import seaborn as sns

# Define the climate periods with clear labels

climate\_periods = [

("RWP", 0, 200),

("DACP", 200, 550),

("S&TWP", 550, 700),

("MCA", 900, 1400),

("LIA", 1400, 1850),

("CWP", 1850, 2024)

]

# Categorize the data based on the climate periods

data['Period'] = pd.cut(data['Age'], bins=[0, 200, 550, 700, 1400, 1850, 2024], labels=["RWP", "DACP", "S&TWP", "MCA", "LIA", "CWP"])

# Time Series Plot

plt.figure(figsize=(14, 8))

sns.lineplot(data=data, x='Age', y='CaCO3', hue='Period', palette='tab10')

plt.xlabel('Age (Years CE)')

plt.ylabel('CaCO3 (%)')

plt.title('CaCO3 Concentration over Time by Climate Period')

plt.legend(title='Climate Period')

plt.grid(True)

plt.show()

# Box Plot

plt.figure(figsize=(14, 8))

sns.boxplot(data=data, x='Period', y='CaCO3', palette='tab10')

plt.xlabel('Climate Period')

CaCo3 analysis

import pandas as pd

# Load the dataset

file\_path = '/mnt/data/CaCo3.csv'

data = pd.read\_csv(file\_path)

# Display the first few rows of the dataset to understand its structure

data.head()

plt.ylabel('CaCO3 (%)')

plt.title('Distribution of CaCO3 Concentration by Climate Period')

plt.grid(True)

plt.show()

# Density Plot

plt.figure(figsize=(14, 8))

sns.kdeplot(data=data, x='CaCO3', hue='Period', fill=True, common\_norm=False, palette='tab10')

plt.xlabel('CaCO3 (%)')

plt.ylabel('Density')

plt.title('Density Plot of CaCO3 Concentration by Climate Period')

plt.grid(True)

plt.show()

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plt.show()

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plt.ylabel('CaCO3 (%)')

plt.title('Distribution of CaCO3 Concentration by Climate Period')

plt.grid(True)

plt.show()

# Density Plot

plt.figure(figsize=(14, 8))

sns.kdeplot(data=data, x='CaCO3', hue='Period', fill=True, common\_norm=False, palette='tab10')

plt.xlabel('CaCO3 (%)')

plt.ylabel('Density')

plt.title('Density Plot of CaCO3 Concentration by Climate Period')

plt.grid(True)

plt.show()

# Time Series Plot

plt.figure(figsize=(14, 8))

sns.lineplot(data=data\_clean, x='Age', y='CaCO3', hue='Period', palette='tab10')

plt.xlabel('Age (Years CE)')

plt.ylabel('CaCO3 (%)')

plt.title('CaCO3 Concentration over Time by Climate Period')

plt.legend(title='Climate Period')

plt.grid(True)

plt.savefig('/mnt/data/Time\_Series\_Plot.svg', format='svg')

plt.show()

# Box Plot

plt.figure(figsize=(14, 8))

sns.boxplot(data=data\_clean, x='Period', y='CaCO3', palette='tab10')

plt.xlabel('Climate Period')

plt.ylabel('CaCO3 (%)')

plt.title('Distribution of CaCO3 Concentration by Climate Period')

plt.grid(True)

plt.savefig('/mnt/data/Box\_Plot.svg', format='svg')

plt.show()