Downscaled Data

Global earth system models are tools that help us understand and predict the behavior of the atmosphere, land surface, ocean, and cryosphere. They allow us to experiment how sensitive the earth is to different features such as a cooling of ocean surface temperatures, which we cannot experiment on the actual Earth. A global earth model is a mathematical representation of the:

- Atmosphere
  - Simulates clouds, aerosols, and transportation of heat and water around the Earth
- Land surface
  - Simulates vegetation, snow cover, soil, rivers, and carbon storing
- Ocean
  - Simulates ocean current movement and mixing, and biogeochemistry
- Cryosphere
  - Simulates melting and growth of sea ice, the ice sheets, and glaciers and ice caps
  - Regulates solar radiation absorption and air-sea heat and water exchanges

Earth system models divide the Earth into grid cells representing geographic locations and elevations. These grid cells are often at a coarse resolution. Statistical downscaling is a method used to convert the coarse resolution to a higher spatial resolution to capture observed patterns of daily surface meteorology.

The Local Hazard Outlooks use downscaled global earth system model data over the historic period from the Gridded Surface Meteorological Dataset (gridMET) (Abatzoglou, 2013). gridMET data are available at https://www.climatologylab.org/gridmet.html.

Projections are based on the Multivariate Adaptive Constructed Analogs (MACA) dataset (Abatzoglou and Brown, 2012). MACA data are available at https://www.climatologylab.org/maca.html. The Local Hazard Outlooks use the MACAv2-METDATA dataset due to the larger number of available variables, improved performance for extreme precipitation, and more recent updates when compared with the LOCA dataset used by the U.S. National Climate Assessment. Users are advised that these choices may result in some differences in projected outcomes, particularly at the small spatial scales represented in the Local Hazard Outlooks.

Additional information on global earth system models can be found at https://www.gfdl.noaa.gov/climate-modeling/#What%20is%20a%20Global%20Climate%20Model.

References

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