The IPCC 5th Assessment Report (AR5) – Part 2: Impacts, Adaptation, and Vulnerability

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Stakeholders meeting, BELSPO & FPS "Public Health & Environment", Brussels, 6 May 2014

Thanks to the Belgian Federal Science Policy Office (BELSPO) for its support

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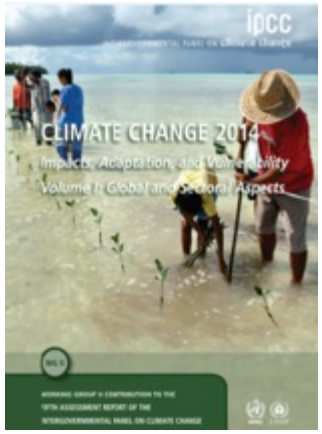
WMO UNEP



What is happening in the climate system?

What are the risks?

What can be done?

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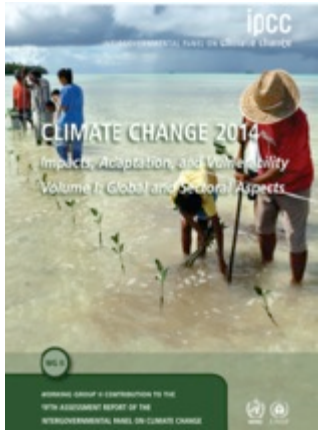
WG I (Physical science basis): 209 lead authors, 2014 pages, 54.677 review comments



WG II (Impacts, Adaptation and Vulnerability): 243 lead authors, 2500 pages, 50.492 review comments

WG III (Mitigation of Climate Change): 235 coordinating and lead authors, 2000 pages, 38.315 review comments

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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 Organizatior

UNEP= United Nations Environment Programme

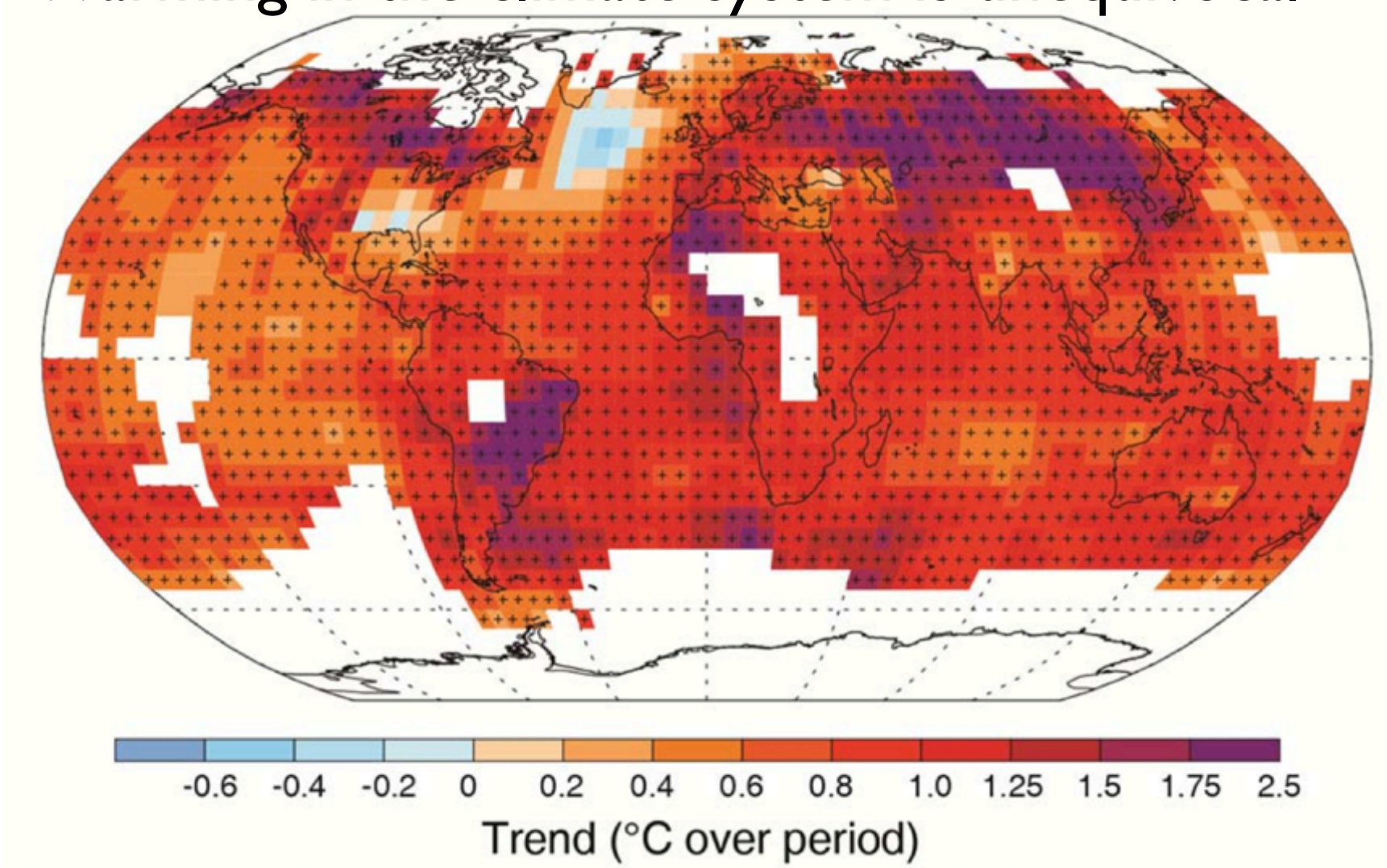
None So Deaf

Auteur: @JohnKudelka

What is happening in the climate system?

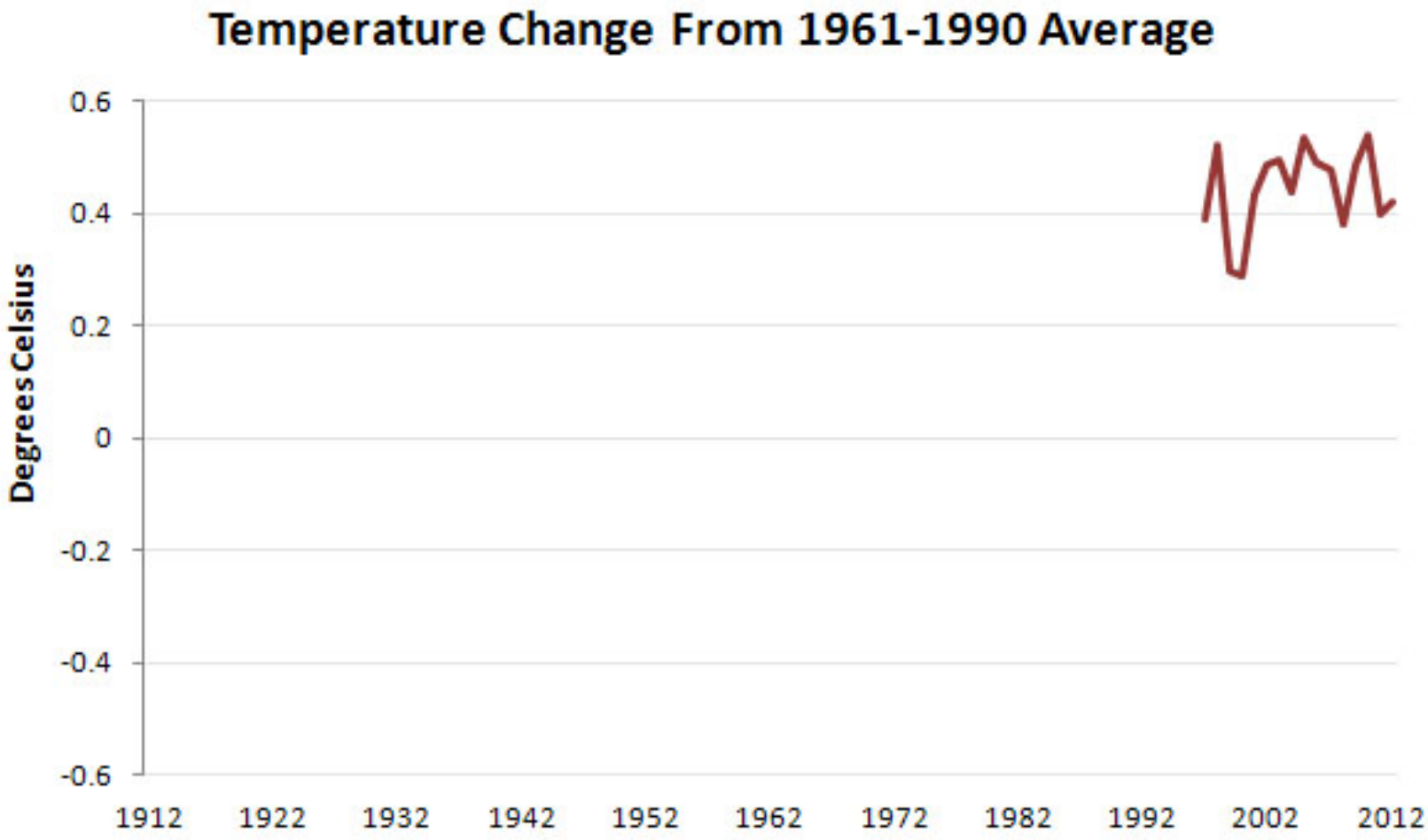
Change in average surface temperature 1901-2012

Warming in the climate system is unequivocal



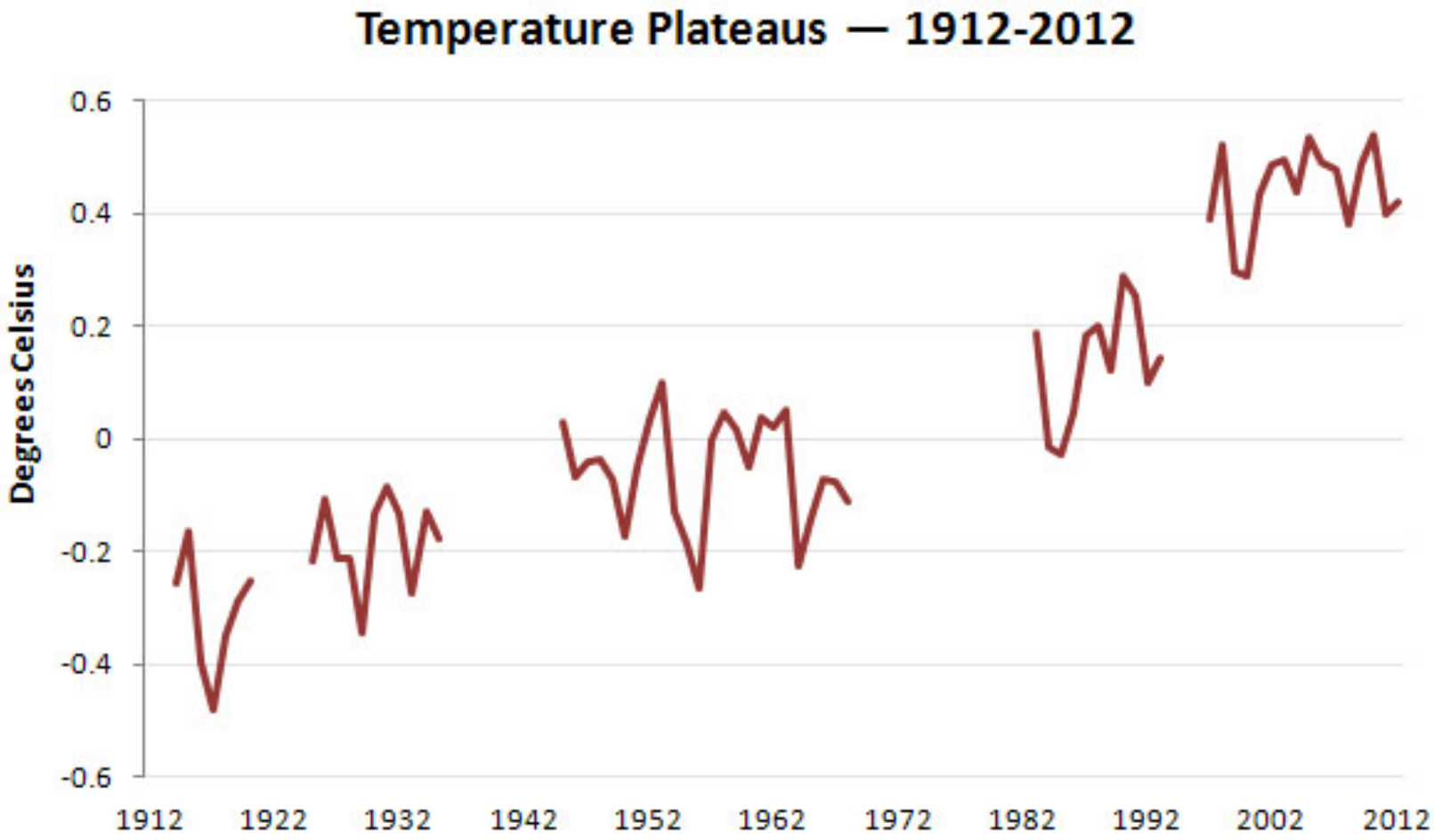
IPCC AR5 WGI Fig. SPM 1b

Lying With Statistics, Global Warming Edition



http://www.motherjones.com/kevin-drum/2012/10/lying-statistics-global-warming-edition

Lying With Statistics, Global Warming Edition



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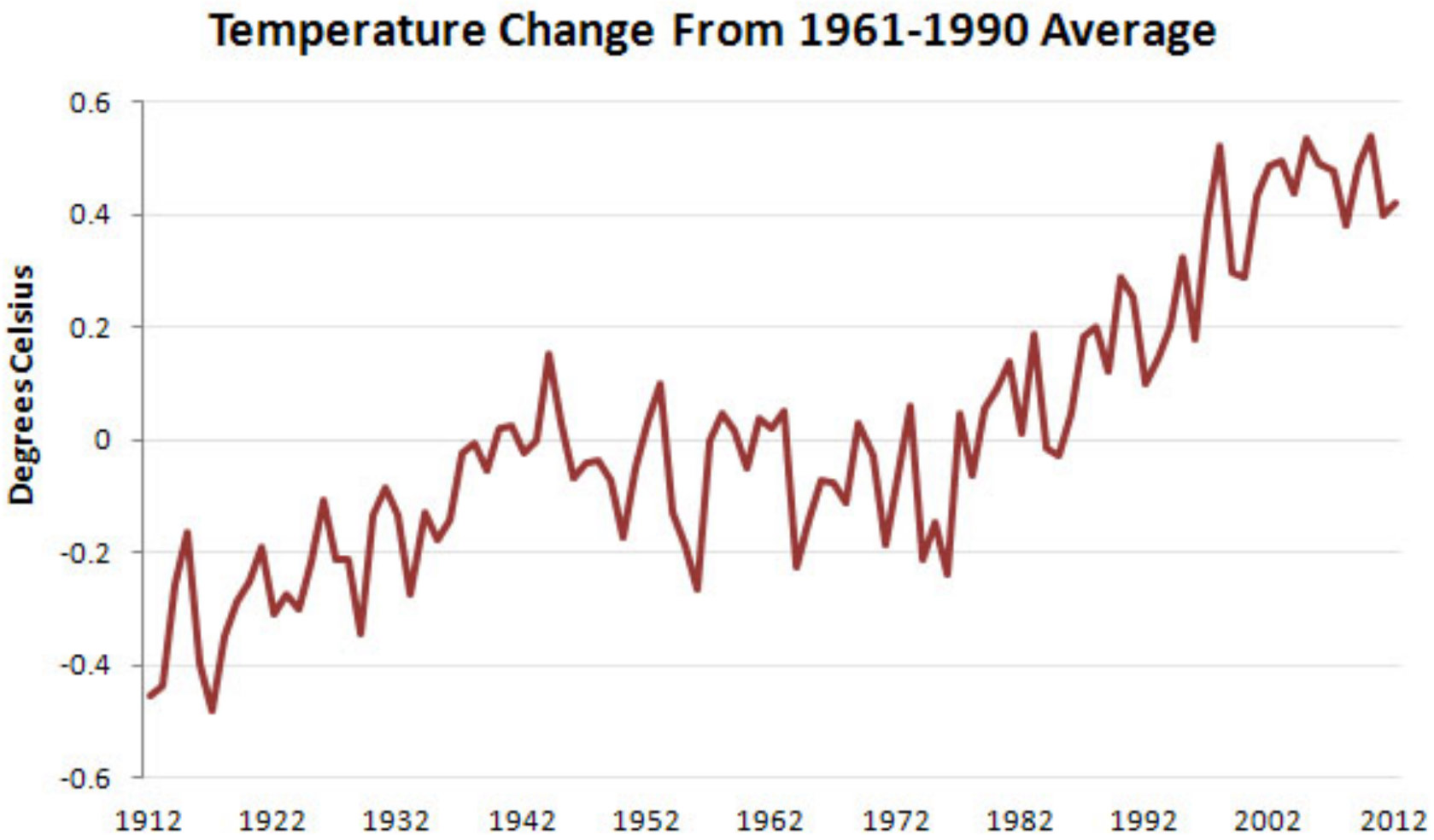
Lying With Statistics, Global Warming Edition



http://www.motherjones.com/kevin-drum/2012/10/lying-statistics-global-warming-edition

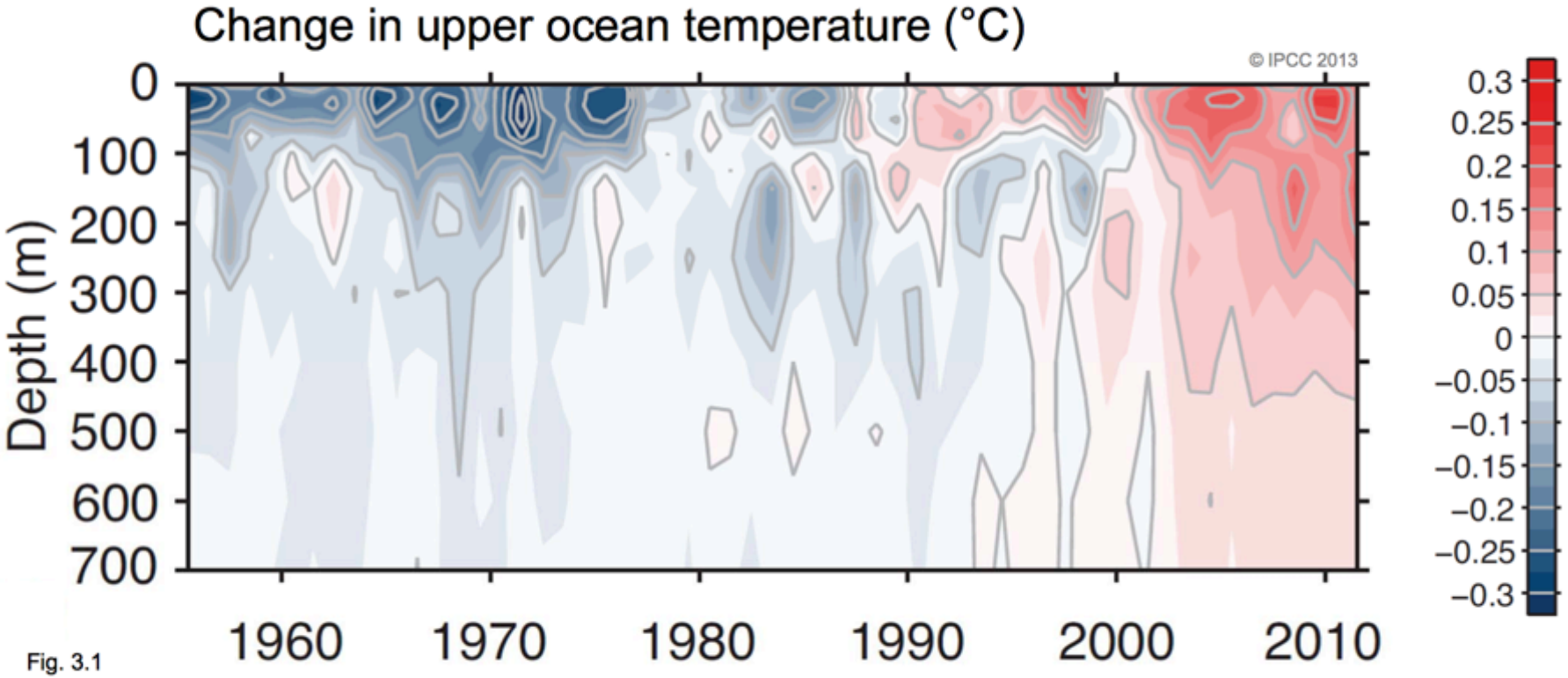


Fig. 3.1

It is *virtually certain* that the upper ocean (0-700 m) warmed from 1971 to 2010, [...]. It is *likely* that the ocean warmed between 700 and 2000 m from 1957 to 2009.

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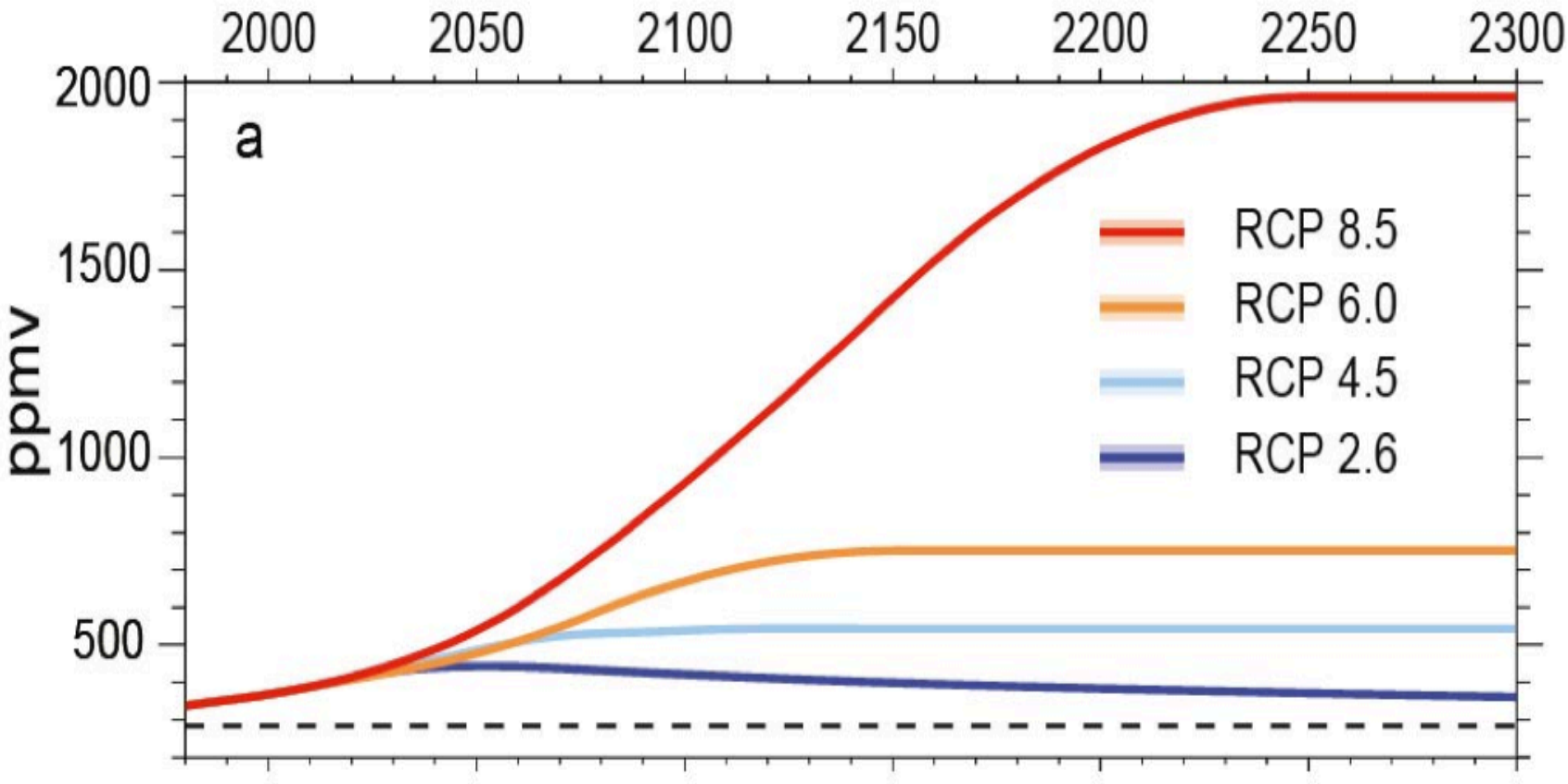
Plateau Glacier (1961)
(Alaska)

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)

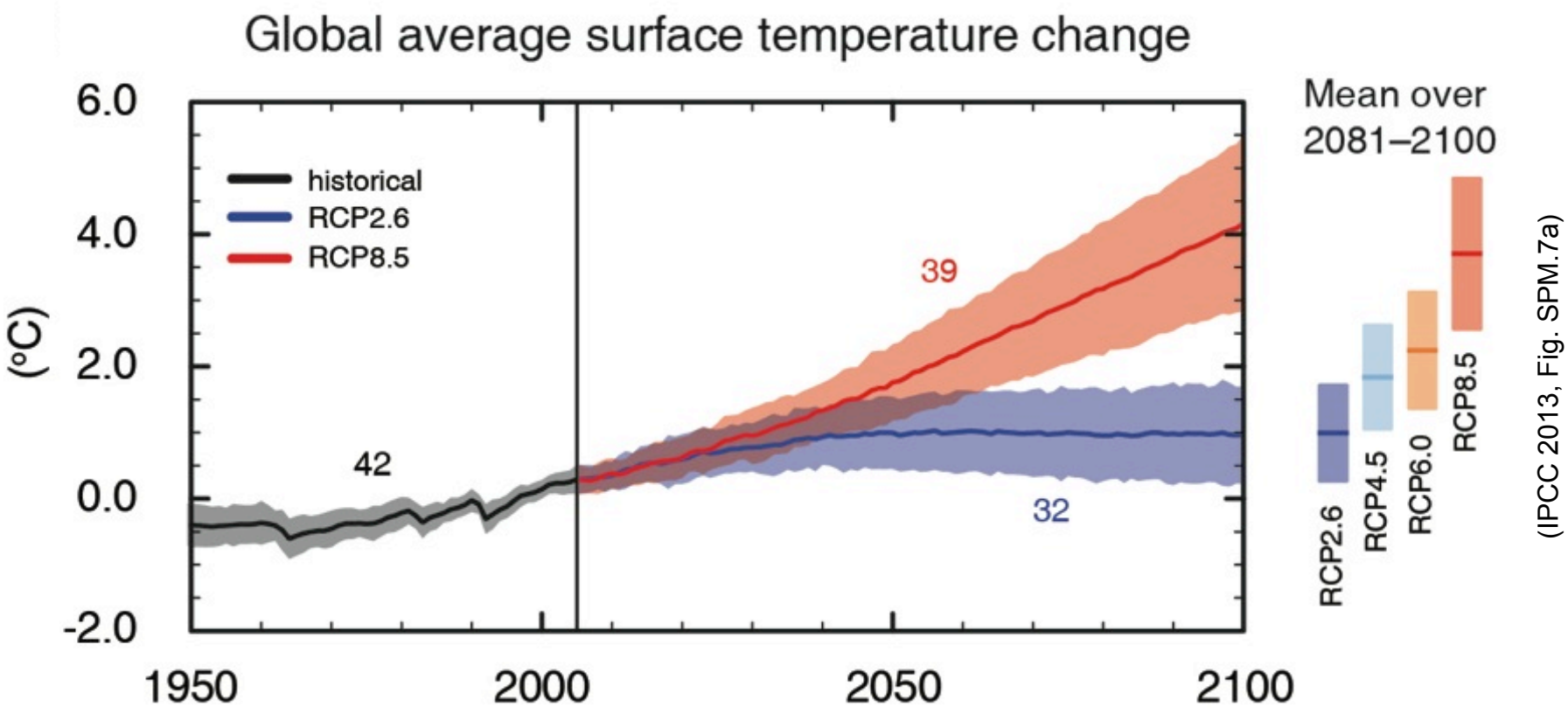
http://www.weather.com/news/science/environment/alaskas-glaciers-capturing-earth-changing-our-eyes-20131125?cm_ven=Email&cm_cat=ENVIRONMENT_us_share

RCP Scenarios: Atmospheric CO_2 concentration



Three stabilisation scenarios: RCP 2.6 to 6
One Business-as-usual scenario: RCP 8.5

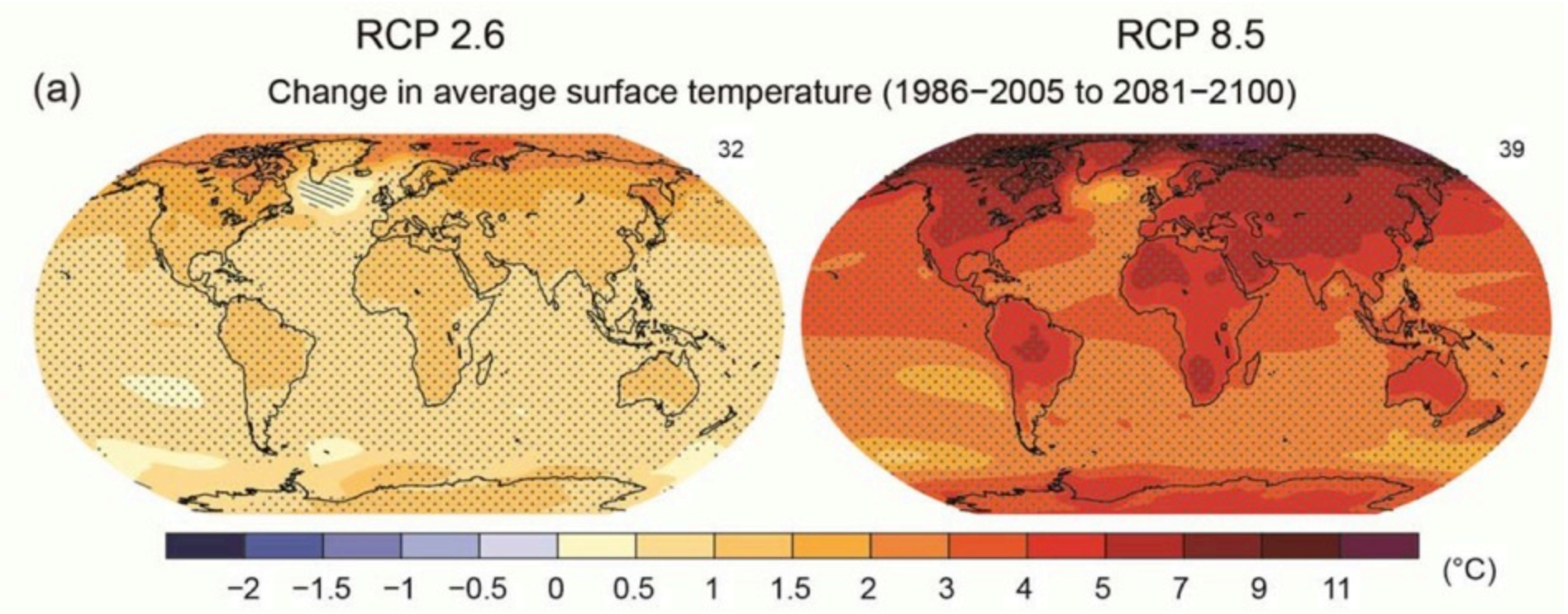
AR5, chapter 12. WGI- Adopted version / subject to final copyedit



(IPCC 2013, Fig. SPM.7a)

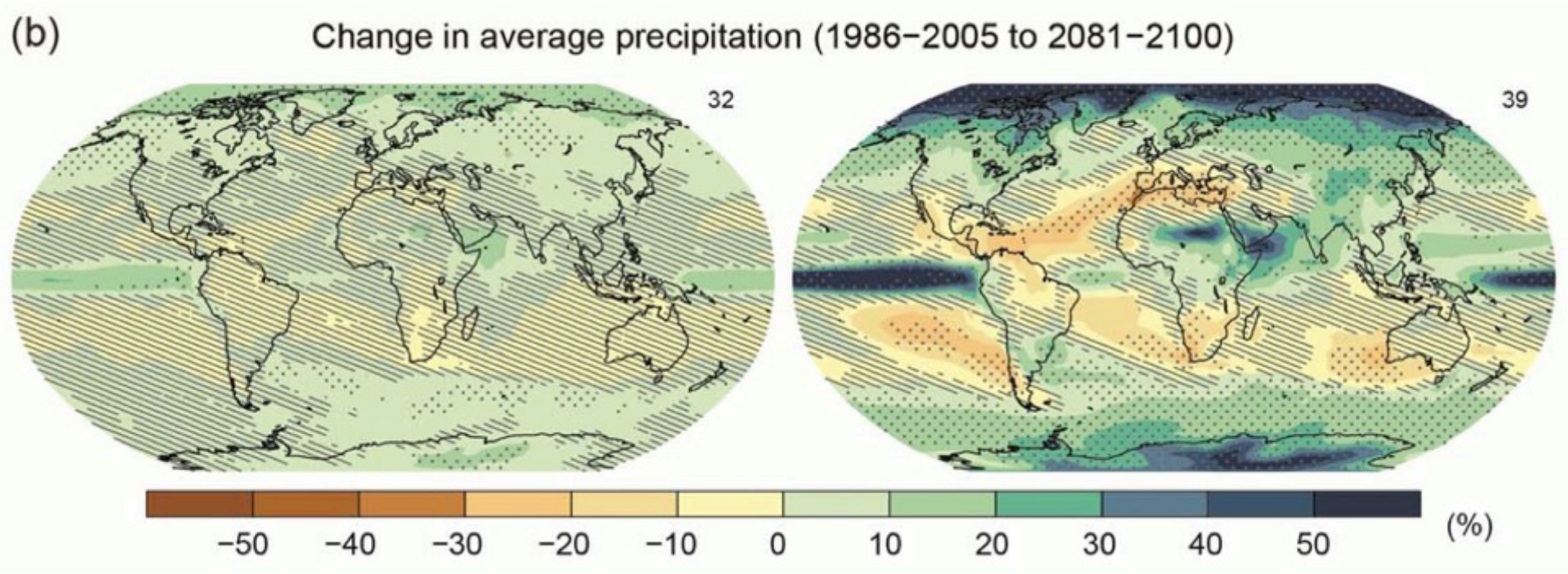
Global surface temperature change for the end of the 21st century is *likely* to exceed 1.5°C relative to 1850 for all scenarios

Surface temperature projections



AR5 WGI SPM - Approved version / subject to final copyedit

Precipitation projections



AR5 WGI SPM - Approved version / subject to final copyedit

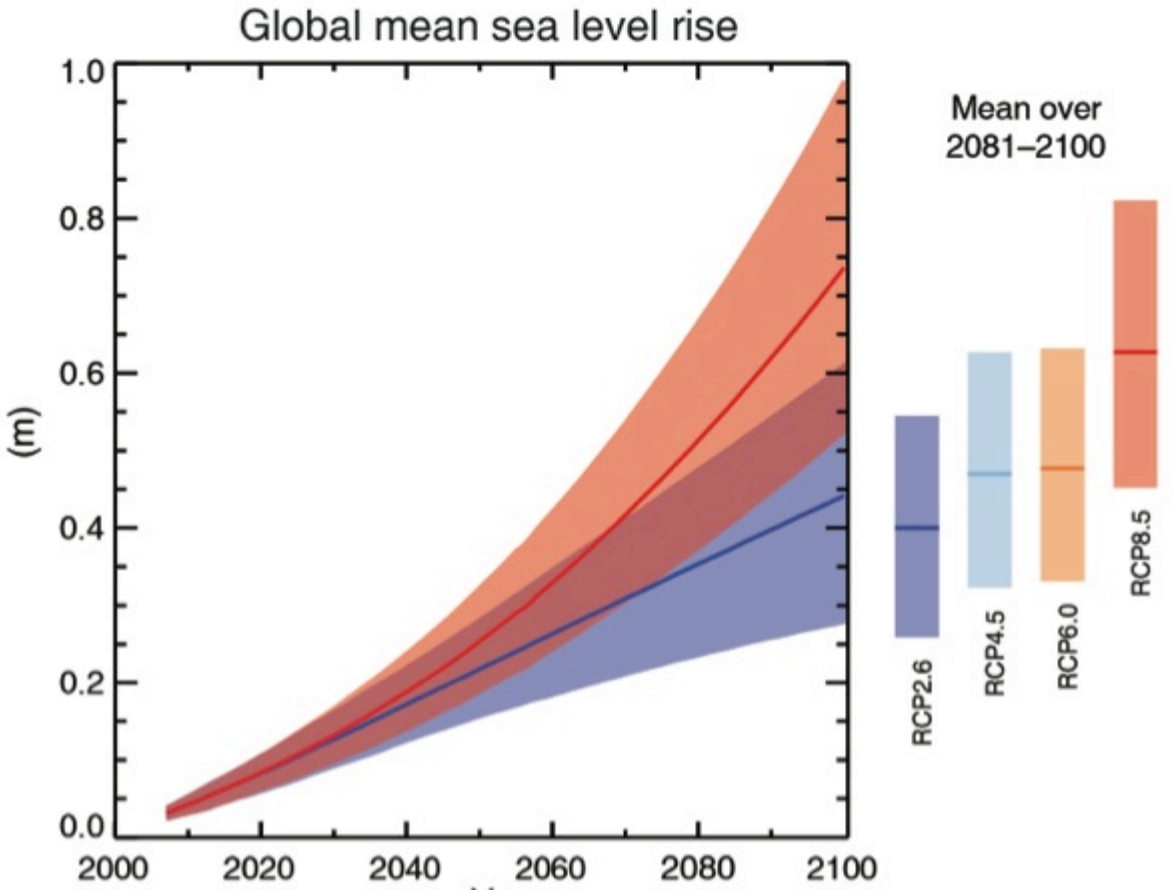


Fig. SPM.9

RCP2.6 (2081-2100), *likely* range: **26 to 55 cm**

RCP8.5 (in 2100), *likely* range: **52 to 98 cm**

(Reference level: 1986-2005)

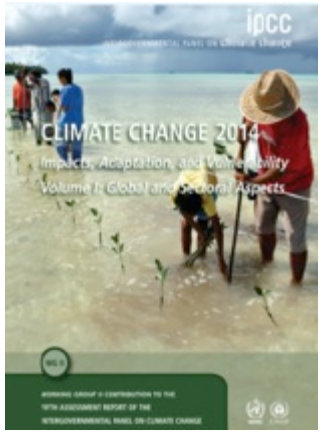
Since 1950, extreme hot days and heavy precipitation have become more common

There is evidence that anthropogenic influences, including increasing atmospheric greenhouse gas concentrations, have changed these extremes

Extreme weather and climate events

Phenomenon and direction of trend	Assessment that changes occurred (typically since 1950 unless otherwise indicated)	Assessment of a human contribution to observed changes	Likelihood of further changes	
			Early 21st century	Late 21st century
Warmer and/or fewer cold days and nights over most land areas	*Very likely*	***Very likely***	*Likely*	***Virtually certain***
Warmer and/or more frequent hot days and nights over most land areas	*Very likely*	***Very likely***	*Likely*	***Virtually certain***
Warm spells/heat waves. Frequency and/or duration increases over most land areas	***Medium confidence*** on a global scale Likely in large parts of Europe, Asia and Australia	***Likely***	Not formally assessed	***Very likely***
Heavy precipitation events. Increase in the frequency, intensity, and/or amount of heavy precipitation	*Likely more land areas with increases than decreases*	***Medium confidence***	*Likely* over many land areas	***Very likely*** over most of the mid-latitude land masses and over wet tropical regions
Increases in intensity and/or duration of drought	***Low confidence*** on a global scale Likely changes in some regions	***Low confidence***	*Low confidence*	***Likely*** *(medium confidence)* on a regional to global scale
Increases in intense tropical cyclone activity	***Low confidence*** in long term (centennial) changes Virtually certain in North Atlantic since 1970	***Low confidence***	*Low confidence*	***More likely than not*** in the Western North Pacific and North Atlantic
Increased incidence and/or magnitude of extreme high sea level	*Likely* (since 1970)	***Likely***	*Likely*	***Very likely***

IPCC, AR5, Table SPM.1



What are the risks?

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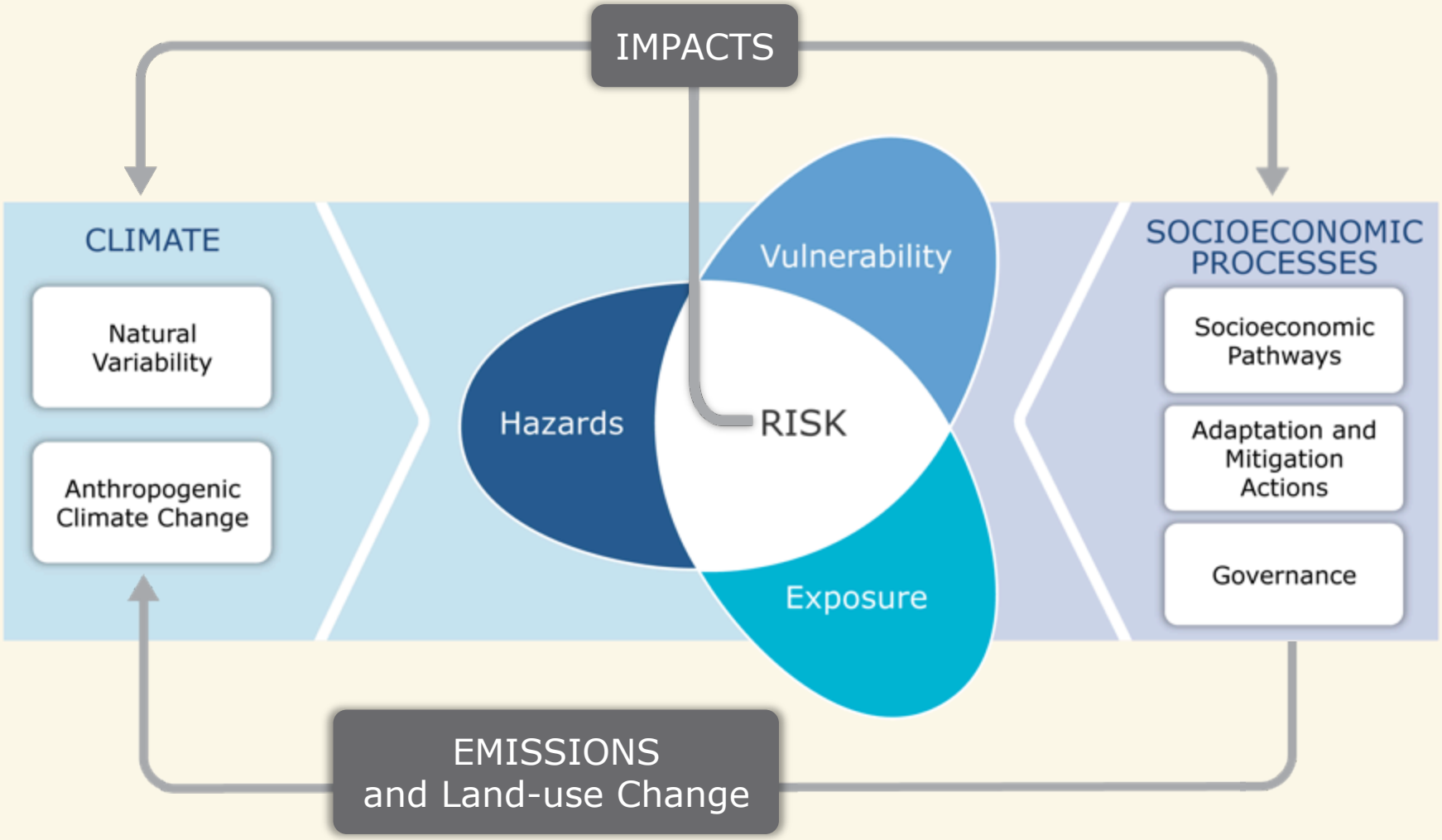
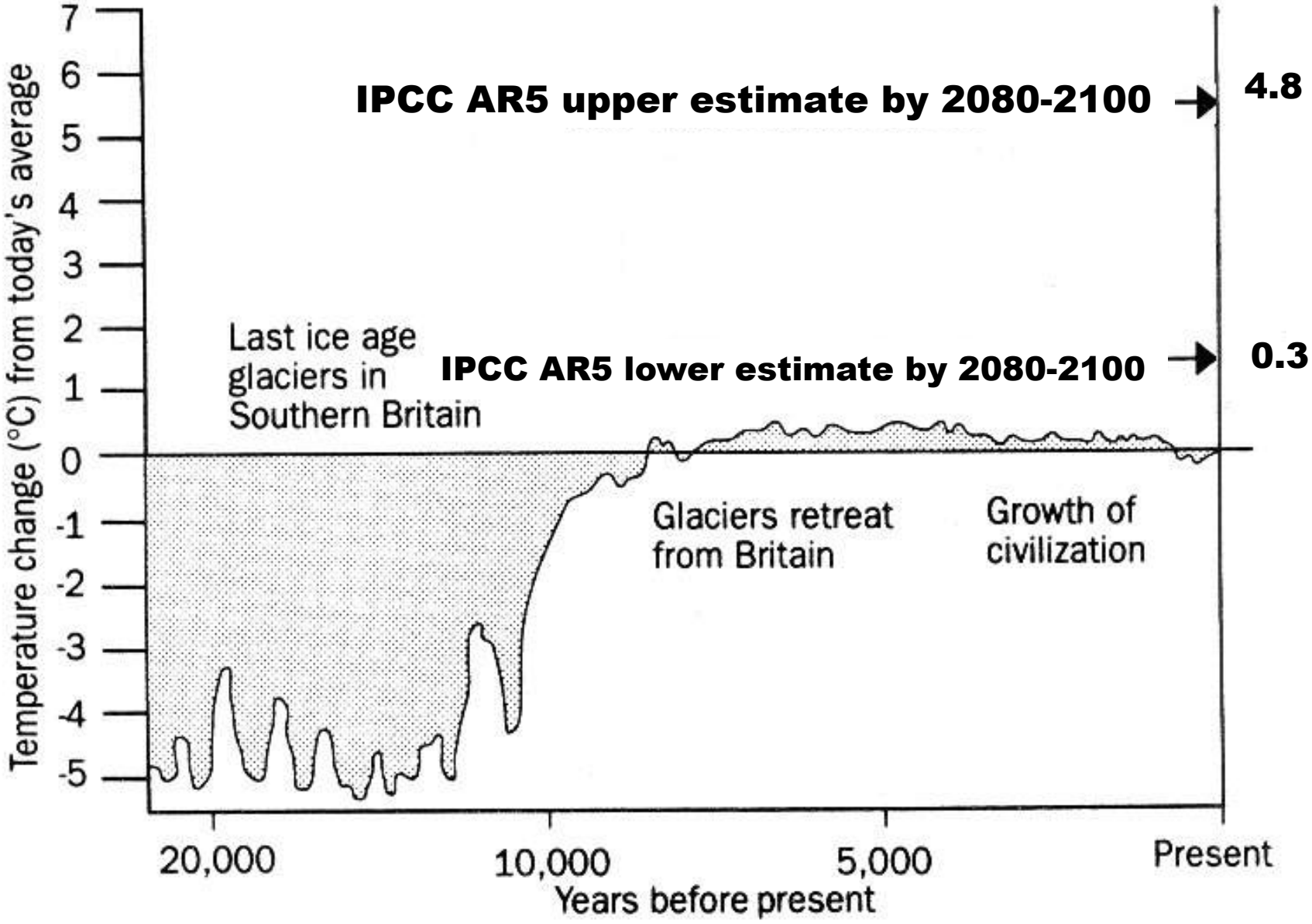
THE WORKING GROUP II

CONTRIBUTION TO THE IPCC'S FIFTH ASSESSMENT REPORT


IMPACTS
CLIMATE
Natural Variability
Anthropogenic Climate Change
Vulnerability
Hazards
RISK
Exposure
SOCIOECONOMIC PROCESSES
Socioeconomic Pathways
Adaptation and Mitigation Actions
Governance
EMISSIONS and Land-use Change



Adapted from: International Geosphere Biosphere Programme Report no.6, Global Changes of the Past, July1988

Risk = Hazard x Vulnerability x Exposure (Katrina flood victim)

AP Photo - Lisa Krantz (http://lisakrantz.com/hurricane-katrina/zspbn1k4cn17phidupe4f9x5t1mzdr)

VULNERABILITY AND EXPOSURE

AROUND THE WORLD

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VULNERABILITY AND EXPOSURE

AROUND THE WORLD

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WIDESPREAD
OBSERVED IMPACTS
A CHANGING WORLD
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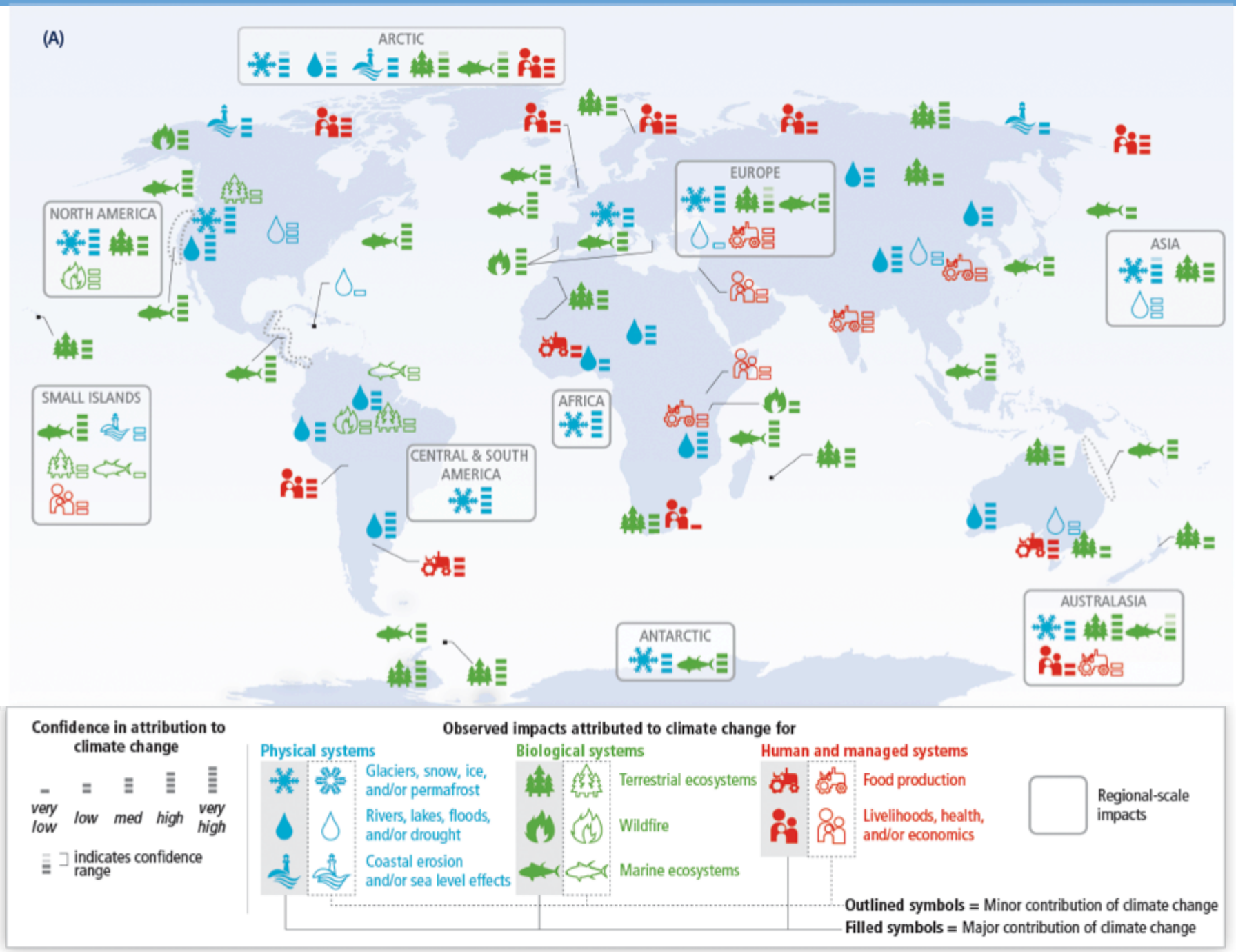
(A)
ARCTIC
NORTH AMERICA
EUROPE
ASIA
SMALL ISLANDS
AFRICA
CENTRAL & SOUTH AMERICA
AUSTRALASIA
ANTARCTIC
Confidence in attribution to climate change
very low
low
med
high
very high
indicates confidence range
Observed impacts attributed to climate change for
Physical systems
Glaciers, snow, ice, and/or permafrost
Rivers, lakes, floods, and/or drought
Coastal erosion and/or sea level effects
Biological systems
Terrestrial ecosystems
Wildfire
Marine ecosystems
Human and managed systems
Food production
Livelihoods, health, and/or economics
Regional-scale impacts
Outlined symbols = Minor contribution of climate change
Filled symbols = Major contribution of climate change

Effects on Nile delta: 10 M people above 1m

(Time 2001)


RB Chemnitz Hbf


ADAPTATION IS
ALREADY OCCURRING
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ADAPTATION IS
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CLIMATE CHANGE

REDUCING AND MANAGING RISKS

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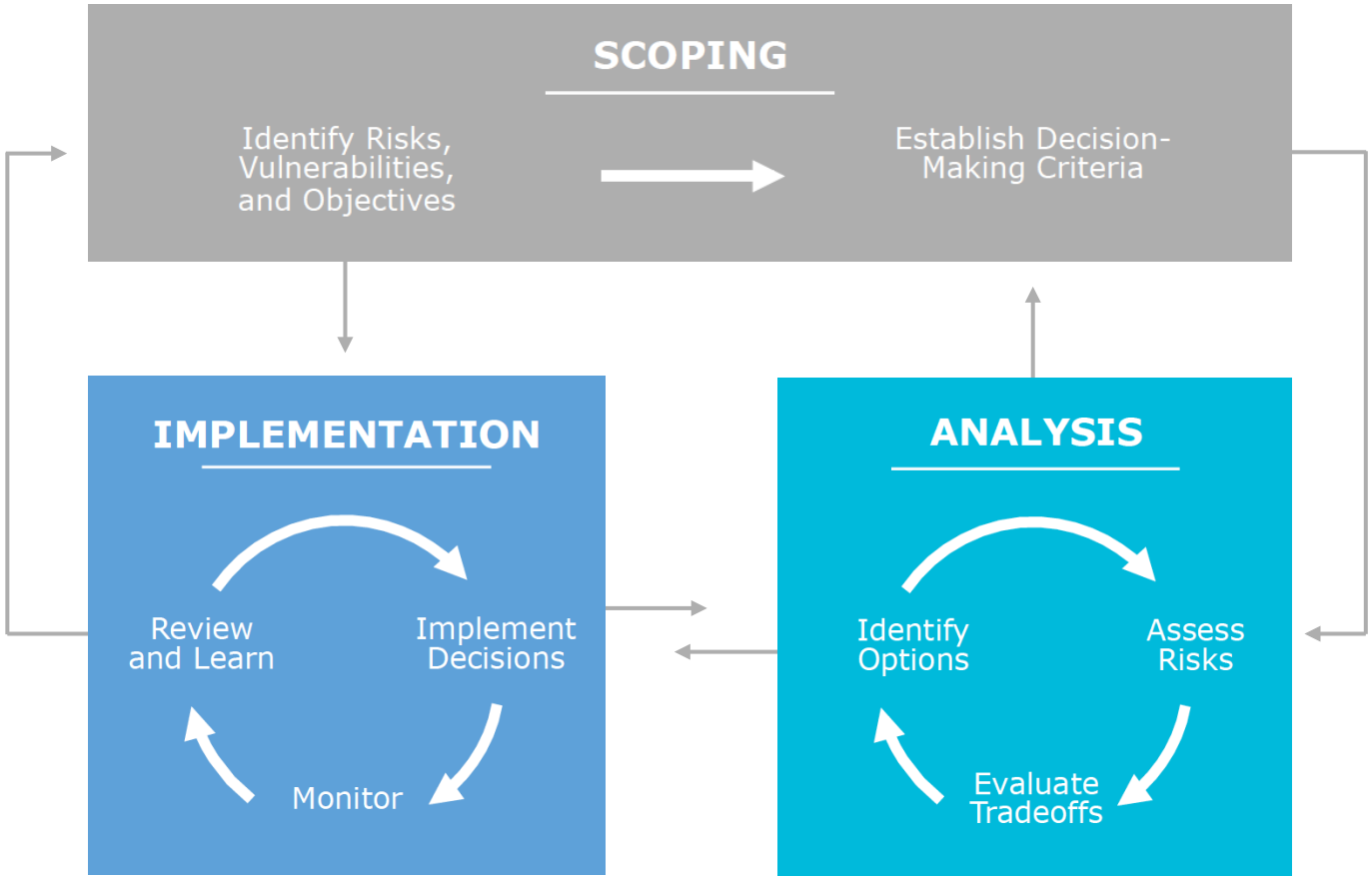
SCOPING
Identify Risks, Vulnerabilities, and Objectives
Establish Decision-Making Criteria
IMPLEMENTATION
Review and Learn
Implement Decisions
Monitor
ANALYSIS
Identify Options
Assess Risks
Evaluate Tradeoffs


INCREASING MAGNITUDES
OF WARMING INCREASE
THE LIKELIHOOD OF
SEVERE AND
PERVASIVE IMPACTS
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RISKS OF
CLIMATE CHANGE
INCREASE
WITH CONTINUED
HIGH EMISSIONS
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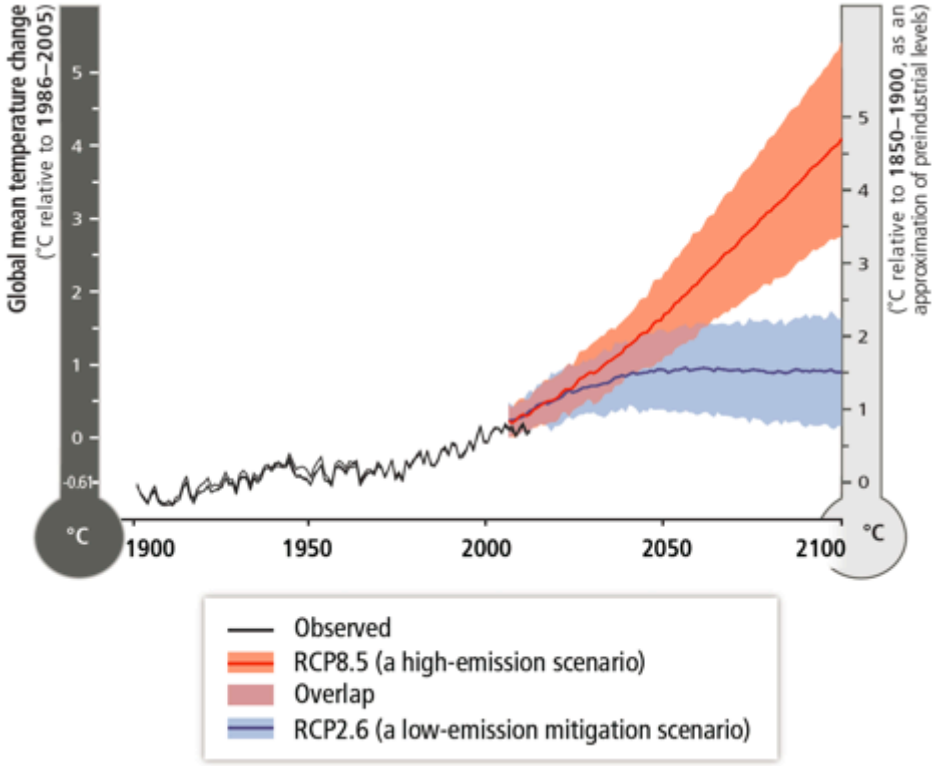

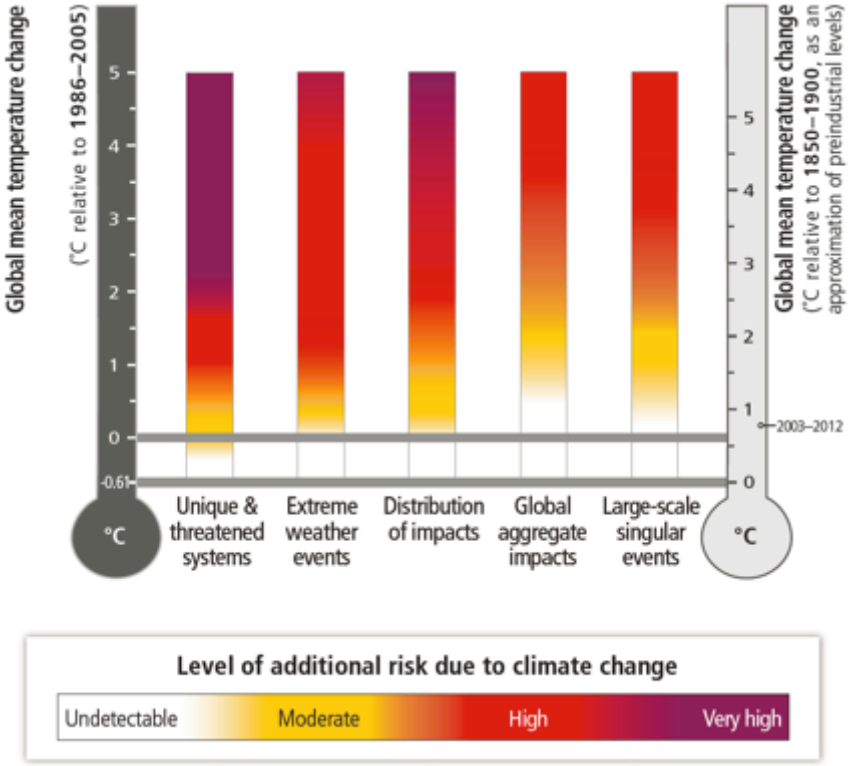

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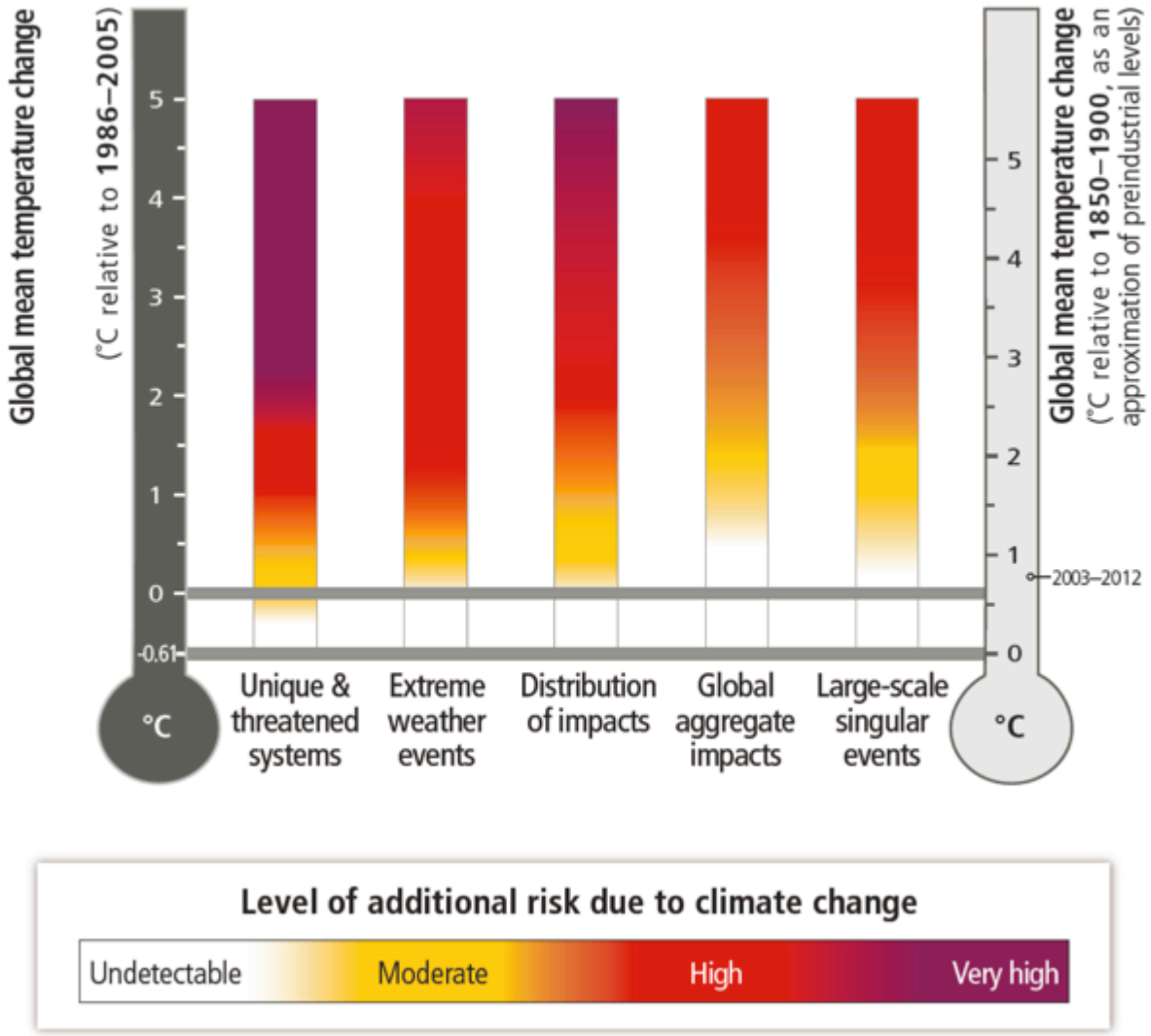
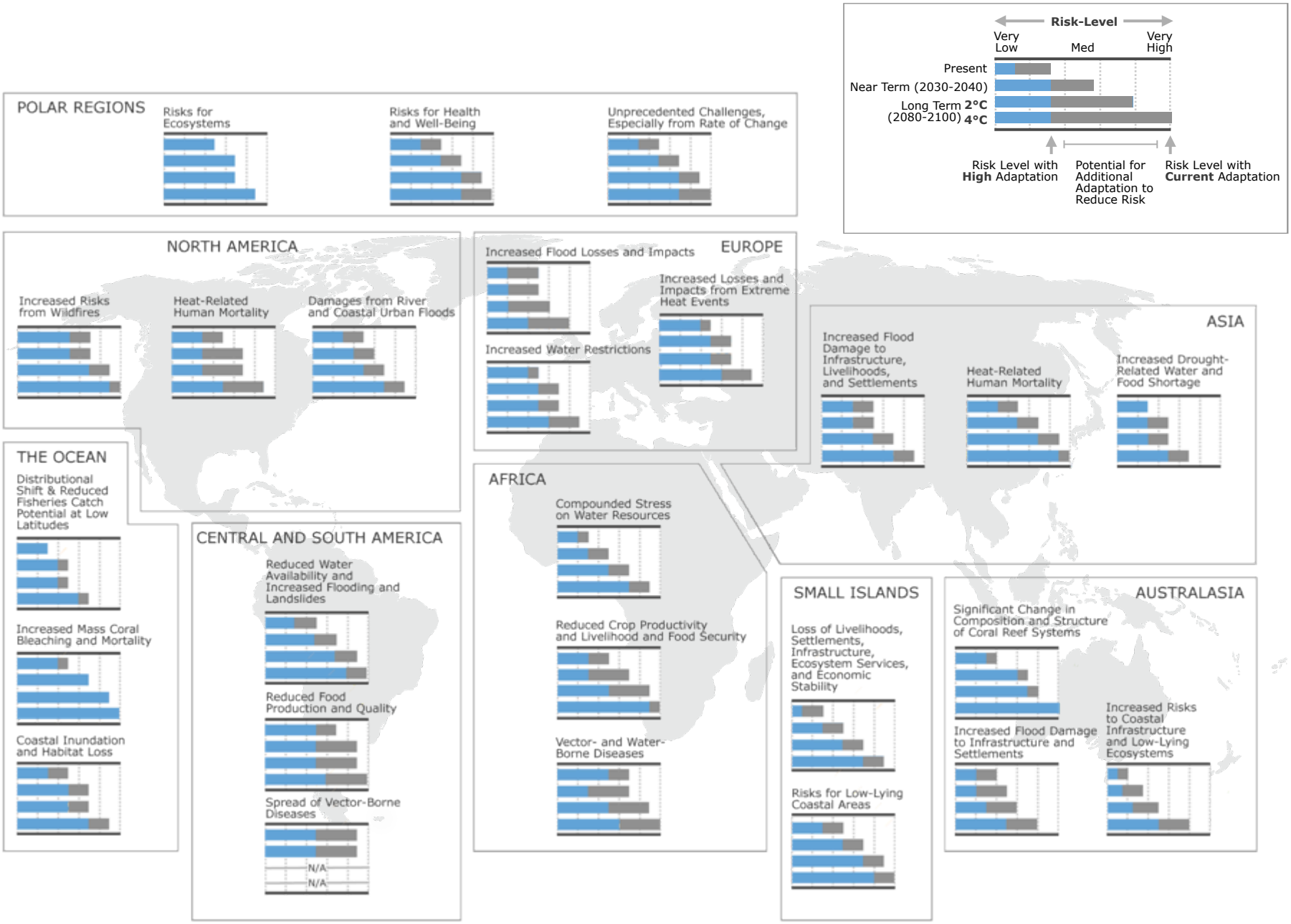
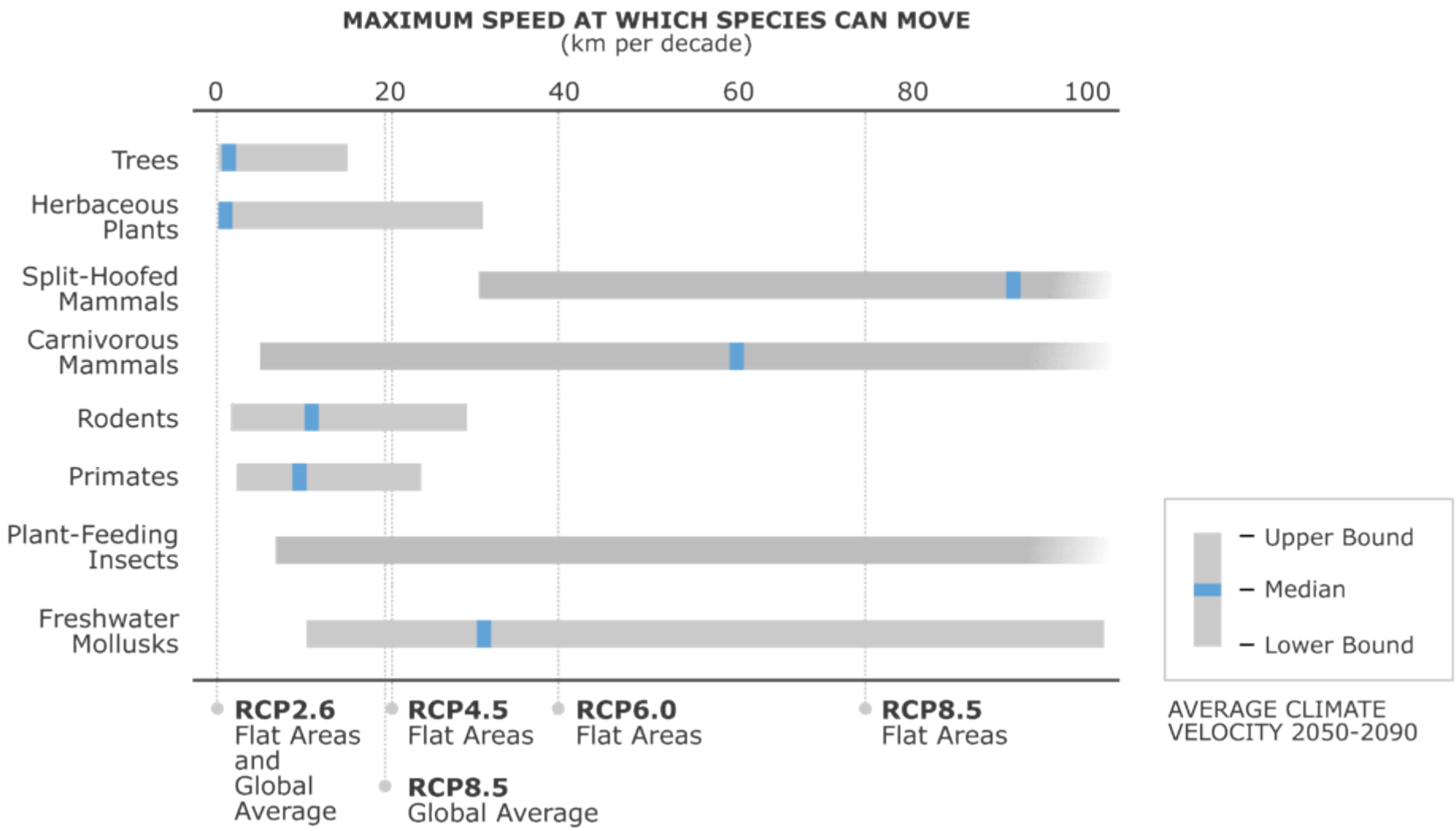


AR5, WGII, Box SPM.1 Figure 1


Risk-Level
Very Low
Med
Very High
Present
Near Term (2030-2040)
Long Term (2080-2100)
2°C
4°C
Risk Level with High Adaptation
Potential for Additional Adaptation to Reduce Risk
Risk Level with Current Adaptation
POLAR REGIONS
Risks for Ecosystems
Risks for Health and Well-Being
Unprecedented Challenges, Especially from Rate of Change
NORTH AMERICA
Increased Risks from Wildfires
Heat-Related Human Mortality
Damages from River and Coastal Urban Floods
EUROPE
Increased Flood Losses and Impacts
Increased Losses and Impacts from Extreme Heat Events
Increased Water Restrictions
ASIA
Increased Flood Damage to Infrastructure, Livelihoods, and Settlements
Heat-Related Human Mortality
Increased Drought-Related Water and Food Shortage
THE OCEAN
Distributional Shift & Reduced Fisheries Catch Potential at Low Latitudes
Increased Mass Coral Bleaching and Mortality
Coastal Inundation and Habitat Loss
CENTRAL AND SOUTH AMERICA
Reduced Water Availability and Increased Flooding and Landslides
Reduced Food Production and Quality
Spread of Vector-Borne Diseases
N/A
N/A
AFRICA
Compounded Stress on Water Resources
Reduced Crop Productivity and Livelihood and Food Security
Vector- and Water-Borne Diseases
SMALL ISLANDS
Loss of Livelihoods, Settlements, Infrastructure, Ecosystem Services, and Economic Stability
Risks for Low-Lying Coastal Areas
AUSTRALASIA
Significant Change in Composition and Structure of Coral Reef Systems
Increased Flood Damage to Infrastructure and Settlements
Increased Risks to Coastal Infrastructure and Low-Lying Ecosystems



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P. Rabhi: « La part du colibri L'espèce humaine face à son devenir »

Un jour, dit la légende, il y eut un immense incendie de forêt. Tous les animaux terrifiés et atterrés observaient, impuissants, le désastre.

Seul le petit colibri s'active, allant chercher quelques gouttes d'eau dans son bec pour les jeter sur le feu.

Au bout d'un moment, le tatou, agacé par ses agissements dérisoires, lui dit : « Tu n'es pas fou ? Tu crois que c'est avec ces gouttes d'eau que tu vas éteindre le feu ? »

« Je le sais, répond le colibri, mais je fais ma part. »

Telle est notre responsabilité à l'égard du monde car nous ne sommes pas totalement impuissants si nous le décidons

Pierre Rabhi (2009) "La part du colibri - L'espèce humaine face à son devenir", Editions de l'Aube, 49 p.

Useful links:

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