Local Implications of Climate Change Research

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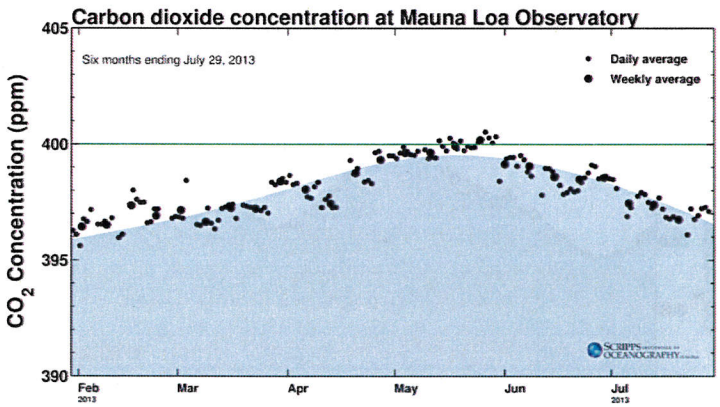
Atmospheric CO_2 variations



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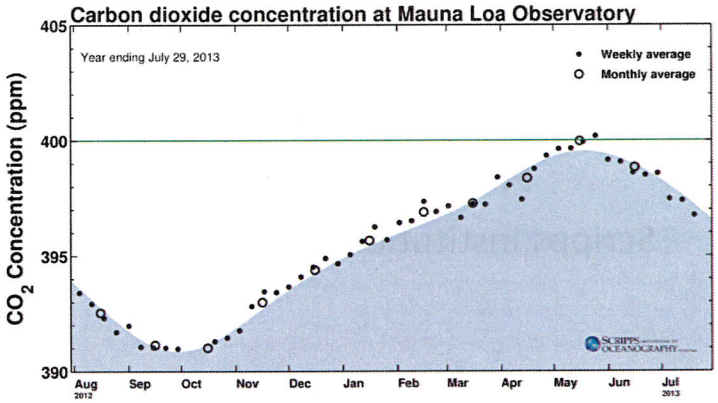

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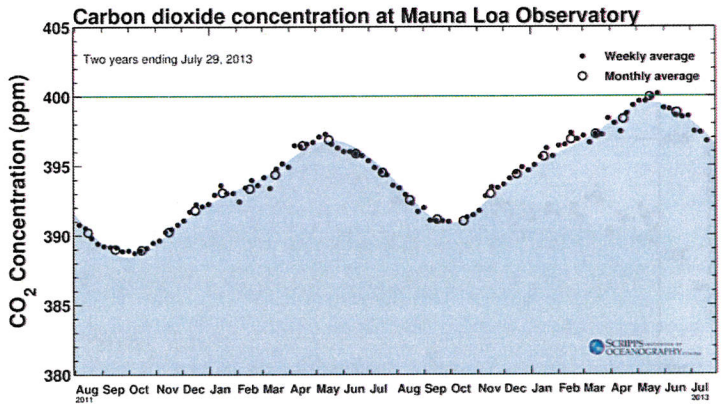

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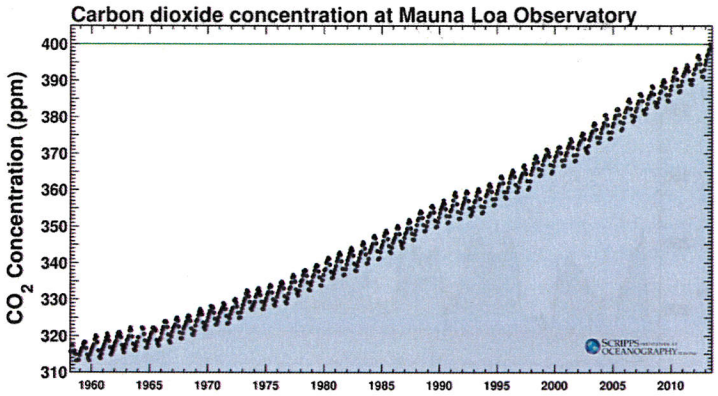

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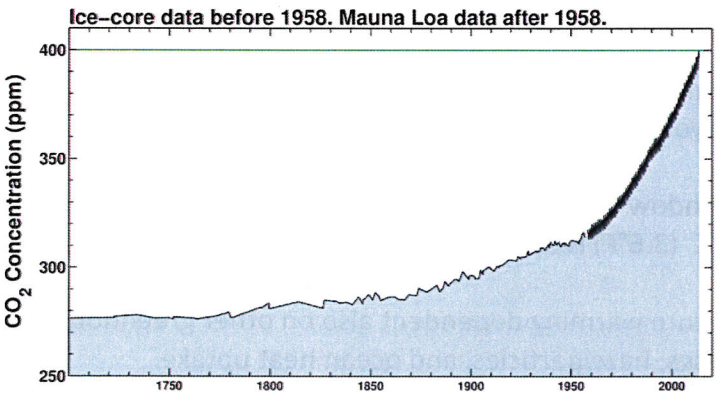

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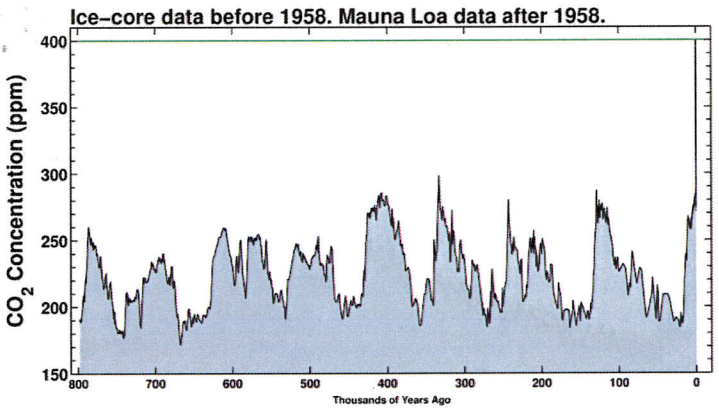


What is the significance of the 400 ppm milestone?

Inertia in energy systems makes it essentially impossible to rapidly halt CO_2 rise.

Almost inevitable that CO_2 will rise to 450 ppm and beyond.

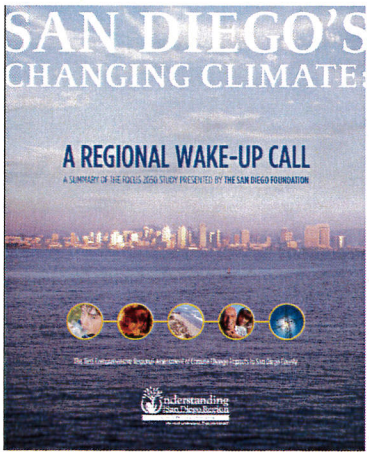
Window of opportunity for holding global warming below 2°C (3.6°F) is closing fast, if not closed already.

Future warming dependent also on other greenhouse gases, haze particles, and ocean heat uptake.

Can buy a little time by focusing on short-lived forcing agents (methane, black carbon).

Implications for California and San Diego

2008 San Diego Foundation Report



2013 Scripps Inst. Oceanography Report

Report to U.S. Rep. Waxman on Climate Impacts on California

Forthcoming reports

California Environmental Protection Agency:

Indicators of Climate Change in California

Port of San Diego

Climate Plan

California Impacts relevant to San Diego

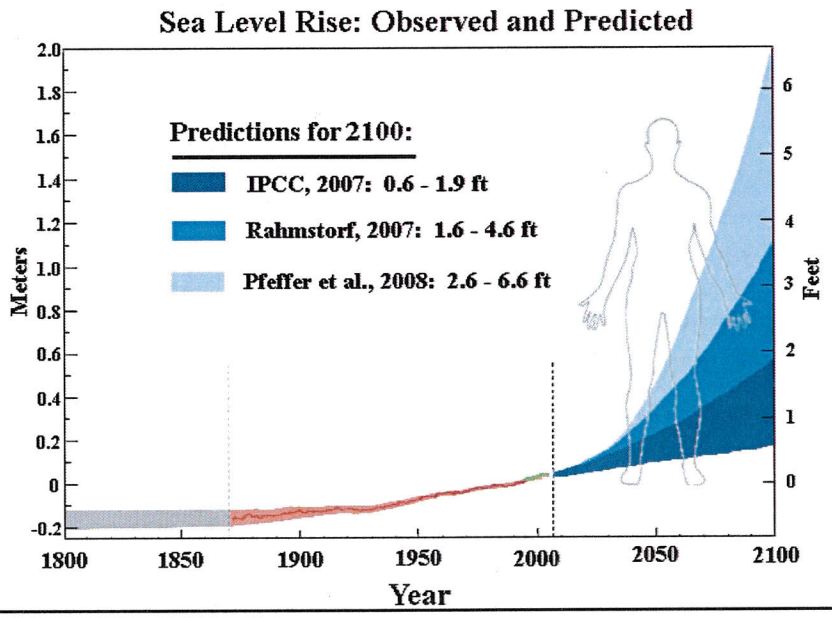
Warming
- More intense and humid heat waves
- more intense storms and droughts
- warmer nights
- health and pest effects
- increased water and energy demand

Water and Energy supply
- Rainfall predictions uncertain
- Less snow pack
- Loss of hydro-electric capacity

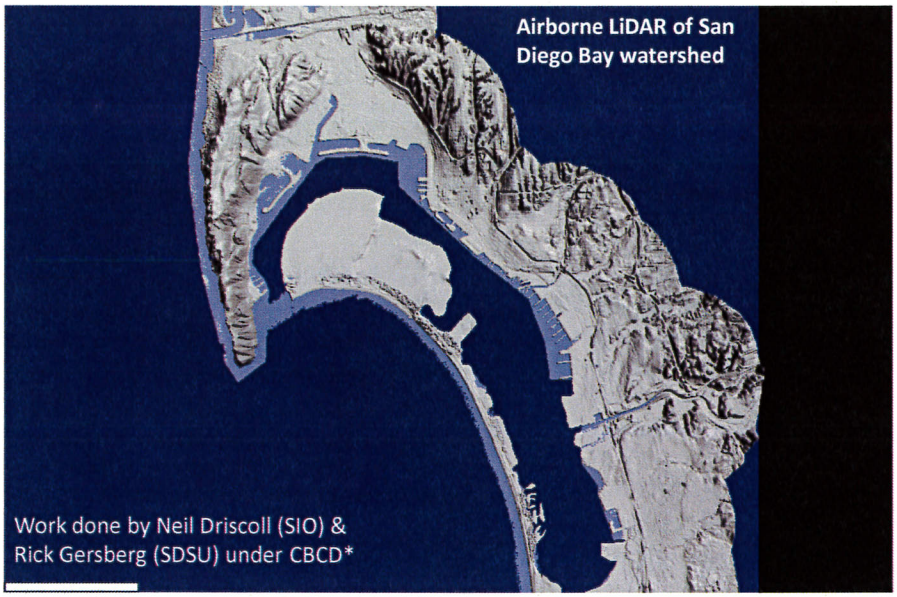
Wild fires
- Increased fire frequency, intensity, and area covered
- 1°C warming associated with 3-fold increase in frequency and 6-fold increase in area

Habitat shifts and loss
- Wild-fire and drought effects, complex interactions
- Many species must be able to migrate to survive

Sea-level rise and coastal effects



Inundation maps for San Diego Bay (bath-tube type model)



*Center for Bay and Coastal Dynamics (*CBCD*) supported by San Diego Port Commissioners

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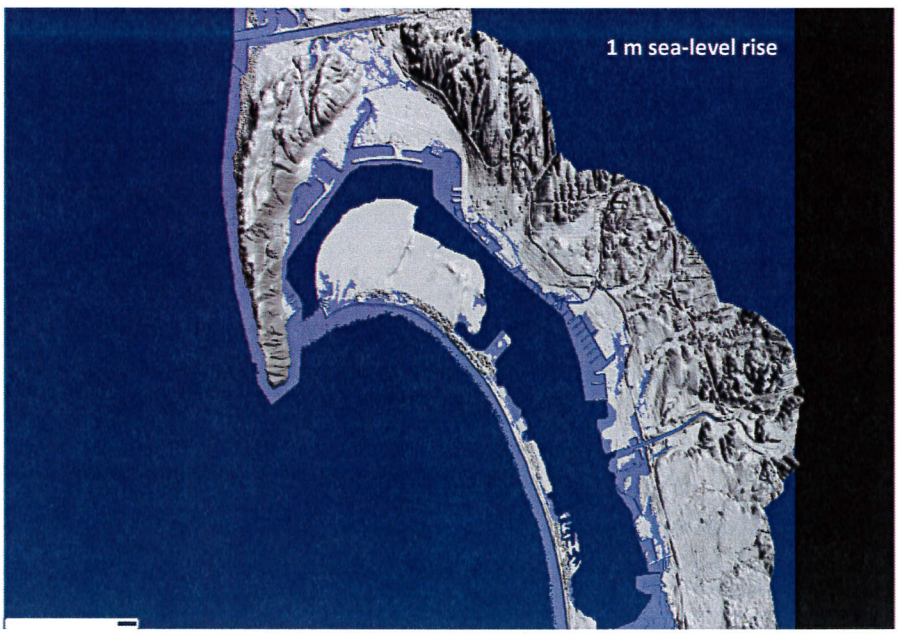

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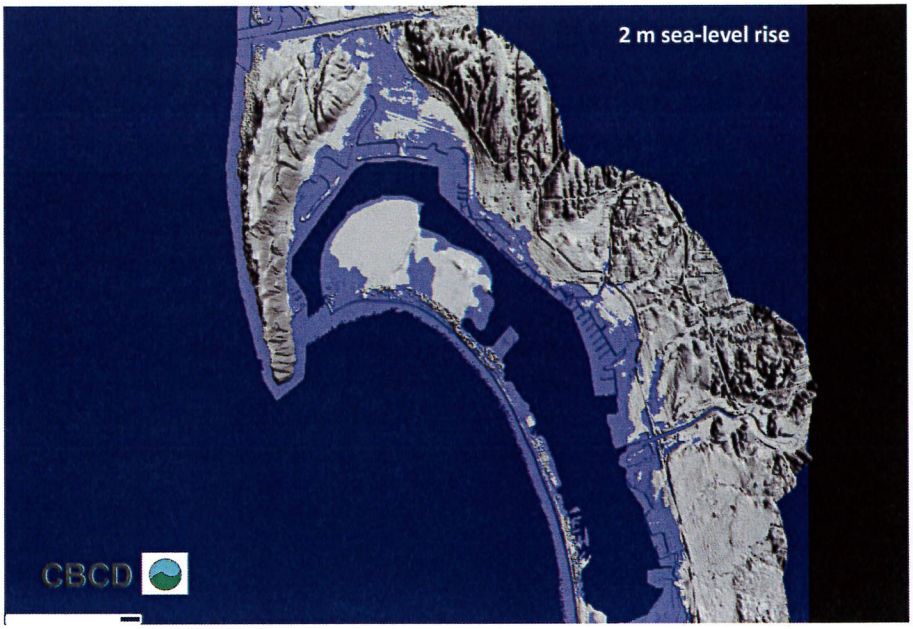


Conclusion

Kendall Frost Reserve

Current - Habitats

Conclusion

20 cm sea level rise

Conclusion

50 cm sea level rise

Conclusion

100 cm sea level rise

Conclusion

150 cm sea level rise

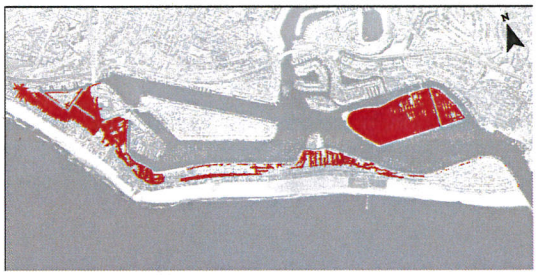
San Diego Flooding

January 20, 2010

January 18, 1988

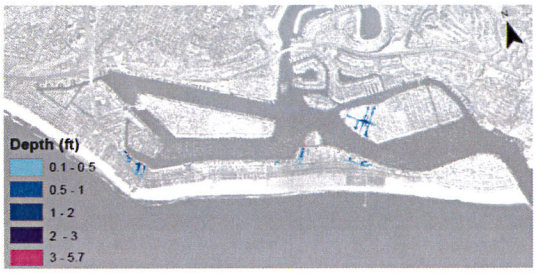
Modeling done for Newport Beach*

Bathtub



Topographic vulnerability only

Hydrodynamic



Flood extent Depth

Timu Gallien supported by UCSD Chancellors fellowship

Long-term sea-level rise commitment

Sea level will inevitably keep rising for many centuries.

Eventual "commitment"*:
2.3m (7.5 ft) of sea level rise for each 1°C of warming.

2°C of global warming will inevitably cause ~6.8m or 15ft of sea level rise.

Actual rise will almost certainly be larger because of difficulty of halting global warming at 2°C.

*Levermann et al, Proceedings of the National Academy of Sciences, 2013

Action on climate mitigation

- Not too late to reduce emission: 1 ton CO_2 emitted in 2050 causes as much additional warming as a ton emitted in 1995* .
- Still lack adequate international framework for effectively reducing of emissions.
- Regions can lead: California Assembly Bill 32.
- Also role for cities to lead.
- Monitoring urban emissions is possible by atmospheric measurements.

Stocker, T. F. (2013). "The Closing Door of Climate Targets." Science **339(6117): 280-282.**