

Climate Change after COP22 and the US elections

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(Université catholique de Louvain)

Former IPCC Vice-Chair (2008- oct. 2015)

Twitter: @JPvanYpersele

APNU, Université libre de Bruxelles, 18 March 2017

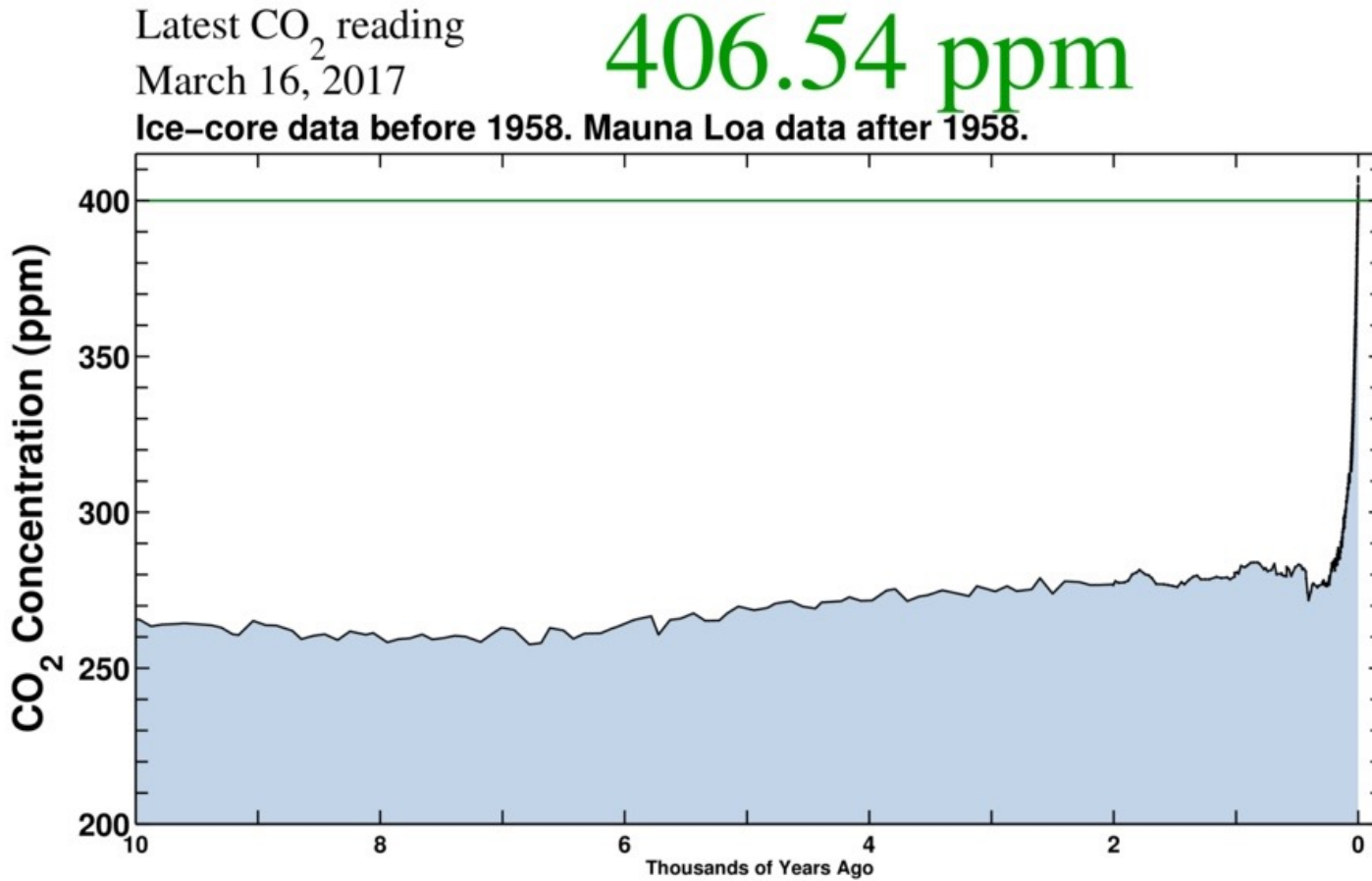
**Thanks to the Walloon Government (funding the Walloon Platform for IPCC)
and to my team at the Université catholique de Louvain for their support**



Let us think about the future of these children from Machakos in a warming climate

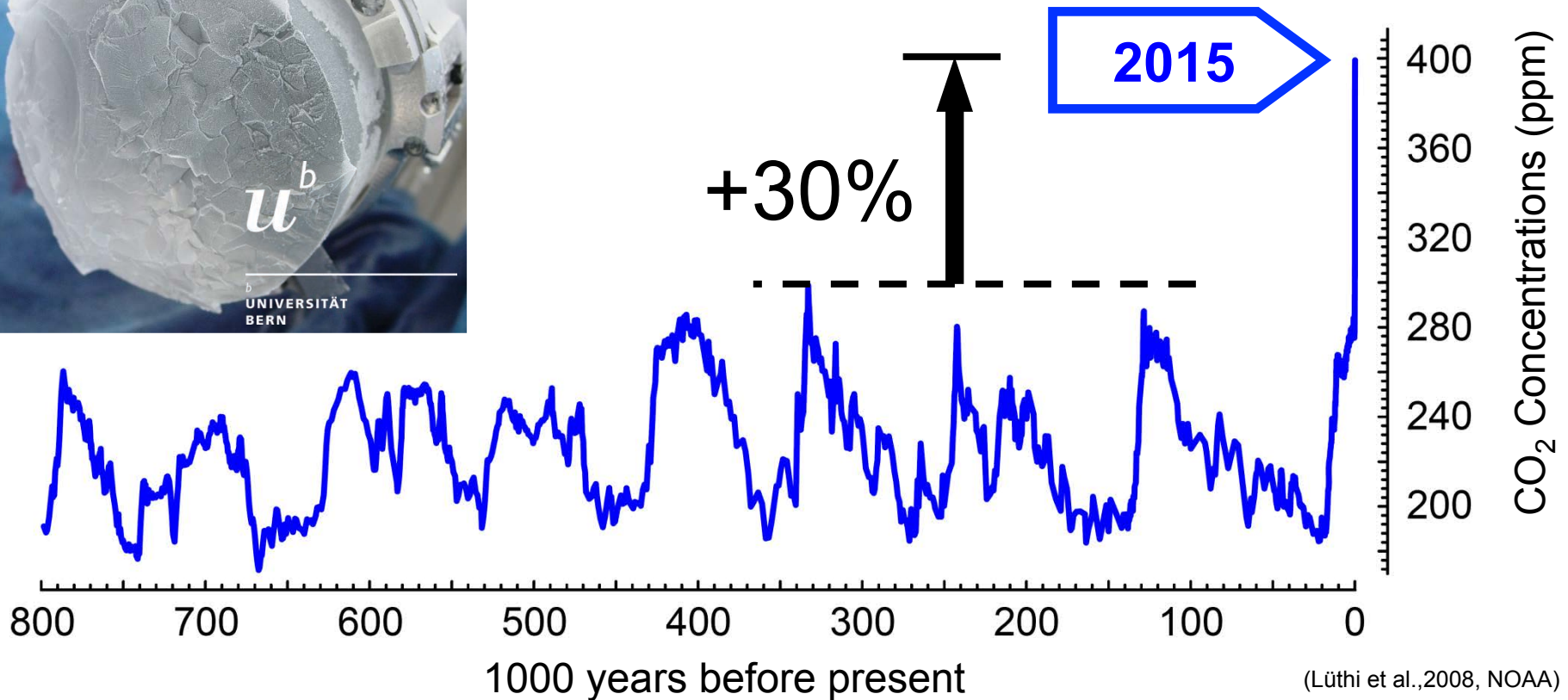


CO₂ Concentration, 16 March 2017 (Keeling curve)



Source: scripps.ucsd.edu/programs/keelingcurve/

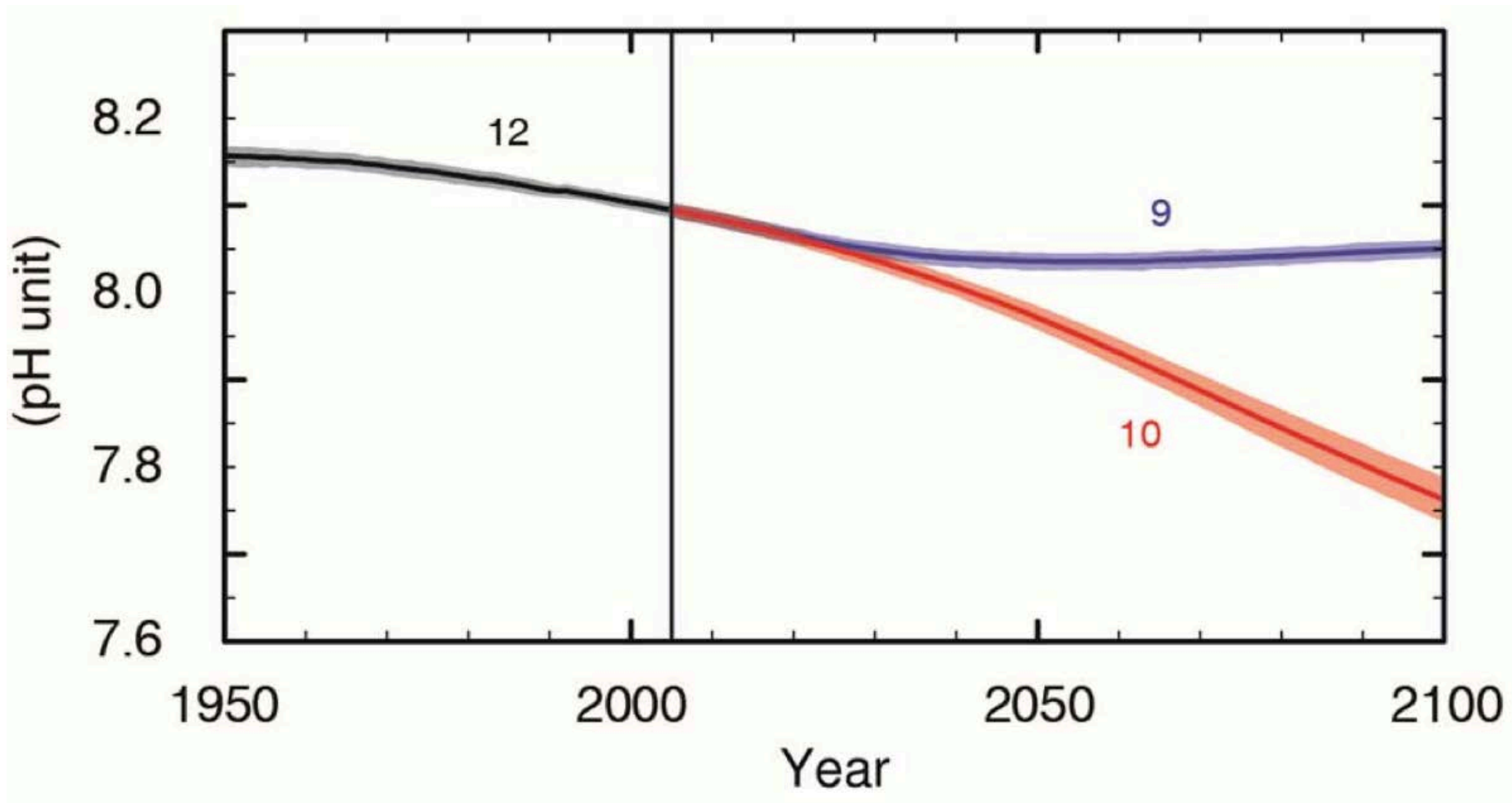
Atmospheric concentrations of CO₂



The concentrations of CO₂ have increased to levels unprecedented in at least the last 800,000 years.

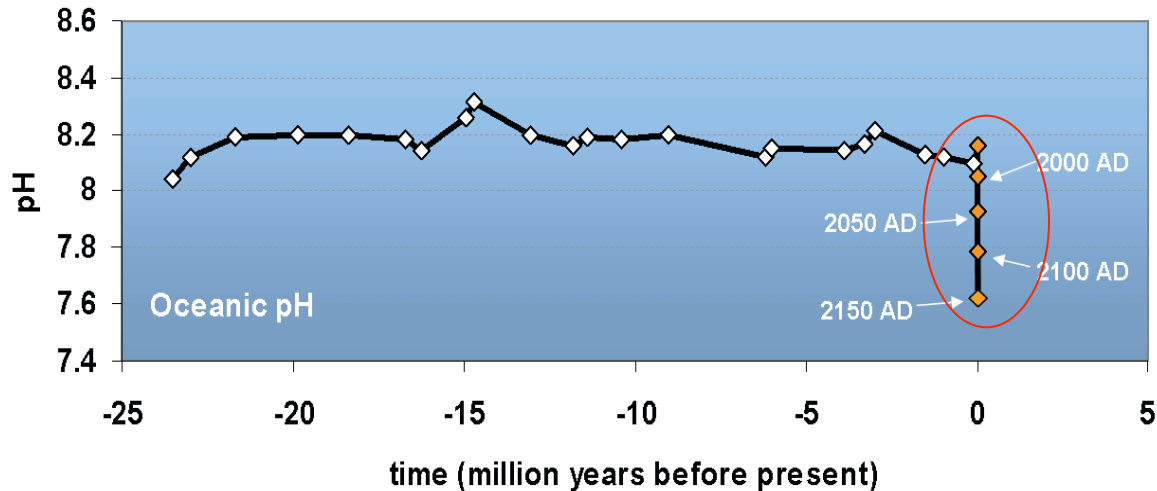
Global ocean surface pH (projections)

Ocean Acidification, for RCP 8.5 (orange) & RCP2.6 (blue)



Oceans are Acidifying Fast

Changes in pH over the last 25 million years

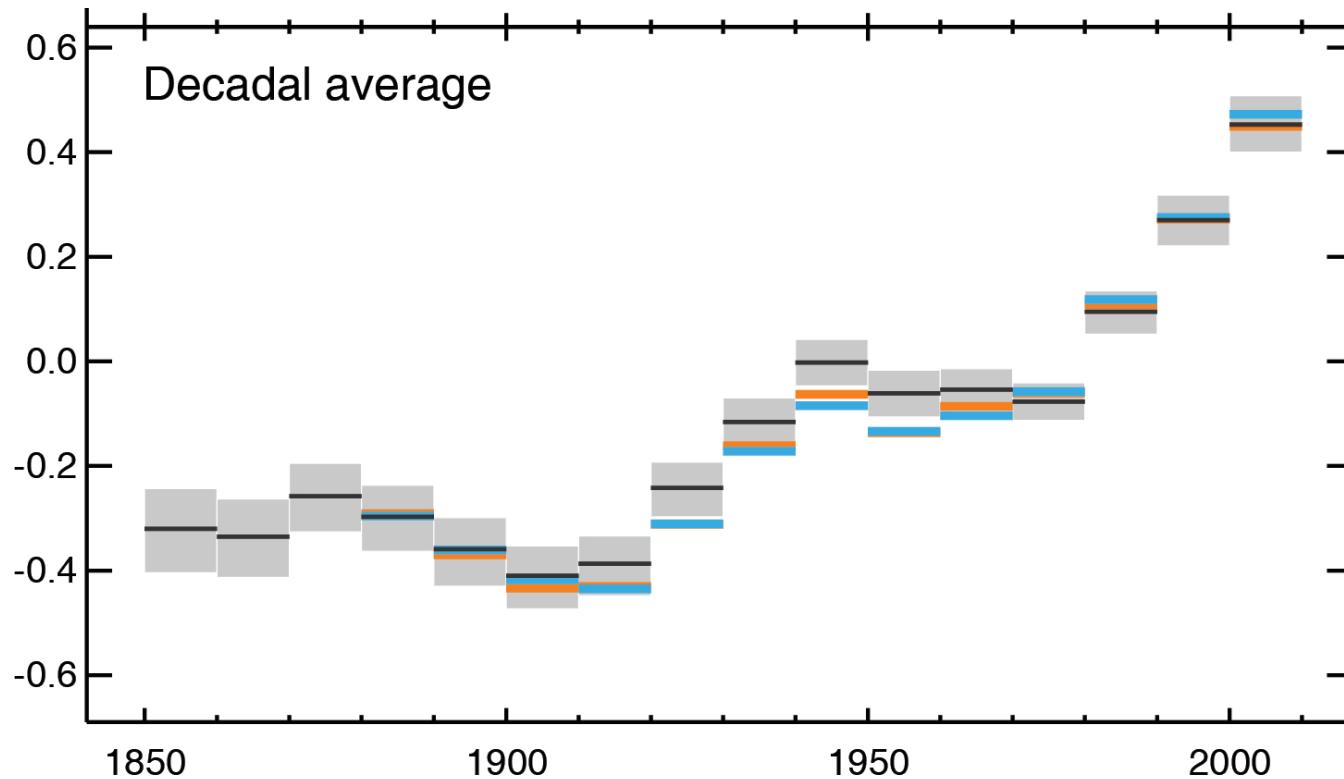


“Today is a rare event in the history of the World”

- It is happening now, at a **speed and to a level** not experienced by marine organisms for about 60 million years
- Mass extinctions linked to previous ocean acidification events
- Takes 10,000' s of years to recover

Turley et al. 2006

Slide courtesy of Carol Turley, PML



(IPCC 2013, Fig. SPM.1a)

Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850.

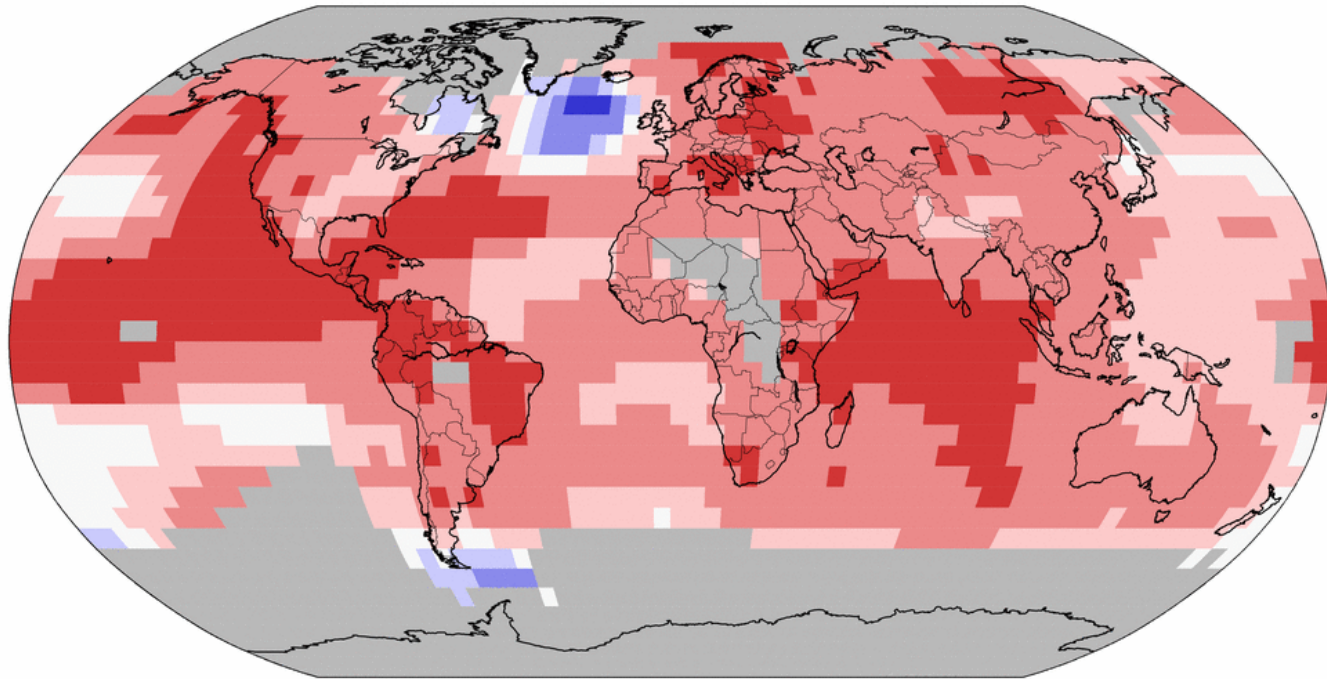
In the Northern Hemisphere, 1983–2012 was *likely* the warmest 30-year period of the last 1400 years (*medium confidence*).

2015= warmest year since 1880

Land & Ocean Temperature Percentiles Jan–Dec 2015

NOAA's National Centers for Environmental Information

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0




Record
Coldest


Much
Cooler than
Average


Cooler than
Average


Near
Average


Warmer than
Average

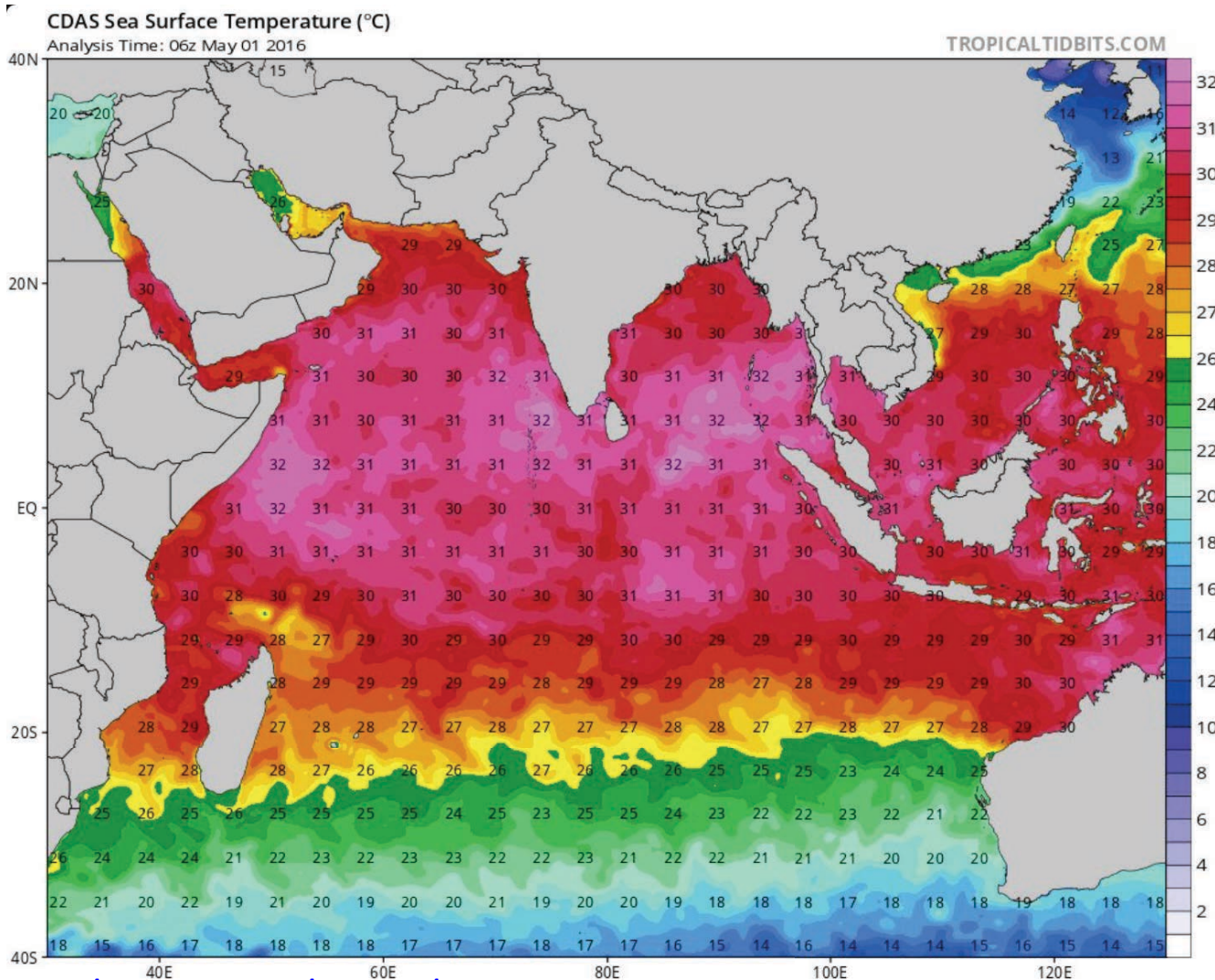

Much
Warmer than
Average


Record
Warmest



Wed Jan 13 12:15:02 EST 2016

The northern Indian Ocean really just incredibly warm (end of April 2016). Numerous 32°C surface temperature



Six weeks worth of rain has fallen in three days over parts of France (May 2016)



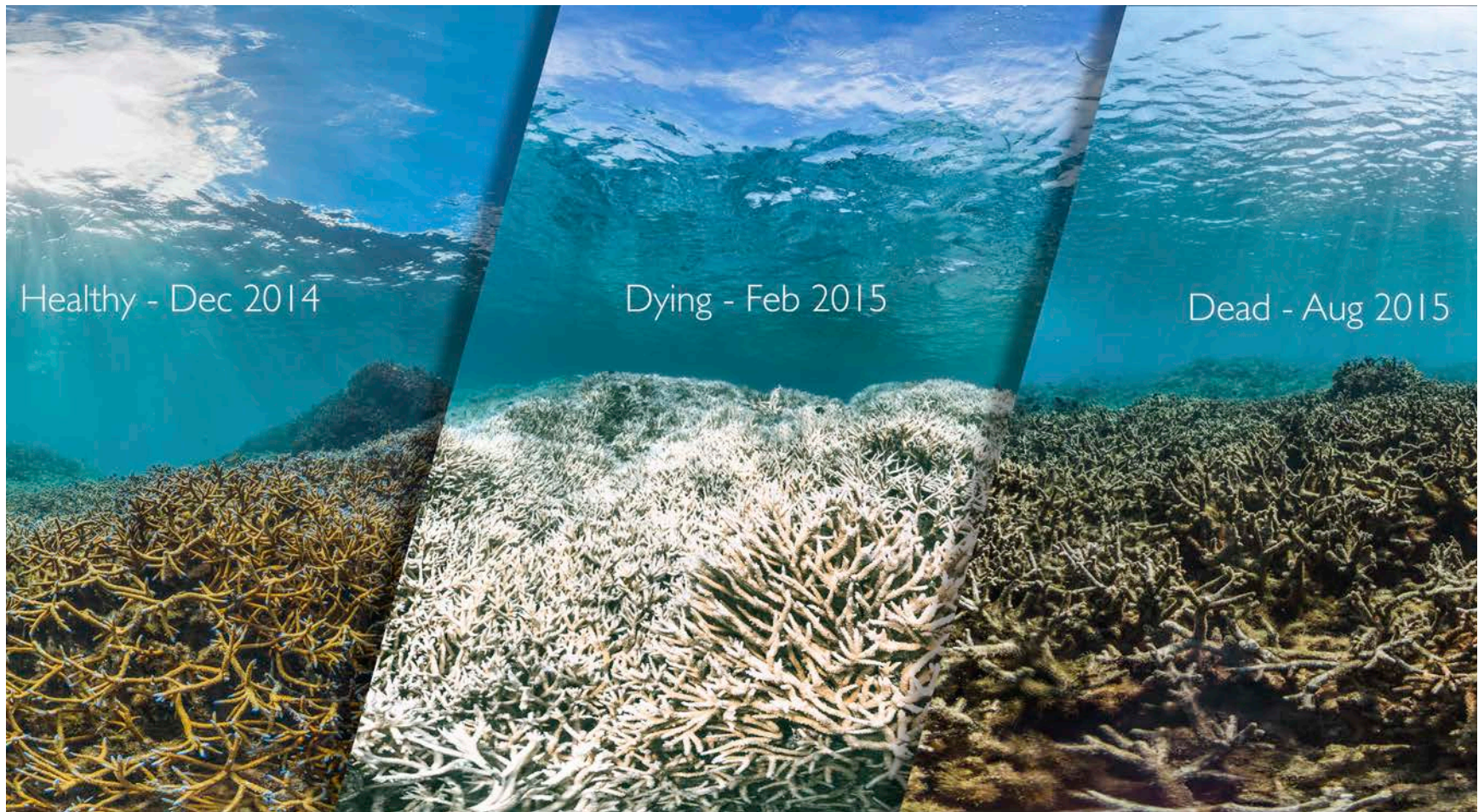
The Louvre and Musée d'Orsay in Paris evacuated their vaults (May 2016)



In Germany, many residents weren't prepared for the mass flooding as the rain pelted down (May 2016)

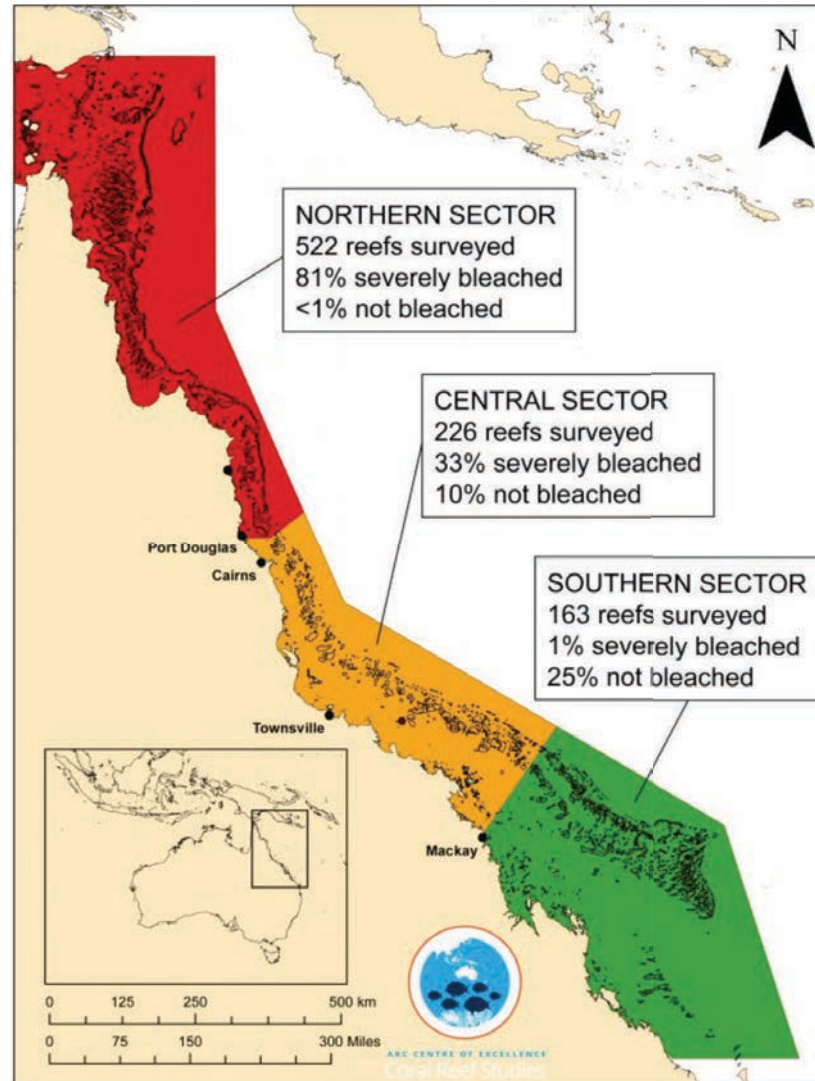


Coral reefs are dying



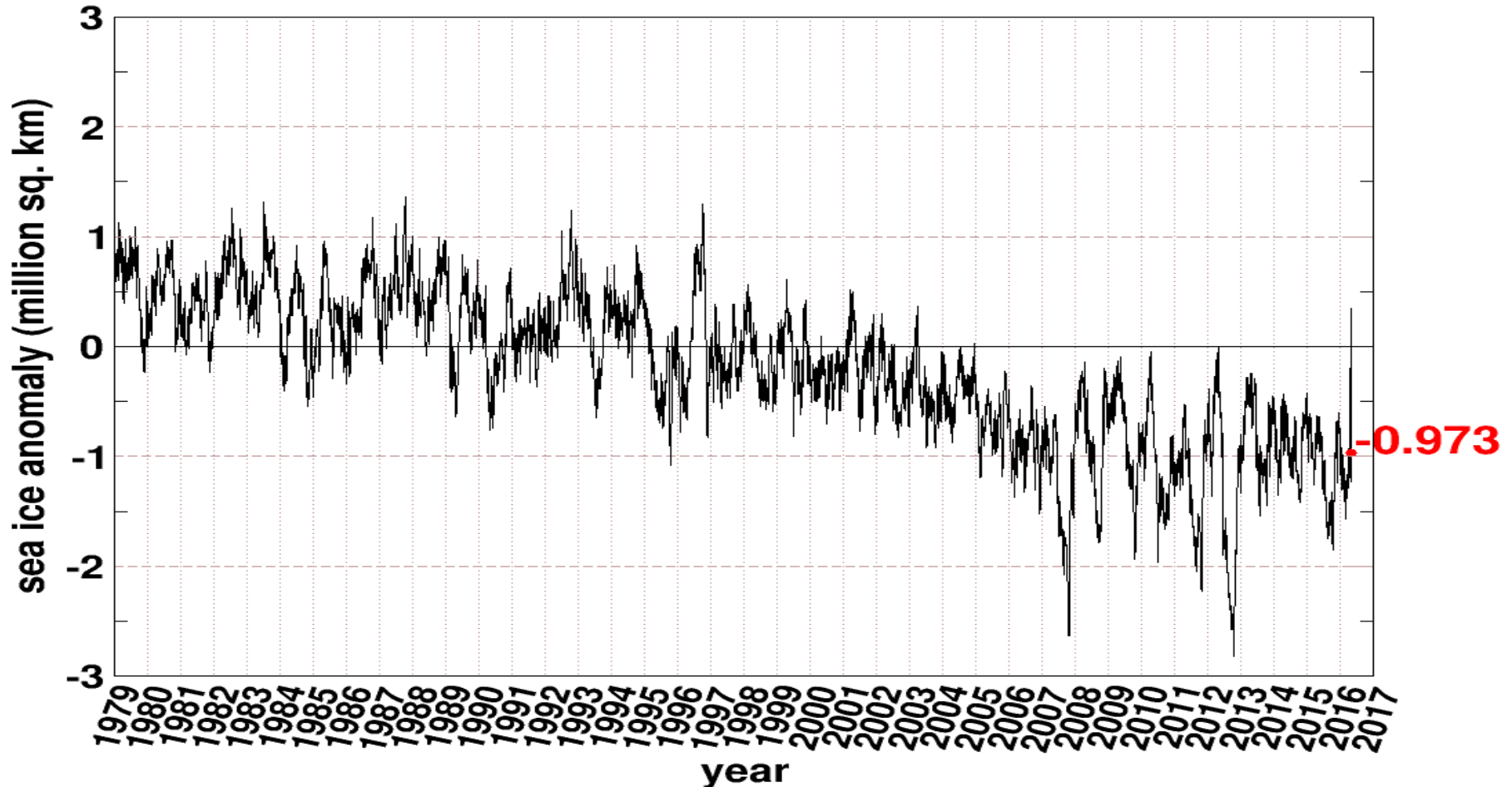
American Samoa (from www.globalcoralbleaching.org)

Only 7% of the Great Barrier Reef has avoided coral bleaching (May 2016)



Arctic Sea Ice Cover (1979-2016)

Northern Hemisphere Sea Ice Anomaly
Anomaly from 1979-2008 mean



Plateau Glacier (1961) (Alaska)



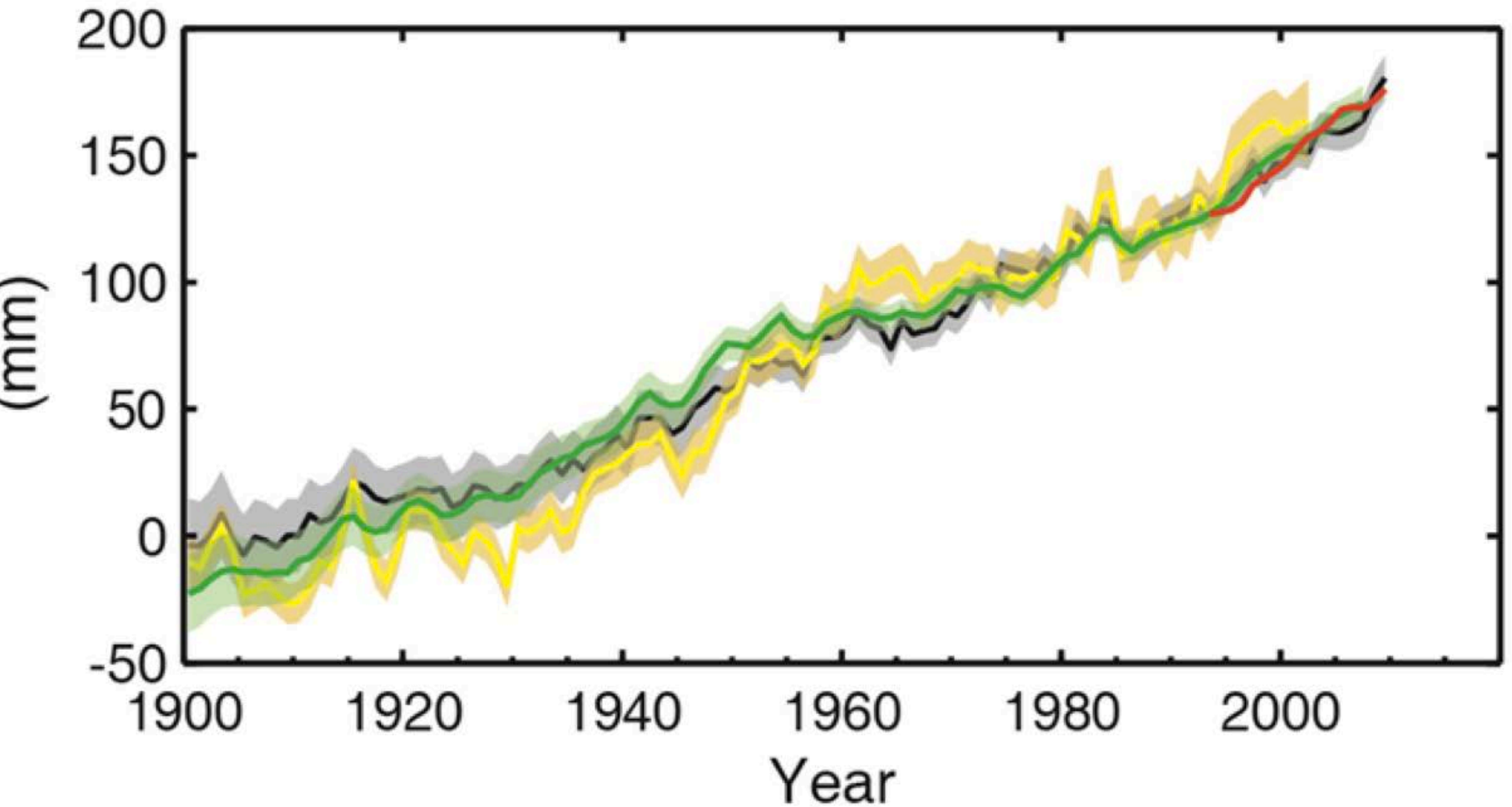
http://www.weather.com/news/science/environment/alaskas-glaciers-capturing-earth-changing-our-eyes-20131125?cm_ven=Email&cm_cat=ENVIRONMENT_us_share

Plateau Glacier (2003) (Alaska)



http://www.weather.com/news/science/environment/alaskas-glaciers-capturing-earth-changing-our-eyes-20131125?cm_ven=Email&cm_cat=ENVIRONMENT_us_share

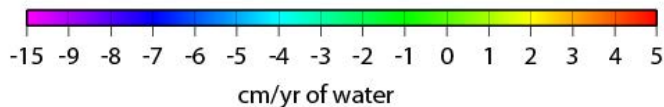
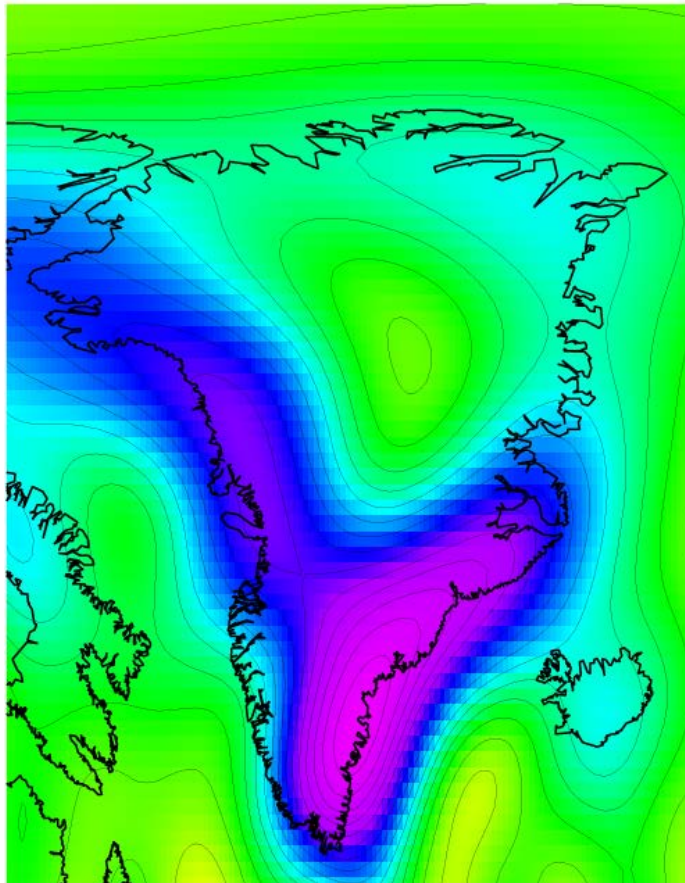
Change in average sea-level change



Greenland Ice Mass Loss 2002-2009

Derived From NASA GRACE Gravity Mission

Greenland

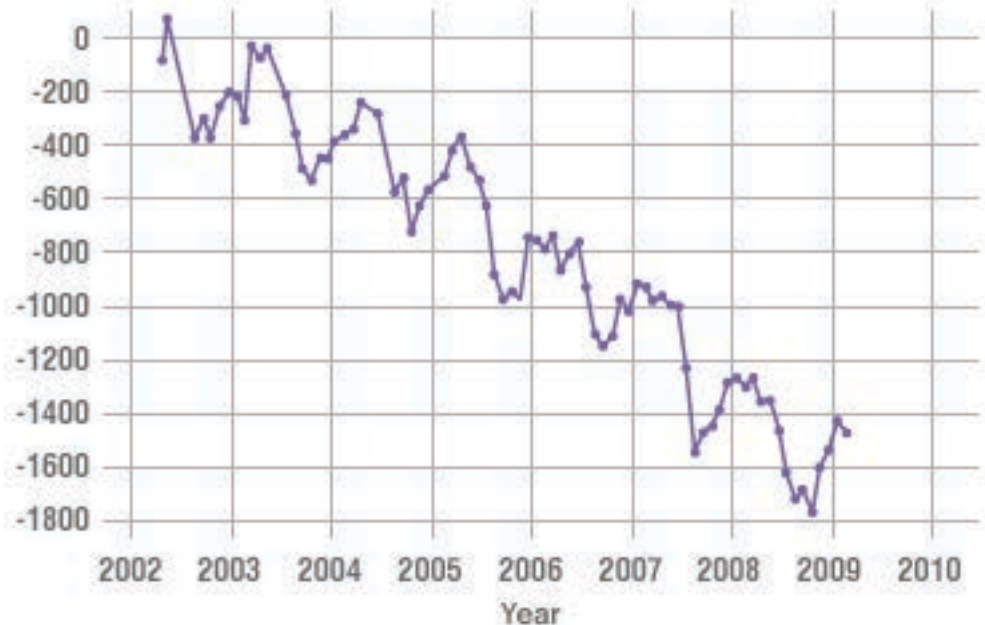


J. Wahr, U. Colorado

GREENLAND MASS VARIATION SINCE 2002

Data source: Ice mass measurement by NASA's Grace satellites.

Change in Ice Mass Loss Gigatons



Velicogna, Geophysical Research Letters, 2009

•Contributes to sea level rise

Why the IPCC ?

Established by WMO and UNEP in 1988

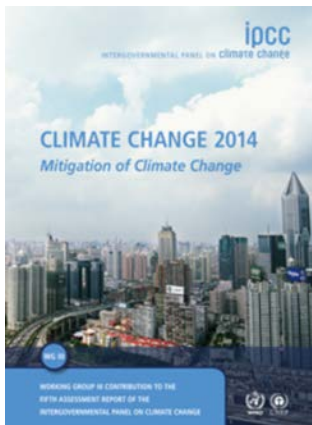
to provide **policy-makers** with an **objective source of information** about

- causes of climate change,
- potential environmental and socio-economic impacts,
- possible response options (adaptation & mitigation).

WMO=World Meteorological Organization

UNEP= United Nations Environment Programme





What is happening in the climate system?

What are the risks?

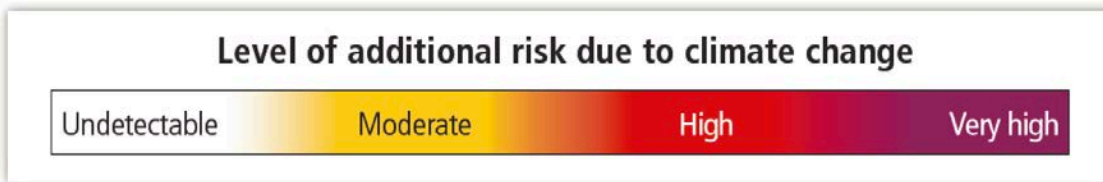
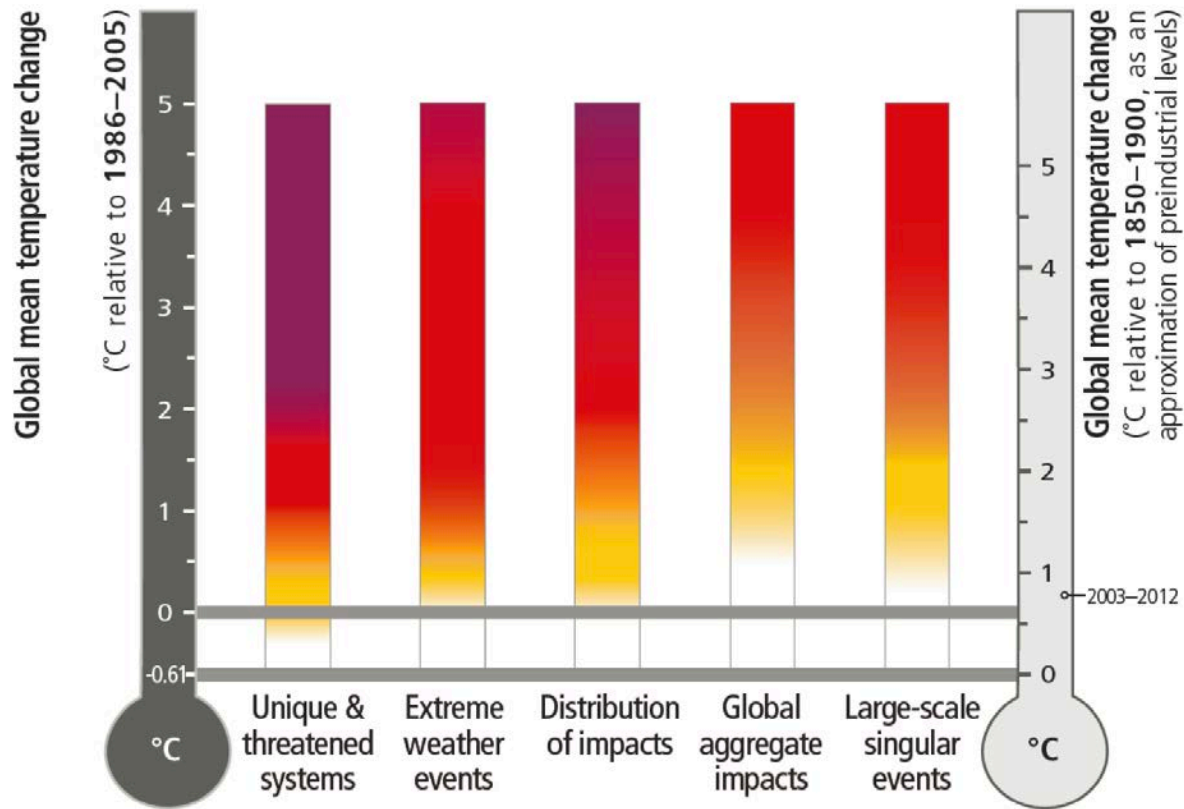
What can be done?

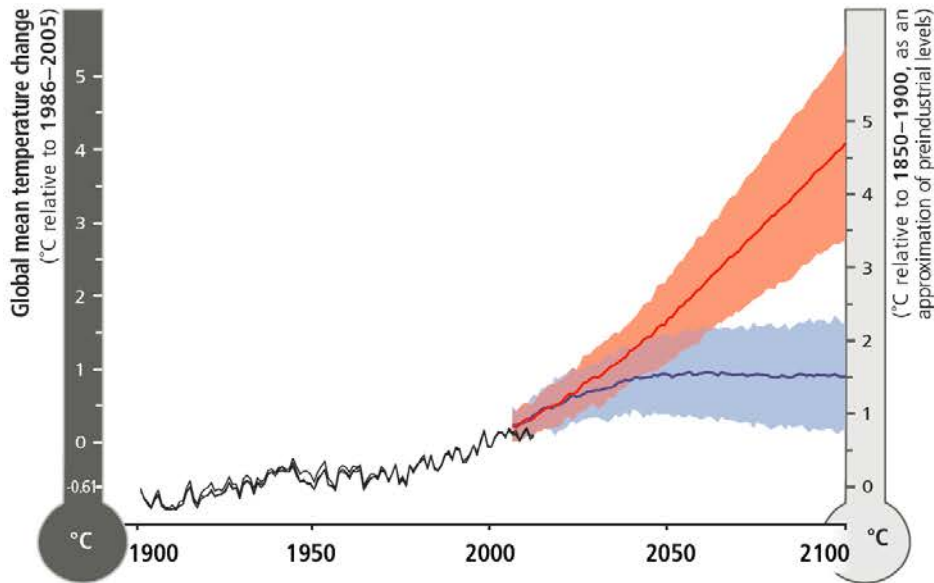
Key messages from IPCC AR5

- **Human influence on the climate system is clear**
- **Continued emissions of greenhouse gases will increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems**
- **While climate change is a threat to sustainable development, there are many opportunities to integrate mitigation, adaptation, and the pursuit of other societal objectives**
- **Humanity has the means to limit climate change and build a more sustainable and resilient future**

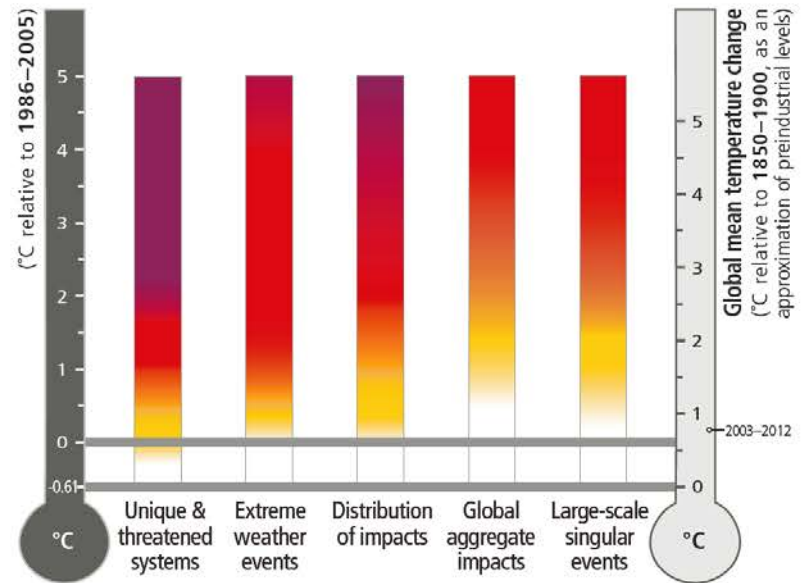
Risk = Hazard x Vulnerability x Exposure (Katrina flood victim, New Orleans, 2005)







- Observed
- RCP8.5 (a high-emission scenario)
- Overlap
- RCP2.6 (a low-emission mitigation scenario)



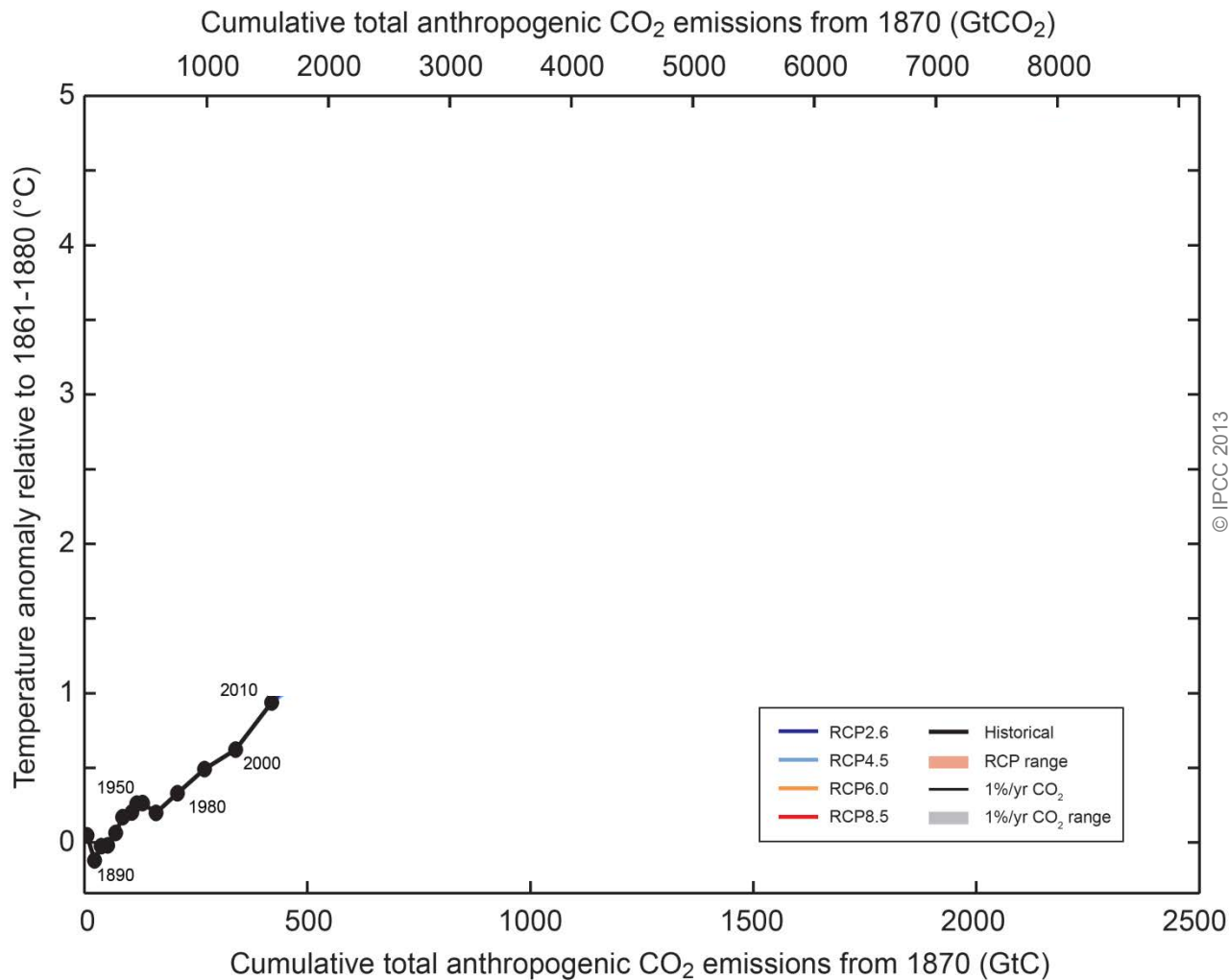
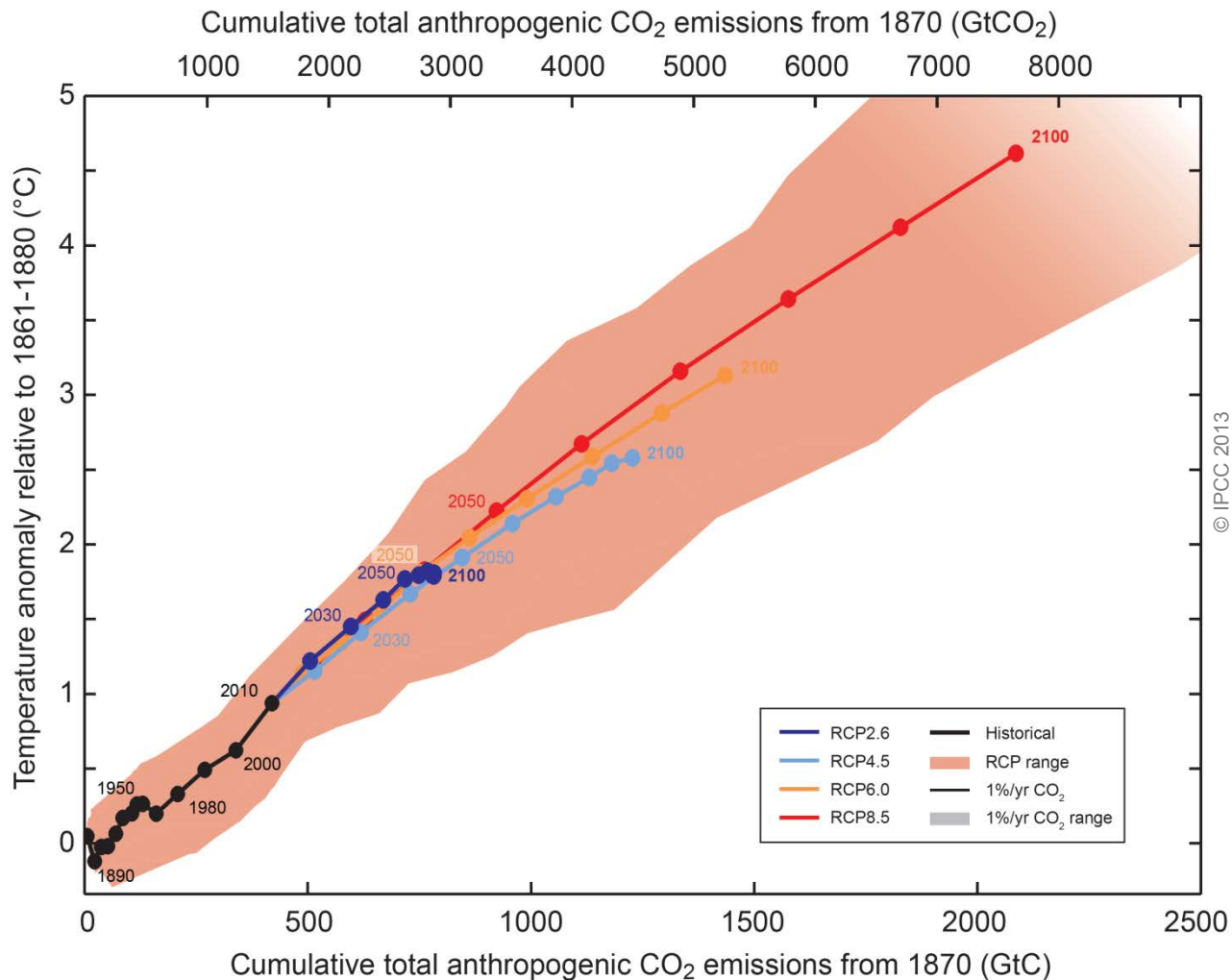


Fig. SPM.10

Cumulative emissions of CO₂ largely determine global mean surface warming by the late 21st century and beyond.



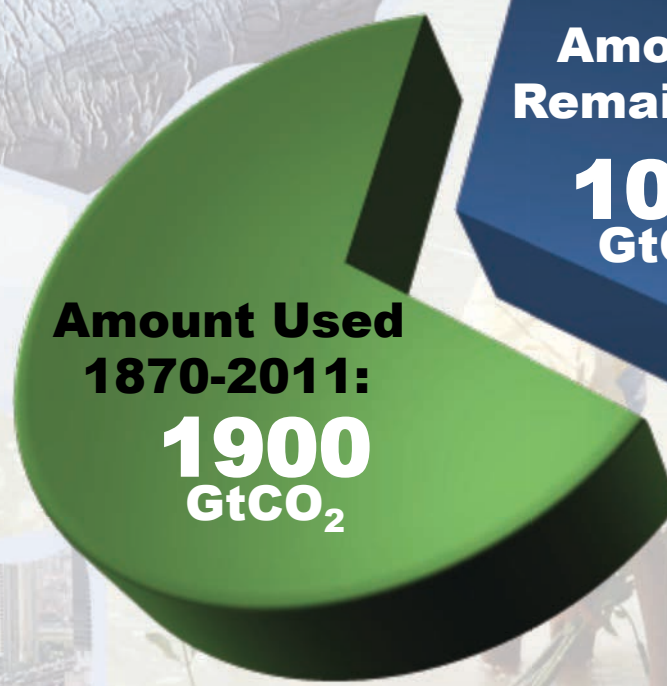
© IPCC 2013

Fig. SPM.10

Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.

The window for action is rapidly closing

65% of the carbon budget compatible with a 2°C goal is already used
NB: this is with a probability greater than 66% to stay below 2°C



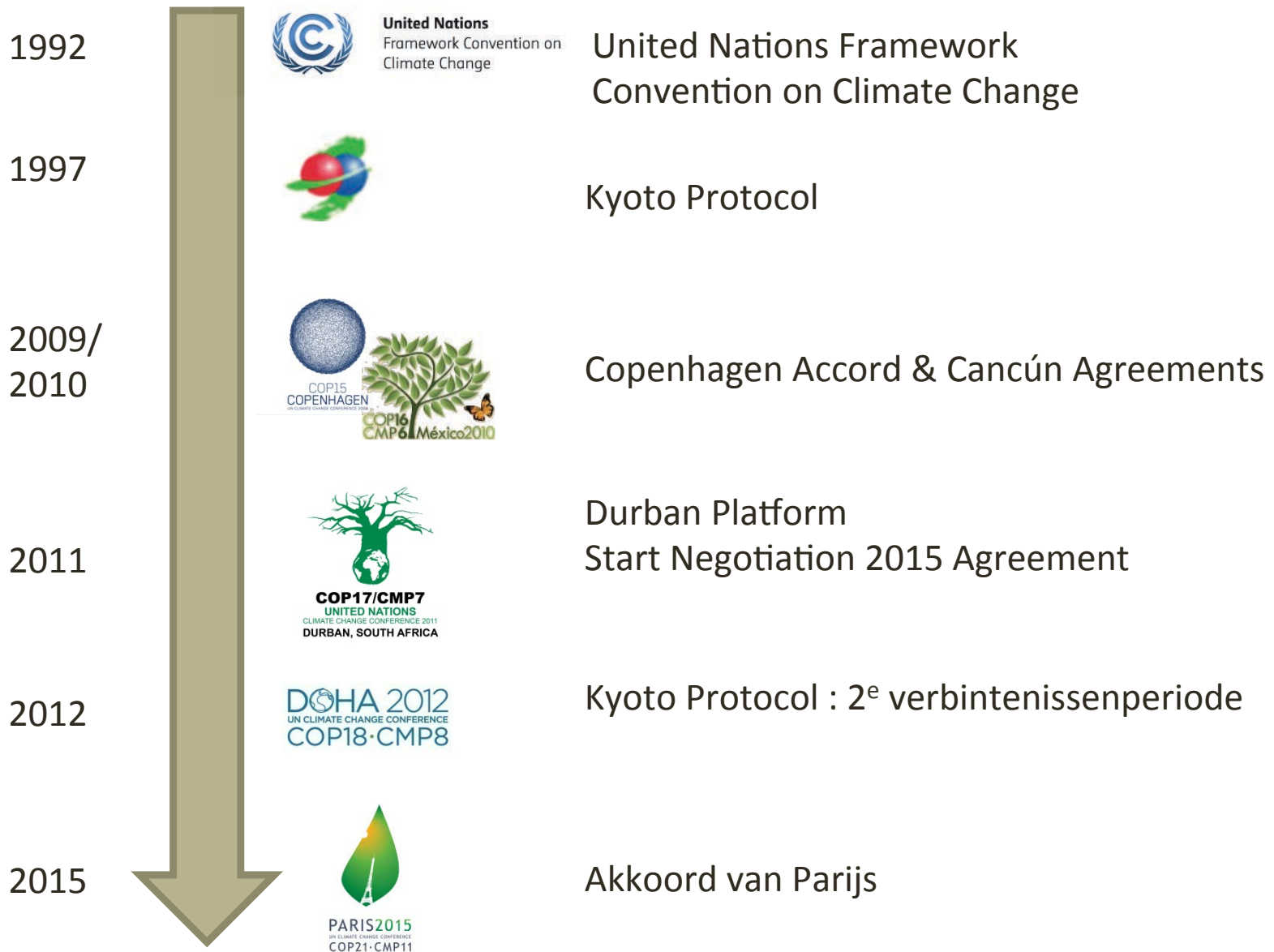
NB: Emissions in 2011: 38 GtCO₂/yr

AR5 WGI SPM



Source: Centre for Science and Environment, Delhi

Process



Dear President Obama
& The United States Congress,
Tomorrow
leaders from 192 countries
will gather at
The UN Climate Change Conference
in Copenhagen
to determine
the fate of our planet.

As business leaders we are optimistic that President Obama is attending Copenhagen with emissions targets. Additionally, we urge you, our government, to strengthen and pass United States legislation, and lead the world by example. We support your effort to ensure meaningful and effective measures to control climate change, an immediate challenge facing the United States and the world today. Please don't postpone the earth. If we fail to act now, it is scientifically irrefutable that there will be catastrophic and irreversible consequences for humanity and our planet.

We recognize the key role that American innovation and leadership play in stimulating the worldwide economy. Investing in a Clean Energy Economy will drive state-of-the-art technologies that will spur economic growth, create new energy jobs, and increase our energy security all while reducing the harmful emissions that are putting our planet at risk. We have the ability and the know-how to lead the world in clean energy technology to thrive in a global market and economy. But we must embrace the challenge today to ensure that future generations are left with a safe planet and a strong economy.

Please allow us, the United States of America, to serve in modeling the change necessary to protect humanity and our planet.

In partnership,

Chris Anderson, Curator, TED Richard Baker, Chairman, Lord & Taylor Dan, David & Lauren Barber, Blue Hill Chris Blackwell, Founder, Island Records, Island Outpost
Graydon Carter, Editor, Vanity Fair Despak Chopra, Adjunct Professor, Kellogg School of Business and Management Von Chouinard, Founder, Patagonia
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Paulette Cole, CEO & Creative Director, ABC Home, ABC Carpet & Home Tom Colacino, Chef & Owner, Craft Restaurants
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Ellean Fisher, CEO, Eileen Fisher Walt Frestis, CEO, Ben & Jerry's Homemade
Michael Galt, Chairman, Bob Williams, President, Co-Founders, Michael Galt + Bob Williams Matt Goldman, Co-Founder & CEO, Blue Man Group
Seth Goldman, CEO, Honest Tea Robert Grubler, Founder, Polonoba Associates, Jenga Licensor Adnan Grenier, Riceless Productions
Alan Hassenfeld, former Chairman, H&M, Inc. Dan Hesse, Executive Editor, AlterNet Gary Hirschberg, CEO, Stonyfield Yogurt
Jeffrey Hollander, CEO, Seventh Generation Katie Hudson, David Stabell, Co-Founders, David Stabell for WicAid Mike Kaplan, CEO, Aspen Skiing Company
Michael Kleschnick, President, Credo Mobile Sheryl Leach, Creator & Founder of Barney Sven-Olov Lindblad, Founder, Lindblad Expeditions
Danny Meyer, CEO, Union Square Hospitality Group Laura Michaszewski, President & GM, Planet Green, Discovery Communications
Will Riale, Chairman & Founder, Gardener's Supply Company Horst Rechelbacher, Founder, Aveda, Founder & CEO, Intelligent Nutrients
David Rockwell, Founder & Owner, Rockwell Group Meury Rubin, Founder, Chef & CEO, City Bakery, Birbaith Green Bakery
Michael Rupp, CEO & President, The Rockport Company Gordon Segal, Chairman, Crave & Barrel Jeff Skoll, Founder, Participant Media and Skoll Foundation
Harvey Spivack, CEO, Equinox Greg Stettinoph, Founder, Dovella Michèle Stern, President, Aelle USA
Martha Stewart, Founder, Martha Stewart Living Omnimedia, Inc. Jeffrey Swartz, CEO, Timberland Tom Szalay, CEO, TerraCycle
Donald J. Trump, Chairman and President, Donald J. Trump, LLC, EYP Eric F. Trump, EVP, Herkie M. Trump, EYP The Trump Organization
Jean-Georges Vongerichten, Executive Chef & Owner, Jean-Georges Management LLC

if you want to go quickly, go alone. if you want to go far, go together. african proverb


Business leaders, sign onto this initiative: businessleaders4environmentalchange.us



Dear President Obama
& The United States Congress,

Tomorrow
leaders from 192 countries
will gather at
The UN Climate Change Conference
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to determine
the fate of our planet.

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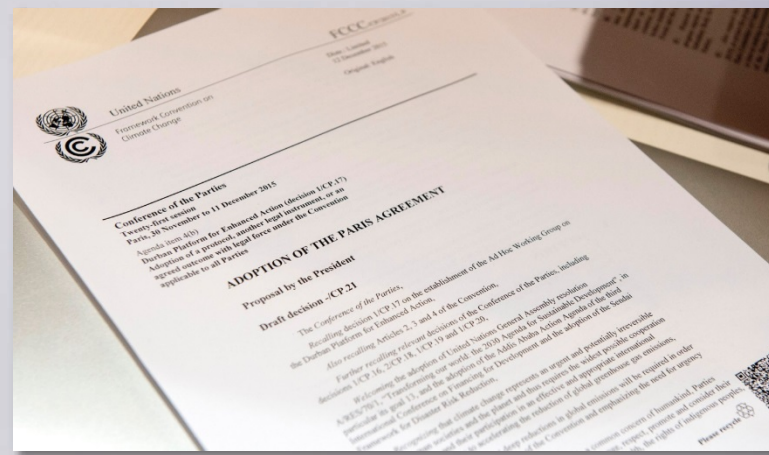


- **196 Parties**
- **150 Heads of State and Govt**
- **36.276 participants**

Sur les Changements Climatiques 2015

COP21/CMP11

Paris, France



The Paris Agreement : Key elements

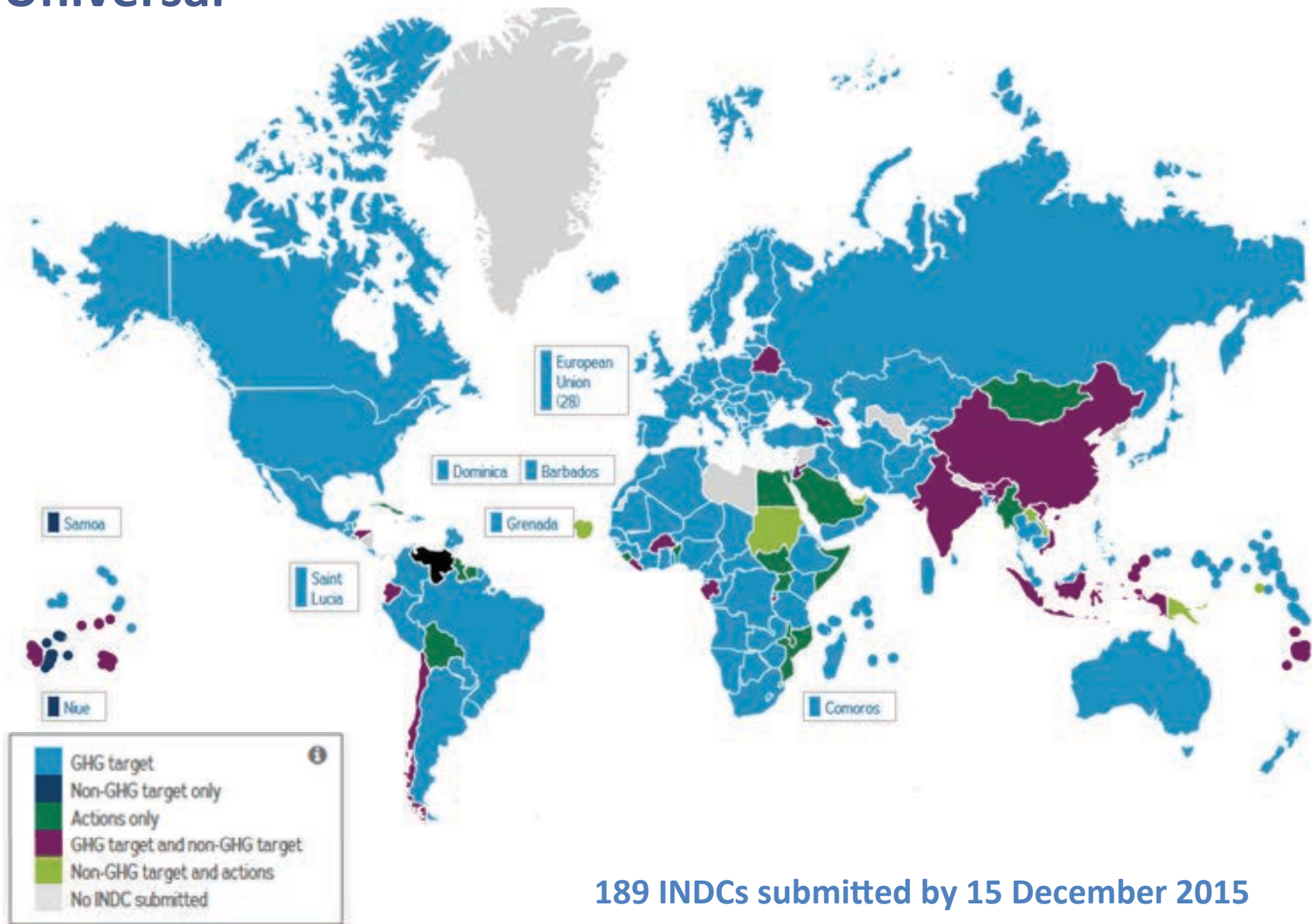
37



- *Vision / Long term objectives*
- *Différentiation of efforts*
- *Ambition cycle*
- *Mitigation*
- *Adaptation / Loss & Damages*
- *Financial flows*
- *Transparency & compliance*

- Main text: 25 pages (English version)
- Accompanying COP Decision (implementation plan and pre-2020 action): 36 pages

Universal

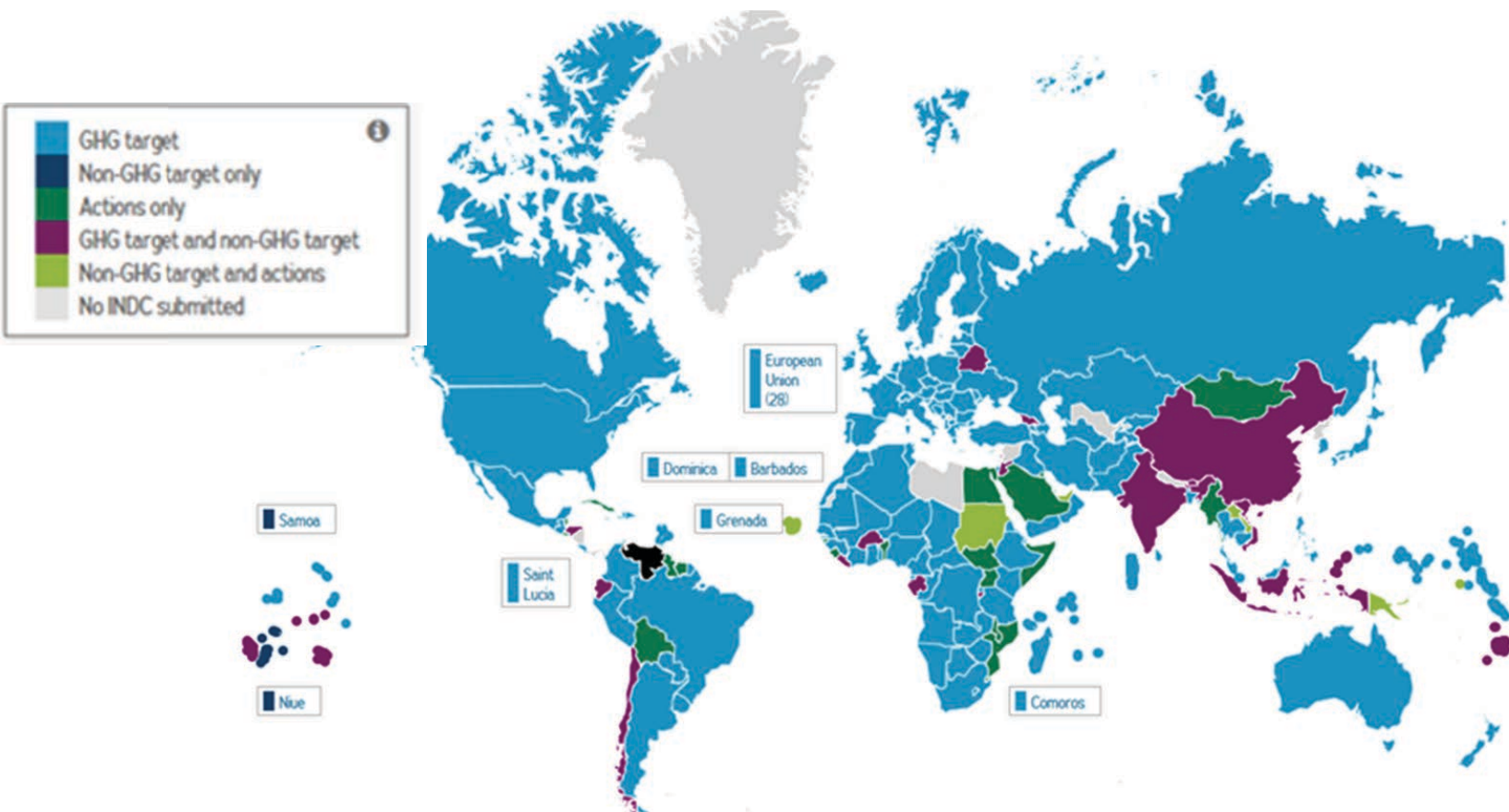


189 INDCs submitted by 15 December 2015

Source : World Resources Institute

Paris agreement: universal, differentiated, transparent

- Obligation to maintain successive targets and to pursue domestic measures
- Obligation to report information necessary to track progress



Paris Agreement

- Article 2:
 - ◆ (...) to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:
 - ▶ Holding the increase in the global average temperature to **well below 2 °C** above pre-industrial levels and to **pursue efforts** to limit the temperature increase to **1.5 °C** above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
 - ▶ **Increasing the ability to adapt** (...) and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
 - ▶ Making **finance flows consistent** with a pathway towards low greenhouse gas emissions and climate-resilient development

Paris Agreement

- Article 3:
 - ◆ As nationally determined contributions to the global response to climate change, **all Parties** are to undertake and communicate ambitious efforts (...) with the view to achieving the purpose of this Agreement as set out in Article 2.
The efforts of all Parties will represent **a progression over time**, while recognizing the **need to support developing country** Parties for the effective implementation of this Agreement.

Paris Agreement

- Article 4:
 - ◆ 1. (...) Parties aim to reach **global peaking** of greenhouse gas emissions **as soon as possible**, recognizing that **peaking will take longer for developing country Parties**,
 - ◆ and to undertake **rapid reductions thereafter in accordance with best available science**,
 - ◆ so as to achieve a **balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century**, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty
 - ◆ 3. **Each Party's successive nationally determined contribution will represent a progression(...)**

Paris Agreement

- Article 4 (cont.):
 - ◆ 4. Developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets.
 - ◆ Developing country Parties should continue enhancing their mitigation efforts, and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances.
 - ◆ **Each Party shall communicate a nationally determined contribution every five years**
 - ◆ Parties shall take into consideration in the implementation of this Agreement the concerns of Parties with economies most affected by the impacts of response measures, particularly developing country Parties.

Paris Agreement

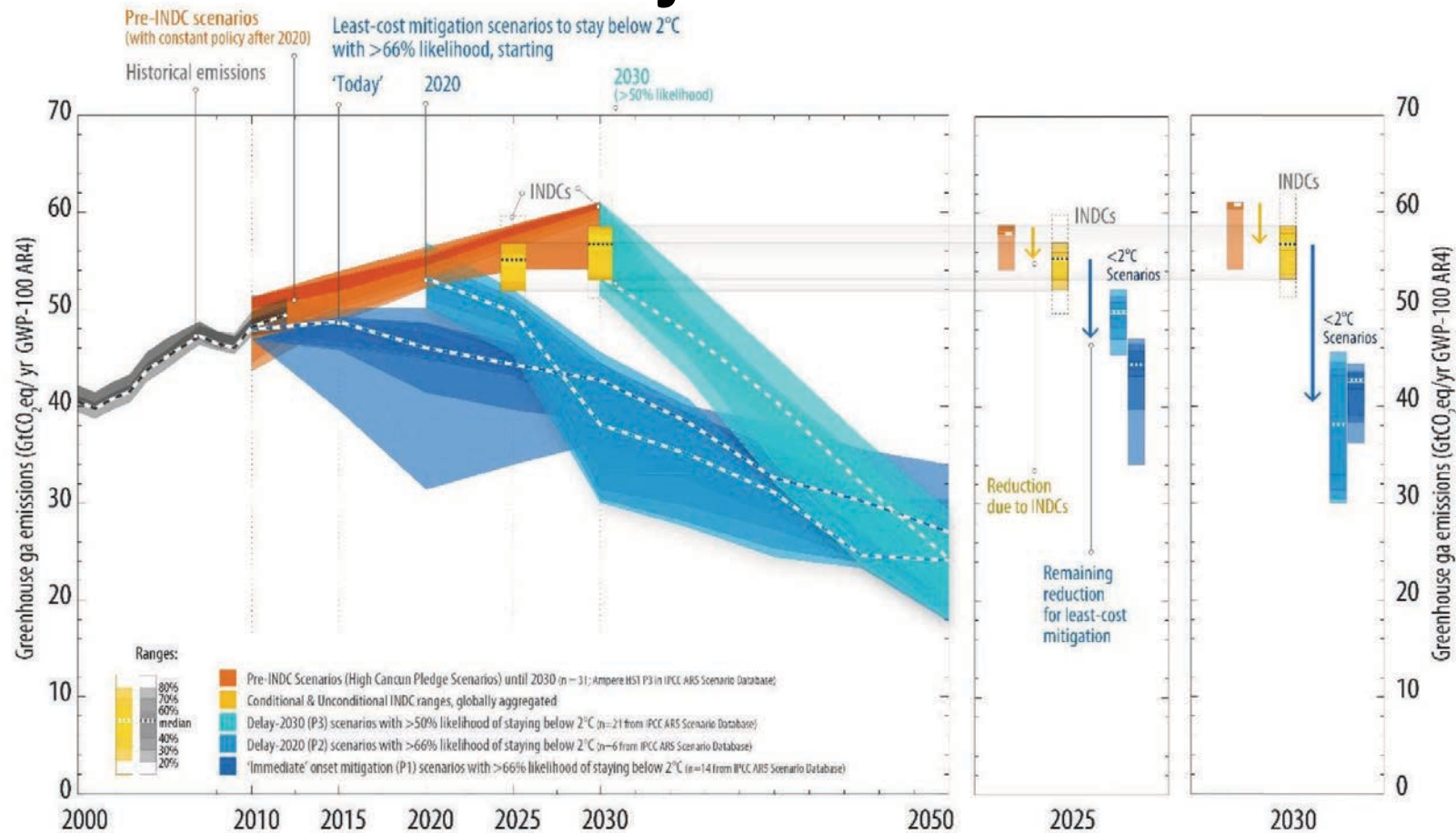
- Article 5:
 - ◆ Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases (...) including forests.
 - ◆ Parties are encouraged to take action to implement and support (...) policy approaches and positive incentives for activities relating to reducing emissions from deforestation and forest degradation,
- Article 6
 - ◆ 4. A mechanism to contribute to the mitigation of greenhouse gas emissions and support sustainable development is hereby established under the authority and guidance of the Conference of the Parties (...) for use by Parties on a voluntary basis.



Paris Agreement

- Article 7
 - ◆ Parties hereby establish the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change
- Article 8
 - ◆ Parties recognize the importance of averting, minimizing and **addressing loss and damage** associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of **loss and damage**.

Comparison of global emission levels resulting from the intended nationally determined contributions in 2025 and 2030 with other trajectories

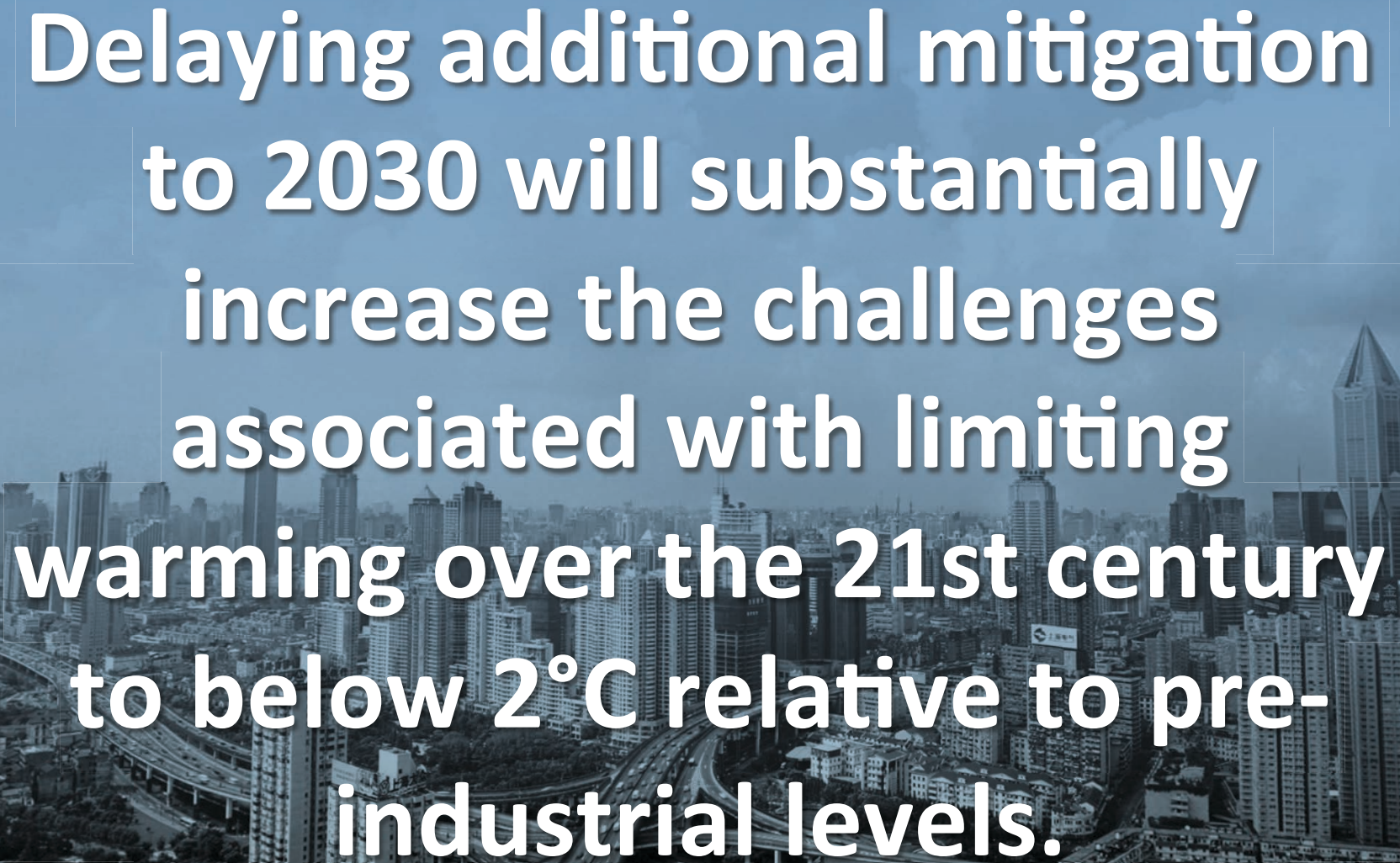


Synthesis report on the aggregate effect of the intended nationally determined contributions
: <http://unfccc.int/resource/docs/2015/cop21/eng/07.pdf> [p.11]

“Getting 196 Countries To Agree On Climate Change Was The Easy Part. Now comes the real work.”

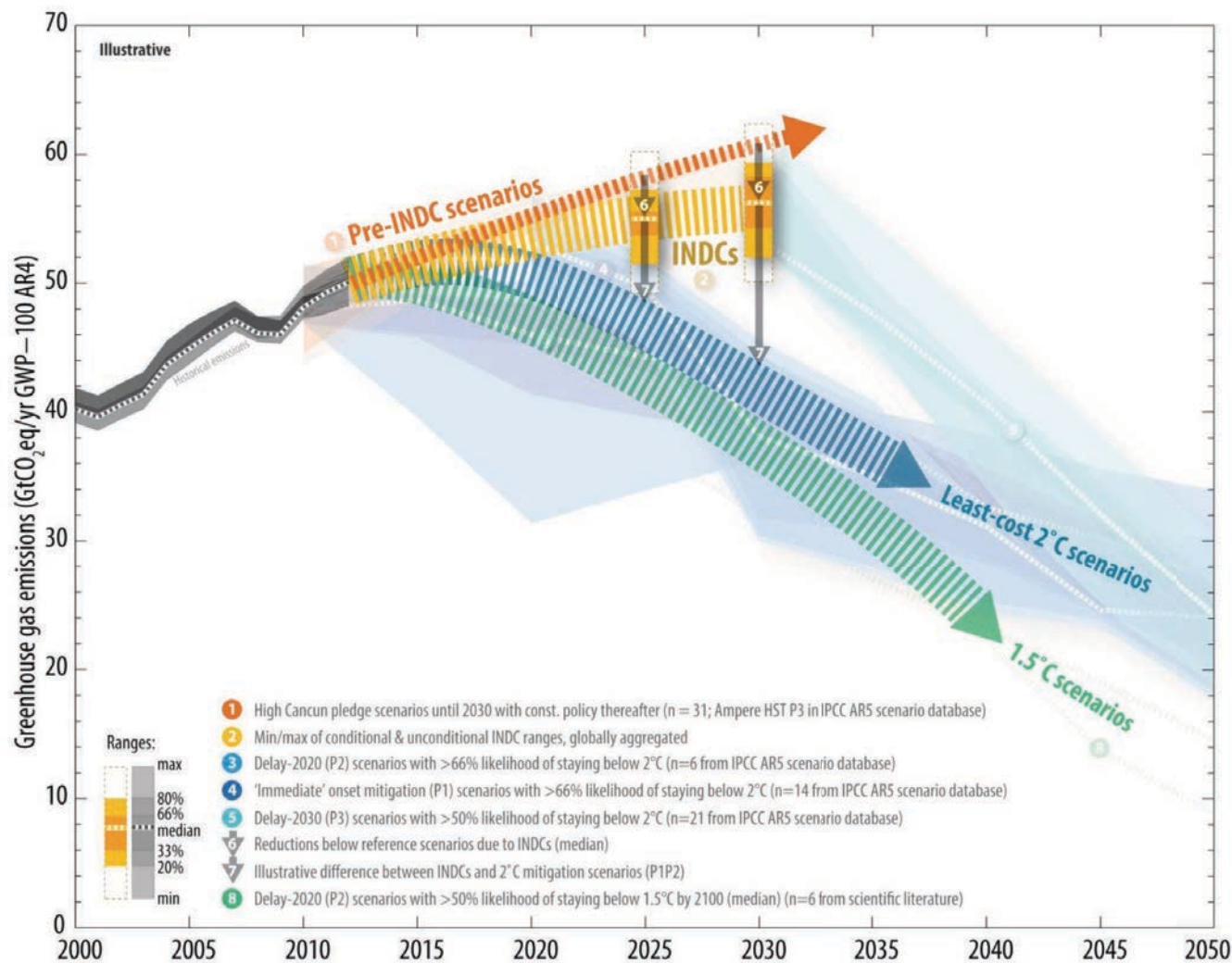
(C. Figueres, World Economic Forum 2016, Davos)



An aerial photograph of a dense urban landscape, likely Hong Kong, featuring a complex multi-level highway interchange in the foreground and numerous high-rise buildings in the background. The image is overlaid with a semi-transparent blue filter.

**Delaying additional mitigation
to 2030 will substantially
increase the challenges
associated with limiting
warming over the 21st century
to below 2°C relative to pre-
industrial levels.**

Comparison of global emission levels in 2025 and 2030 resulting from the implementation of the intended nationally determined contributions



Leaders Aim to Put a Price on Half of All Global Carbon Emissions



http://www.worldbank.org/en/news/feature/2016/04/21/leaders-aim-to-put-a-price-on-half-of-all-global-carbon-emissions?CID=CCG_TT_climatechange_EN_EXT



SUSTAINABLE DEVELOPMENT GOALS



STAYING THE COURSE:

What we should do to stay on track from Paris to Marrakech



PARIS COP21 AGREEMENT

Countries agreed to keep warming below 1.5°C. With the current commitments we are on track for 3°C of warming.



Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

panda.org/climateandenergy | [@climateWWF](https://twitter.com/climateWWF)












Donald J. Trump 
@realDonaldTrump



 Suivre

The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.

 Voir la traduction

RETWEETS

99 789

JAIME

63 394



11:15 - 8 nov. 2012



100 k



63 k





CUT EMISSIONS?!
THINK OF THE ECONOMY

MEGASTORMS

EPA

©2014 ADAM ZYGLIS
THE BUFFALO NEWS

Here is my 100-day action plan:

- We're going to rescind all the job-destroying Obama executive actions including the Climate Action Plan and the Waters of the U.S. rule.
- We're going to save the coal industry and other industries threatened by Hillary Clinton's extremist agenda.
- I'm going to ask Trans Canada to renew its permit application for the Keystone Pipeline.
- We're going to lift moratoriums on energy production in federal areas
- We're going to revoke policies that impose unwarranted restrictions on new drilling technologies. These technologies create millions of jobs with a smaller footprint than ever before.
- We're going to cancel the Paris Climate Agreement and stop all payments of U.S. tax dollars to U.N. global warming programs.
- Any regulation that is outdated, unnecessary, bad for workers, or contrary to the national interest will be scrapped. We will also eliminate duplication, provide regulatory certainty, and trust local officials and local residents.
- Any future regulation will go through a simple test: is this regulation good for the American worker? If it doesn't pass this test, the rule will not be approved.

Florida sea level locked in after:



Florida sea level locked in after:



Long-term warming-induced
Sea Level Rise without protection

Example: United States

Clark et al.,
Nature Climate Change, 2016.

Tampa

New York
City

Savannah

Jacksonville

Miami



to thrive in a global market and economy. But we must embrace the challenge today to ensure that future generations are left with a safe planet and a strong economy.

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Harvey Spevak, CEO, Equinox Greg Steltenpohl, Founder, Odwalla Michelle Stein, President, Aëffe USA
Martha Stewart, Founder, Martha Stewart Living Omnimedia, Inc. Jeffrey Swartz, CEO, Timberland Tom Szaky, CEO, TerraCycle
Donald J. Trump, Chairman and President, Donald J. Trump Jr., EVP, Eric F. Trump, EVP, Ivanka M. Trump, EVP, The Trump Organization
Jean-Georges Vongerichten, Executive Chef & Owner, Jean-Georges Management LLC

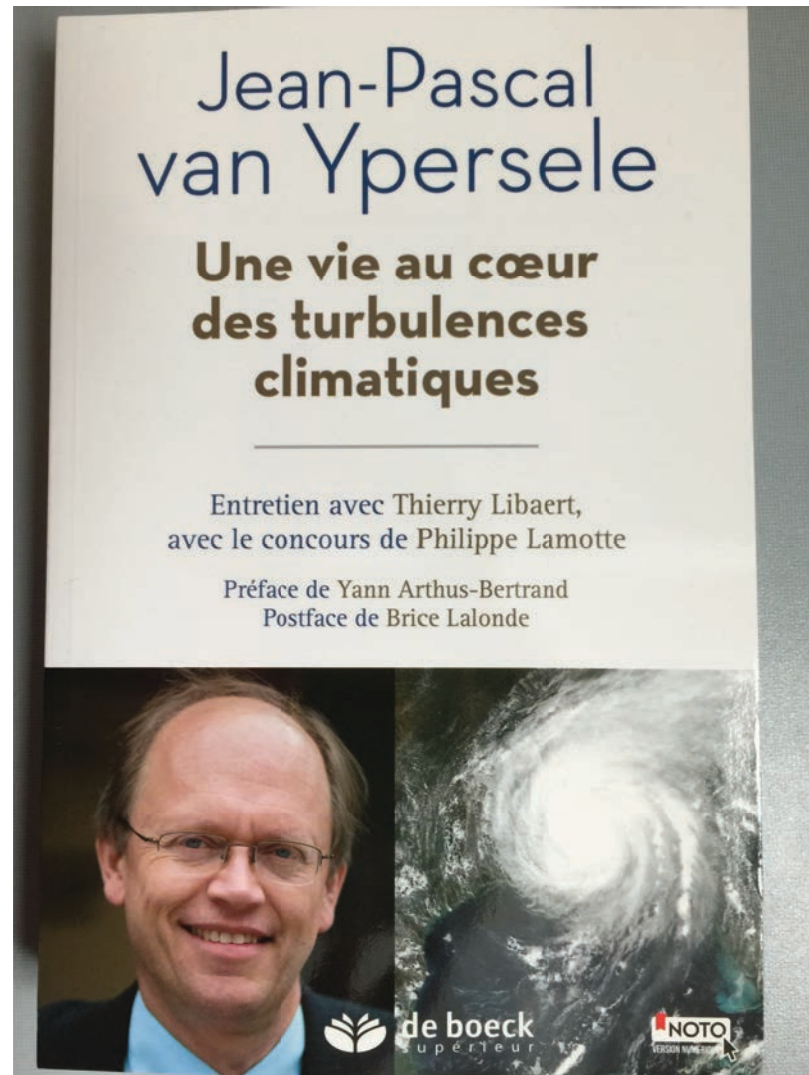
if you want to go quickly, go alone. if you want to go far, go together. african proverb

Business leaders, sign onto this initiative: businessleaders4environmentalchange.us

I am trying to be coherent
(external insulation)



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Useful links:

- www.ipcc.ch : IPCC (reports and videos)
- www.climate.be/vanyp : my slides and other documents
- www.skepticalscience.com: excellent responses to contrarians arguments
- **On Twitter: @JPvanYpersele
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