xCDAT : A Python Package for Simple and Robust Analysis of Climate Data

Need

- The volume of climate data continues to grow due to increases in the number and resolution of model and observational datasets
- Need fast, reliable climate data analysis software to execute cutting-edge climate research

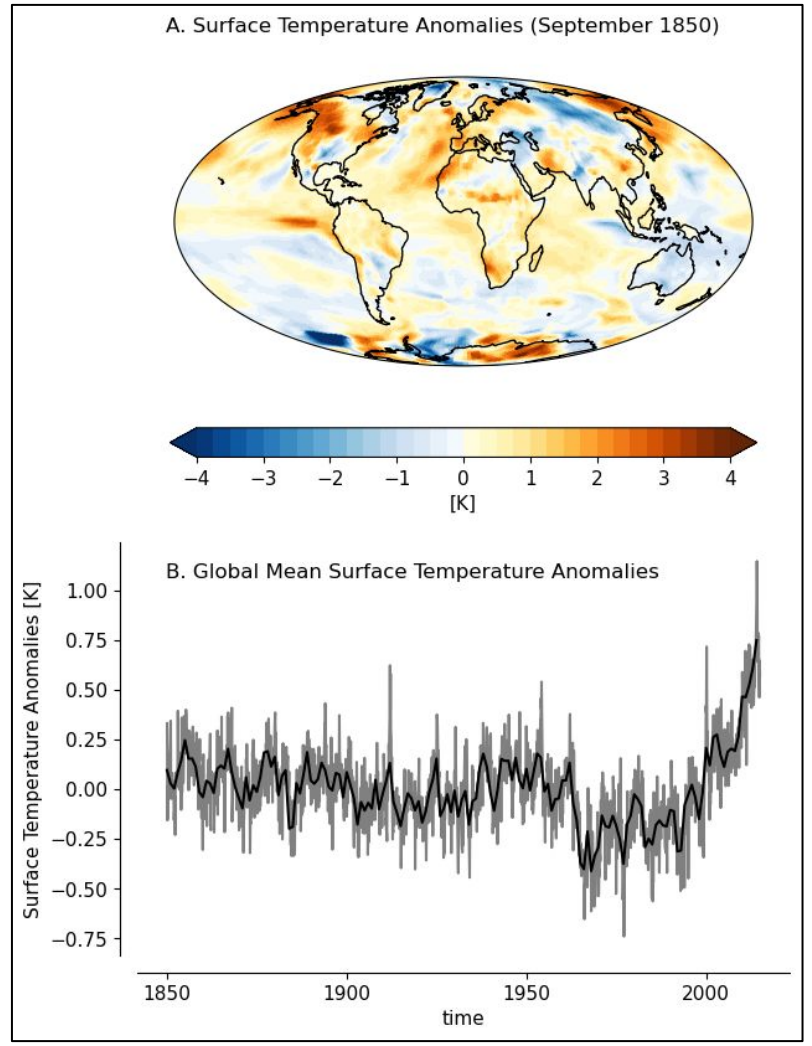
Approach

- Developed **xCDAT (Xarray Climate Data Analysis Tools)** to address this need, which builds climate analysis tools on top of standard, climate and array-based software tools (i.e., xarray, xgcm, cf-xarray, xESMF, CF-conventions)
- Key features include: read/write of datasets, spatial/temporal averaging, and regridding

Impact

- **Rapid adoption**: 15,000+ total downloads on Anaconda and 100+ stars on GitHub
- **Being integrated as data processing engine** within the **PCMDI Metrics Package** and **E3SM Diagnostics Package**. Included in the **E3SM Unified Environment** as a tool for post processing and analyzing E3SM data.

Figure 1. Output based on core xCDAT capabilities including reading data, departure calculations, spatial averaging, temporal averaging in just 5 lines of code. *A) Monthly surface skin temperature anomalies for September 1850. B) Monthly (gray) and annual (black) global mean surface skin temperature anomaly values. Temperature data is from an E3SMv2 climate model (Golaz et al., 2022) simulation over the historical period (1850 – 2014).*



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