Grain size data

# Load the grain size dataset with the correct path

grain\_size\_path = '/mnt/data/grain .csv'

grain\_size\_data = pd.read\_csv(grain\_size\_path)

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

grain\_size\_data.head()

# Display the first few rows with more context to identify the issues

grain\_size\_data.head(10)

# Define the climate periods

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

grain\_size\_data['Period'] = pd.cut(grain\_size\_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=grain\_size\_data, x='Age', y='Mean\_Grain\_Size', hue='Period', palette='tab10')

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

plt.ylabel('Mean Grain Size (μm)')

plt.title('Mean Grain Size 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=grain\_size\_data, x='Period', y='Mean\_Grain\_Size', palette='tab10')

plt.xlabel('Climate Period')

plt.ylabel('Mean Grain Size (μm)')

plt.title('Distribution of Mean Grain Size by Climate Period')

plt.grid(True)

plt.show()

# Save the plots as SVG files

# Time Series Plot

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

sns.lineplot(data=grain\_size\_data, x='Age', y='Mean\_Grain\_Size', hue='Period', palette='tab10')

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

plt.ylabel('Mean Grain Size (μm)')

plt.title('Mean Grain Size over Time by Climate Period')

plt.legend(title='Climate Period')

plt.grid(True)

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

plt.show()

# Box Plot

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

sns.boxplot(data=grain\_size\_data, x='Period', y='Mean\_Grain\_Size', palette='tab10')

plt.xlabel('Climate Period')

plt.ylabel('Mean Grain Size (μm)')

plt.title('Distribution of Mean Grain Size by Climate Period')

plt.grid(True)

plt.savefig('/mnt/data/Grain\_Size\_Box\_Plot.svg', format='svg')

plt.show()