WBGU

German Advisory Council on Global Change

Challenges for International Climate Policy

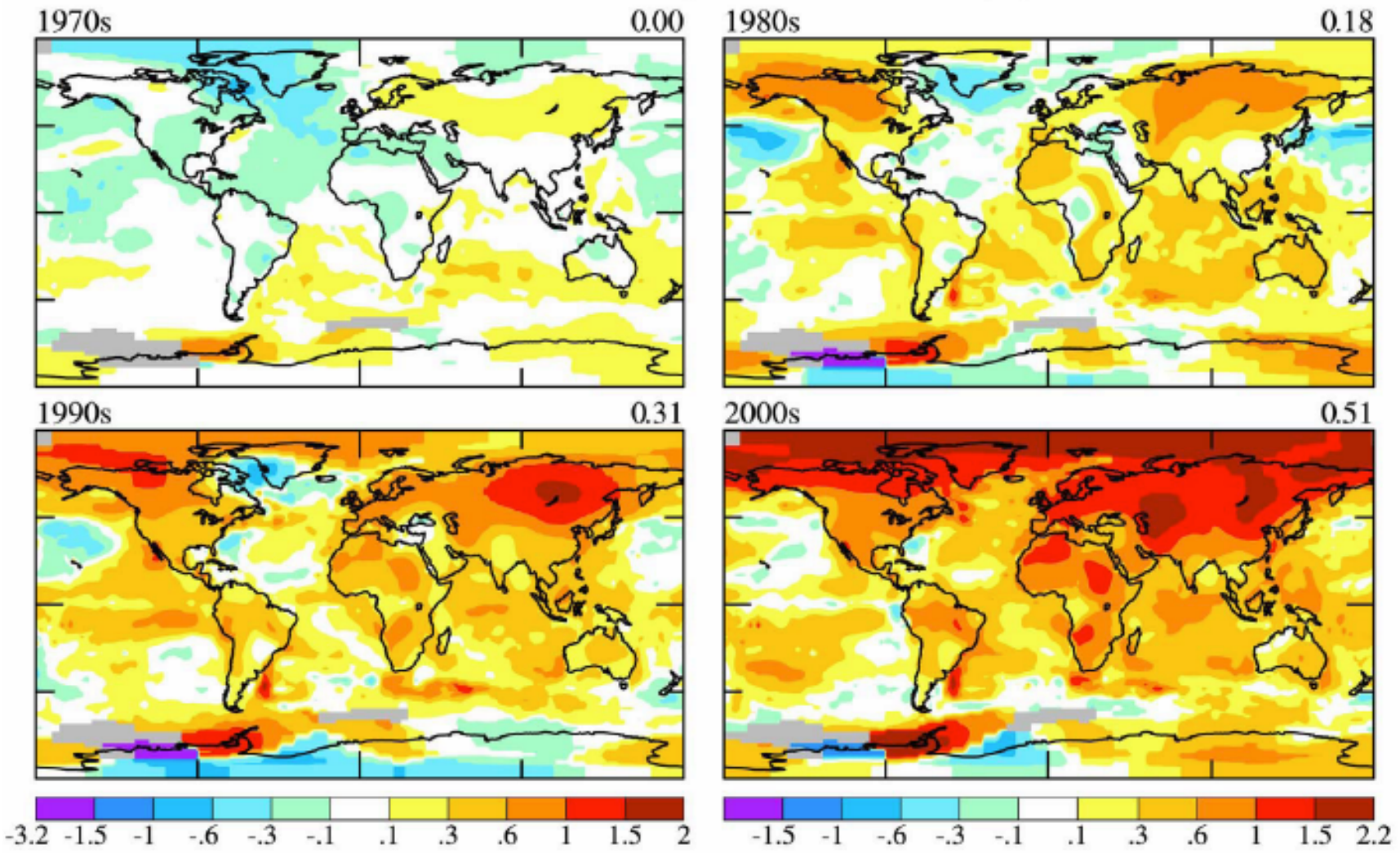
Side Event: How to achieve a global transformation towards a climate-friendly, sustainable future?

Professor Hans Joachim Schellnhuber CBE

Durban,5 December 2011

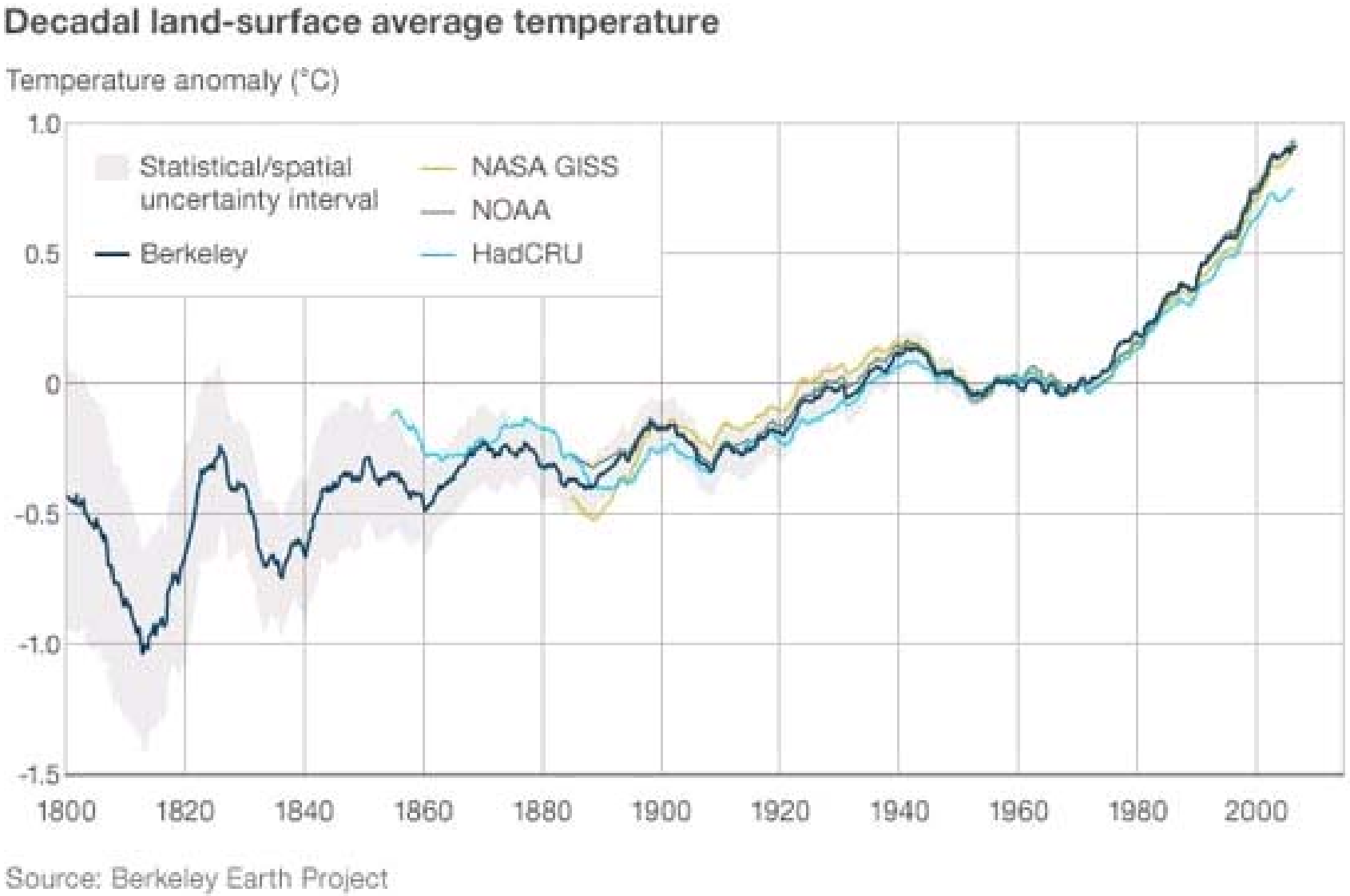
The Current Past

Decadal Surface Temperature Anomalies (°C)

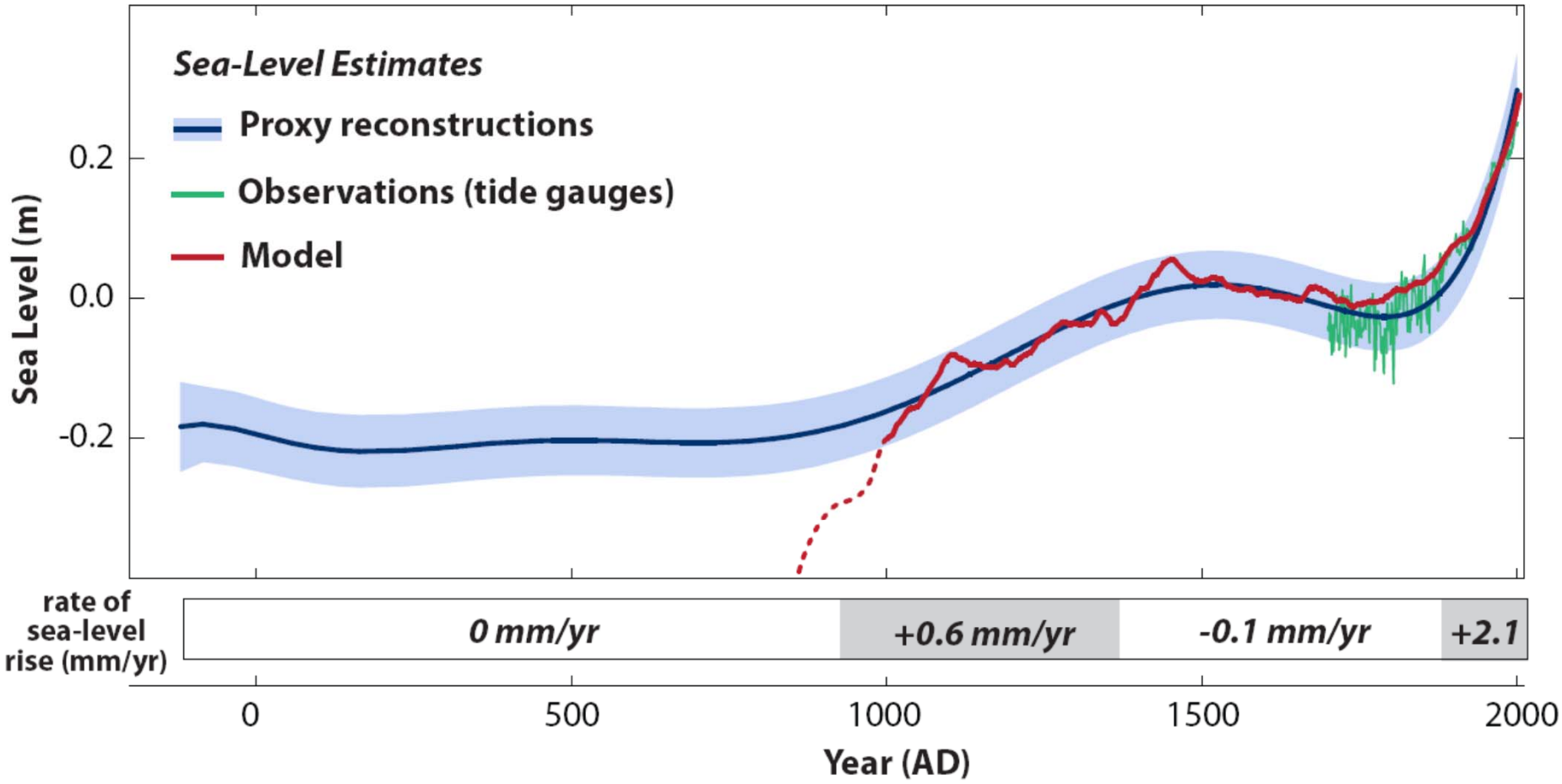


Source: Hansen et al. 2010 NASA GISS

Berkeley Earth Surface Temperature (BEST) Project

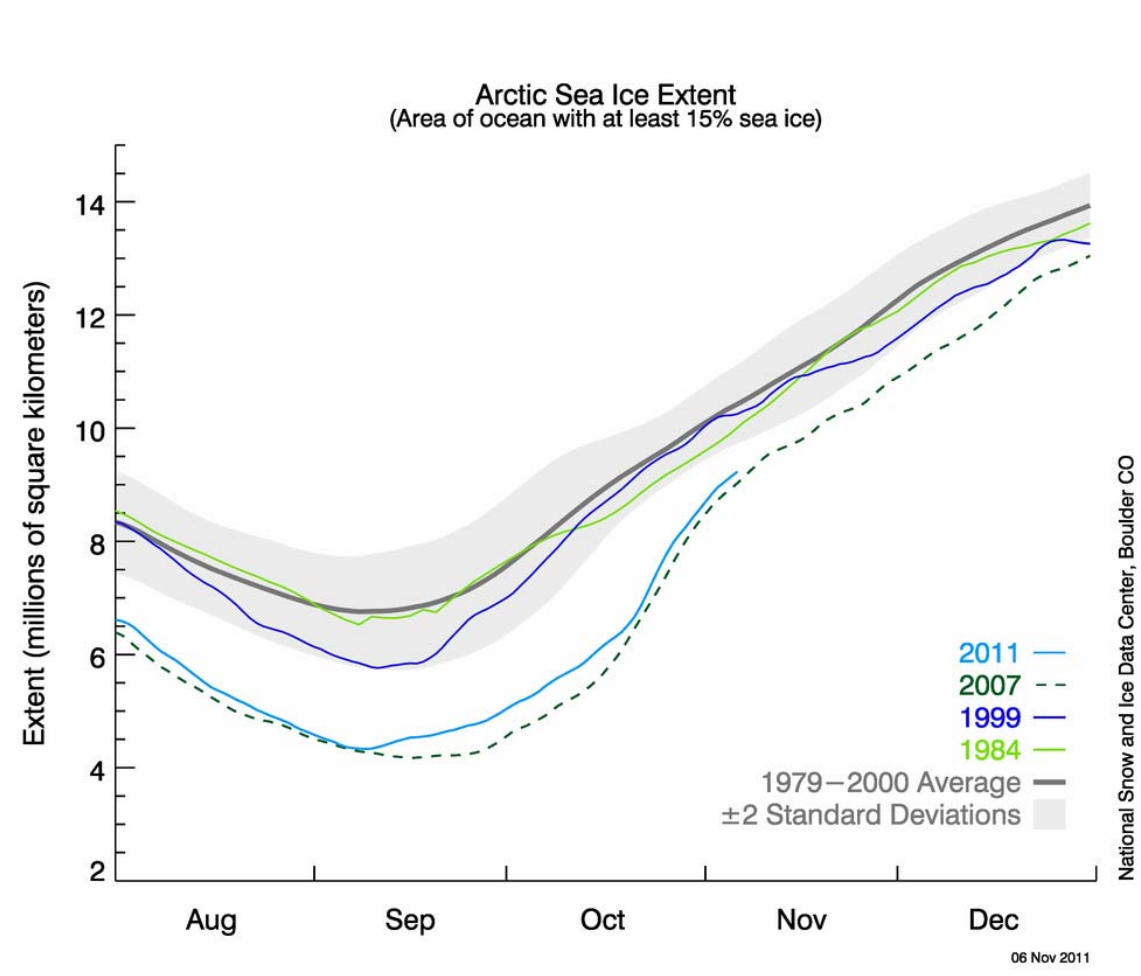


Historical Sea-Level Rise



Kemp et al. 2011 PNAS

2011 Minimum in Arctic Sea-Ice Extent Close to Previous Record



1979-2000 Median

Increase of extreme events in a warming world

PNAS

Stefan Rahmstorf[1] **and Dim Coumou**

Potsdam Institute for Climate Impact Research, PO Box 601203, 14412 Potsdam, Germany

Edited by William C. Clark, Harvard University, Cambridge, MA, and approved September 27, 2011 (received for review February 2, 2011)

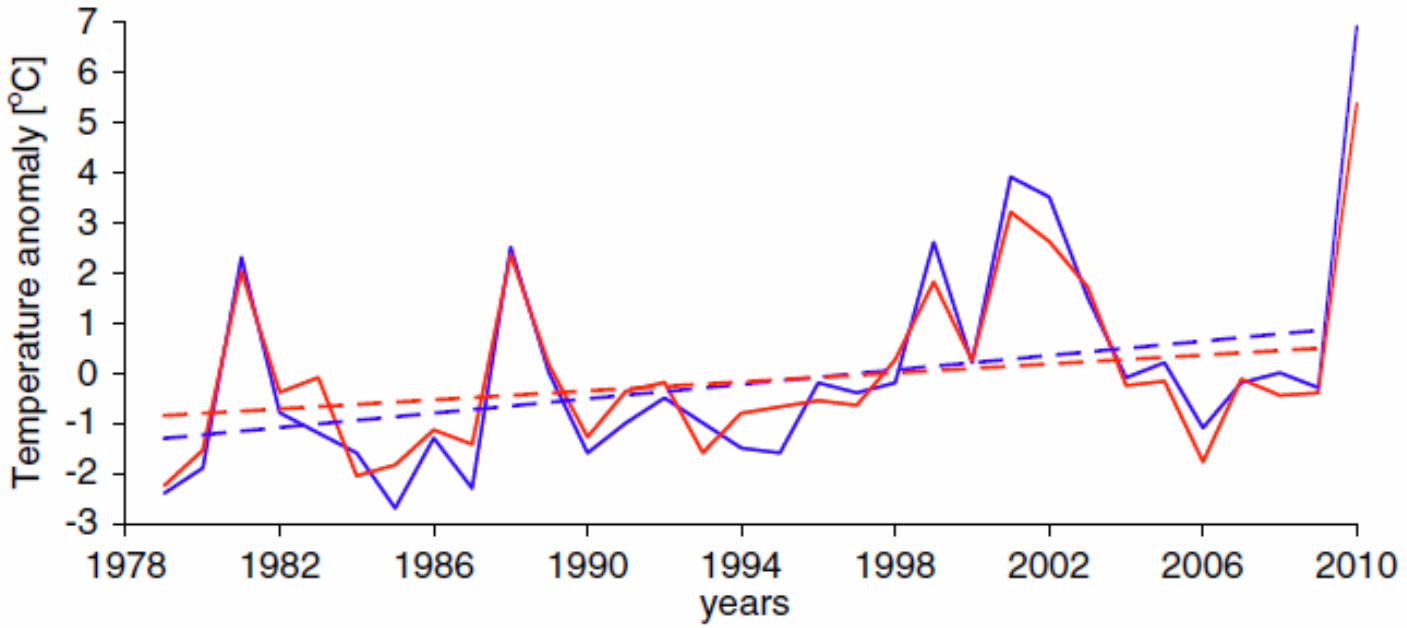
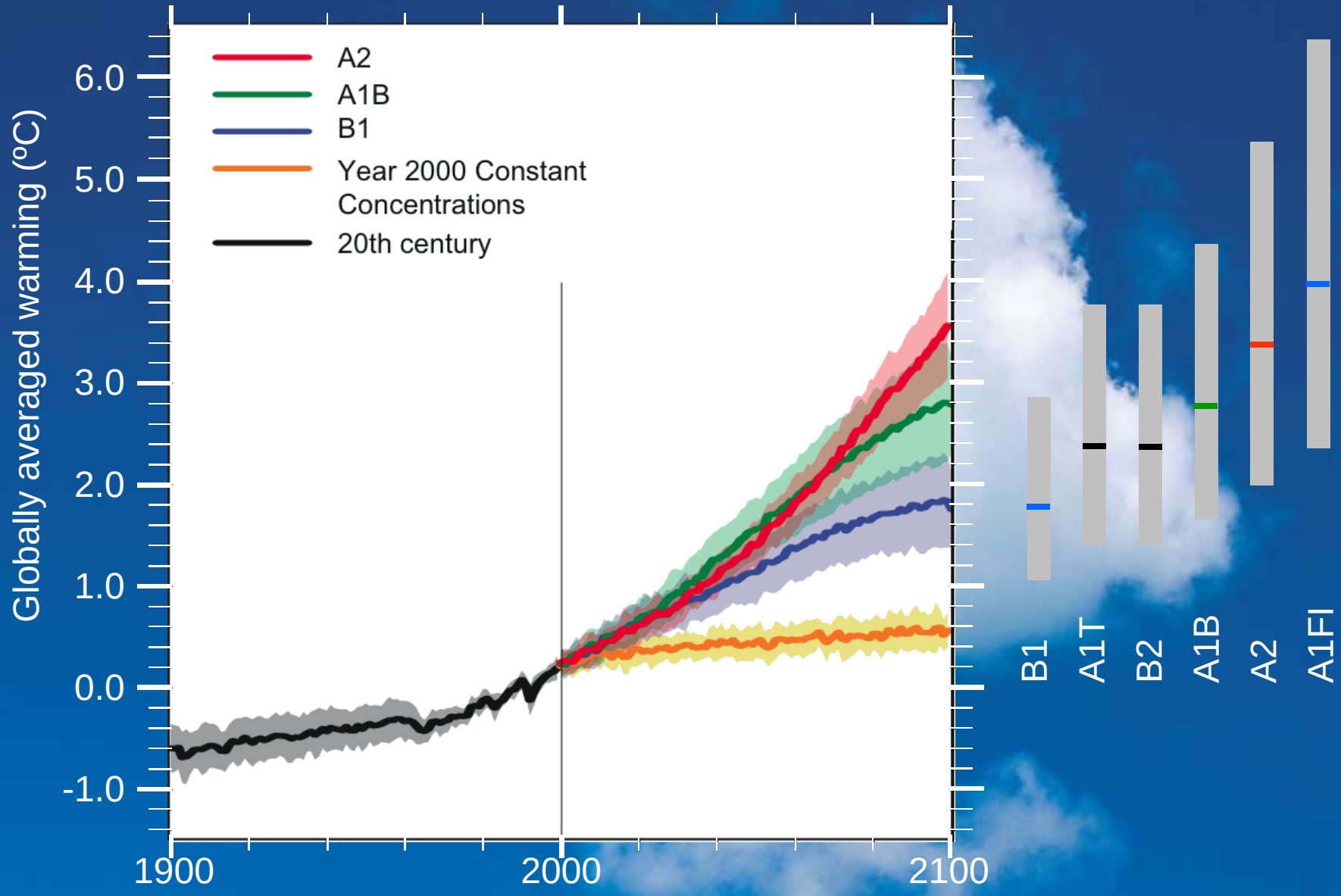


Fig. 5. Comparison of temperature anomalies from remote sensing systems surface data (red; ref. 15) over the Moscow region (35°E–40°E, 54°N–58°N) versus Moscow station data (blue; ref. 21). The solid lines show the average July value for each year, whereas the dashed lines show the linear trend of these data for 1979–2009 (i.e., excluding the record 2010 value). The satellite data have a trend of 0.45 °C per decade for 1979–2009, as compared to 0.72 °C per decade for the Moscow station data.

www.pnas.org/cgi/doi/10.1073/pnas.1101766108

The Past Future

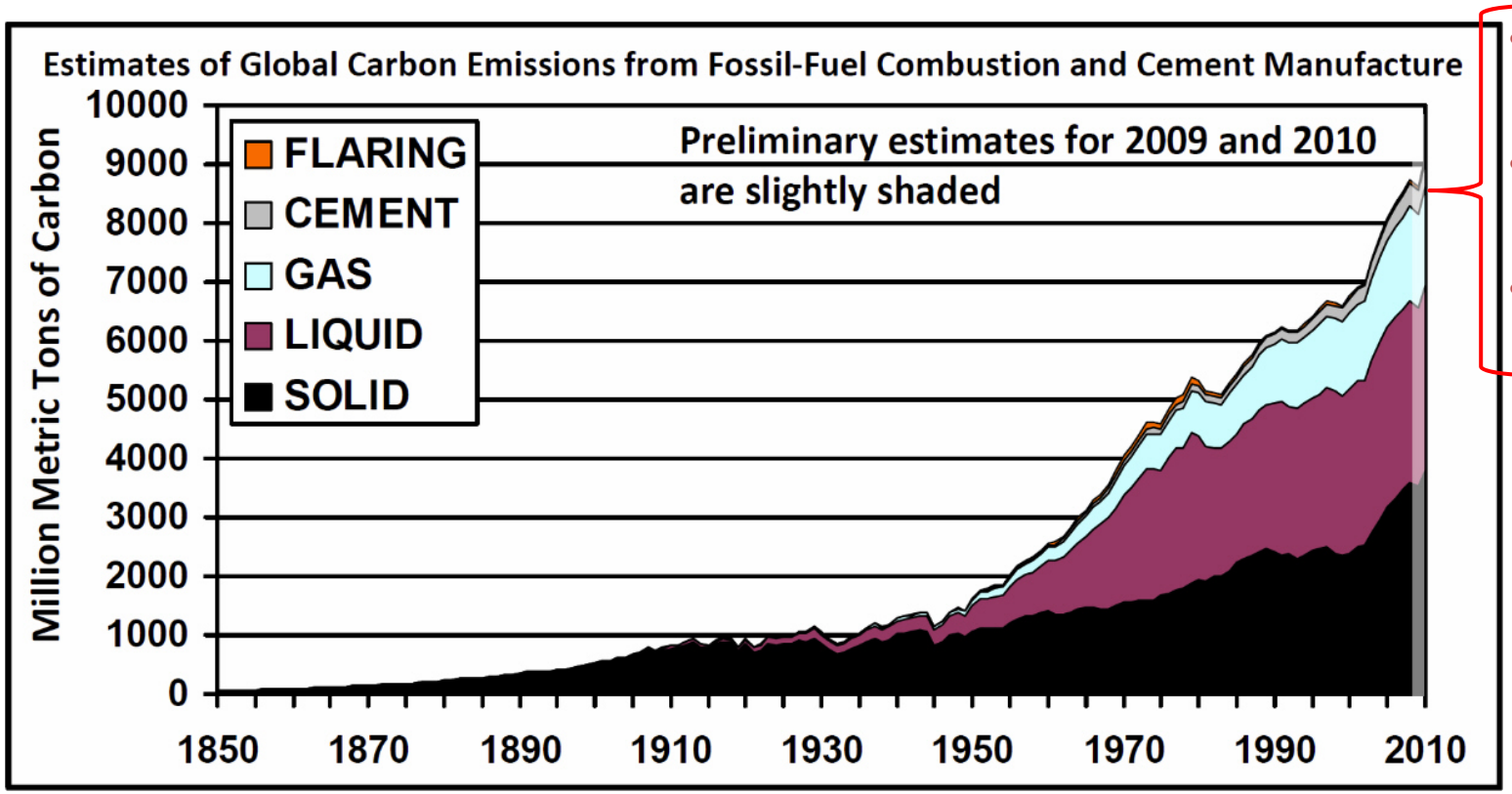
Multi-model Averages and Assessed Ranges for Surface Warming



Global CO_2 Emissions at Record Levels

2010:

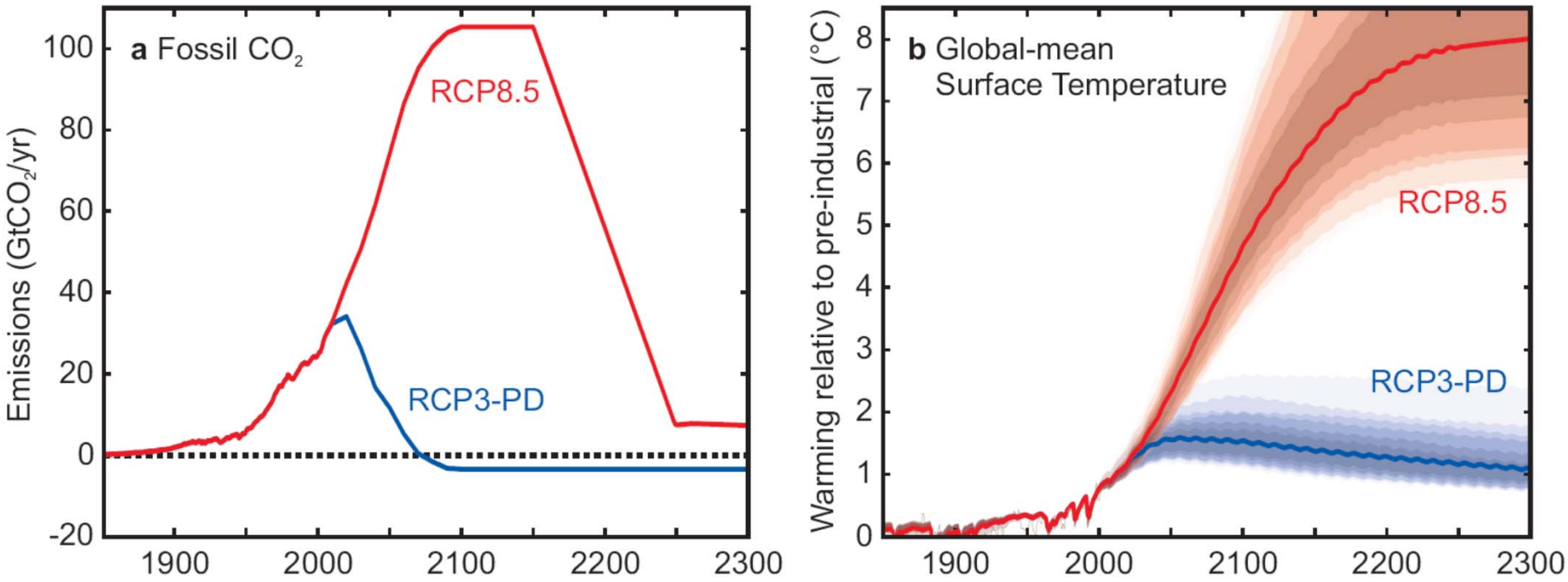
- **Highest-ever global CO_2 emissions, reaching 33.5 Gt**
- **Increase of 5.9% over 2009 and 4.5% over 2008 (previous record year)**
- **Absolute increase of over 500 million tons CO_2 over last year**



- **China: +212 million tons**
- **USA: +60 million tons**
- **India: +48 million tons**

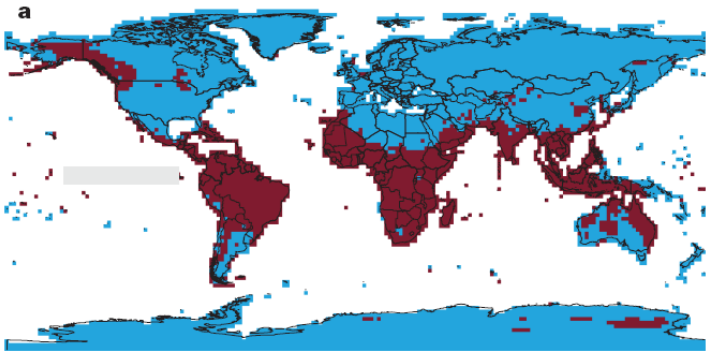
(CDIAC 2011)

Humankind at the Crossroads



Source: adapted from Meinshausen et al. 2011
Climatic Change

Civil Conflicts Associated With the Global Climate

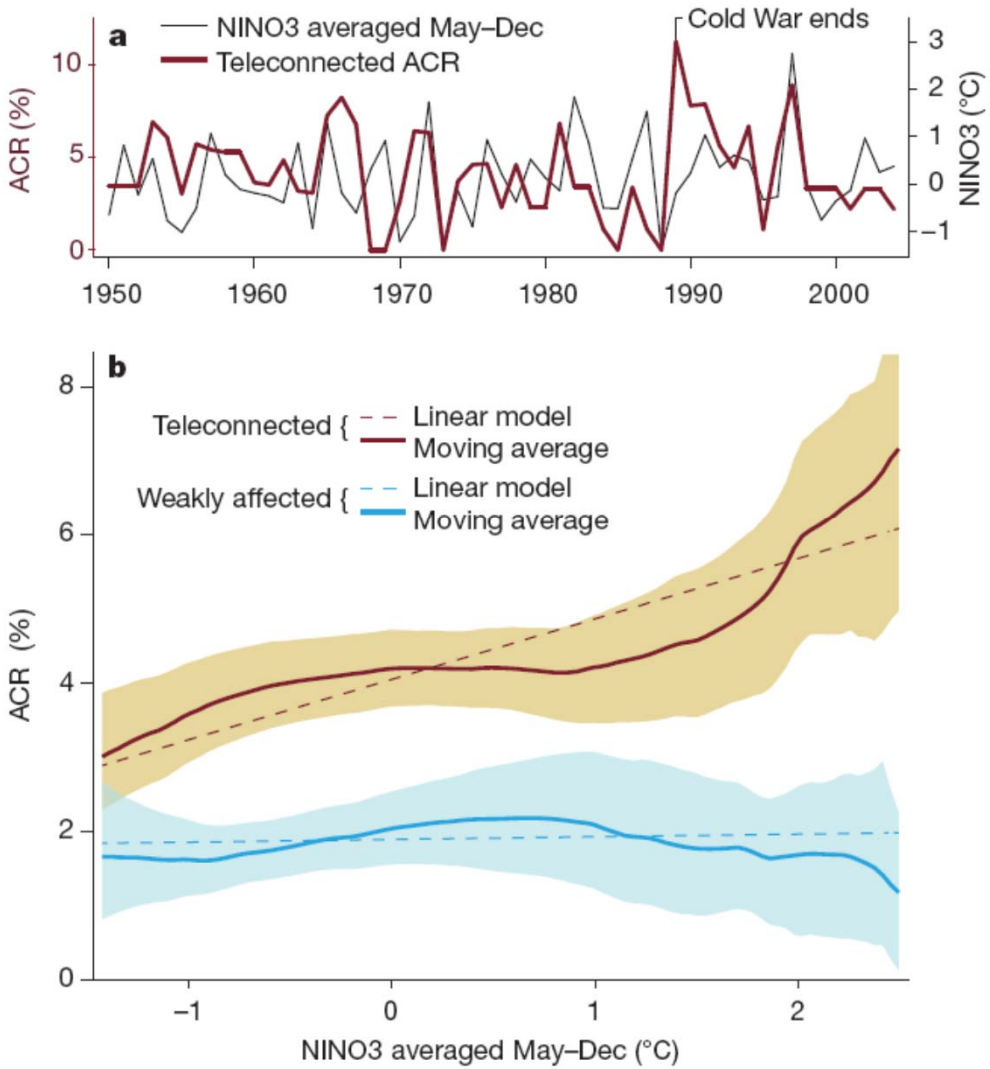


Red: ENSO teleconnected

Blue: weakly affected

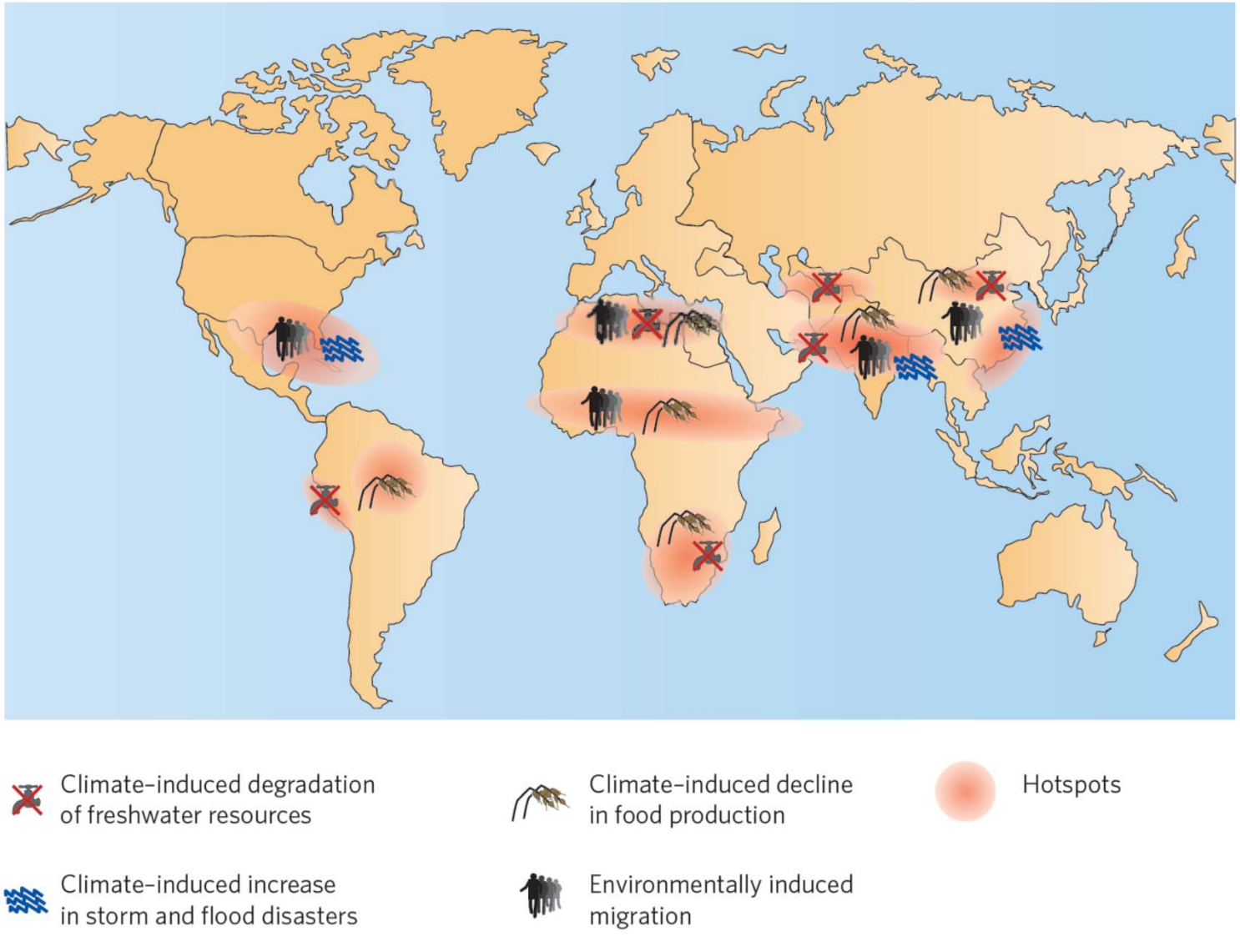
"Using data from 1950 to 2004, we show that the probability of new civil conflicts arising throughout the tropics doubles during El Niño years relative to La Niña years."

ACR: annual conflict risk; NINO3: ENSO index



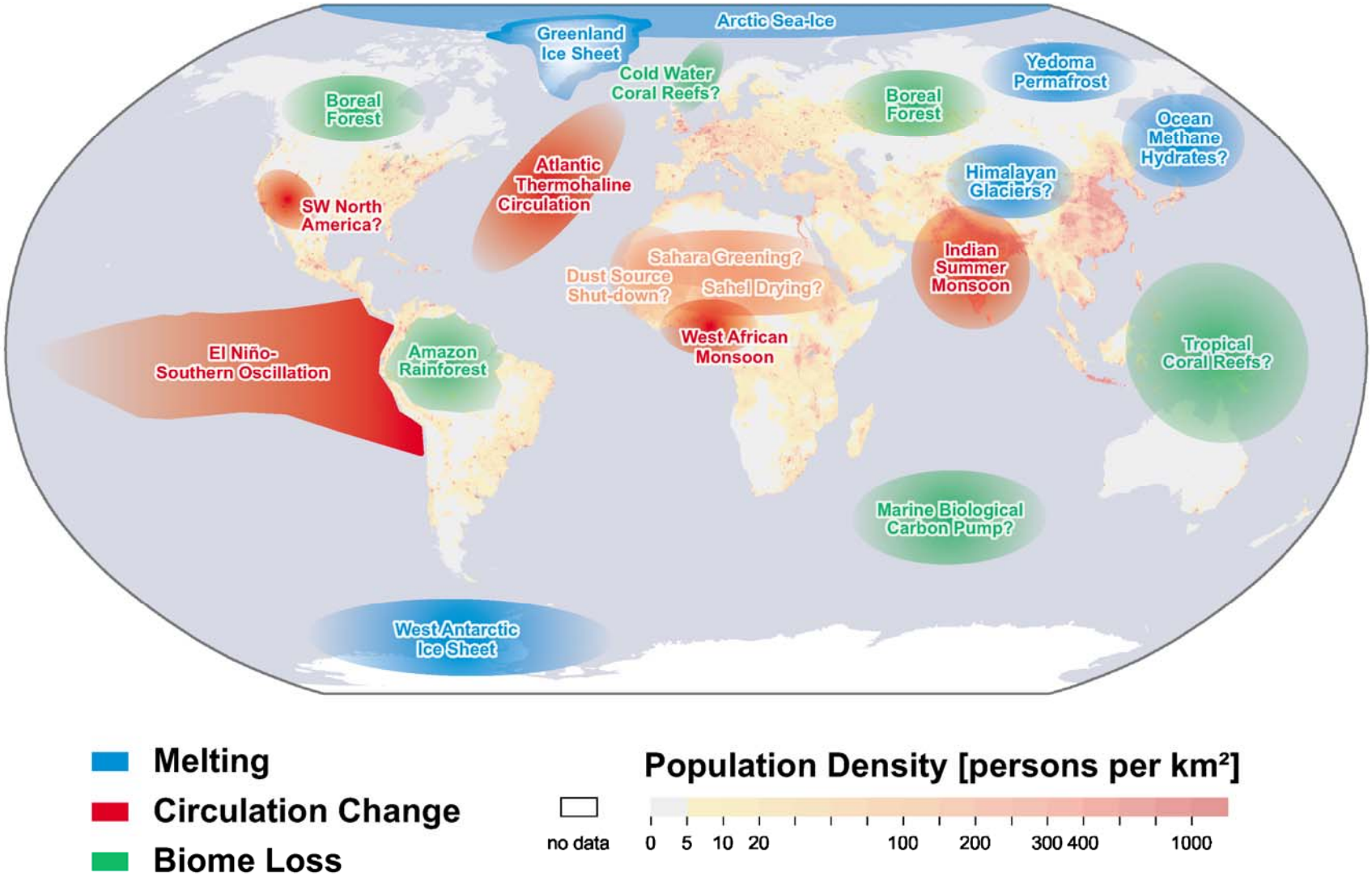
Source: Hsiang et al. 2011 Nature

Hotspots For Future Conflicts and their Causes



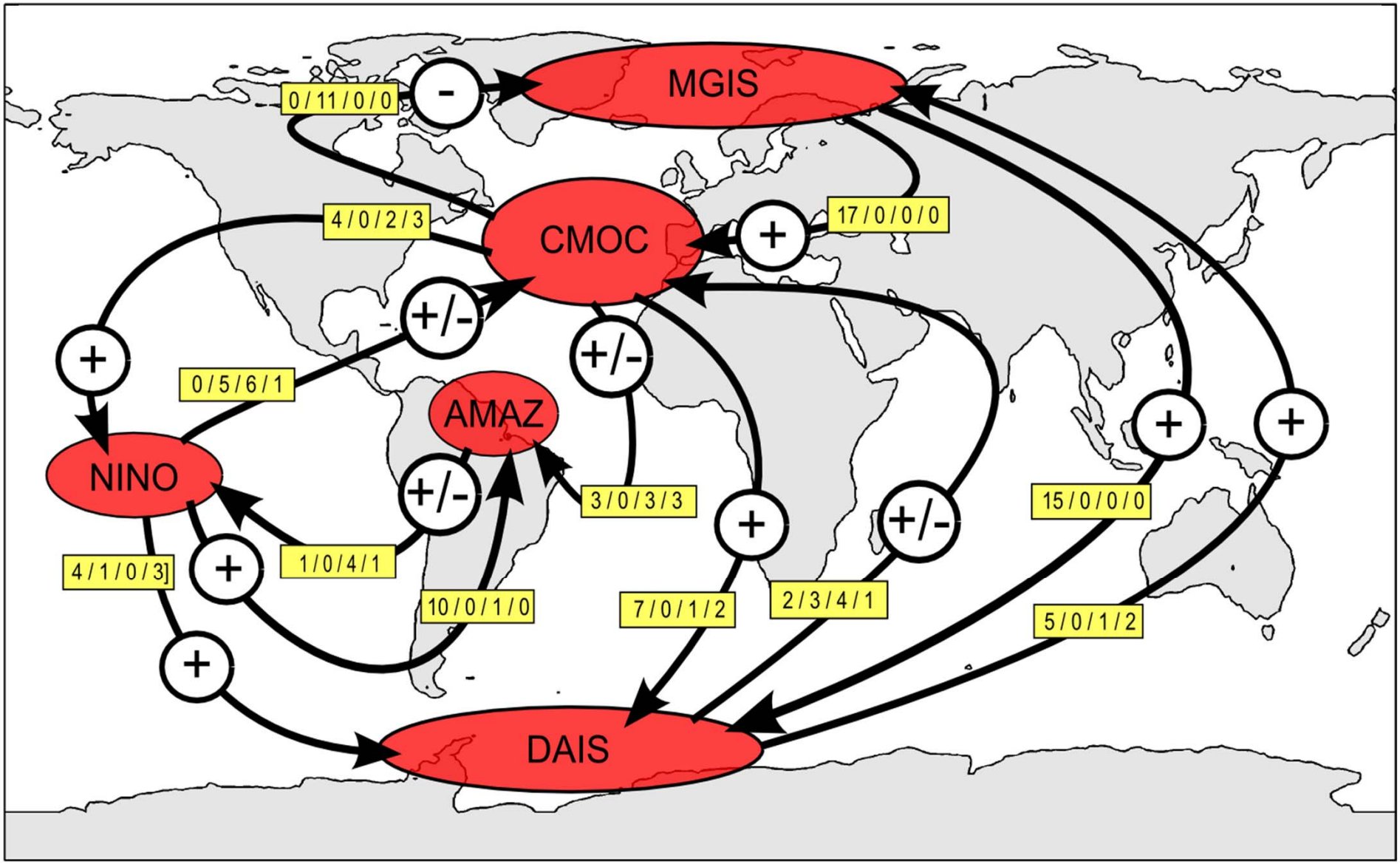
Source: WBGU 2008

Updated Map of Tipping Elements in the Earth System



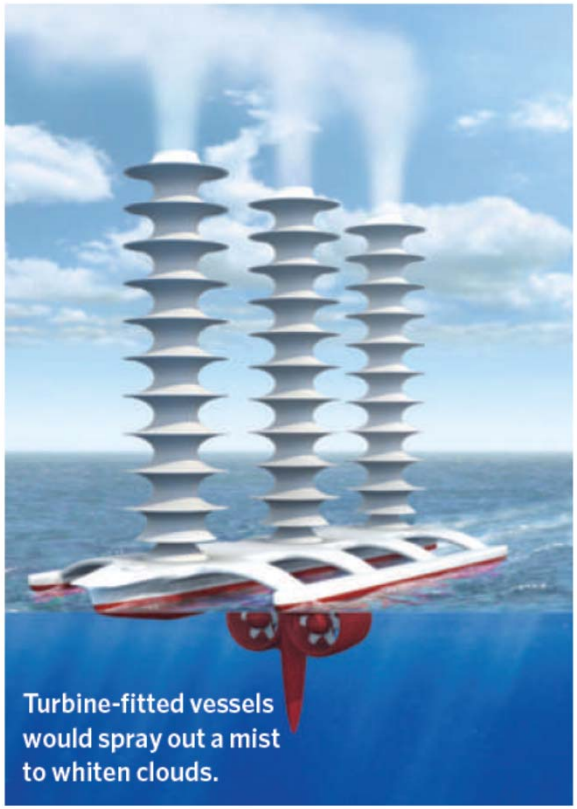
Source: PIK, after Lenton et al. 2008

Interdependency between Tipping Points



Source: Kriegler et al. 2009 PNAS

The Geoengineering Tale



Turbine-fitted vessels would spray out a mist to whiten clouds.

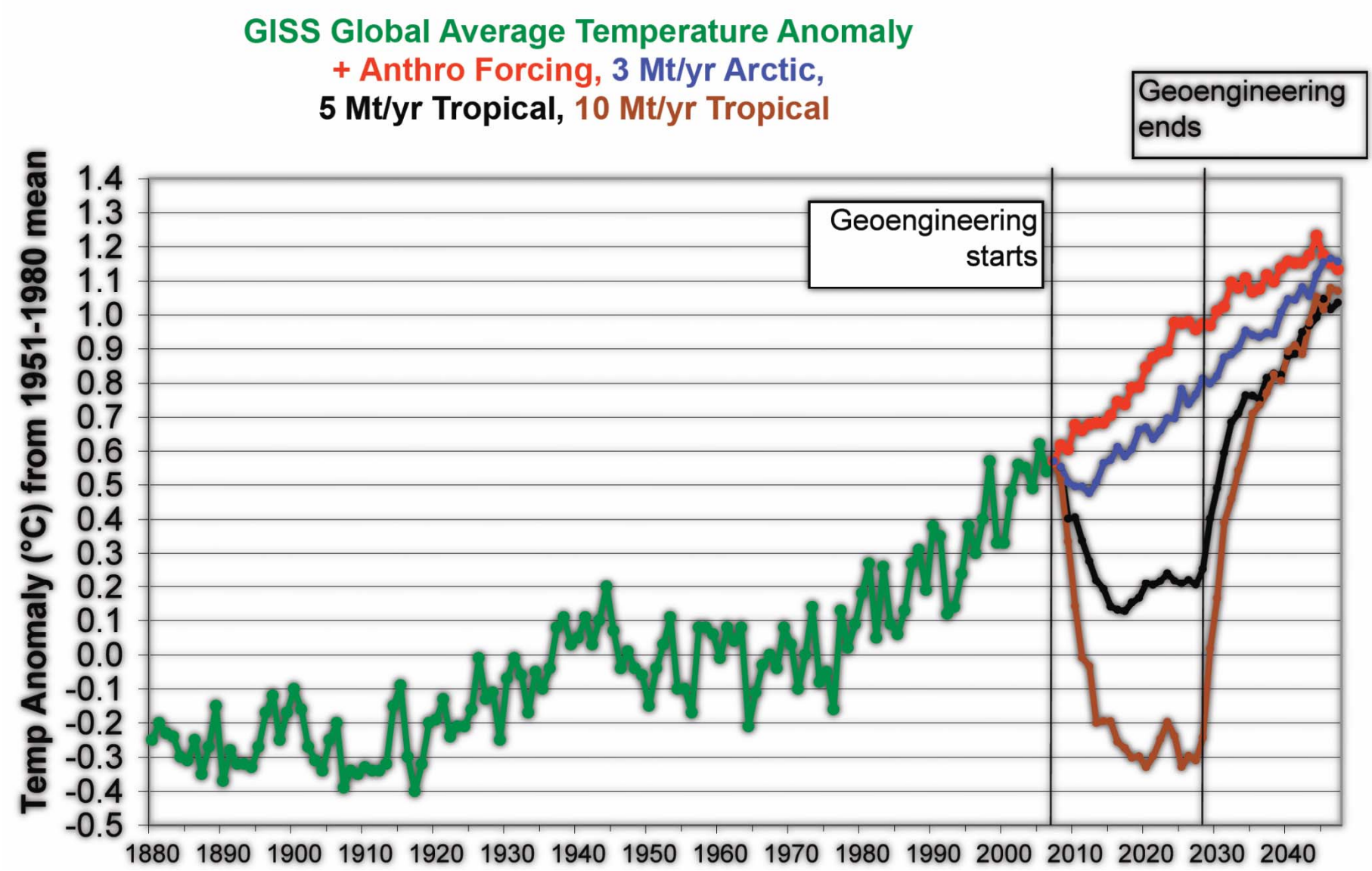
Solar Radiation Management (SRM)

Industrial Air Capture (IAC)

STONEHAVEN PRODUCTIONS

Klaus Lackner has imagined huge 'farms' featuring thousands of air-scrubbing devices that could soak up billions of tonnes of carbon from the atmosphere.

Geoengineering Fingerprints in the Temperature Record



Source: Robock et al., 2008