lat_nearest_idx]
    reconstructed_values = filled_gaps_data.variables["tas"].stack(grid=['lat', 'lon']).values
    reconstructed_values = [np.median(x) for x in reconstructed_values]

    measurements_values = measurements_data.variables["tas"].stack(grid=['lat', 'lon']).values
    measurements_values = [np.median(x) for x in measurements_values]

    era_df = single_df(full_era5_data.variables["time"], era5_nearest_values, "era5_nearest")
    reconstructed_df = single_df(filled_gaps_data.variables["time"], reconstructed_values, "filled_in_gaps")
    measurements_df = single_df(measurements_data.variables["time"], measurements_values, "measurements")

    # merge on time
    merged = pd.concat([era_df, reconstructed_df, measurements_df], axis=1)
    # drop rows where reconstructed and measurements are both nan simultaneously
    return merged.dropna(subset=["filled_in_gaps", "measurements"], how="all")
```

In [ ]:

```python
hourly_filled_gaps_df = create_filled_in_gaps_df(era5_full_data, output_actual_gaps_data, measurements_data)
hourly_filled_gaps_df
```

Out[ ]:

	era5_nearest	filled_in_gaps	measurements
time			
2017-04-24 07:00:00	281.133545	280.147217	NaN
2017-04-24 08:00:00	282.382568	281.665955	NaN
2017-04-24 09:00:00	283.316010	283.075714	NaN
2017-04-24 10:00:00	284.647461	NaN	287.723913
2017-04-24 11:00:00	285.885742	285.778595	NaN
...	...	...	...
2022-05-24 12:00:00	294.967529	NaN	295.348077
2022-05-24 13:00:00	294.676453	NaN	294.840909
2022-05-24 14:00:00	294.638306	NaN	294.950000
2022-05-24 15:00:00	294.390717	NaN	294.563333
2022-05-24 16:00:00	293.362244	NaN	294.381707

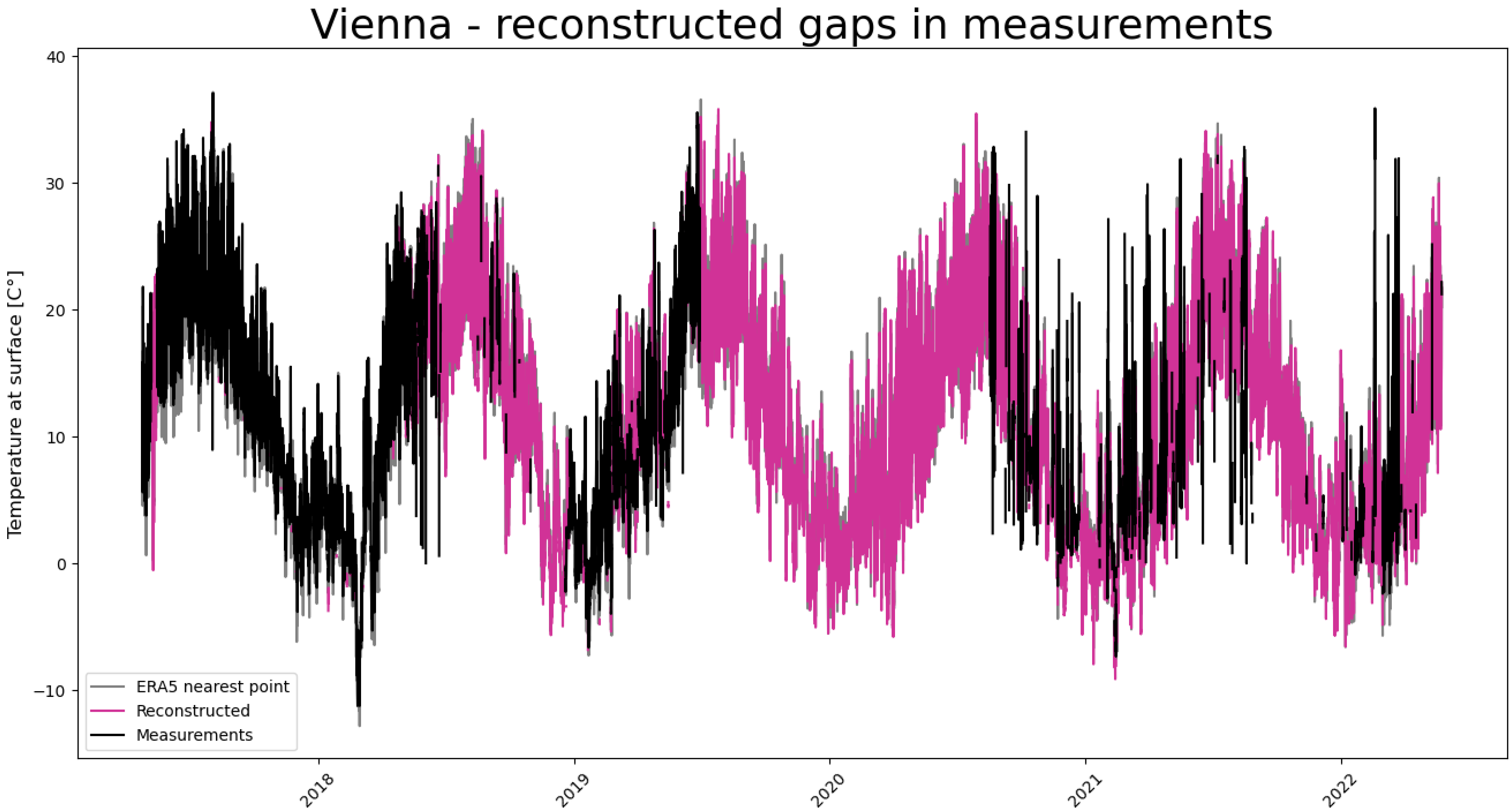
44554 rows × 3 columns

In [ ]:

```
def plot_n_steps_of_filled_in_df(df, n=None, title=None):

    time = df.index.values

    era5_nearest_values = df["era5_nearest"].values - 273.15
    reconstructed_median_values = df["filled_in_gaps"].values - 273.15

    measurements_values = df["measurements"].values - 273.15

    import random

    if n is None:
        n = len(df)

    break_loop = 0
    we_have_measurements_and_reconstructed_values_in_this_timeframe = False
    while not we_have_measurements_and_reconstructed_values_in_this_timeframe and break_loop < 1000:

        # random slice of n consecutive datapoints

        slice_start = random.randint(0, len(time) - n)
        time_slice = slice(slice_start, slice_start + n)

        if n == len(df):
            we_have_measurements_and_reconstructed_values_in_this_timeframe = True
        else:
            break_loop += 1
            # check in time slice if we have measurements and reconstructed values
            we_have_measurements_and_reconstructed_values_in_this_timeframe = not (np.all(np.isnan(measurements_values[time_slice])) or np.all(np.isnan(reconstructed_median_va

    time = time[time_slice]

    plt.ylabel("Temperature at surface [C°]")
```

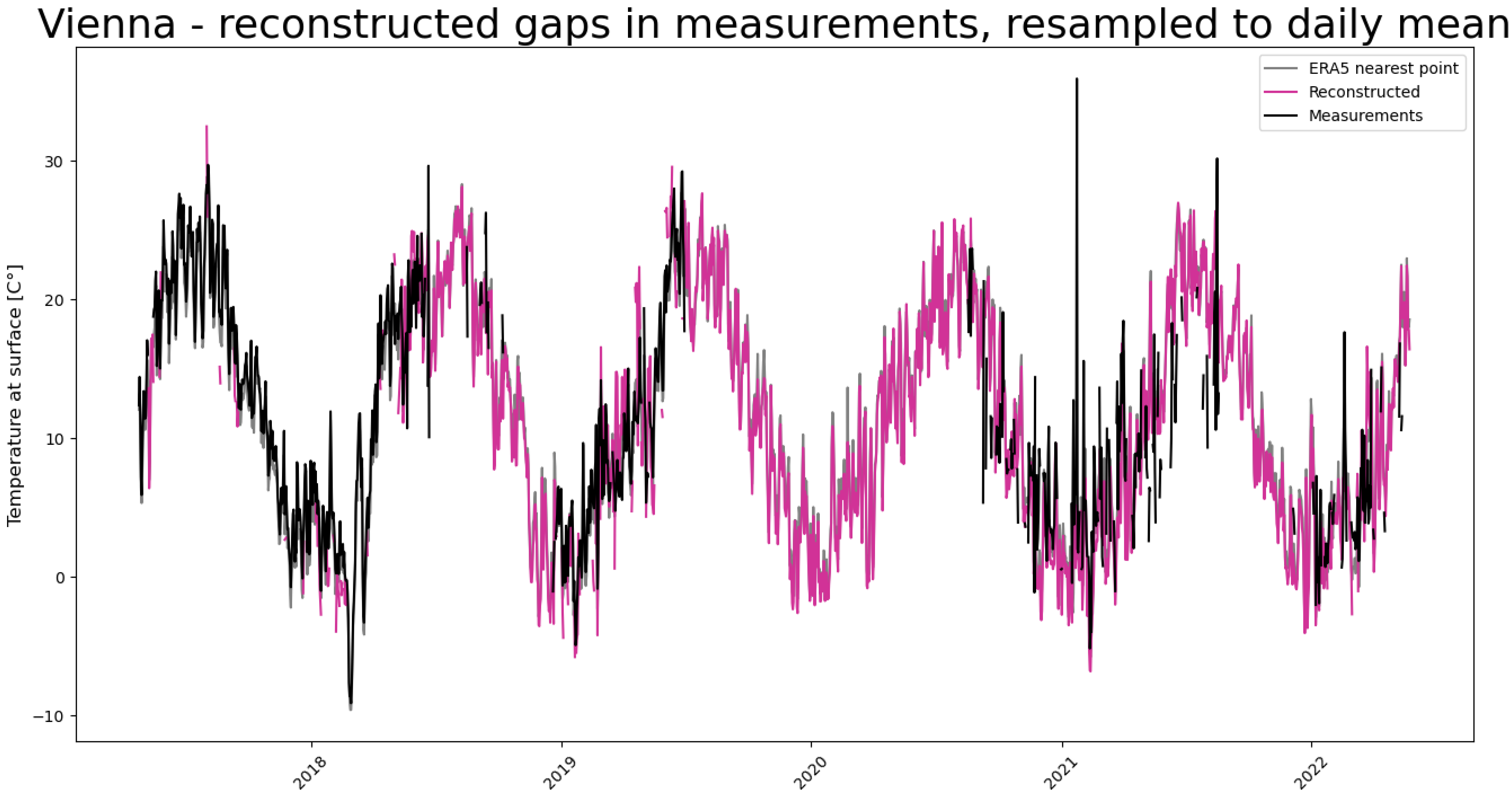
```python
    plt.plot(time, era5_nearest_values[time_slice], label="ERA5 nearest point", color="grey", linestyle="--" if n <= 168 else "-")
    # plt.plot(time, era5_mid_values[time_slice], label="ERA5 nearest 4 points")


    plt.plot(time, reconstructed_median_values[time_slice], label="Reconstructed", color="#d13297", linestyle="-", marker="o" if n <= 168 else "")
    plt.plot(time, measurements_values[time_slice], label="Measurements", color="black", linestyle="-", marker="o" if n <= 168 else "")

    # x-axis labels 90 degrees
    plt.xticks(rotation=45)

    # title
    if title is not None:
        plt.title(title)


    # font size of legend
    plt.rcParams.update({'font.size': 10})

    # font size of axis labels
    plt.rcParams.update({'axes.labelsize': 12})

    # font size of title
    plt.rcParams.update({'axes.titlesize': 26})

    plt.legend()

    # figure size A4 landscape
    plt.gcf().set_size_inches(16, 8)

    plt.show()
```

In [ ]:
```python
plot_n_steps_of_filled_in_df(hourly_filled_gaps_df, title=f"{station_name} - reconstructed gaps in measurements")
```



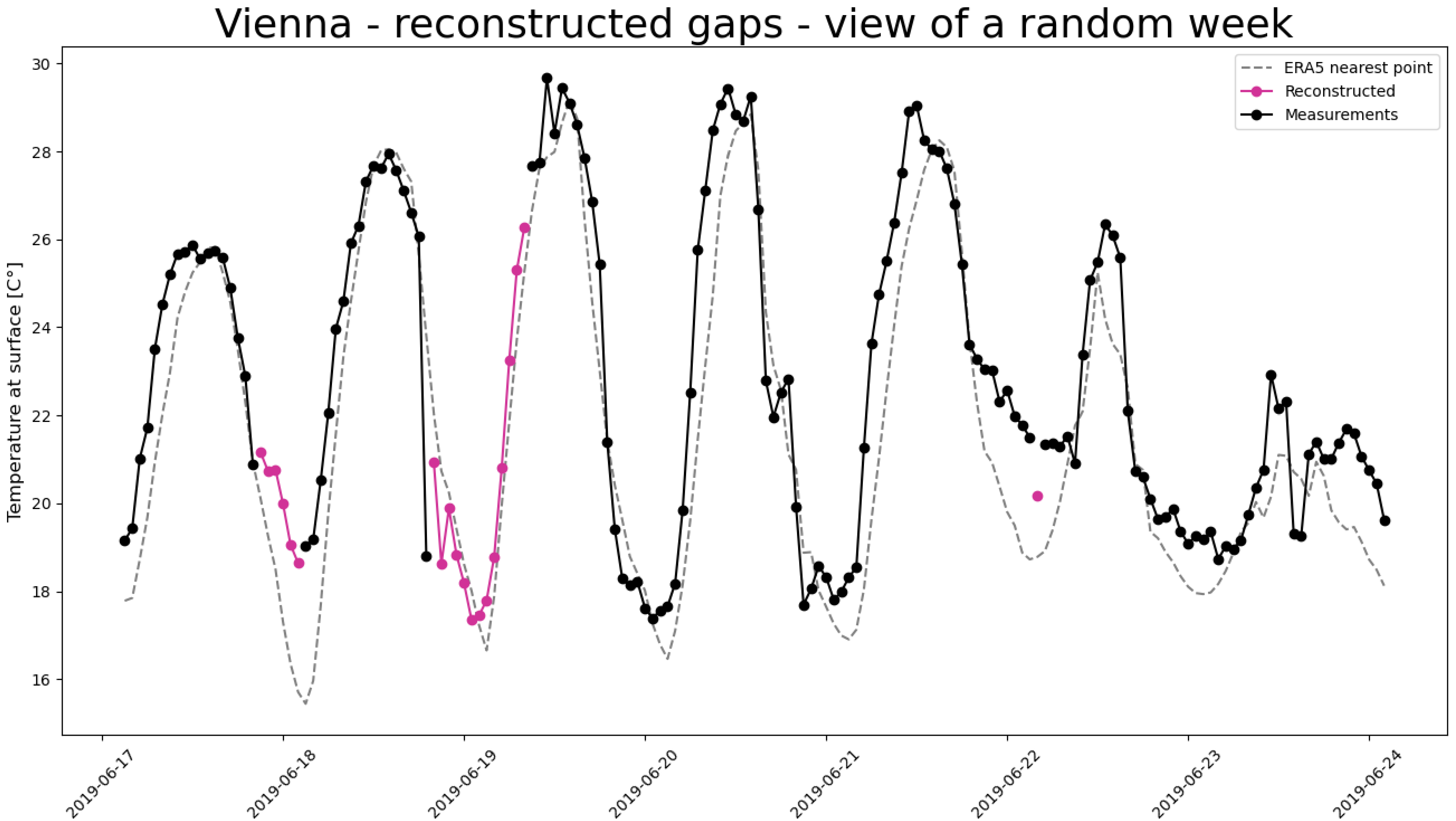
Resampled to Daily Mean

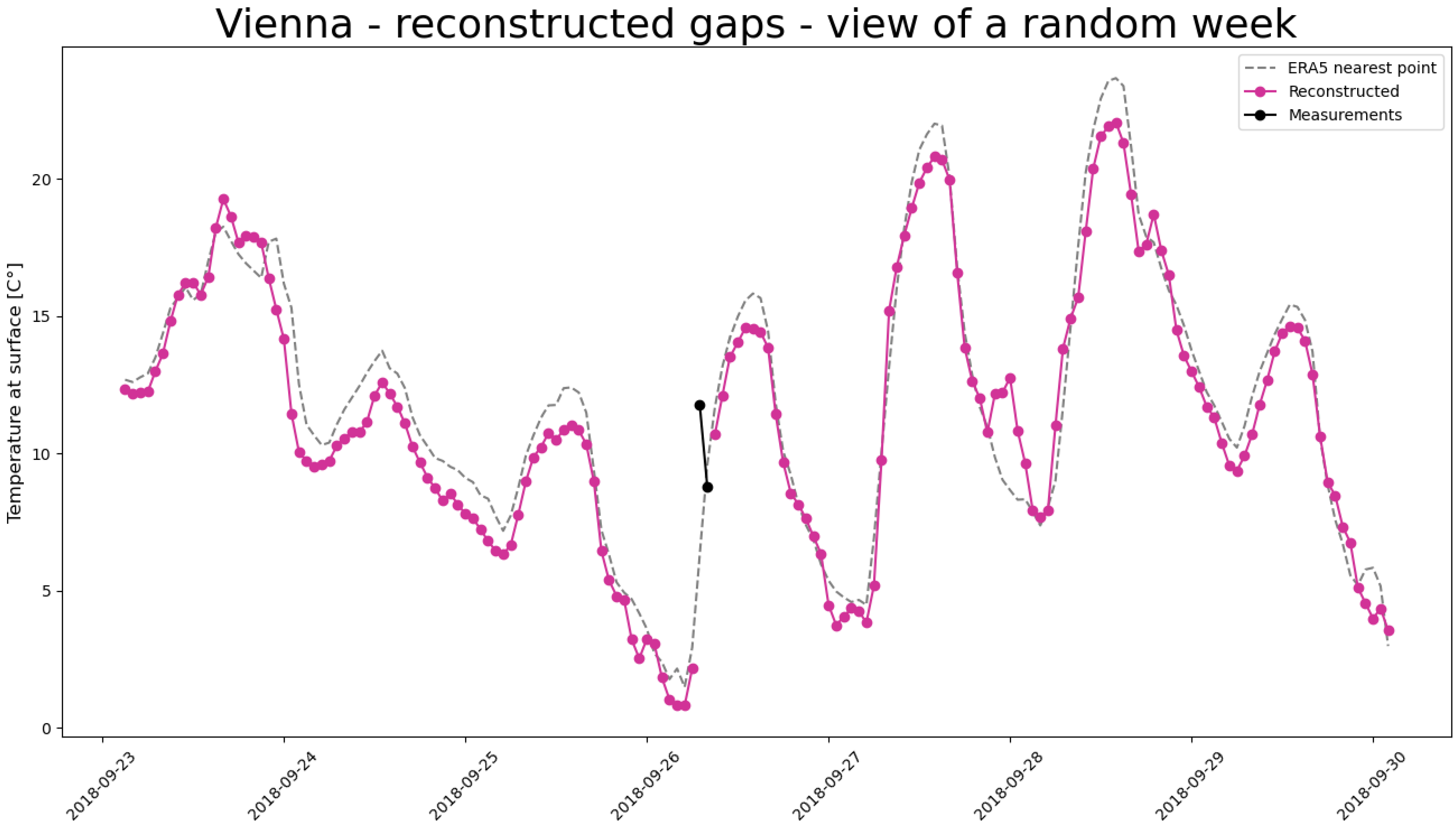
In [ ]:
```
daily_filled_gaps_df = hourly_filled_gaps_df.resample("D").mean()
plot_n_steps_of_filled_in_df(daily_filled_gaps_df, title=f"{station_name} - reconstructed gaps in measurements, resampled to daily mean")
```

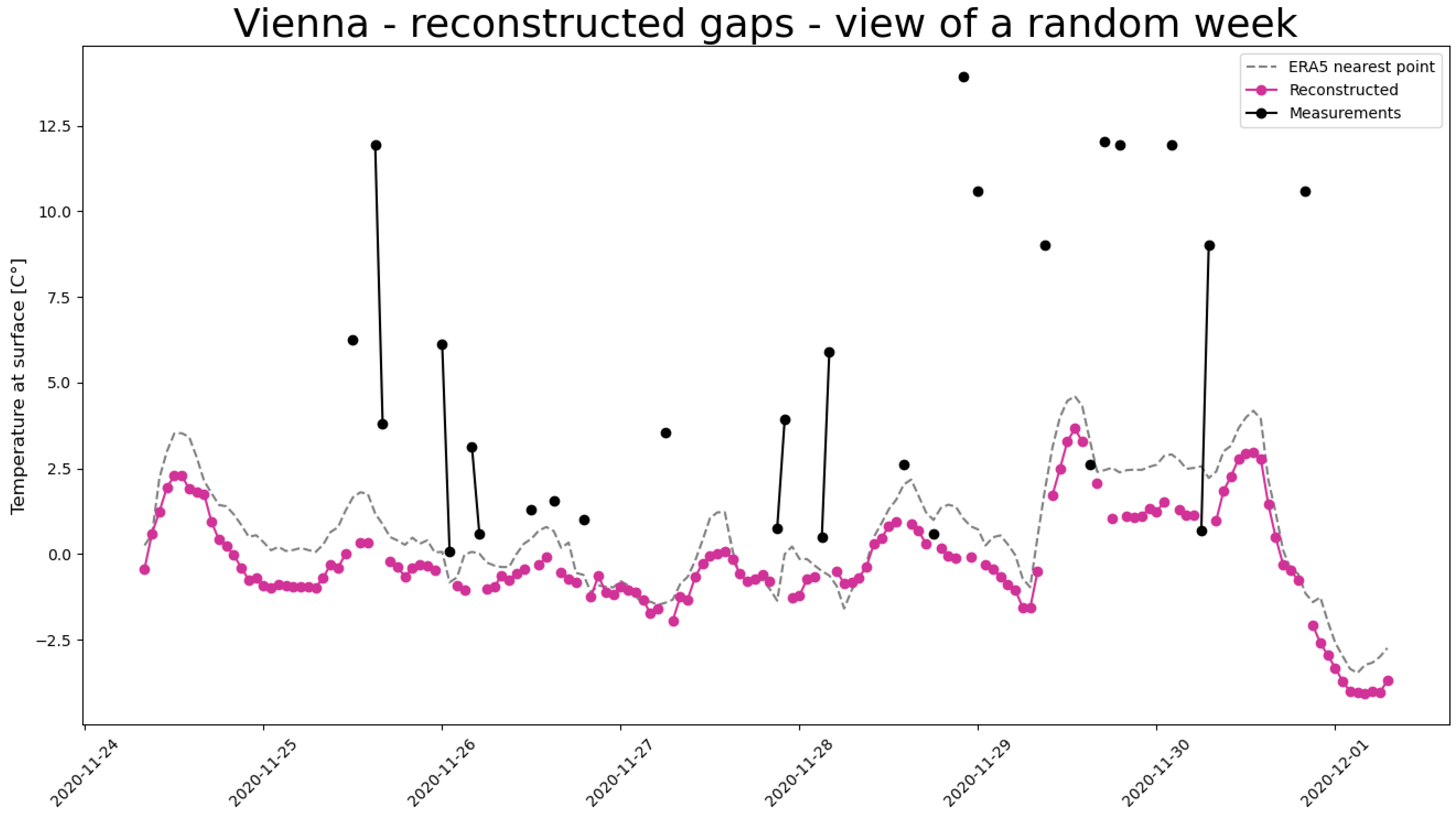


Plot random weeks

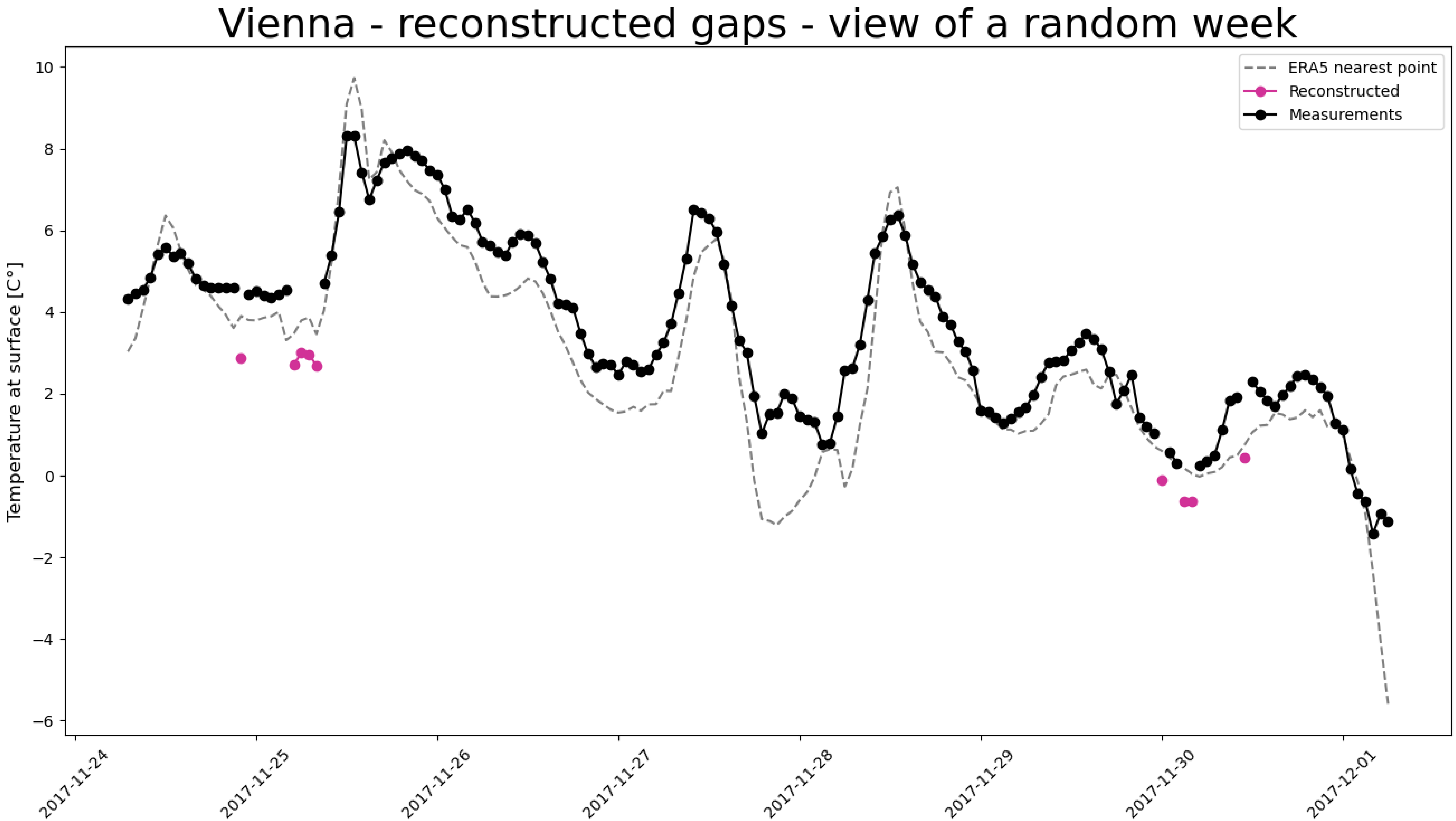
In [ ]:
```
for i in range(10):
    plot_n_steps_of_filled_in_df(hourly_filled_gaps_df, n=168, title=f"{station_name} - reconstructed gaps - view of a random week")
```


Vienna - reconstructed gaps - view of a random week
ERA5 nearest point
Reconstructed
Measurements
Temperature at surface [C°]
30
28
26
24
22
20
18
16
2019-06-17
2019-06-18
2019-06-19
2019-06-20
2019-06-21
2019-06-22
2019-06-23
2019-06-24

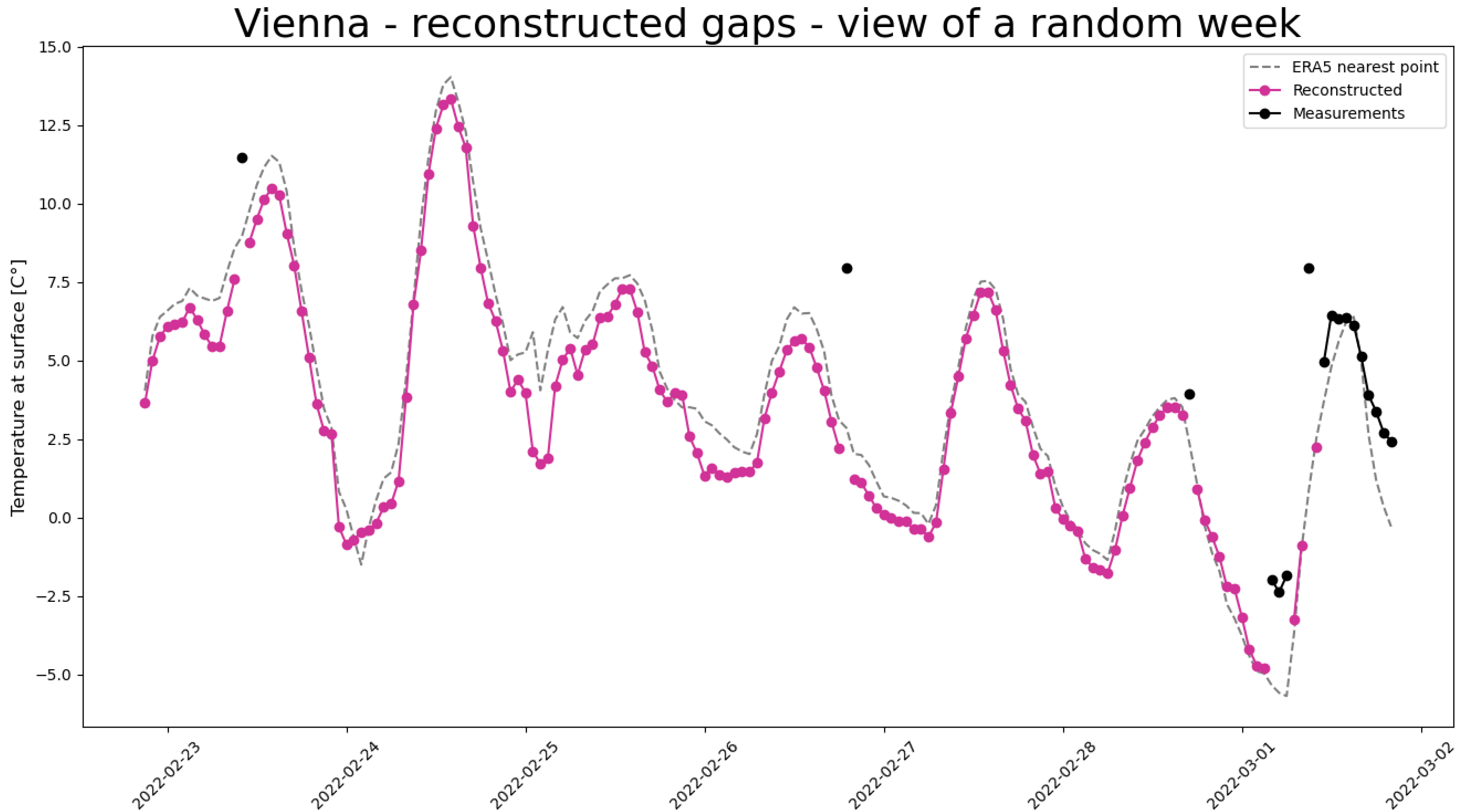

Vienna - reconstructed gaps - view of a random week
ERA5 nearest point
Reconstructed
Measurements
Temperature at surface [C°]
0
5
10
15
20
2018-09-23
2018-09-24
2018-09-25
2018-09-26
2018-09-27
2018-09-28
2018-09-29
2018-09-30



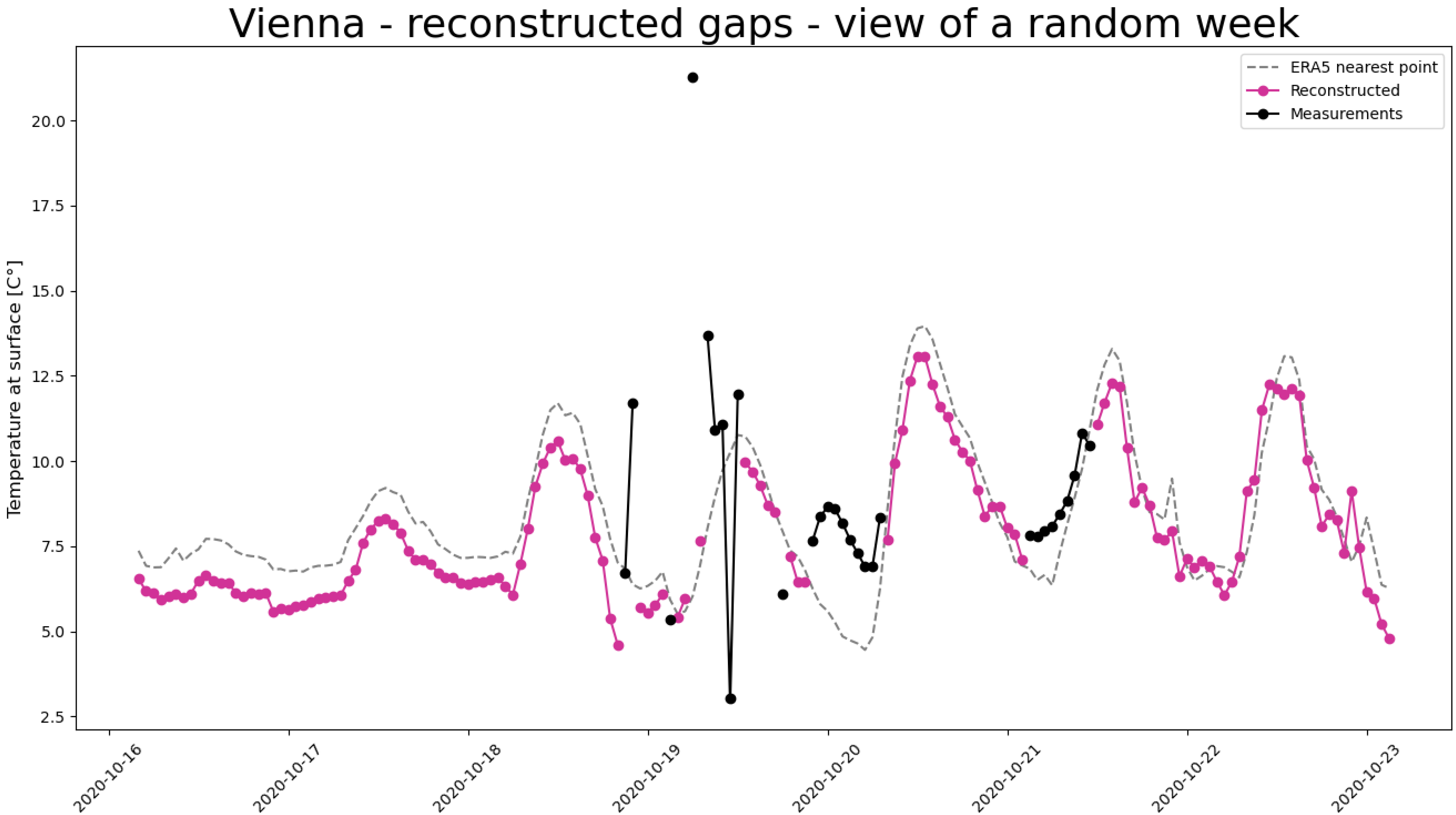
Vienna - reconstructed gaps - view of a random week
ERA5 nearest point
Reconstructed
Measurements
Temperature at surface [C°]
12.5
10.0
7.5
5.0
2.5
0.0
−2.5
2020-11-24
2020-11-25
2020-11-26
2020-11-27
2020-11-28
2020-11-29
2020-11-30
2020-12-01

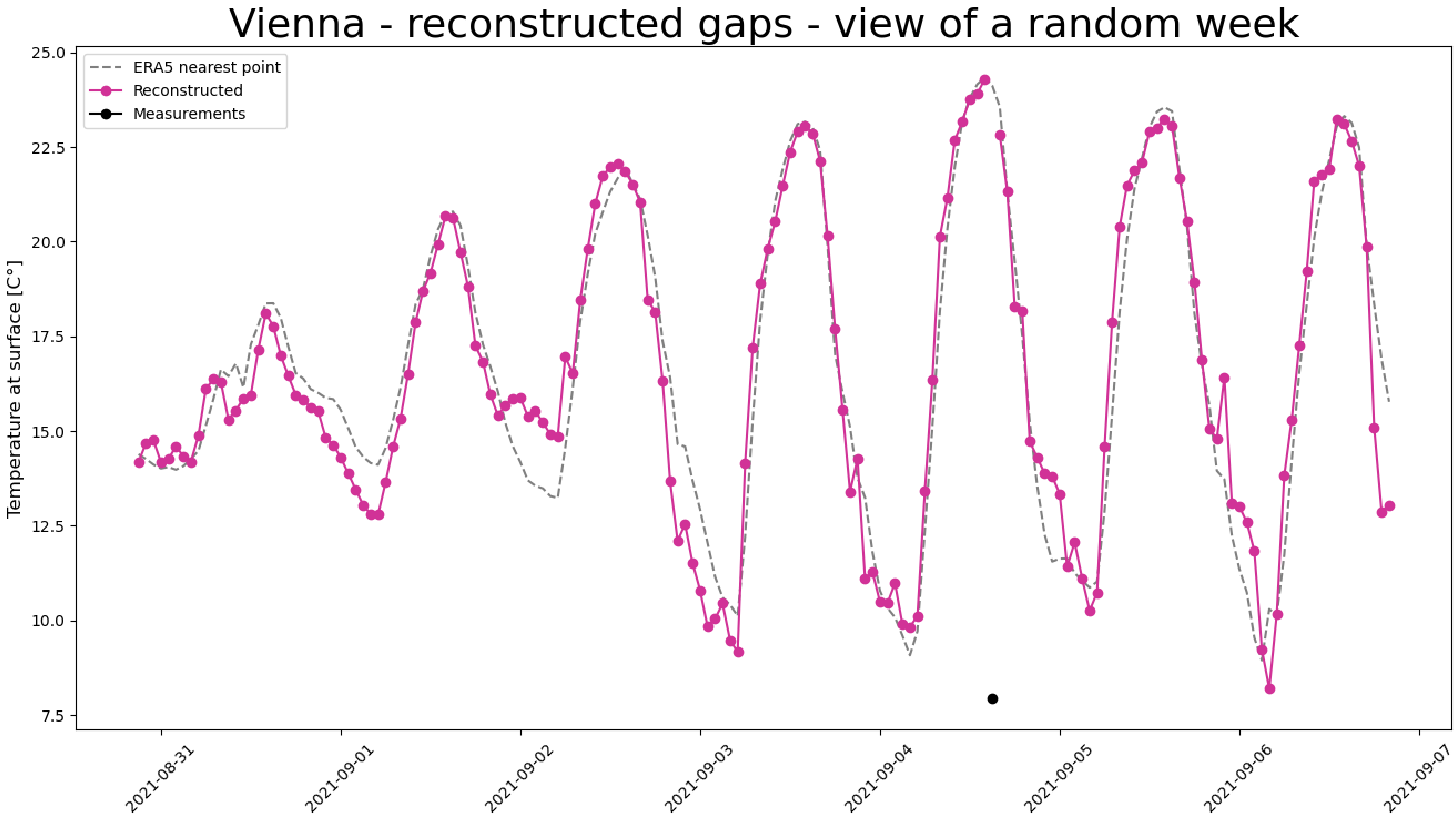


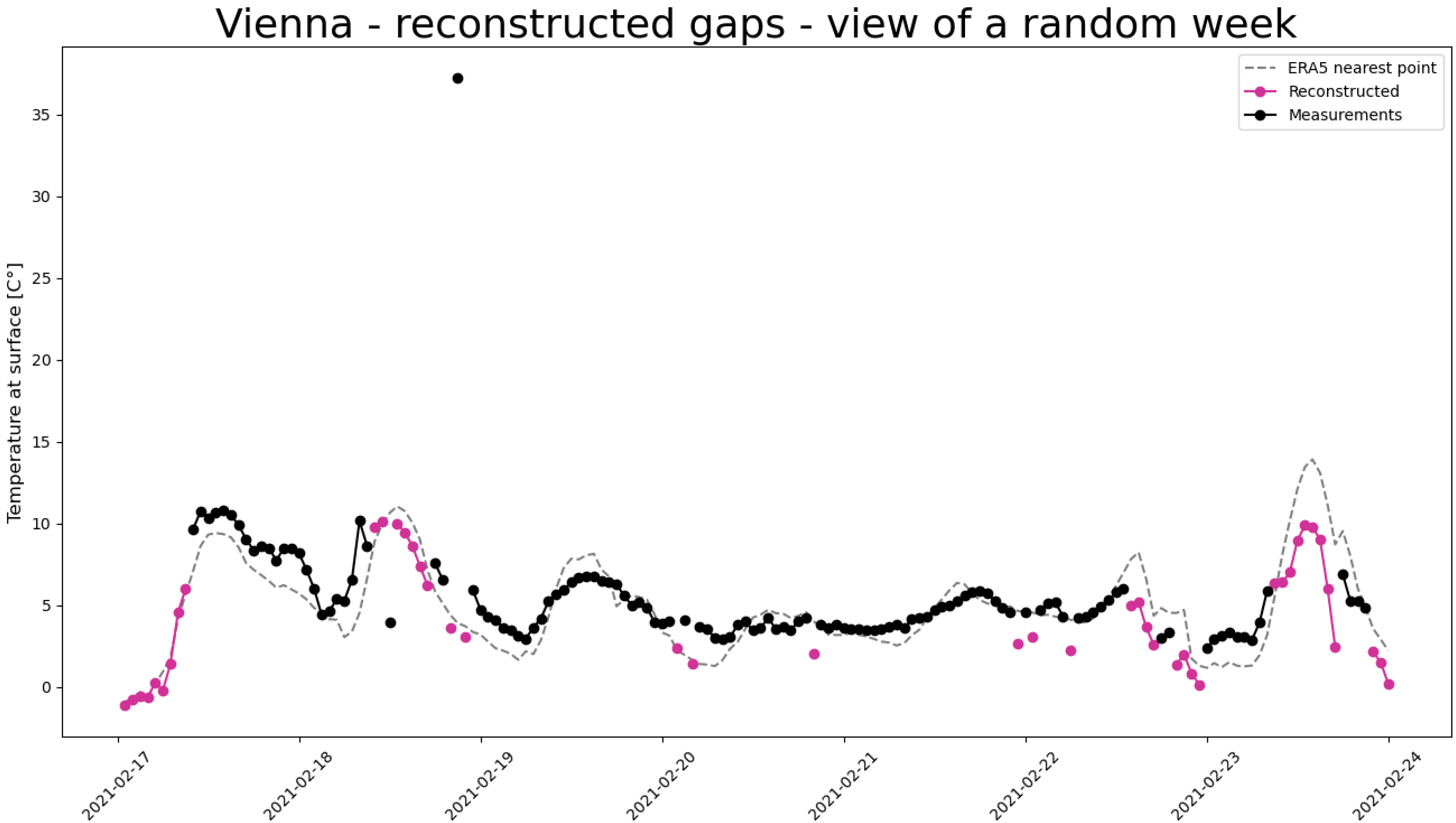
Vienna - reconstructed gaps - view of a random week
ERA5 nearest point
Reconstructed
Measurements
Temperature at surface [C°]
10
8
6
4
2
0
−2
−4
−6
2017-11-24
2017-11-25
2017-11-26
2017-11-27
2017-11-28
2017-11-29
2017-11-30
2017-12-01



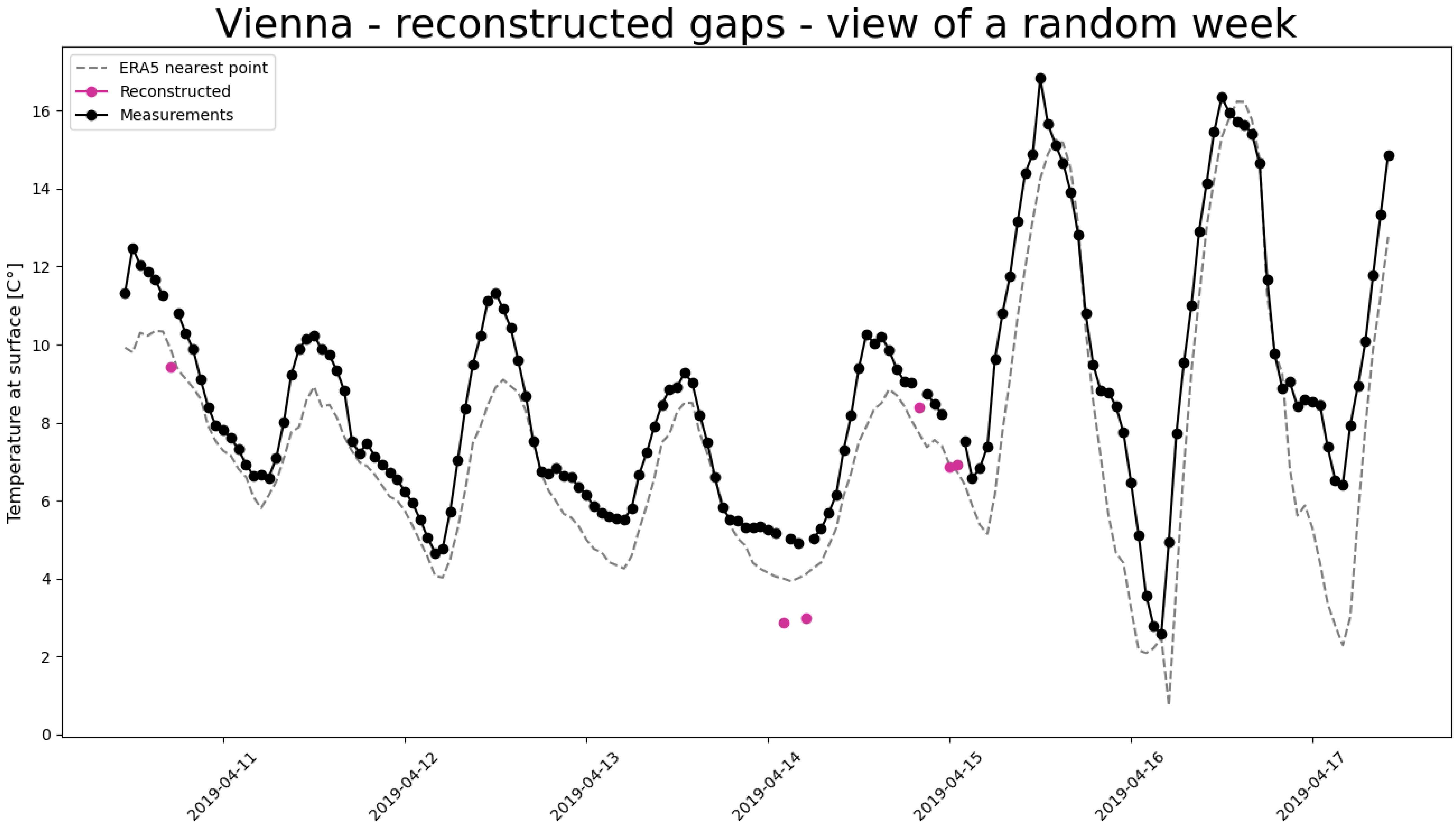
Vienna - reconstructed gaps - view of a random week
Temperature at surface [C°]
15.0
12.5
10.0
7.5
5.0
2.5
0.0
−2.5
−5.0
2022-02-23
2022-02-24
2022-02-25
2022-02-26
2022-02-27
2022-02-28
2022-03-01
2022-03-02
ERA5 nearest point
Reconstructed
Measurements

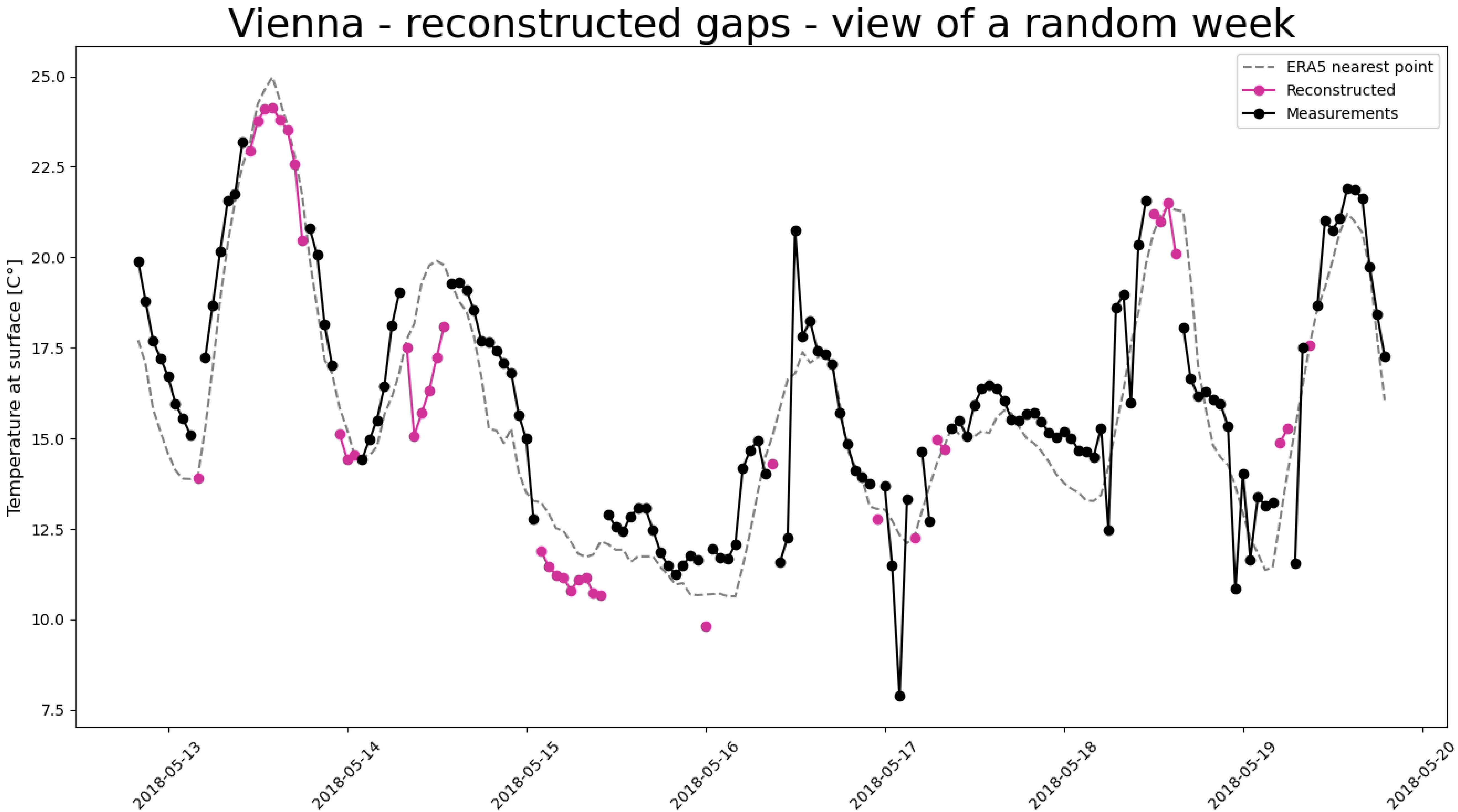

Vienna - reconstructed gaps - view of a random week
ERA5 nearest point
Reconstructed
Measurements
Temperature at surface [C°]
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
2020-10-16
2020-10-17
2020-10-18
2020-10-19
2020-10-20
2020-10-21
2020-10-22
2020-10-23


Vienna - reconstructed gaps - view of a random week
ERA5 nearest point
Reconstructed
Measurements
Temperature at surface [C°]
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
2021-08-31
2021-09-01
2021-09-02
2021-09-03
2021-09-04
2021-09-05
2021-09-06
2021-09-07



Vienna - reconstructed gaps - view of a random week
ERA5 nearest point
Reconstructed
Measurements
Temperature at surface [C°]
0
5
10
15
20
25
30
35
2021-02-17
2021-02-18
2021-02-19
2021-02-20
2021-02-21
2021-02-22
2021-02-23
2021-02-24


Vienna - reconstructed gaps - view of a random week
ERA5 nearest point
Reconstructed
Measurements
Temperature at surface [C°]
0
2
4
6
8
10
12
14
16
2019-04-11
2019-04-12
2019-04-13
2019-04-14
2019-04-15
2019-04-16
2019-04-17


Vienna - reconstructed gaps - view of a random week
ERA5 nearest point
Reconstructed
Measurements
Temperature at surface [C°]
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
2018-05-13
2018-05-14
2018-05-15
2018-05-16
2018-05-17
2018-05-18
2018-05-19
2018-05-20