





Go, go, go said the bird: human kind
Cannot bear very much reality

T.S. Eliot (in *Burnt Norton*, *Four Quartets*)

... the problem is “not seeing what we don’t want to see”
 (“willful blindness”)

John Casti, X-Events, 2012

Climate Change and Sea Level Rise: The Social Construct of Risk and Vulnerability



The Syndrome: What we know about the changes

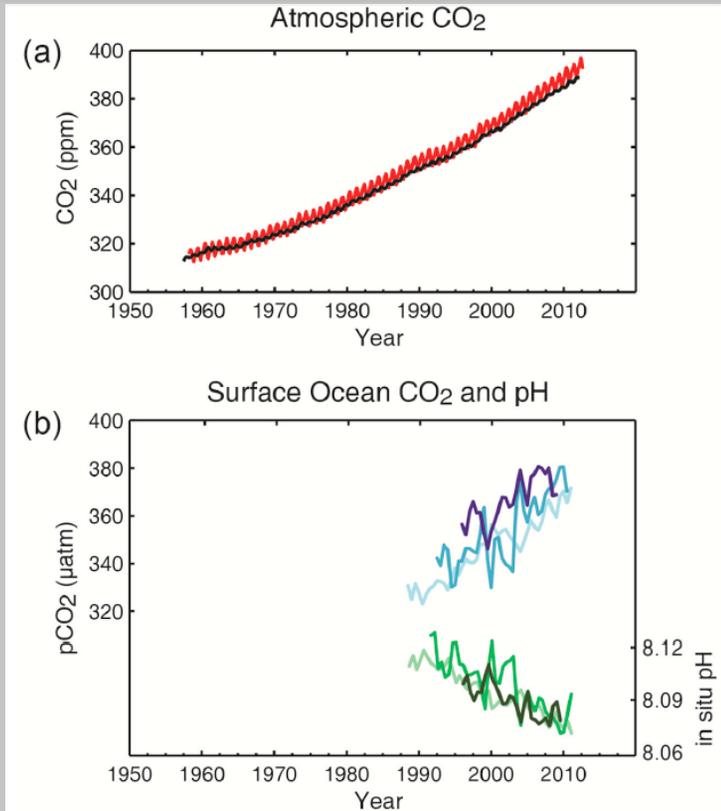
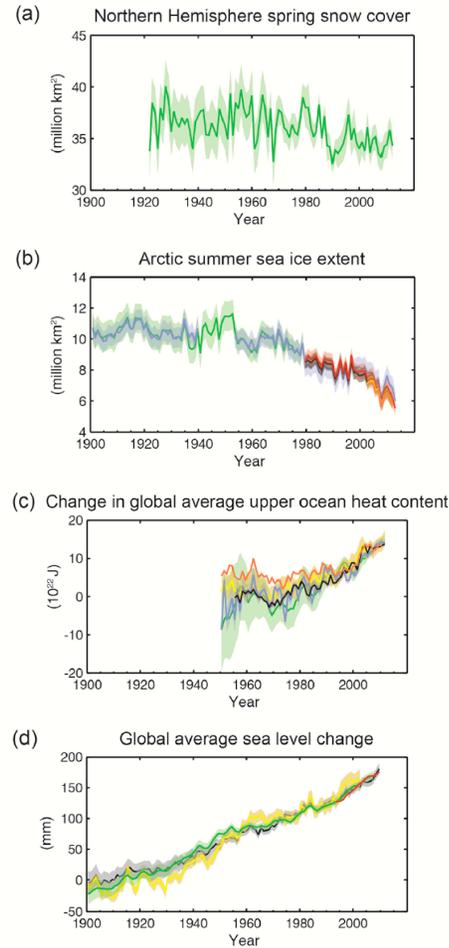
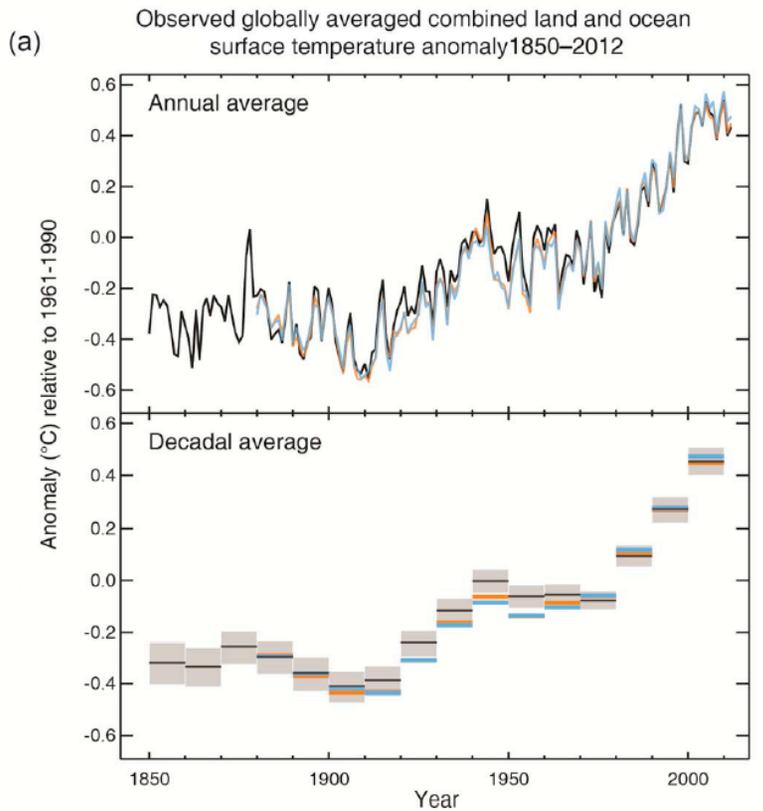
The Diagnosis: What we know about the causes

The Prognosis: Predicting the future or anticipating surprises?

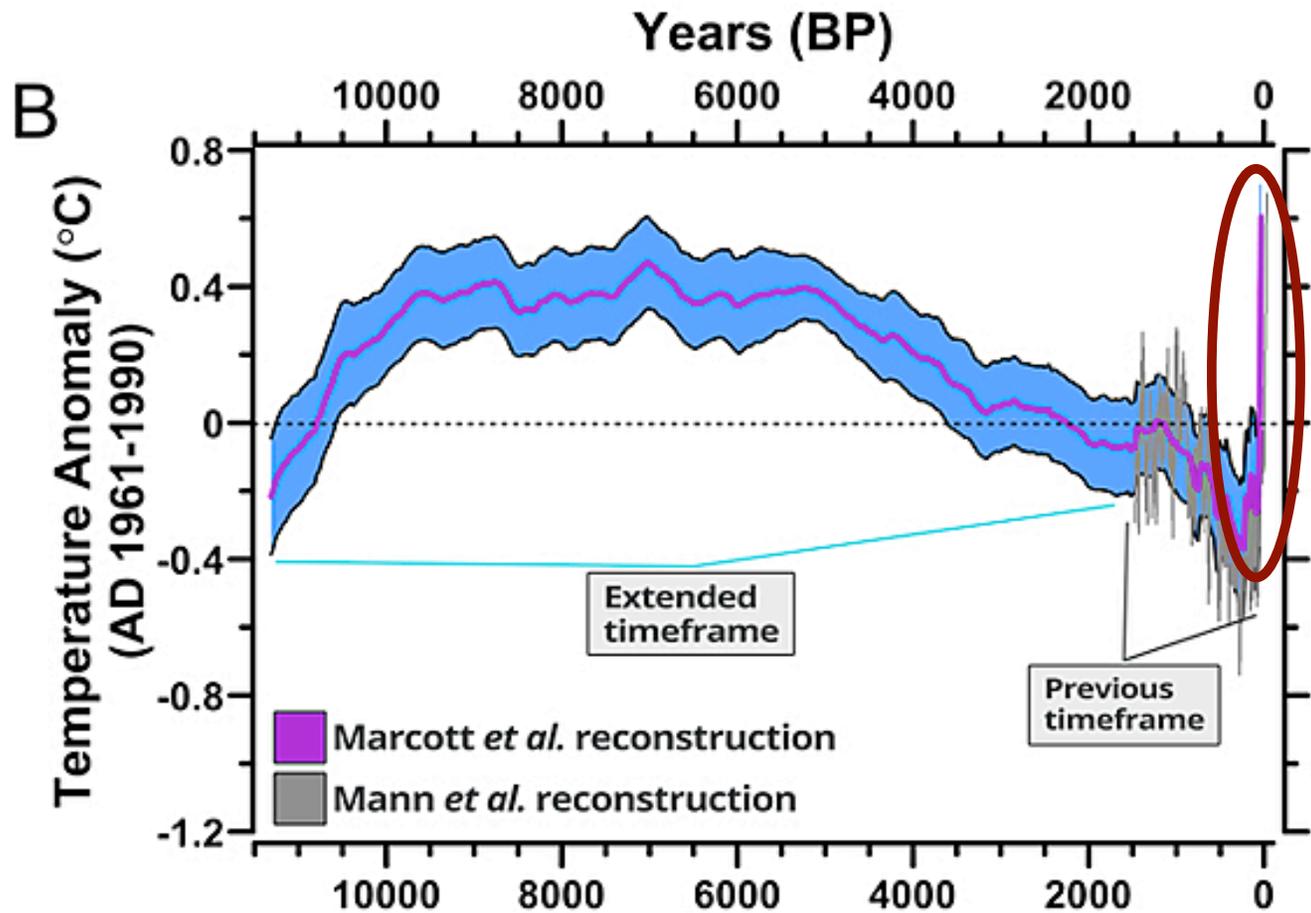
The Therapy: Responding to vulnerabilities and risks

Hans-Peter Plag
February 21, 2014

The Syndrome: ...



The Syndrome: ...



The Syndrome: ...

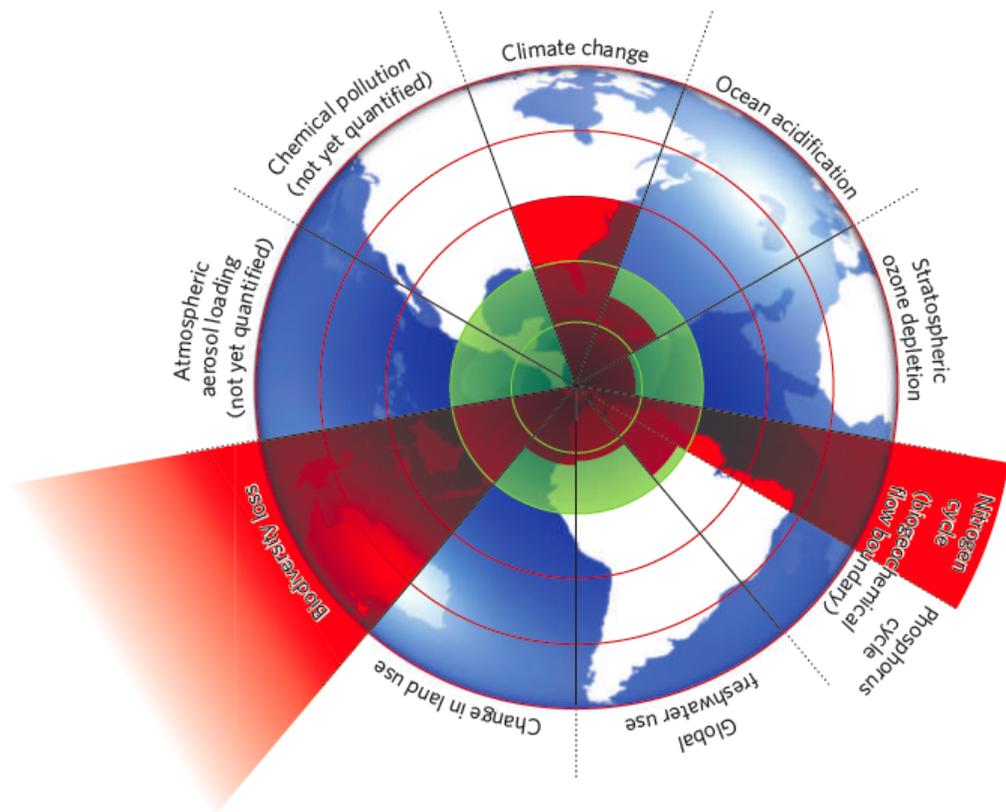


Figure 1 | Beyond the boundary. The inner green shading represents the proposed safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle), have already been exceeded.

We are moving out of the Holocene and the “safe operating space for humanity” (Rockstroem et al., 2009):

Climate Change (***)

Ocean acidification (**)

Stratospheric ozone depletion (*)

Nitrogen (*****) and Phosphorous cycles (**)

Global freshwater (*)

Change in land use (*)

Biodiversity loss (*****)

Atmospheric aerosols (?)

Chemical pollution (?)

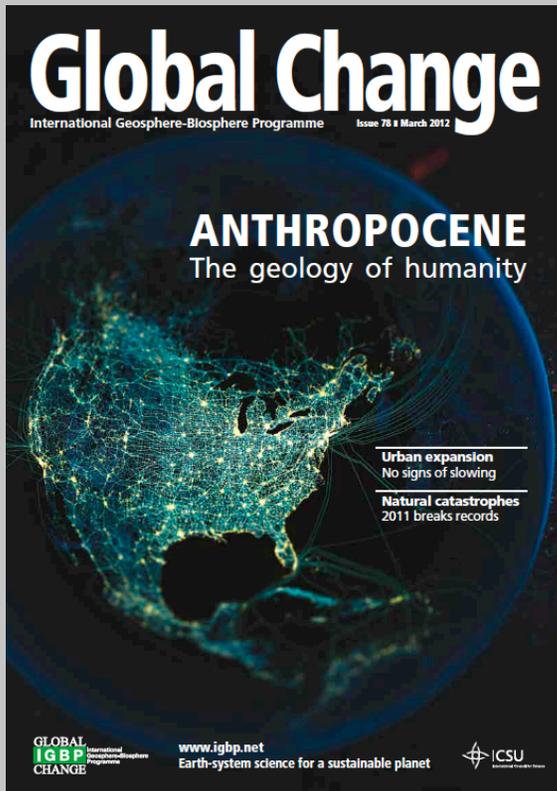
Climate change and sea level rise are symptoms, not the cause, the “sickness.”

The Diagnosis



“Has human activity over the past two centuries pushed the Earth out of the Holocene and into the Anthropocene?”

James Syvitski, 2012.



We have moved from to back seats of the bus into the driver seat ...

The Diagnosis



And it seems pretty obvious that the time has arrived to prepare for the consequences of unsustainability, ...

Robert Engelman, 2013; president, World Watch Institute

IS
SUSTAINABILITY
Still Possible?

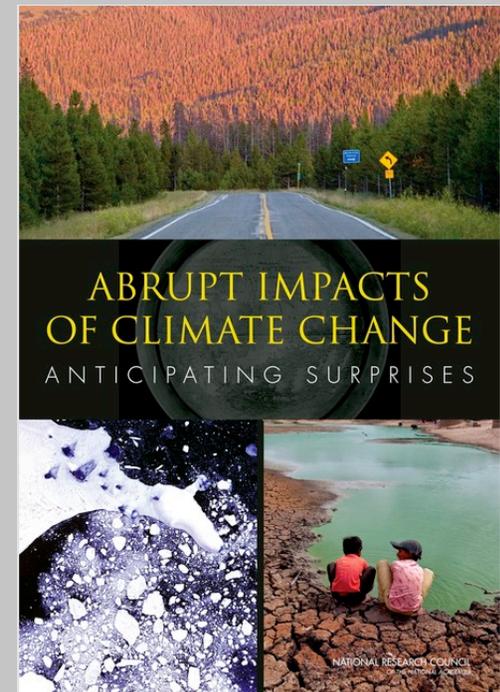


THE WORLDWATCH INSTITUTE

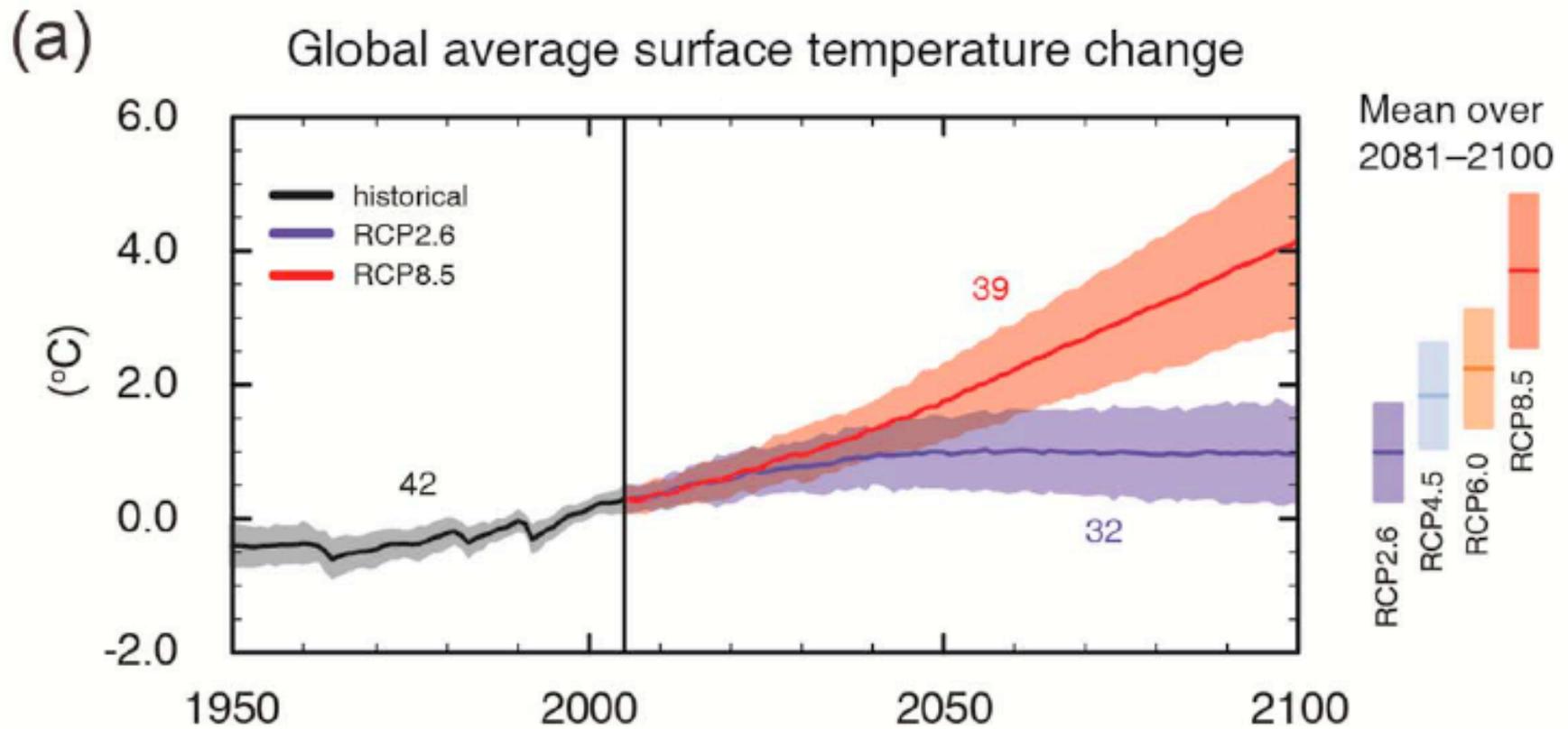
Copyrighted Material

The planet is on a path unknown to humanity ...

We need to develop adaptive capabilities to handle surprises ...



The Prognosis: ...

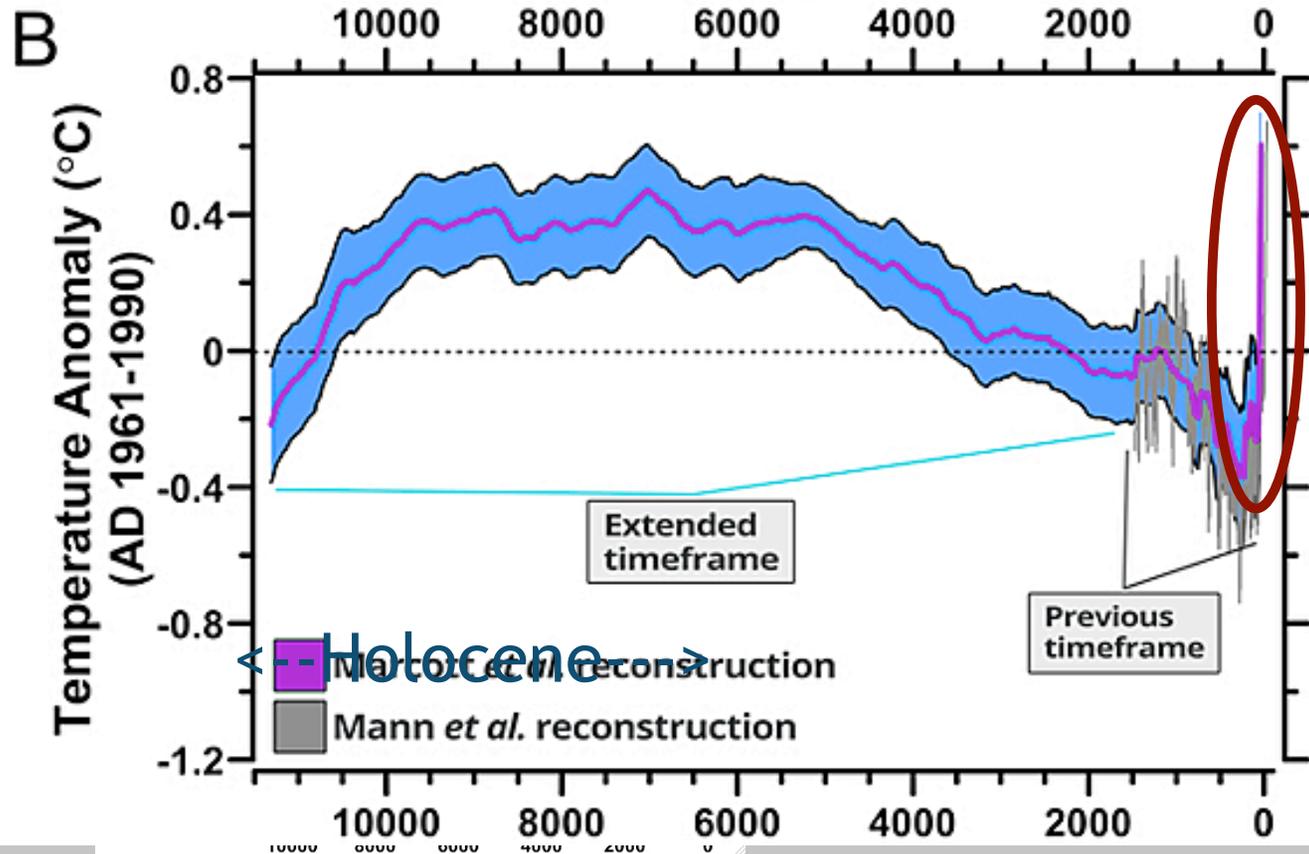


The Prognosis: ...



4

← Anthropocene ??



ment:
2100

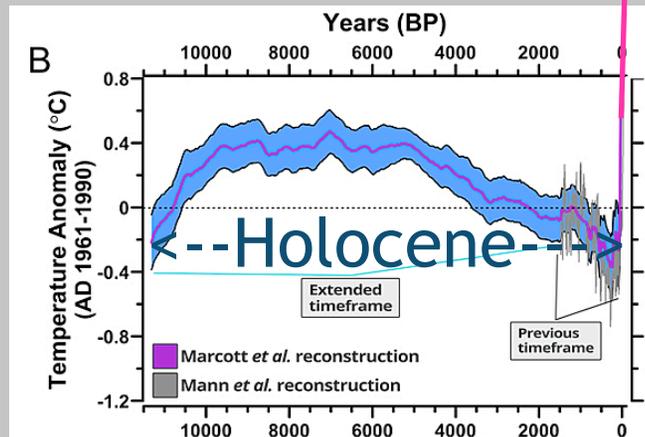
The Prognosis: ...



4
3
2
1°C

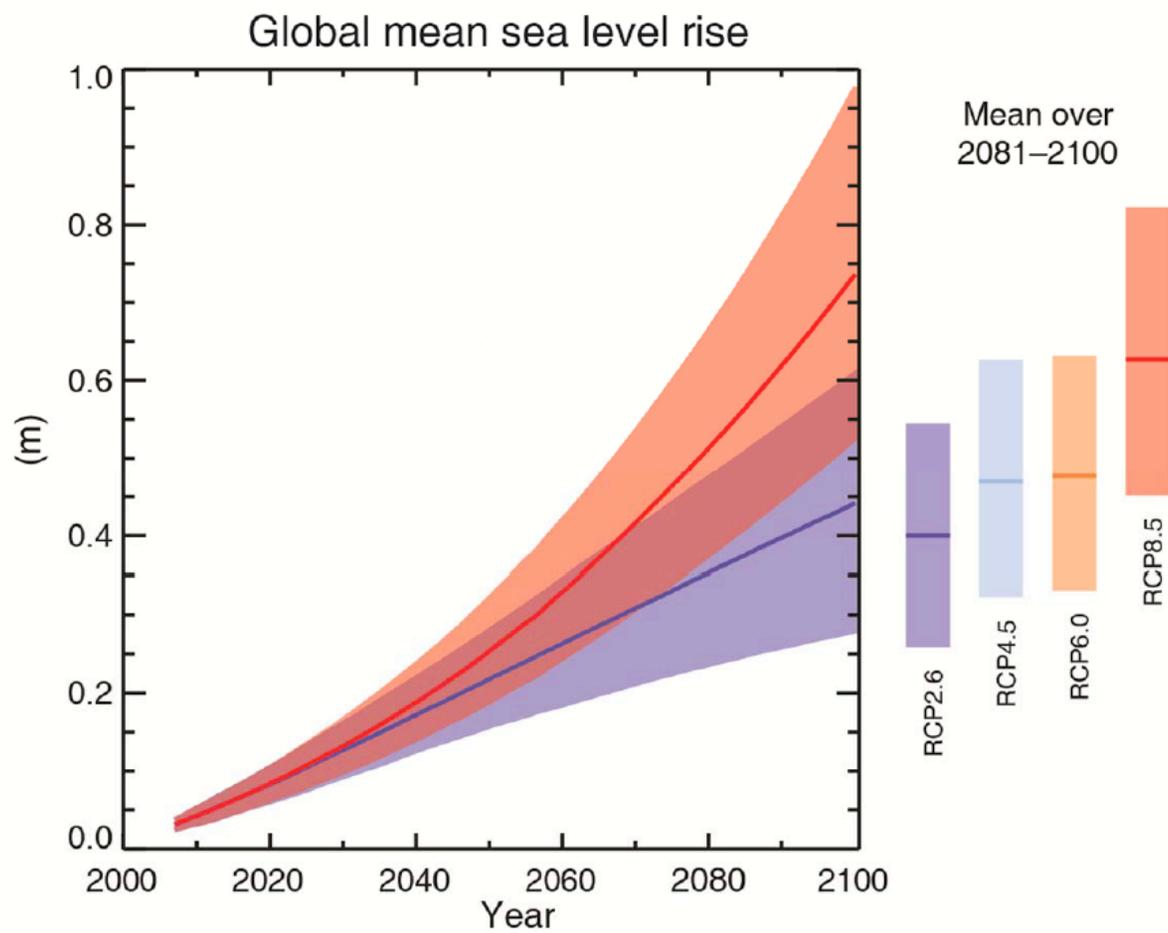
<--Anthropocene ??

IPCC Assessment:
Very Likely by 2100

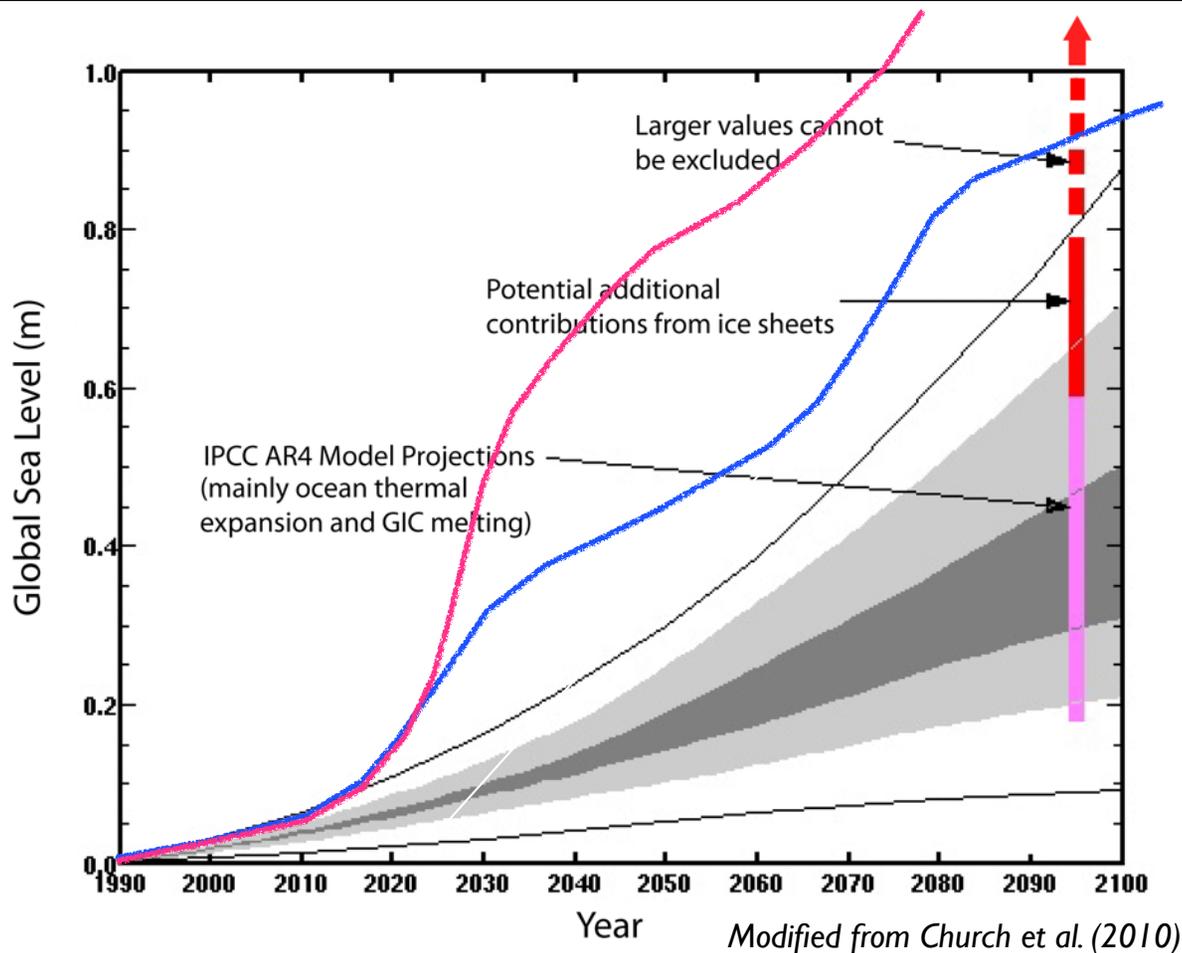


Marcott et al., 2013

The Prognosis: ...



The Prognosis: ...



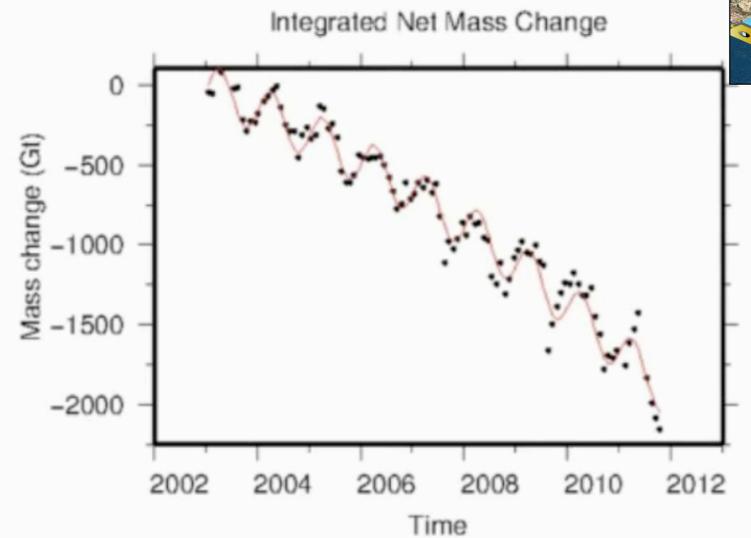
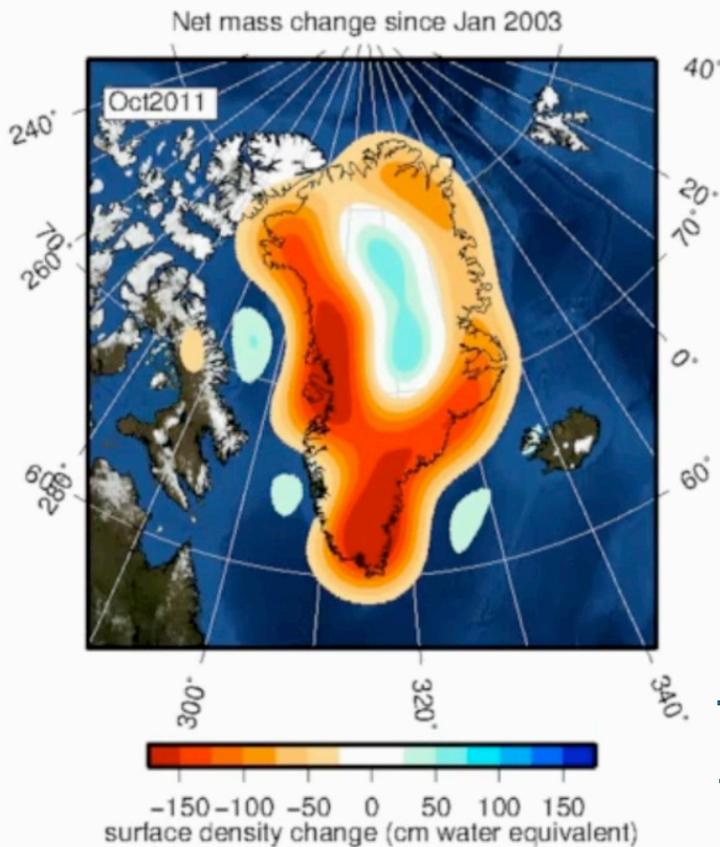
Example Hampton Roads

Today's rate: 5 mm per year
(about 1.5 feet in 100 years)



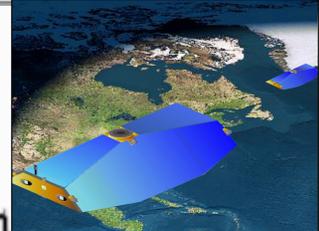
Soon could get as high as:
20 mm per year
(about 6 feet in 100 years)

The Prognosis: ...

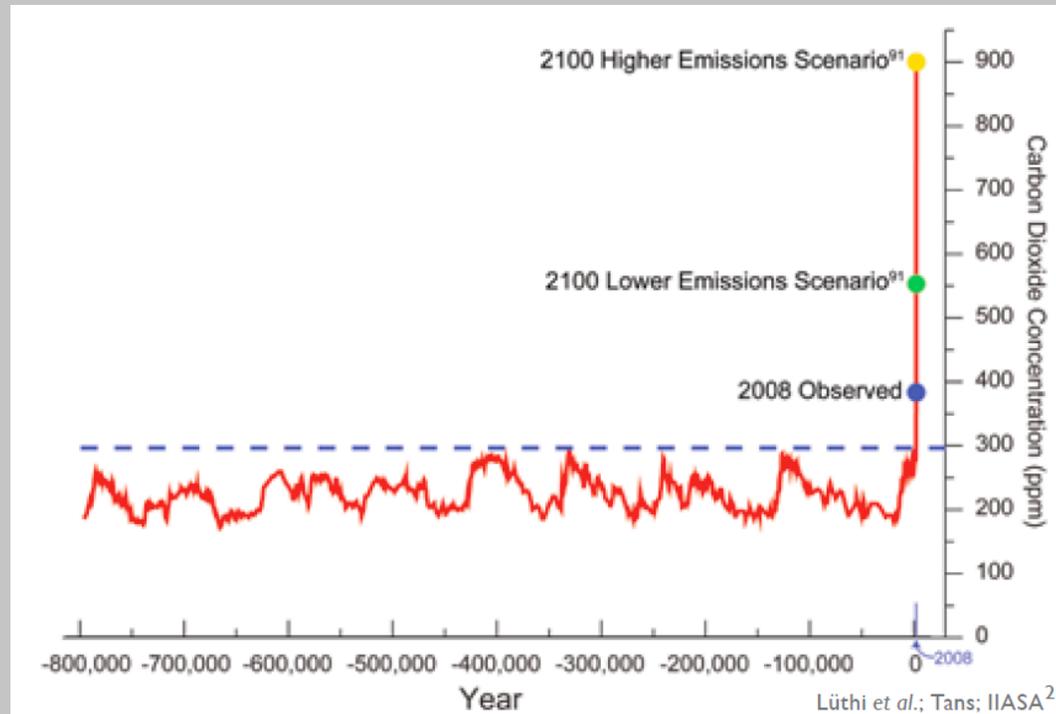


<http://www.polarice.princeton.edu>

The last 10 years of observing the ice sheets have revealed many surprises ...



The Prognosis: ...



The future is going to be different from the past ...

There is the potential for surprises and new extremes ...

The Therapy: ...



Plan A: Planning for a (somewhat) predictable future

- Choose a range of plausible trajectories (for droughts, heat waves, sea level rise, extreme events, ...)
- Determine the range of risks to be reduced based on these trajectories and vulnerabilities
- Adapt land use, building codes, protective measures accordingly
- Was used around the North Sea in Europe for almost 2,000 years



The Theraphy: ...



Plan A: Planning for a (somewhat) predictable future

Social construct of risk and vulnerability:

North Sea countries:

- general perception (based on 2,000 years of cultural heritage): vulnerability to, and risk associated with storm surges is very high and a national/regional problem;
- approach to extreme events:
there is a 1% chance that the 1 in 10,000 years flood happens in this century.
- Approach to SLR: What is the maximum SLR in the 21st century that cannot be excluded?

United States:

- general perception: vulnerability to, and risk associated with storm surges is more a local problem and can be addressed ad hoc by (horizontal) evacuation;
- approach to extreme events: there is a 1% chance that the 1 in 100 years flood happens in this year.
- Approach to SLR: What curve should we choose? Definitely not the maximum SLR in the 21st century that cannot be excluded!

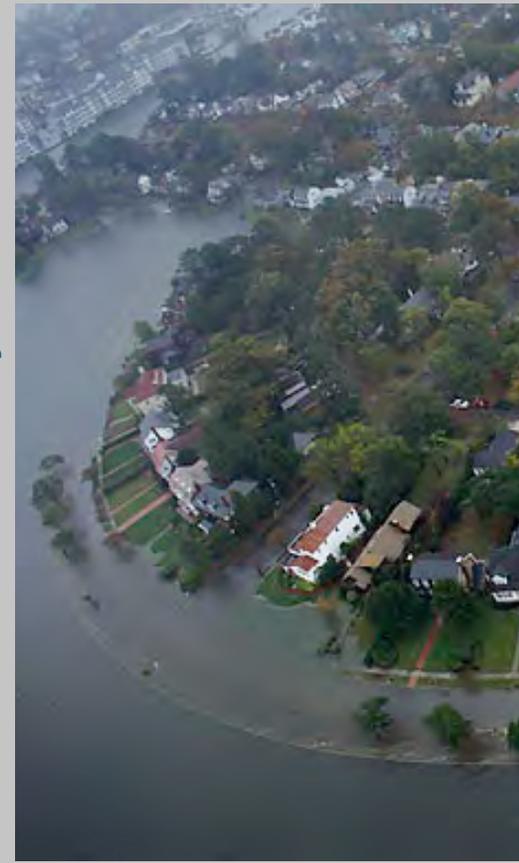
The Therapy: ...



Plan A: Planning for a (somewhat) predictable future
Social construct of risk and vulnerability:

Question: Do we know the risks we have not addressed?

- Fire insurance: we pay for a risk that has a 99.8% chance not to happen.
- The Netherlands: pays (a lot) to reduce a risk that has a 99% chance not to happen in this century.
- Hurricane: we here do not pay (a lot) to reduce a risk that has a 66% chance to happen in this century.
- Cost-benefit analysis shows we should be willing to pay order \$100,000,000 each year to reduce this risk



The Therapy: ...



Plan B: Preparing for surprises

Adaptation to unpredictable future instead of mitigation of impacts:

Paradigm shift:

- living where it is safe and working where it is needed
- understanding the vulnerabilities and comprehensively assessing the risks
- making room for the water
- knowing the worst case

The Theraphy: ...



Plan B: Preparing for surprises

Adaptation requires science that analyses decisions, identifies vulnerabilities, improves foresight, and develops options

Moss et al., 2013

Published on November 8, 2013 in Science

