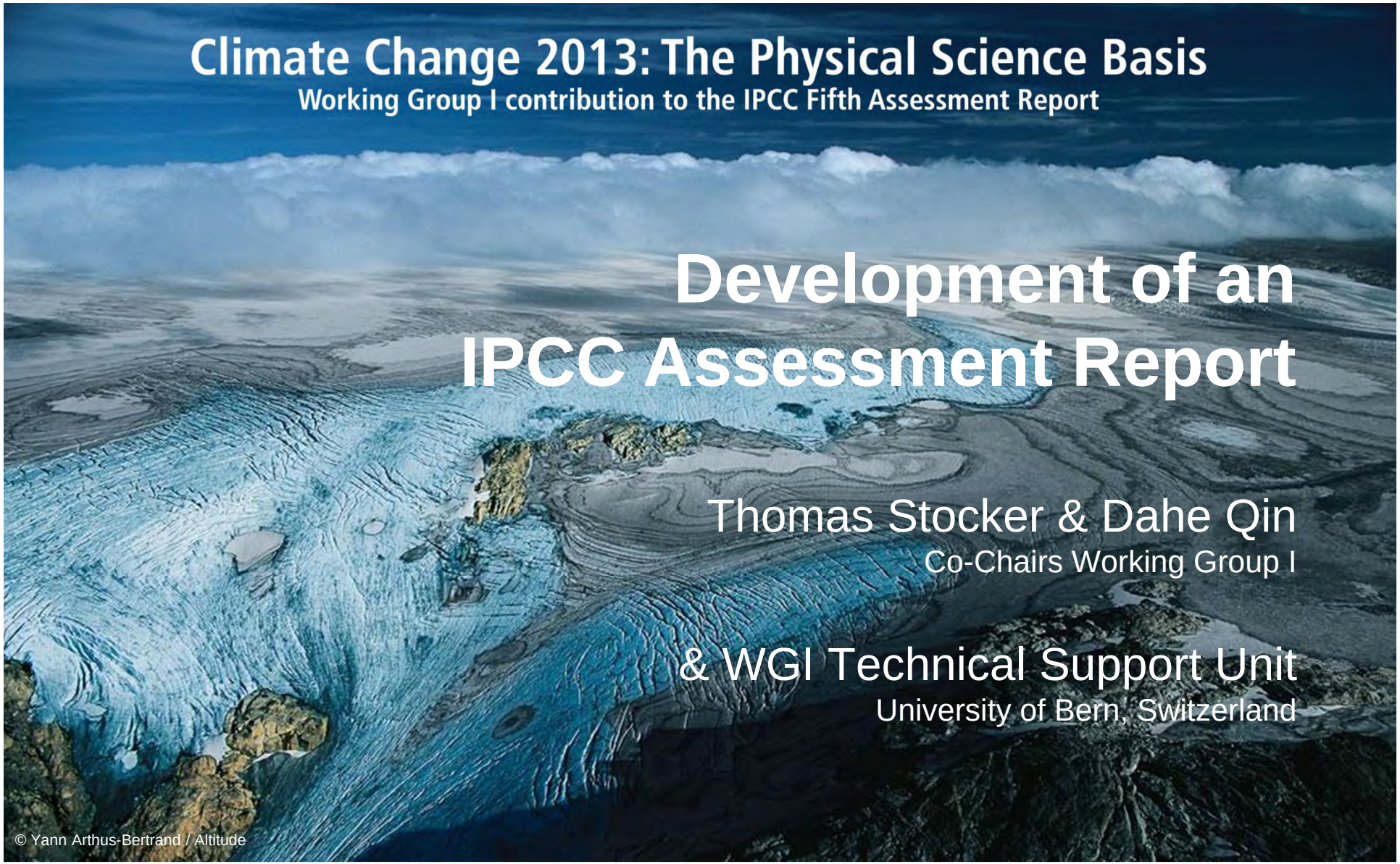
Climate Change 2013: The Physical Science Basis
Working Group I contribution to the IPCC Fifth Assessment Report
Development of an
IPCC Assessment Report
Thomas Stocker & Dahe Qin
Co-Chairs Working Group I
& WGI Technical Support Unit
University of Bern, Switzerland
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No Assessment without Support: The WGI Technical Support Unit

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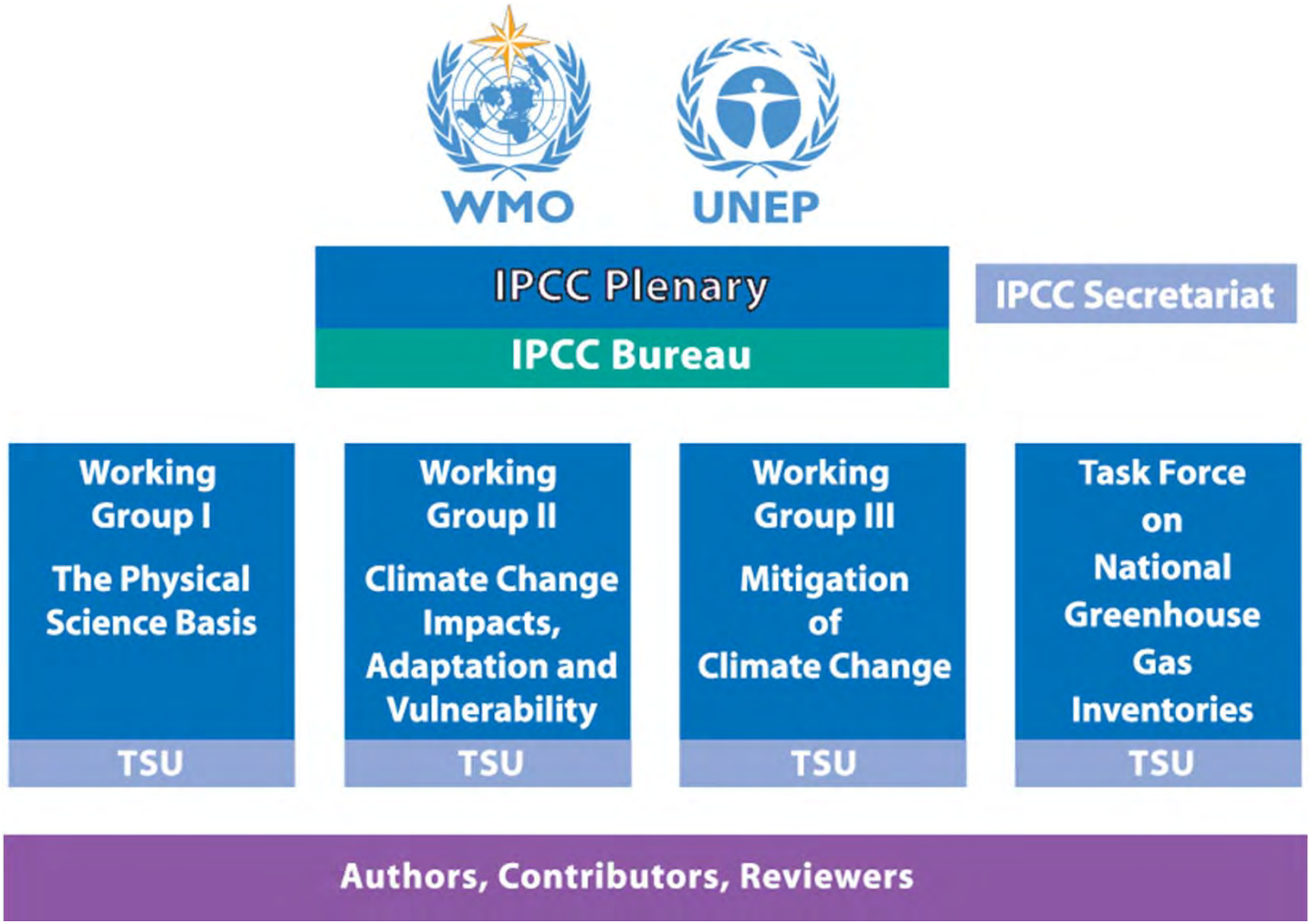
Structure of the Intergovernmental Panel on Climate Change



Principles Governing IPCC Work (1998, 2003, 2006, 2011)

[…]

2. The role of the IPCC is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation. IPCC reports should be neutral with respect to policy, although they may need to deal objectively with scientific, technical and socio-economic factors relevant to the application of particular policies.

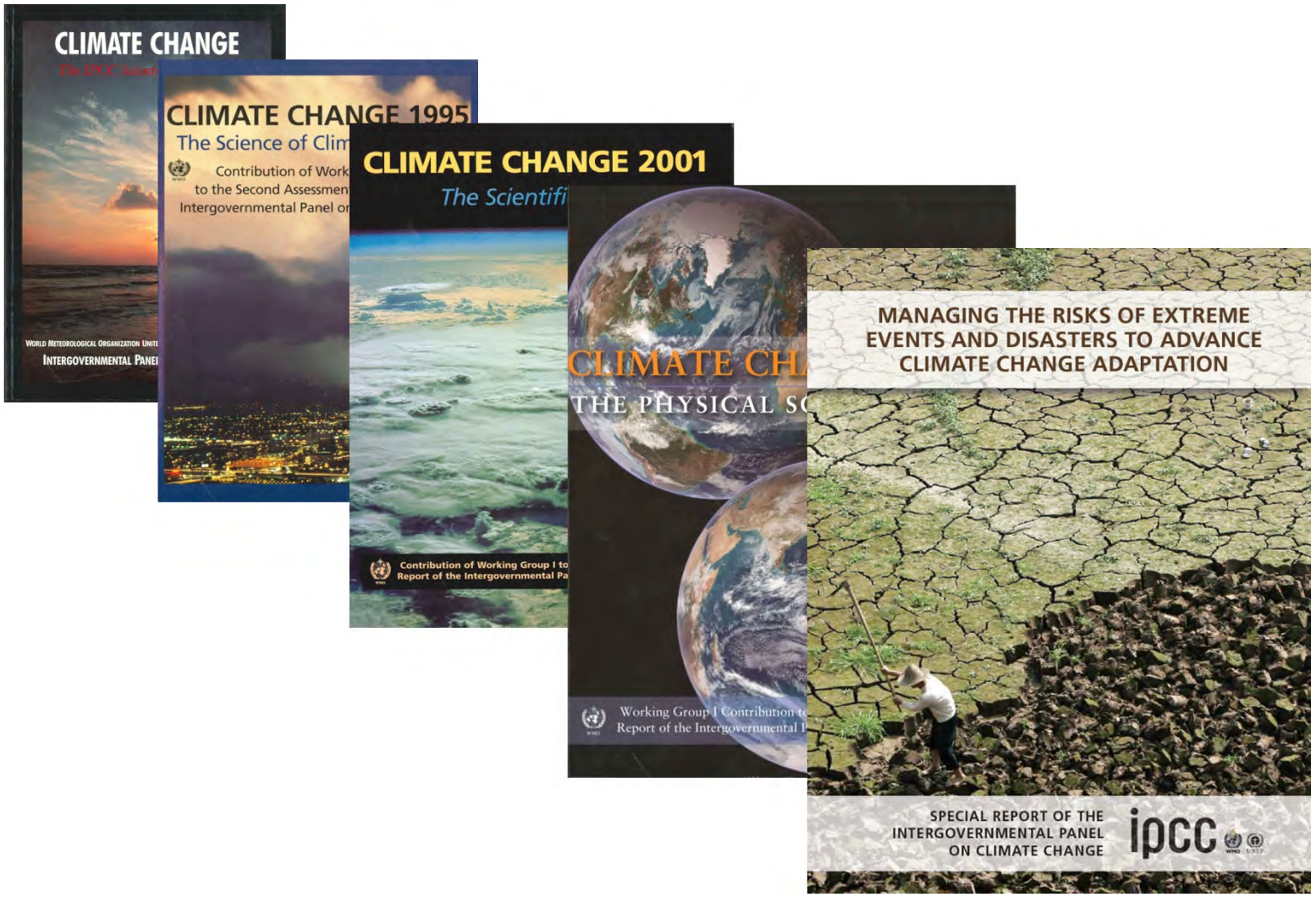
3. Review is an essential part of the IPCC process. Since the IPCC is an intergovernmental body, review of IPCC documents should involve both peer review by experts and review by governments.

[…]

The 3 IPCC Working Groups (WGs)

- **WG I** assesses the *physical science basis* of the climate system and natural and anthropogenic climate change. **(Release 27. September 2013)**
- **WG II** assesses the *vulnerability* of socio-economic and natural systems to climate change, negative and positive *impacts* of climate change, and options for *adapting* to it. **(Release 31. March 2014)**
- **WG III** assesses options for *mitigating climate change* through limiting or preventing greenhouse gas emissions and enhancing activities that remove them from the atmosphere. **(Release 12. April 2014)**

IPCC WGI Reports to Date (1990−2012)



What Are the Elements of the WGI Assessment Report?

Report

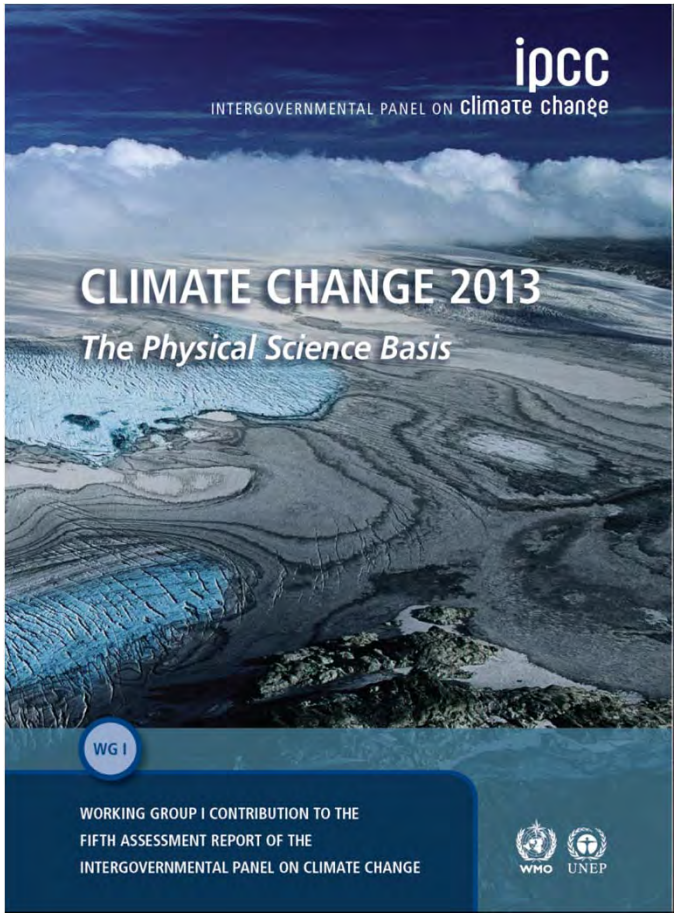
14 Chapters, Annexes, Supplementary Material
Regional Projections in Digital Form

Technical Summary

Summary for Policymakers

Synthesis Report

all WGs contribute (target 30 pages excl. Figs.)



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all WGs contribute (target 30 pages total)

Table TS.3. *Contributions to sea level rise based upon observations (left columns) compared to models used in this assessment (right columns; see Section 9.5 and Appendix 10.A for details). Values are presented for 1993 to 2003 and for the last four decades, including observed totals. {Adapted from Tables 5.3 and 9.2}*

	Sea Level Rise (mm yr^{-1})			
	1961–2003		1993–2003	
Sources of Sea Level Rise	Observed	Modelled	Observed	Modelled
Thermal expansion	0.42 ± 0.12	0.5 ± 0.2	1.6 ± 0.5	1.5 ± 0.7
Glaciers and ice caps	0.50 ± 0.18	0.5 ± 0.2	0.77 ± 0.22	0.7 ± 0.3
Greenland Ice Sheet	0.05 ± 0.12[a]		0.21 ± 0.07[a]	
Antarctic Ice Sheet	0.14 ± 0.41[a]		0.21 ± 0.35[a]	
Sum of individual climate contributions to sea level rise	1.1 ± 0.5	1.2 ± 0.5	2.8 ± 0.7	2.6 ± 0.8
Observed total sea level rise	1.8 ± 0.5 (tide gauges)		3.1 ± 0.7 (satellite altimeter)	
Difference (Observed total minus the sum of observed climate contributions)	0.7 ± 0.7		0.3 ± 1.0	

Notes:
[a] prescribed based upon observations (see Section 9.5)

while in other regions sea level is falling. The largest sea level rise since 1992 has taken place in the western Pacific and eastern Indian Oceans (see Figure TS.19). Nearly all of the Atlantic Ocean shows sea level rise during the past decade, while sea level in the eastern Pacific and western Indian Oceans has been falling. These temporal and spatial variations in regional sea level rise are influenced in part by patterns of coupled ocean-atmosphere variability, including ENSO and the NAO. The pattern of observed sea level change since 1992 is similar to the thermal expansion computed from ocean temperature changes, but different from the thermal expansion pattern of the last 50 years, indicating the importance of regional decadal variability. {5.5}

Observations suggest increases in extreme high water at a broad range of sites worldwide since 1975. Longer records are limited in space and under-sampled in time, so a global analysis over the entire 20th century is not feasible. In many locations, the secular changes in extremes were similar to those in mean sea level. At others, changes in atmospheric conditions such as storminess were more important in determining long-term trends. Interannual variability in high water extremes was positively correlated with regional mean sea level, as well as to indices of regional climate such as ENSO in the Pacific and NAO in the Atlantic. {5.5}

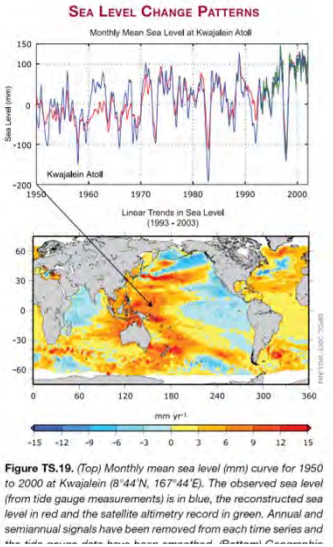

Figure TS.19. *(Top) Monthly mean sea level (mm) curve for 1950 to 2000 at Kwajalein (8°44'N, 167°44'E). The observed sea level (from tide gauge measurements) is in blue, the reconstructed sea level in red and the satellite altimetry record in green. Annual and semiannual signals have been removed from each time series and*

(IPCC 2007, Technical Summary)

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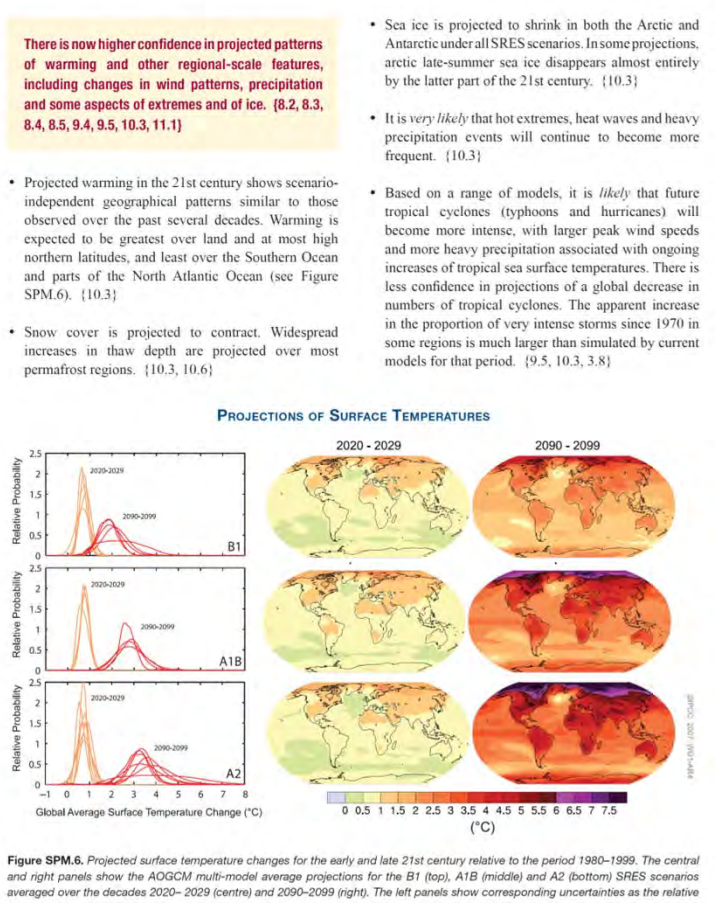
all WGs contribute (target 30 pages total)



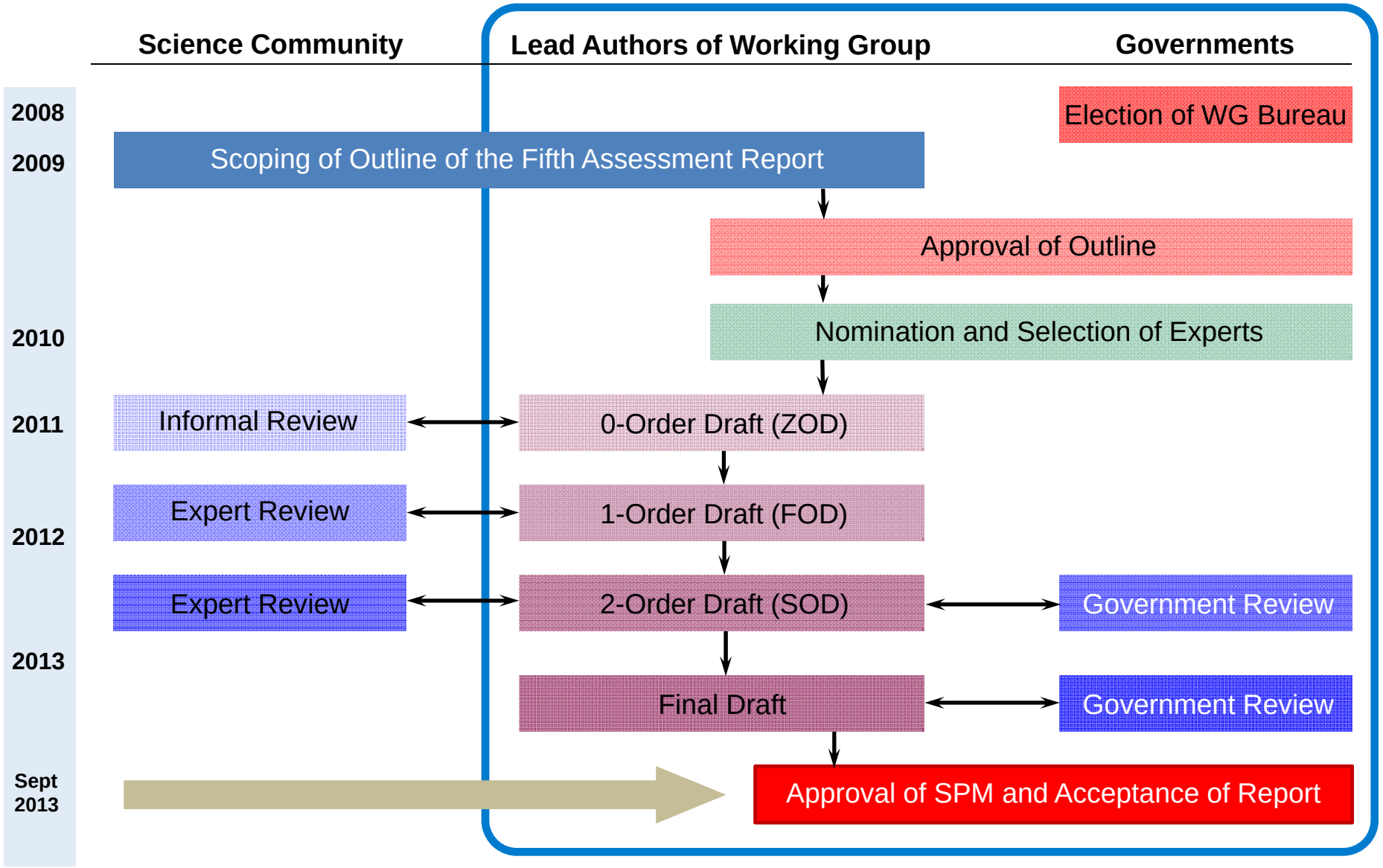
There is now higher confidence in projected patterns of warming and other regional-scale features, including changes in wind patterns, precipitation and some aspects of extremes and of ice. {8.2, 8.3, 8.4, 8.5, 9.4, 9.5, 10.3, 11.1}

- Projected warming in the 21st century shows scenario-independent geographical patterns similar to those observed over the past several decades. Warming is expected to be greatest over land and at most high northern latitudes, and least over the Southern Ocean and parts of the North Atlantic Ocean (see Figure SPM.6). {10.3}
- Snow cover is projected to contract. Widespread increases in thaw depth are projected over most permafrost regions. {10.3, 10.6}
- Sea ice is projected to shrink in both the Arctic and Antarctic under all SRES scenarios. In some projections, arctic late-summer sea ice disappears almost entirely by the latter part of the 21st century. {10.3}
- It is *very likely* that hot extremes, heat waves and heavy precipitation events will continue to become more frequent. {10.3}
- Based on a range of models, it is *likely* that future tropical cyclones (typhoons and hurricanes) will become more intense, with larger peak wind speeds and more heavy precipitation associated with ongoing increases of tropical sea surface temperatures. There is less confidence in projections of a global decrease in numbers of tropical cyclones. The apparent increase in the proportion of very intense storms since 1970 in some regions is much larger than simulated by current models for that period. {9.5, 10.3, 3.8}

Figure SPM.6. *Projected surface temperature changes for the early and late 21st century relative to the period 1980–1999. The central and right panels show the AOGCM multi-model average projections for the B1 (top), A1B (middle) and A2 (bottom) SRES scenarios averaged over the decades 2020– 2029 (centre) and 2090–2099 (right). The left panels show corresponding uncertainties as the relative*

(IPCC 2007, Summary for Policymakers)

IPCC Process (WGI):



Facts About the WGI Contribution to IPCC AR5

- **209 Lead Authors** and 50 Review Editors from 39 countries
- Over **600 Contributing Authors**
- More than **2 million gigabytes** of numerical data from climate models
- Over **9200 scientific publications** cited
- **1089 expert reviewers** from 55 countries and 38 governments
- **54,677 review comments**
- Will be approved by up to **195 countries** in September 2013

Characteristics of IPCC reports

- **Authors nominated by governments**, observer organisations
- Selection of chapter teams **based on expertise**
- Attention to **regional and gender balance**
- Drafts are developed with **multiple rounds of review**
- **Line-by-line approval** of Summary for Policymakers by governments
- Presence of authors at approval ensures **scientific accuracy**

Dates and WGI Milestones to Note

- 23-26.9.2013 — WGI SPM approval in Stockholm
- **27 Sept. 2013** — **IPCC Media Conference, Stockholm**
  Release of Summary for Policymakers
- 30 Sept. 2013 — WGI Stakeholder Event, Bern;
- 30 Sept. 2013 — Release of Final Draft (version 7.6.2013)
- **ca. Jan. 2014** — **Publication of Report (pdf Versions)**
- ca. Mar 2014 — Publication of printed Report by CUP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Working Group I contribution to the IPCC Fifth Assessment Report
Further Information
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