National Climate Change Viewer for visualizing, summarizing and accessing CMIP5/IPCC AR5 climate model output and water-balance modeling

Steve Hostetler and Jay Alder

National Research Program, Climate and Land Use Research and Development

College of Earth, Oceanic and Atmospheric Science Computing,
Oregon State University

U.S. Department of the Interior
U.S. Geological Survey

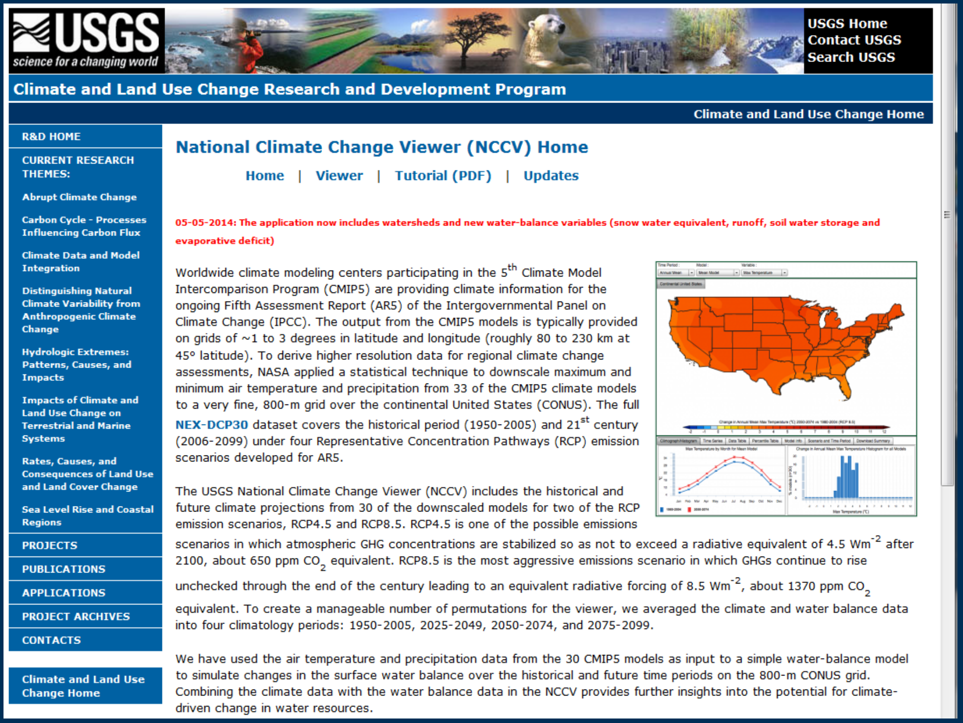
Motivation

- Synthesize and translate huge volumes of climate model output into a form that is understandable, informative, and accessible to a wide range of users
- Model CONUS water balance
- Average data into tangible geographic units: states, counties, USGS hydrologic units
- Provide web applications for viewing, interrogating and accessing data
- Apply data to address climate related research

State, county and HUC viewer

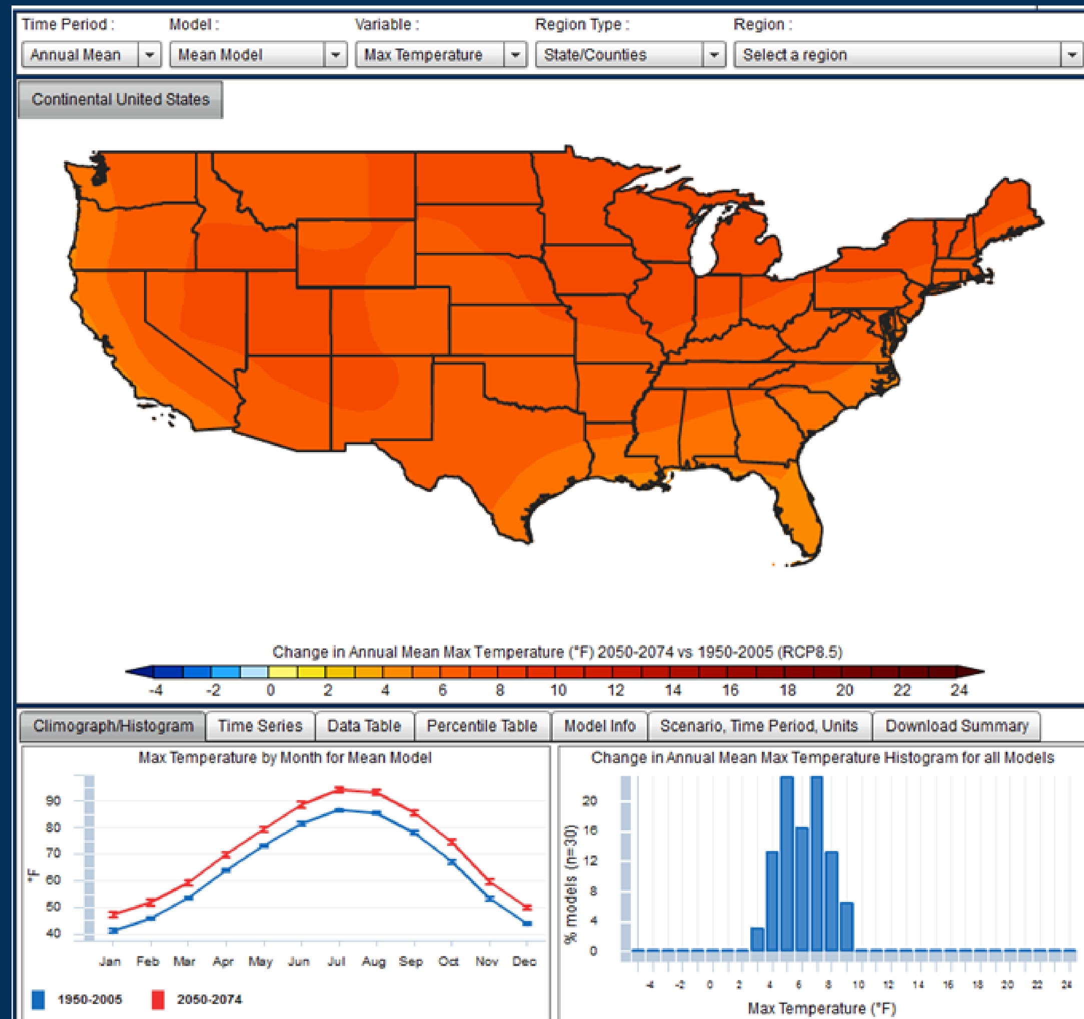
(http://www.usgs.gov/climate_landuse/clu_rd/nccv.asp; doi:10.5066/F7W9575T)

- 30 CMIP5/IPCC models
- Temperature and precipitation statistically downscaled to 800 m by NASA using BCSD
- Middle (RCP4.5, ~650 ppm CO_2) and high (RCP8.5, 1370 ppm CO_2) IPCC emissions scenarios
- Historical (1950-2005) and future 25-yr averaging periods (2025-2049, 2050-2074, and 2075-2099)
- Water balance modeling at 800 m
- Averaged over US, states, counties and USGS HUCs



Design

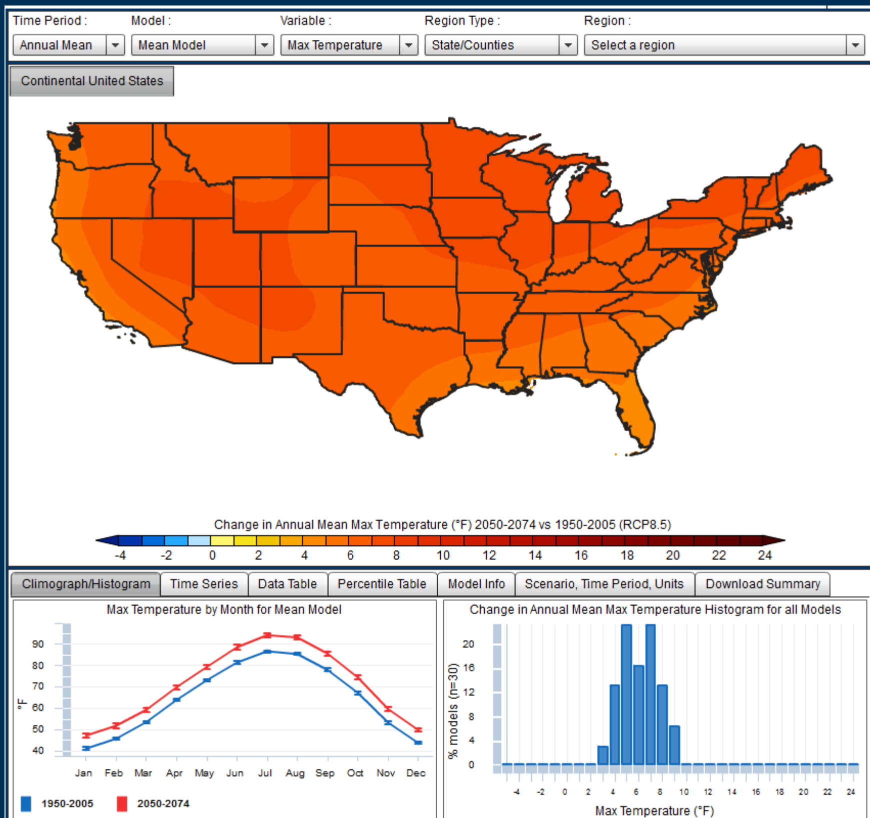
- Simple user interface
- Tutorial (PDF)
- Maps, graphs charts
- Summaries (PDF)
- Data (spreadsheet)



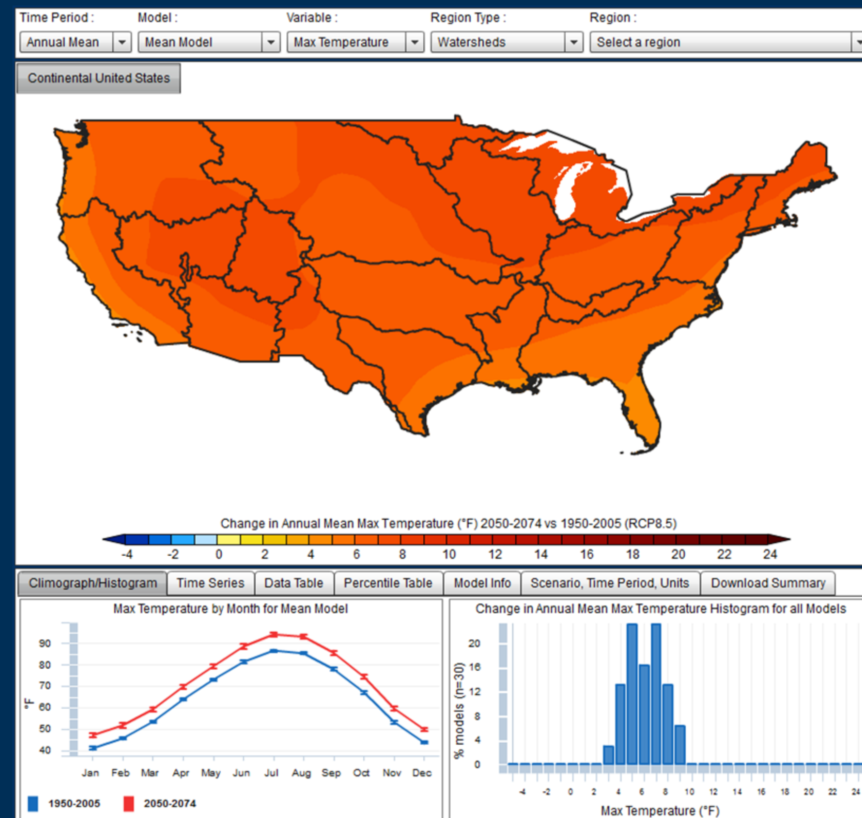
USGS

CONUS (2050-2074)

States/counties

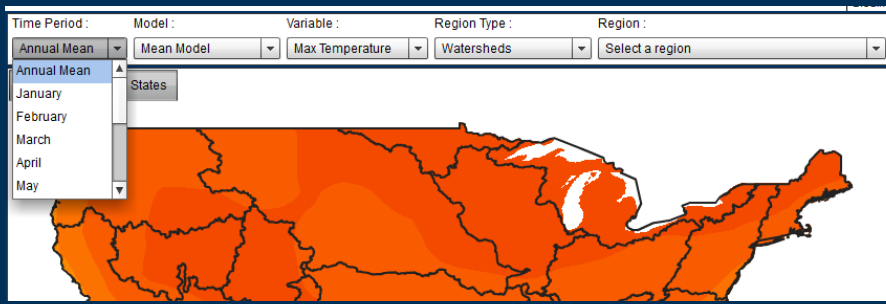


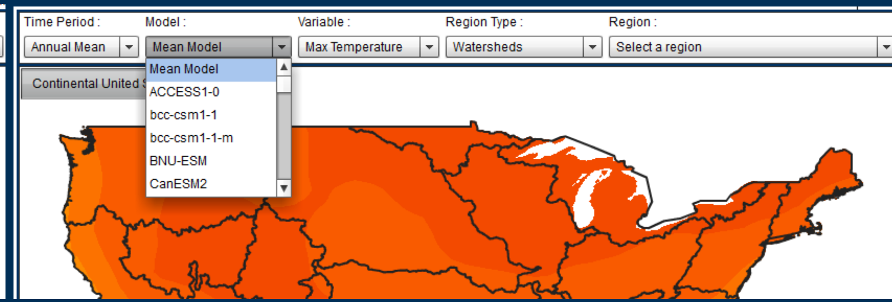
USGS HUCs

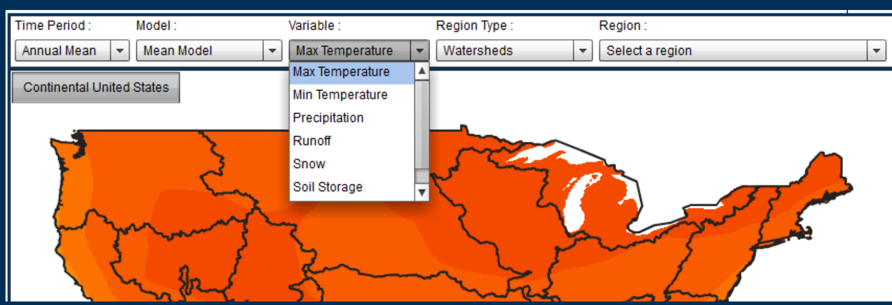


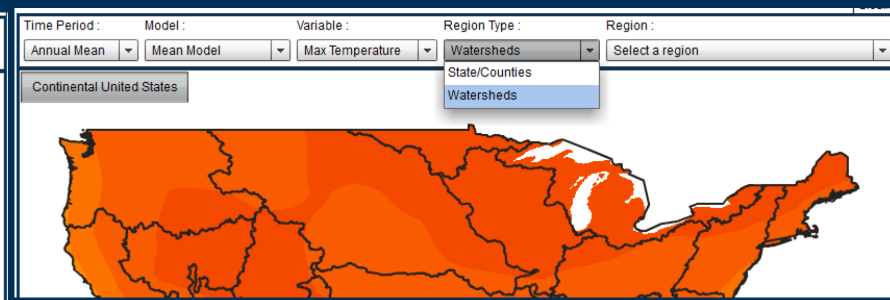
USGS

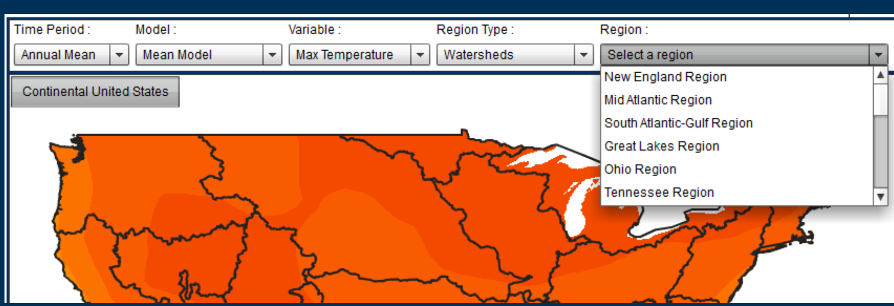
Viewer settings





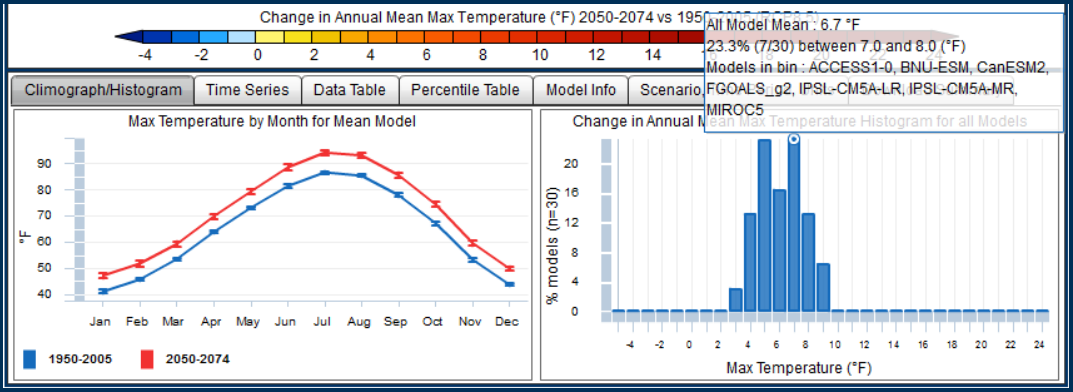


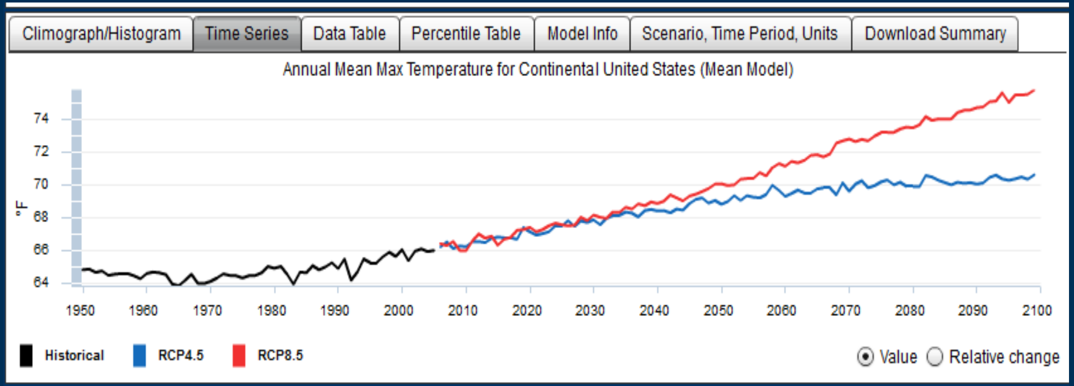


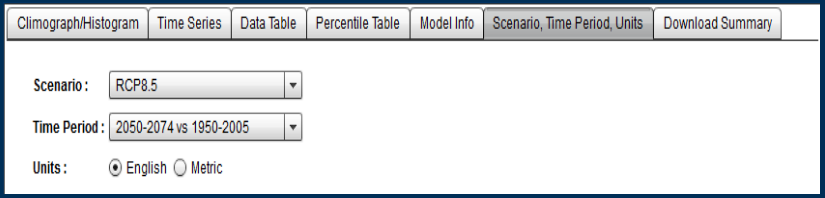


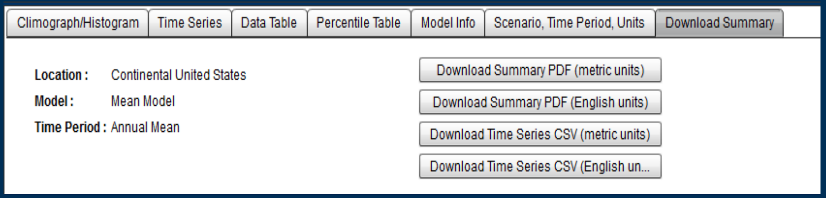
USGS

Viewer settings









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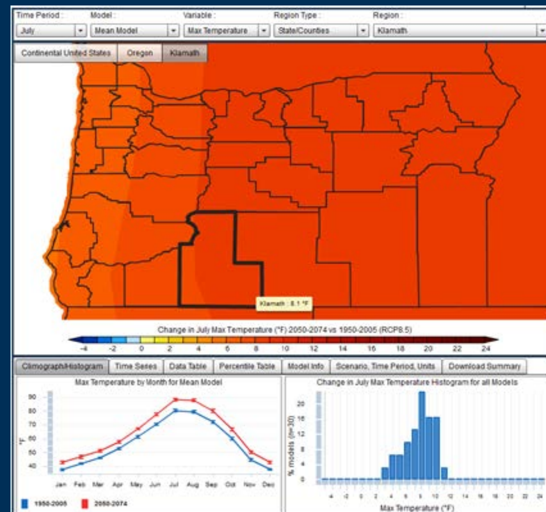
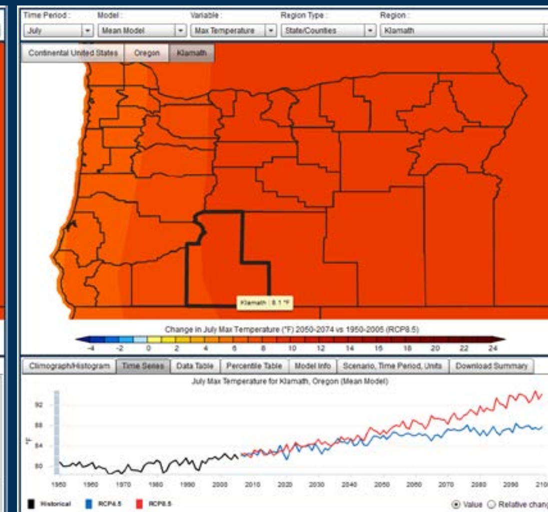
Klamath County, Oregon (2050-2074)

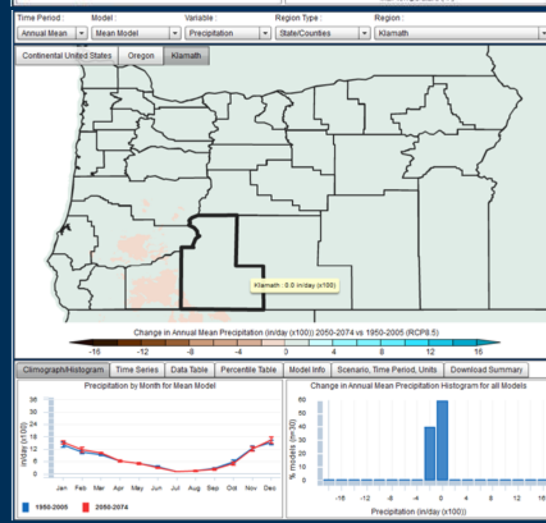
Climatology | **Time series**

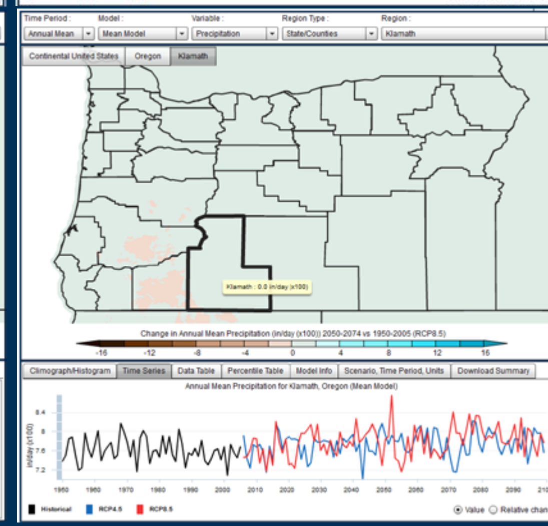
Change in July maximum air temperature





Change in annual precipitation

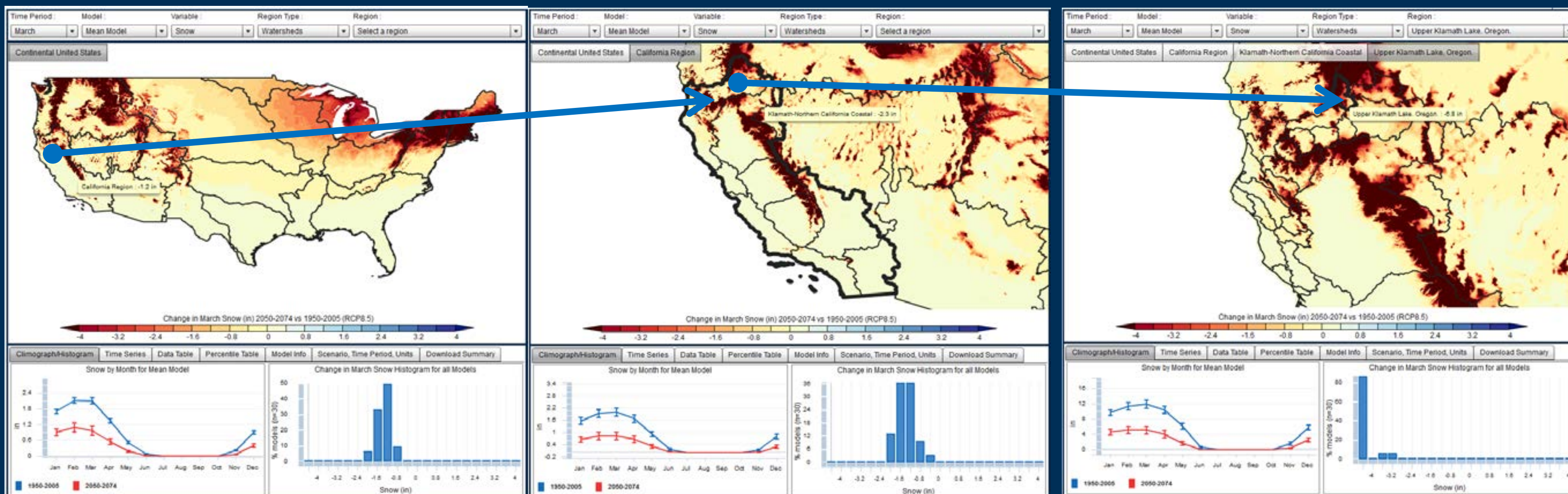




Telescoping USGS Hydrologic Units

Change in March snow water equivalent (mean model)

HUC2	HUC4	HUC8
21 ~460,000 km^2	222 ~43,500 km^2	2,200 ~1,800 km^2

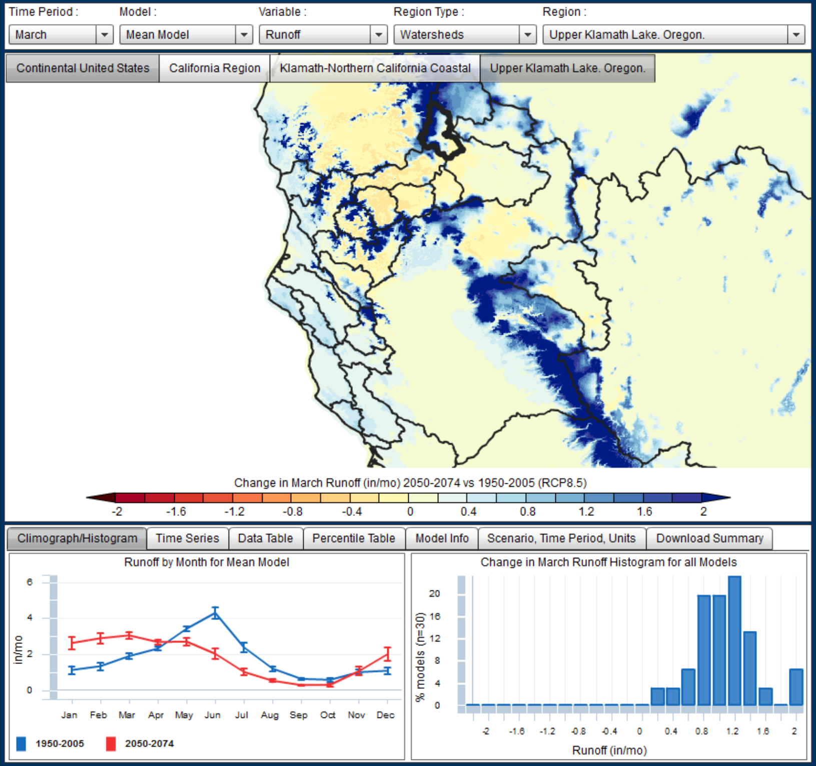


California Region	Klamath-Northern California Coastal	Upper Klamath Lake, Oregon

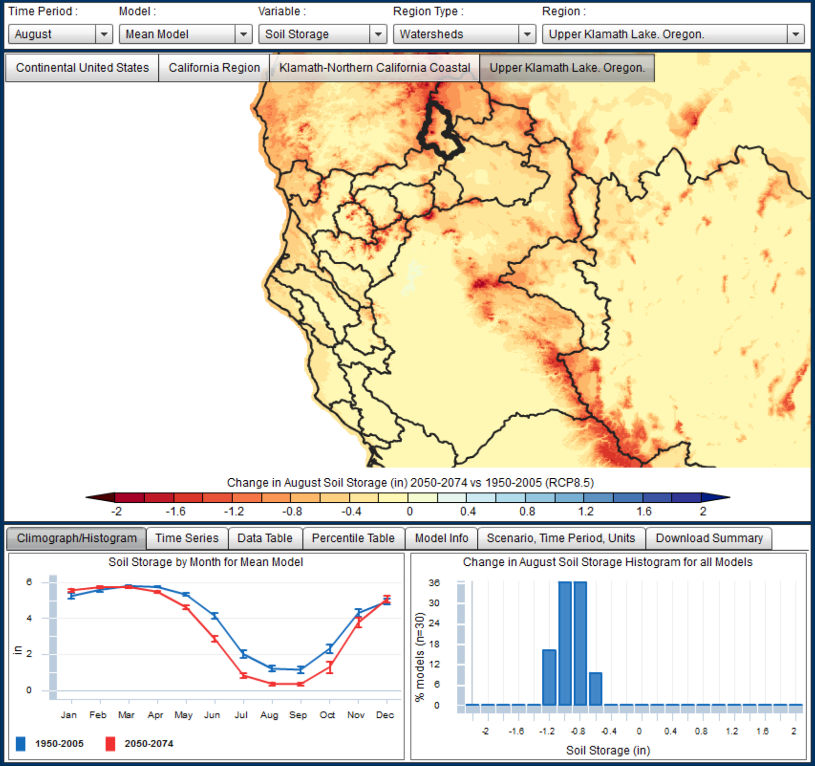
USGS

Upper Klamath Lake, OR (HUC8) water balance components

Change in March runoff



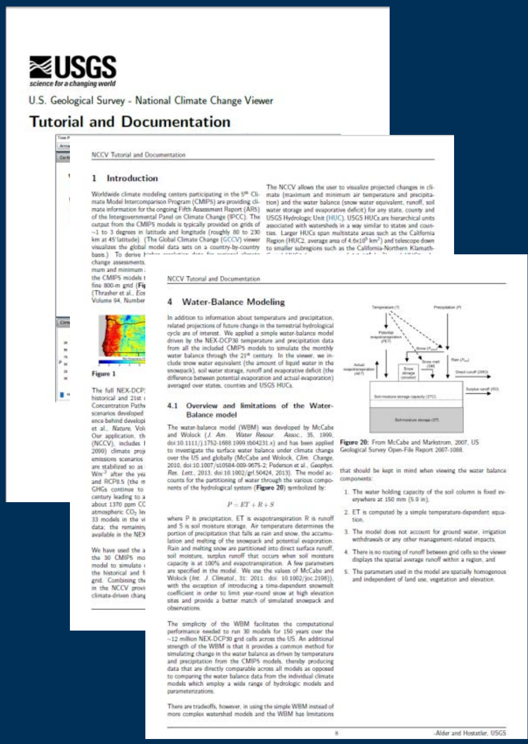
Change in August soil moisture



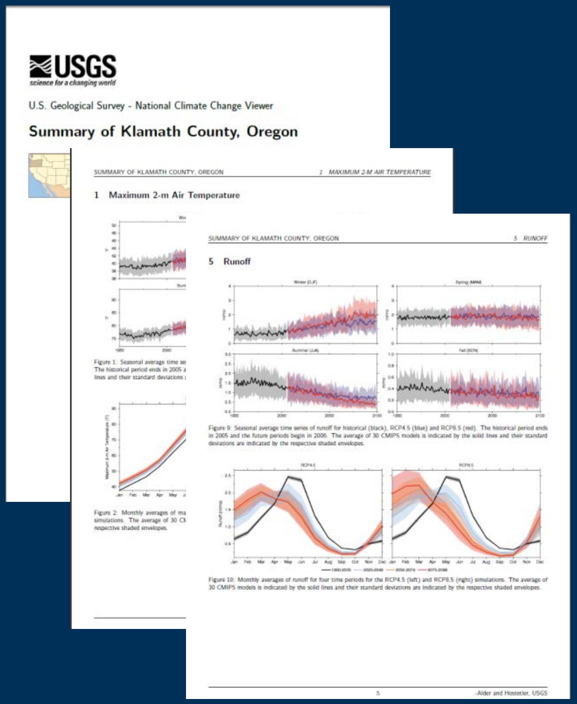
USGS

Documentation, summaries, data

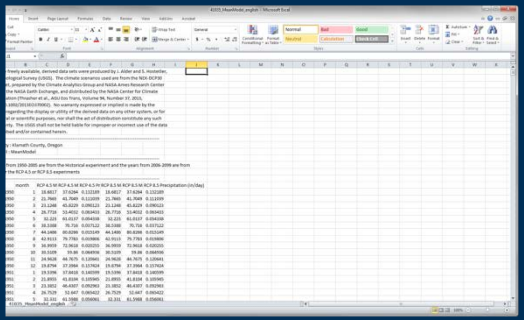
Tutorial



Summary



CSV files



Model agreement/spread

At a place (HUC8)

5 Runoff

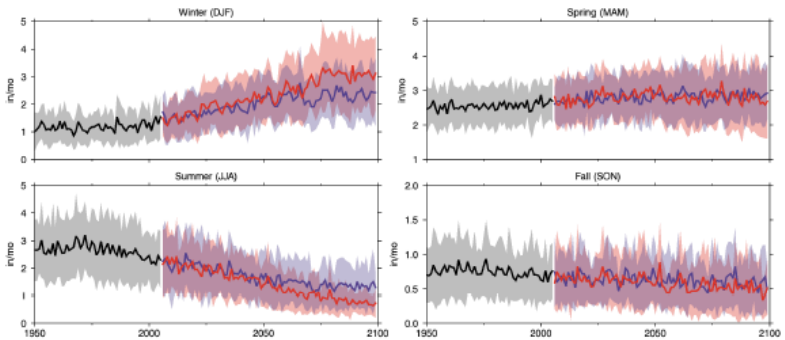


Figure 9: Seasonal average time series of runoff for historical (black), RCP4.5 (blue) and RCP8.5 (red). The historical period ends in 2005 and the future periods begin in 2006. The average of 30 CMIP5 models is indicated by the solid lines and their standard deviations are indicated by the respective shaded envelopes.

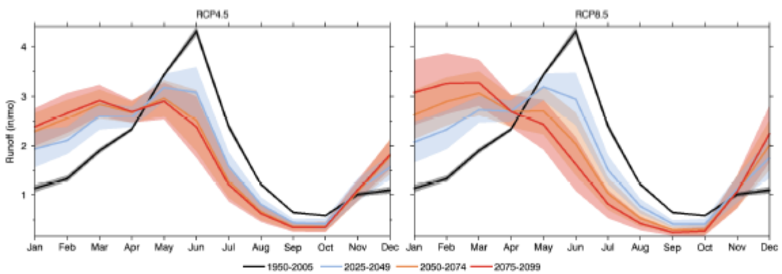
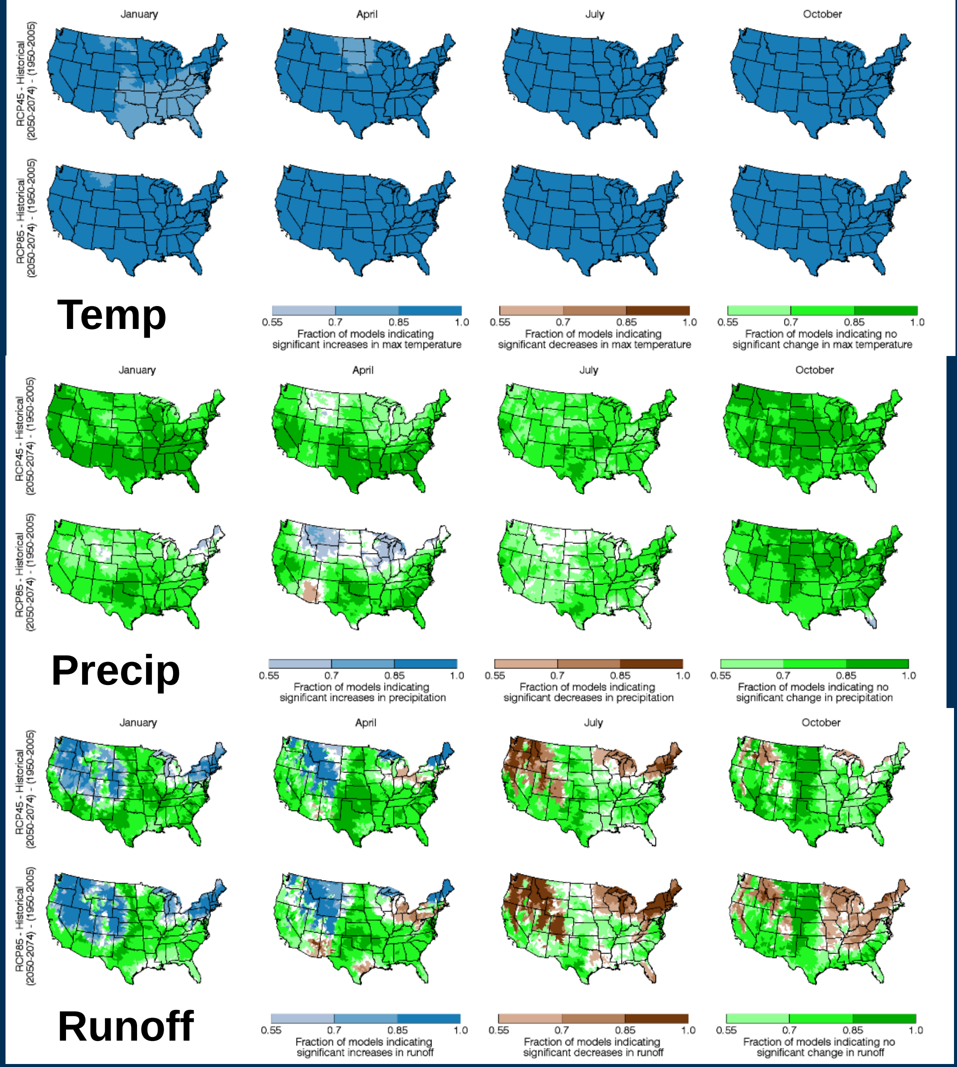


Figure 10: Monthly averages of runoff for four time periods for the RCP4.5 (left) and RCP8.5 (right) simulations. The average of 30 CMIP5 models is indicated by the solid lines and their standard deviations are indicated by the respective shaded envelopes.

Nationwide (HUC8)



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Summary

- NCCV provides simplified access to a maze and volume of CMIP5/IPCC climate data
- Entry point for understanding climate modeling in the context of climate change e.g., the average and spread in model results
- Starting point for investigating potential future change at local scales
- Only one type of downscaling (BCSD) used
- Simple water balance model
- Monthly time scales do not capture shorter term events e.g., rain on snow flooding, storms

USGS