ETH zürich

Forschungs-Herausforderungen für den AR6
mit Fokus auf WG2 Themen und „Der Schweizer IPCC Weg“

Andreas Fischlin

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Ko-Fazilitator der Industrieländer «Structured Expert Dialog» und langjähriges Mitglied Schweizerische Delegation Klimaverhandlungen (UNFCCC), Mitglied OcCC und IPCC Vice-Chair WGII für IPCC AR6

ETH Zürich, D-USYS, IBP, Umweltphysik, Leiter Terrestrische Systemökologie

Zusammenfassung!

- **In Paris (COP21) ist ein historischer Durchbruch gelungen - Nutzen wir ihn!**
- **IPCC ist von entscheidender Bedeutung für die Klimapolitik**
- **Dazu muss aber Wissenschaft nicht nur robust, sondern direkt brauchbar gemacht werden! AR5 hatte Lücken die es zu korrigieren gilt.**
- **Herausforderungen sind zurzeit auch für WissenschaftlerInnen gewaltig, bitte nicht übersehen und nicht zum Alltag zurückkehren!**


Was geschah in Paris und im Vorfeld?

Historic Paris Agreement on Climate Change

195 Nations Set Path to Keep Temperature Rise Well Below 2 Degrees Celsius


Paris,
SECRETAIRE EXECUTIVE CCNUCC

Ich meinte

In Paris wurde Geschichte gemacht

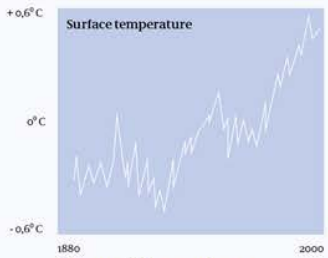

im Vorfeld von
Paris ...

Nature of the 2013-2015 review

What we know

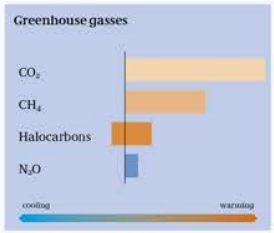
The UNFCCC calls on national governments to promote and cooperate in research and systematic observation of the global climate system – a key prerequisite for advancing scientific knowledge on climate change.

Observe



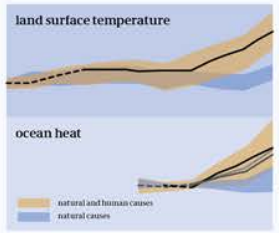
The world is warming
Global average temperature has been increasing since 1870 by 0.85°C.

Driver of changes



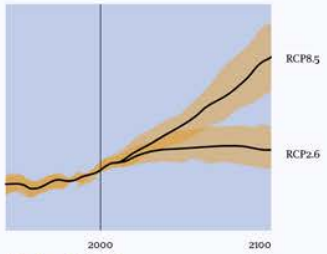
CO_2 remains the main driver
Natural and human-caused substances and processes that alter the Earth's energy budget are drivers of climate change.

Understand changes



Human influence is clear
It is clear that human influence has been the dominant cause of the observed warming since the mid-20th century.

Future changes



The heat is on!
Global average temperature change by the end of the 21st century is likely to rise 1.5°C above pre-industrial levels.

Policy response

In 2010 national governments agreed to set the upper limit of acceptable global warming at 2°C.

3. Assessing the adequacy and progress
A dialogue between governments and scientists is underway to assess current and future risks and impacts and progress in limiting global warming.

2. Gathering information
Reports from the IPCC, national governments, the UN system and regional agencies will be gathered and compiled to carry out technical assessments.

4. Choosing a goal
The review will determine whether the 2°C goal remains adequate enough to avoid dangerous climate change. The review will consider whether to strengthen the upper limit to 1.5°C.

1. Making decisions
National governments decided to:
a) Review the adequacy of the 2°C limit of global warming; and
b) Assess the progress in limiting global warming.

5. Taking action
National governments to take ambitious action to bend the emissions curve and put humankind on track to limit global warming and to adapt to climate change.

The Structured Expert Dialogue (SED)
Co-Facilitators: Zou Ji (China) and me

Structured Expert Dialogue (SED)

COP20, Lima, Peru

Experts at the Structured Expert Dialogue (SED)

Structured Expert Dialogue (SED)

COP20, Lima, Peru

COP20, Lima, Peru

Facts of the Structured Expert Dialogue (SED)

- Fact-finding, face-to-face exchanges of views between Parties and experts

Fourth meeting of the Structured Expert Dialogue (SED) discussing IPCC SYR AR5 during COP20, Lima, Peru, 2nd Dec. 2014 © 2014, IISD

- 2013-2015: 4 meetings, 5 locations, 34.5 hours, 11 days, 60 presentations, 73 experts, many delegates, many observers

SED served as a new science-policy interface

Fourth meeting of the Structured Expert Dialogue (SED) discussing IPCC SYR AR5 during COP20, Lima, Peru, 2nd Dec. 2014 © 2014, IISD

Perfecting unidirectional communication

The Conversation - Shutterstock/rangizzz

Bidirectional communication (i.e. Dialogue), despite imperfections, empowers policy makers

Outcome e.g. SED Final report* including technical summary

1. A long-term global goal defined by a temperature limit serves its purpose well
2. Imperatives of achieving the long-term global goal are explicitly articulated and at our disposal, and demonstrate the cumulative nature of the challenge and the need to act soon and decisively
3. Assessing the adequacy of the long-term global goal implies risk assessments and value judgments not only at the global level, but also at the regional and local levels
4. Climate change impacts are hitting home
5. The 2 °C limit should be seen as a defence line
6. Limiting global warming to below 2 °C is still feasible and will bring about many co-benefits, but poses substantial technological, economic and institutional challenges
7. We know how to measure progress on mitigation but challenges still exist in measuring progress on adaptation
8. The world is not on track to achieve the long-term global goal, but successful mitigation policies are known and must be scaled up urgently
9. We learned from various processes, in particular those under the Convention, about efforts to scale up provision of finance, technology and capacity-building for climate action
10. While science on the 1.5 °C warming limit is less robust, efforts should be made to push the defence line as low as possible

* FCCC/SB/2015/INF.1 available at http://unfccc.int/6911.php?priref=600008454

Historic Paris Agreement on Climate Change

195 Nations Set Path to Keep Temperature Rise Well Below 2 Degrees Celsius

- Alle 196 Vertragsparteien sind dabei (AI vs. NAI überholt)
- Die langfristige Erwärmungsgrenze wurde verschärft (weit unterhalb 2 °C mit Bemühung auf 1.5 °C gegenüber vorindustriell zu begrenzen)
- Rasche Absenkung der Emissionen (ASAP)
- Regelmässige Erarbeitung nationaler Aktivitäten (188 Länder haben im Vorfeld INDCs eingereicht)
- Transparenz dank Berichterstattung und Überprüfung der erzielten Fortschritte
- Marktmechanismen inkl. Emissionshandel
- Kooperation und Solidarität um Schäden und Verluste jenseits Anpassungsfähigkeit zu minimieren
- Minimum 100 Milliarden $/a Finanztransfer vom Norden in den Süden (Ausweitung des Geberländerkreises, freiwillig)
- Wälder sind zu schützen und verstärkt als Senken zu nutzen (REDD+)

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Ich meinte

IPCC hat hierzu einen entschei-denden Beitrag geleistet

Ich meinte

Doch 1.5 °C vs. 2 °C als LTGG ist noch nicht vom Tisch!

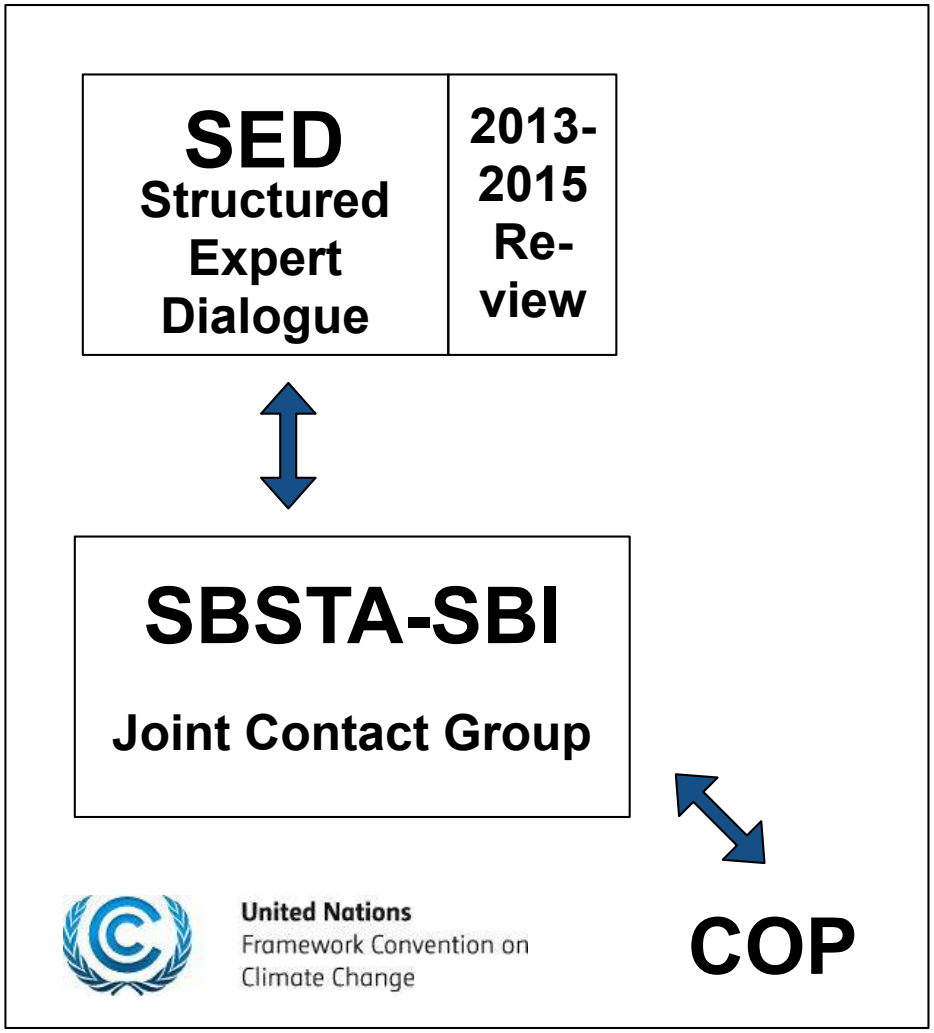
IPCC Aufgaben im AR6 Zyklus

NTERGOVERNMENTAL PANEL ON C imate change

- Aufbau der TSU (neu bei allen Co-chairs)
- Special Report (SR) 1.5 °C (Impacts Pathways) (2018)
- SR on climate change and oceans and cryosphere (2019)
- SR on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems (2019)
- AR6: WGI, WGII, WGIII, SYR (2021/22)
- RCP 2.0 fördern (complete?)
- Stärkung des Sekretariats
- Professionalisierung der IPCC Arbeiten
- “Open access”, volle Transparenz

Sie


ipcc
IPCC

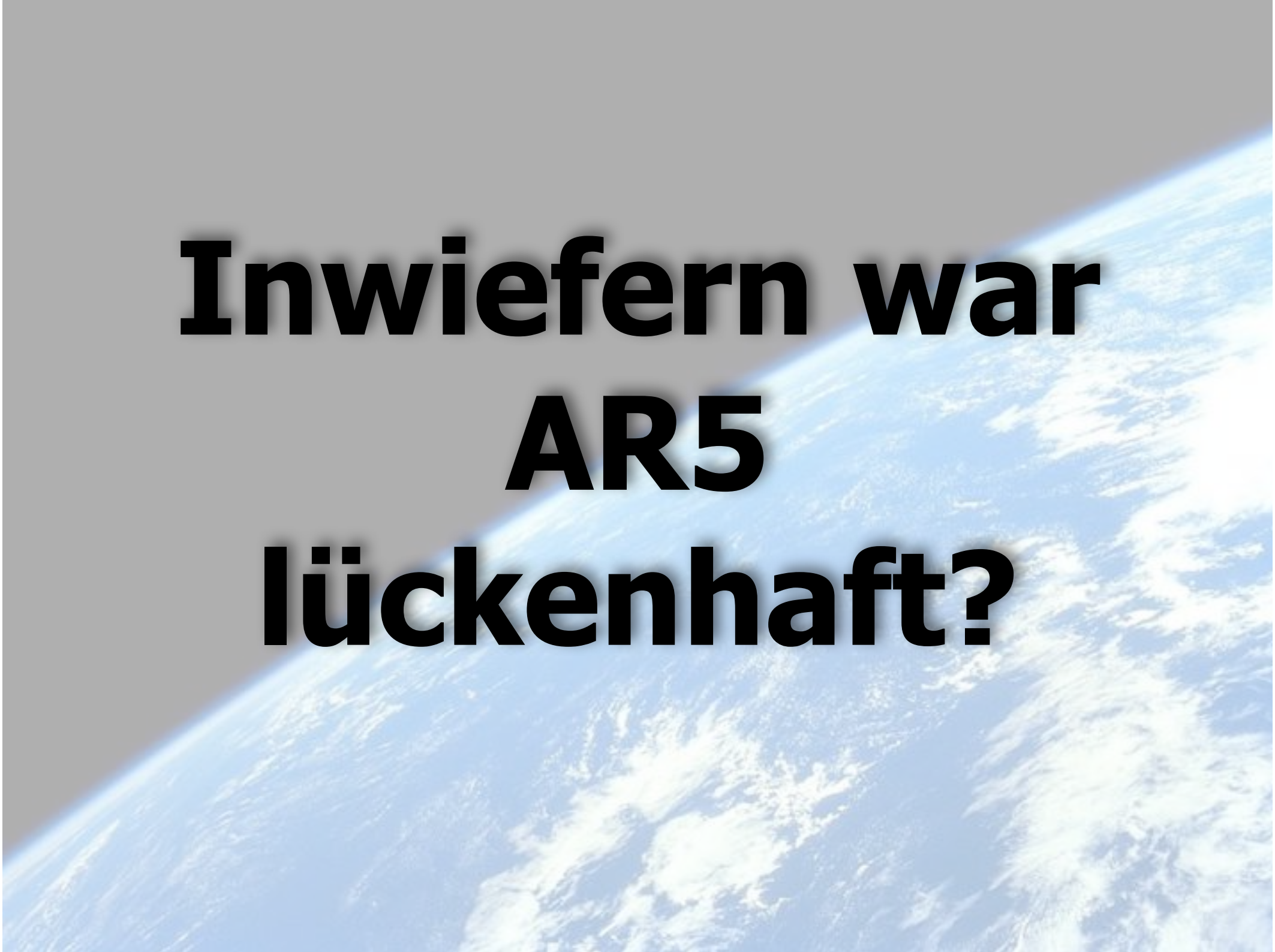

SED
Structured
Expert
Dialogue
2013-
2015
Re-
view
SBSTA-SBI
Joint Contact Group
United Nations
Framework Convention on
Climate Change
COP

Sie ⟷ IPCC ⟷ SED ⟷ SBSTA-SBI ⟷ COP

- Die Wissenschaft hat phantastische Arbeiten gemacht
- die Eingang in den AR5 gefunden haben
- und damit der politischen Entscheidung zur Verfügung gestanden haben
- Leider waren sie aber nicht alle gleich gut brauchbar

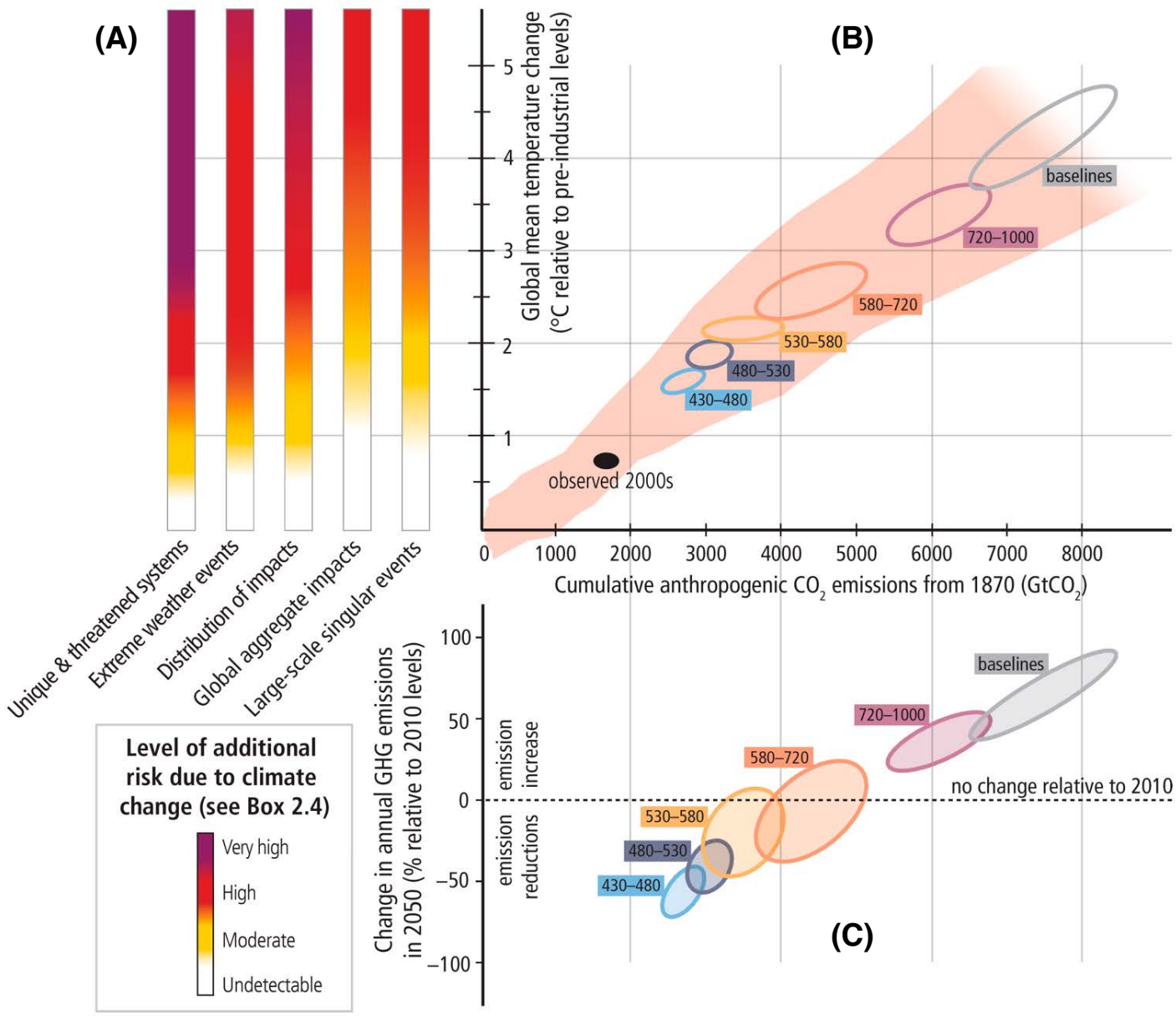
Warum?

- WissenschaftlerInnen haben vieles nicht beachtet, z.B. COP15 2009
- Es gab Lücken im AR5
- Die gilt es für den AR6 zu stopfen!
- Es gilt also im Moment vermehrt der Politik zuzuhören …


Inwiefern war
AR5
lückenhaft?


Das Schutzziel
von 2 °C

Die Zukunft in Ihren Händen



After IPCC, 2014. Synthesis Report, Figure SPM.10

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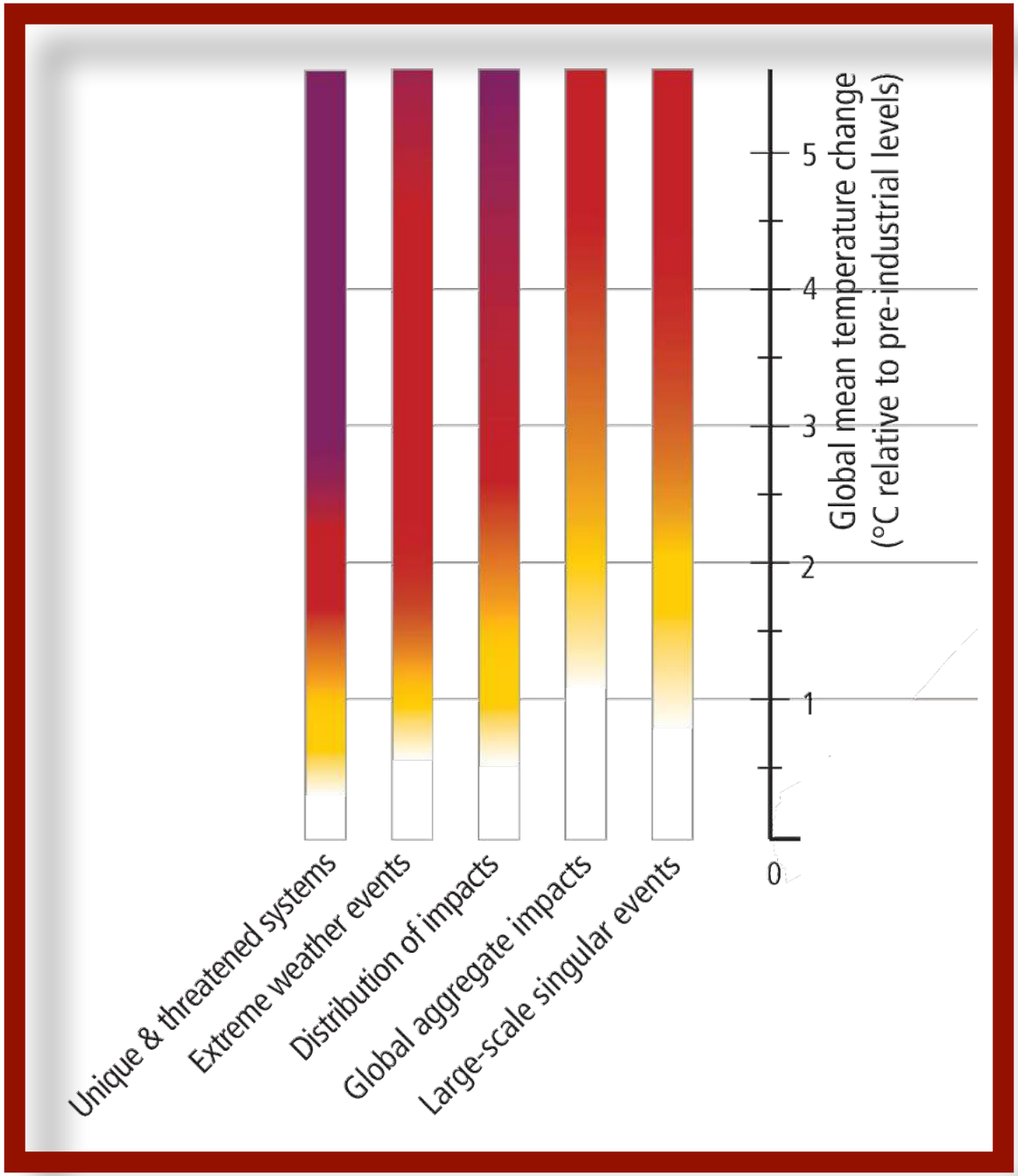
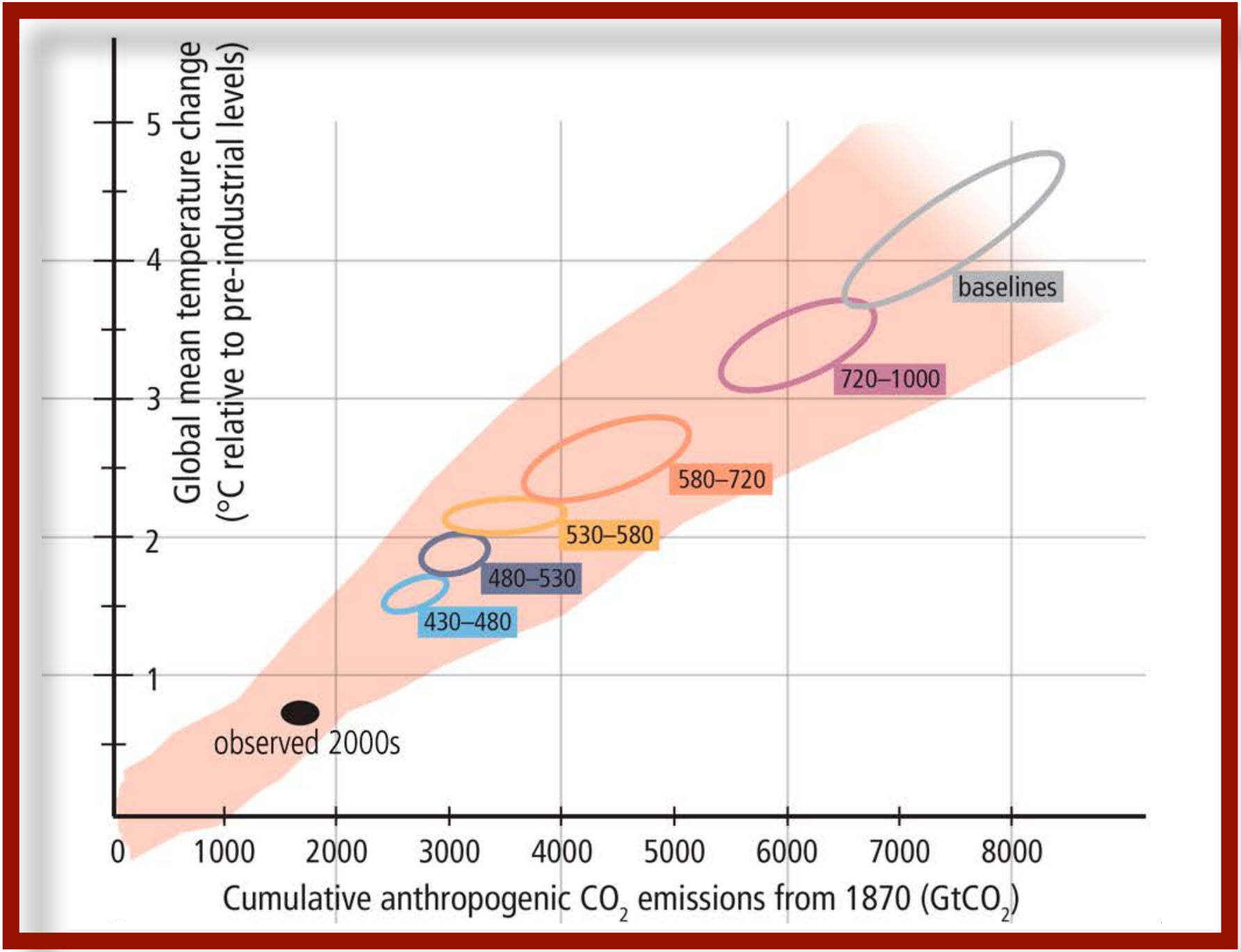
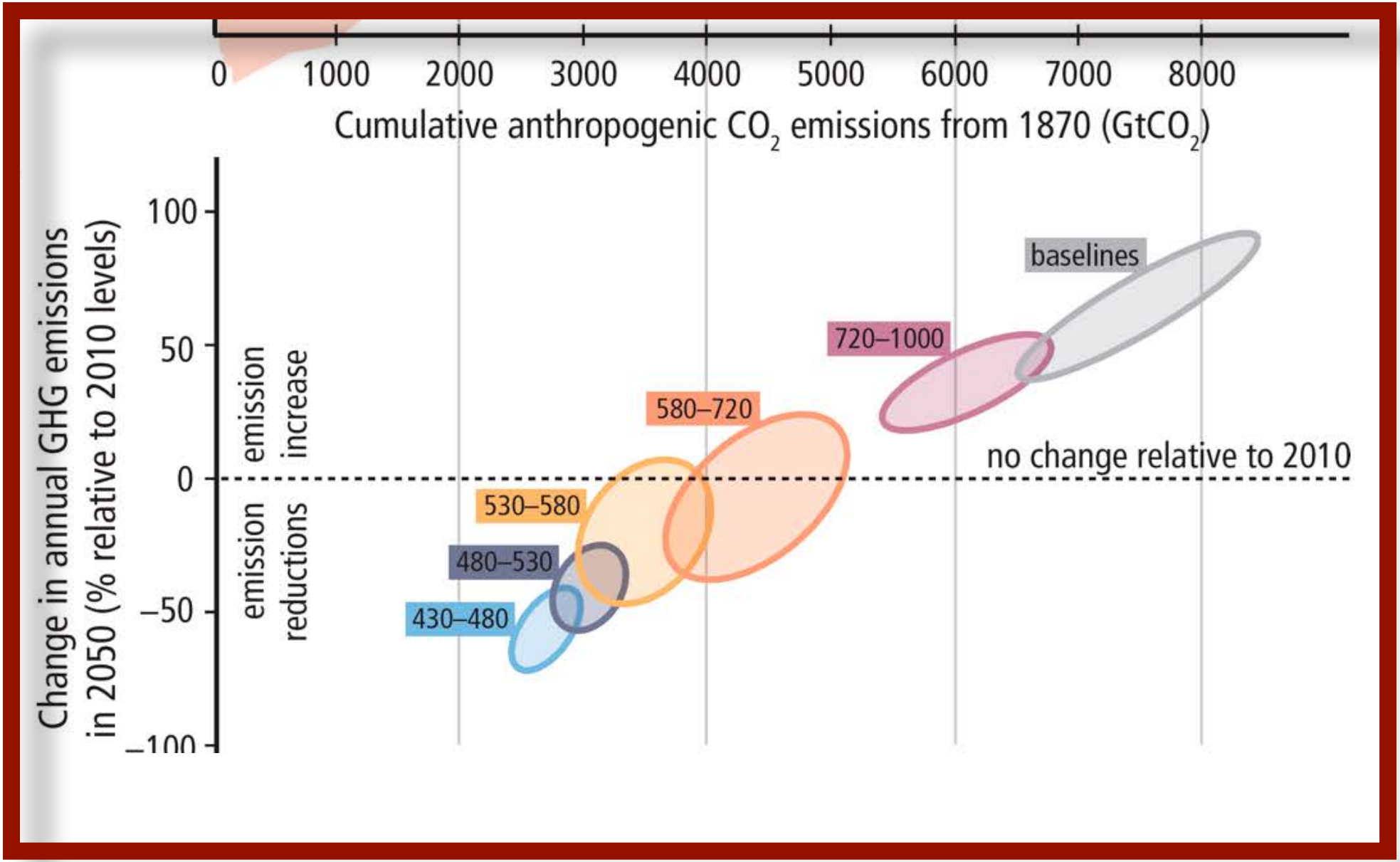
Die Zukunft in Ihren Händen



Die Zukunft in Ihren Händen

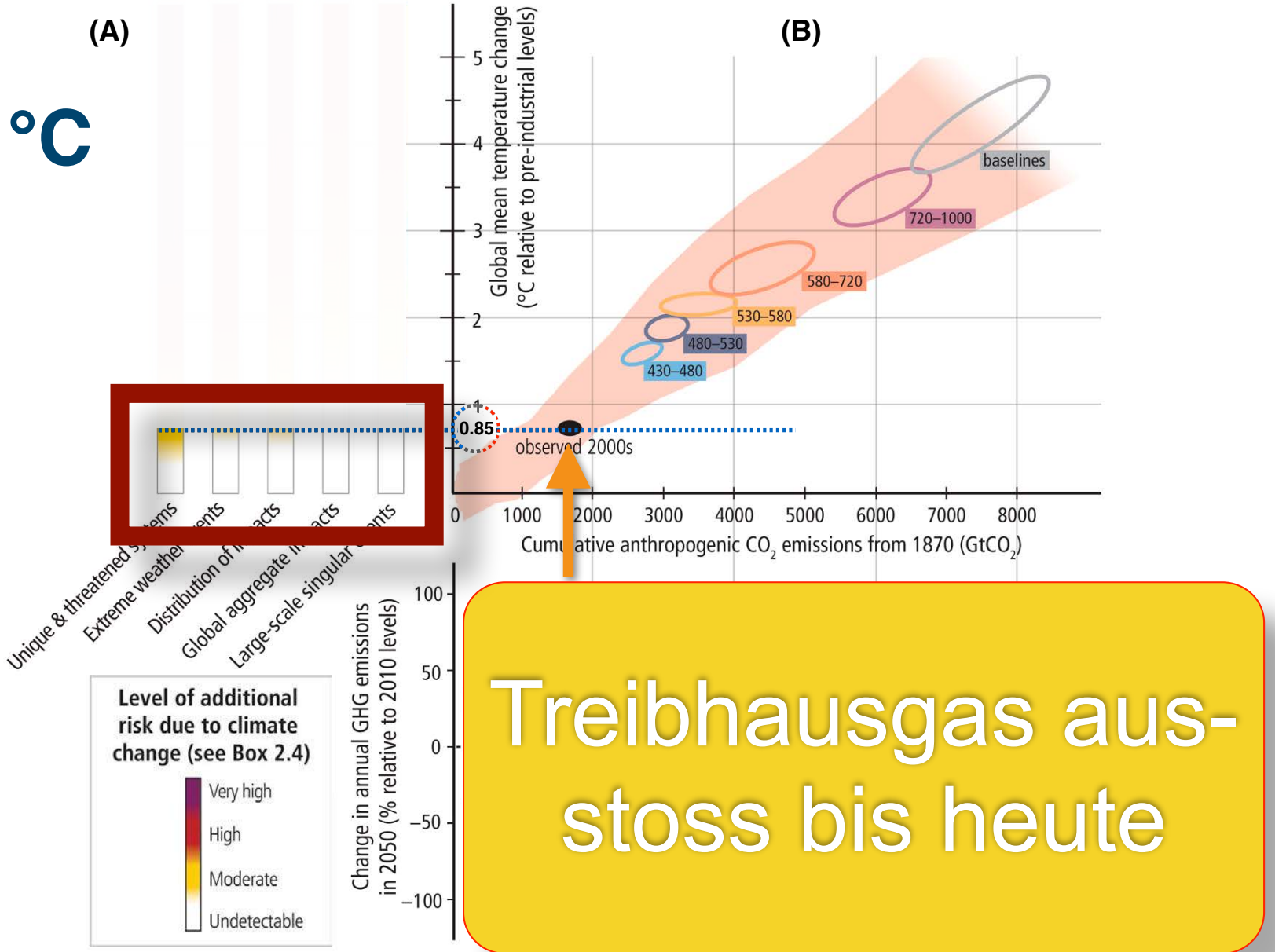


Die Zukunft in Ihren Händen



Jetziger Klimawandel bedeutungsvoll?

+0.85 °C



Treibhausgas aus-stoss bis heute

After IPCC, 2014. Synthesis Report, Figure SPM.10

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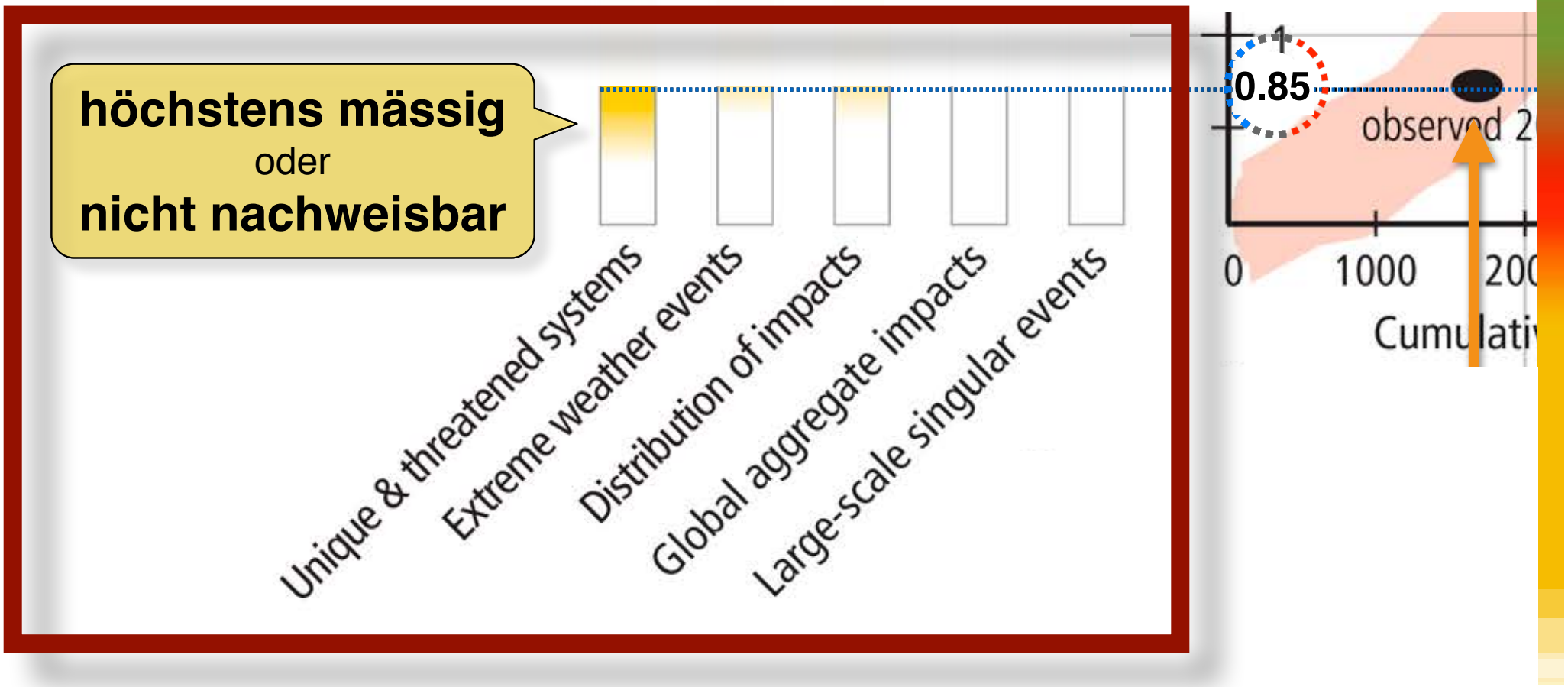


Eis

Wasser

Ökosysteme

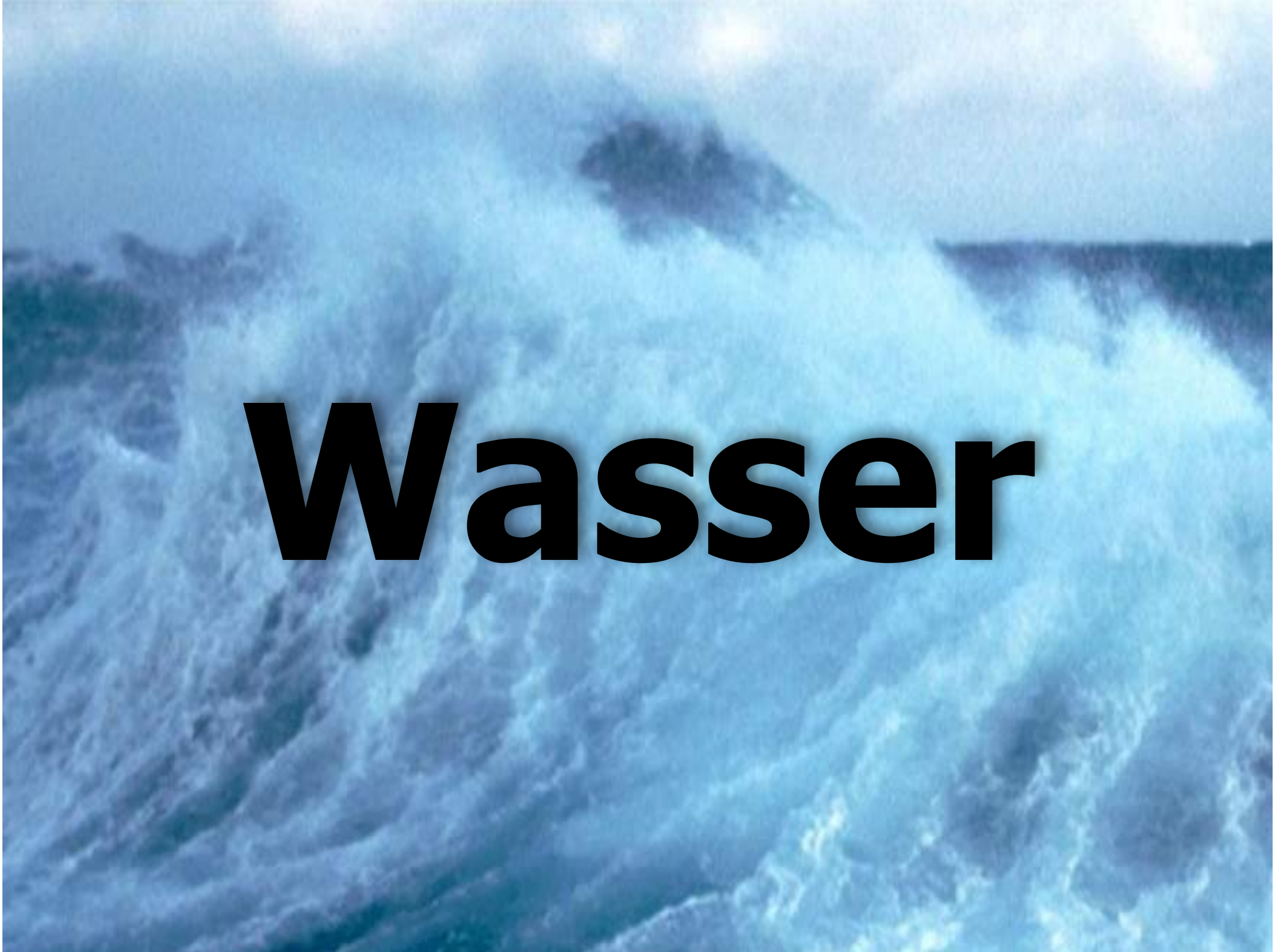
Nahrung

Infrastruktur

Gesundheit


Eis

Findelgletscher 2013

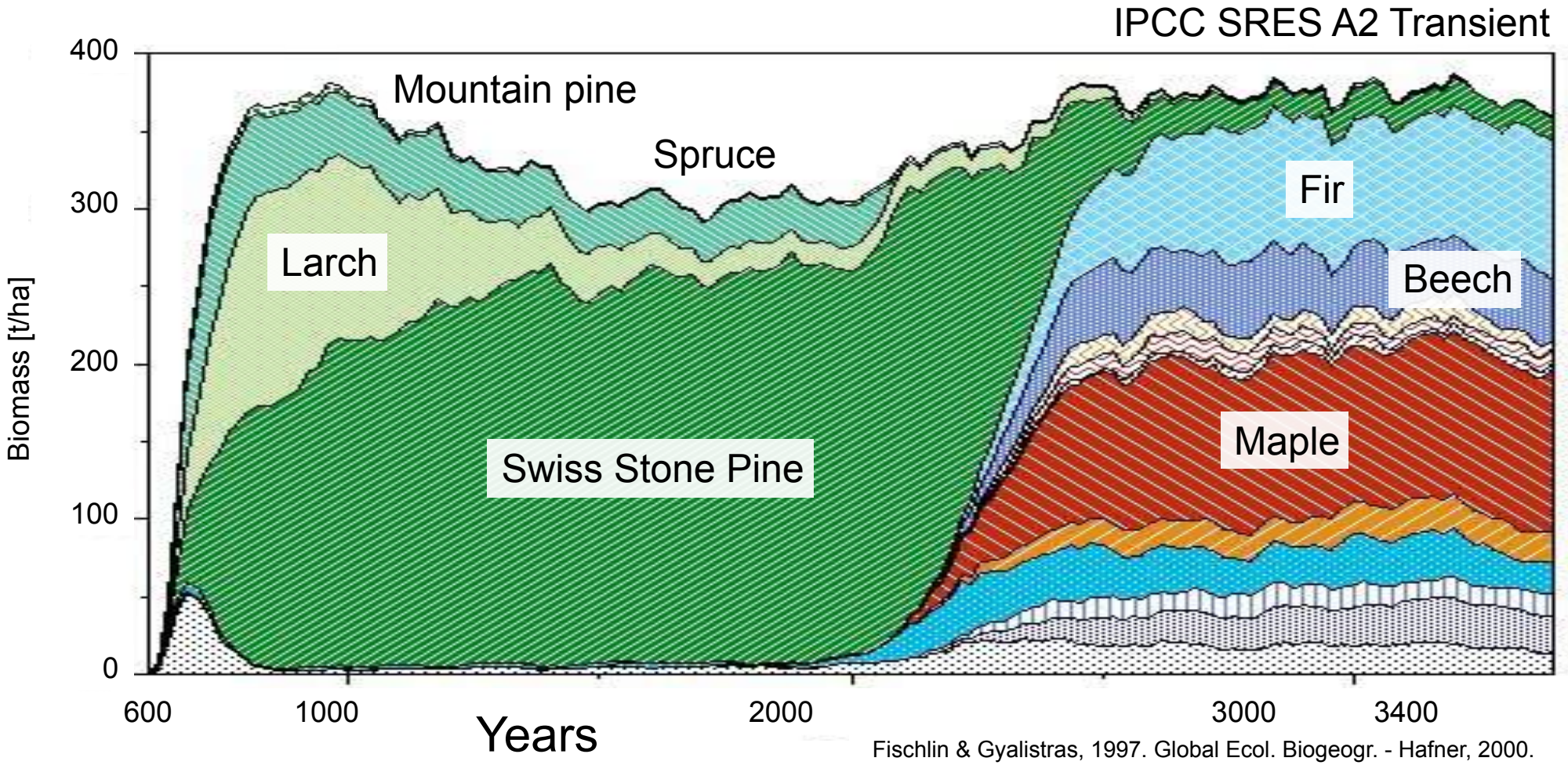

Wasser

Töss 2003

Öko-systeme

Entire ecosystems change

Ex.: Larch-Swiss stone pine forests in the Engadine



Fischlin & Gyalistras, 1997. Global Ecol. Biogeogr. - Hafner, 2000.

Departement Umweltsystemwissenschaften, Terrestrische Systemökologie, IBP
Prof. em. Dr. Andreas Fischlin, IPCC Vice-Chair WGII


Sihlsee 11.Mai.2011

Waldbrände werden auch bei uns häufiger
Z.B. im Mittelmeerraum ein besonderes Problem

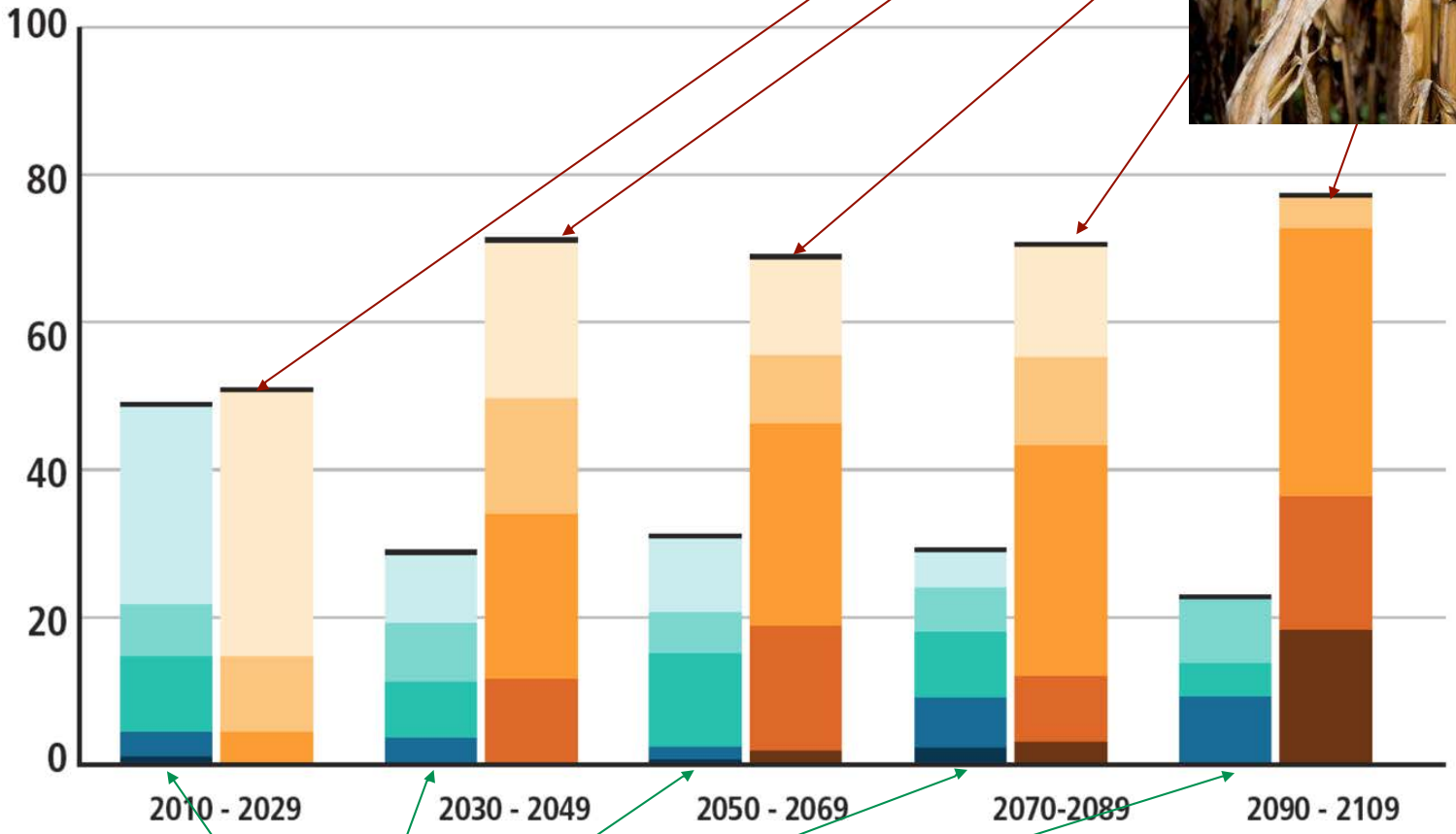
Forest pests - **Mountain Pine Beetle**

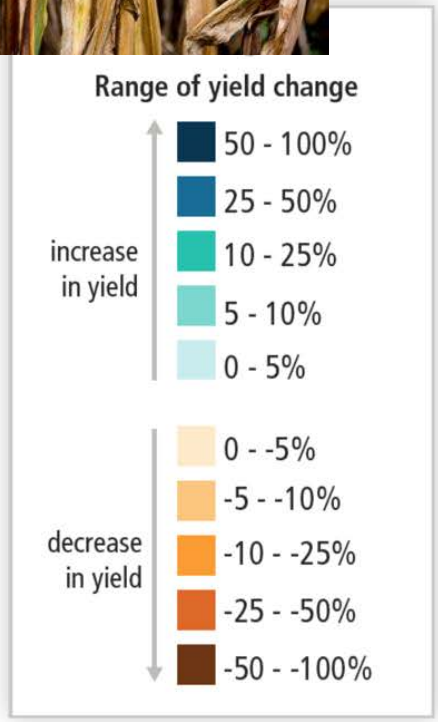
(***Dendroctonus ponderosae, Col., Scolytidae***)

Fischlin *et al*., 2007.
IPCC WGII, Section 4.4.5


Nahrung

Ernährungssicherheit





CH Landwirtschaft hat auch schon profitiert vom Klimawandel
z.B. Zuckerrüben 2011: +20%

IPCC, 2014, AR5 WGII, Figure SPM.7

Departement Umweltsystemwissenschaften, Terrestrische Systemökologie, IBP
Prof. em. Dr. Andreas Fischlin, IPCC Vice-Chair WGII


Infra-
struktur

Auswirkungen in der Gegenwart:

Insbesondere im empfindlichen Gebirgsland Schweiz (Bsp. Grindelwald)

Die Schweiz ist aufgrund ihres hohen Gebirgsanteils teilweise besonders empfindlich und ist von einem ungebremsten Klimawandel direkt und indirekt stark betroffen

Auswirkungen in der Gegenwart:

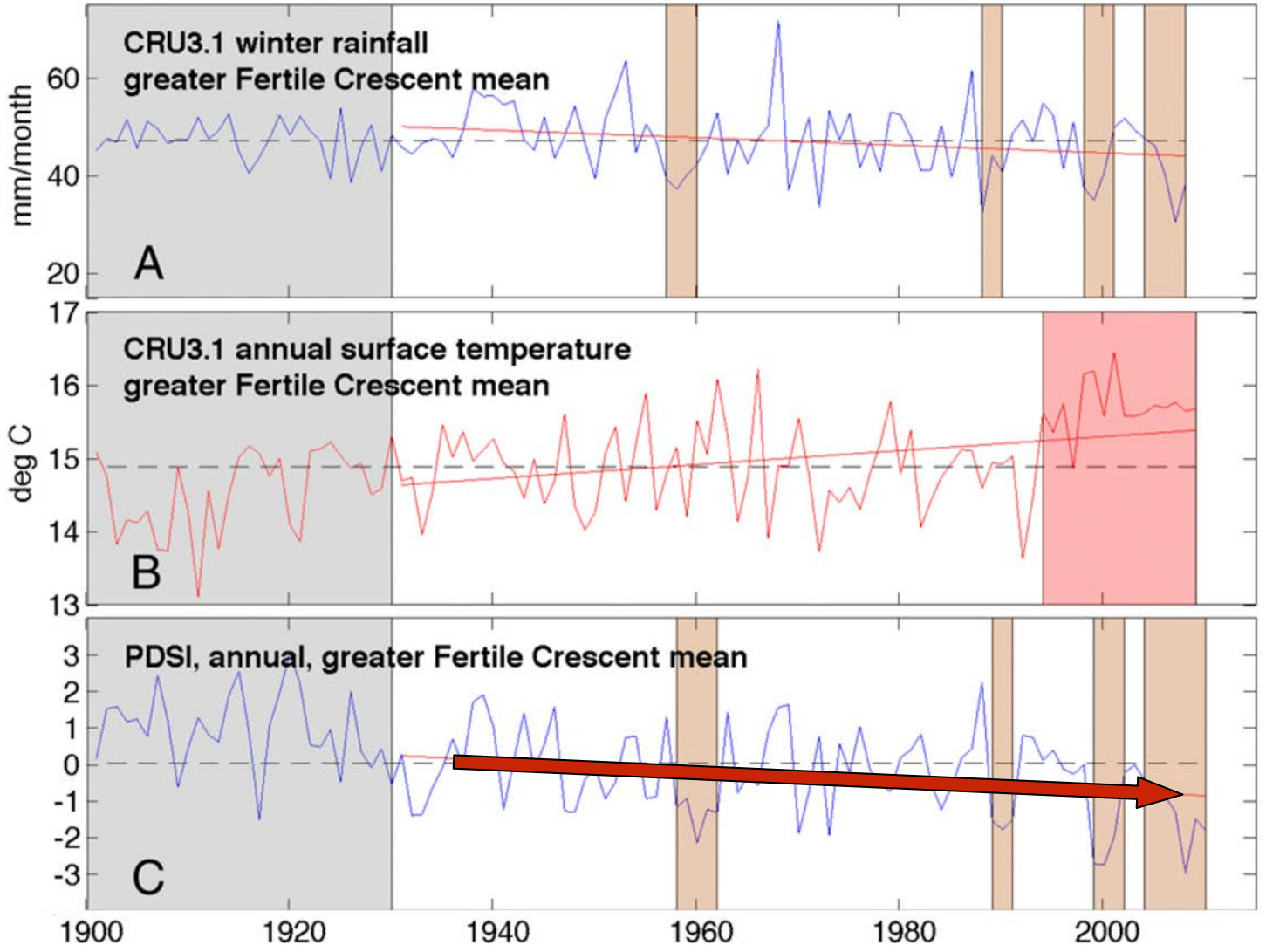
Insbesondere im empfindlichen Gebirgsland Schweiz (Bsp. Grindelwald)

Die Schweiz ist aufgrund ihres hohen Gebirgsanteils teilweise besonders empfindlich und ist von einem ungebremsten Klimawandel direkt und indirekt stark betroffen


Gesund-
heit


Flüchtlingsboot, 32 km vor libyscher Küste, 3. Aug. 2015
Flüchtlinge

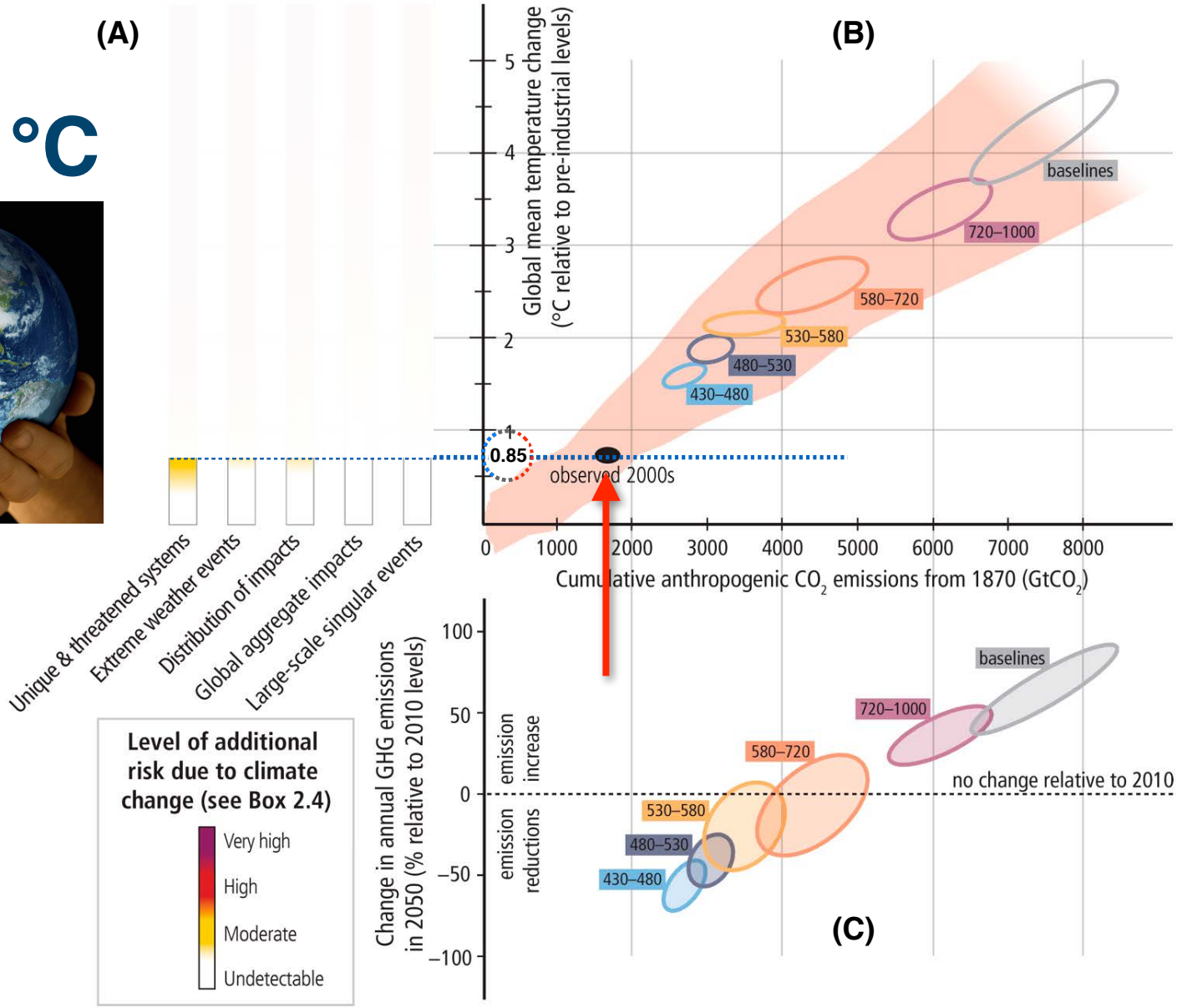
Klimaflüchtlinge: Serie von Dürren in Syrien



Kelley et al., 2015. PNAS, 112(11): 3241-3246. doi: 10.1073/pnas.1421533112

Die Gegenwart

+0.85 °C



After IPCC, 2014. Synthesis Report, Figure SPM.10

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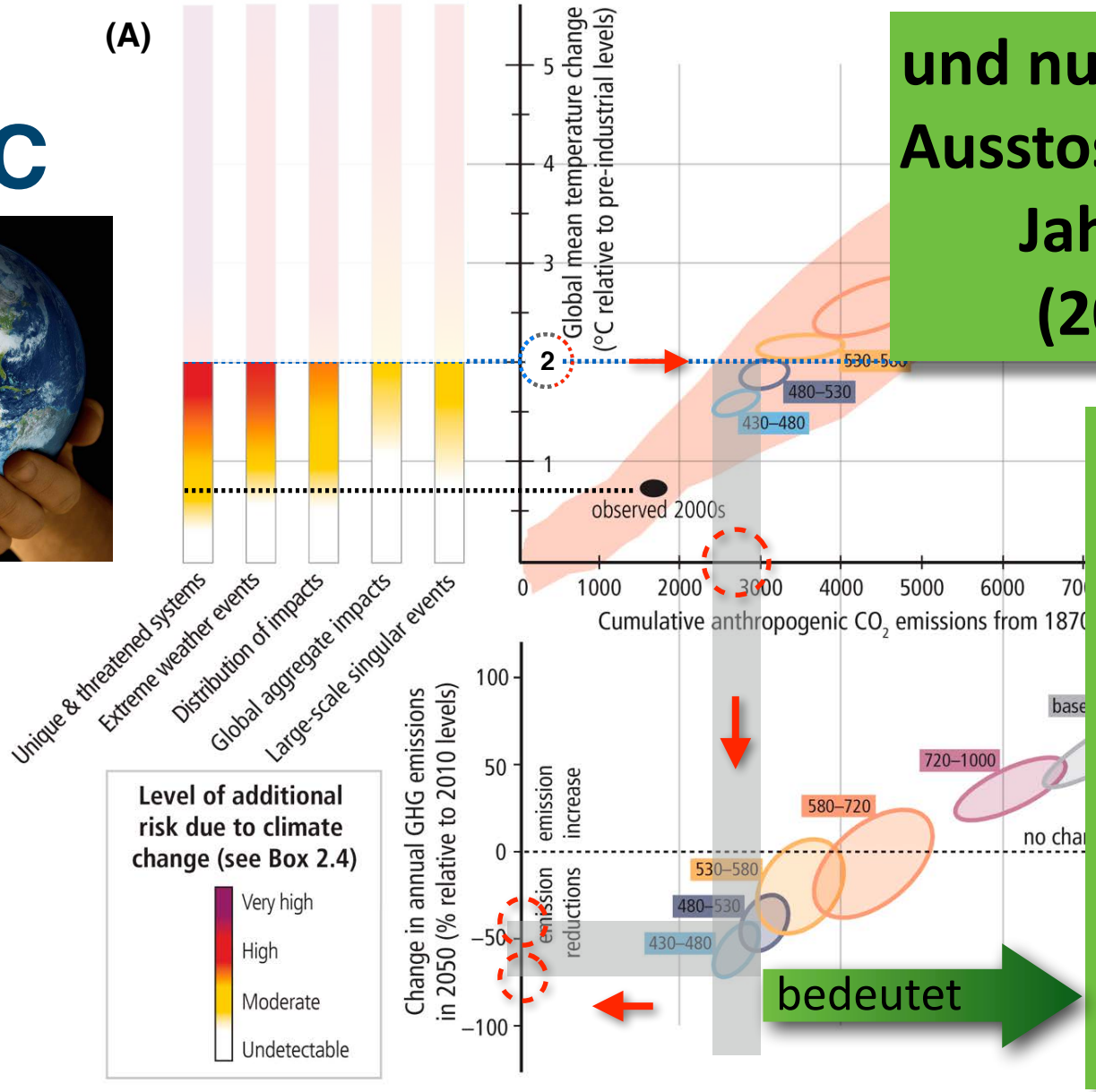
Schutzziel von Paris: < 2 °C

+2 °C



After IPCC, 2014. Synthesis Report, Figure SPM.10

und null übriger THG-Ausstoss bis Ende des Jahrhunderts (2080-2100)

Um 2050 Global THG: -40% bis -70% CH: -80 bis -95%

bedeutet

2055-2070 CO2: -100 %

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Wieviel Emissionen bleiben uns noch?

2 °C

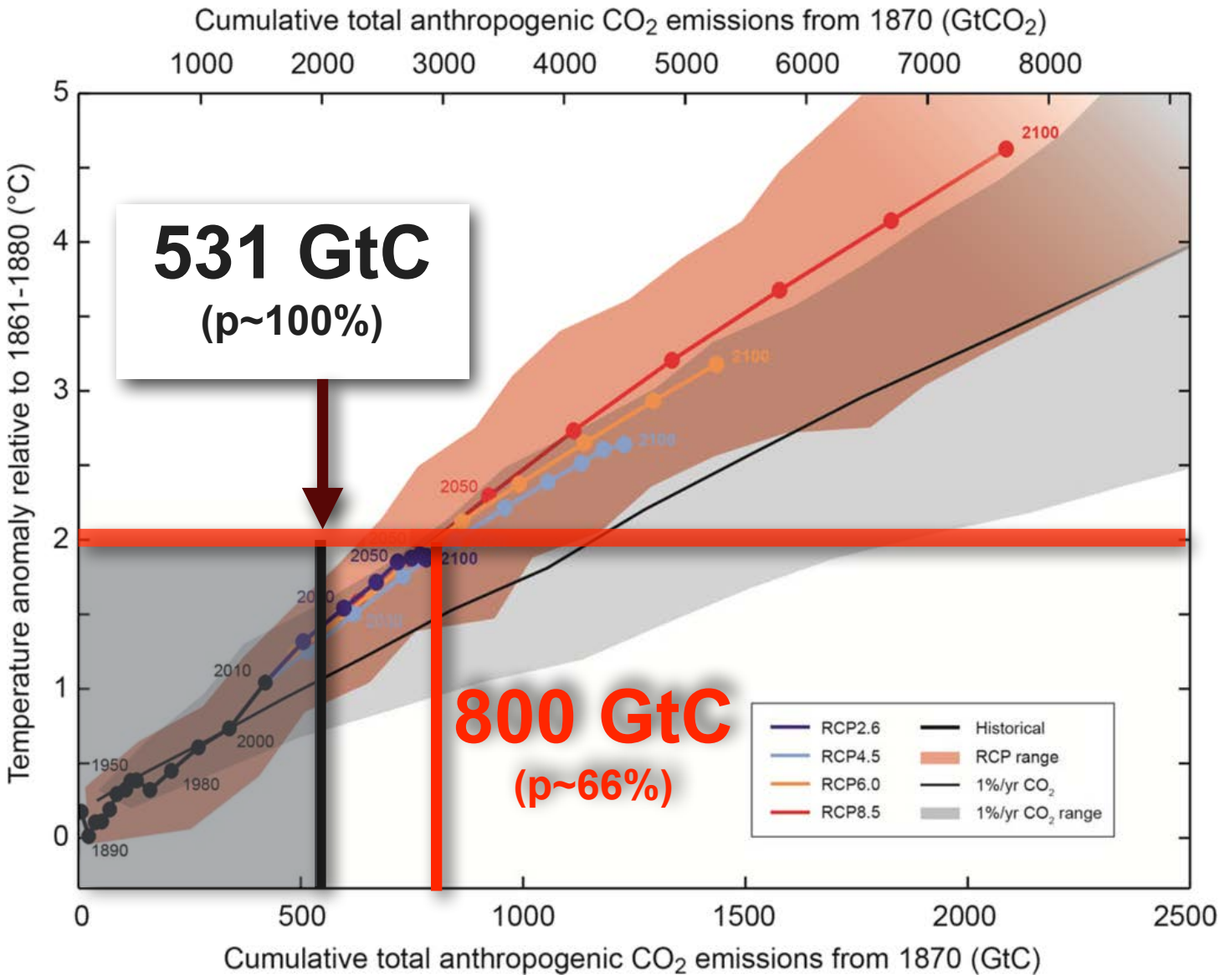

Figure SPM.10: Global mean surface temperature increase vs. cumulative total global CO2 emissions from various lines of evidence (IPCC, 2013. SPM WGI)

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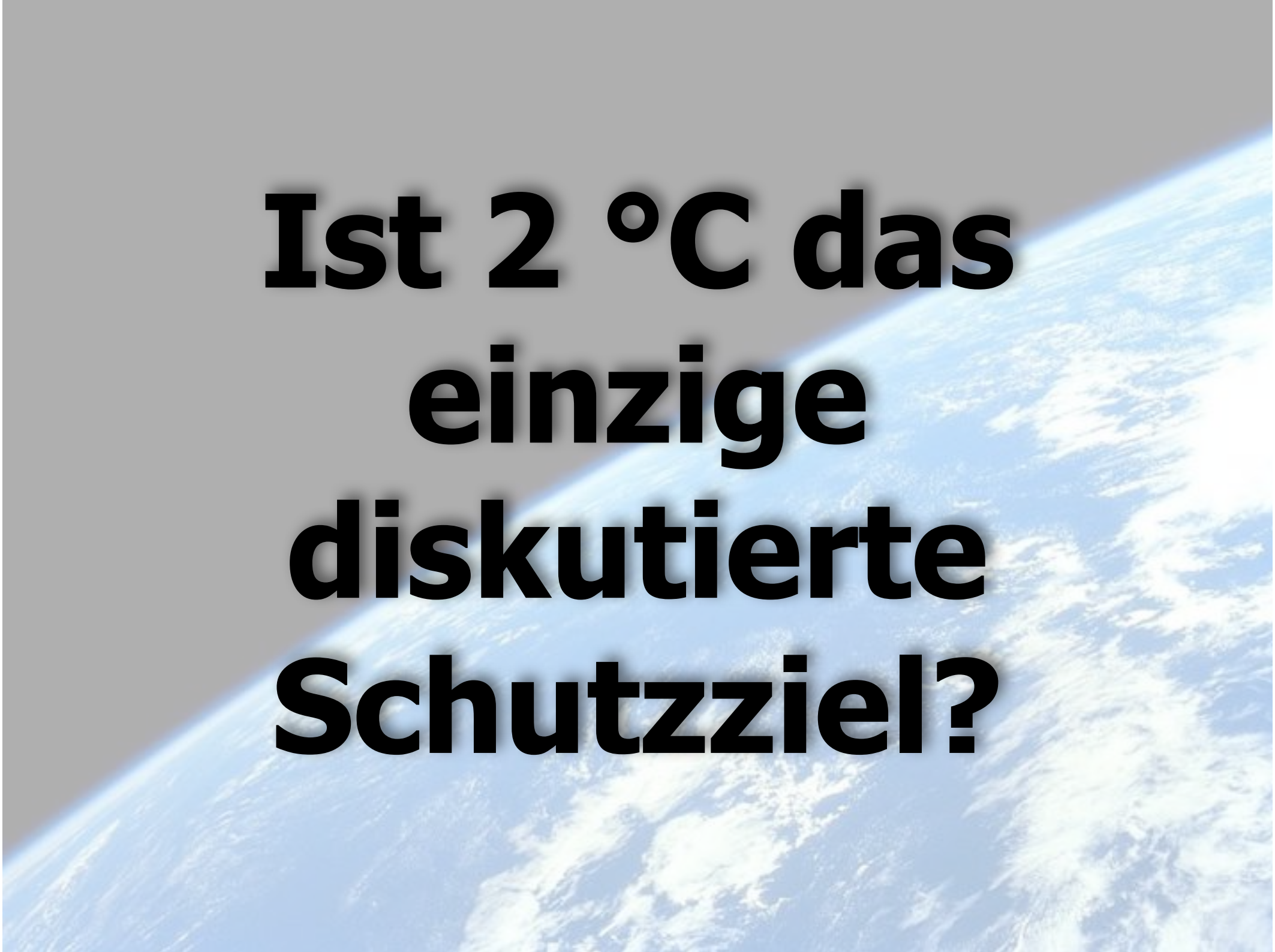
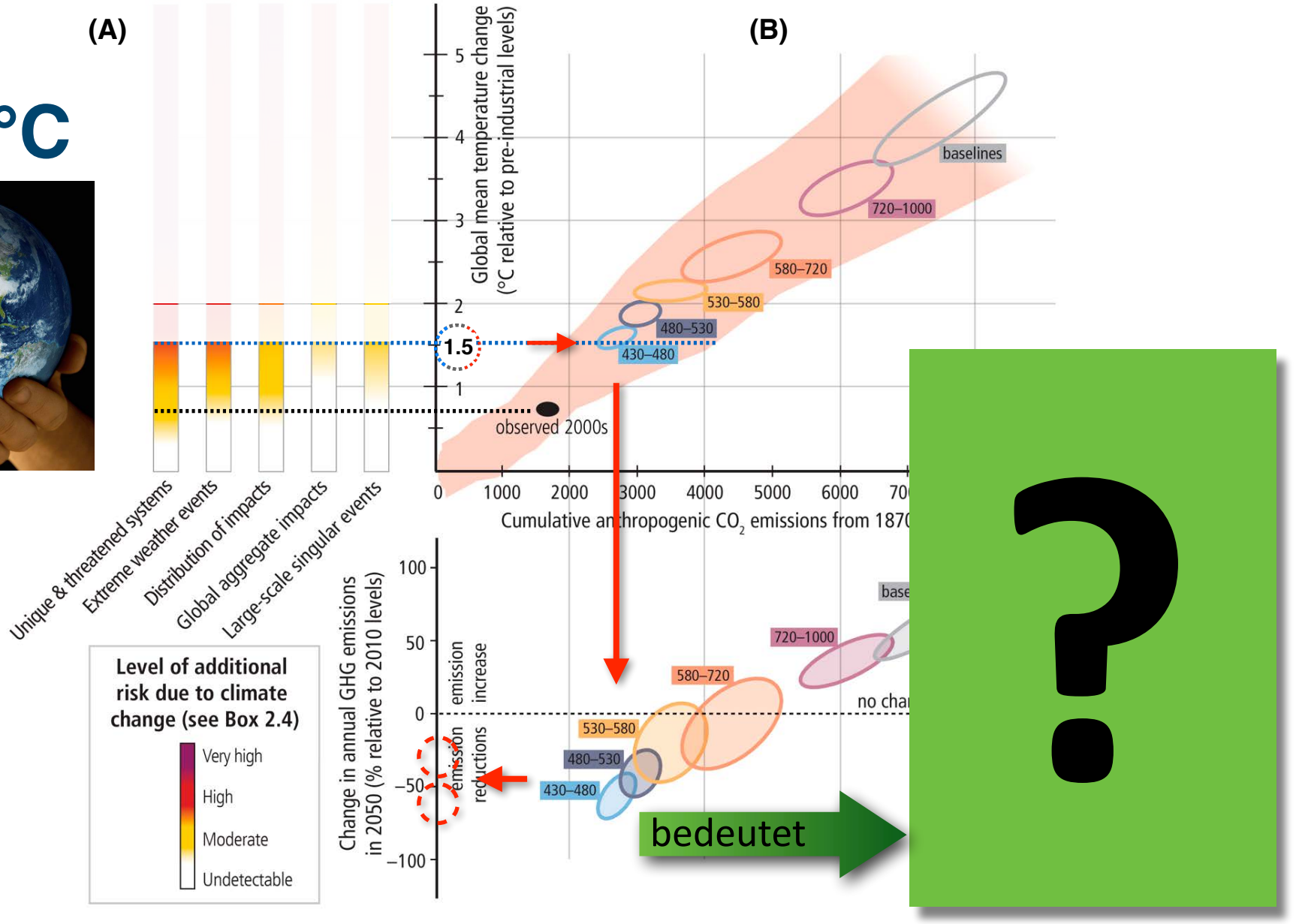

Ist 2 °C das
einzige
diskutierte
Schutzziel?

Verschärfung des Schutzziels auf 1.5 °C

+1.5 °C



After IPCC, 2014. Synthesis Report, Figure SPM.10

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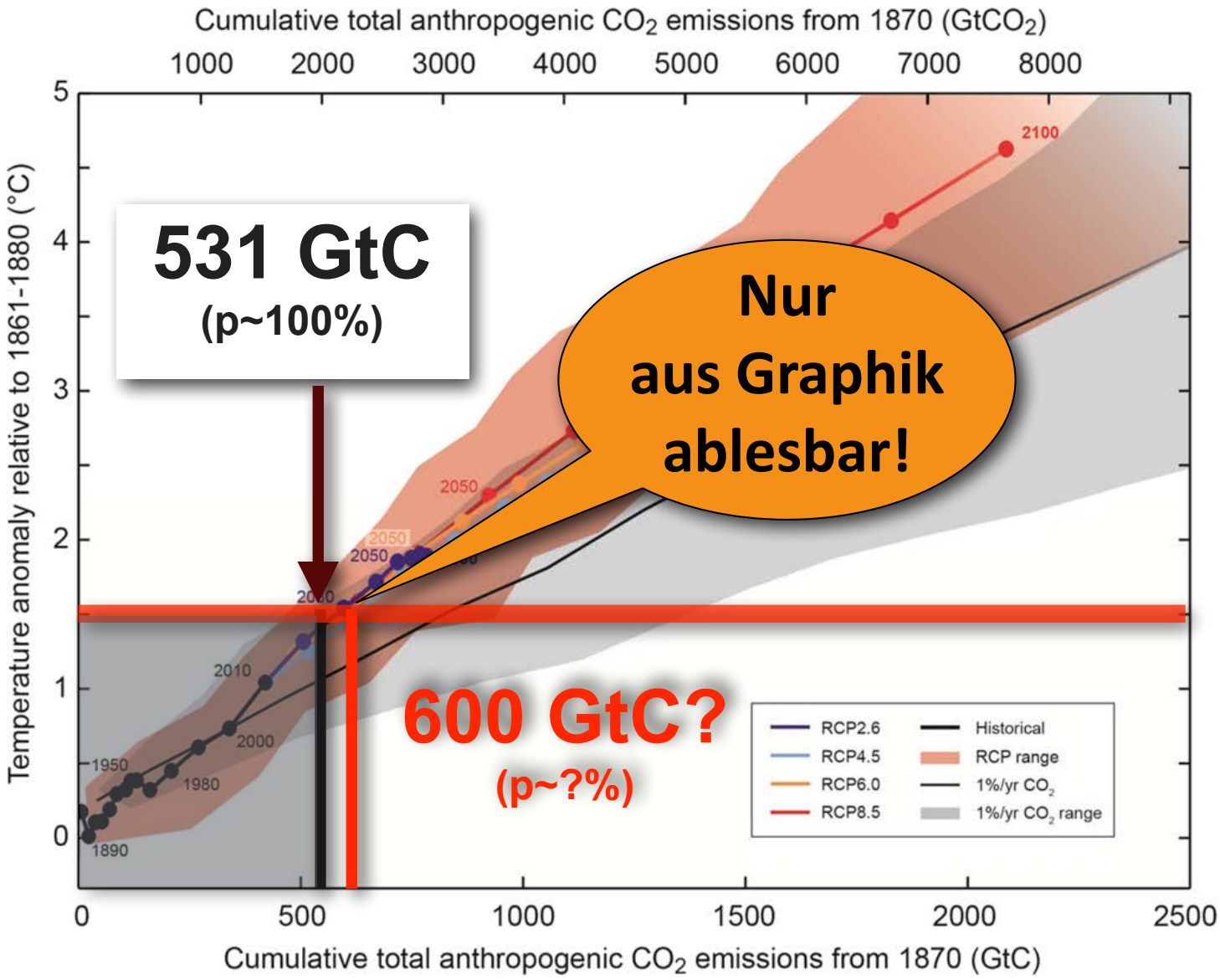
Ich meinte

Wissenschaftler Innen haben nicht so gut zugehört!

Wieviel Emissionen bleiben uns noch? WGI Antworten

1.5 °C



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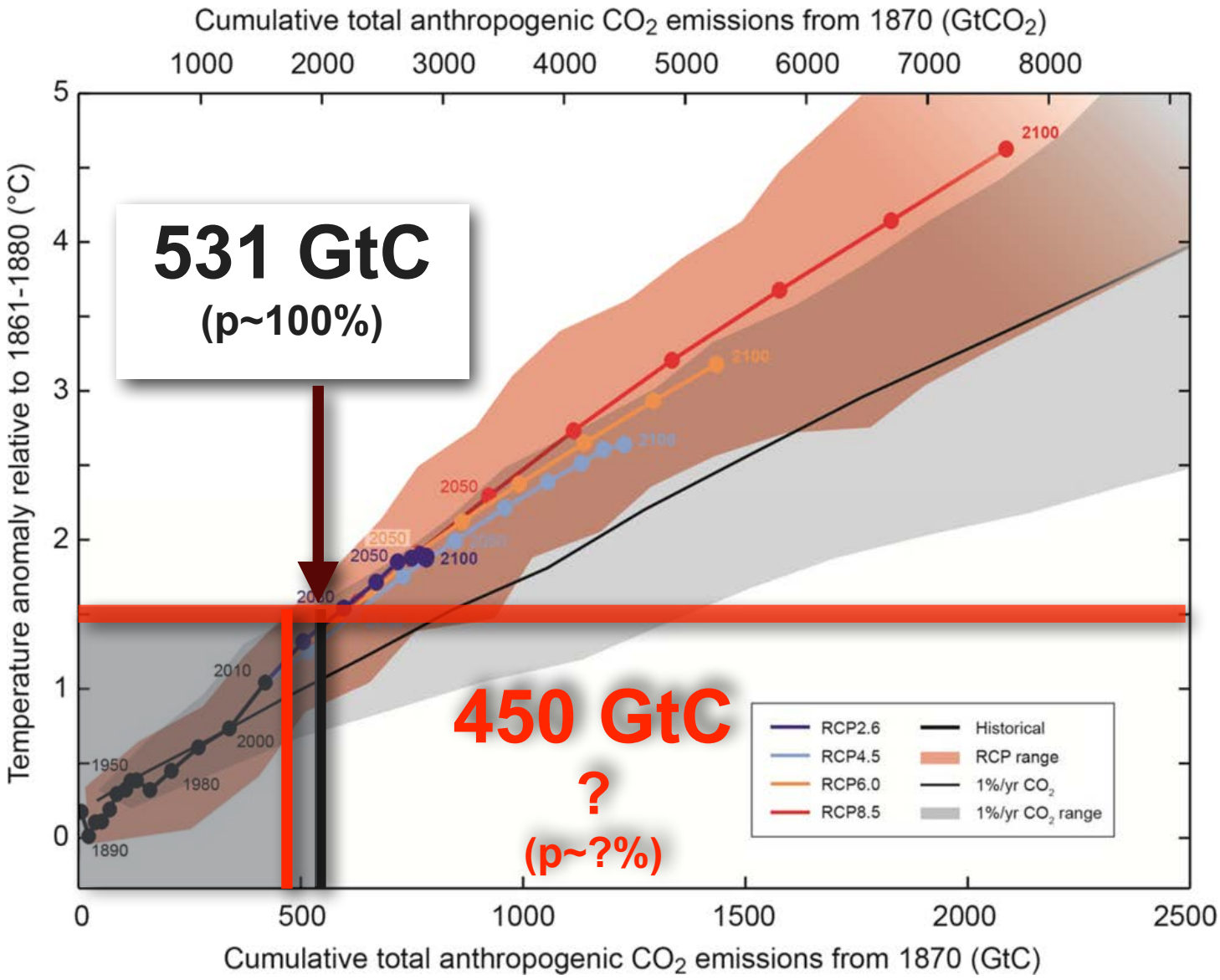
INTERGOVERNMENTAL PANEL ON climate change

Wieviel Emissionen bleiben uns noch? WGI Antworten

1.5 °C



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INTERGOVERNMENTAL PANEL ON climate change

Wieviel Emissionen bleiben uns noch? WGI Antworten

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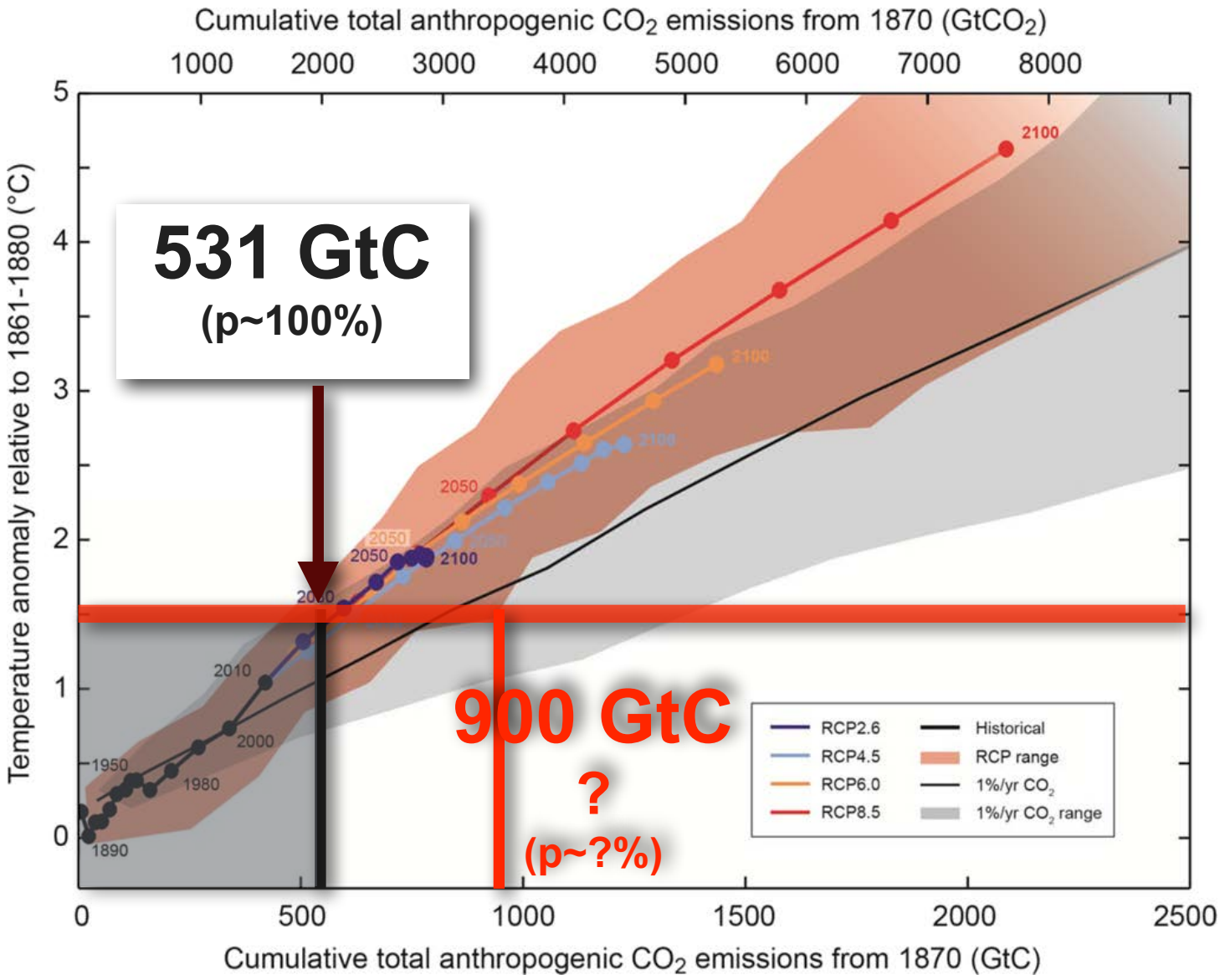

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INTERGOVERNMENTAL PANEL ON climate change

Wieviel Emissionen bleiben uns noch? WGI Antworten

1.5 °C

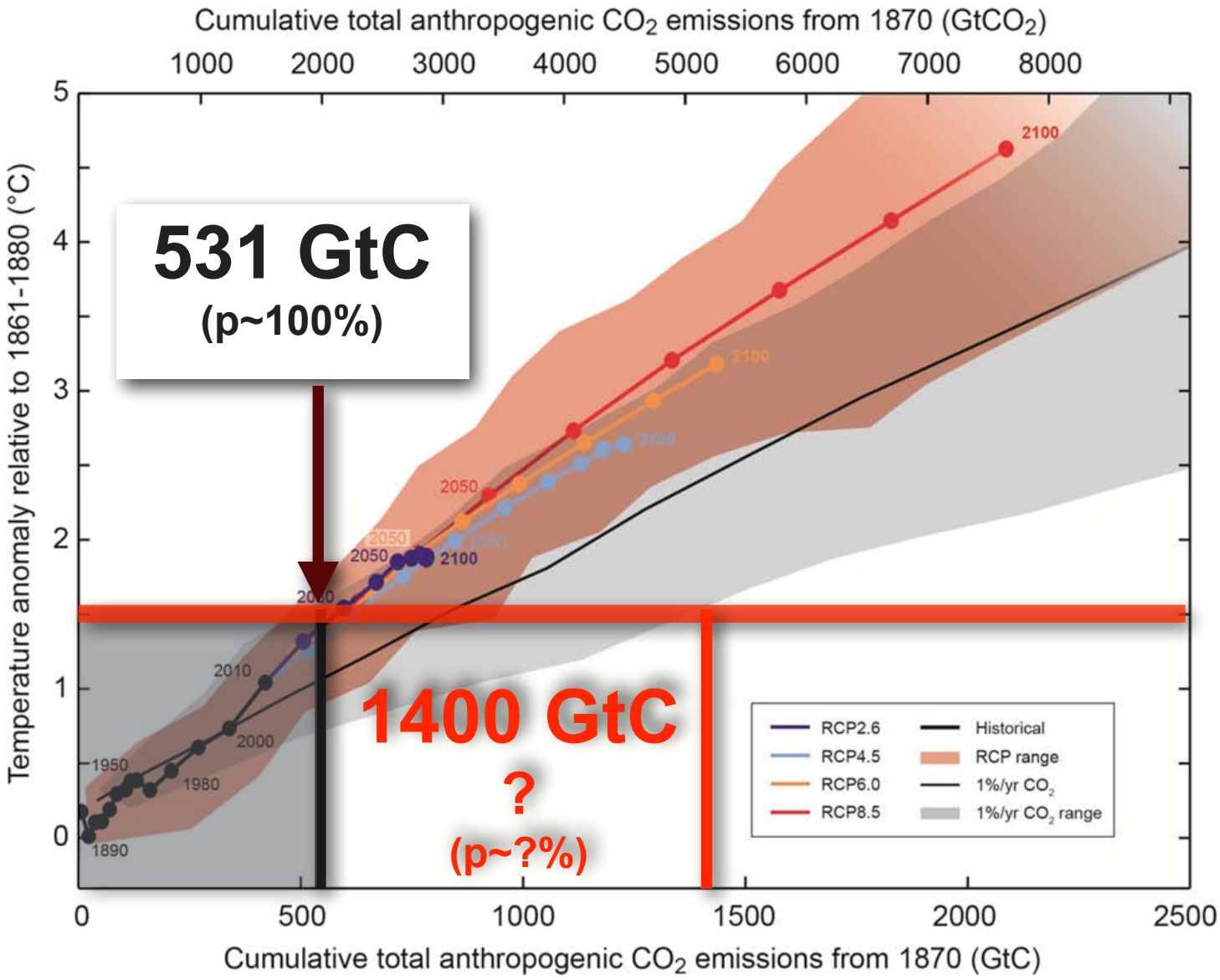

Figure SPM.10: Global mean surface temperature increase vs. cumulative total global CO2 emissions from various lines of evidence (IPCC, 2013. SPM WGI)

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INTERGOVERNMENTAL PANEL ON climate change

Warming vs. cumulative emissions (WGI vs. III)

2 °C

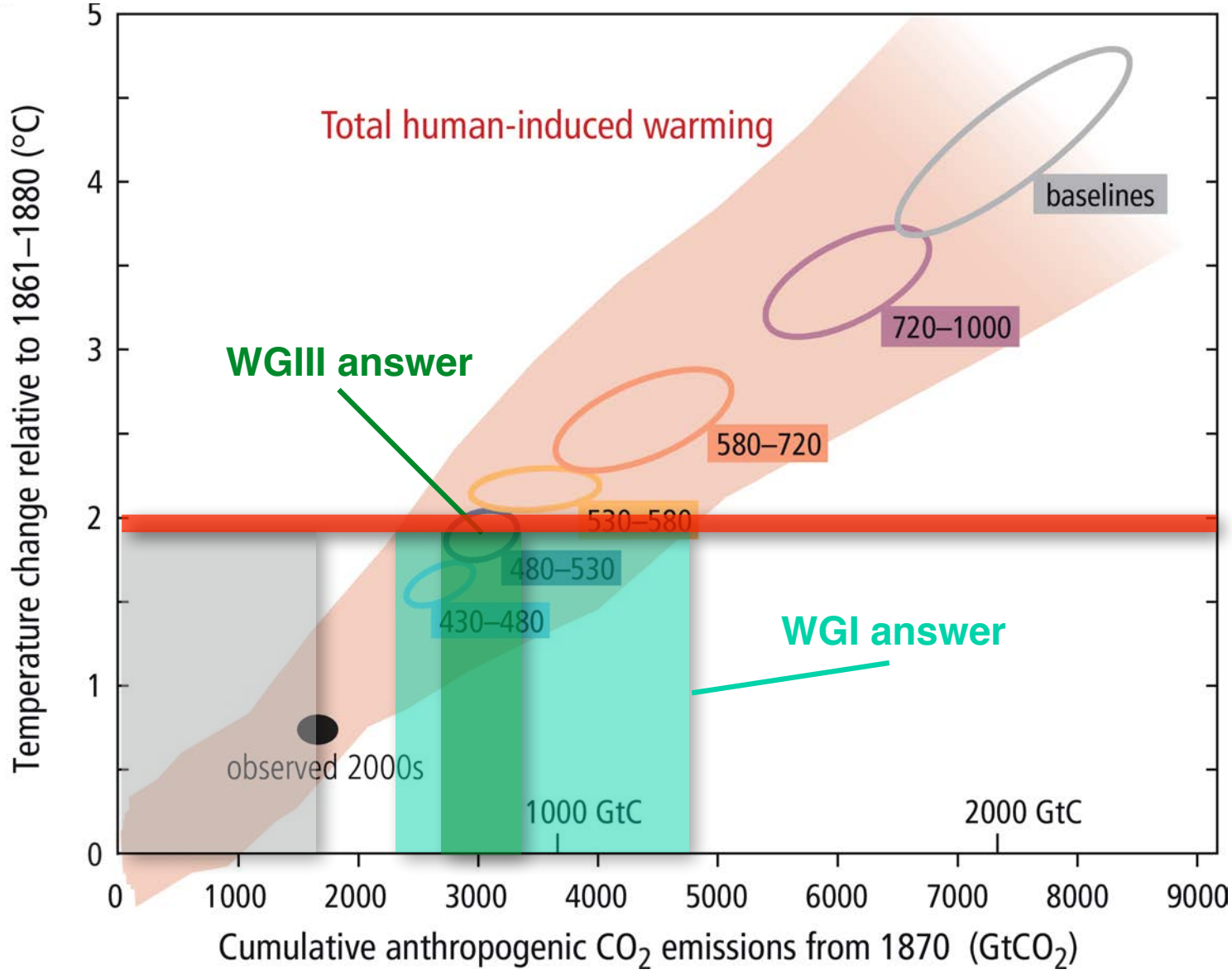

Figure SPM.5 (b): Global mean surface temperature increase vs. cumulative total global CO2 emissions from various lines of evidence (IPCC, 2014. SYR SPM)

Warming vs. cumulative emissions (WGI vs. III)

1.5 °C

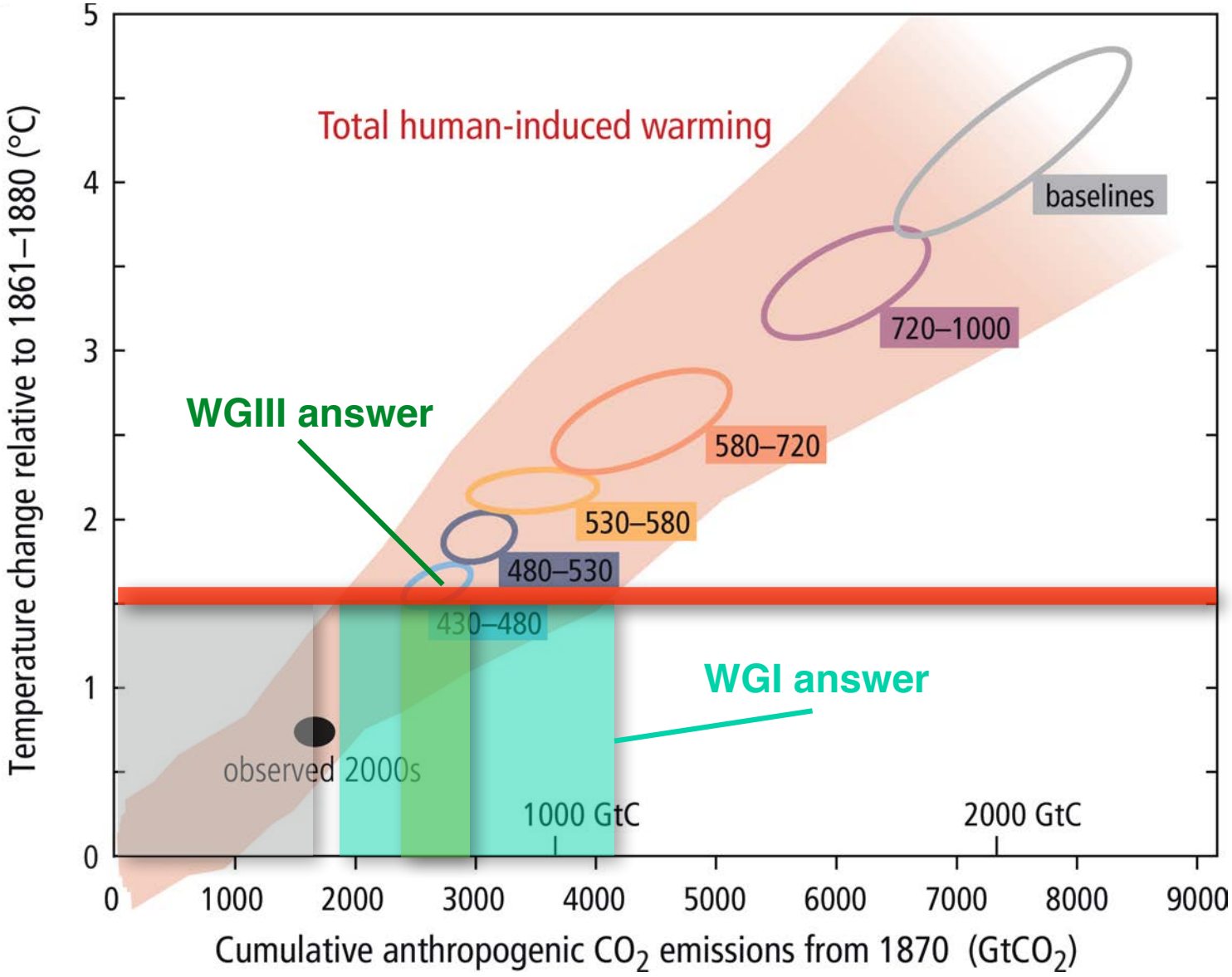

Figure SPM.5 (b): Global mean surface temperature increase vs. cumulative total global CO2 emissions from various lines of evidence (IPCC, 2014. SYR SPM)

Warming vs. cumulative emissions (WGIII on 3°C)

3 °C

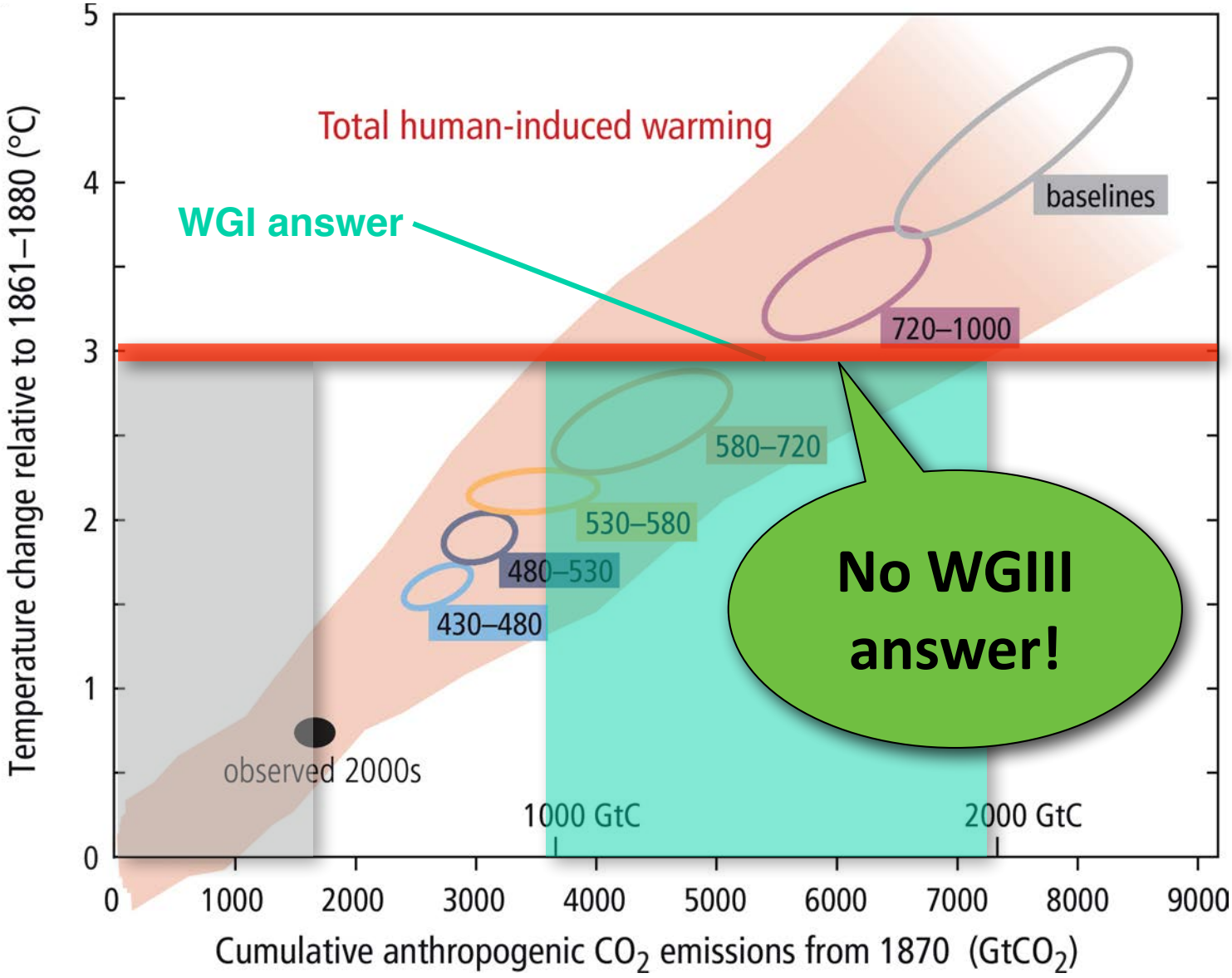

Figure SPM.5 (b): Global mean surface temperature increase vs. cumulative total global CO2 emissions from various lines of evidence (IPCC, 2014. SYR SPM)

Wieviel Emissionen bleiben uns noch? Noch mehr Unklarheiten zum LTGG 2 °C

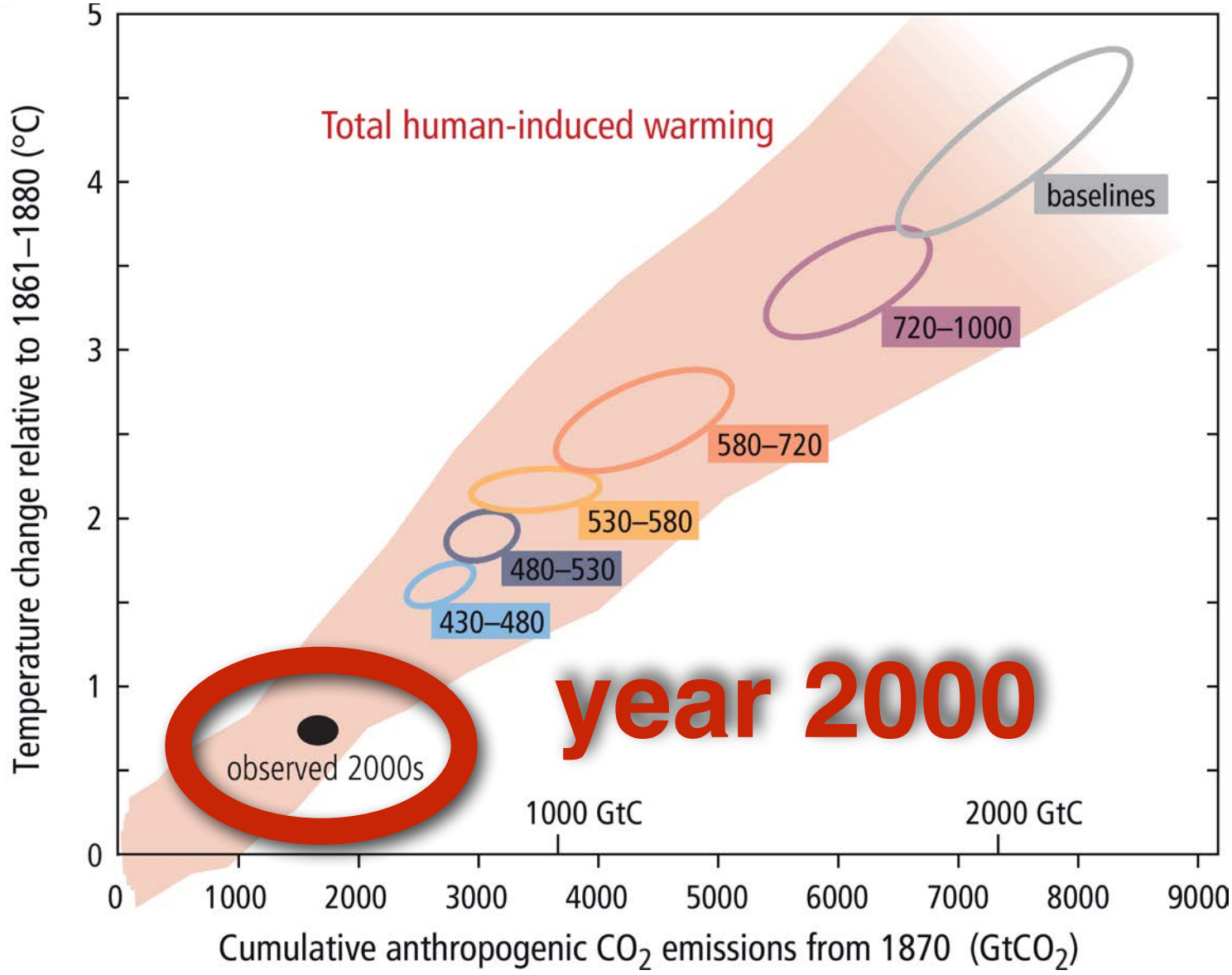

Figure SPM.5 (b): Global mean surface temperature increase vs. cumulative total global CO2 emissions from various lines of evidence (IPCC, 2014. SYR SPM)

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Wieviel Emissionen bleiben uns noch? Noch mehr Unklarheiten zum LTGG 2 °C

2 °C

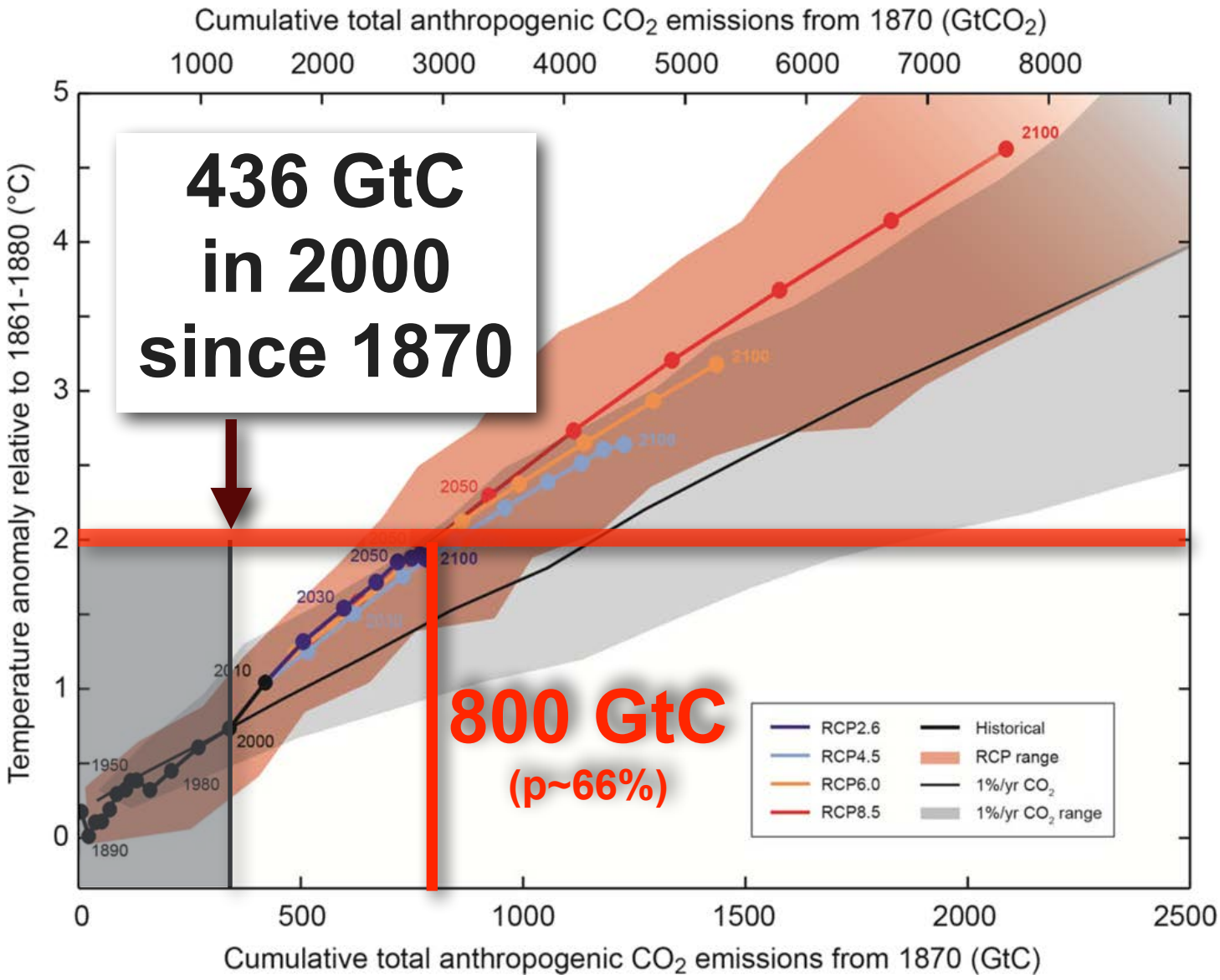

Figure SPM.10: Global mean surface temperature increase vs. cumulative total global CO2 emissions from various lines of evidence (IPCC, 2013. SPM WGI)

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Wieviel Emissionen bleiben uns noch? Noch mehr Unklarheiten zum LTGG 2 °C

2 °C

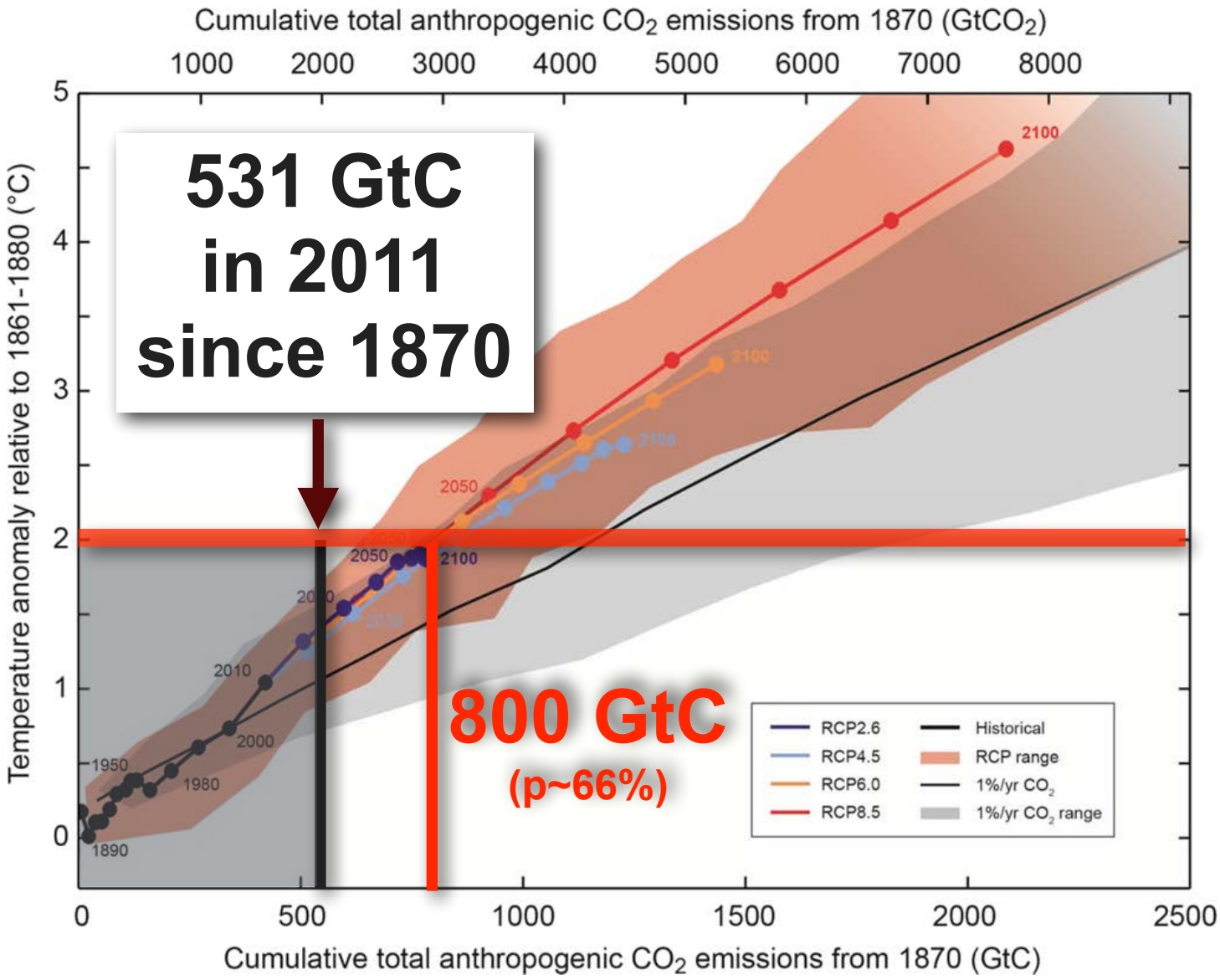

Figure SPM.10: Global mean surface temperature increase vs. cumulative total global CO2 emissions from various lines of evidence (IPCC, 2013. SPM WGI)

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Wieviel Emissionen bleiben uns noch? Noch mehr Unklarheiten zum LTGG 2 °C

2 °C

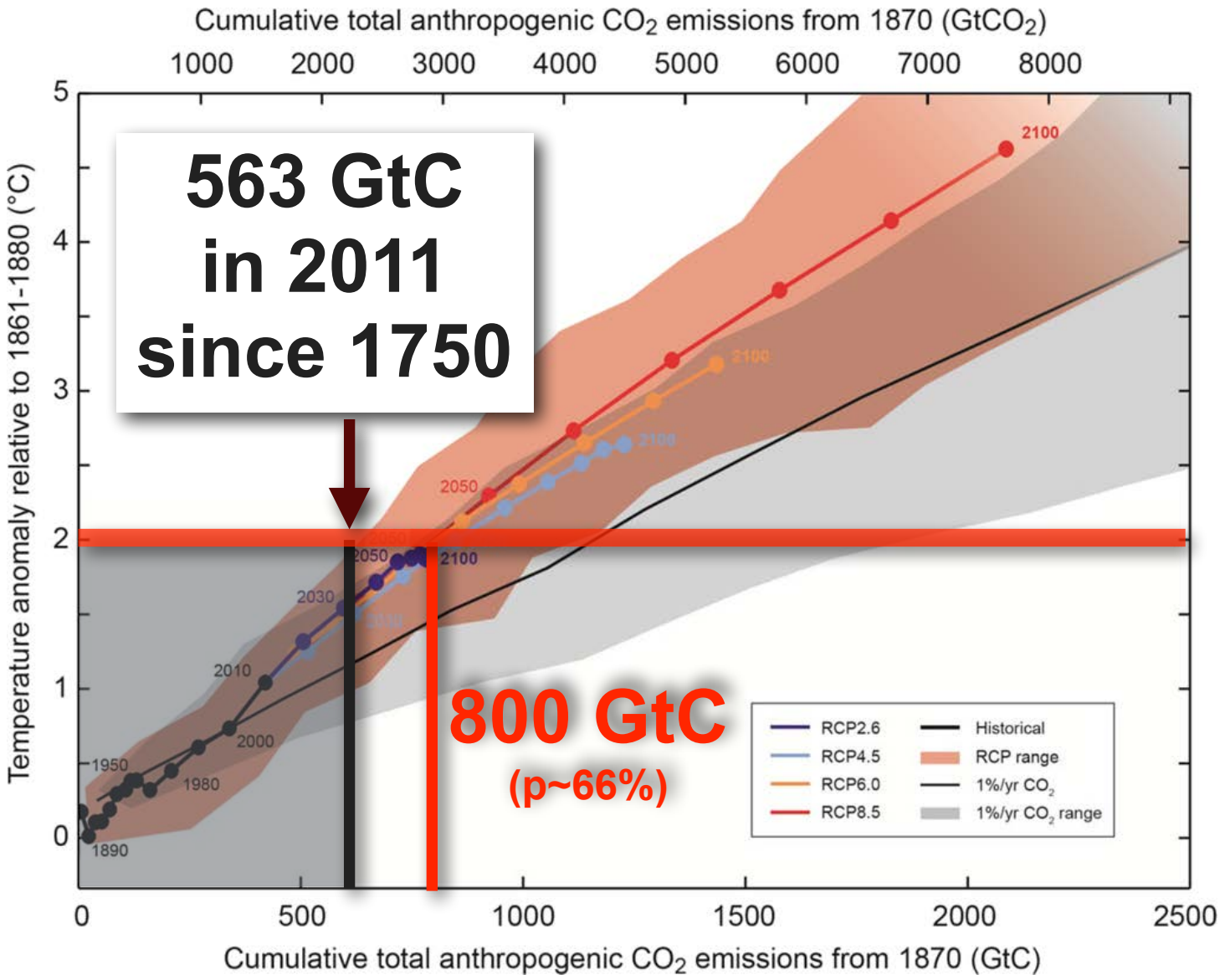

Figure SPM.10: Global mean surface temperature increase vs. cumulative total global CO2 emissions from various lines of evidence (IPCC, 2013. SPM WGI)

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Ich meinte

Zahlen sind zu unterschiedlich für Beschlüsse auf Dauer

Ich meinte

WGI und WGIII müssen noch enger zusam-menarbeiten!

COP Decisions from Paris

United Nations
Framework Convention on
Climate Change

1/CP.21

21. *Invites* the Intergovernmental Panel on Climate Change to provide a special report in 2018 on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways;

17. *[illegible]oncern* that the estimated aggregate greenhouse gas emission levels in 202[illegible]lting from the intended nationally determined contributions do not fall with[illegible]°C scenarios but rather lead to a projected level of 55 gigatonnes in 2030, a[illegible] *notes* that much greater emission reduction efforts will be required than those associa[illegible]d with the intended nationally determined contributions in order to hold the increase in th[illegible] global average temperature to below 2 °C above pre-industrial levels by reducing emiss[illegible]ons to 40 gigatonnes or to 1.5 °C above pre-industrial levels by reducing to a level to be identified in the special report referred to in paragraph 21 below;

For WGIII

Ich meinte

Statt RCP8.5 nun RCP2.0 untersuchen!


Zur WGII...

COP Decisions from Paris

United Nations
Framework Convention on
Climate Change

1/CP.21

For WGII

21. *Invites* the Intergovernmental Panel on Climate Change to provide a special report in 2018 on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways;

17. *Notes with concern* that the estimated aggregate greenhouse gas emission levels in 2025 and 2030 resulting from the intended nationally determined contributions do not fall within least-cost 2 °C scenarios but rather lead to a projected level of 55 gigatonnes in 2030, and *also notes* that much greater emission reduction efforts will be required than those associated with the intended nationally determined contributions in order to hold the increase in the global average temperature to below 2 °C above pre-industrial levels by reducing emissions to 40 gigatonnes or to 1.5 °C above pre-industrial levels by reducing to a level to be identified in the special report referred to in paragraph 21 below;


Ein Beispiel

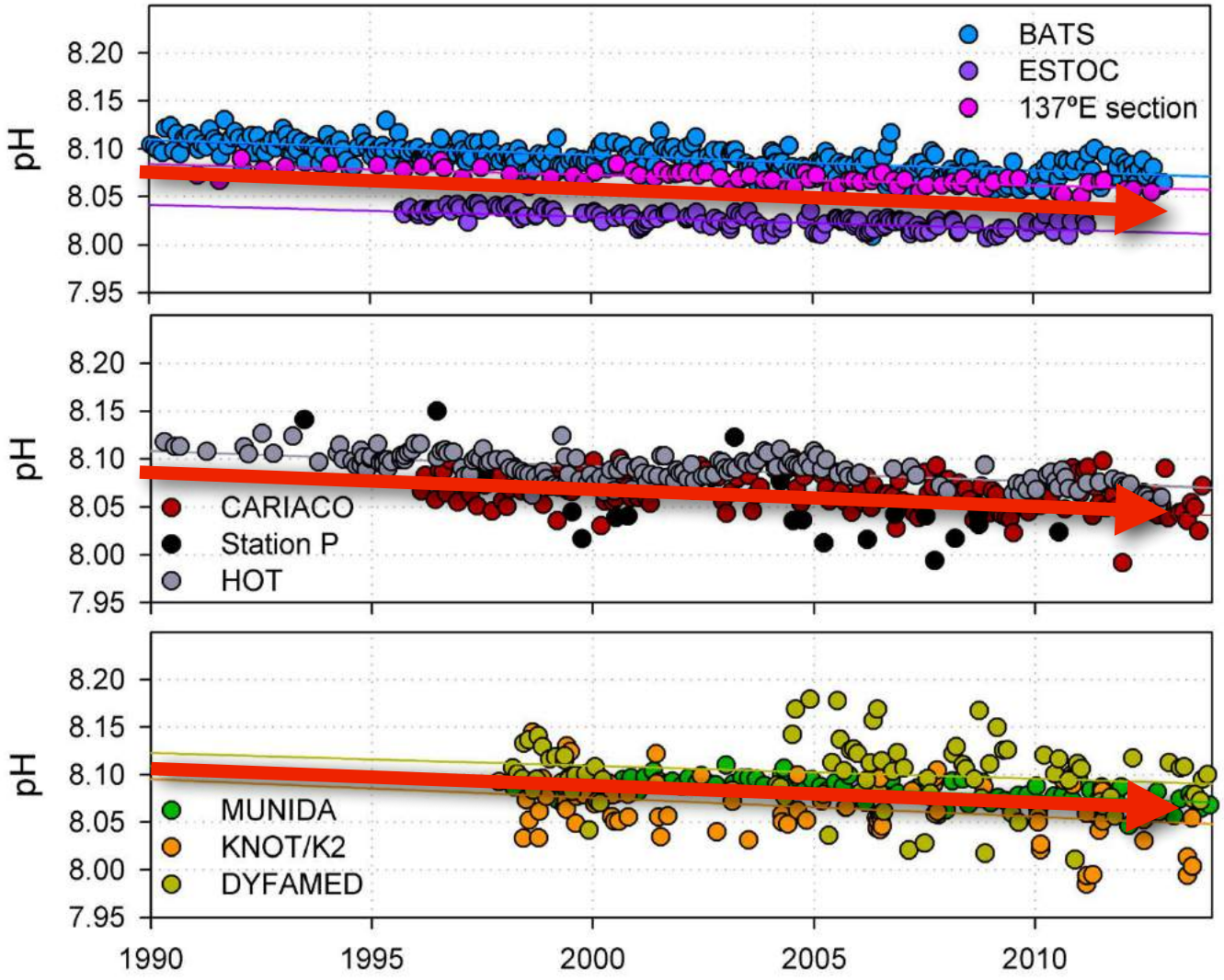
Vor Korallenbleiche

IPCC, 2014. WGII, Cross-chapter box compendium

Nach Korallenbleiche

IPCC, 2014. WGII, Cross-chapter box compendium

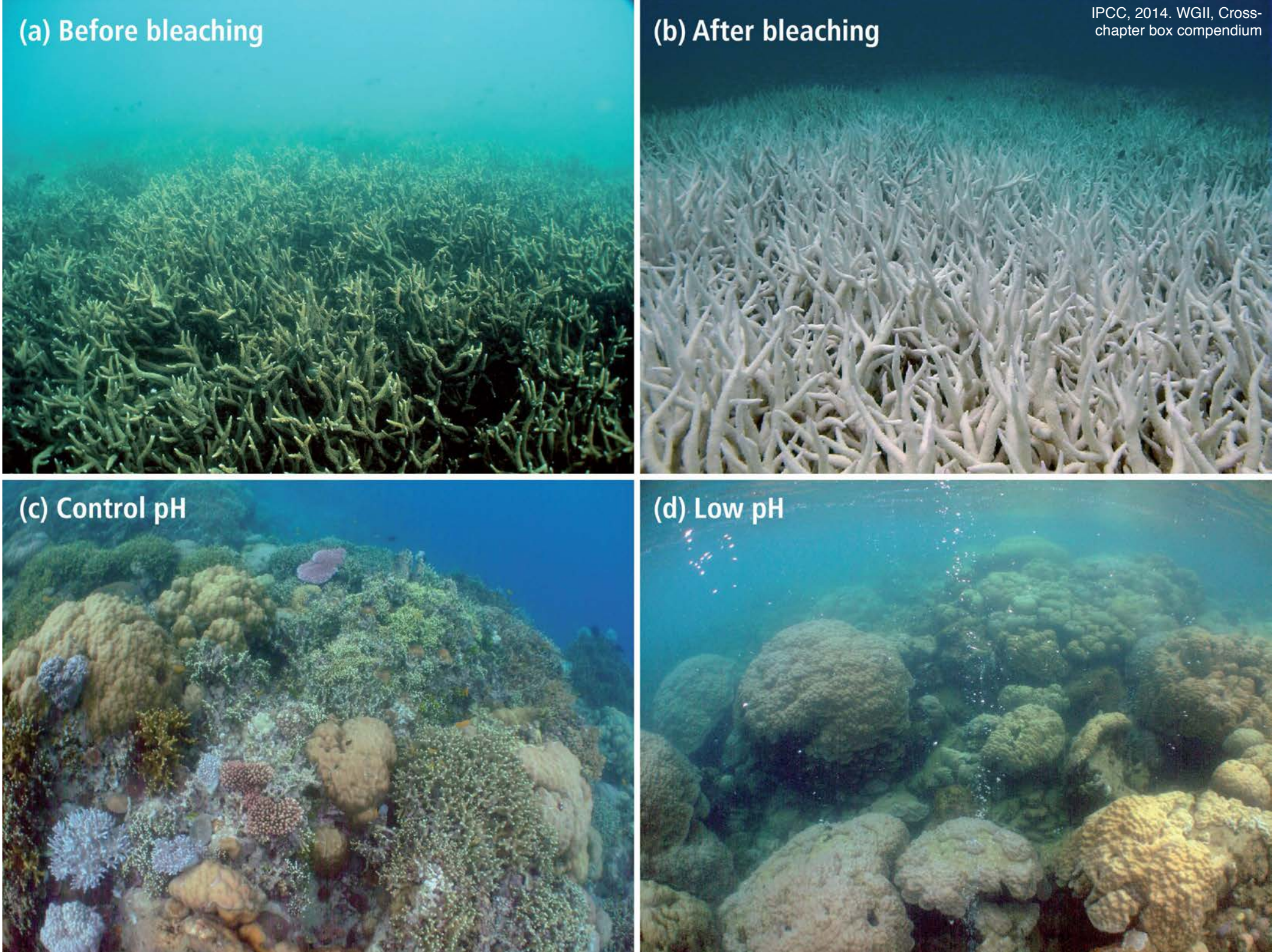
CO_2 macht das Meerwasser saurer…



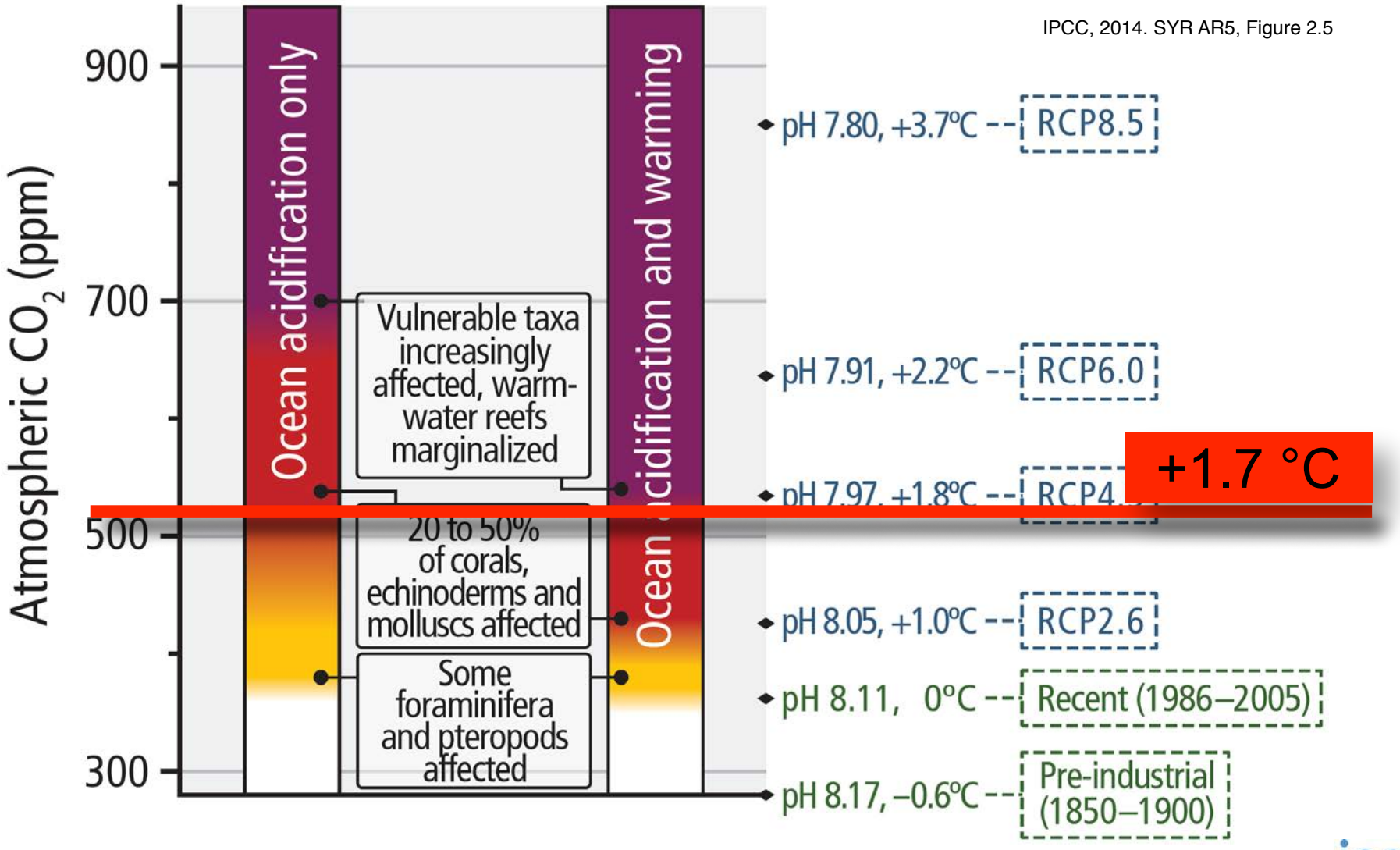
Klare Trends der zunehmenden Ozeanver-sauerung:

pH nimmt überall ab!

WMO, 2014. The state of greenhouse gases in the atmosphere based on global observations through 2013


(a) Before bleaching
(b) After bleaching
IPCC, 2014. WGII, Cross-chapter box compendium
(c) Control pH
(d) Low pH

Marine ecosystems among most vulnerable



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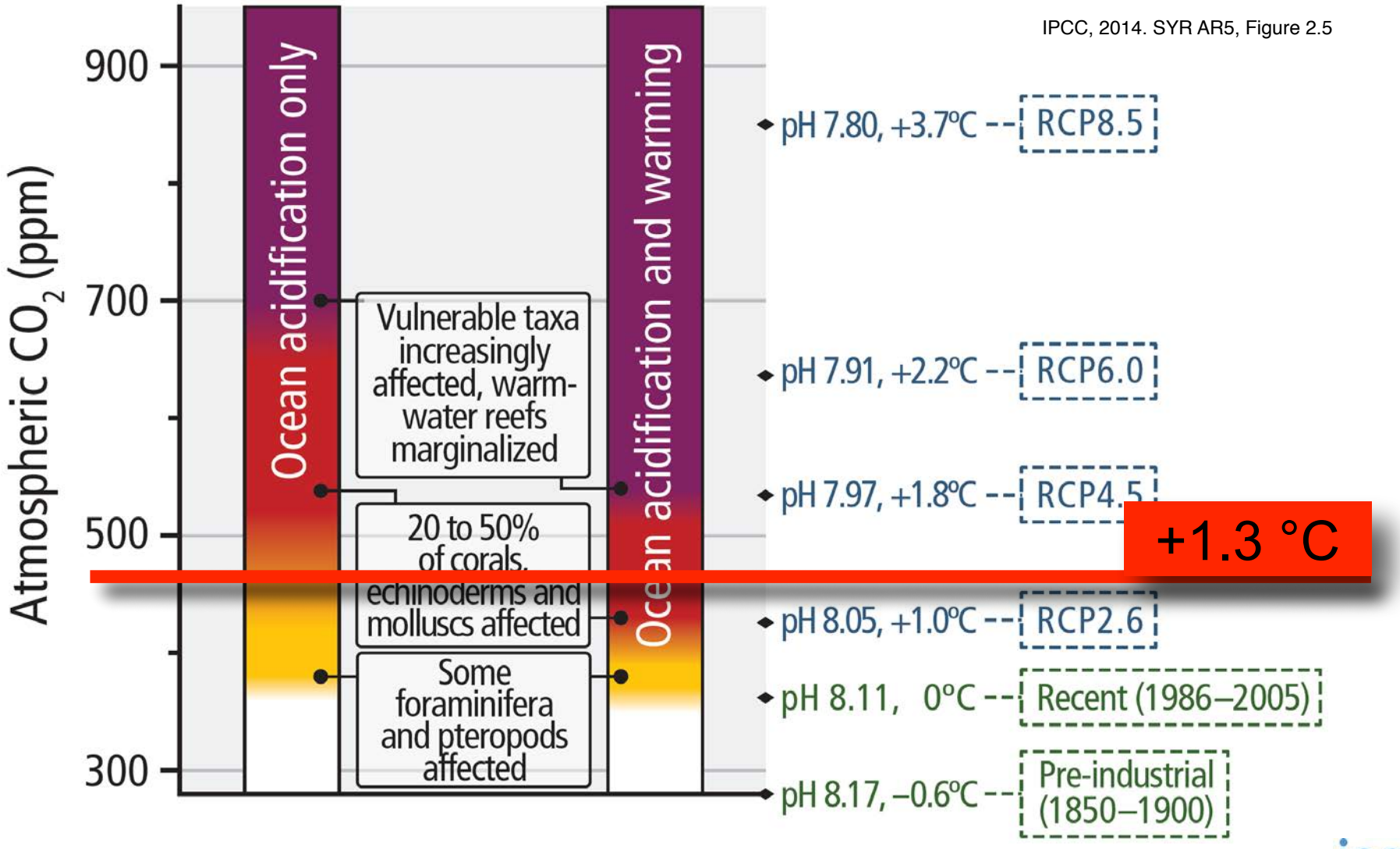
Marine ecosystems among most vulnerable



Merke

AR5 hat für Korallenriffe Unterschiede identifiziert

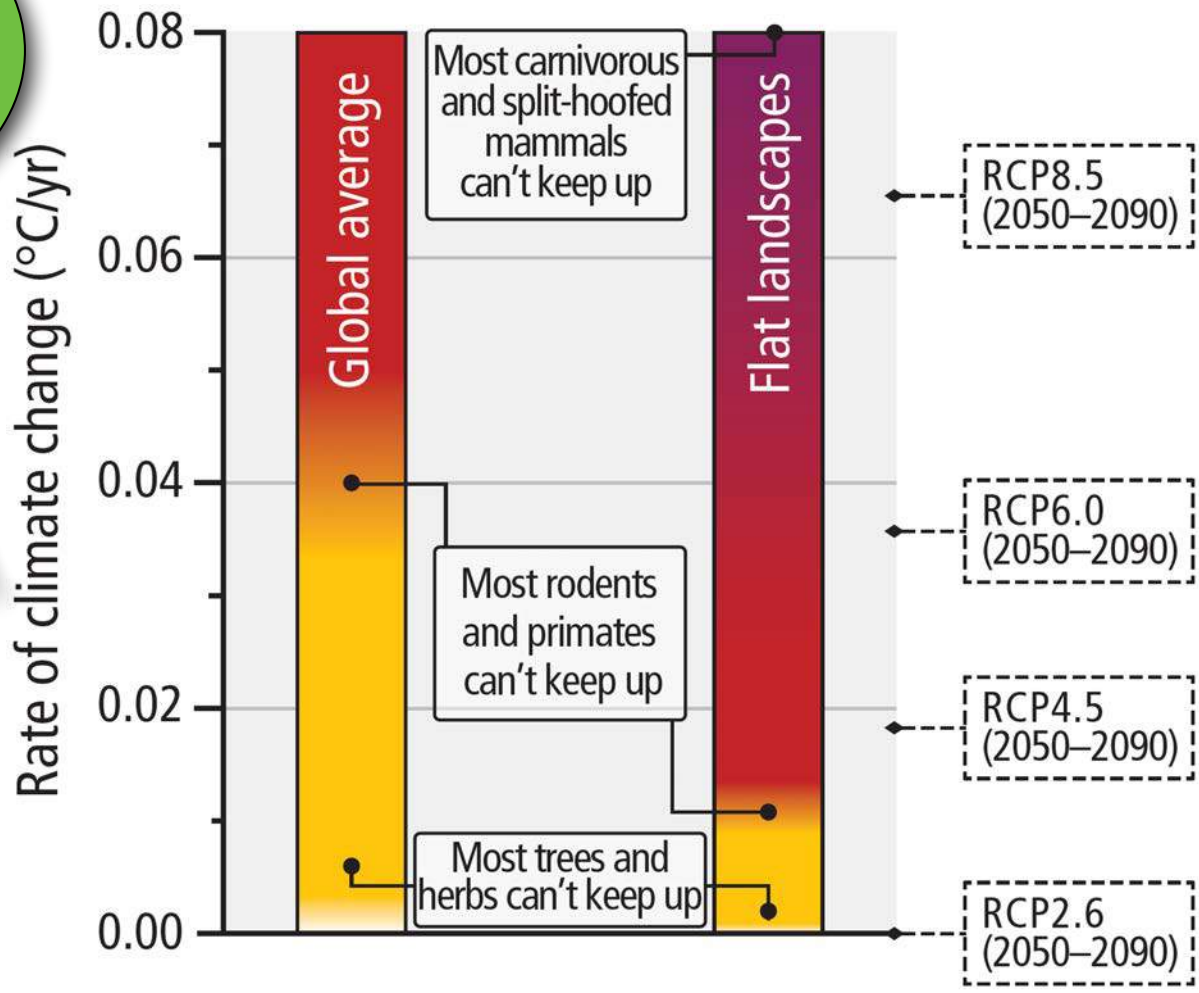
Merke

Es braucht 1.5 °C vs. 2 °C für alle Sektoren

Beispiel Migration von Arten

Risk for terrestrial and freshwater species impacted by the rate of warming

1.5 vs. 2.0: Are rates affected too?



IPCC, 2014. SYR AR5, Figure 2.5

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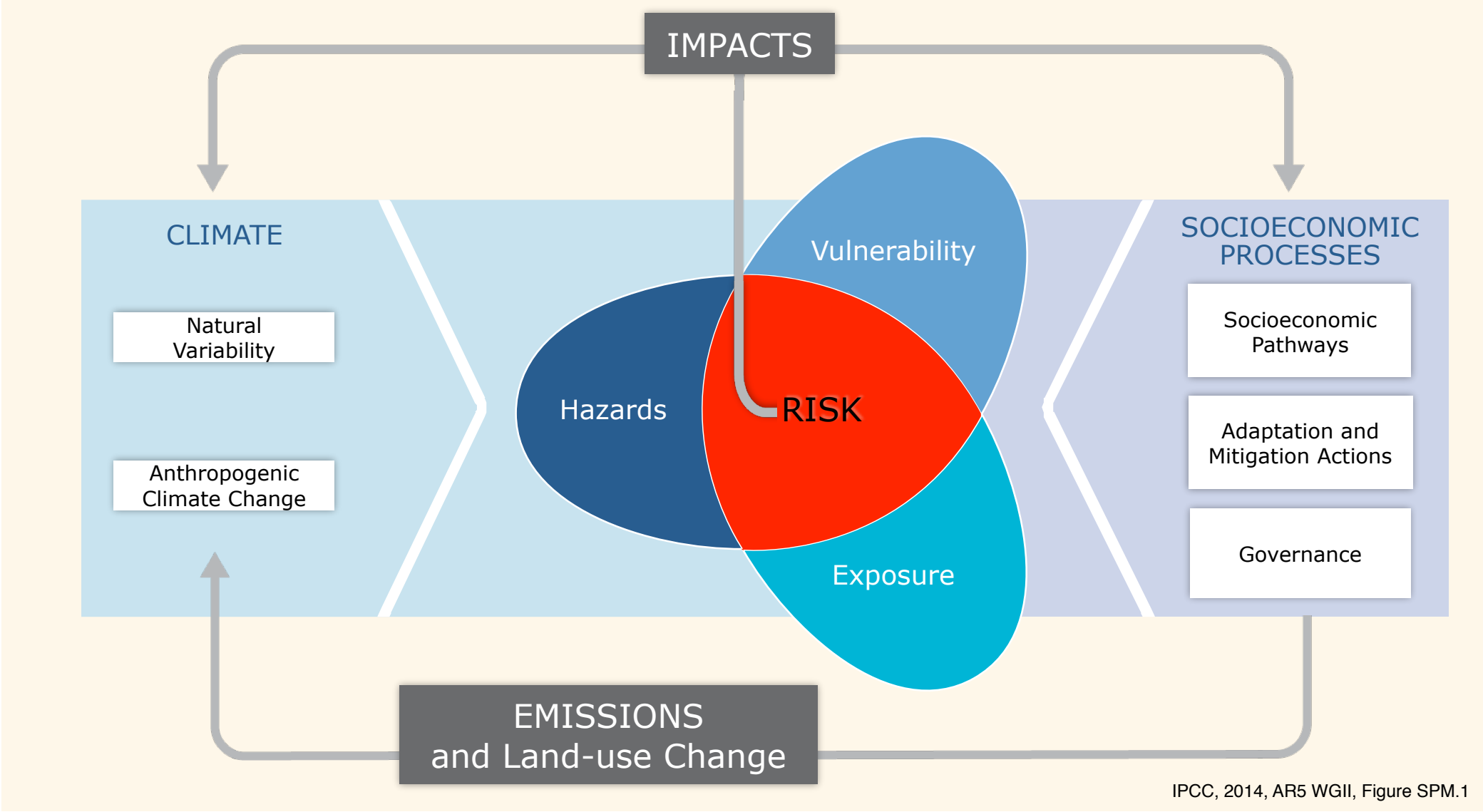
Arktis erfährt höchste Erwärmungsraten

Merke

Es gilt systematisch solche Lücken zu füllen


Das Risk
Konzept von
AR5 ...

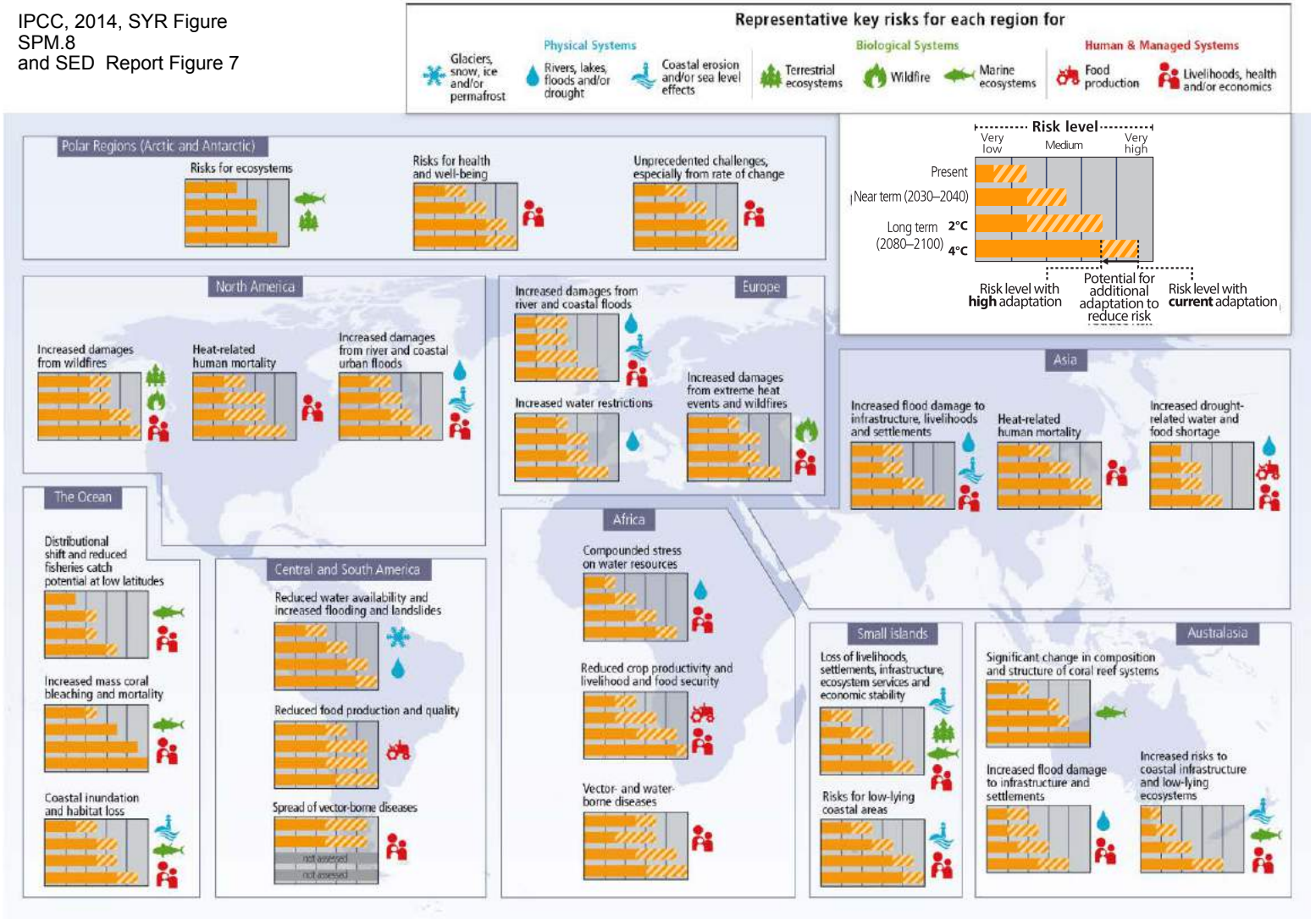
Risk Framework - IPCC AR5 WGII



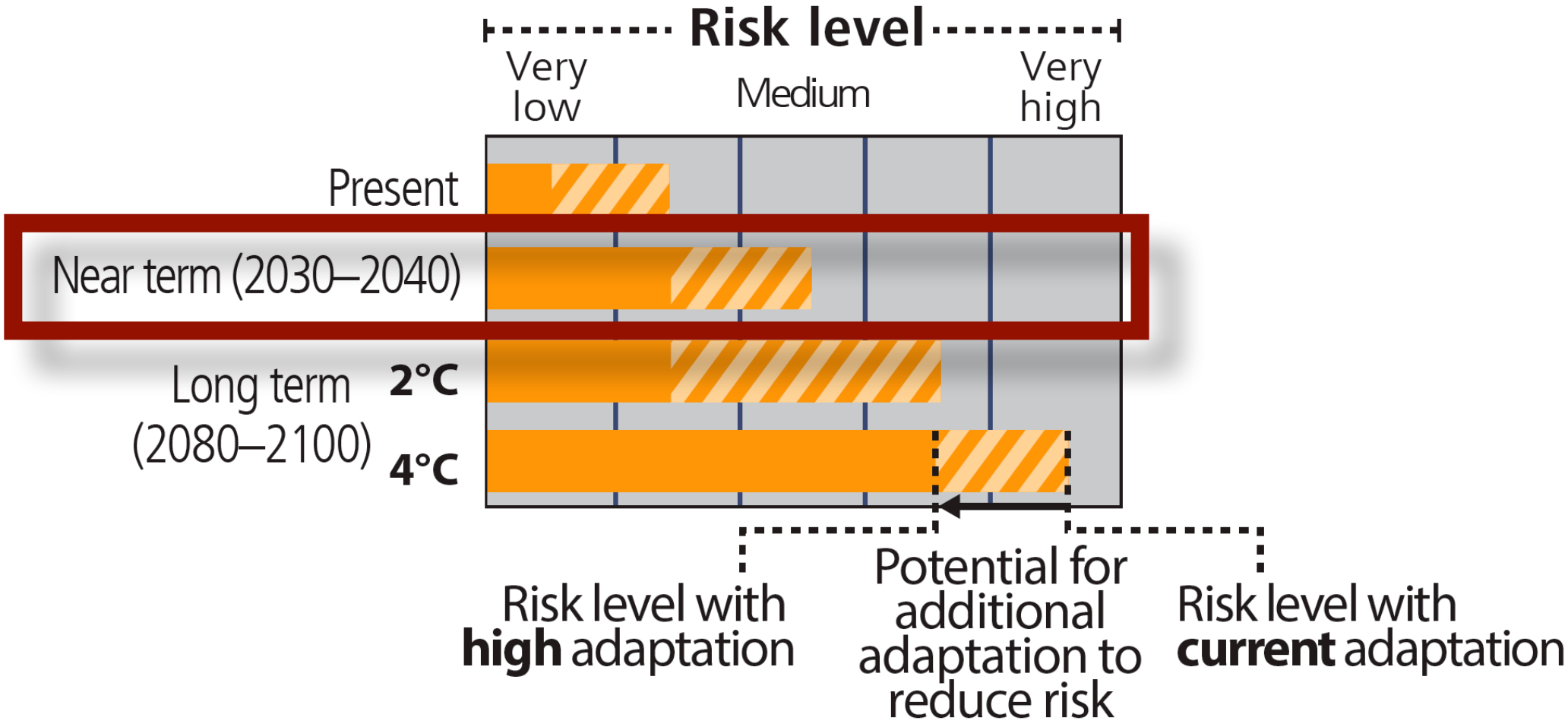
IPCC, 2014, AR5 WGII, Figure SPM.1

AR5: Risks were assessed for all regions, sectors

IPCC, 2014, SYR Figure SPM.8
and SED Report Figure 7



AR5: Risks were assessed for all regions, sectors

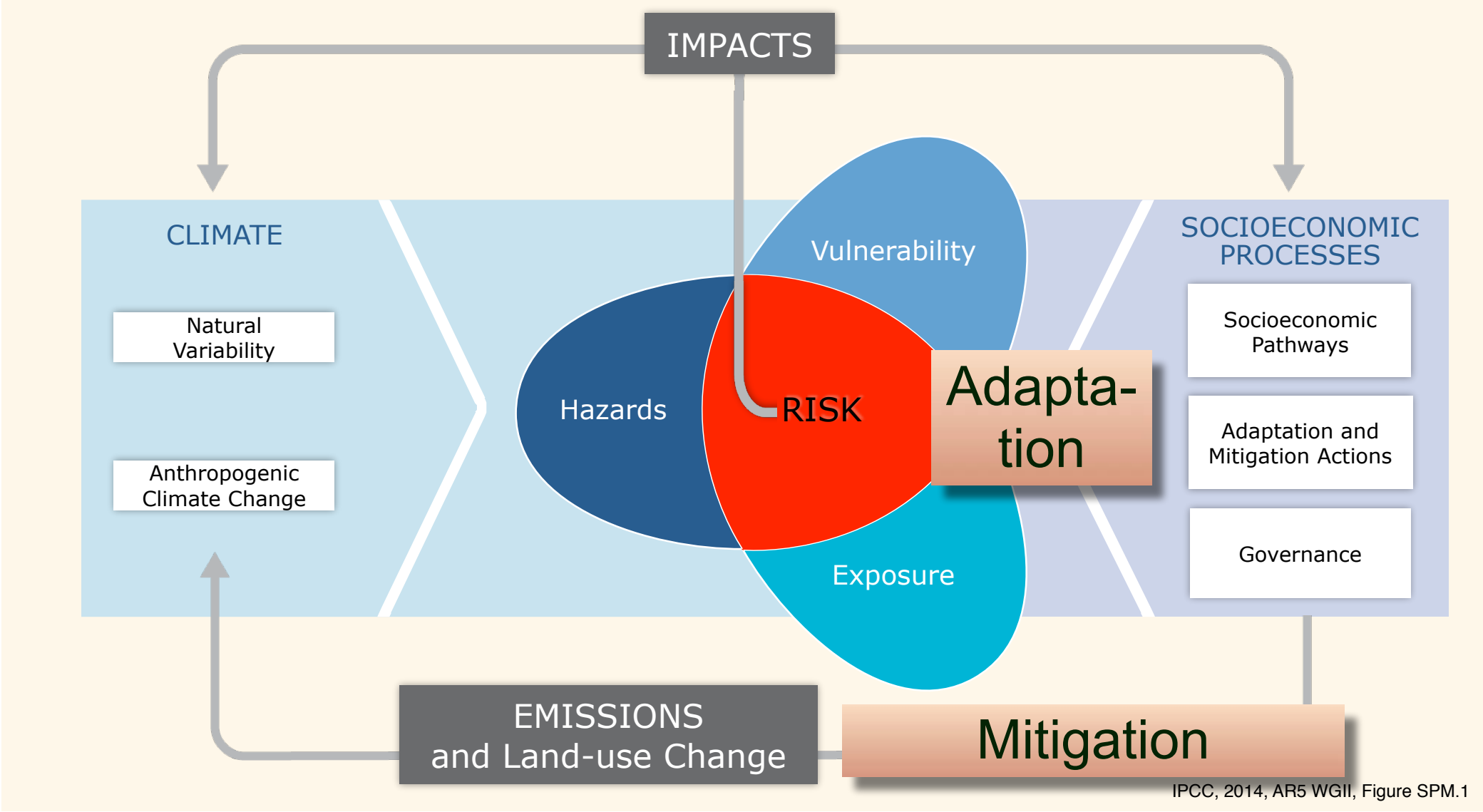


Ich frage

Ist Near term (2030-2040) ein guter Proxy für 1.5 °C?

Das Risk Konzept von AR5 macht vieles komplizierter

Risk Framework - IPCC AR5 WGII

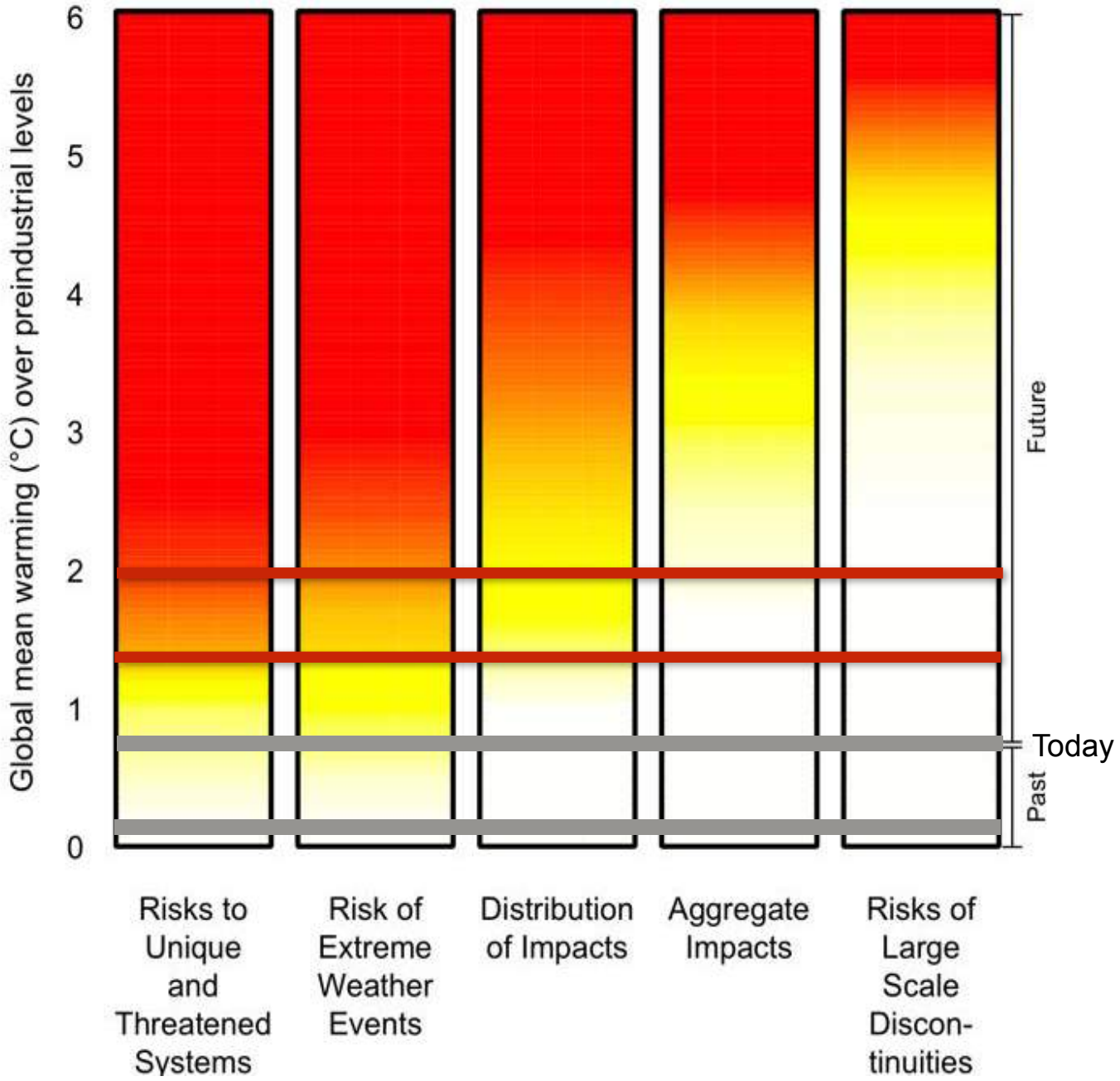


IPCC, 2014, AR5 WGII, Figure SPM.1

Reasons for concerns are key

Reasons of concern evolved

Know-ledge **TAR 2001**

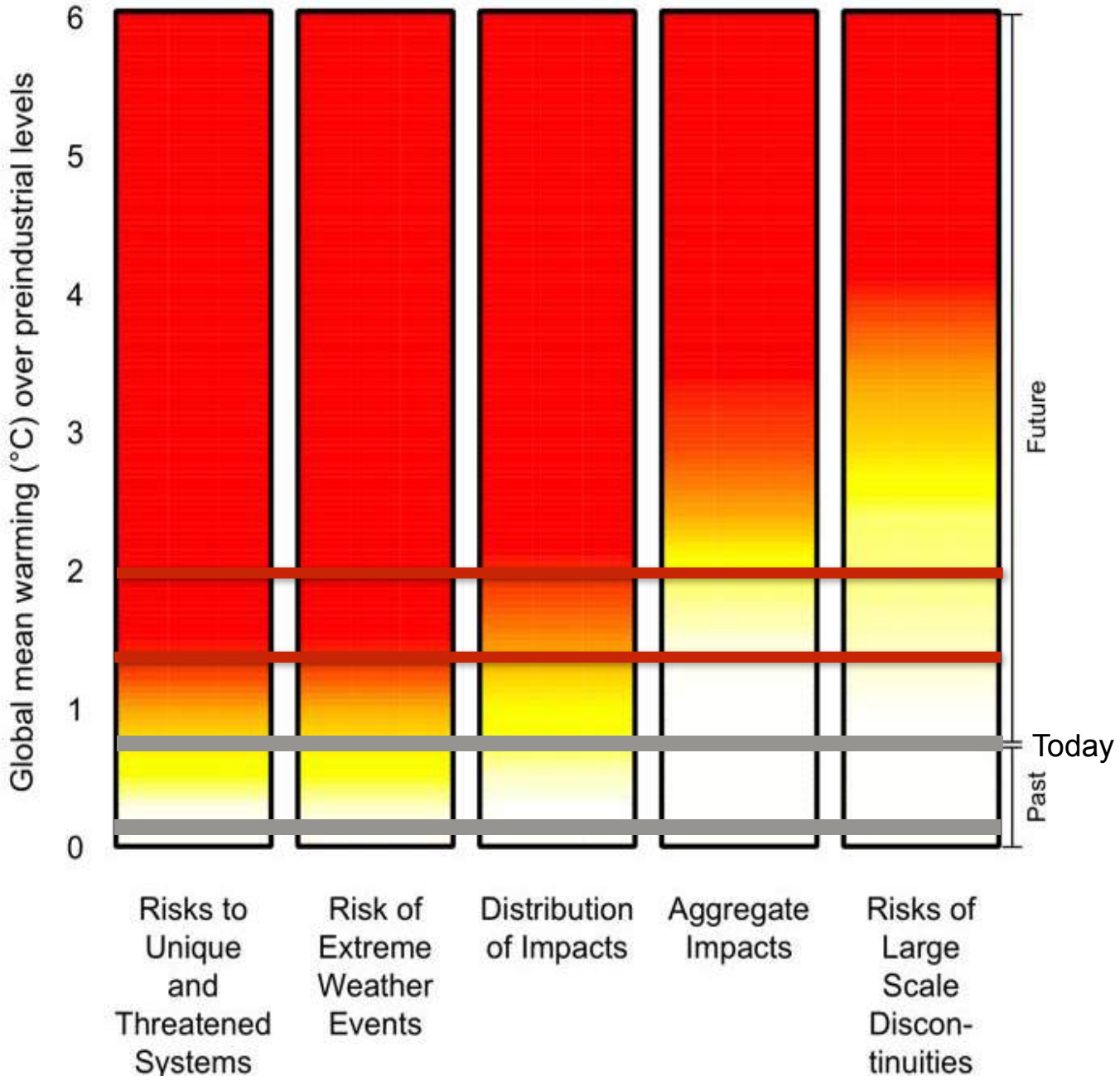


Smith et al., 2009. PNAS u. Fischlin, 2009

Reasons for concerns are key

Reasons of concern evolved

Know-ledge **AR4 2007**



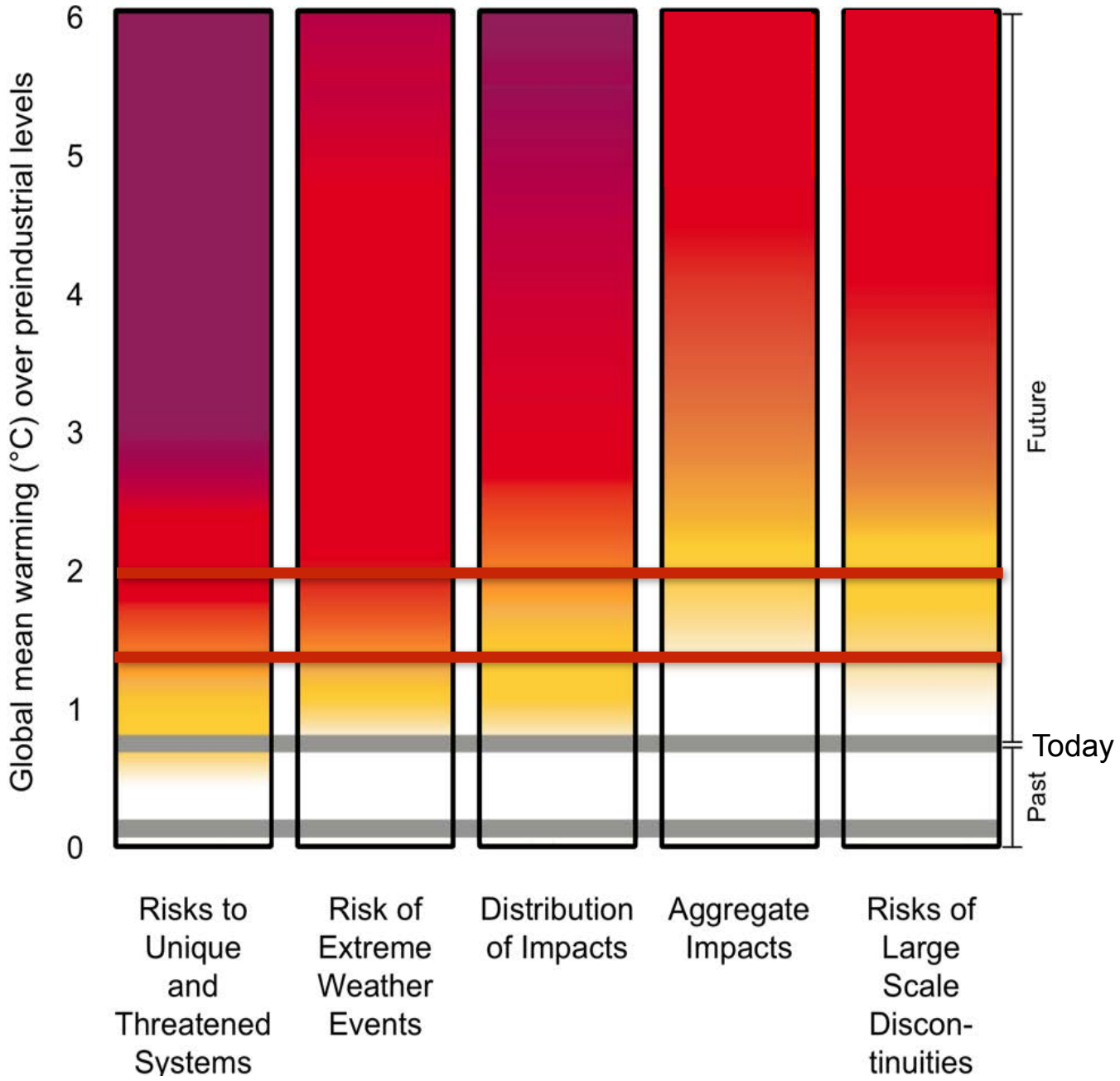
Smith et al., 2009. PNAS u. Fischlin, 2009

Reasons for concerns are key

Reasons of concern evolved

Know-ledge **AR5 2014**

Smith et al., 2009. PNAS u. Fischlin, 2009

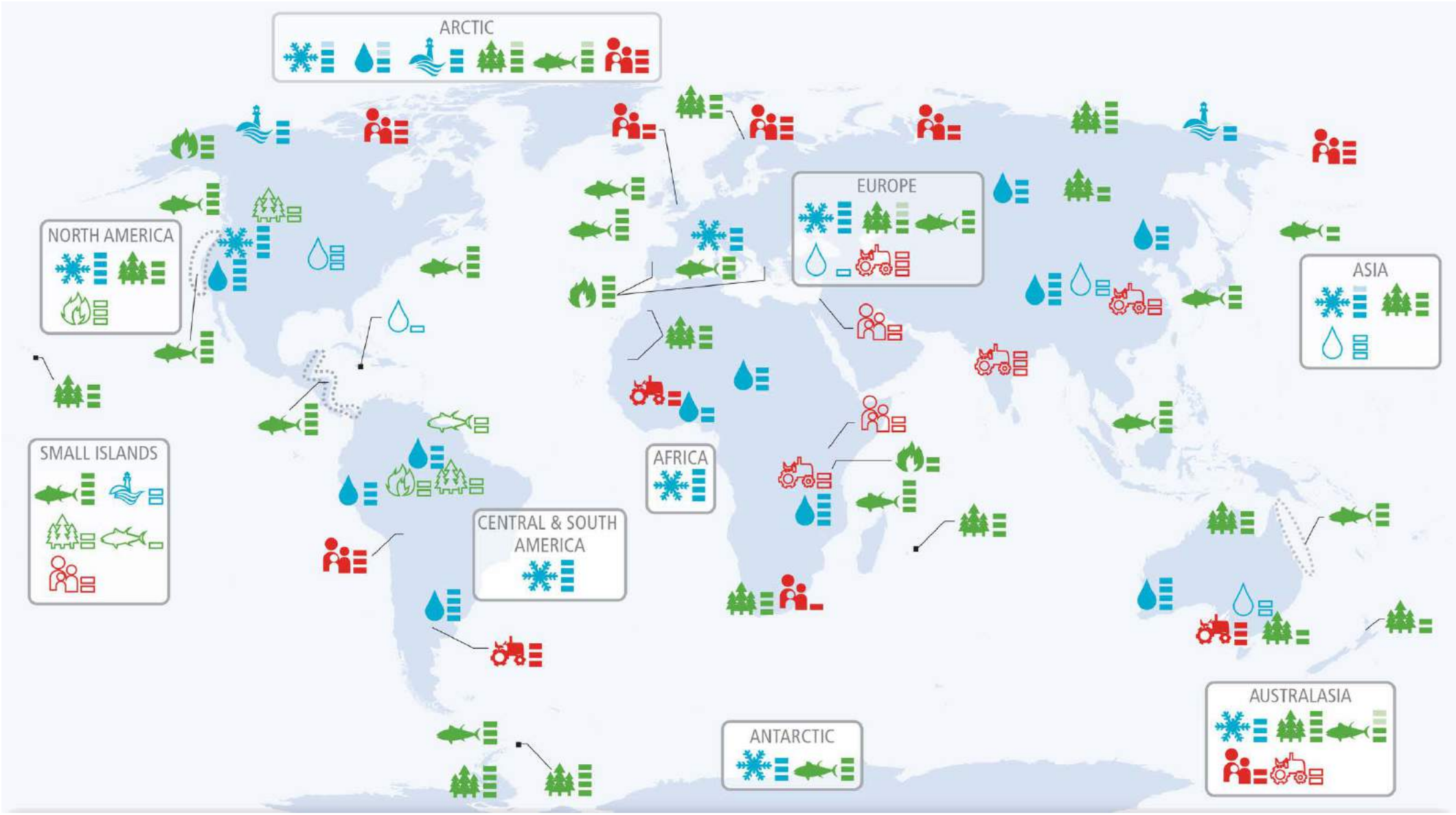


Ich meinte

Unterschied 1.5 °C vs. 2 °C wird noch unsicherer!


Ist Attribution
wirklich so
wichtig?

Attribution - Is it that important?



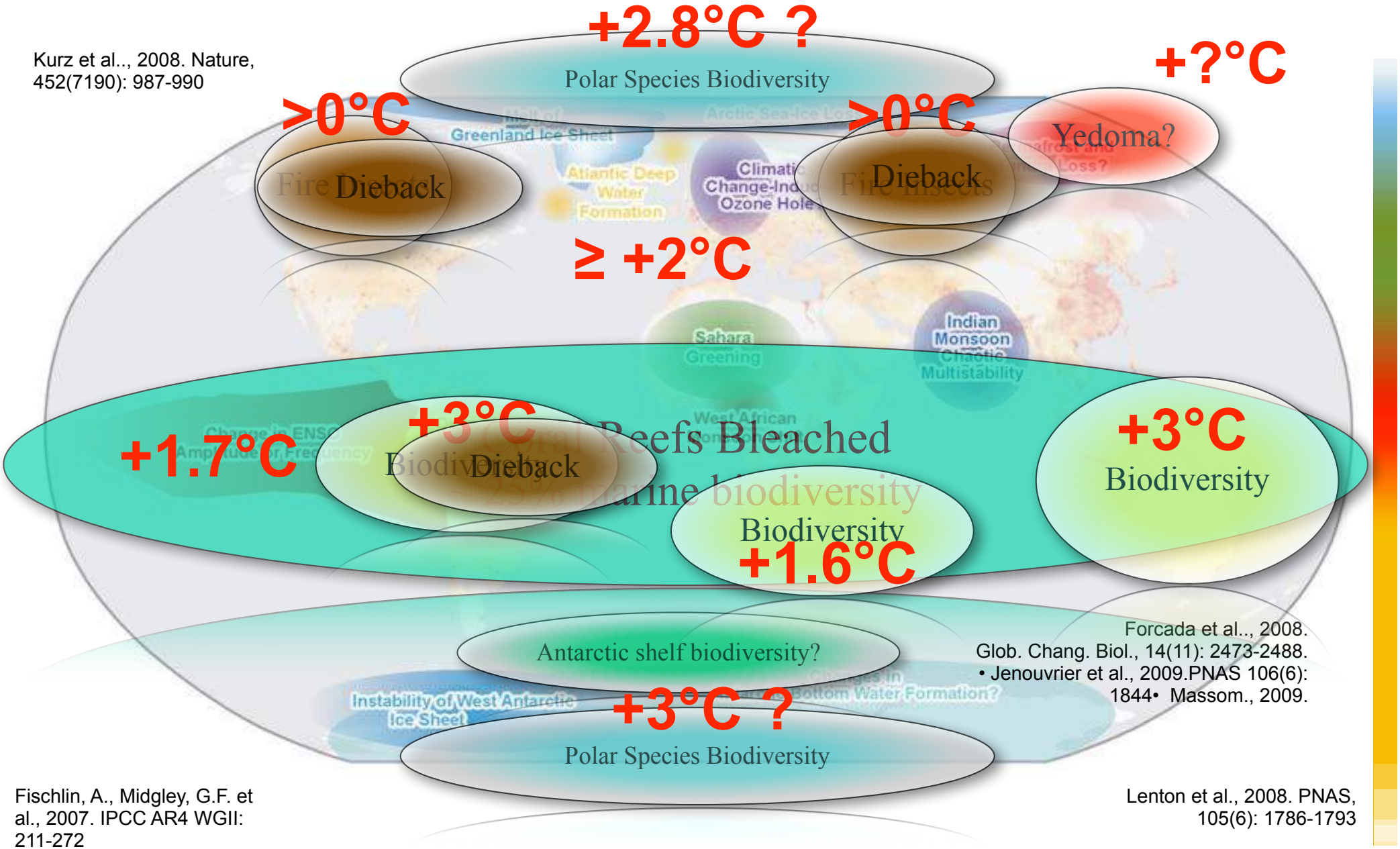
Ich meinte

Klimaskeptiker sind nicht so wichtig


Besonders
wichtig sind
Kipppunkte

Tipping points and ecosystems - AR4

Kurz et al.., 2008. Nature, 452(7190): 987-990



Forcada et al.., 2008. Glob. Chang. Biol., 14(11): 2473-2488. • Jenouvrier et al., 2009.PNAS 106(6): 1844• Massom., 2009.

Fischlin, A., Midgley, G.F. et al., 2007. IPCC AR4 WGII: 211-272

Lenton et al., 2008. PNAS, 105(6): 1786-1793

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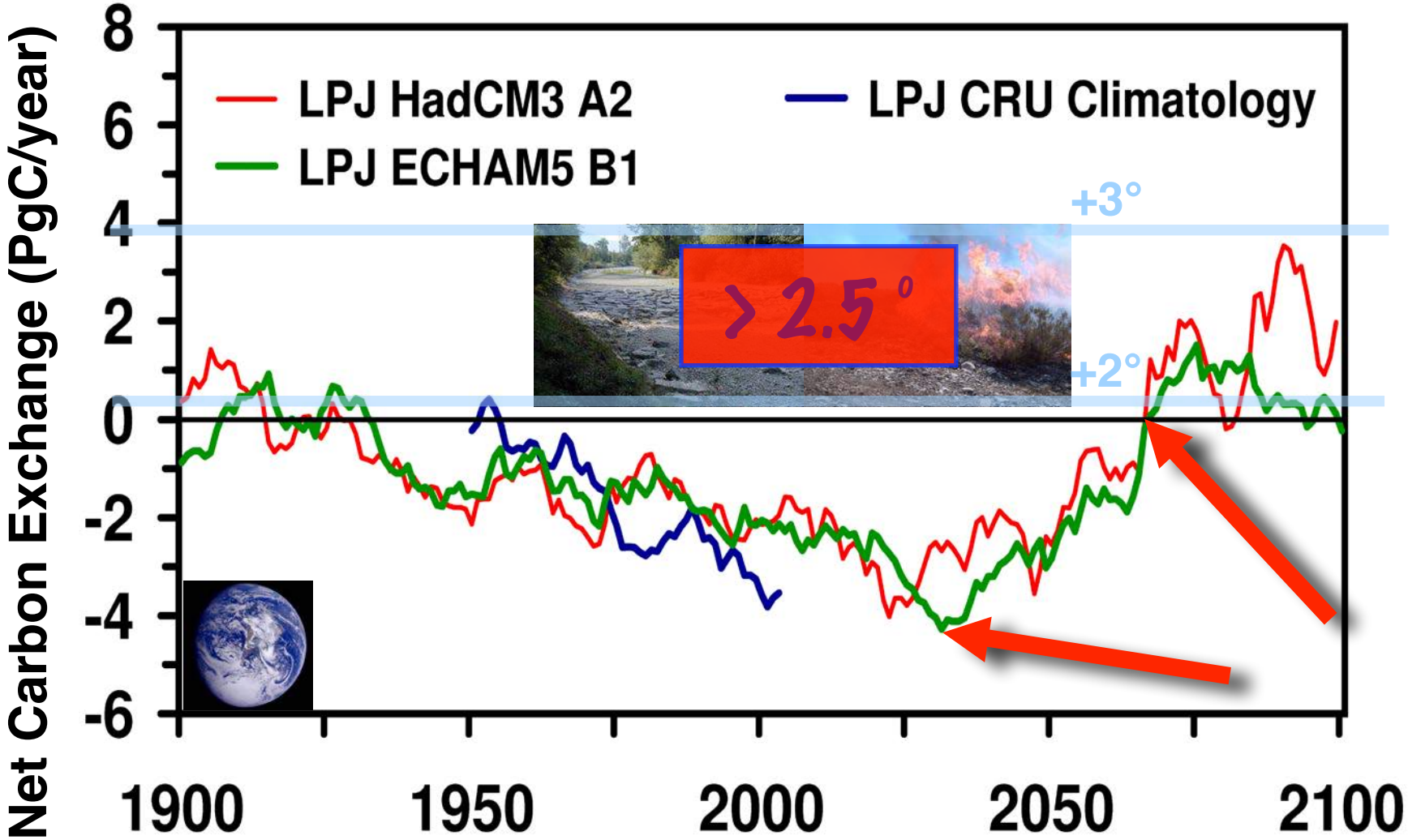
Example: Sink service by terrestrial biosphere at risk!



Fischlin et al., 2007. Ecosystems. In IPCC AR4

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Ich meinte

Es gibt noch sehr viel zu erforschen

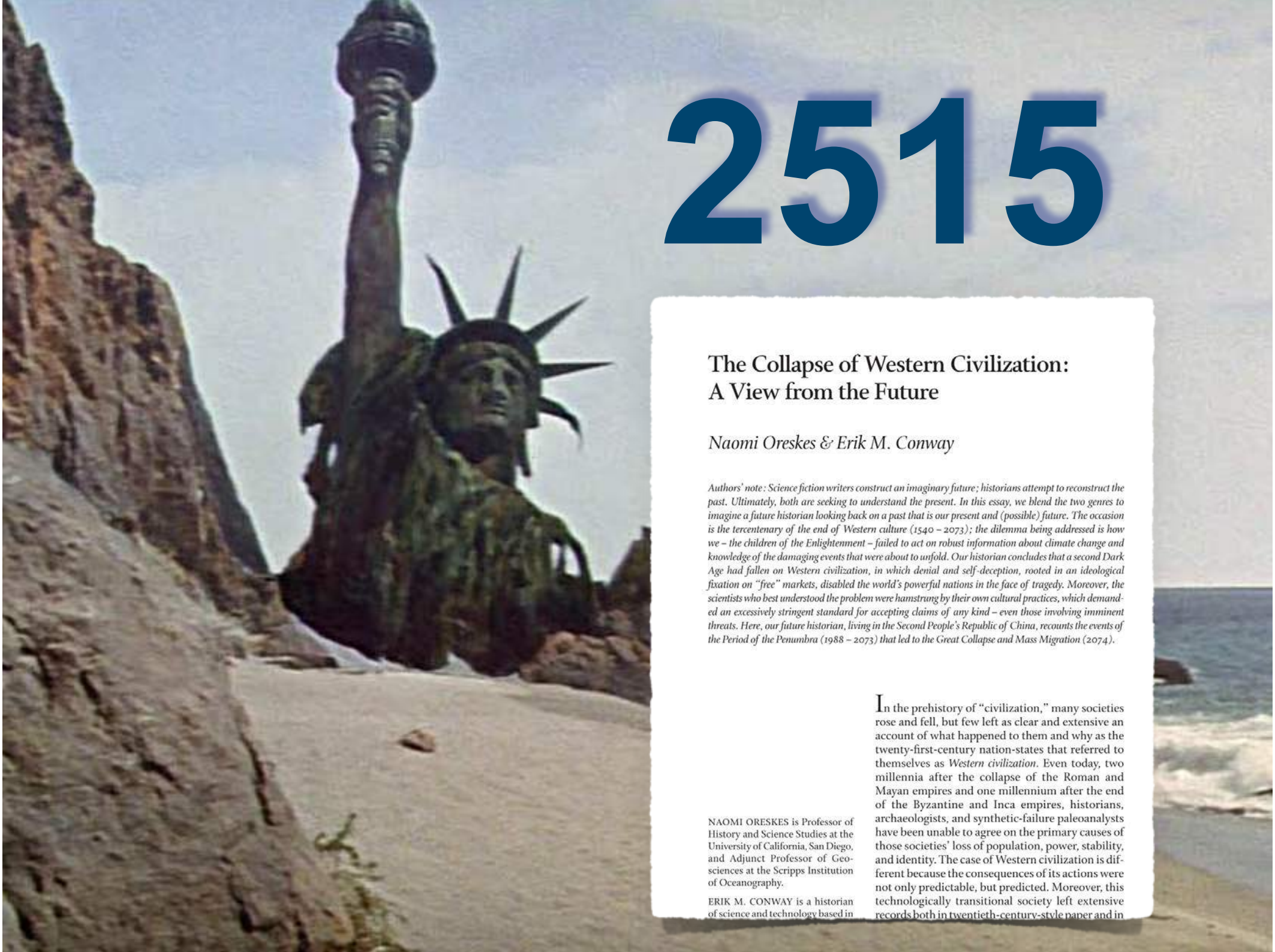
“Der Schweizer IPCC Weg”

- Wir beherbergen das Sekretariat in Genf: www.ipcc.ch
- Wir haben ProClim als Teil der SCNAT
- OcCC “Beratende Organ für Fragen der Klimaänderung”
- Strikte COI (Conflict of Interest) Politik (ich gehöre nicht der schweiz. Delegation an, ich bin auch Ihr Vice-Chair)

- Wir sind forschungsmässig sehr aktiv Uni Bern, ETH Zürich, Freiburg, Genf und viele andere (WGI und WGII)

Zusammenfassung!

- **In Paris (COP21) ist ein historischer Durchbruch gelungen - Nutzen wir ihn!**
- **IPCC ist von entscheidender Bedeutung für die Klimapolitik**
- **Dazu muss aber Wissenschaft nicht nur robust, sondern direkt brauchbar gemacht werden! AR5 hatte Lücken die es zu korrigieren gilt.**
- **Herausforderungen sind zurzeit auch für WissenschaftlerInnen gewaltig, bitte nicht übersehen und nicht zum Alltag zurückkehren!**



2515

The Collapse of Western Civilization: A View from the Future

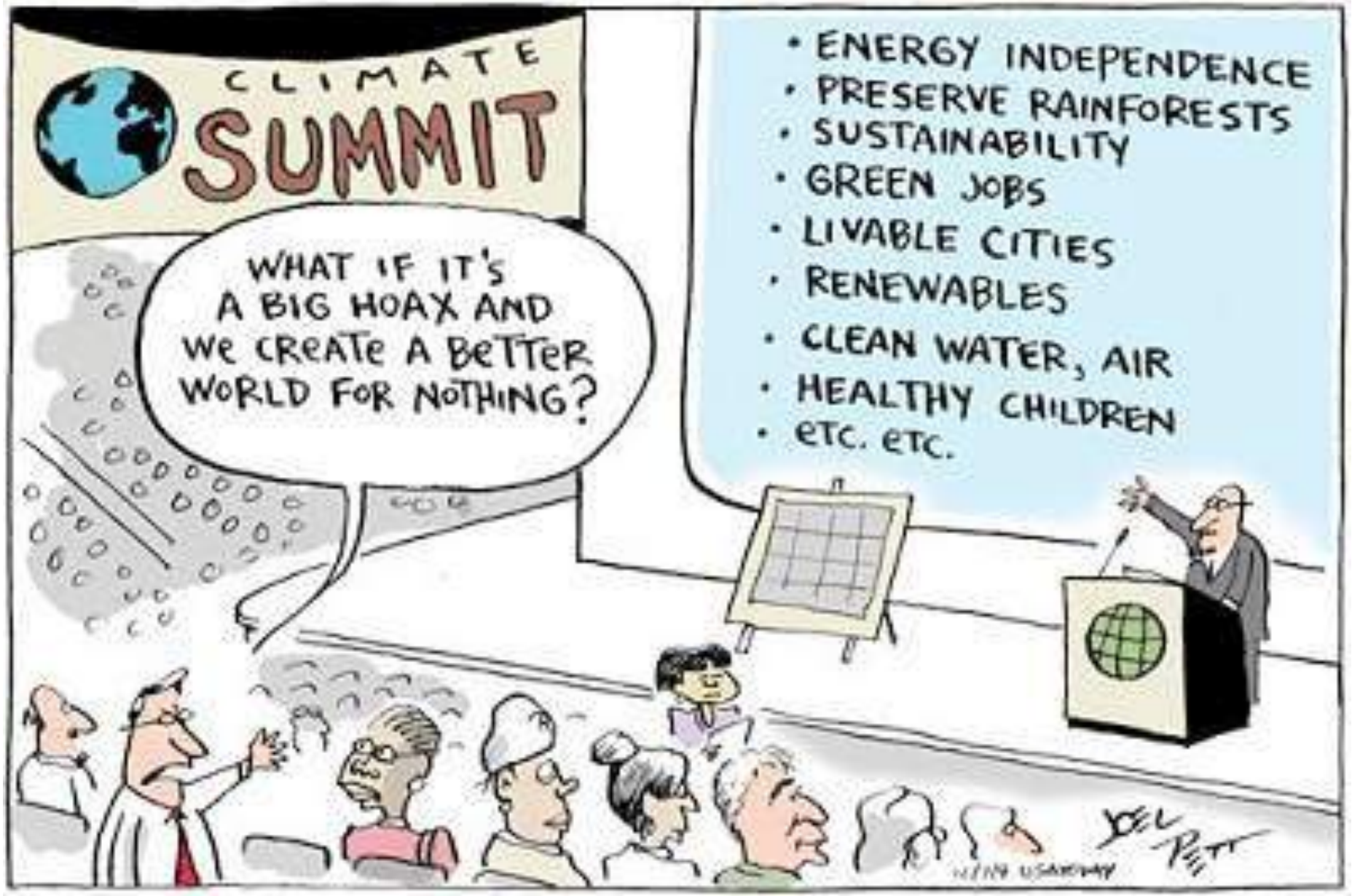
Naomi Oreskes & Erik M. Conway

Authors' note: Science fiction writers construct an imaginary future; historians attempt to reconstruct the past. Ultimately, both are seeking to understand the present. In this essay, we blend the two genres to imagine a future historian looking back on a past that is our present and (possible) future. The occasion is the tercentenary of the end of Western culture (1540 – 2073); the dilemma being addressed is how we – the children of the Enlightenment – failed to act on robust information about climate change and knowledge of the damaging events that were about to unfold. Our historian concludes that a second Dark Age had fallen on Western civilization, in which denial and self-deception, rooted in an ideological fixation on "free" markets, disabled the world's powerful nations in the face of tragedy. Moreover, the scientists who best understood the problem were hamstrung by their own cultural practices, which demanded an excessively stringent standard for accepting claims of any kind – even those involving imminent threats. Here, our future historian, living in the Second People's Republic of China, recounts the events of the Period of the Penumbra (1988 – 2073) that led to the Great Collapse and Mass Migration (2074).

NAOMI ORESKES is Professor of History and Science Studies at the University of California, San Diego, and Adjunct Professor of Geosciences at the Scripps Institution of Oceanography.

ERIK M. CONWAY is a historian of science and technology based in

In the prehistory of "civilization," many societies rose and fell, but few left as clear and extensive an account of what happened to them and why as the twenty-first-century nation-states that referred to themselves as *Western civilization*. Even today, two millennia after the collapse of the Roman and Mayan empires and one millennium after the end of the Byzantine and Inca empires, historians, archaeologists, and synthetic-failure paleoanalysts have been unable to agree on the primary causes of those societies' loss of population, power, stability, and identity. The case of Western civilization is different because the consequences of its actions were not only predictable, but predicted. Moreover, this technologically transitional society left extensive records both in twentieth-century-style paper and in


CLIMATE
SUMMIT
WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER WORLD FOR NOTHING?
• ENERGY INDEPENDENCE
• PRESERVE RAINFORESTS
• SUSTAINABILITY
• GREEN JOBS
• LIVABLE CITIES
• RENEWABLES
• CLEAN WATER, AIR
• HEALTHY CHILDREN
• ETC. ETC.
JOEL PETT

Joel Pett

Danke für Ihre Aufmerksamkeit!

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