

TUTORIAL I

To do:

- Plot Global mean temperature change using different datasets:
 - 1) Metoffice, UK:
<https://www.metoffice.gov.uk/hadobs/hadcrut5/data/HadCRUT.5.0.2.0/download.html>
 - 2) NOAA, US:
<https://www.ncei.noaa.gov/products/land-based-station/noaa-global-temp>
 - Additional datasets: ERA5, NASA, Berkely etc.,
- Anomalies: Calculate anomalies for different baseline periods (1850-1900, 1850-1880 etc.,)

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Steps to take:

1. Download Data: [\[link\]](#) (NOAA)

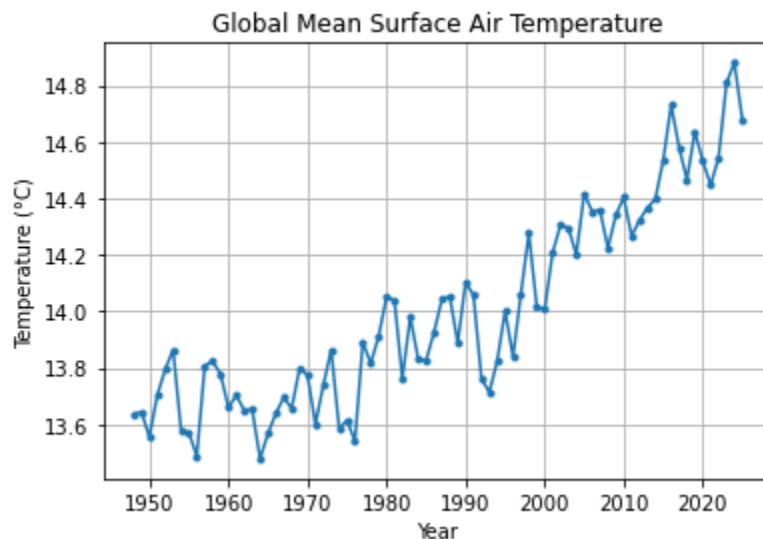
2. Read Global Mean Temperature Time Series:

```
import xarray as xr
ds = xr.open_dataset('tutorial_t.nc')    # Load the dataset
global_mean = ds.air                    # Read the temperature variable
```

3. Visualising the data

```
import matplotlib.pyplot as plt
temp=data.air
```

```
temp.plot(marker='.', label='Global Mean Temp (°C)')
plt.title("Global Mean Surface Air Temperature")
plt.ylabel("Temperature (°C)")
plt.xlabel("Year")
plt.grid(True)
plt.legend()
plt.show()
```



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4. Baseline:

i) Choose a baseline e.g 1951-1980:

```
baseline1 = ts_celsius.sel(year=slice(1951, 1980))  
baseline1_mean = baseline1.mean()  
anomaly1 = ts_celsius - baseline1_mean
```

```
plt.figure(figsize=(10,6))  
anomaly1.plot(label='Anomaly (1951-1980)')  
plt.axhline(0, color='gray', linestyle='--')  
plt.title("Global Mean Temperature Anomalies")  
plt.xlabel("Year")  
plt.ylabel("Anomaly (°C)")  
plt.grid(True)  
plt.legend()  
plt.show()
```

