Water and Fire in a Changing Climate

Central Coast Climate Collaborative Inaugural Summit

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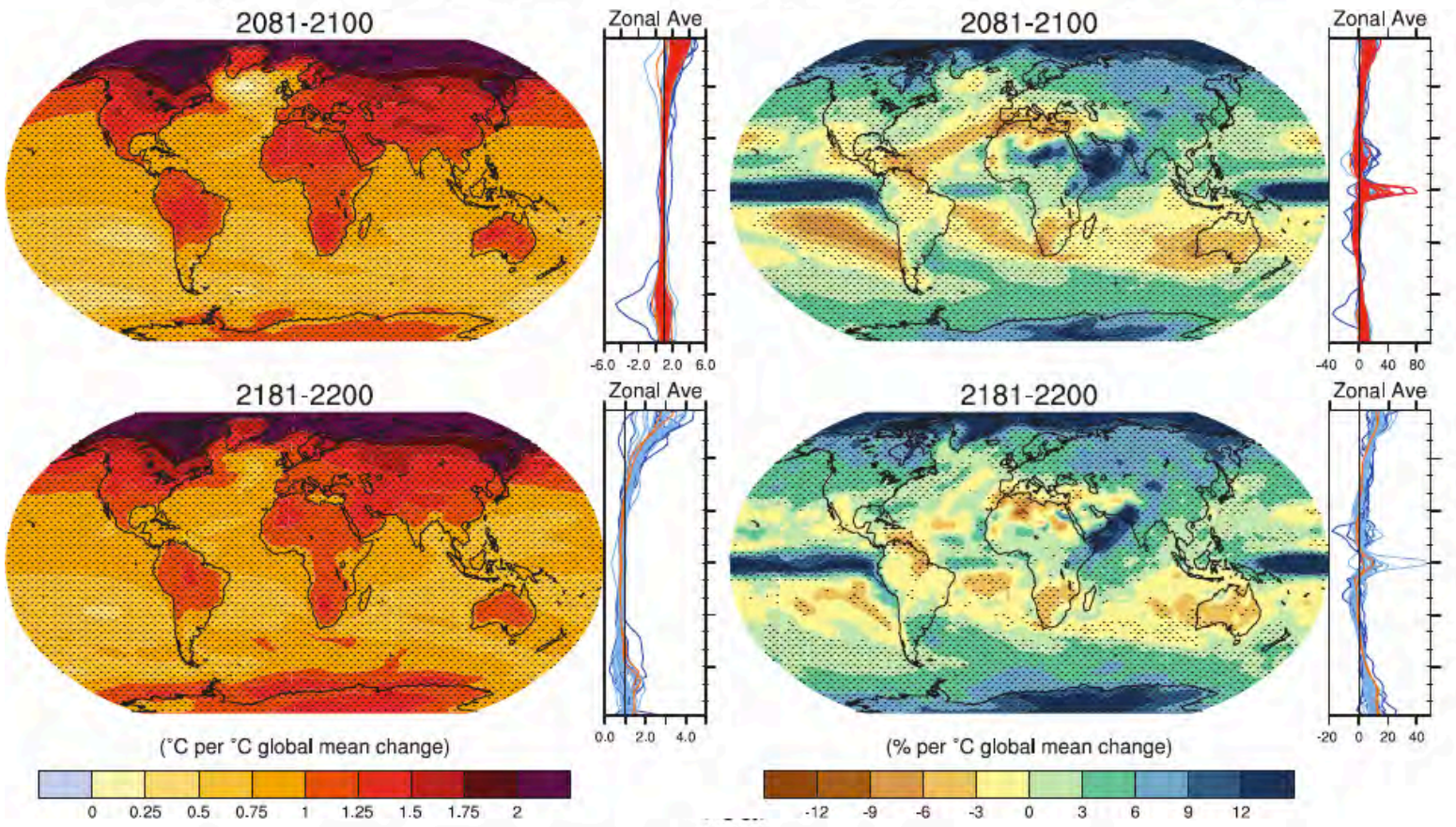
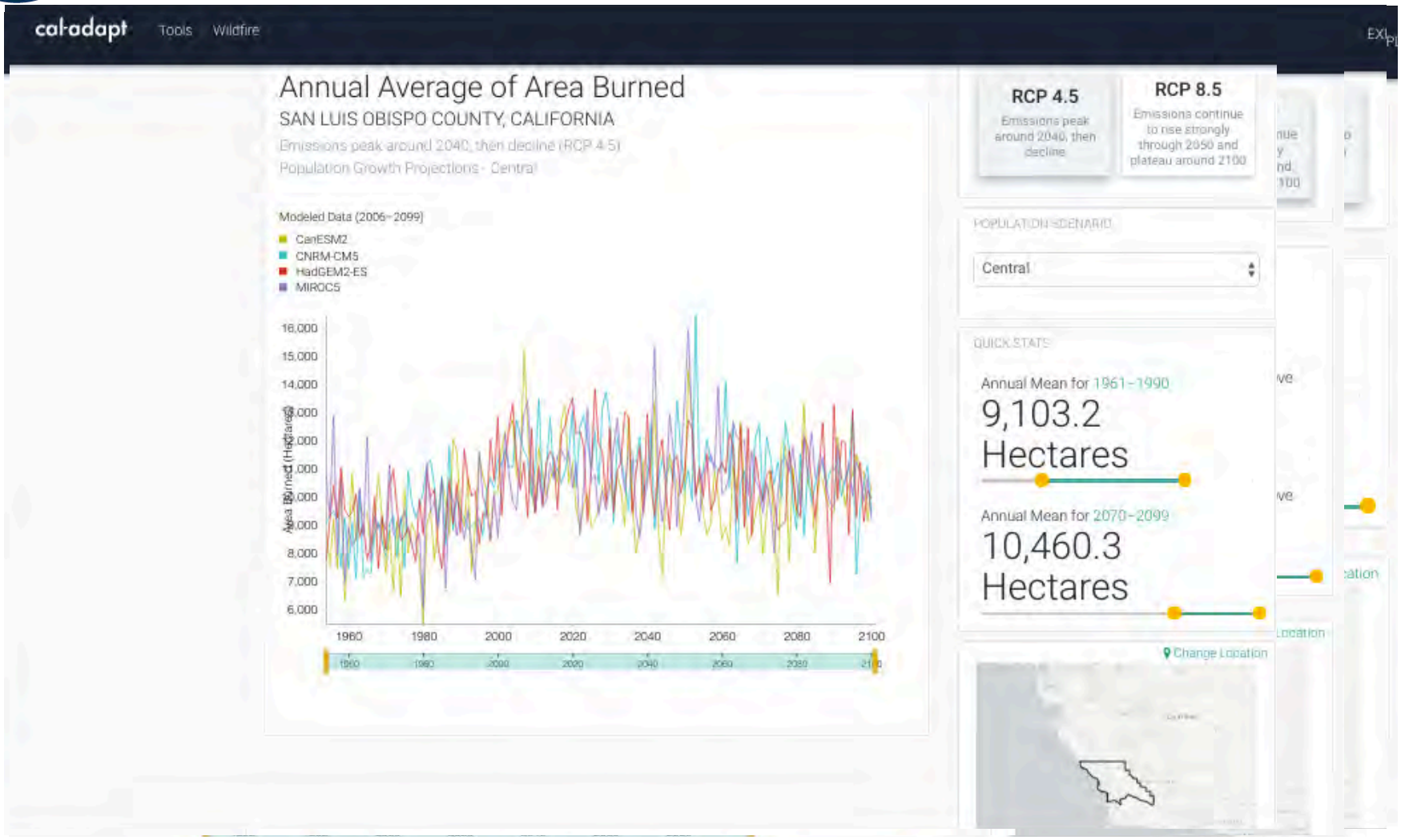
Changing Greenhouse Gases, Changing Climate



- ***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.***

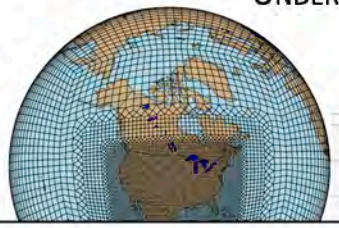
Resolving Model Differences at Scale

- ***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

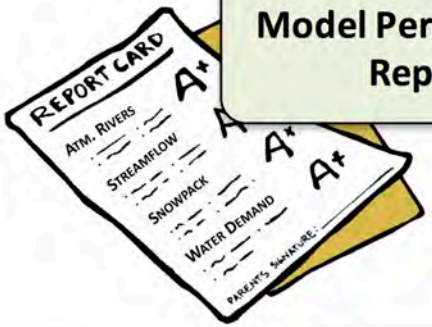
HYPERION

UNDERSTANDING HYDROCLIMATE DATA WITH USE-INSPIRED METRICS



Regional Climate Datasets

Grid Metadata



Model Performance Report

Observational Data

Pre-Processing
TempestRemap, NCO

Hydrologic Models
ALM-MOSART-WM
CLM-PAWS
WEAP

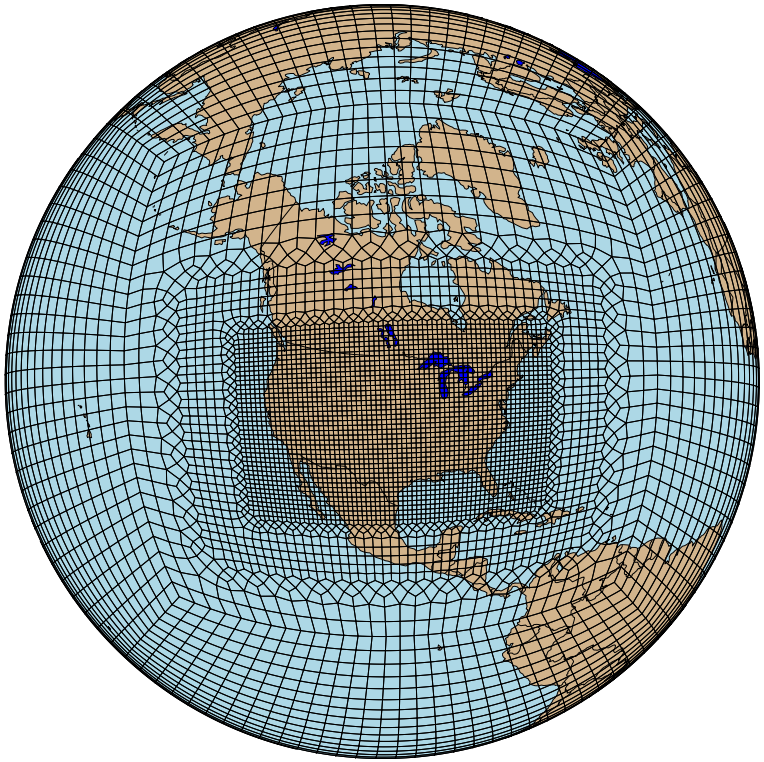
Metric Evaluation
Meteorological Metrics

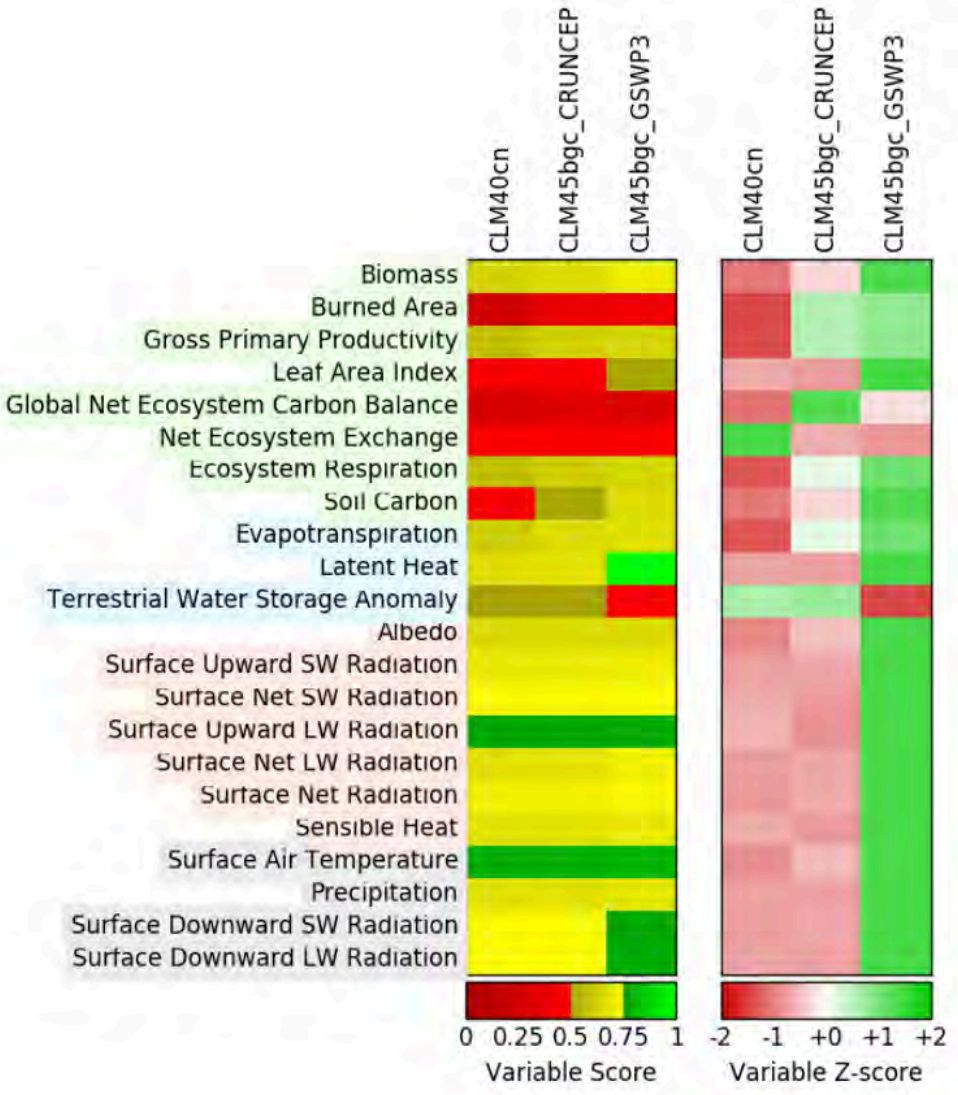
Metric Evaluation
Integrated Metrics

Metric Evaluation
Hydrologic Metrics

Evaluated Metrics

Resolution and Metrics





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

Climate Model Metrics

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UNDERSTANDING HYDROCLIMATE DATA WITH USE-INSPIRED METRICS

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.*

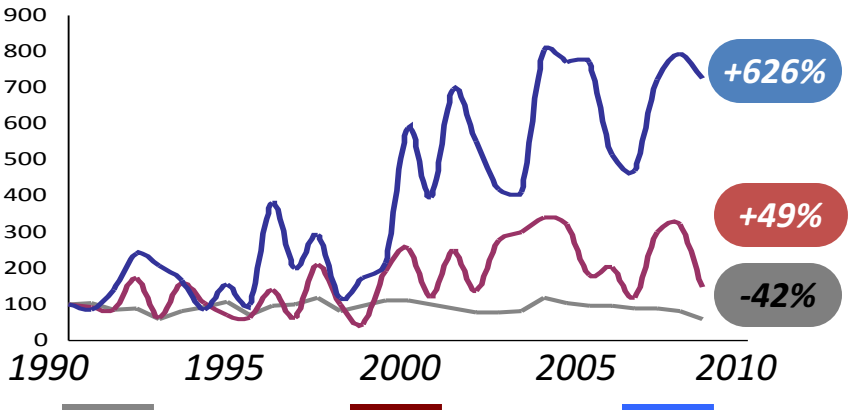
Atmospheric Rivers: *Initiated a collaboration with the ARTMIP project.*

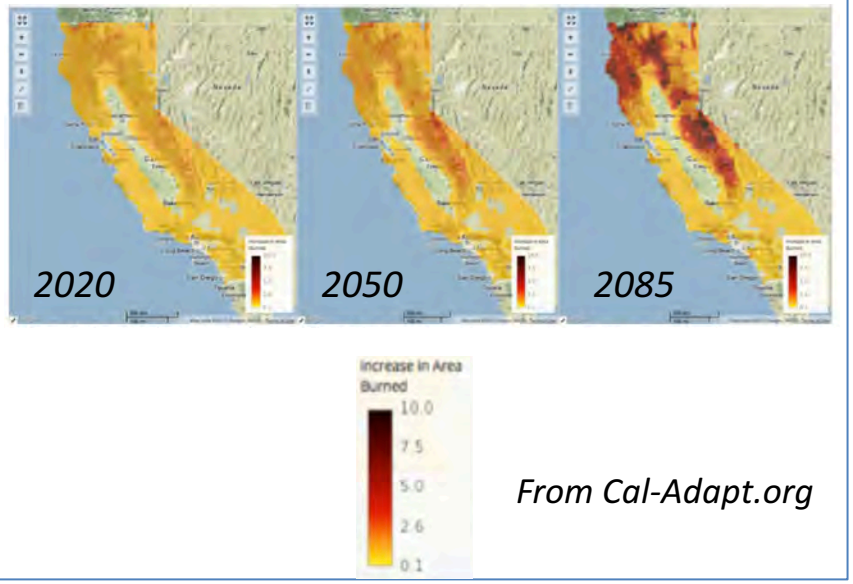
Coastal Storms: *A new tropical cyclone tool has been developed and optimized against the IBTrACS dataset. A new metric for overland precip has been developed.*

Sea Breeze: *2 metrics based on sea breeze.*

Wildfires and Climate Change

- *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.*





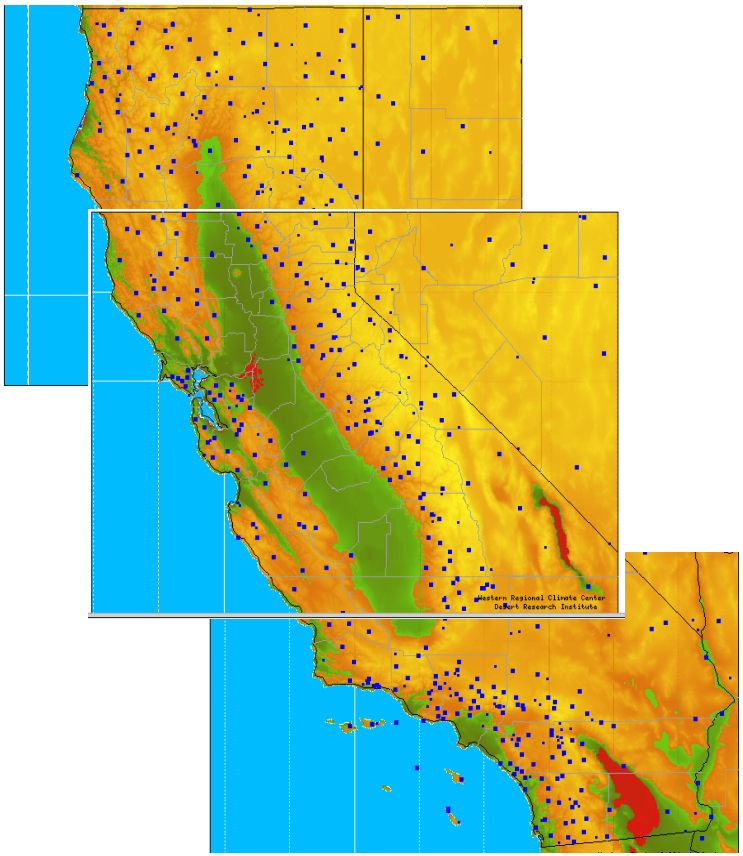
From Cal-Adapt.org

Wildfires Risk Monitoring

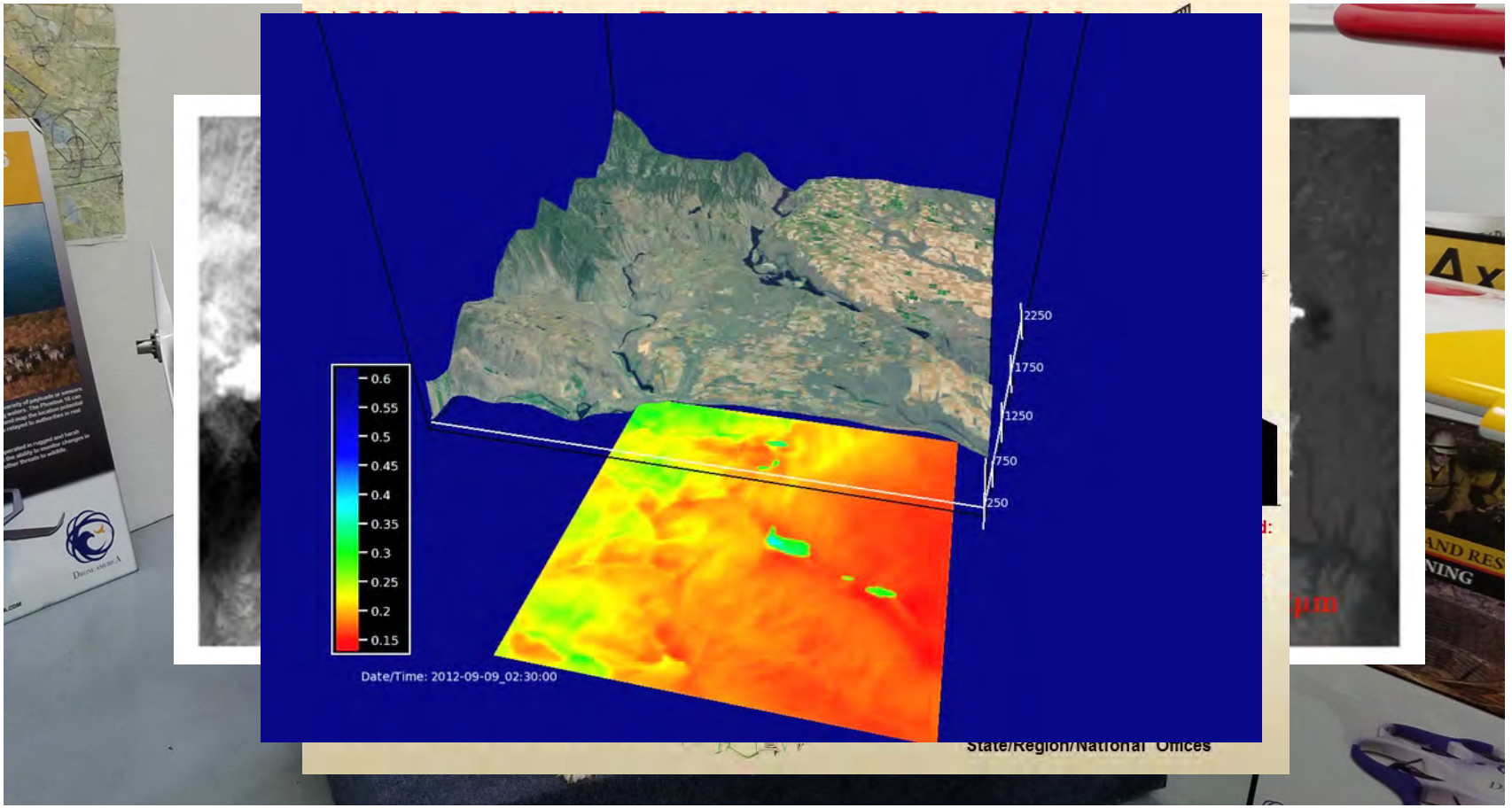
- ***Wildfires require fuel availability, low fuel-moisture, (un)favorable weather, and ignition.***

- ***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



Real-Time Fire Forecasting



- ***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.***

Fires and Climate

- ***Climate model predictions of fire risk are a work-in-progress.***

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