Water and Fire in a Changing Climate

Central Coast Climate Collaborative Inaugural Summit

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Greenhouse gases add energy to the atmosphere.

At a basic level, this will lead to rising temperatures globally.

But other changes are expected and spatial patterns matter!
County-Level Predictions

- Predictions at the county level are hard.
- There is high confidence that the Central Coast will warm due to climate change.
- Changes in precipitation and fire much less certain.
• The climate service provided to the local scale by the global models is a work-in-progress.

• Stakeholders need the best information at the local level.

• Some models are better suited for Central Coast climate predictions than others.

• We can evaluate models on a number of metrics, and build new capabilities to serve, for example, the Central Coast.
Improved Modeling of California’s Hydroclimate

HYPERION
UNDERSTANDING HYDROCLIMATE DATA WITH USE-INSPIRED METRICS

Regional Climate Datasets
Grid Metadata

Pre-Processing
TempestRemap, NCO

Hydrologic Models
ALM-MOSART-WM
CLM-PAWS
WEAP

Model Performance Report
Observational Data

Metric Evaluation
Meteorological Metrics

Metric Evaluation
Integrated Metrics

Metric Evaluation
Hydrologic Metrics

Evaluating Metrics
Resolution and Metrics

- Higher model spatial resolution helps.
- We can also evaluate models by metrics that we care about.
**Meteorological Metrics**

**Precipitation Character and Extremes:** 24 metrics for precipitation characteristics and precipitation extremes have been developed.

**Mesoscale Convective Systems:** Metrics based on MCS tracking in the early summer/late spring.

**North American Monsoon System:** Metrics based on timing.

**Atmospheric Rivers:** Initiated a collaboration with the ARTMIP project.

**Coastal Storms:** A new tropical cyclone tool has been developed and optimized against the IBTrACS dataset. A new metric for overland precip has been developed.

**Sea Breeze:** 2 metrics based on sea breeze.
• For wildfires, the number of fires has decreased, but acreage has increased and costs have increased a lot!

• CalFire estimates that fires now cost Californians $70/person/yr.

• There is a pressing need to bend the curve of growth for fires.
Wildfires require fuel availability, low fuel-moisture, (un)favorable weather, and ignition.

Observations and data-processing are needed to monitor risk. Machine-learning techniques can find smoke and fires automatically.

Remote Automatic Weather Stations (RAWS) in California. Used to predict fire behavior and monitor fuels. http://www.raws.dri.edu
• Fires sometimes create their own weather, but forecasts are possible!

• Satellite and aircraft imagery and weather-service data can be used to run a fire-weather forecast model.
• *Climate model predictions of fire risk are a work-in-progress.*

• *We are building dynamic vegetation to capture vegetation growth, mortality, and moisture.*