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LAWRENCE BERKELEY NATIONAL LABORATORY



## Greenhouse Gas Strategies in a Changing Climate

November 16 -17, 2011 • San Francisco, CA



AIR & WASTE MANAGEMENT  
ASSOCIATION



# Modeling Regional Climate Change and Its Impacts

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November 17, 2011

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# Regional Climate Change

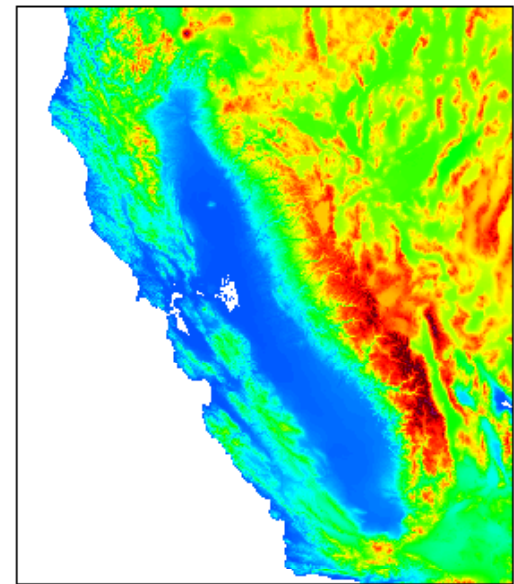
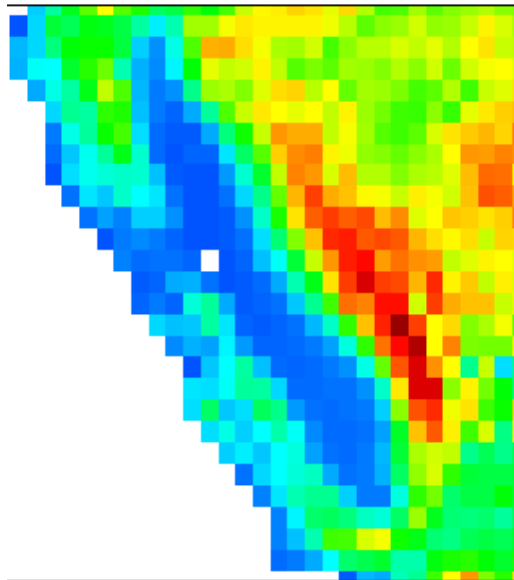
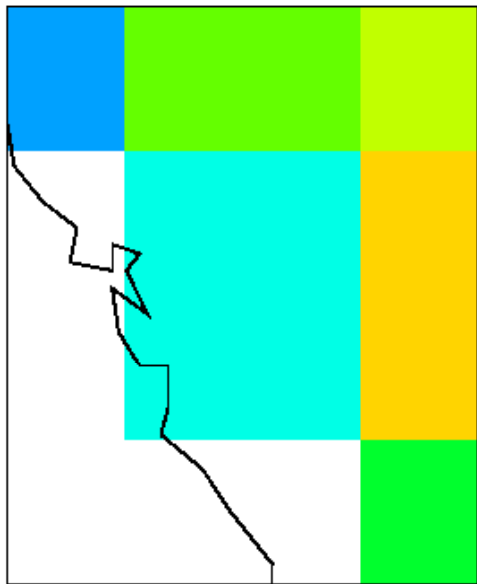
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- ❖ The root of the question is grid resolution
- ❖ Global climate models for the IPCC AR5 are at ~100km
- ❖ Climate change impacts are at a much finer scales

## Strategies for getting to these scales

- ❖ Dynamical downscaling
- ❖ Statistical downscaling
- ❖ Very high resolution global modeling

# California topography (feet)



300km (T42)  
Typical resolution of IPCC  
AR4 models

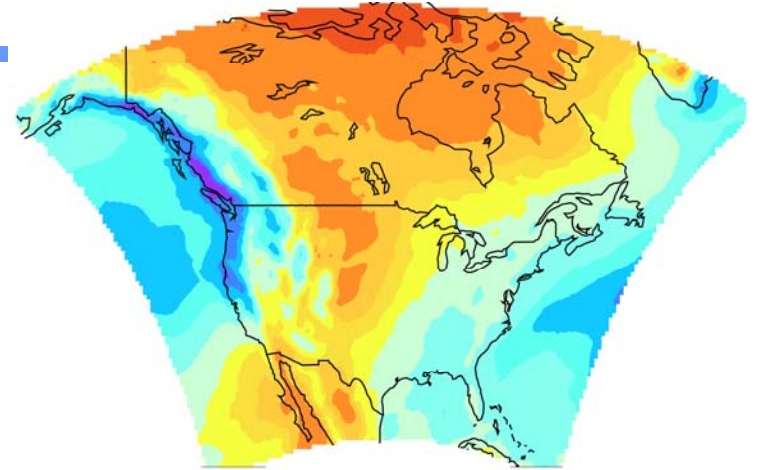
25km  
Upper limit of climate  
models with cloud  
parameterizations

1km  
Cloud system  
resolving models



# Regional climate models (RCM)

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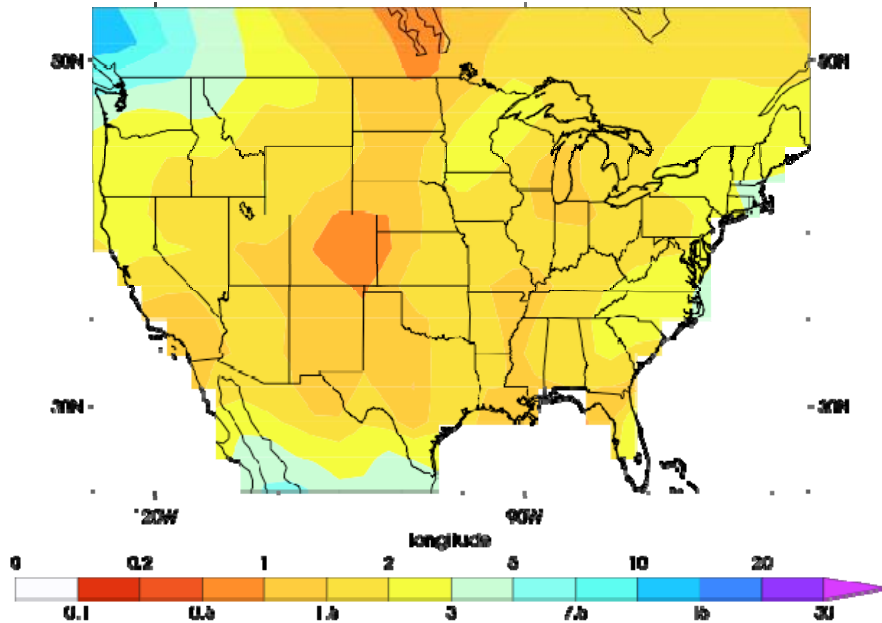
- ❖ “Dynamical downscaling”
- ❖ Limited area region of the globe
  - Can run at finer resolutions than global models.
- ❖ Lateral boundary conditions must be supplied
  - Winds, moisture, temperature, pressure
- ❖ North American Regional Climate Assessment Project
  - NARCCAP
  - Free, [www.narccap.ucar.edu](http://www.narccap.ucar.edu)
- ❖ Ensembles (Europe)
- ❖ CORDEX (Africa and other locales)

# Statistical Downscaling

- ❖ Use observed relationships between coarse and fine scales to develop scaling factors to refine global model output.
- ❖ Assume these relationships do not change in the future

[http://gdo-dcp.ucllnl.org/downscaled\\_cmip3\\_projections/dcpInterface.html](http://gdo-dcp.ucllnl.org/downscaled_cmip3_projections/dcpInterface.html)

Raw unbiased CCSM3, run1



Bias corrected, downscaled

