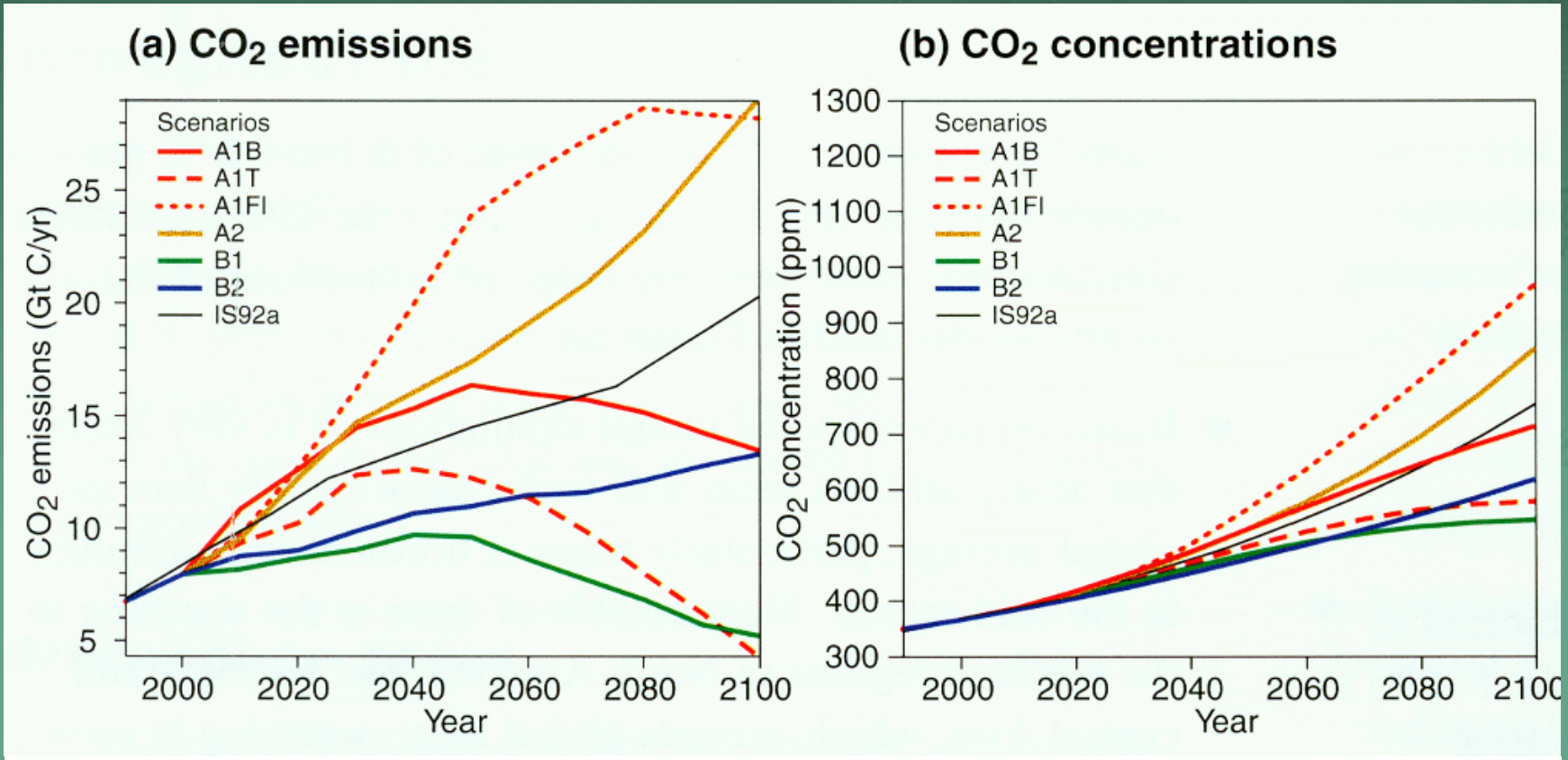
Abrupt Climate Change: Responses and Impacts

Dr. Thomas R. Armstrong
Senior Advisor, Global Change
USGS

U.S. Department of the Interior
U.S. Geological Survey

Modeling the Future



Source: IPCC, Climate Change 2001: The Scientific Basis

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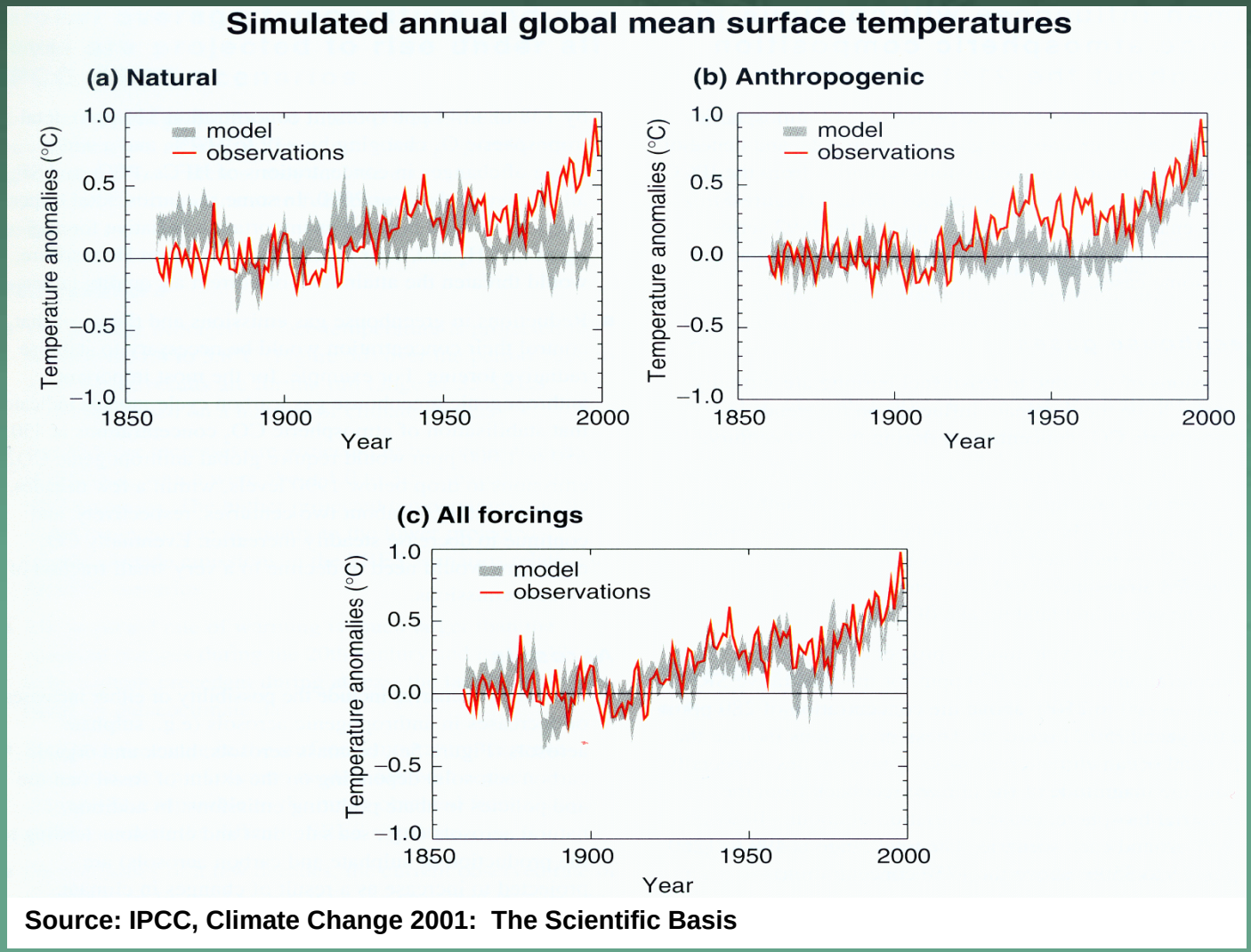
Climate Change: Natural vs. Anthropogenic



Source: IPCC, Climate Change 2001: The Scientific Basis

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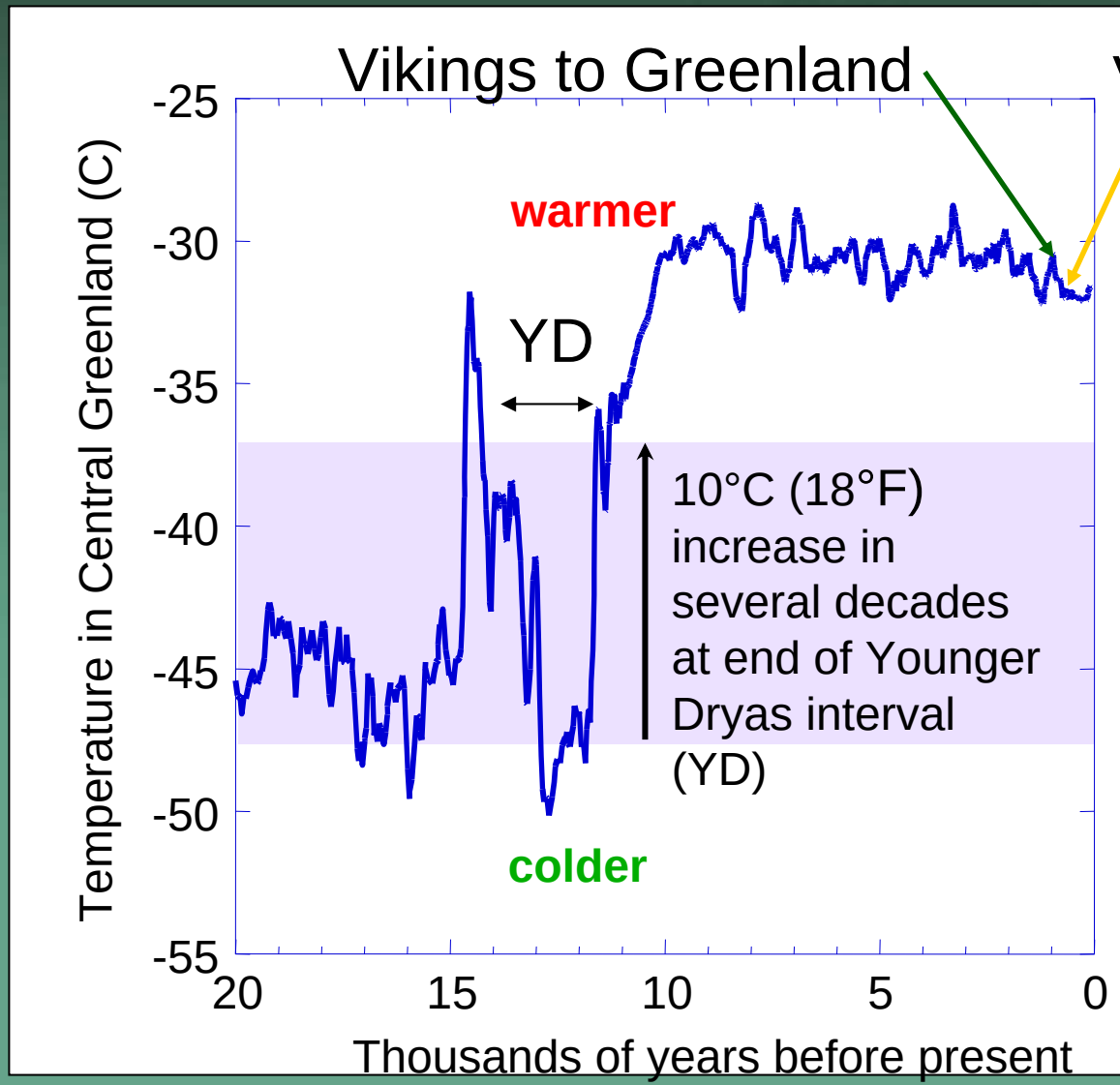
Abrupt Climate Change: The Past 20,000 Years



- Small changes in temperature can lead to significant local human impacts
- Big temperature changes have occurred rapidly that could have significant global impacts

Alley, 2000

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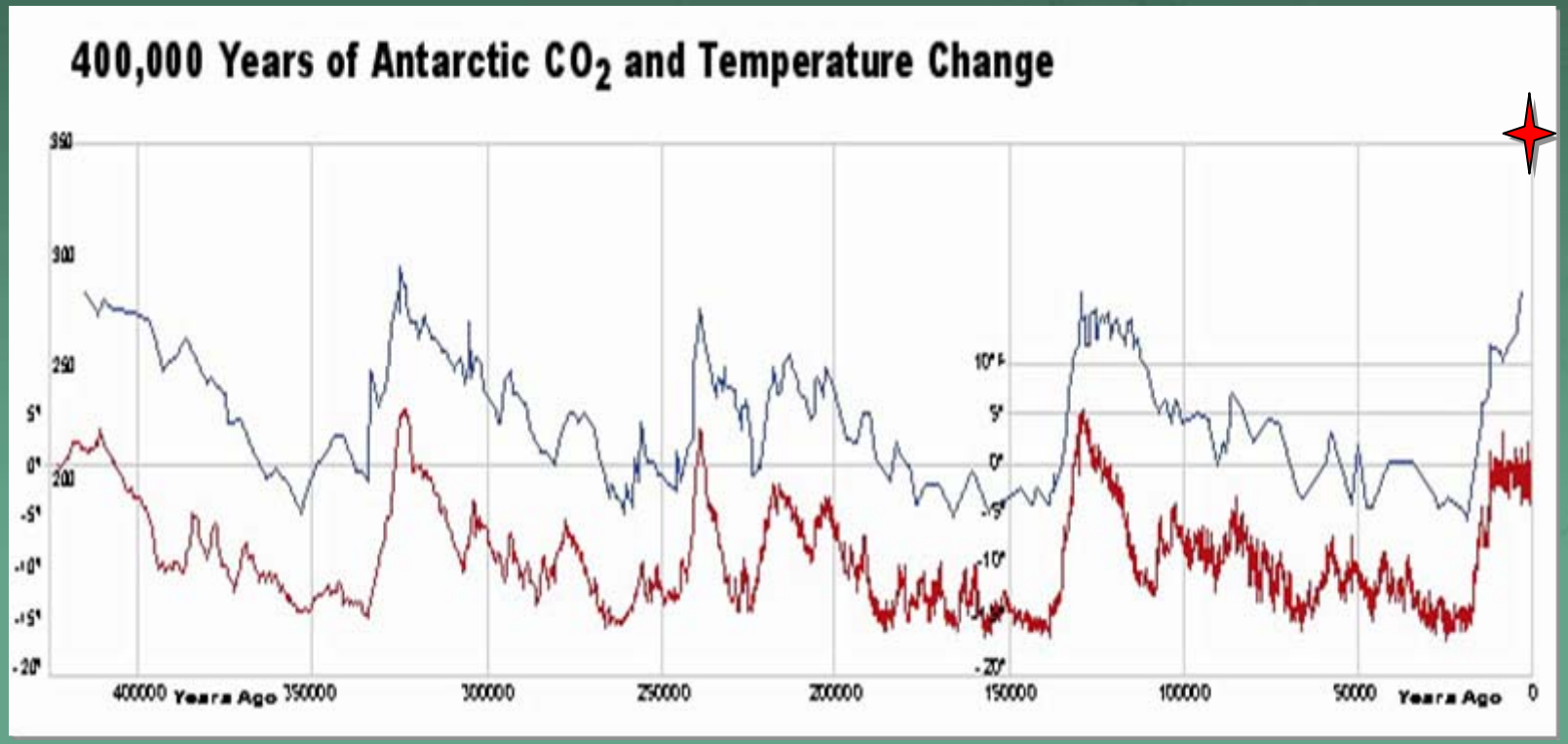
Abrupt Climate Change: The Past 400,000 Years



Upper, blue line = CO_2 level

Lower, red line = temperature

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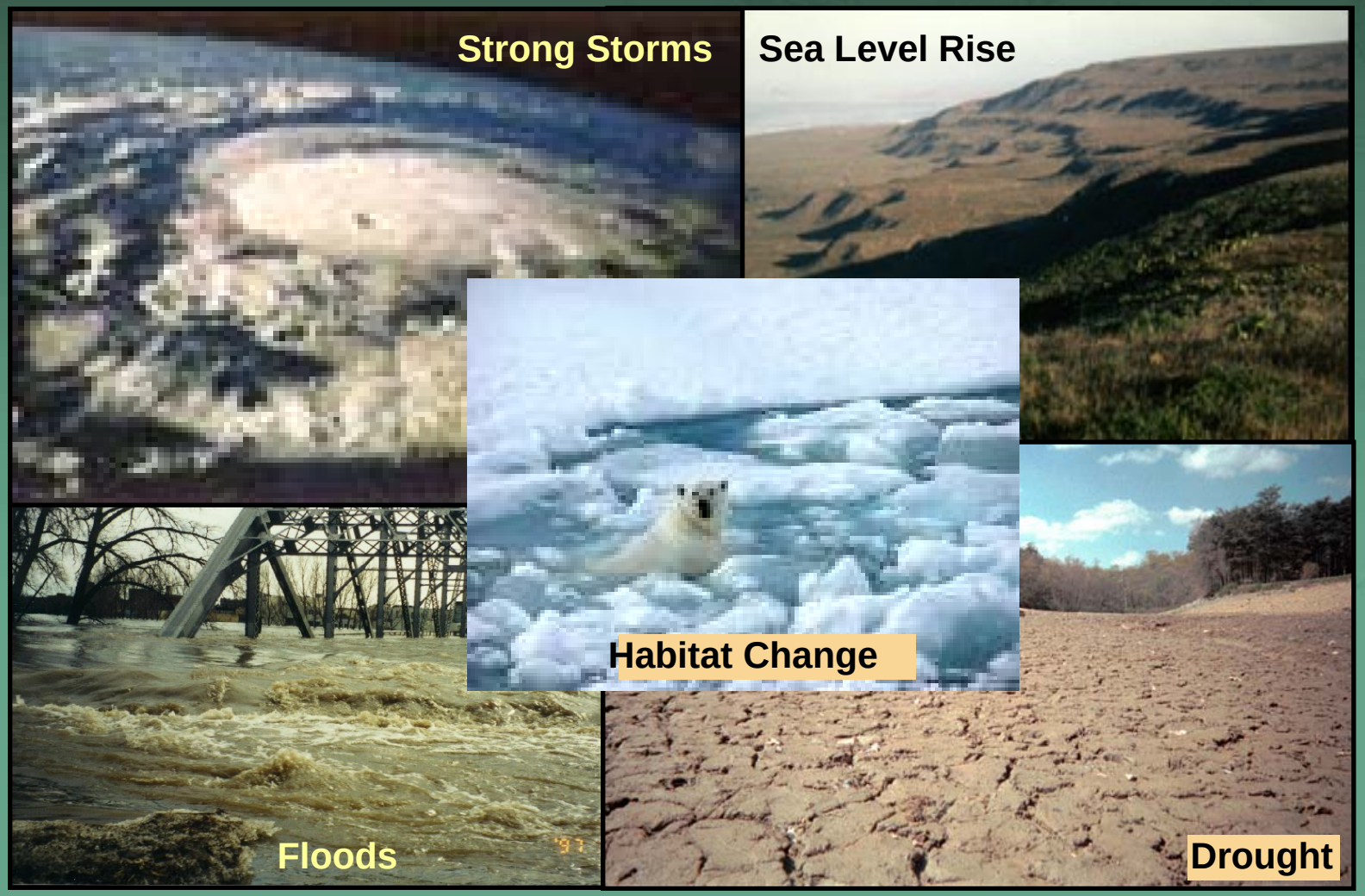
Some Responses to Abrupt Climate Change



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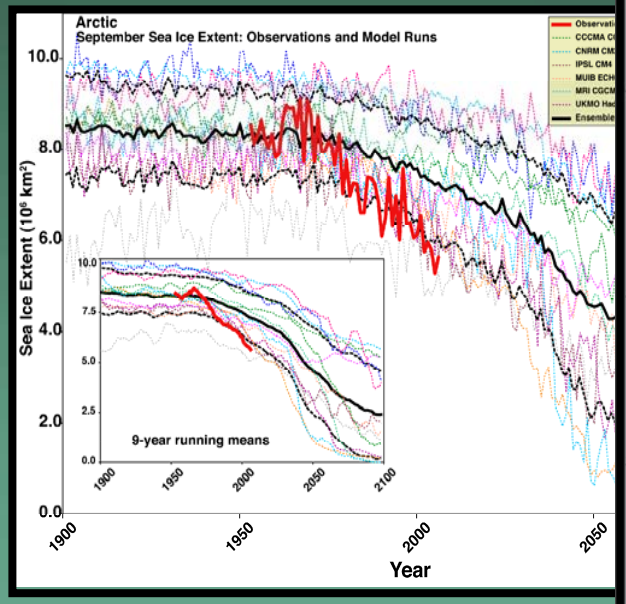
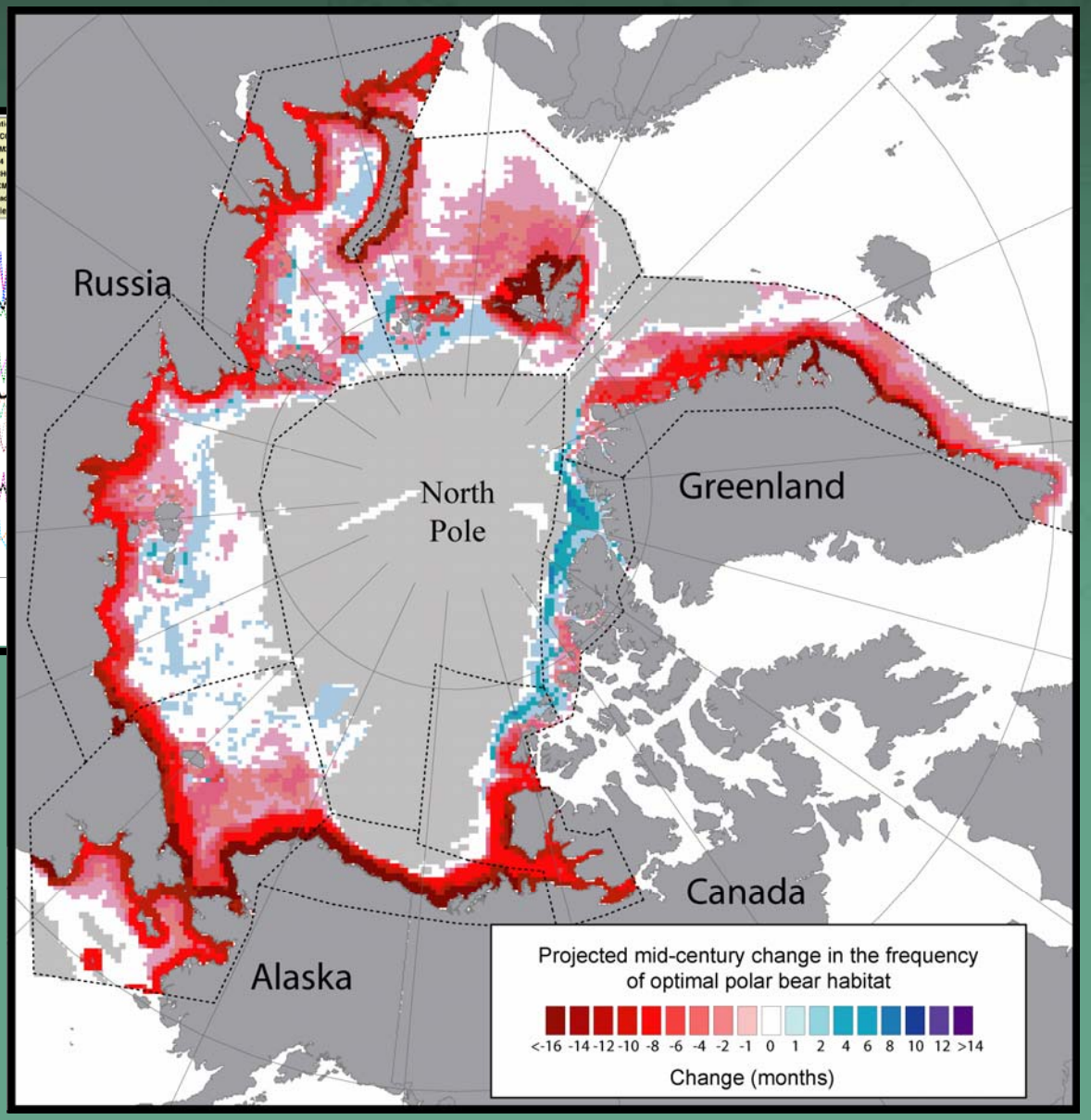
Climate Change, Sea Ice Loss, and Polar Bear Habitat



Significant loss of polar bear habitat (red)



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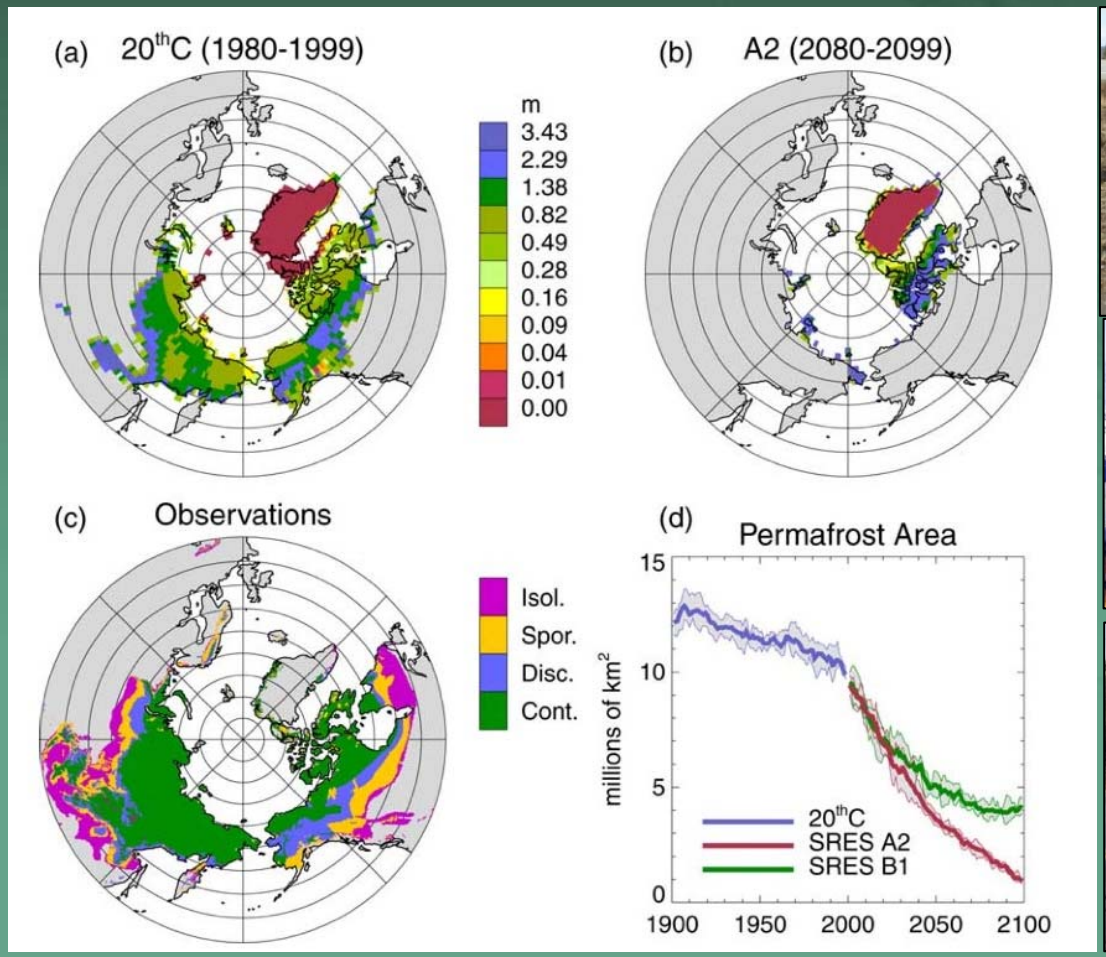
Response to Climate Change



Projected Permafrost Degradation by 2100

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As the Earth Warms, Sea-Level Rises

Two factors: increased meltwater and thermal expansion

Since the last glacial maximum (≅ 20,000 b.p.):

- sea level has risen 120 m (400 ft)
- past 100 years - 1.0 - 2.0mm/yr

Low lying coastal areas are prone to more frequent inundation

As sea level rises, flooding, erosion, and salt water intrusion will accelerate

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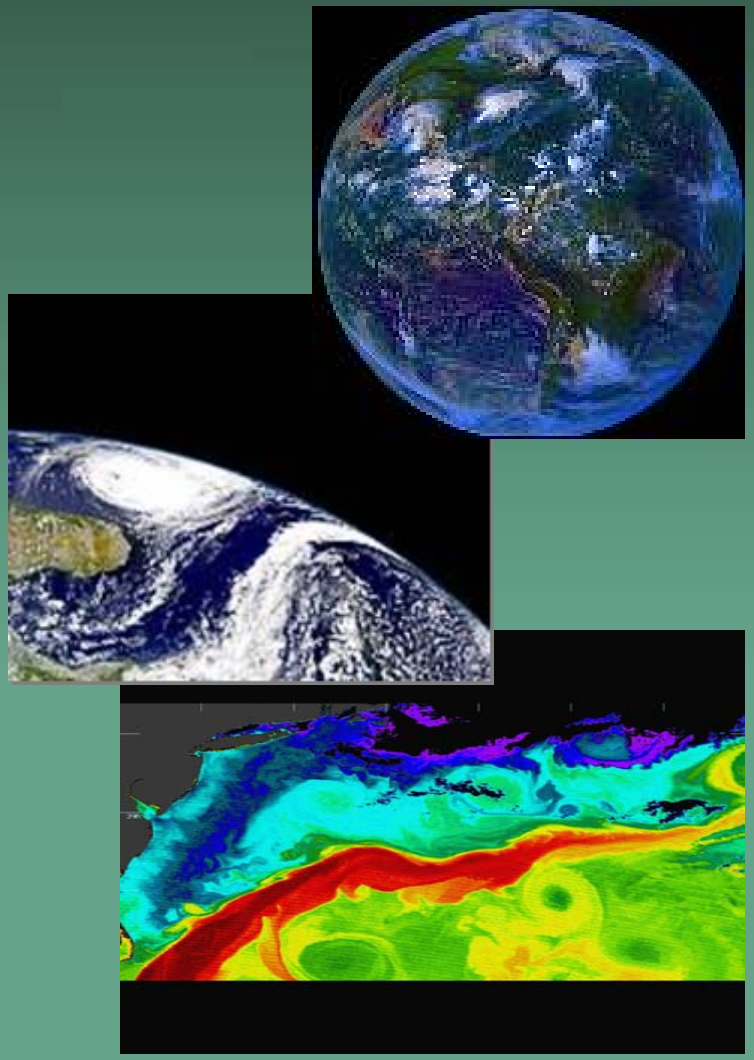
Future Science Challenges



- Forecasting changes in state
- Forecasting accelerated rates
- Linkages between state change and system response
- System thresholds and their triggers
- Adaptation and mitigation strategies

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The Vision – A National Climate Effects Network

- An integrated National climate effect monitoring network capable at a range of scales.
- Focus on early detection and forecasting in support of adaptation or mitigation strategies.
- An information dissemination and decision support system.
- The capacity for the next generation to protect and sustain our National trust resources through early detection of change.

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