Background:

The problem: The Climate Model Intercomparison Project Phase 6 (CMIP6) offers an abundance of important data in summarizing and understanding climate change. This data consists of a series of global simulations from different climate models under various scenarios of human activity. These climate models are important to understand because they provide an invaluable tool to study the past, present, and future climate in order to create climate projections, inform policy decisions, and advance scientific knowledge of climate change. Further, it is important to understand the uncertainty associated with these models when interpreting the data. Uncertainty inherently arises in these simulations from the models themselves, from factors in the scenarios (such as emission), and from natural internal variability in the climate. Climate models and uncertainty in climate projections can be challenging to understand for people who are not familiar with climate science or who are not comfortable working directly with the climate model output.

Our solution: A streamlined dashboard for users without a technical background to interact with climate model output and visualize uncertainty for a specific location. This interactive dashboard will allow users to tailor their visualization for specific criteria such as climate variables (temperature, rainfall, etc), location (latitude/longitude or city), scenario, and timespan (year mean, monthly means, seasons, etc.).

User Profiles:

User group	Objective for tool use	Domain(D) & Computing(C) knowledge
Policy makers	Understanding potential impact of changes in scenario	D: low C: low
Urban planners	Understanding infrastructure and resource planning for current scenario	D: low-medium C: low-medium
Social science researchers	Understanding social impacts/implications of climate models and scenario change	D: low-medium C: medium
Advocacy groups	Use for evidence support causes	D: medium C: low
Informed public	Understanding what climate models are and uncertainty for their location and other places	D: variable- low C: variable- low

Data sources:

Name	Location	Type	Structure	Notes
Climate model output	Climate Model Intercomparison Project phase 6	netcdf	Dimensions of latitude, longitude, and time (monthly)	One file for each variable (average, minimum, and maximum monthly temperature), model, and scenario
Historical climate observations	Berkeley Earth Surface Temperature dataset	netcdf	Dimensions of latitude, longitude, and time (monthly)	One file for each variable (average, high, and low temperature)

Use Case 1:
Objective: The user wants to create a climate dashboard for her city to understand climate models and uncertainty.

Expected Interactions:

- *User*: inputs latitude and longitude or city of their chosen location
- *User*: selects variables, e.g. temperature and annual mean
- *Tool*: graphs update for selections

Use Case 2:
Objective: The user wants to understand the changes in climate models and uncertainty when there is a change in scenario.

Expected Interactions:

- *User*: inputs latitude and longitude or city of their chosen location
- *User*: selects variables, e.g. temperature and annual mean
- *Tool*: graphs update for selections
- *User*: selects scenario
- *Tool*: graphs update for scenario selection