Climate and Sea Level Scenarios for California

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sponsors:

California Energy Commission PIER program
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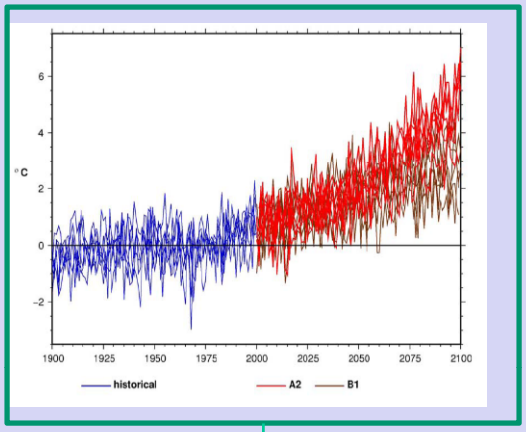
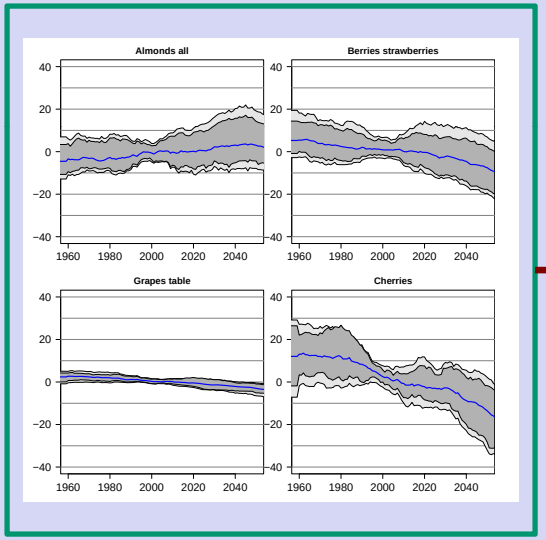
Climate and Sea Level Rise Scenarios

Cayan et al., (Scripps, Santa Clara University)

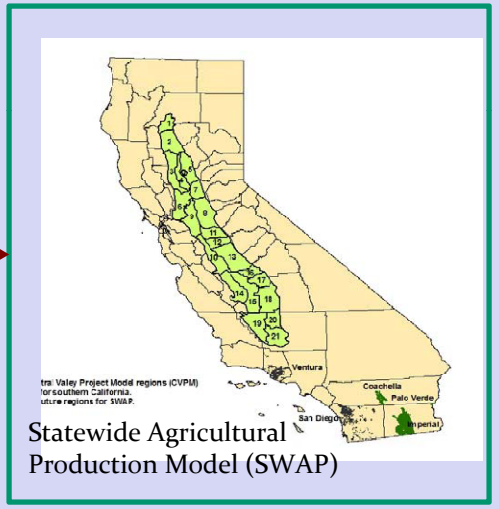


Physical Impacts



Lobell and Field (Stanford)

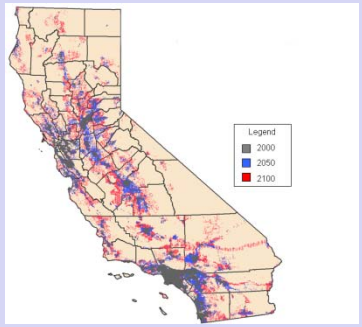
Economic Outcomes



Statewide Agricultural Production Model (SWAP)

Howitt et al. (UC Davis)

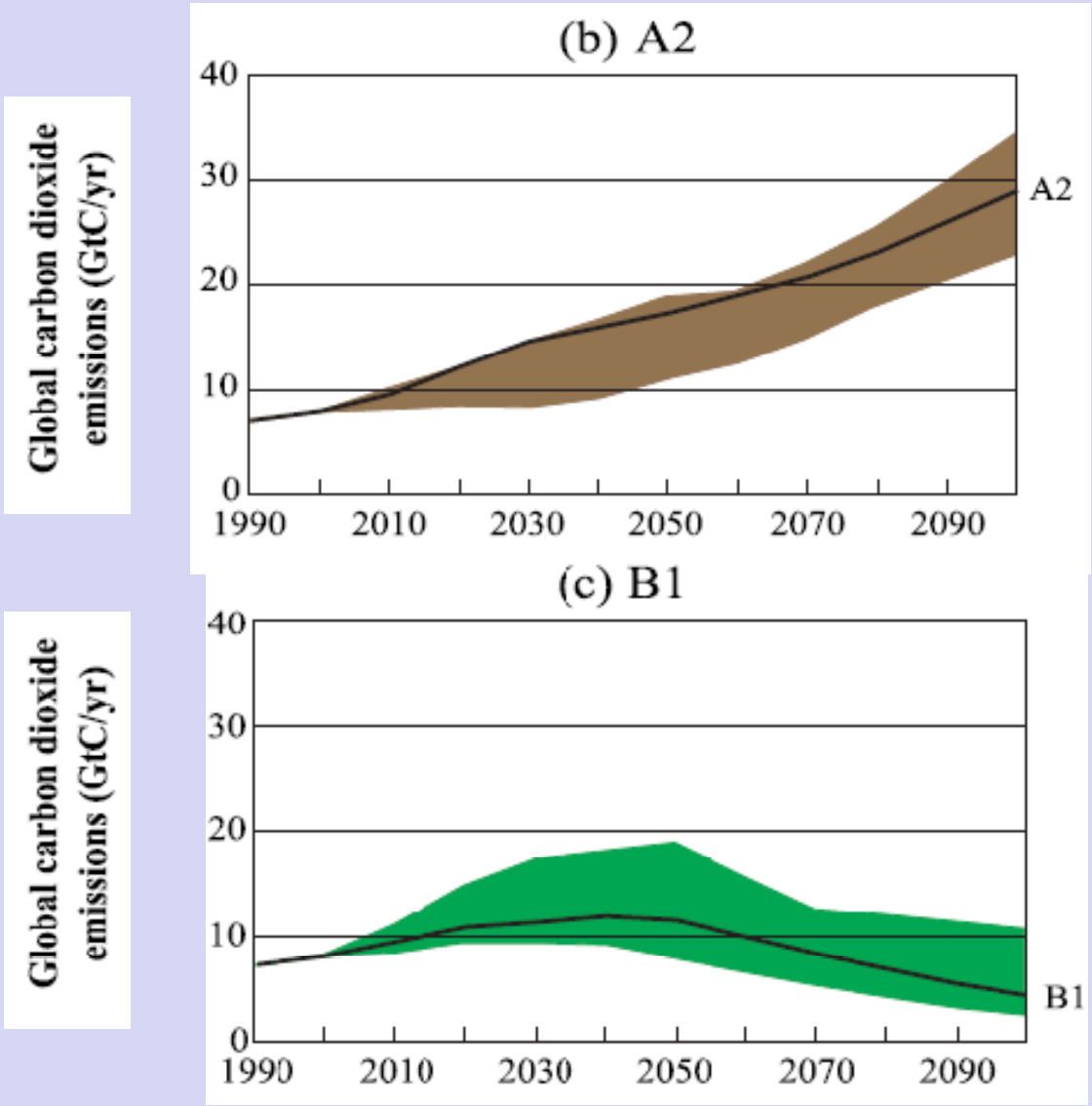
Sanstad et al., (LBNL, PPIC, LLLN, CEC)



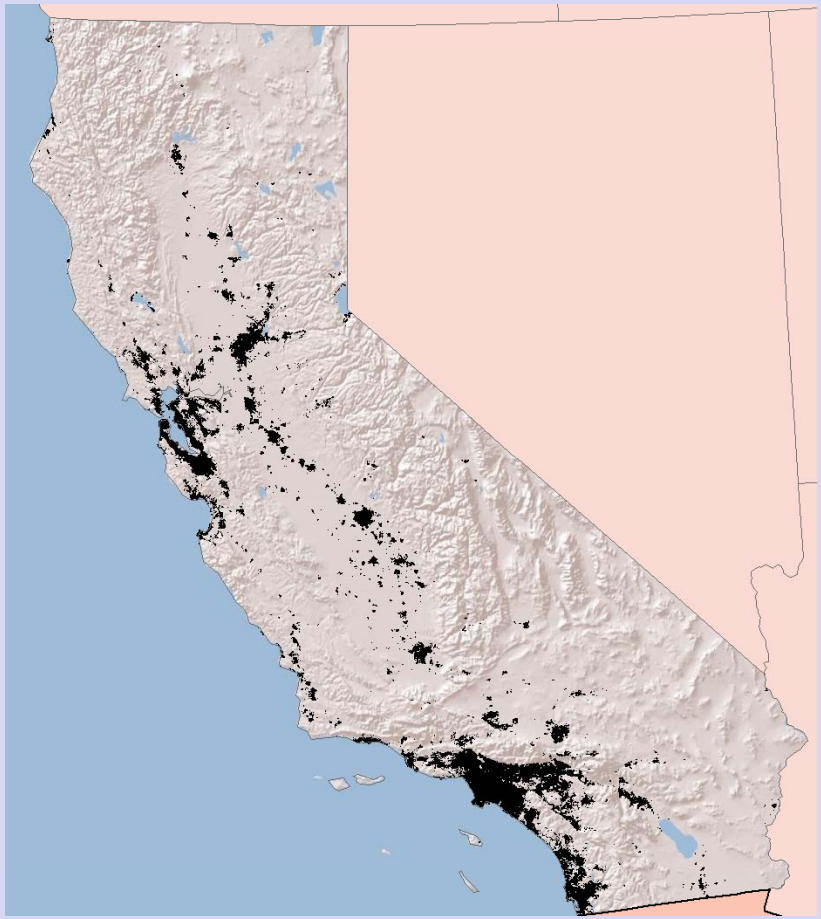
Demographic and Urban Projections

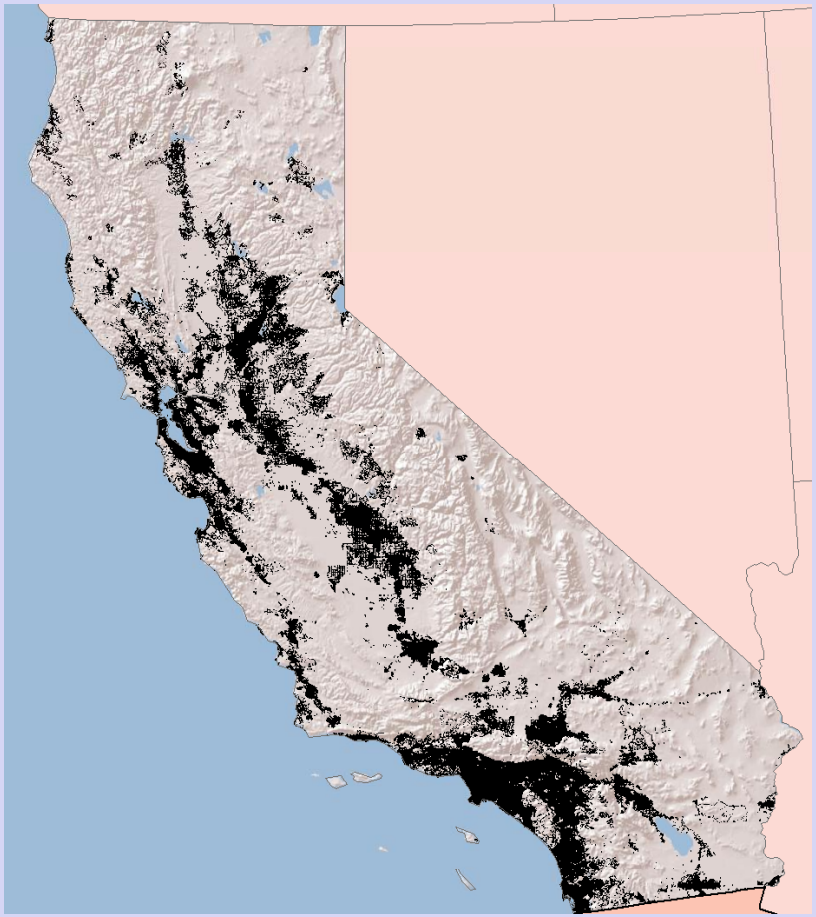
Uncertainty

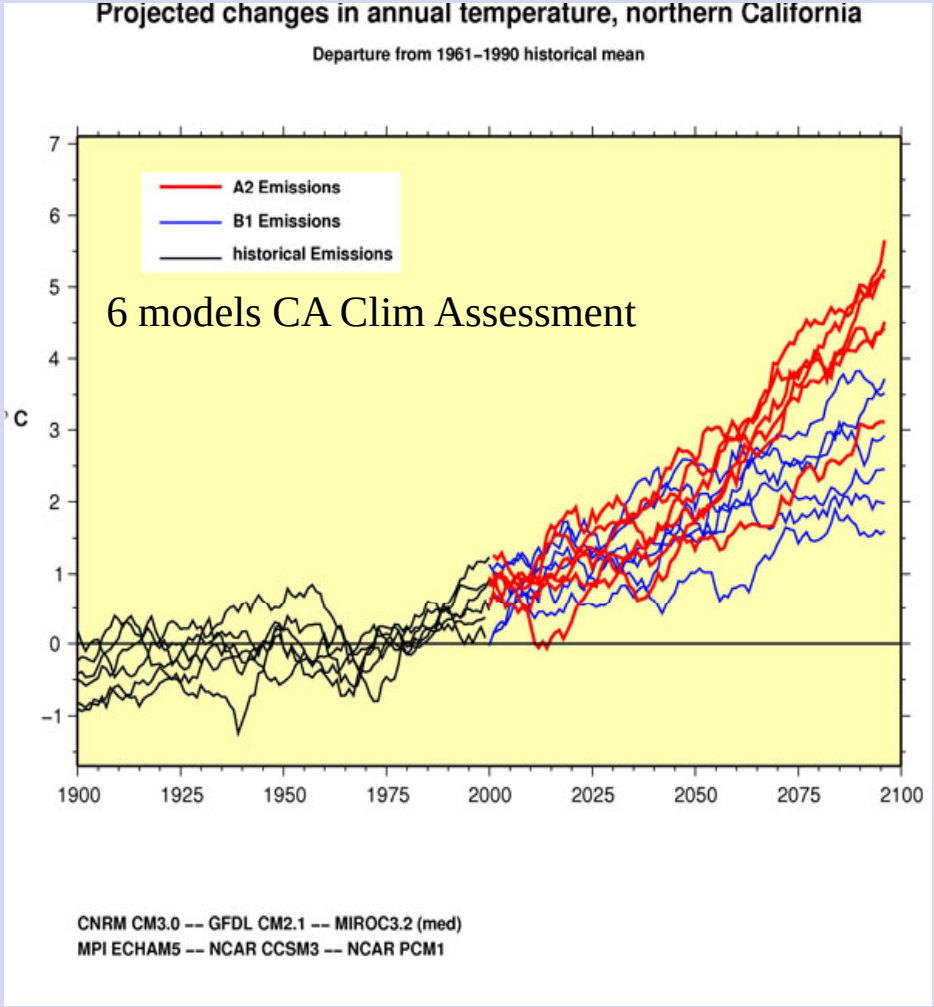
SRES A2 and B1 Scenarios: Global carbon dioxide emissions



Example: Urban “footprint,” 2000 and 2100



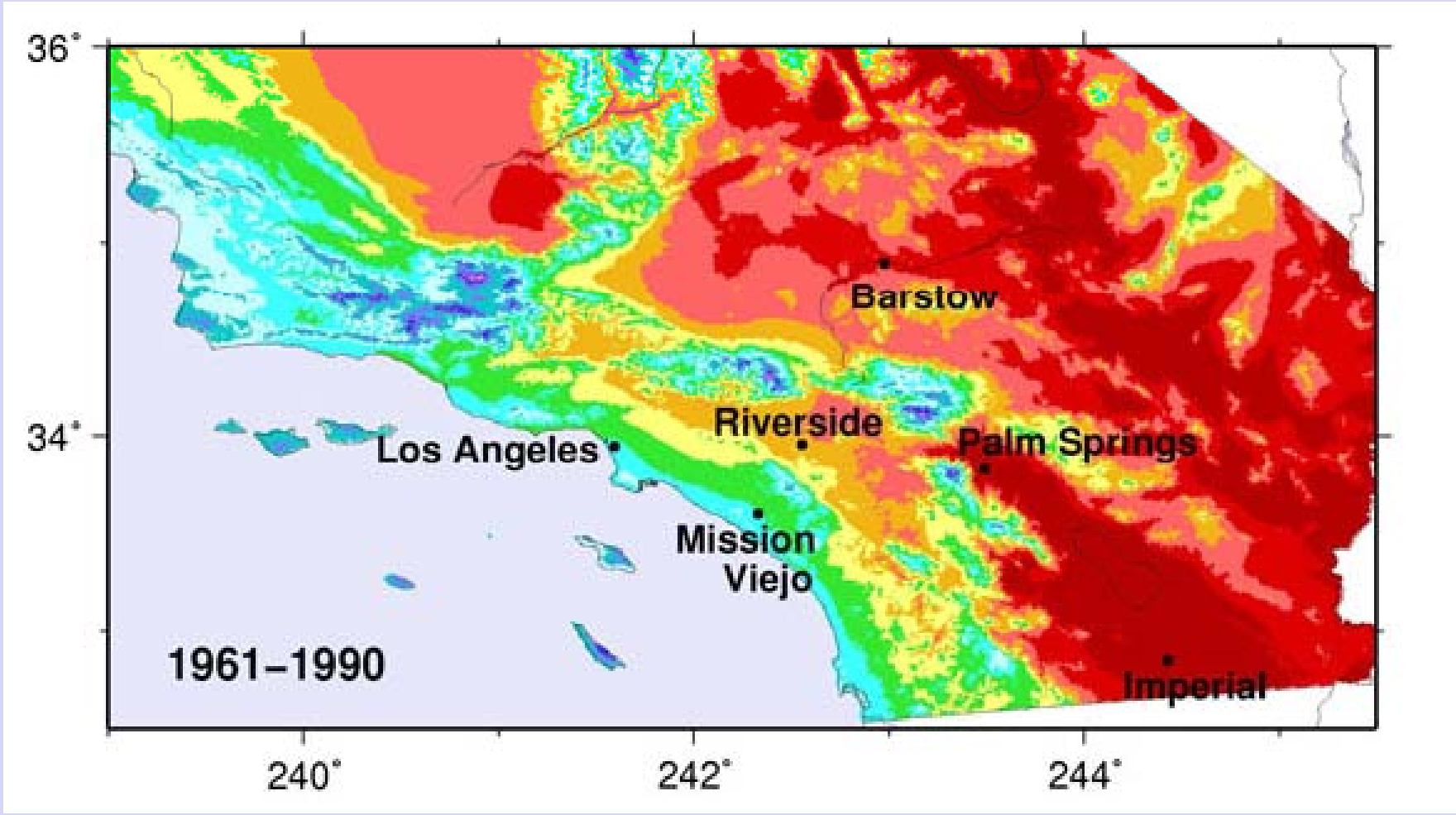


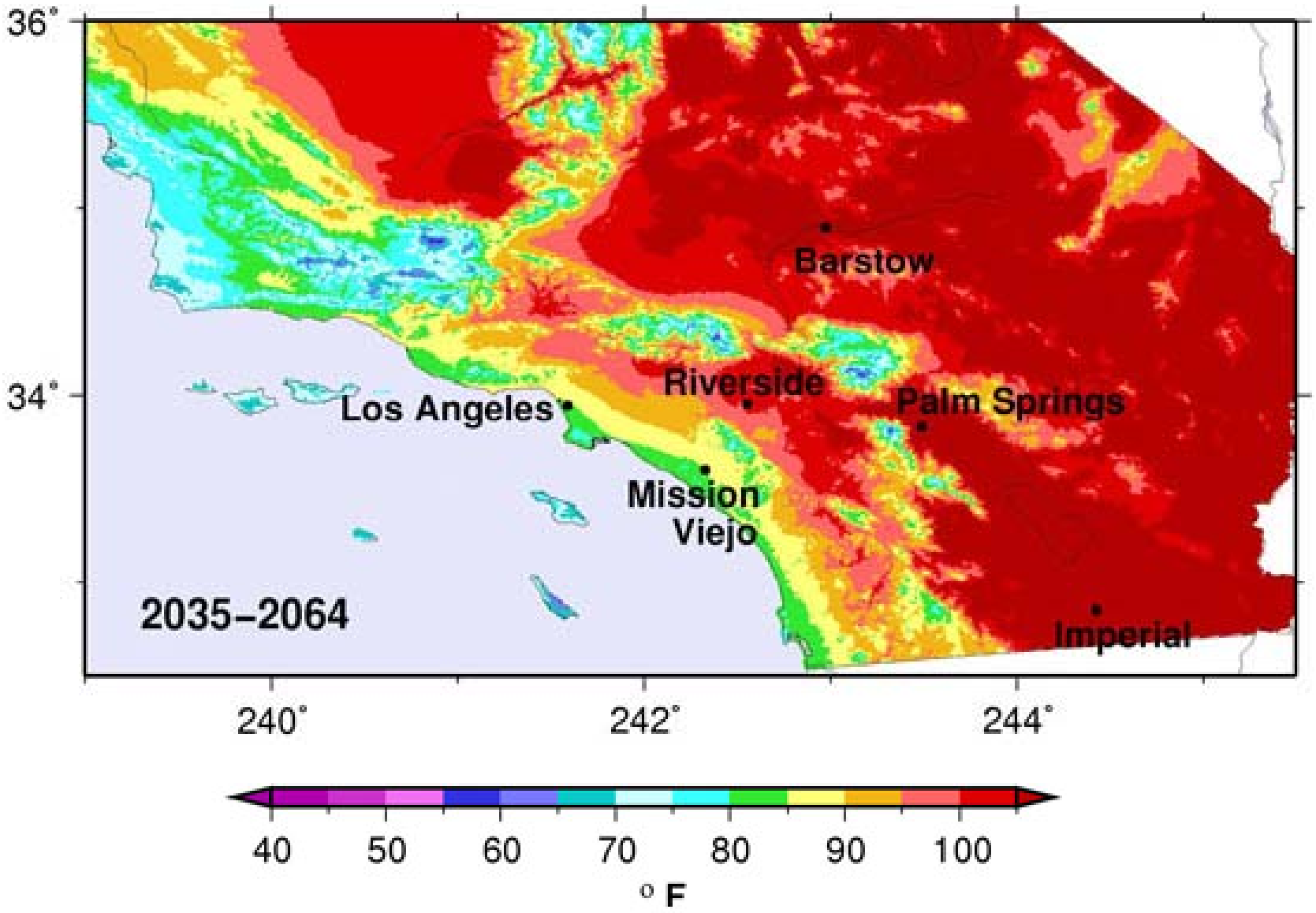


All simulations warm over the 21st Century, at very substantial rates

A2 simulations (red) warm more than B1 simulations (blue)

6 models selected for California Assessment are representative of larger population of IPCC AR4 models


36°
34°
240°
242°
244°
Barstow
Riverside
Palm Springs
Los Angeles
Mission
Viejo
Imperial
1961–1990



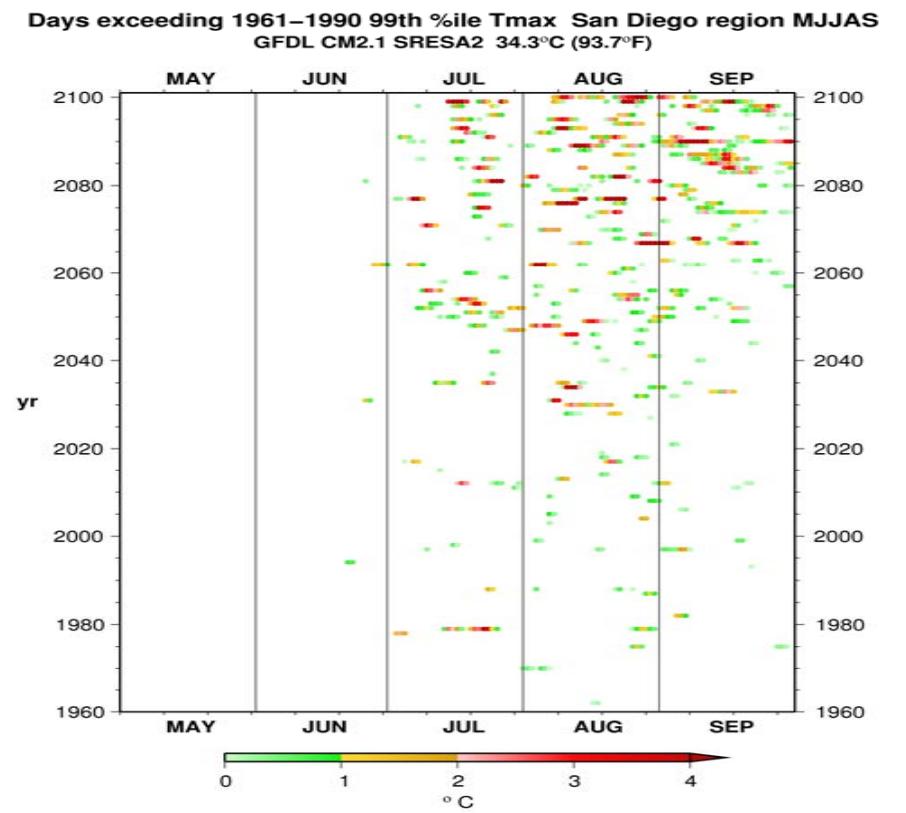
GFDL A2 1km downscaled to 1km
Hugo Hidalgo Tapash Das Mike Dettinger

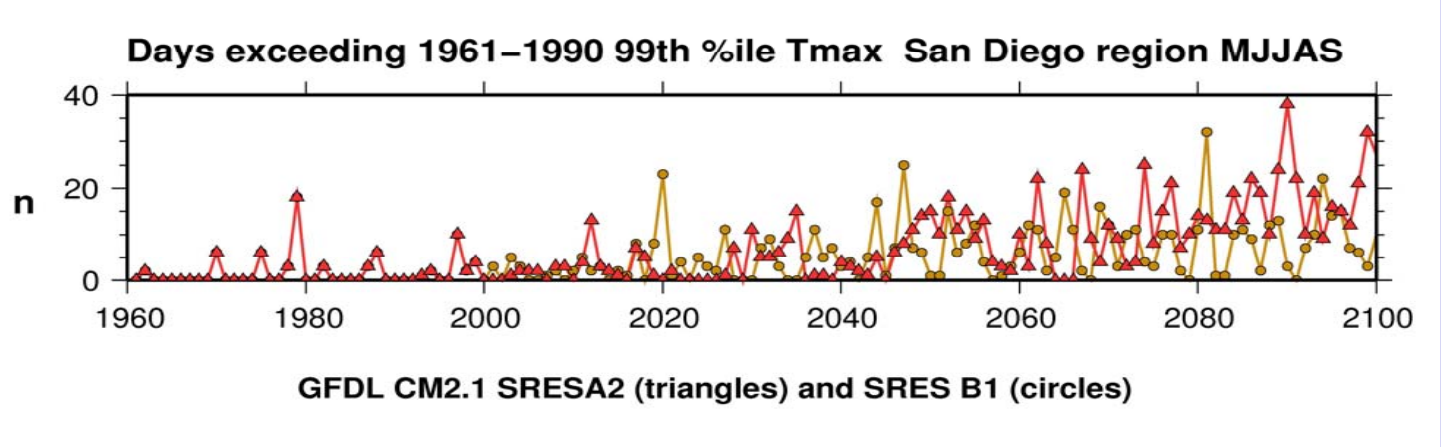
California Heat Waves

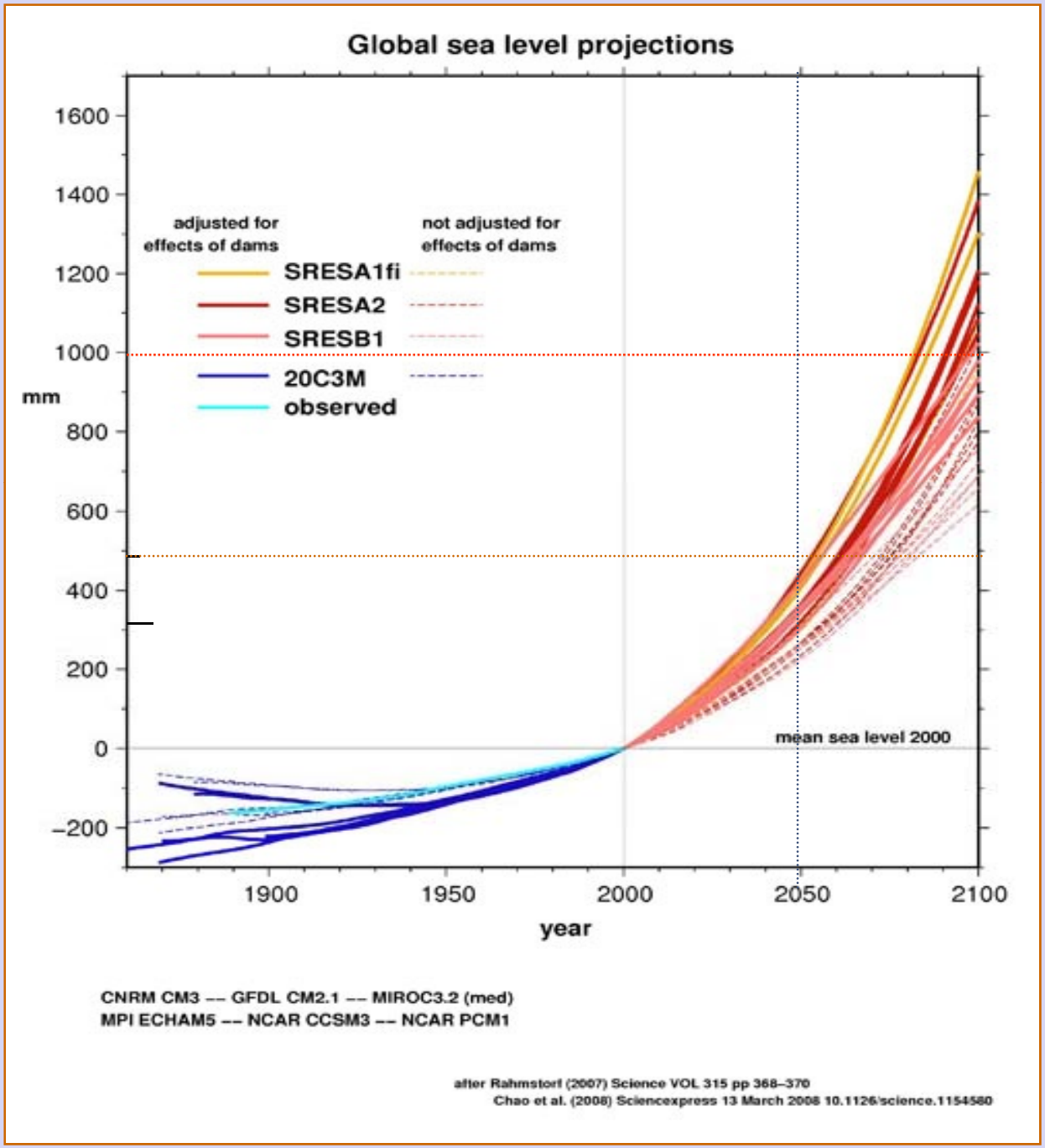
GFDL A2 Simulation

latest generation of GCMs Indicate that summers warm more than winters

Heat Wave frequency and intensity increases markedly, but depends on which emissions scenario and which GCM



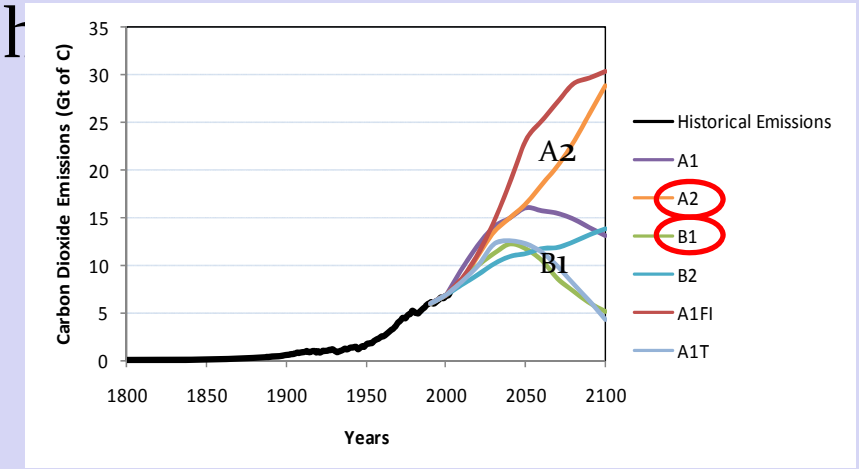


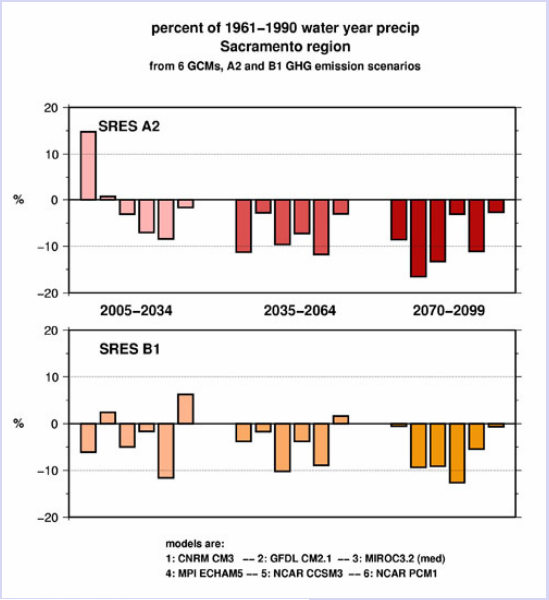

Global sea level projections
1600
1400
1200
1000
800
600
400
200
0
−200
mm
adjusted for
effects of dams
not adjusted for
effects of dams
SRESA1fi
SRESA2
SRESB1
20C3M
observed
mean sea level 2000
1900
1950
2000
2050
2100
year
CNRM CM3 –– GFDL CM2.1 –– MIROC3.2 (med)
MPI ECHAM5 –– NCAR CCSM3 –– NCAR PCM1
after Rahmstorf (2007) Science VOL 315 pp 368–370
Chao et al. (2008) Sciencexpress 13 March 2008 10.1126/science.1154580

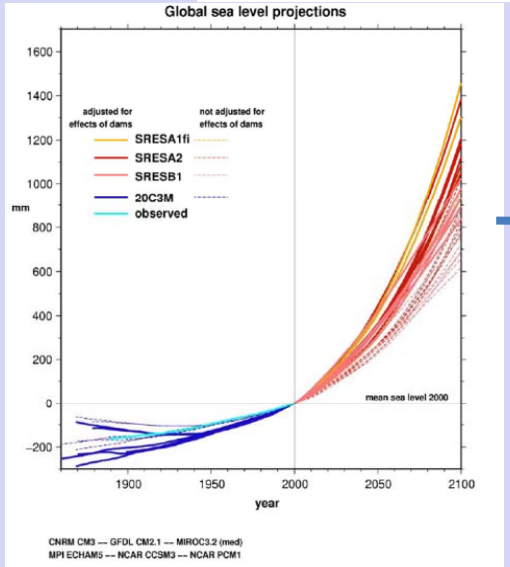
Climate and Sea Level Rise Scenarios:

What is new?

- 6 models—several more than in 2006 Assessment
- Drying trends by mid-century
- Updated sea level projections h







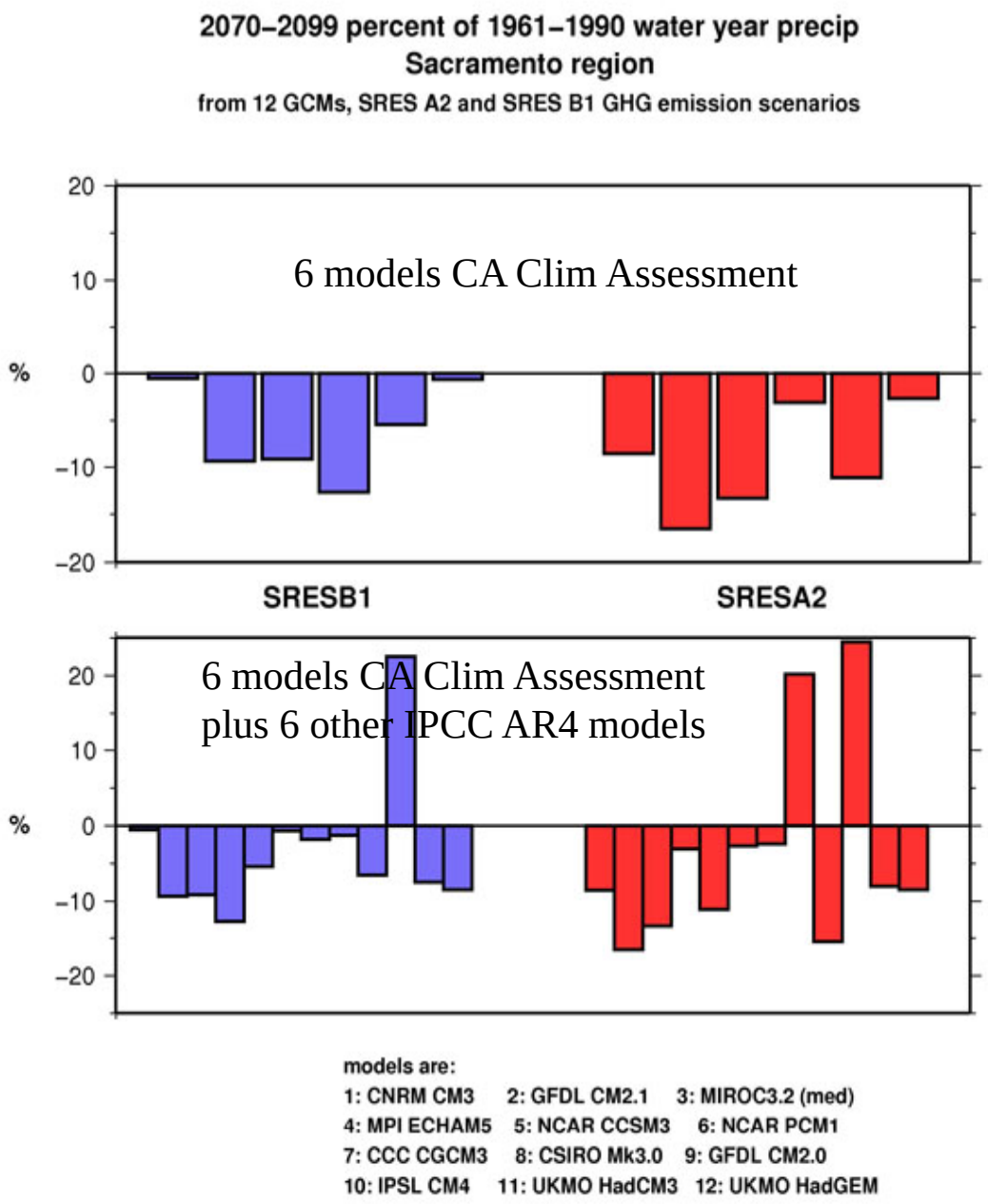
2006 Assessment

This Report:

Climate Change Scenarios and Sea Level Rise Estimates for the California 2008 Climate Change Scenarios Assessment Publication CEC-500-2009-014-D. *62 pp.* *2.2 megabytes*

www.climatechange.ca.gov/publications/cat/

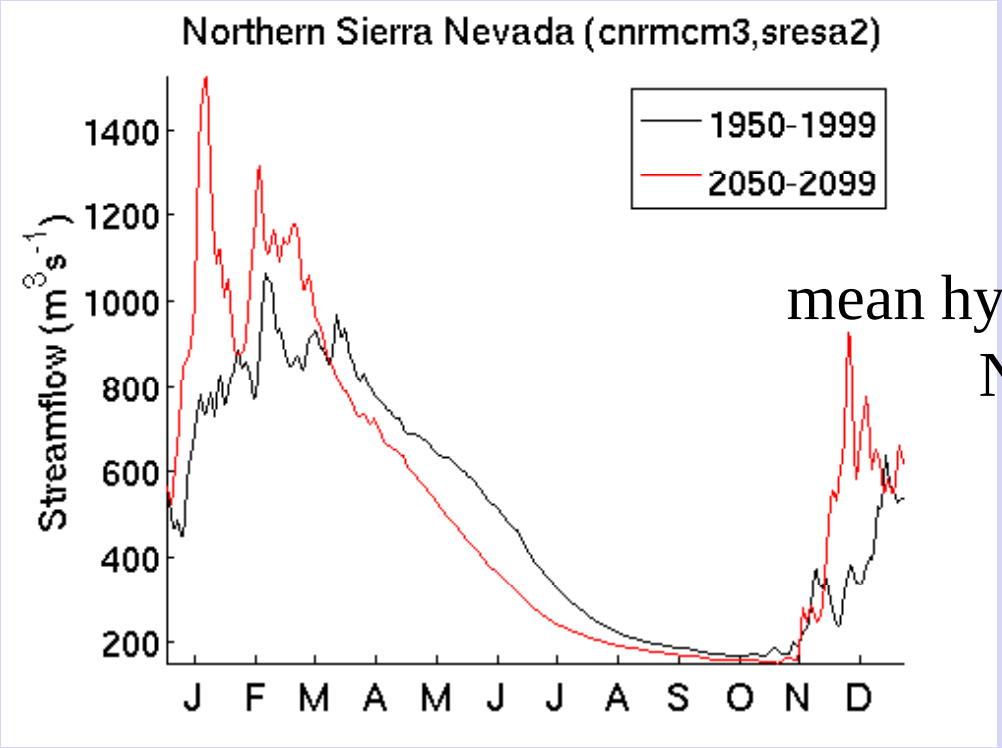
THANK YOU



6 climate models employed in the Scenarios Assessment were heavily shaded toward drying in central California.

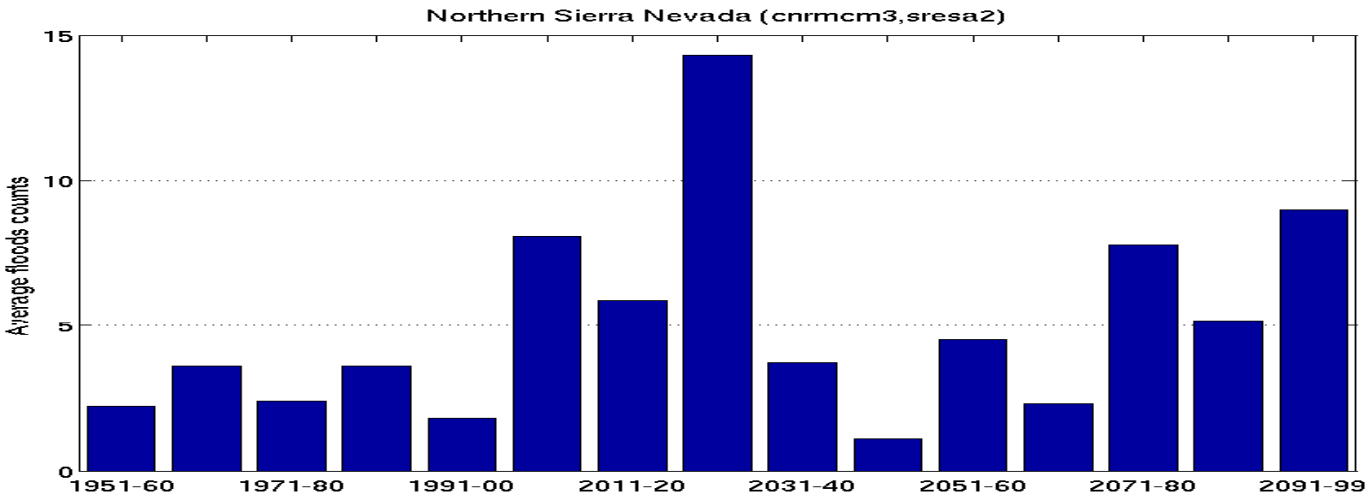
A larger set of 12 climate IPCC models do contain two simulations having wetter conditions at end of 21st Century, but the consensus reinforces concerns over a drier future.

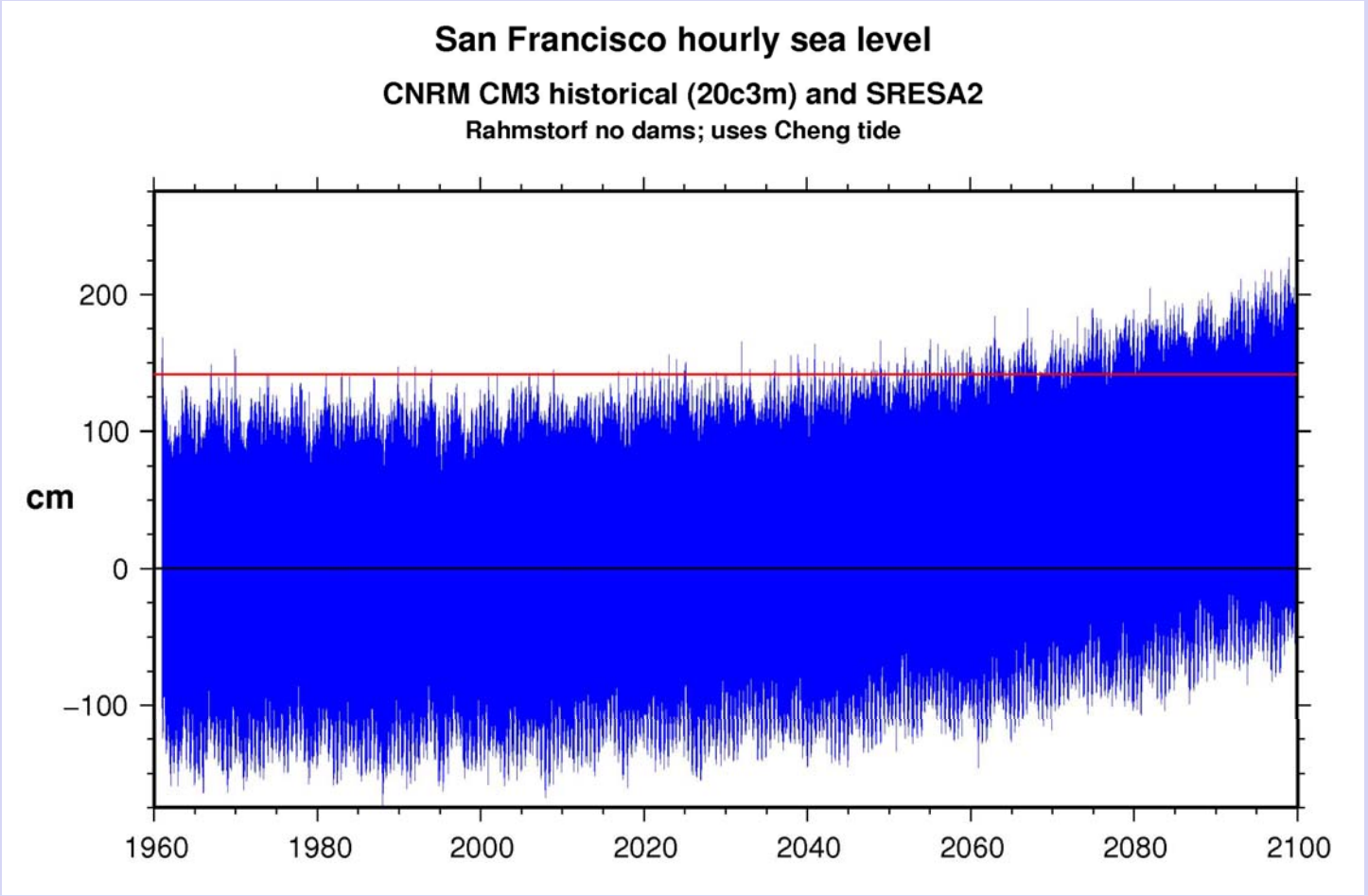
In Southern California, magnitude of drying tendencies was increased



mean hydrographs CNRM A2
Northern Sierra becomes
more flood-prone

99th percentile streamflow events come twice as often





San Francisco sea level CNRM A2 using Rahmstorf scheme

99.99th level (1961-1990) shown in red

Global societal and emission scenario themes

- A2: Disparities in regional development patterns; high global population growth; relatively low economic growth
- B1: Convergence of development patterns; low population growth; relatively high economic growth; global emphasis on environmental sustainability
  - *No global CO2 policy, but significant moderation of emissions*