DOCKETED	
Docket Number:	24-IEPR-03
Project Title:	Electricity Demand Forecast
TN #:	258125
Document Title:	Presentation - Research at the Nexus of Climate Science, Energy System Planning, & Policy
Description:	2. Susan Wilhelm, CEC
Filer:	Raquel Kravitz
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	7/29/2024 12:17:46 PM
Docketed Date:	7/29/2024

Research at the Nexus of Climate Science, Energy System Planning, & Policy

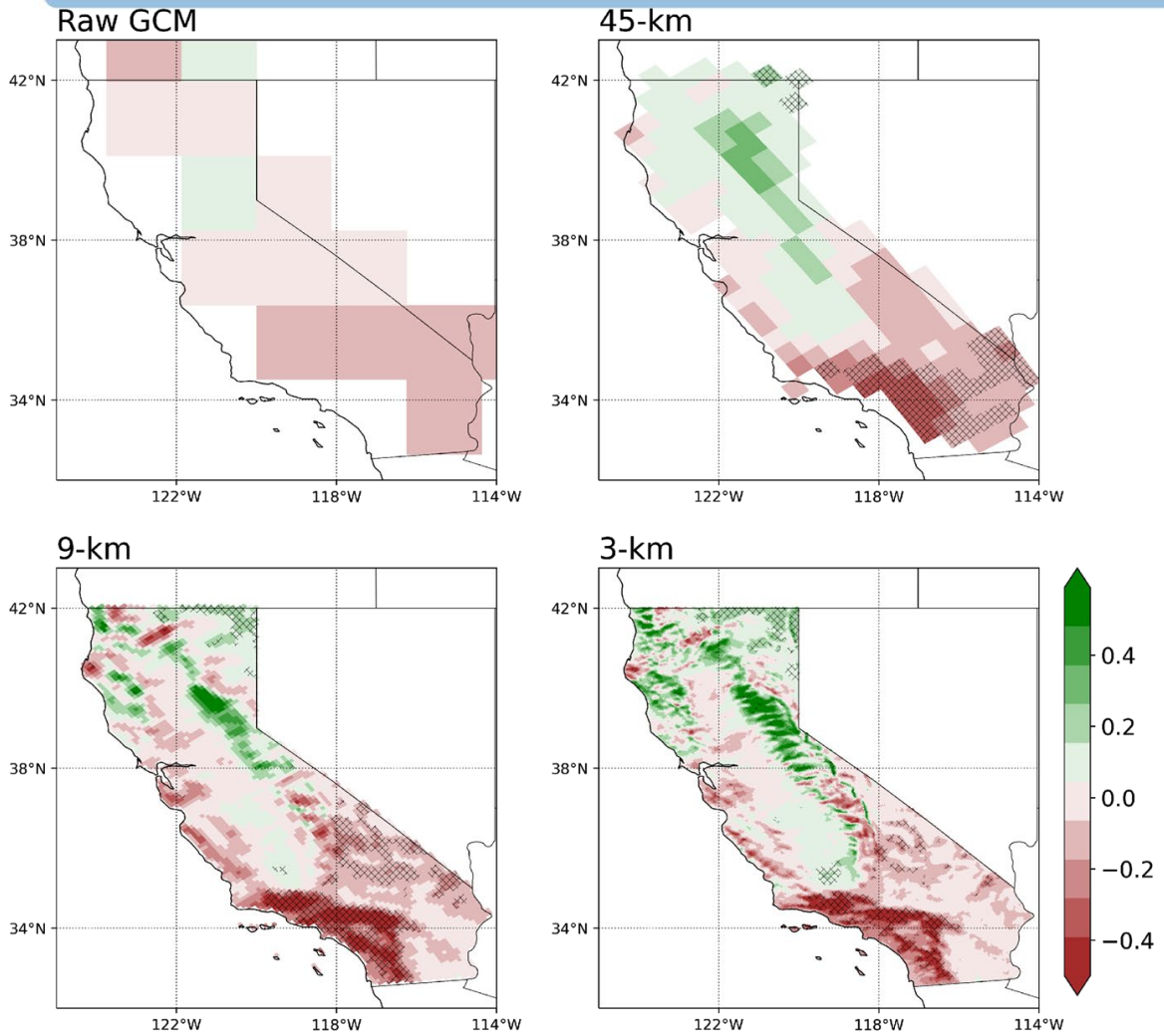
Presenter: Susan Wilhelm, Ph.D., Sustainability & Health Research

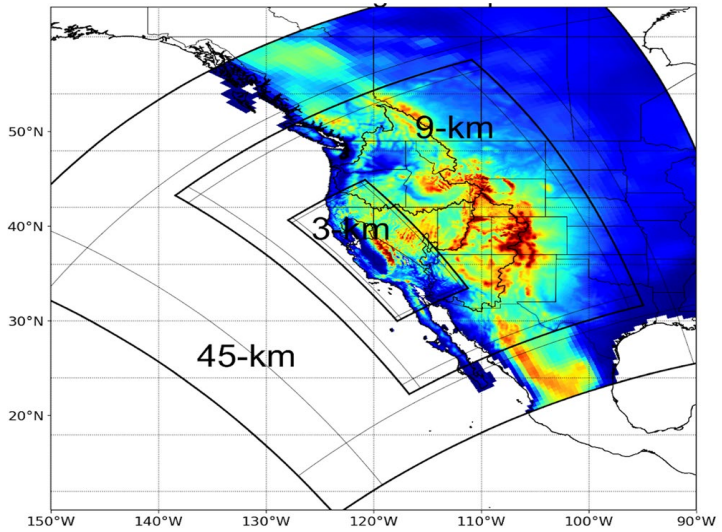
July 30, 2024

Outline

- **High resolution climate projections** in support of energy sector resilience
- **Data attributes** germane to climate-informed planning
- Types of **analyses** enabled by these data
- CEC's research **portfolio at the nexus of climate, energy system planning, & policy**
- Two efforts that are working with demand forecast unit
  - **Cal-Adapt Analytics Engine**: Localized climate projections
  - **Lumen**: Detrended weather variants

High-resolution climate projections in support of energy resilience





Figures: (*left*) Raw Global Climate Model (GCM) outputs with resolution of 100 km to 250 km are downscaled to provide 3 km spatial resolution over California.

(*above*) Limited model runs are available with 45 km and 9 km resolution for much larger domains that include the vast majority of WECC.

Source: Scripps Institution of Oceanography and UCLA, EPC-20-006.

Data attributes and climate-informed planning

Data products portray **evolution of weather-related extremes, variability, uncertainty**.

- Duration of extreme events
- Spatial coverage of extreme events
- Intensity of extreme events
- Evolution of temporal and synoptic variability
- Multiple possible futures

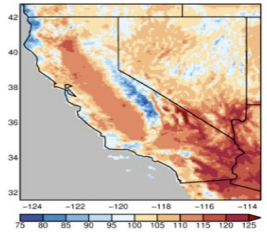
Support for climate-informed planning

Downscaled climate data enable **a variety of analyses that can support many use cases**:

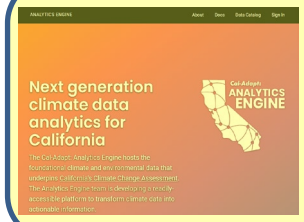
- ✓ **Median conditions** as well as **1-in-x** extremes
- ✓ **Stochastic** analyses
- ✓ **Anticipating novel extremes** without analogues in the historical record (duration, magnitude, frequency, timing/seasonality, spatial extent)
- ✓ **Uncertainty analyses** that account for multiple possible futures
- ✓ Identification of **stress conditions** and support for **scenario-driven** "stress tests"
- ✓ Analyses of **correlated extremes**
- ✓ Both **long-term** (e.g., drought) and **short-term** (e.g., heat waves, cold snaps) extremes

Portfolio of energy-related climate research

Two EPIC Recipients are working directly with CEC's demand forecast team…



Climate Projections



Cal-Adapt Analytics Engine

Research to Support Resilient Energy Transition

- Climate-Informed Zero-Carbon Generation Capacity Modeling (Eagle Rock Analytics)
- Climate-Informed Load Forecasting & Electric Grid Modeling (E3)
- Advancing California's Electricity Resource Planning Tools to Assess & Improve Climate Resilience (Lumen)

Continuing evolution in climate readiness