CENTRE FOR
NON-TRADITIONAL
SECURITY STUDIES

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Sustainable Development and the Nexus between Climate Change and Energy Security

© Hans Günter Brauch,
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Editor, Hexagon Series on Human, Environmental Security and Peace
Editor, SpringerBriefs in Environment, Security, Development & Peace

Business-as-Usual vs. Sustainability Transition in the Context of the Nexus between Climate Change and Energy Security

Freie Universität Berlin

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Institute for Environment and Human Security

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the language of science

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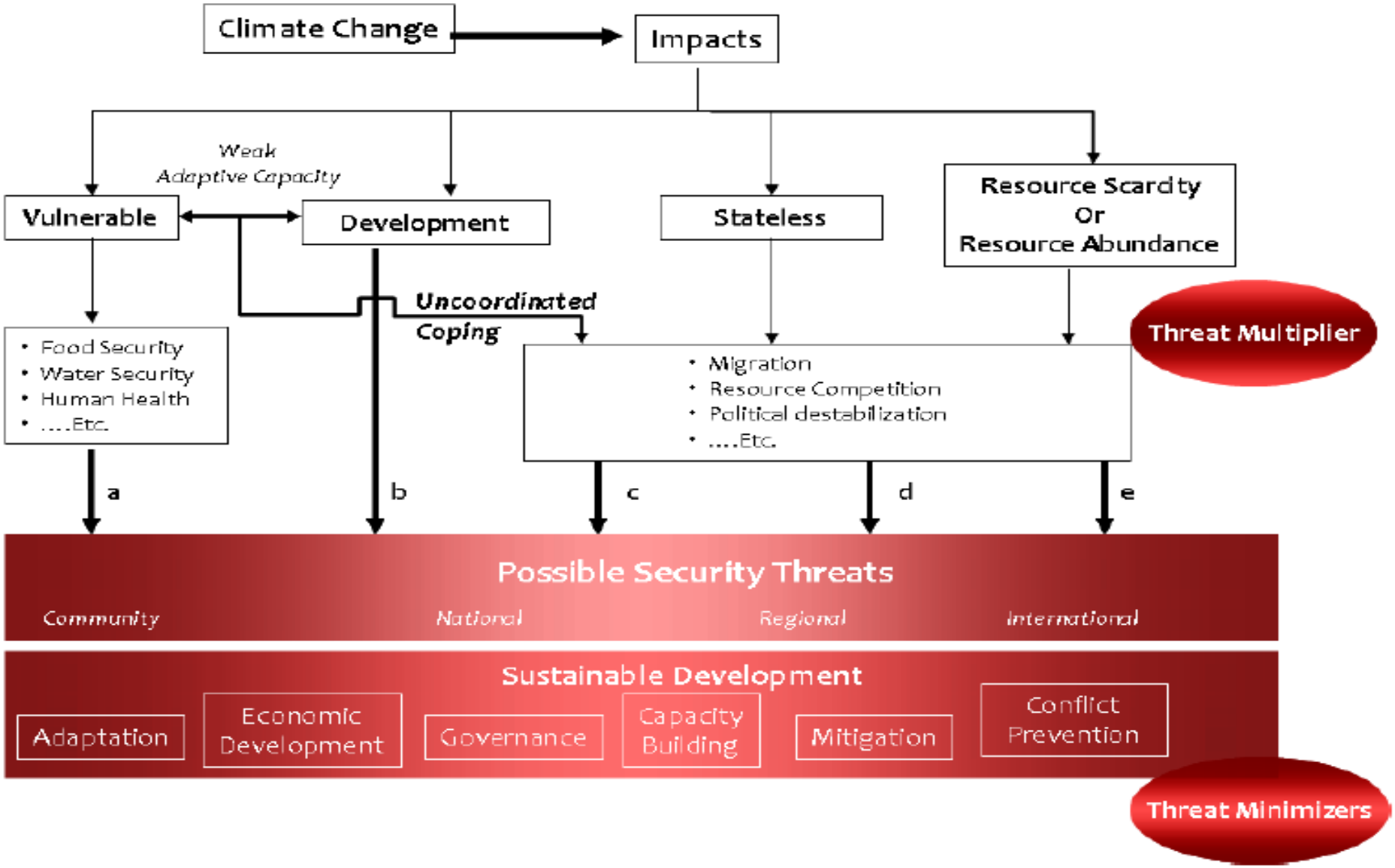
1. Introduction: 3 anniversaries and 2 debates

- **Three anniversaries**
  - **25 years:** Brundtland Report (1987)
  - **20 Years:** Rio Earth Summit: UNFCCC (1992)
  - **15 years:** Kyoto Protocol (1997)
  - UNCSD summit **Rio+20 (2012):** Future we Want!
- **2 Policy Debates & Scientific Discourses:**
  - Climate Change and Security: Implications of GEC & CC for international, national & human security
  - Decarbonization or Greening of the Economy
  - Longterm transformative change to sustainable development or: sustainabiility transition

1.1. Report of UN-Sec-General (11.9.2009)



1.2. First Discourse: Securitization of Climate Change - Three Security Policy Debates

Climate change & internat. security discourse

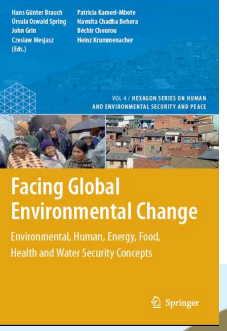
- **UN (17 April 2007):** FM M. Beckett, UK presidency
- **EU (2008):** EC & Council Study & roadmap process
- UN GA (June 2009) Res., Report by Sec. General

Climate change & national security discourse:

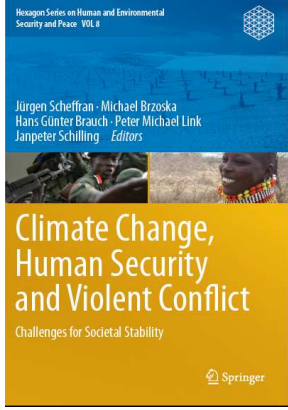
- **US studies:** CNA, CSIS, NIC (CIA), NSS 2010

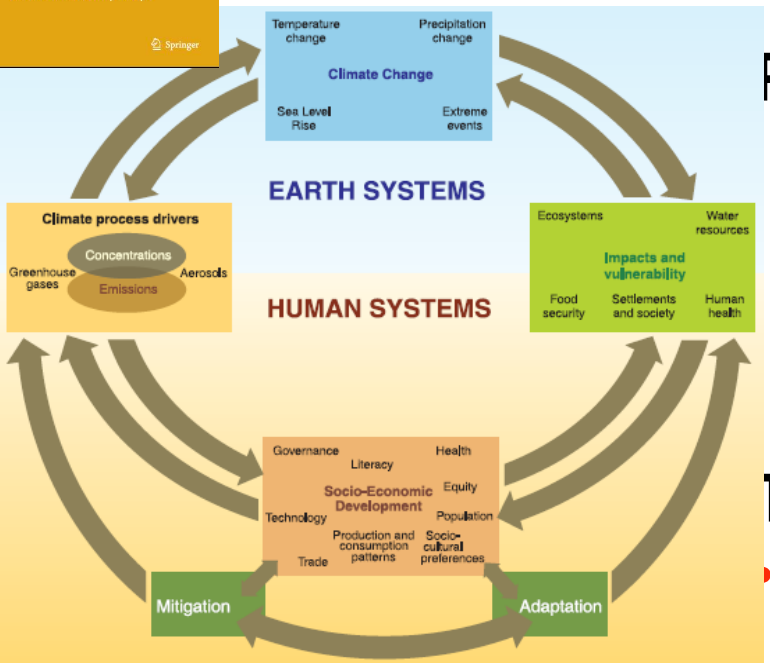
Climate change & human security discourse

- IHDP (GECHS): Lonergan & Brklacich (chairnen)
  - 2005: conference in Norway on Cliamte change and human security
- HSN (Canada was a co-founder & a major sponsor)
- 2007/2008: Greek HSN presidency
- **2011-2014: IPCC, WG II, chapter on human security**



1.3. Climate Change & Security Nexus in Social Sciences





Four Schools

- Dramatizers: Climate wars
- Sceptics: lack of research (PRIO)
- **Empiricists: PEISOR Model & linkages**
- Trend & future scenarios

Two Approaches

- **Policy & Scenario analysis Causal analysis**
  - Natural phenomena -> migration, crises, conflicts (violence)
- **Discourse analysis:** climate change
  - International security
  - National security
  - Environmental security
  - Human security

Objects of Security Analysis (Securitization)

- Physical Effects: e.g. temp, rise
- Impacts: Sectors & Regions
- Societal Effects (migration, crises, conflicts

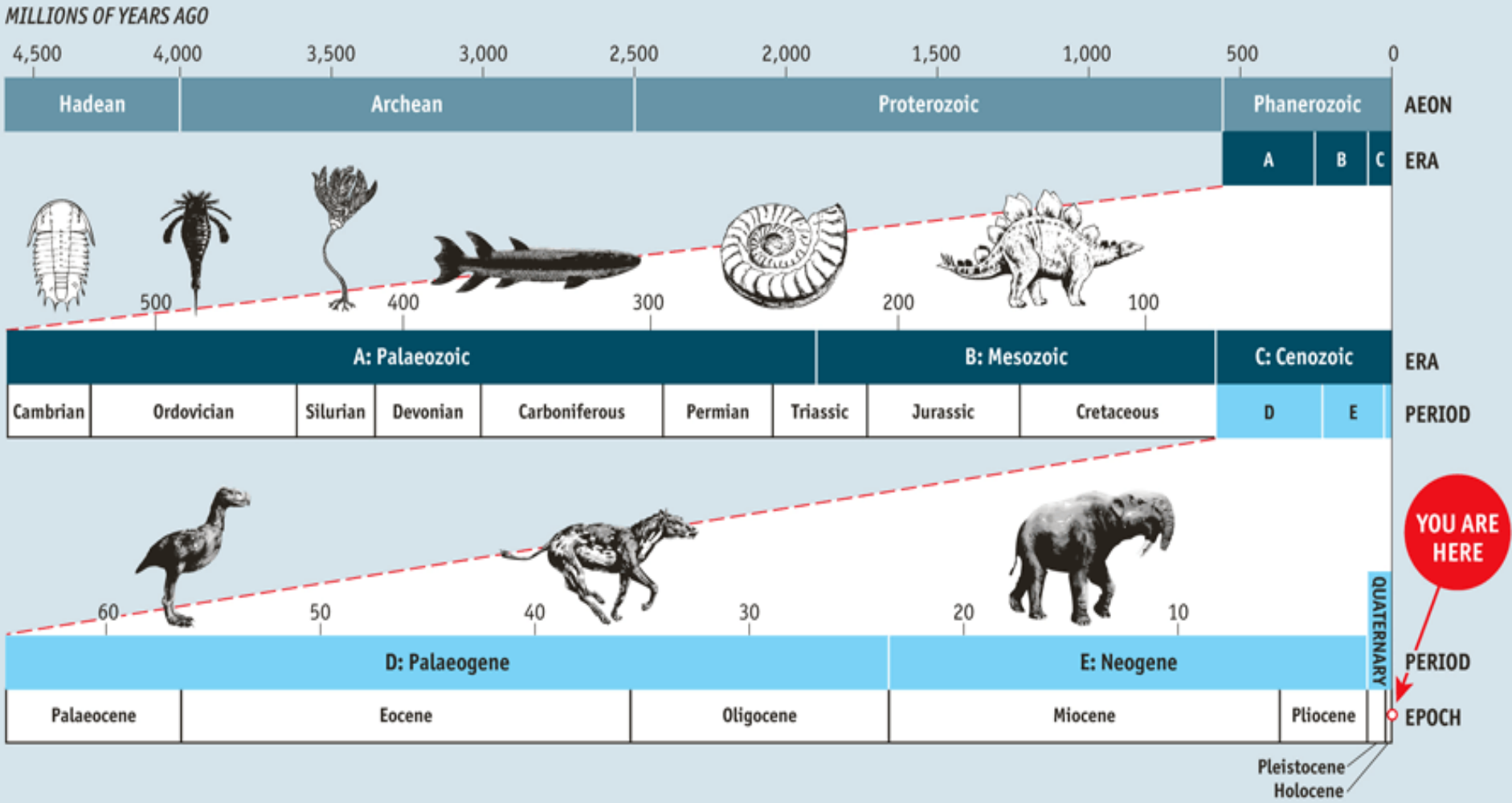
Whether they pose:

- **Objective Security Dangers**
- **Subjective Security Concerns**

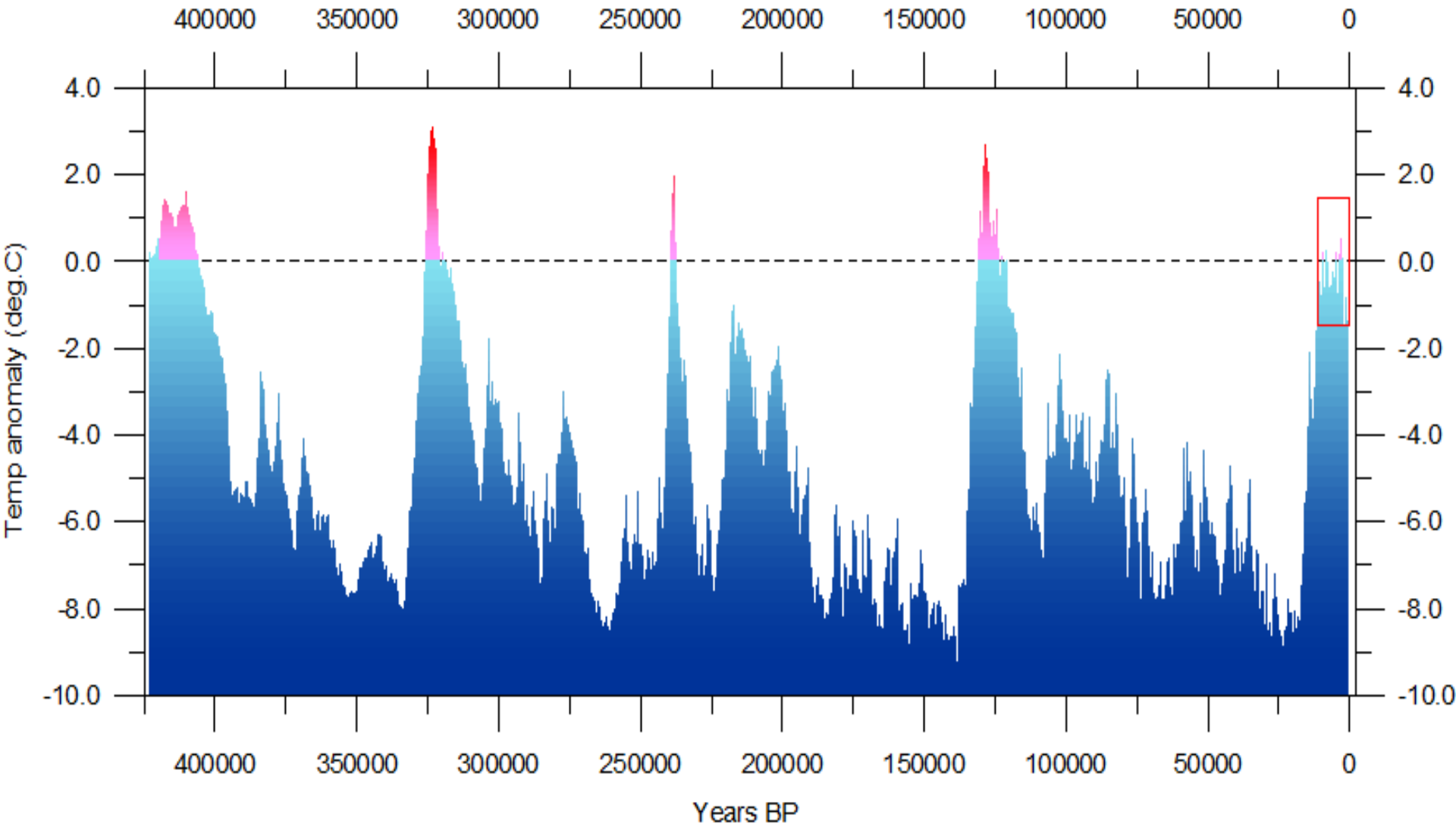
2. Transition of Earth History: From the Holocene to the Anthropocene

- We have mapped a fundamental and global **Reconceptua-lization of Security** since 1989 for three reasons:
- What has triggered this global contextual & conceptual change?
  - End of the Cold Wat
  - Process of Globalization
  - Global environmental change: Transition from Holocene to Anthropocene
- Which conceptual innovations affecting the security analysis
  - Ulrich Beck (1986, 2007): Theory of (international) risk society
  - Ole Wæver (1997): Theory of securitization (Copenhagen school of critical security studies
  - Paul J. Crutzen (2000): Humankind was instrumental for transition in earth history from Holocence (12000 BP) to Anthropocene

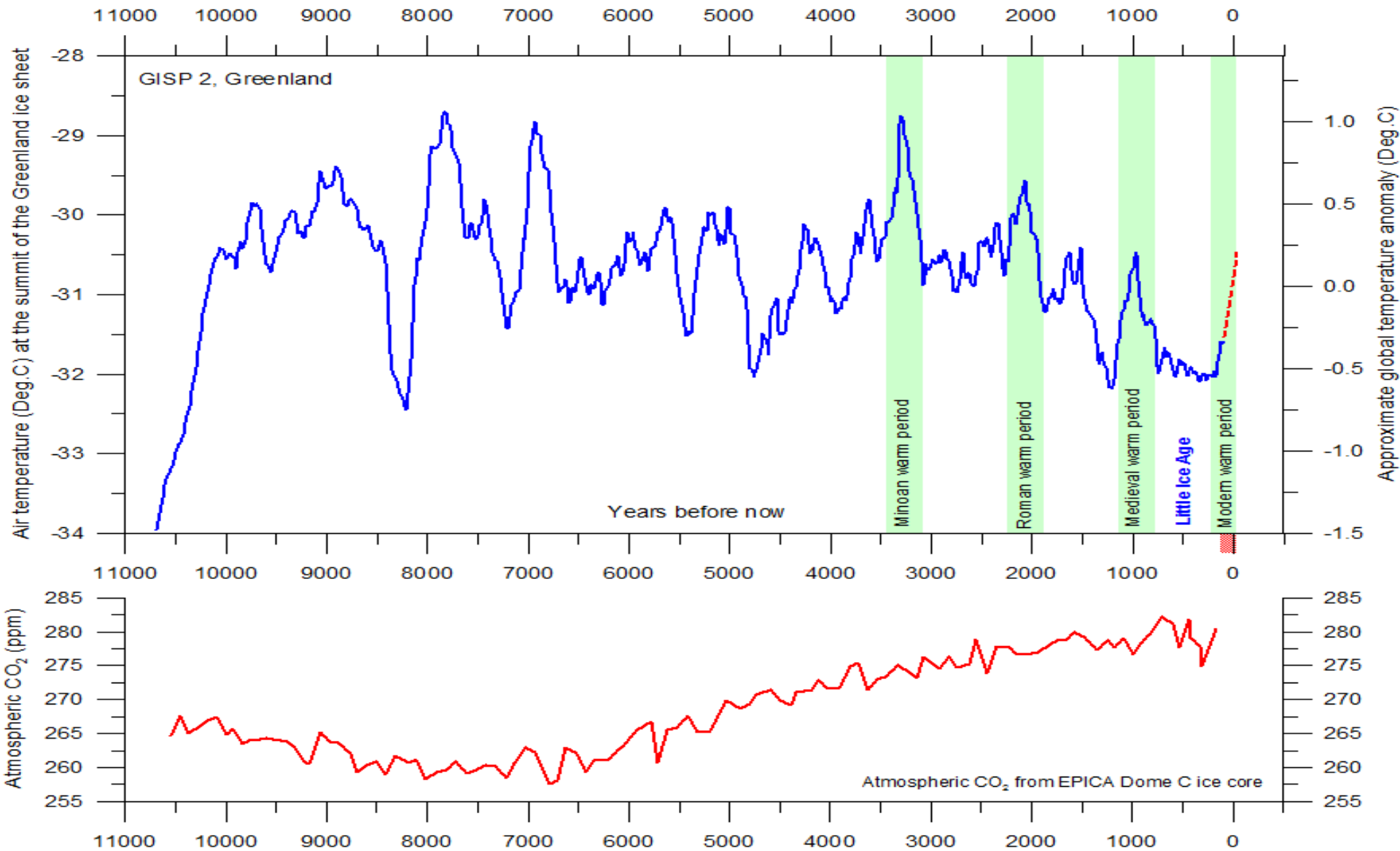
2.1 Geological Time: Earth History



2.2 Geological times: 400 000 years of climate history

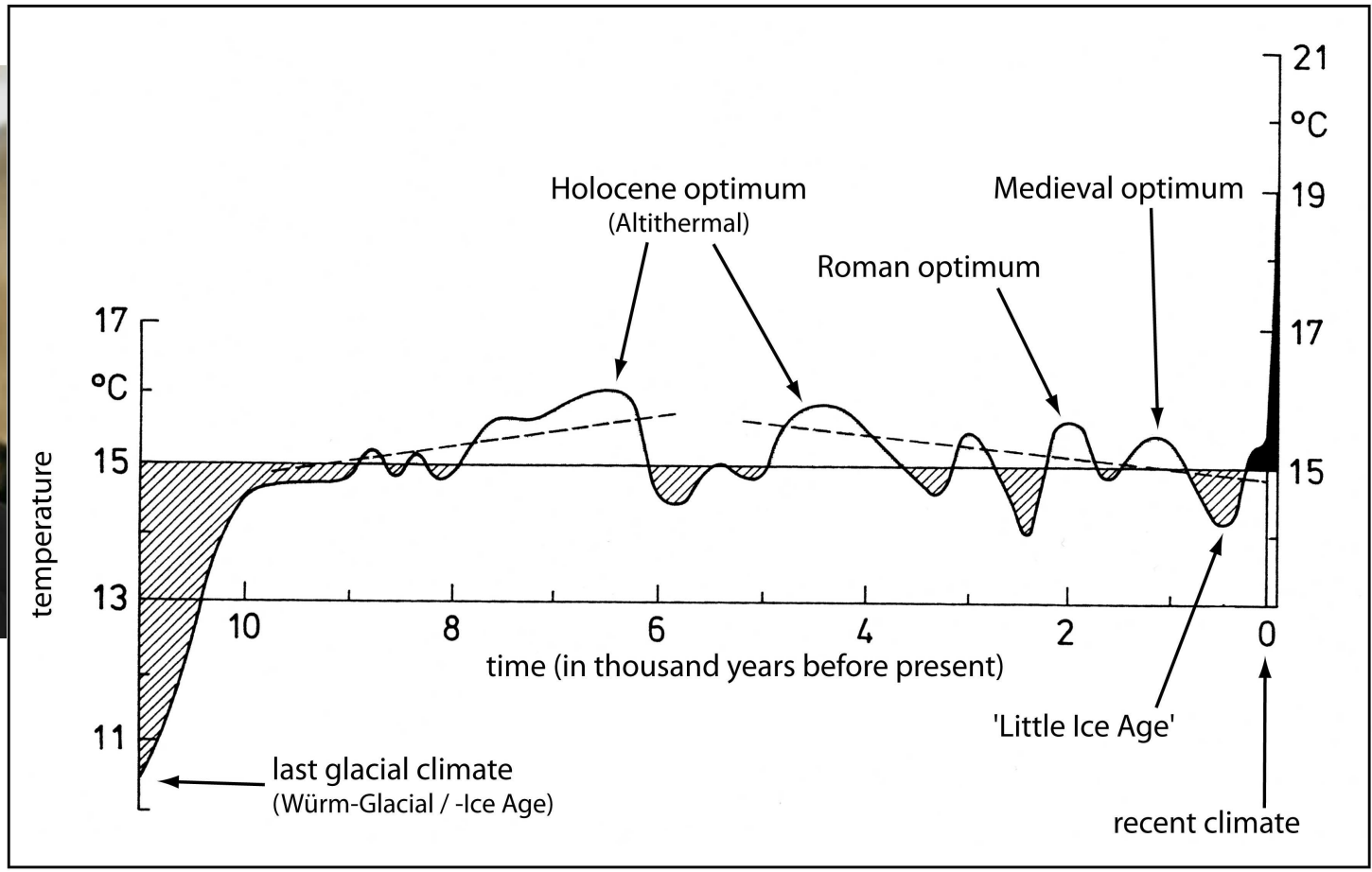


2.3 The Holocene (11600 BP-now)



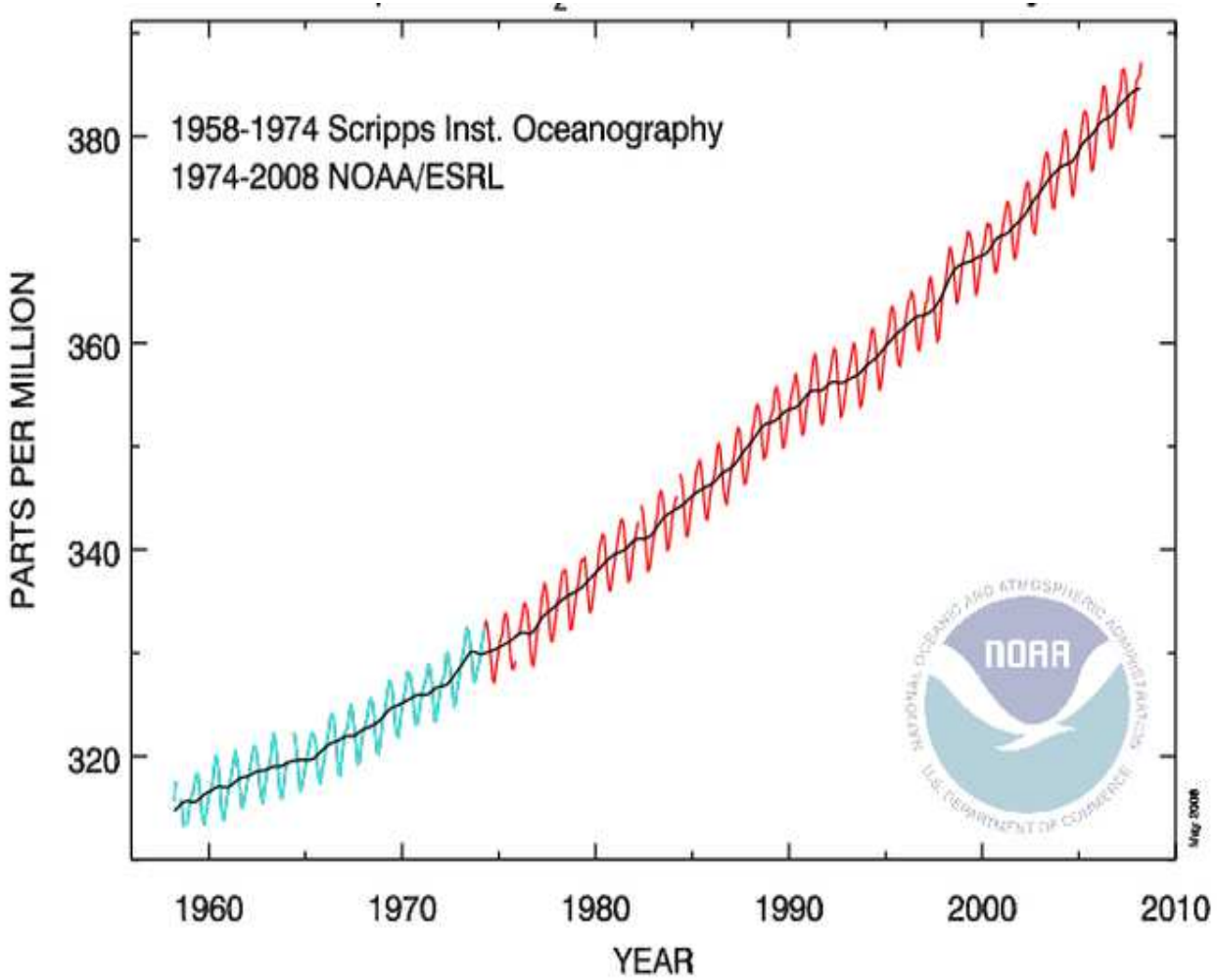
2.4. From the Holocene (12.000 years b.p.) to the Anthropocene (1784 AD)

Paul Crutzen, Nobel Laureate for Chemistry (1995)



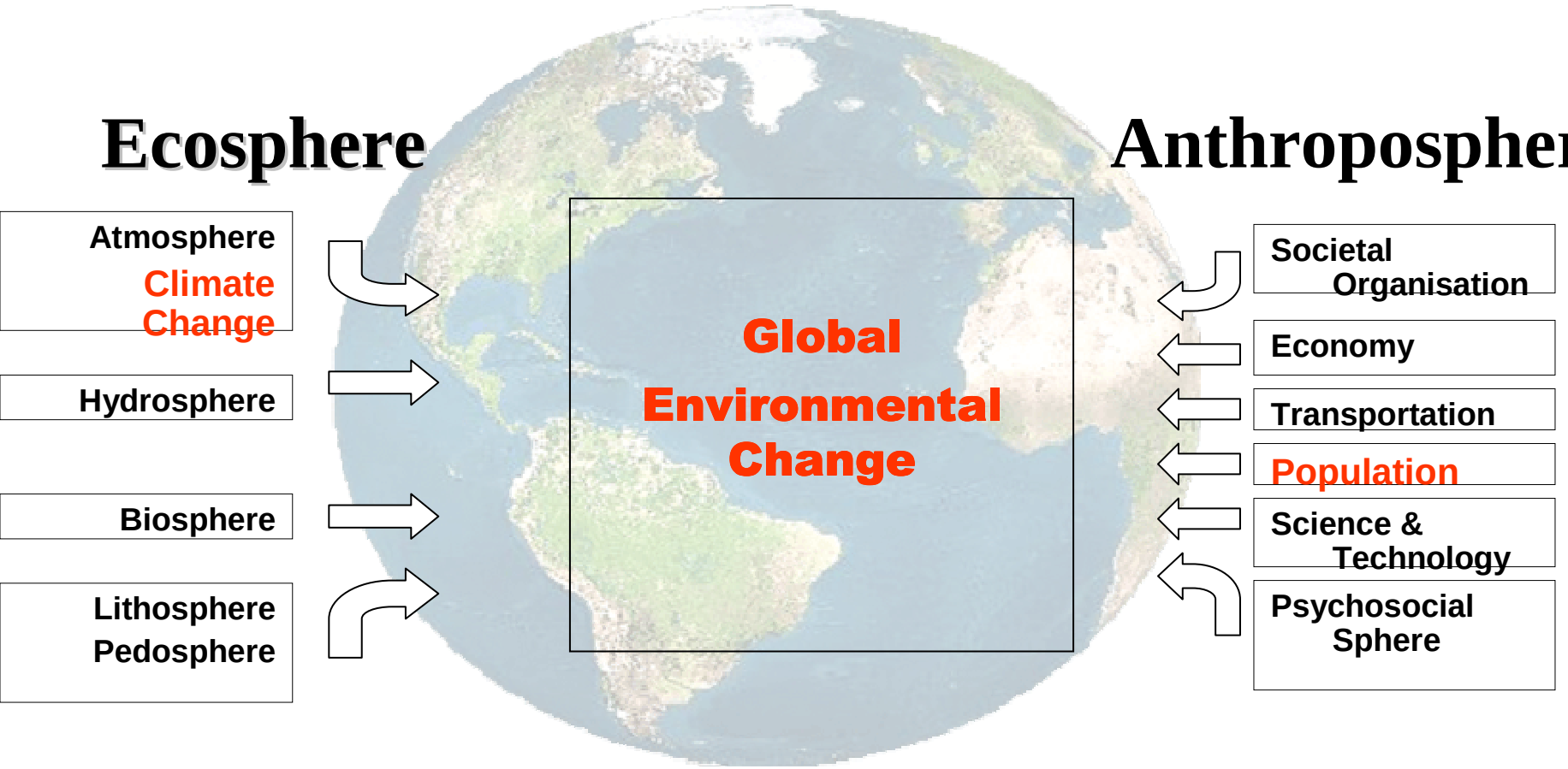
In Geology/geography: **Holocene** era of earth history since end of glacial period (10-12.000 years ago, Anthropocene, since industrial revolution (1784, J.Watt's invention of steam engine: anthropogenic climate changte: burning of coal.oil,gas➔GHG increase

2.5. Anthropogenic Climate Change in the Anthropocene Era (1750 to present)



- GHG concentration in the atmosphere
- 1750: 279 ppm, 1987: 387 ppm
- 2011: 393 ppm
- 2012: 396 ppm
- 1/3: 1750-1958: 279 to 315 ppm
- 2/3: 1958-2011: 315 to 393 ppm

3. Global Environmental and Climate Change: Rio Conventions UNFCCC (1992) & Kyoto Protocol (1997)



GEC poses a threat, challenge, vulnerabilities and risks for human security and survival.

3.1. Milestones in the Policy Debates on Sustainable Development (1987-2012): Rio Conventions (1992)

- 1983: **UN *World Commission on Environment and Development*** (WCED), was appointed by UN SG in 1983 based on UNGA Resolution
- 1987: **Brundtland Commission Report** was released in October that called for an international meeting where more concrete initiatives and goals could be mapped out [that] was held in Rio de Janeiro, Brazil in June
- **1992: UNCED:** Rio conventions (UNFCCC, UNCBD) & Agenda 21
- UNCSD set up as a commission of ECOSOC,
- **1994: Barbados Plan of Action**
- **1997: Programme for the Further Implementation of Agenda 21**
- **2000: the adoption of the MDGs**
- **2002, UNCSD** adopted the ***Johannesburg Declaration on Sustainable Develop-ment*** **and a *Plan of Implementation of the World Summit on Sustainable Development*.**
- **2005: Mauritius Strategy of Implementation**
- In **June 2012 in Rio de Janeiro** in June 2012, the conference approved an outcome document on **"The Future We Want".**

3.2. Goal of Sustainability & Past 25 Years of Policy and Scientific Debates on Sustainable Development

Political Concept of Sustainable Development (SD)

- Since the Brundtland Commission (1987) report, SD has become a key concept that has since guided both policy and scientific debates. It defined sustainable development as a form of development that
- **"meets the needs of the present without compromising the ability of future generations to meet their own needs".**
- **SD** comprises two other concepts of "'needs', **"in particular the essential needs of the world's poor, to which overriding priority should be given; & the idea of limitations imposed by the state of technology & social organization on the environment's ability to meet present & future needs".**
- For Brundtland Commission, **"SD is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations".**

4. Climate Paradox: Legal Obligations & Limited Implementation

- A ‘climate paradox' has emerged due to a **growing implementation gap in Canada, USA & Japan**, while Russia, Germany, UK, France & Italy fulfilled their GHG reduction obligation.
- As **Annex-1 & Annex-B** countries, G8 share a major responsibility for this policy failure, together with other G20 countries, which contribute more than 80% of global GHG emissions.
- **Three G8 countries face a ‘climate paradox’ due to their inability to implement their legal obligations and policy declarations for GHG reduction targets for 2050.**
- **Overcoming the ‘climate paradox’ in North America** requires a delibera-te **climate leadership of EU countries** and a willingness to unilaterally im-plement their climate reduction goals & their different roadmaps for 2050.
- **Implementing a sustainability transition** with increasing energy efficiency reduces energy costs and **enhances the competitiveness of European products.** It may also reduce the dependence on fossil imports and thus the involvement in resource conflicts over the control of fossil energy resources.

4.1. Legal Obligations: UNFCCC & KP

There is a weak not very specific legal commitment

- **UNFCCC (1992): Art. 2, Objective:**

  The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, **stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system**. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

- **Kyoto Protocol (1997): Art. 3,1:**

1. The Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by **at least 5 % below 1990 levels in the commitment period 2008 to 2012.**
   - **USA: - 7% under KP (signed but never ratified)**
   - **Canada: -6% under KP (signed, ratified and withdrew on 31 December 2011**
   - **Mexico: no legal obligations but voluntary commitments: -50% (by 2050) base year 2000**

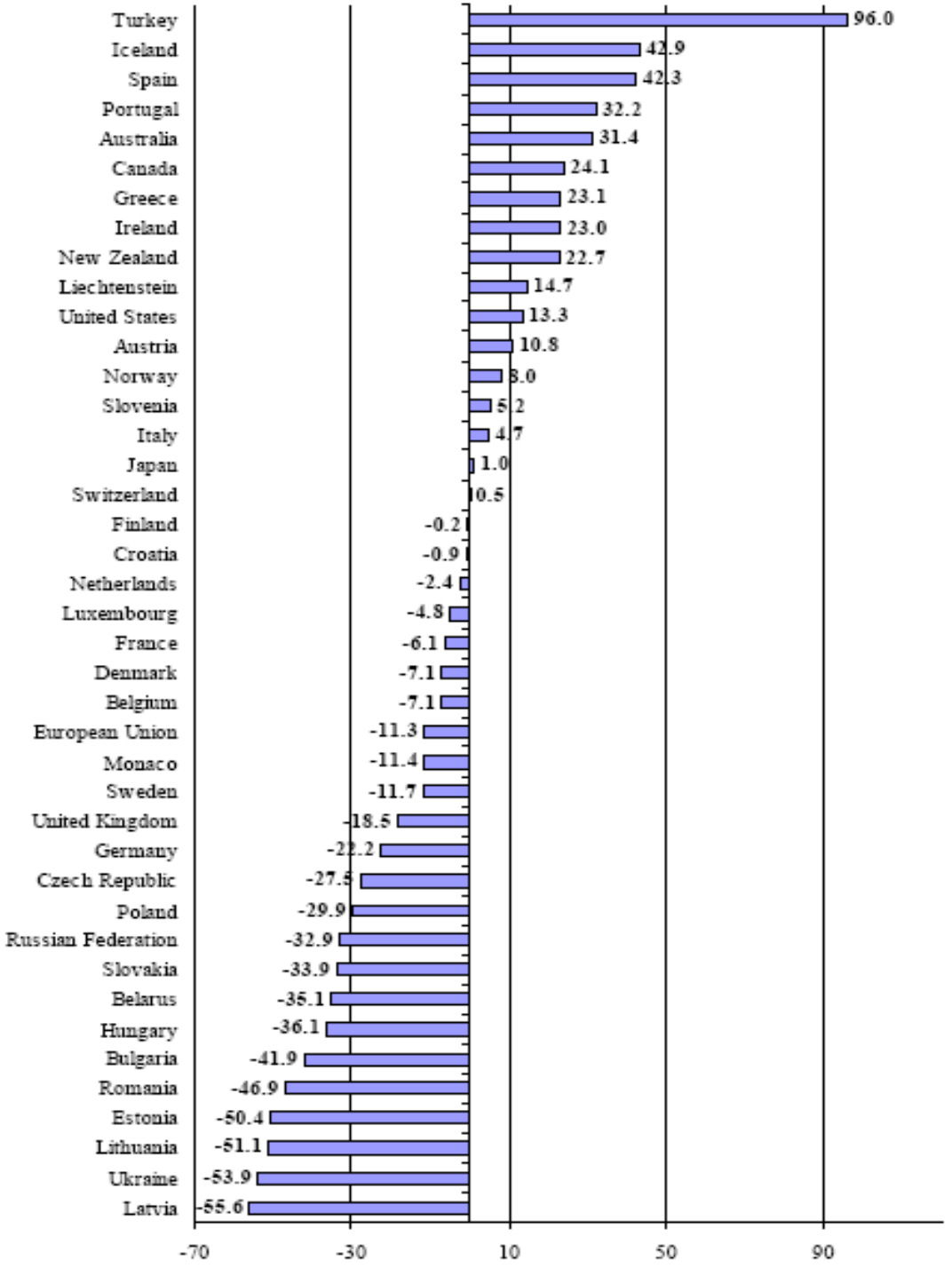
4.2. GHG Reduction Implementation Gap

QELRO, Kyoto Protocol

- EU countries: -8%
- Canada: -6%
- USA: - 7% (no party KP)
- Japan: -6%
- Australia: +8%

Changes in GHG Emissions: Annex I Part., 1990–2008 (exc. [incl.] LULUCF (%).

- EU countries:-11.3 [-11.3]
- Canada: + 24.1 [+33.6]
- USA: +13.3 [+15.3]
- Japan: +1% [-0.2]
- Australia: +31.4 [+33.1]
- Turkey: +96.0 [101.1]



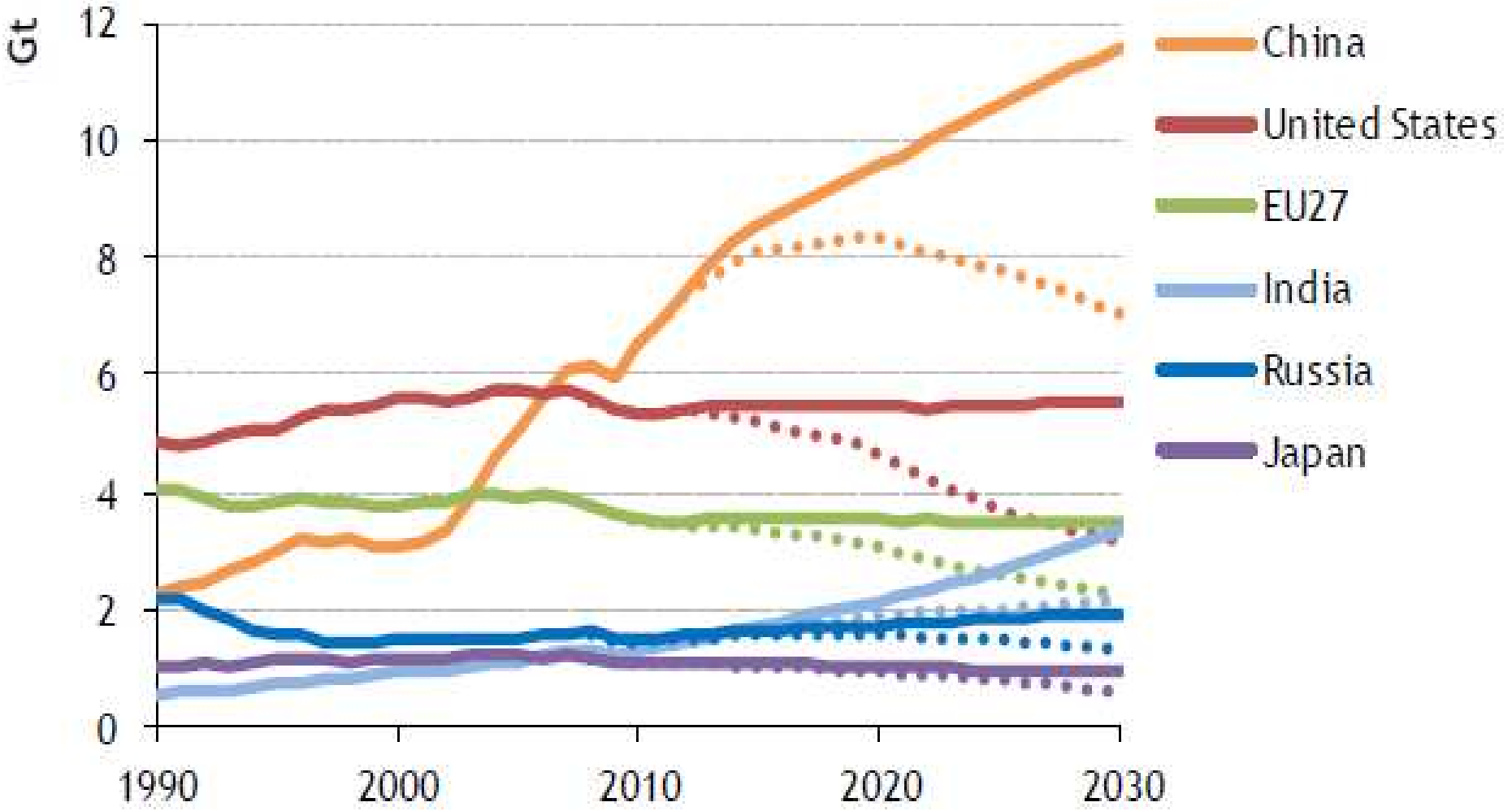
4.3. Performance of G-8: Mixed Performance: GHG Emissions

Country	UNFCCC (1992)		Kyoto Protocol (1997)		Re-duc-tion goal (%)	EU-15 Reduc-tion goal (%)	Performance (1990-2009) GHG reductions in % 1990 (base year)		
G8 countries	An-nex 1	An-nex 2	Annex B	In tran-sition		Burden-sharing agree-ment (1998)	EU Eurostat (2011) IEA [2011]	UNFCC (2009) Landuse change and forestry (LULUCF) Excl.	Incl.
1) USA	X		X		-7		+6.7	+7.2	+5.6
2) Canada	X		X		-6		+20.4	+17.0	+29.8
3) Japan	X		X		-6		+2.7	-4.5	-5.0
4) Germany	X		X		-8	-21	-25.4[-21.9]	-26.3	-23.0
5) UK	X		X		-8	-12.5	-27.1[-15.2]	-26.9	-27.7
6) France	X		X		-8	0	-8.3[+0.6]	-7.7	-12.9
7) Italy	X		X		-8	-6.5	-5.0[-2.0]	-5.4	-13.3
8) Russia		X		X	0		-29.7	-36.9	-57.2

4.4. Performance of G-20: No Commitment

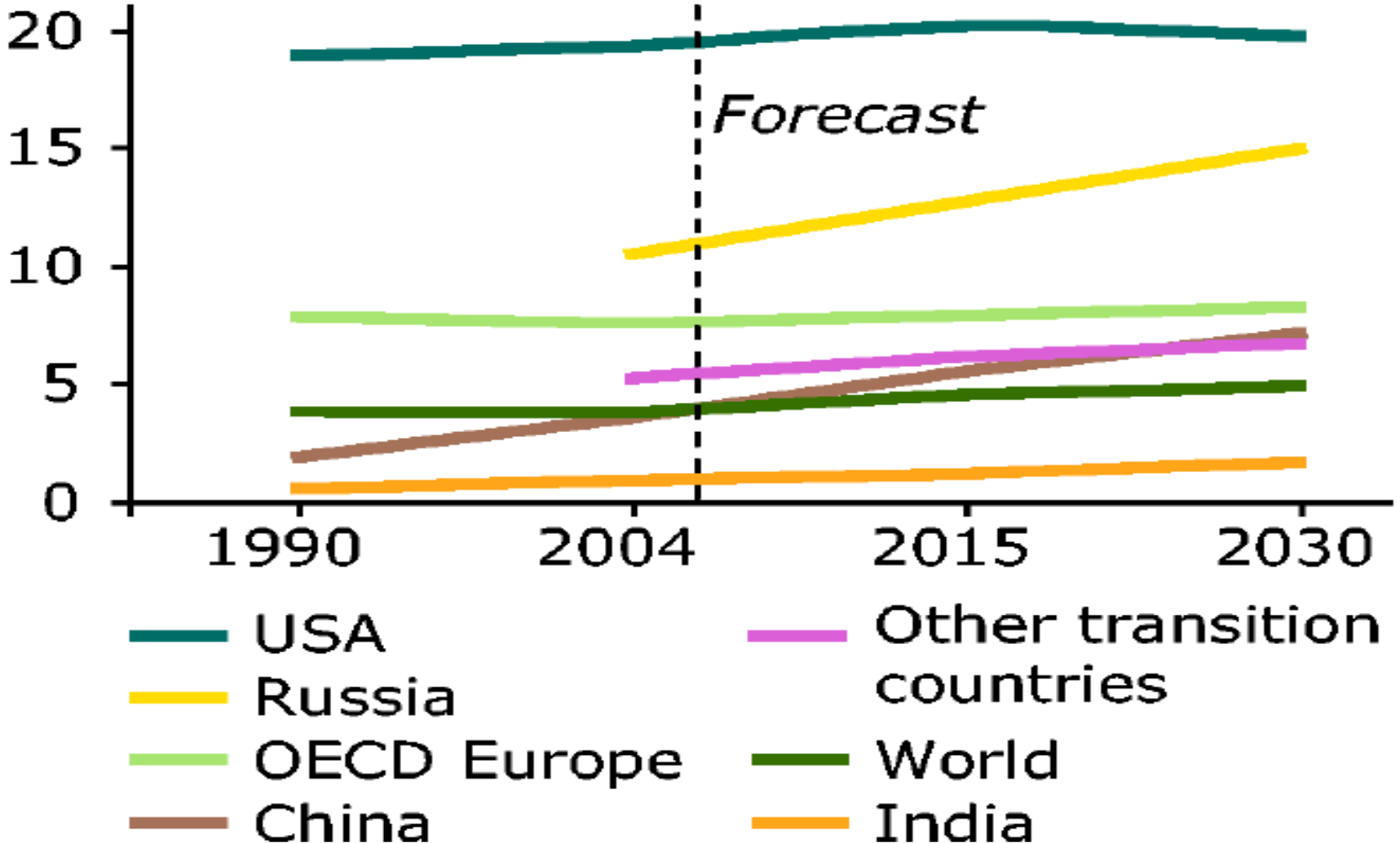
- Between 1950 and 2010 the population of the G20 increased significantly what coincided with a major increase in CO2 emissions since 1971 to 2009.
- With regard to the population projections until 2050 and 2100, population of 4 G8 is projected to continue to grow from 2010- 2100 (USA,France, Canada,UK), while it will decline for Japan, Russia, Germany, Italy.
- During past 60 years the population of India & China together has grown by 1 643 million people but the projections until 2100 for China and India differ significantly with a projected increase of 326 million for India and a projected decline of 400 million people for China by 2100 compared with 2010.

4.5. Energy-related CO2 Emissions for EU27, US, Japan, Russia, China & India (1990-2030). IEA's Global Energy Projections to 2030/2050



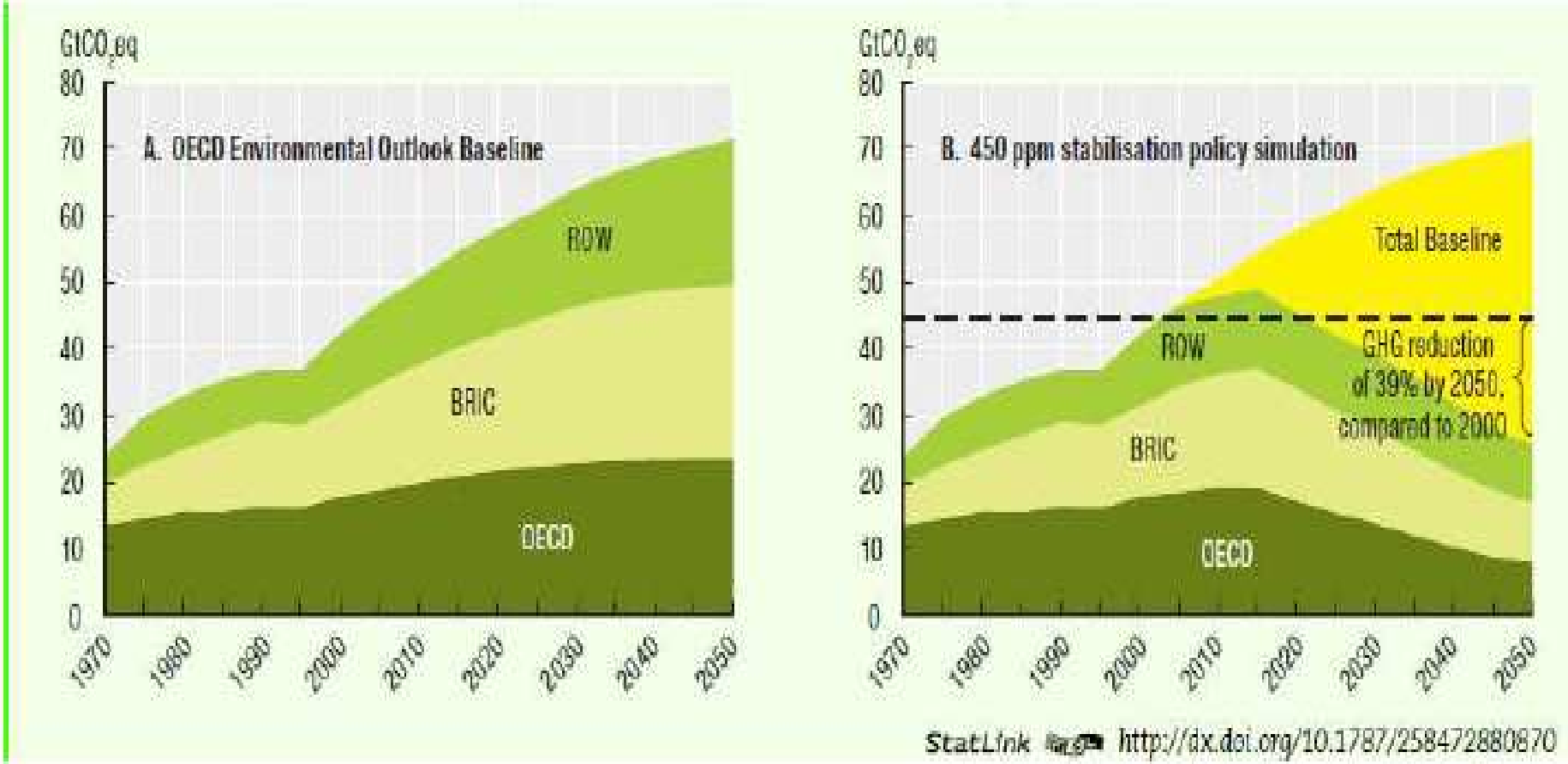
4.8. Energy-related CO2 Emissions per cap. for EU27, US, Japan, Russia, China & India

Figure 2: IEA estimates and projections of energy-related CO_2 emissions per capita from 1990 t 2030. **Source:** IEA at: <http://www.eea.europa.eu/data-and-maps/figures/iea-estimates and-projections-of-energy-related-co2-emissions-per-capita-from-1990-to-2030>.



4.9. IEA/OECD: Energy projections & GHG emissions until 2050: 2 scenarios

Figure 4: Total greenhouse gas emissions (by region), 1970-2050. **Source: IEA**



5. Paralysis of Climate Negotiations

- **Reagan Admin**. put climate change on G-7 agenda
- Domestic economic & ideological opposition: USA: Kyoto Protocol signed but not ratified
- Canada: withdrew in December 2011 from KP
- Canada, US, Japan (Australia) failed: Annex B targets
- COP 15 (Copenhagen) failed: US bypass UN negot.
- COP 16 (Cancun) Accords: voluntary commitments
- COP 17 (Durban): goal 2015 agreement, 2020 in force
- COP 18 (Doha): 26.Nov.-7 Dec. 2012:

Kyoto Protocol will run out by end of 2012: no agreement on legally binding GHG reduction targets:

My thesis: If present trends continue: security consequences of climate change may occur!

5.1. Average Value of Surface Temperature (IPCC 2007, WG 1, AR4, p. 14)

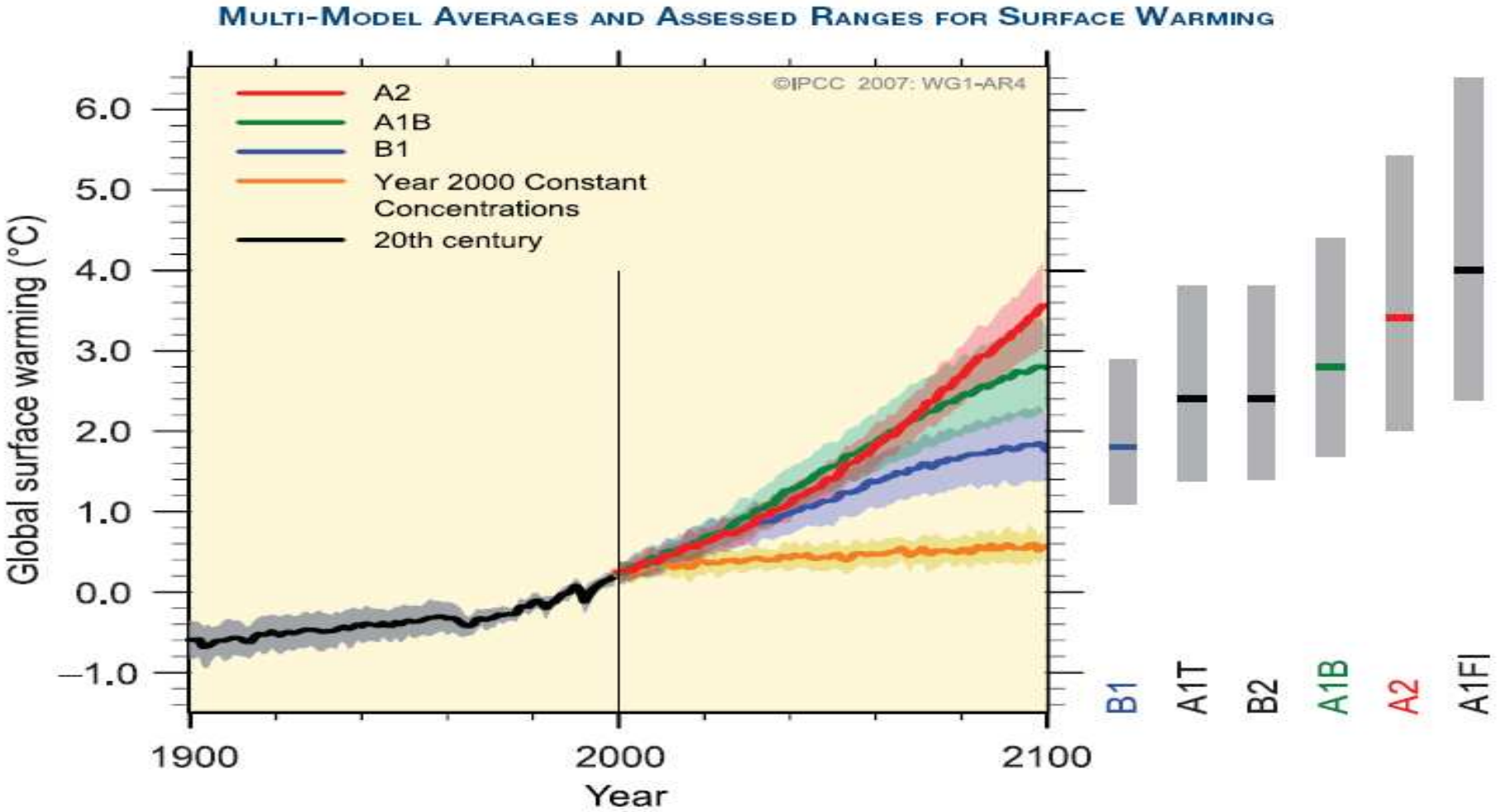


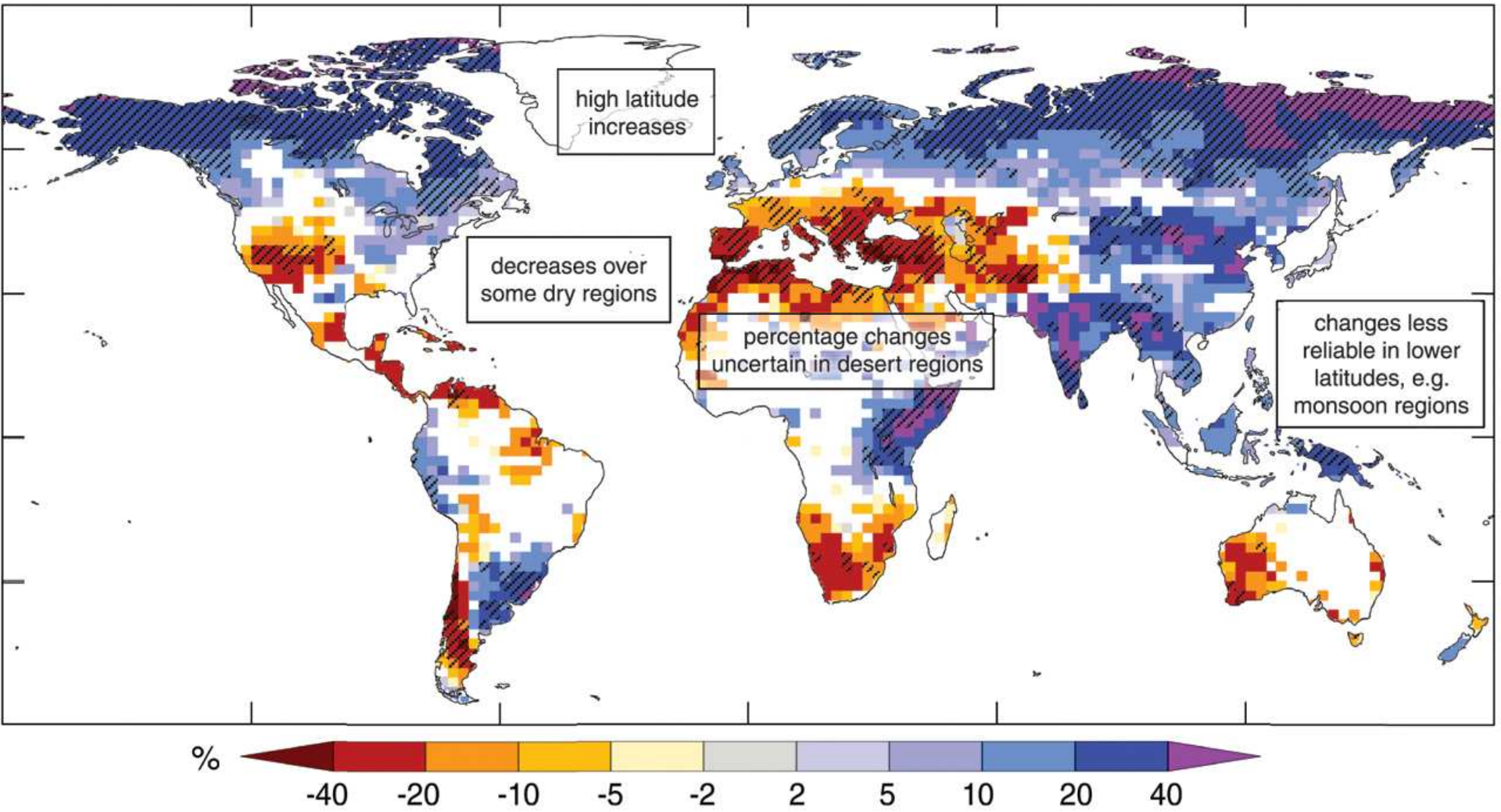
Figure SPM.5. *Solid lines are multi-model global averages of surface warming (relative to 1980–1999) for the scenarios A2, A1B and B1, shown as continuations of the 20th century simulations. Shading denotes the ±1 standard deviation range of individual model annual averages. The orange line is for the experiment where concentrations were held constant at year 2000 values. The grey bars at right indicate the best estimate (solid line within each bar) and the* ***likely*** *range assessed for the six SRES marker scenarios. The assessment of the best estimate and* ***likely*** *ranges in the grey bars includes the AOGCMs in the left part of the figure, as well as results from a hierarchy of independent models and observational constraints. {Figures 10.4 and 10.29}*

5.2. From a 2℃ to a 4℃ World by 2100

- Many scientists agree that the goal of the stabilization of global average temperature at 2□℃ above the pre-industrial level by the year 2100 is becoming increasingly unlikely. An increase of 2–4□℃ is becoming more probable.
- This may result in a ‘dangerous climate change’, and an increase of 4–6□℃ above pre-industrial levels is becoming possible by 2100; this could result in a ‘catastrophic climate change’.
- In September 2009, a conference of the Royal Society (UK) addressed the impacts of a world experiencing the impacts of “four degrees and beyond” (New 2011), while Mark Lynas (2007) discussed Six degrees: Our future on a hotter planet.
- World Bank Study of November 2012 by Potsdam Institute of Climate Change Impact Research:we are moving to +4℃ wor ld
- Rahmsdorf study for COP 18 in Doha: Sea level rise: 50cm-1m

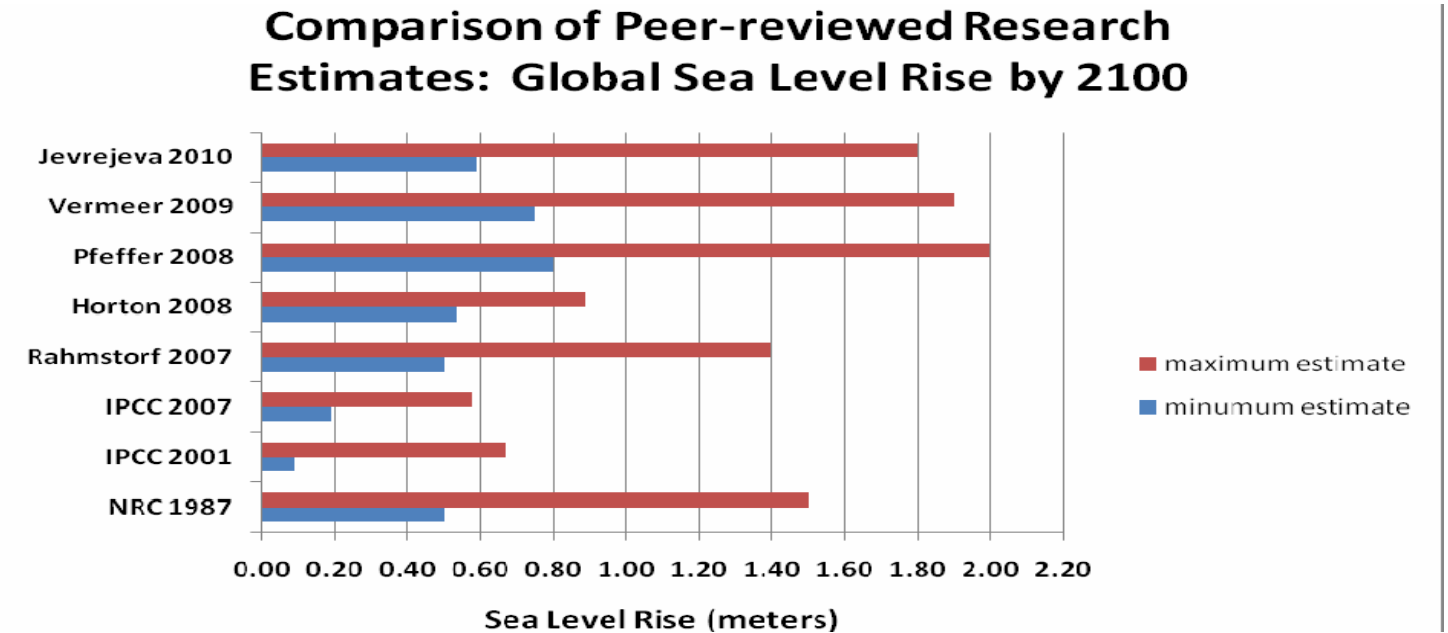
5.3. Precipitation Change by 2100:

Projections and model consistency of relative changes in runoff by the end of the 21st century

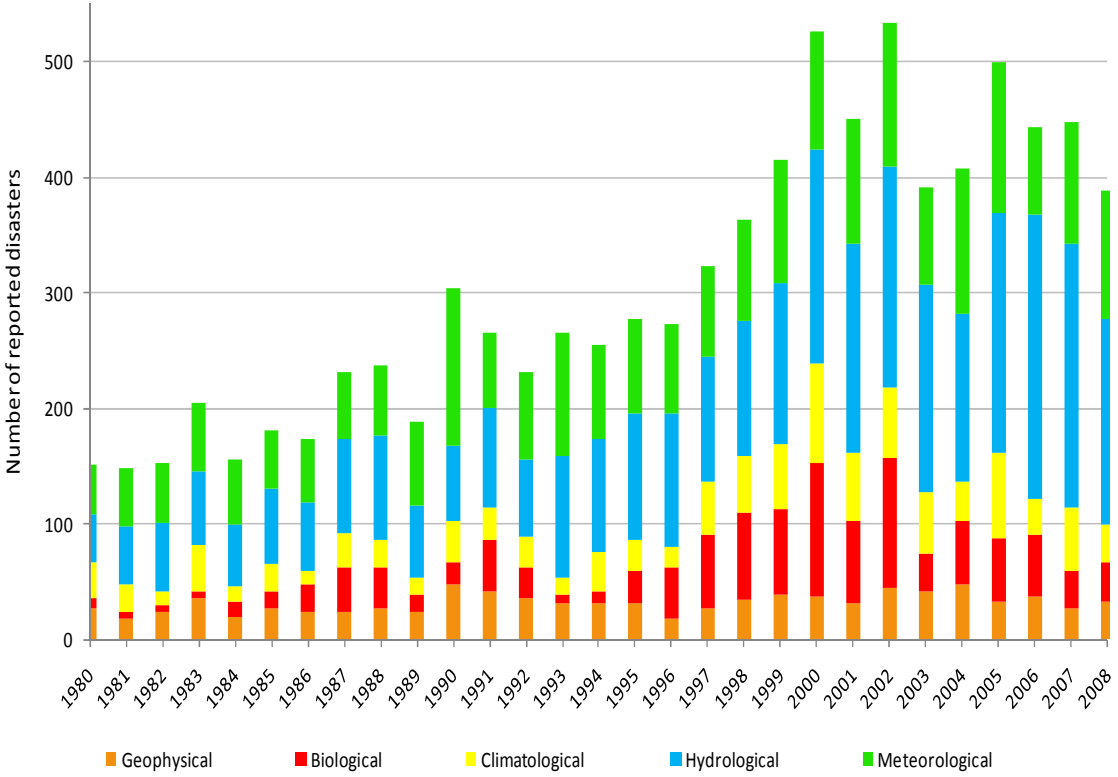


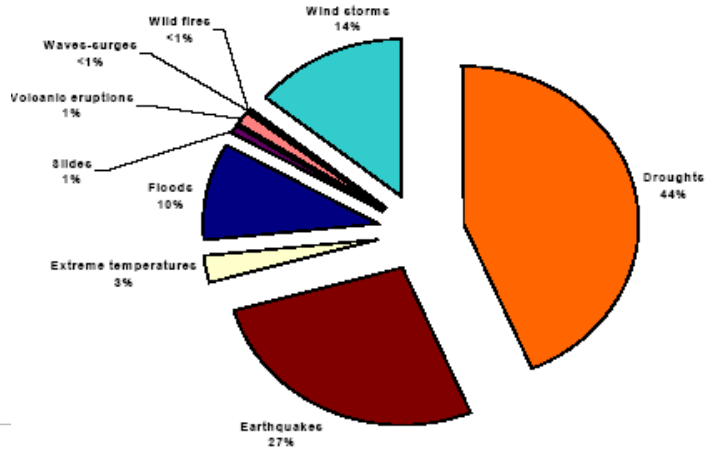
5.4. Projected Increase of Sea Level Rise (IPCC chair, Pachauri, 2008)

Stabilization level (ppm CO_2-eq)	Global mean temp. increase (°C)	Year CO_2 needs to peak	Global sea level rise above pre-industrial from thermal expansion (m)
445 – 490	2.0 – 2.4	2000 – 2015	0.4 – 1.4
490 – 535	2.4 – 2.8	2000 – 2020	0.5 – 1.7
535 – 590	2.8 – 3.2	2010 – 2030	0.6 – 1.9
590 – 710	3.2 – 4.0	2020 – 2060	0.6 – 2.4



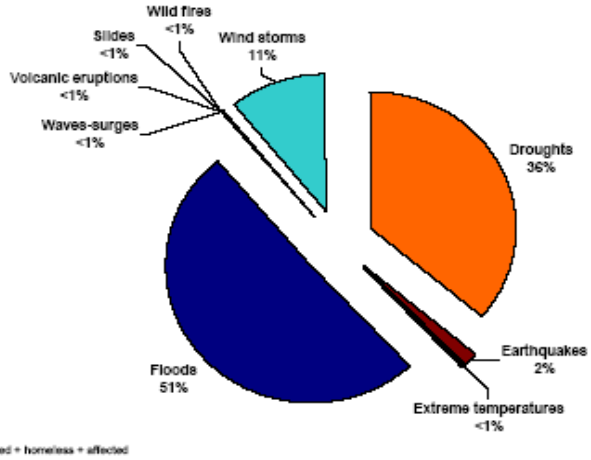
5.5. Climate-related natural hazards





Reported Death of Natural Hazards globally (1974-2003): 2.066.273 persons

Affected persons of Natural Hazards globally (1974-2003): 5 076 494 541 persons



(1) injured + homeless + affected

Changes of Hydro-meteorological Hazards (Guha-Sapir 2010)

5.6. Tropical Cyclones: Threat to Megacities

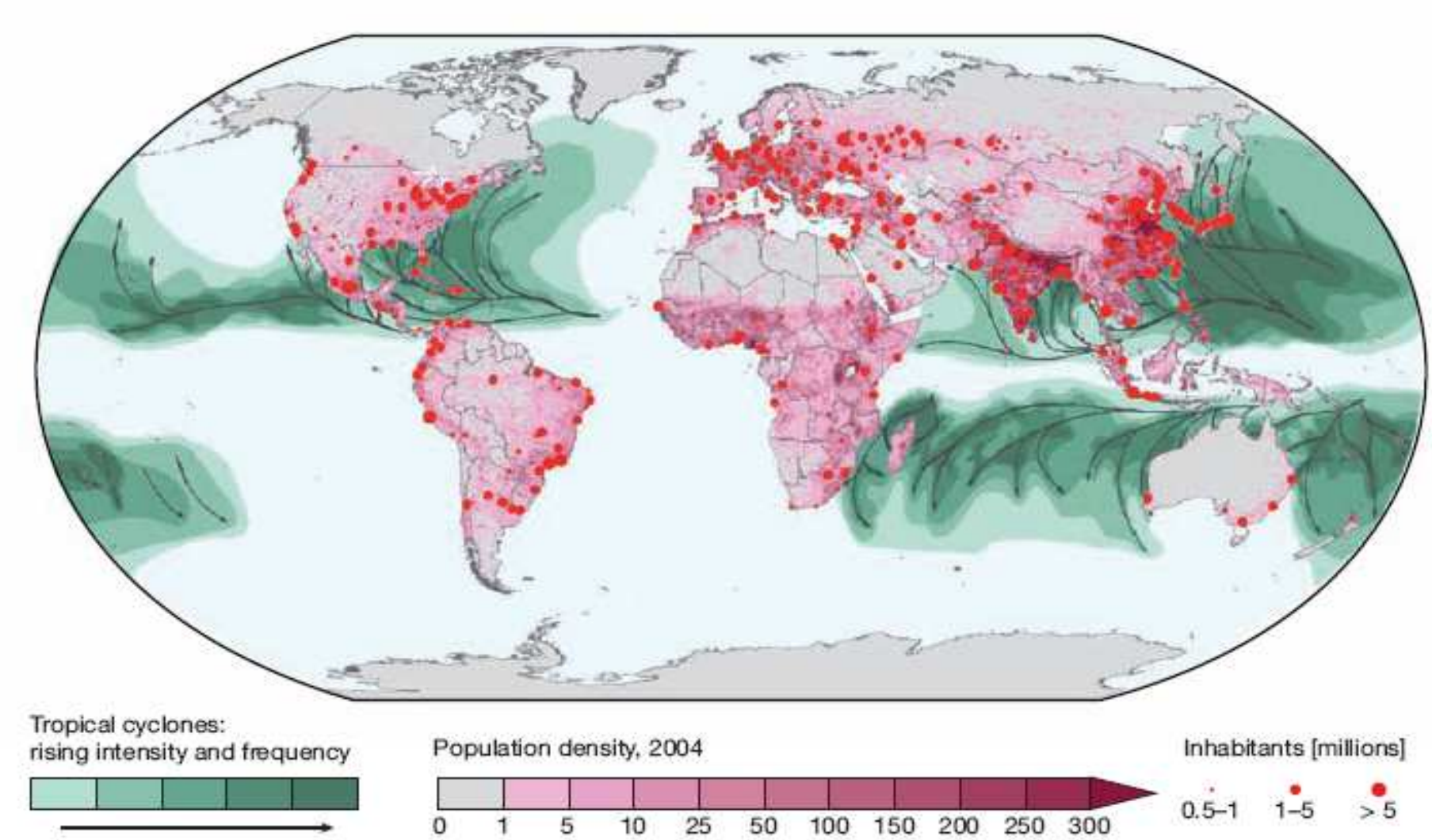
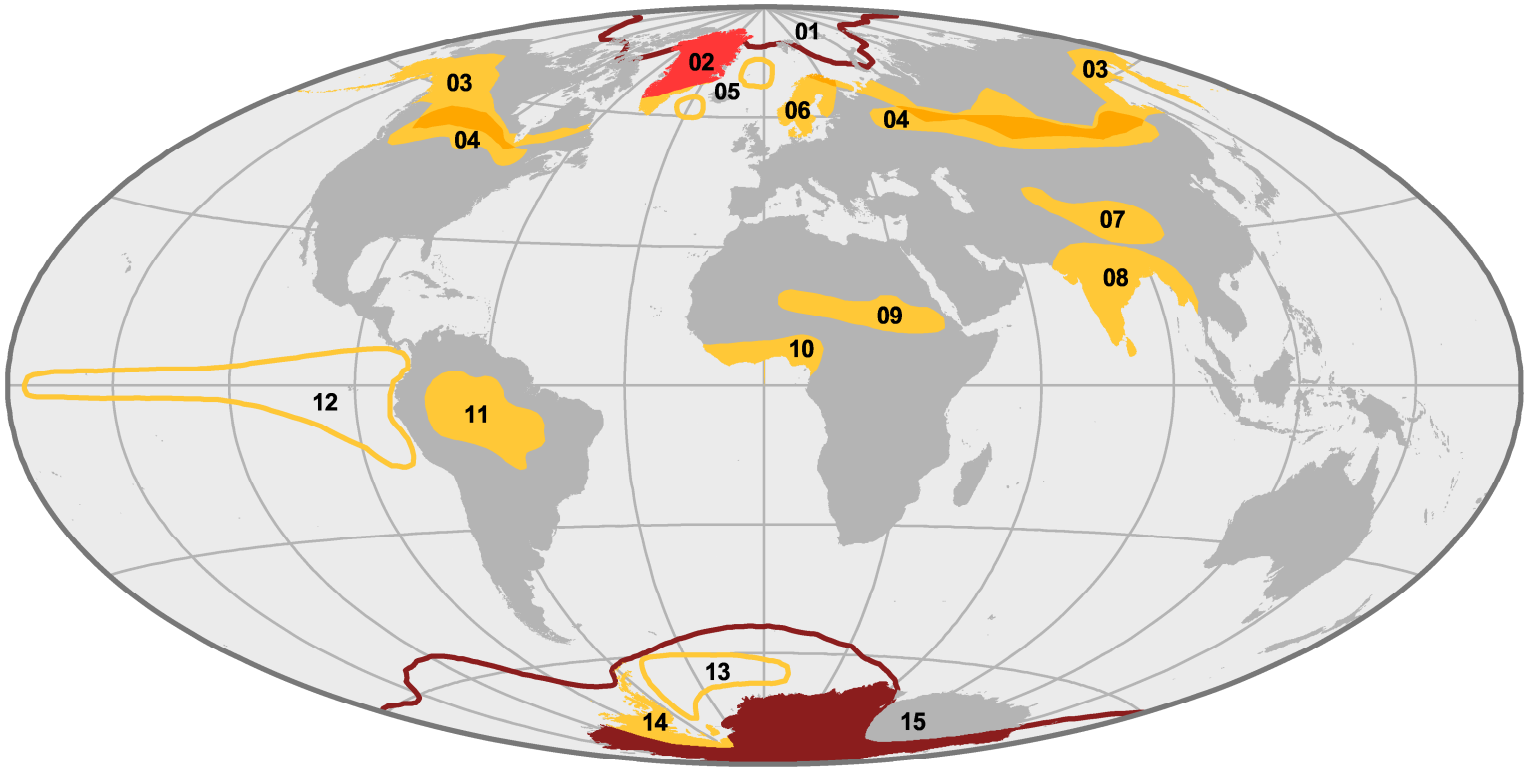


Figure 6.4-1
Tropical cyclone threat to urban agglomerations.
Cartography: Cassel-Gintz, 2006.
Source: WBGU

Potential Anthropogenic Tipping Elements in the Earth System



tipped already

in limbo

still stable

01 Arctic Sea Ice Loss

02 Greenland Ice Sheet

03 Thawing Permafrost / Methan Escape

04 Boreal Forest Dieback

05 Suppression of Atlantic Deep Water Formation

06 Climatic Change-Induced Ozon Hole over Northern Europe

07 Albedo Tibetan Plateau

08 Indian Monsoon

09 Re-Greening Sahara / Sealing of Dust Sources

10 West African Monsoon

11 Dieback of Amazon Rainforest

12 Southern Pacific Climate Oscillation

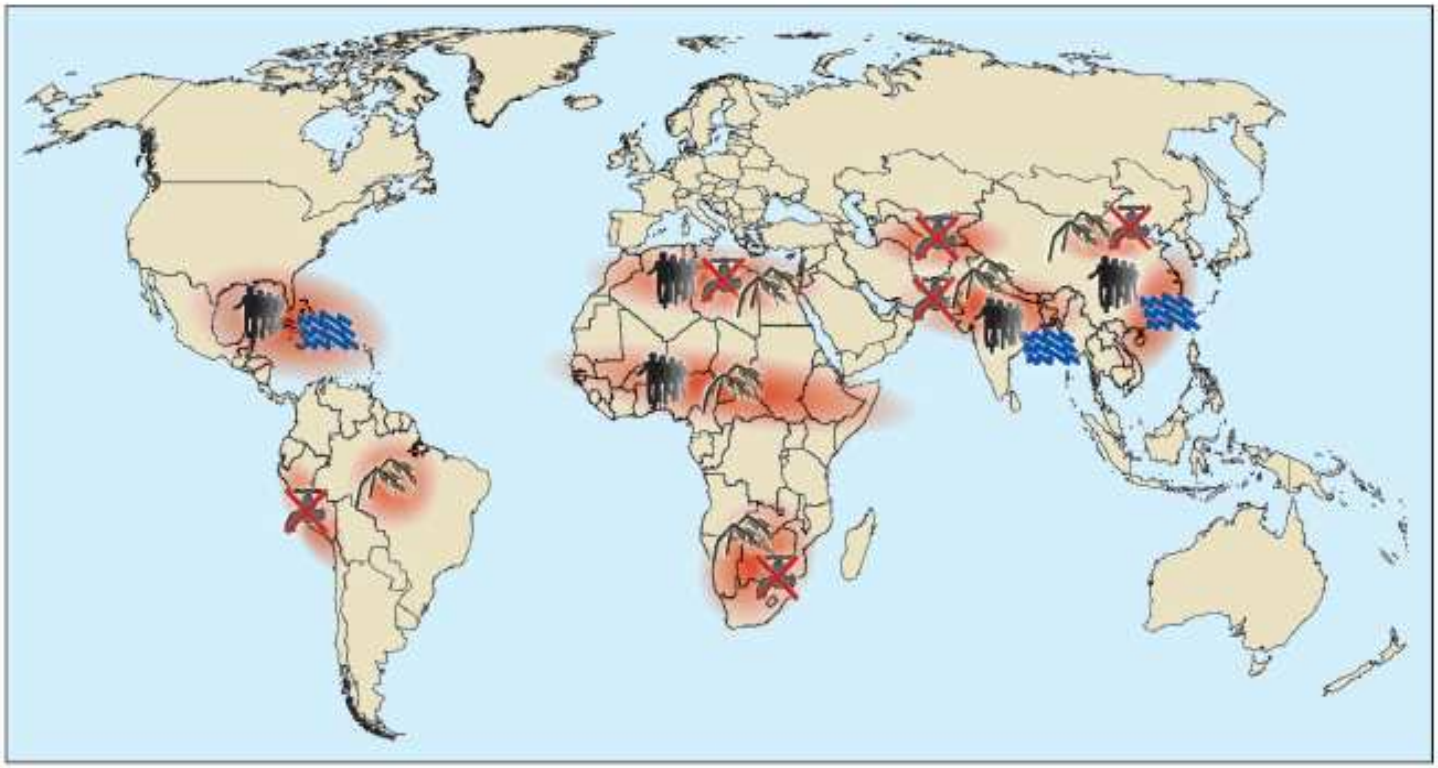
13 Antarctic Deep Water Formation / Nutrients Upwelling

14 Westantarctic Ice Sheet

15 Antarctic Ozone Hole

5.8. Global Climate Change Hotspots & Conflict Constellations

Figure 4.7: Regional hotspots and security risks associated with climate change. **Source**: WBGU (2008: 4). Reprinted with permission.

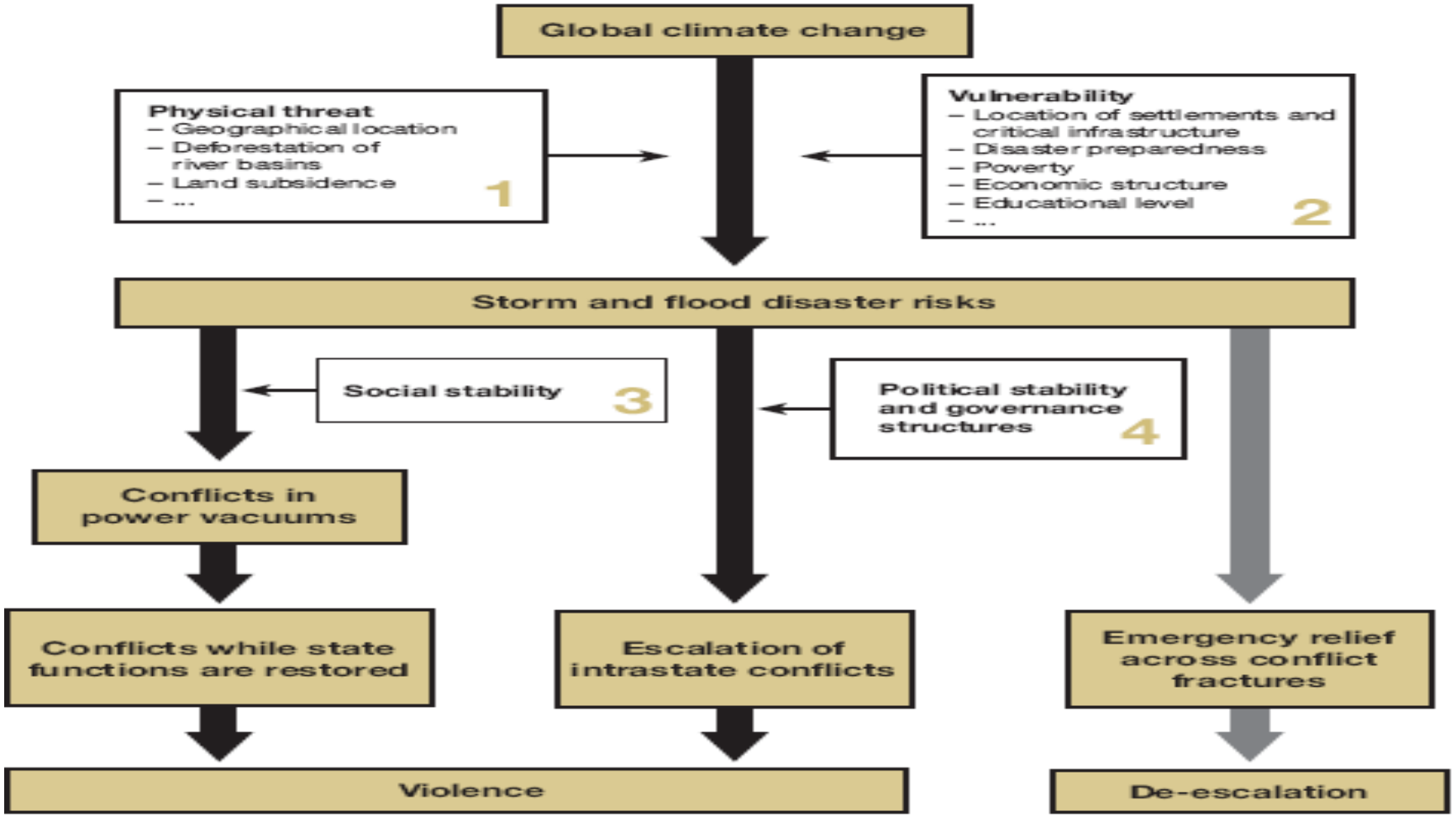


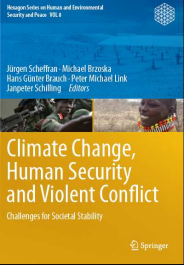
Security-related challenges in MENA region: Water scarcity to rise due to demand increase and supply decline

Rising food deficits

Rising environmentally induced migration

5.9. Conflict Constellation Climate-induced Increase in Storm & Flood Disasters





5.10. Scientific Discourses in Europe

- **Securitizing of Climate Change: Copenhagen, 03-2009**
  - Olaf Cory: Securitisation and Riskification of CC: **Millennium**,1/2012
- **PRIO: Climate Change and Conflicts; June 2010: Trondheim conf,**
  - **Special Issue of Journal of Peace Research, 49/1, Janaury 2012**
  - **Guest Editor: Nils Petter Gleditsch, PRIO**
  - Quantative, macro-sociological approach
  - Ignores qualiative and policy-oriented debates
- **CLISEC (Hamburg Conf., November 2009):** Research Group Climate Change & Security conducts multidisciplinary research & education on potential security risks, social instabilities & conflicts induced by climate change & on strategies for international cooperation, conflict management & sustainable peace.
  - Scheffran, Jürgen; Brzoska, Michael; Brauch, Hans Günter; Link, Peter Michael; Schilling, Janpeter (Eds.): **Climate Change,Human Security and Violent Conflict: Challenges for Societal Stability** Hexagon Series on Human and Environmental Security and Peace, vol. 8 (Heidelberg – Dordrecht – London – New York: Springer, 30 April 2012). 900 pages

6. Alternative perspectives & visions:
Business-as-usual vs. Sustainability Transition

Oswald Spring and Brauch (2011) argued that:

- **Vision of business-as-usual with minimal reactive adaptation & mitigation strategies** will most likely increase the probability of a 'dangerous climate change' or catastrophic GEC with linear and chaotic changes in the climate system & socio-political consequences that represent a high-risk approach.
- To avoid these consequences the **alternative vision and sustainability perspective requires a change in culture** (thinking on the human-nature interface), **worldviews** (thinking on the systems of rule, e.g. democracy vs. autocracy and on domestic priorities and policies as well as on interstate relations in the world), **mindsets** (strategic perspectives of policy-makers) and new forms of **national and global governance**.
- Alternative vision of a **new fourth 'sustainability revolution**': radical change in culture, worldview, mindset and participative governance in the thinking and action on sustainability laying out an alternative development path with a total transformation of productive and consumptive processes aiming at equity, social justice, and solidarity with the most vulnerable and marginal people and the poorest countries.

6.1. Coping Strategies: Business-as-Usual

- **Instant Response: Discredit the message & attack the messenger: 2009: Attack on IPCC**
- **Coping with Climate Change Impacts:**
  - **Market will provide means** for coping with physical climate change effects: **Washington neoliberal consens.**
  - **Military Protection:** Adjust military strategies, mis-sions and tools to be able to operate under conditions of dangerous climate change („militarization"): **Hobbesian**
  - **Develop the technologies:** Geo-engineering schemes, strategy of energy independence: **Cornucopian**
- ***Business-as-usual*** in a **Hobbesian world** where economic and strategic interests and behaviour prevail leading to a major crisis of humankind, in inter-state relations and destroying the Earth as the habitat for humans and ecosystems putting the survival of the vulnerable at risk.
- **No Need for a Sustainability Revolution**

6.2. Fourth Sustainability Revolution

- 2nd vision for a *transformation* of global cultural, environmental, economic (productive and consumptive patterns) and political (with regard to human & interstate) relations
- In the alternative vision of a comprehensive transformation a *sustainable perspective* has to be developed and implemented into effective new strategies and policies with different goals and means based on global equity and social justice.

6.3. Alternative Vision

- The alternative sustainability perspective requires a change in *culture* (thinking on the human-nature interface), ***worldviews*** (thinking on the systems of rule, e.g. democracy vs. autocracy and on domestic priorities and policies, interstate relations), ***mindsets*** (strategic perspectives of policy-makers) and new forms of national and global *governance*.
- This alternative vision refers to the need for a "**new paradigm for global sustainability**" (Clark/Crutzen/Schellnhuber 2004), for a "transition to [a] much more sustainable global society", aimed at peace, freedom, material well-being and environmental health. Changes in technology and management systems alone will not be sufficient, but "significant changes in governance, institutions and value systems" are needed, resulting in a fourth major transformation after "the stone age, early civilization and the modern era". These alternative strategies should be "more integrated, more long-term in outlook, more attuned to the natural dynamics of the Earth System and more visionary"

6.4. Four Knowledge-based Concepts of for Alternative Vision

- Key concepts of the alternative vision of a new fourth 'sustainable revolution' are a radical change in *culture*, *worldview*, *mindset* and *participative governance* in the thinking and action on sustainability laying out an alternative development path with a total transformation of productive and consumptive processes aiming at equity, social justice, and solidarity with the most vulnerable and marginal people and the poorest countries.
- This lays out an alternative development path with a **total transformation of productive and consumptive processes** aiming at equity, social justice, and solidarity with the most vulnerable and marginal people and the poorest countries.

7. Discourse on Sustainability Transition: Four Hypotheses

- We are in the midst of a **global transition in earth history** from the '**Holocene', to the 'Anthropocene'** that began with human interventions into the **earth system** and that has resulted in a rapid increase in GHG emissions in the atmosphere.
- The **impacts of the grand transformations** of the first and second industrial revolution have resulted in a complex global environmental change and in anthropogenically-induced climate change, besides as well as the increasing destruction of the biodiversity. natural climatic variations. This has resulted in an exponentially growing accumulation of GHG in the atmosphere this has also affected almost all environmental services.
- The **societal impacts** of four physical effects of 'anthropogenic global climate change' and of biodiversity loss may result in **major international, national, and human security dangers**.
- **Since 2005 an alternative discourse on 'sustainability transitions' or on 'transitions to sustainable and resilient development' has begun to evolve**. It addresses new directions in the 'study of long-term transformative change' that also needs to focus on resilient societies.

7.1. Political Urgency and Research Agenda: Towards a Fourth Sustainability Revolution

Glooming Prospects for Post-Kyoto Regime: Paralysis

- Prospects for Post-Kyoto climate regime at COP 17 in Durban are low
- At present it becomes increasingly unlikely to realize the 2°C world
- Probability of 'dangerous climate change' increases dramatically
- This increases the probability that thresholds in the climate system may be crossed, that tipping points may be unleashed, triggering cascading processes as: 'Arabellion' and 'Fukushima nuclear disaster'

Business-as-usual paradigm prevails in politics & media

- In light of global financial crisis, the sense of urgency for proactive climate action has declined since 2009 prior to Copenhagen (COP 15)
- The US government is paralyzed due to ideological confrontation within the US Congress and between the Senate & the House
- Lack of urgency among BASIC countries to accept commitments.

7.2. Emerging Scientific ST Discourse

- **2001: Amsterdam conference** on Earth Systems Science (ESSP)
- 2004: Clark/Crutzen/Schellnhuber provided conceptual context for the **Dahlem Workshop on "Earth Systems Science and Sustainability" (2003),** where they pointed to "the need for harnessing science and technology in support of efforts to achieve the goal of environmentally sustainable human development in the Anthropocene"
- **2005: KSI started** to work on Sustainability transition (John Grin, co-chair)
- **2009:Amsterdam Conference on Sustainability** Transition resulted in Sustainability Transition Research Network (STRN)
- **2010: Routledge Series on Sustainability Transitions** was launched
- **2011: Elsevier: Environmental Innovation and Sustainability Transition**
- **2011: Oswald Spring/Brauch: Fourth Sustainability Revolution (FSR)**
- **2011: Brauch/Dalby/Oswald Spring: A Political Geoecology for the Anthropocene**
- **2011: WBGU. Report: A Social Contract for Sustainability**
  - We are currently witnessing the emergence of a new scientific paradigm that is driven by unprecedented planetary-scale challenges, operationalized by transdisciplinary centennium-scale agendas, and delivered by multiple-scale co-production based on a new contract between science and society.
- **2012: Third STRN Conference in Copenhagen: 30-31 August 2012**
- **2013: Fourth STRN Conference in Zürich in June**

7.3. Implications for the Social Sciences

- The challenge of research on the societal impacts of global environmental change in the Anthropocene requires an understanding of the **observed and projected changes** within the **earth system** and its **physical and societal impacts for the human systems, i.a. an analysis of earth systems sciences.**
- This requires increased funding for multi-, inter- and transdisciplinary research to address the '**consilience**' of the sustainability paradigm.
- Research on sustainability transition may not be limited to a research agenda of the priorities, pathways & strategies towards sustainability
- For **sociology and political science** it requires to address 'cascading processes' in the 'world risk society' stimulated by the ‚principle of *precaution through prevention*' (Ulrich Beck, 2011).
- For international relations, security and peace research this requires conceptual research on the conditions and possibilities of a sustainable peace as a global political framework for a sustainable transition.

7.4. Seven Dimensions of Emerging Debate on Sustainability Transition

In a talk at the first sustainability transition and sustainable peace (STSP) workshop I distinguished among 7 dimensions of ST

<http://www.afes-press-books.de/html/sustainability_workshop_overview.htm>

1. **Temporal Dimension of Sustainability Transition**
2. **Spatial Dimension of Sustainability Transition**
3. **Scientific Dimension of Sustainability Transition**
4. **Societal Dimension of Sustainability Transition**
5. **Economic Dimension of ST**
6. **Political Dimension of ST**
7. **Cultural Dimension of ST**

7.5. Discourse on Sustainability Transition

- **Research & Dialogue Project: Sustainability Transition and Sustainable Peace (STSP)**
- *Second debate* is partly policy driven, by debate on a **green economy** that has been launched by **UNEP, OECD and by different DGs of the European Commission.**
- ***Scientific discourse*** on sustainability transition evolved
  - after conference in Amsterdam (2009); Lund (2011), Copenhagen (2012)
  - *Sustainability Transitions Research Network* (STRN)
  - journal on *Environmental Innovation and Sustainability Transition* (EIST)
  - *Routledge Book Series in Sustainability Transitions* (since 2010).
- **This new project tries to link this emerging debate with the experience of international relations and *environment, security, development and peace* (ESDP) studies by addressing possible impacts of both alternative policy trends for international peace and security.**

8. EU-27 Climate & Energy Policy Goals: GHG Reductions by 2020 & 2050

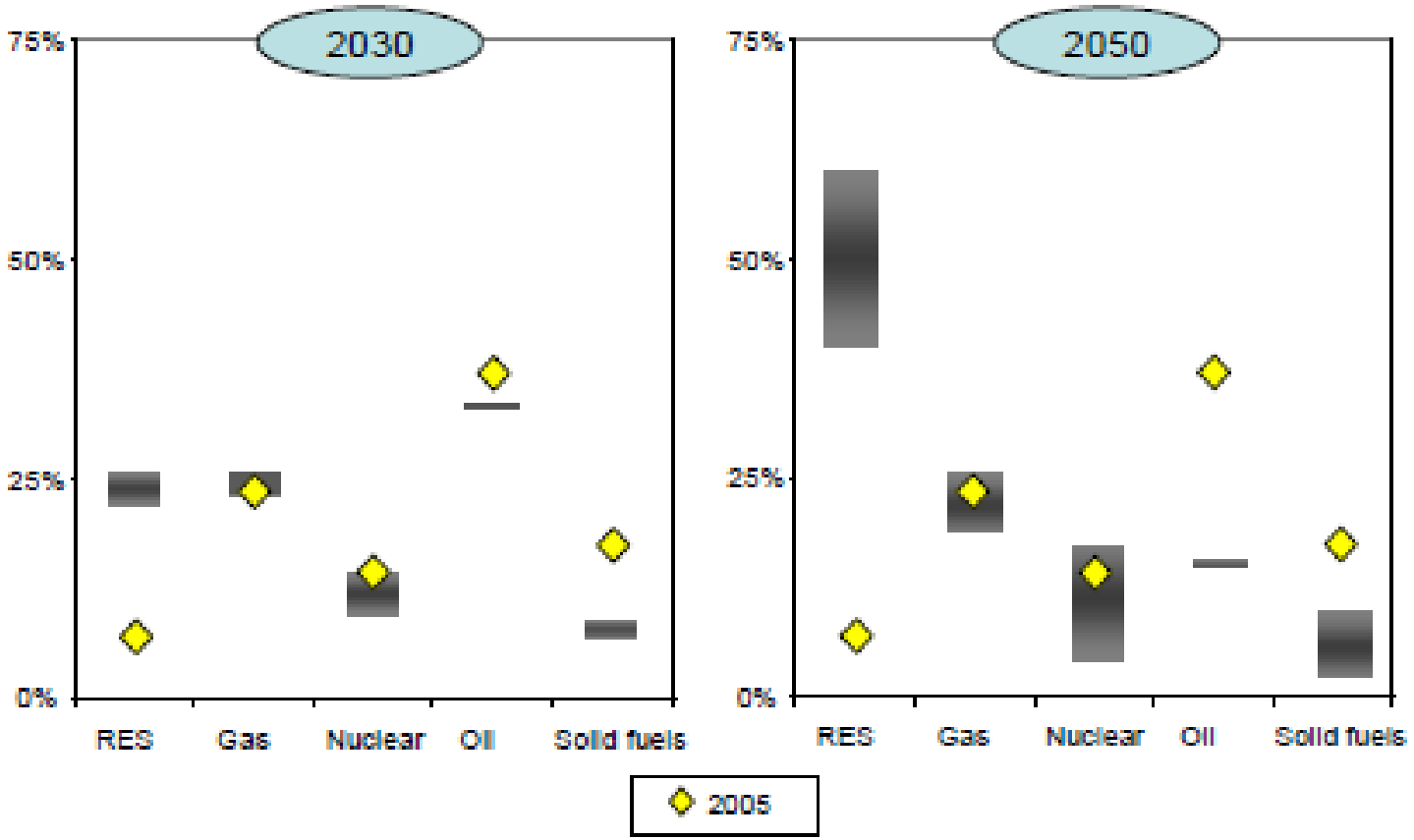
- Among EU-27 **Germany, UK, France & Italy: 54.9% of GHG** weighted emissions in CO2 equivalents who complied with their EU reduction targets.
- Among the 27 EU countries several laggards missed their reduction targets under Annex B of the KP and EU-15 'burden-sharing' approach, **Spain (+37.7/+11.8%), Portugal (+35.3/-3.0%), Ireland (+32.4/-0.8%), Greece (28.6/-10.5%);** their combined share of the EU-27 was 13.7% in 2009.
- EU-27 are the global leaders in implementing their commitments under KP.
- **In March 2007**, the European Council decided for a 20/20/20 target by 2020:
  - reduction in EU GHG emissions 20% cent below 1990 levels;
  - 20% of EU energy consumption to come from renewable resources;
  - 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.
- On 10–11 December 2009, the European Council offered to increase its emissions reduction to thirty per cent if other major emitting countries would commit to significant reductions under a global climate agreement.
- **On 15 December 2011 the European Commission (2011) released its Energy Roadmap 2050**

8.1. EU-27 Reduction Goal for 2050

- On 15 December 2011 the European Commission (2011) released its ***Energy Roadmap 2050***, according to which:
- The EU is committed to reducing greenhouse gas emissions to **80-95% below 1990 levels by 2050 in the context of necessary reductions by developed countries as a group.** The Commission analysed the implications of this in its **'Roadmap for moving to a competitive low-carbon economy in 2050'.**
- **The 'Roadmap to a Single European Transport Area' focused on solutions for the trans-port sector and on creating a Single European Transport Area**.
- In this Energy Roadmap 2050 the Commission explores the challenges posed by delivering the EU's decarbonization objective while at the same time ensuring security of energy supply and competitiveness. It responds to a request from the European Council.
- **This requires a sustainable transition in energy sector.**

8.2. EU Decarbonization scenarios 2030 and 2050 (comp. with 2005 in %)

Graph 1: EU Decarbonisation scenarios - 2030 and 2050 range of fuel shares in primary energy consumption compared with 2005 outcome (in %)



9. Energy Transition: Bottom-up vs. top-down

- Energy transition has started globally & accelerated since 2009: China major producer
- Energy transition in Germany: bottom-up
  - State set the legal framework (national renewables)
    - Electricity Feed-In Law
    - Renewable Energy Law (2000)
  - Customers: Investment in Wind and Solar Power
- Top-down: Macro Scale Proposals
  - Import of renewable electricity from the desert
  - As part of a co-development strategy between Europe and MENA Region

9.1. Solar Thermal Technologies for Electricity Generation in the Deserts

Concentrating Solar Power Technologies:

- **alternatives: a) Fresnel concentrators, b) parabolic trough (400-600 ℃), c) solar tower concept with surrounding heliostat field (1200 ℃, up to 50 MW), d) solar dish (for small applications up to 50 kW).**

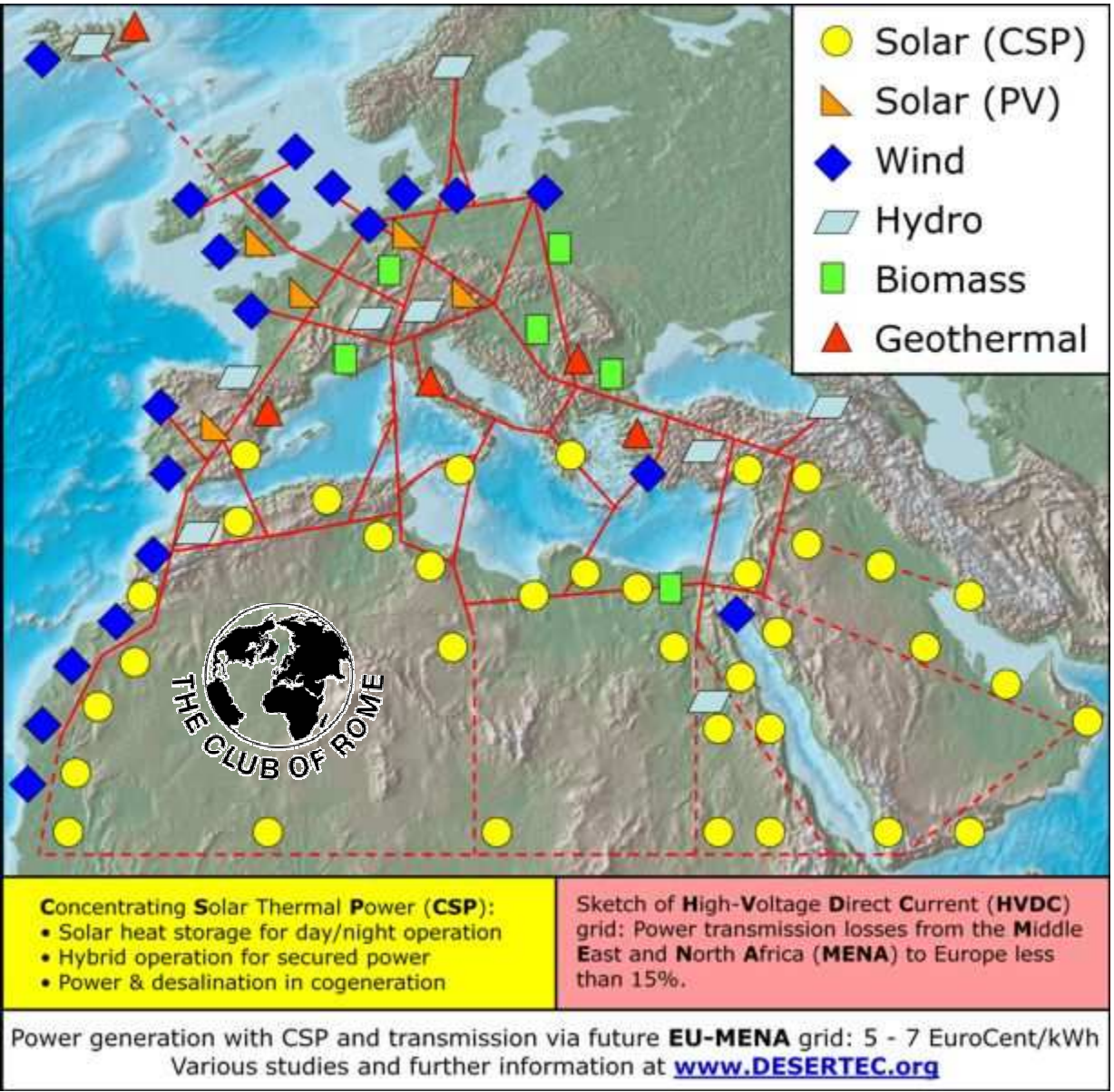







9.2. System of Solar Electricity Generation
SEGS, California, USA (354 MW, since 1985)
ANDASOL 1, Spain (50 MW, 7h storage, 2009)

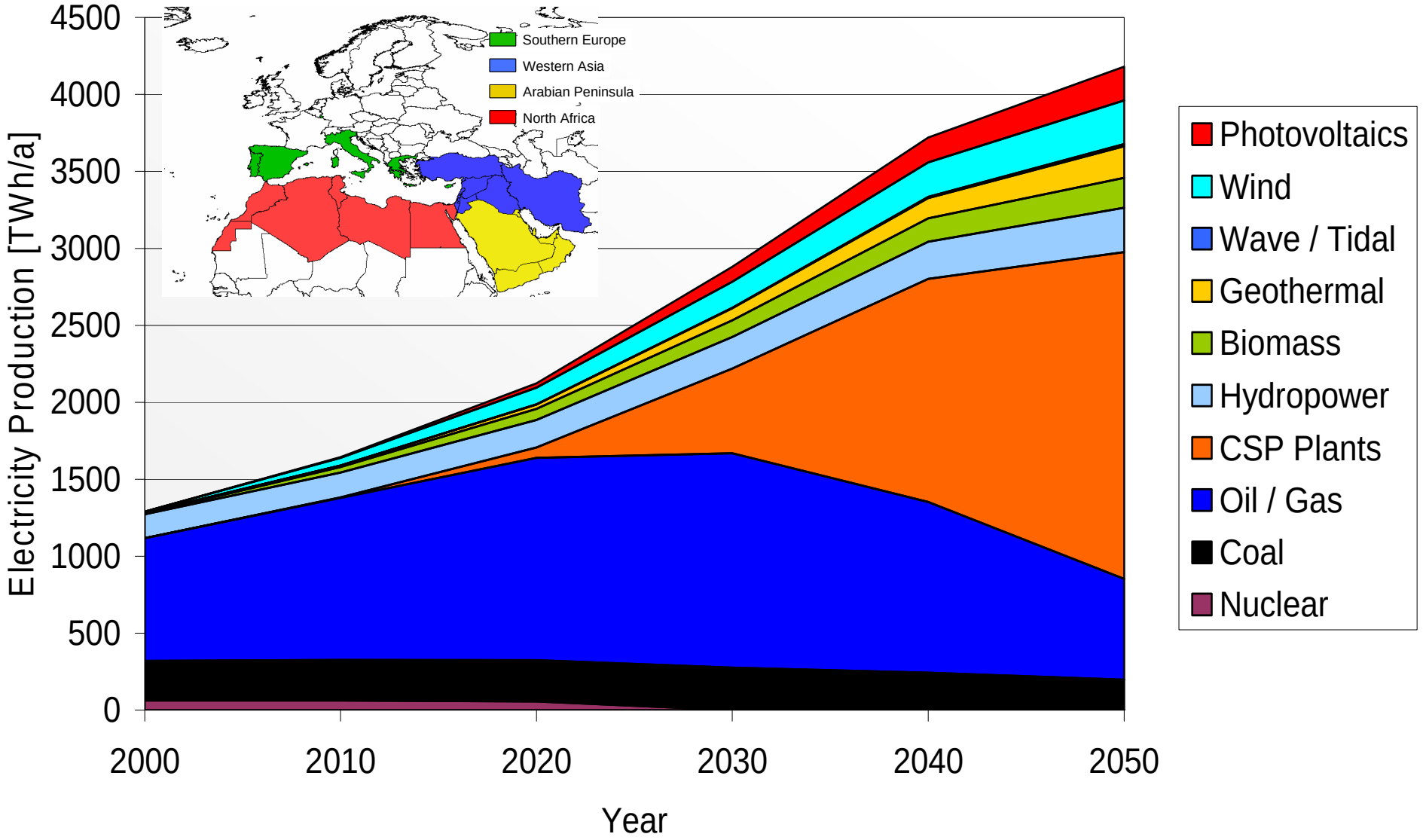
9.3. Mediterranean Renewable Energy Potential



Trans-Mediterranean **R**enewable **E**nergy **C**ooperation (**TREC**) is an initiative that campaigns for the transmission of clean power from deserts to Europe.

Since 2003 TREC has developed the **DESERTEC Con-cept**.

9.4. Annual electricity demand & generation within the countries analysed in the MED-CSP scenario



DESERTEC FOUNDATION

An initiative of

TREC
Clean Power from Deserts

9.5. Desertec Vision: An Intercontinental Mega Project

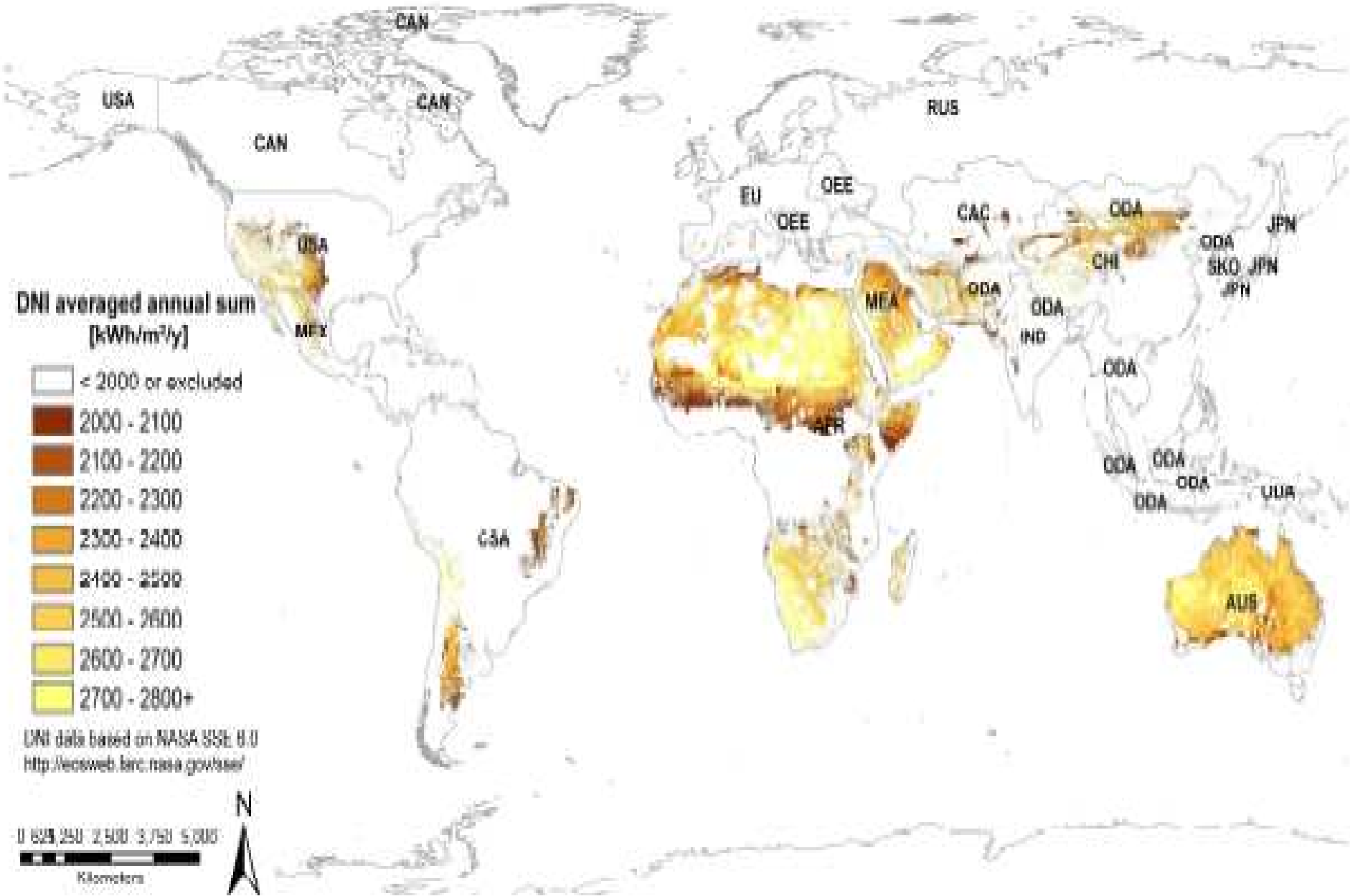
9.6. Desertec Concept

- A close cooperation between EU and MENA for market introduction of renewable energy and interconnection of electricity grids by high-voltage direct-current transmission are keys for economic and physical survival of the whole region. … The DESERTEC White Book describes a scenario of electricity demand and supply opportunities by renewable energy in the integrated EU-MENA region up to the middle of the century. Among the Dii's main goals are the drafting of concrete business plans and associated financing concepts, and the initiating of industrial preparations for building a large number of networked solar thermal power plants distributed throughout the MENA region. The initiative's clear focus on implementation is set out in the Dii Principles for all future Dii shareholders. Besides the business opportunities for the companies, there are other economic, ecological, and social potentials:
  - greater energy security in the EU-MENA countries;
  - growth and development opportunities for the MENA region as a result of substantial private investment;
  - safeguarding the future water supply in the MENA countries by utilizing excess energy in seawater desalination plants; and
  - reducing carbon dioxide emissions and thus making a significant contribution to achieving the climate change targets of the European Union and the German Federal Government

9.7. Desertec Role in Morocco

- Dii will not make any investments itself, nor will it build or operate any power plants. During the planning phase (until late 2012), a suitable framework for the long-term development of renewable energies will be set up to invest in generation plants and power grids. Dii will launch several reference projects to demonstrate the fundamental viability of the Desertec vision. In spring 2011, the Moroccan Agency for Solar Energy (Masen) and Dii signed a Memorandum of Understanding (MoU) concerning a reference project, and they jointly plan:
  - installed capacity: 400 MW solar thermal power station, 100 MW photovoltaic plant;
  - output: approximately 1.4 – 1.6 TWh of renewable energy;
  - export: eighty per cent to Europe, of which approximately 1 TWh of energy to Germany;
  - percentage of energy supplied locally: twenty per cent;
  - a contribution towards achieving the 2020 environmental protection objectives.

9.8. World Solar Potential



10. Sustainable Development & the Nexus between Climate Change and Energy Security

- **Present Trend: Consumption of oil, gas and coal are projected to rise (IEA‘s World Energy Outlook)**
- GHG emissions will increase irrespective what EU-27 will do (IEA‘s World Energy Outlook)
- With peak oil: oil prices are projected to increase
- Resource competition over access to oil and gas will most likely increase, i.e. oil 6 gas-related conflcits may rise
- With a continuation of a prevailing Hobbesian mindset on international relations and world economic policy military means may be used to insure access to resources.
- Due to both possibly increasing resource conflics and the likely security impacts of increasing GHG emissions: new military conflicts are possible, thus a militarization of climate change may be one possible outcome.

10.1 Sustainable Transition & the Nexus between Climate Change & Energy Security

- **My thesis:** alternative worldview of sustainability transition requires a different political & economic strategy: a) resource efficiency increase, b) shift from fossil fuels to renewables, c) new interregional cooperative policies with energy supply regions.
- **Energy sector:** as major cause for GHG increases in the Anthropocene is also **the major economic sector for a sustainability transition.**
- **Sustainability transition** requires changes in worldviews, mindsets, culture and in national & international governance
- **Sustainability Transition and Sustainable Peace project (STSP)** aims to address the international dimension this emerging scientific discourse for peace and security and to explore the cooperative potentials that may foster policies aiming at sustainable peace in the Anthropocene.

Sustainability Transition:
An Enlightening Policy Vision Whose Time Has Come!?

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