

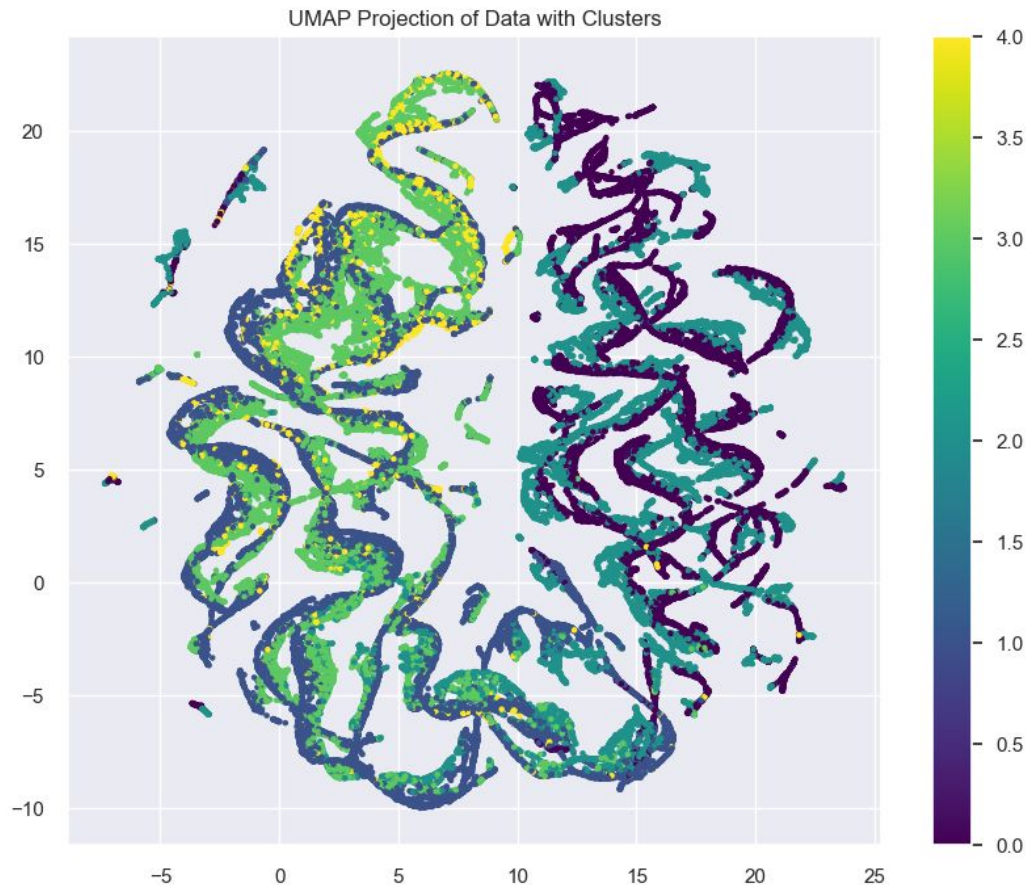
Climate Patterns Insight

- **Challenge:** **climate patterns understanding.**
- **Objective:** analyze data using **K-Means** and **UMAP clustering** for insights.
- **Data:** ~400K rows, **~250 columns**, from the US.
- **Timeline:** **4 years**, from mid-2014 to late 2022, with a gap from 2017 to 2022.
- **Source:** WiDS Worldwide Datathon, Stanford, Harvard, in partnership with CCAI.

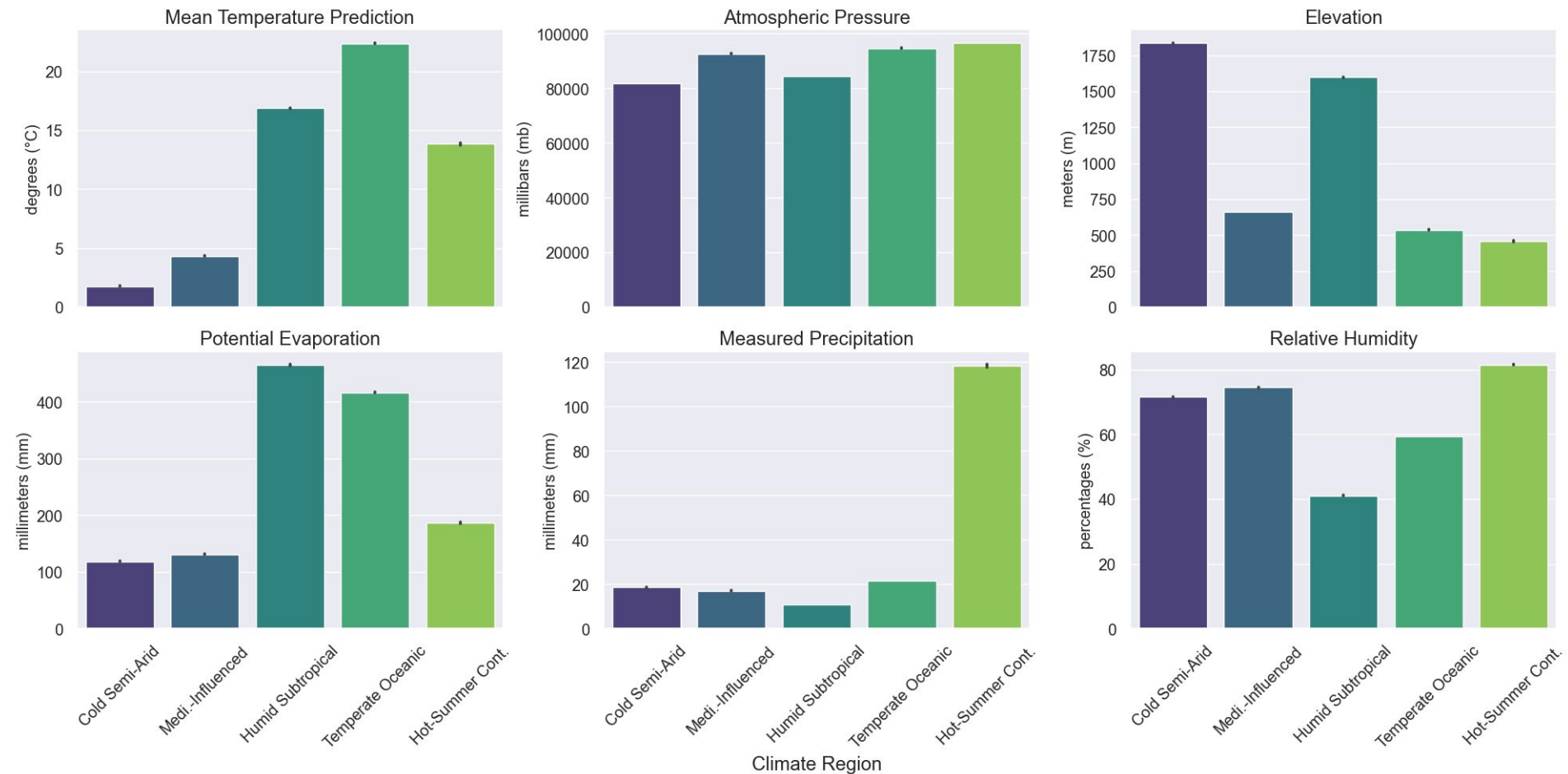


Temporal Patterns of 5 Clusters

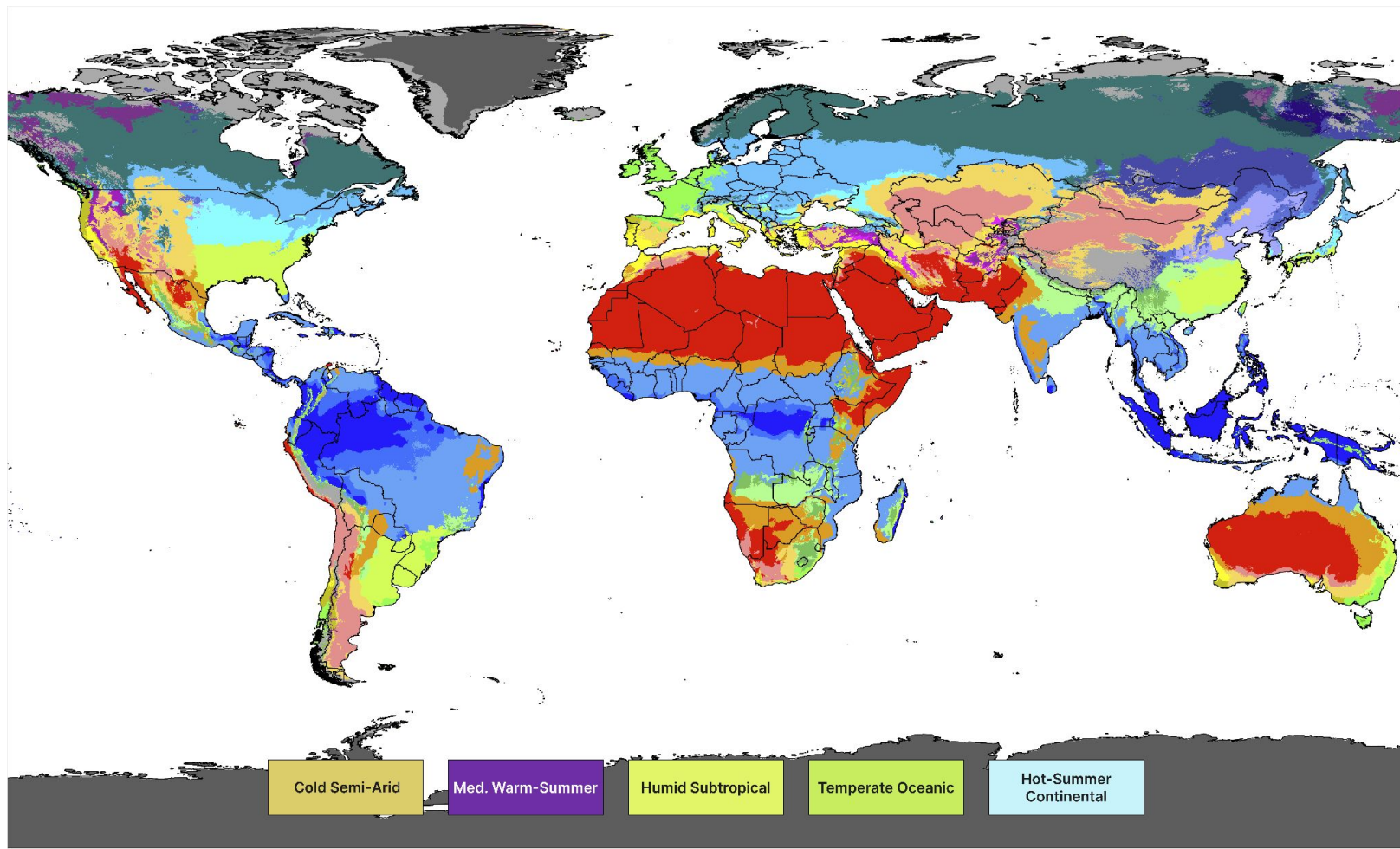
- **Dimensionality Reduction:** low-dimensional representation **preserving temporal relations**.
- **Time-Based Clusters:** **similar temporal behaviors** in close data points.
- **Local and Global Trends:** both short-term fluctuations and long-term trends.
- **Smooth Transitions:** **gradual changes**, not abrupt shifts, consistent with seasonality.
- **Outliers:** isolated points signify anomalies in time series.



Clusters Characteristics (Köppen System)



Clusters on World Map



Main Findings:

5 Climate patterns, that match Köppen System, have been found:

- **Cold Semi-Arid:** cold winters, limited rain.
- **Mediterranean-Influenced:** warm-summer humid continental climate, wet winters.
- **Humid Subtropical:** hot summers, mild winters, rainfall year-round.
- **Temperate Oceanic:** mild, humid, cool summers.
- **Hot-Summer Continental:** hot summers, cold winters, seasonal rain, potentially exceeding year-round rainfall.

Main Challenges:

- Sifting through large amount of columns.
- Finding the right visualization approach.