Rationale and process of the assessment of knowledge about regional climate change and impact - the cases of BACC and NOSCCA.

Hans von Storch

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Co-Chair of BACC and Hamburg reports

Overview

1. The global state of affairs, consolidated knowledge, IPCC, beliefs
2. Climate Service – challenge and needs
3. Knowledge assessment reports: BACC, NOSCCA and Hamburg
4. The Baltic Sea region state of affair – the BACC (II) assessment.
5. Knowledge gaps

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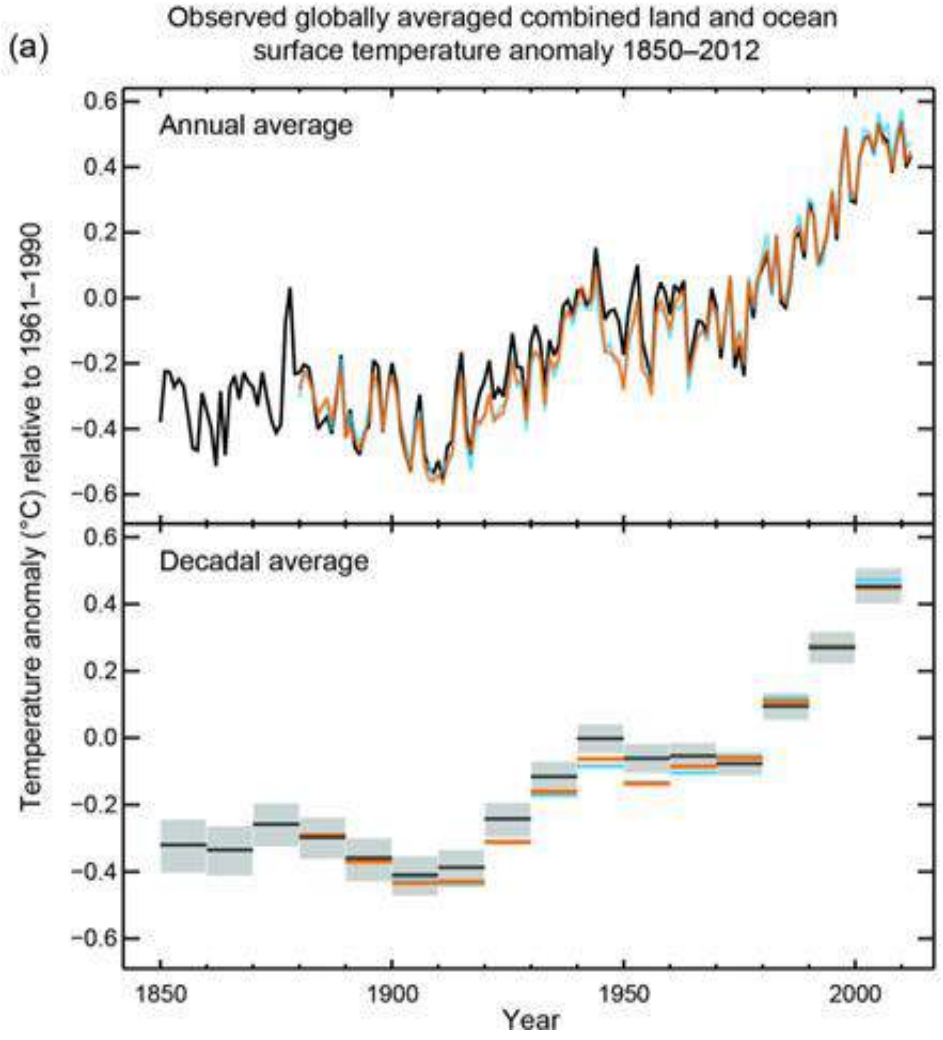
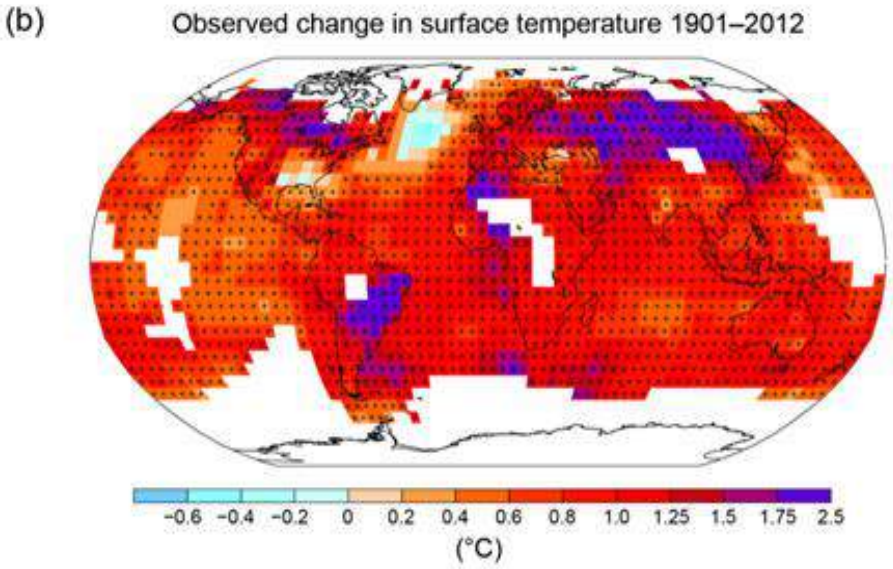
IPCC: Global temperature development during “instrumental times”





ipcc
INTERGOVERNMENTAL PANEL ON climate change

Climate change – present knowledge

Consensus

- There is a **global warming**, which is **inconsistent with internal causes** (Detection)
- Thus, the warming needs an explanation with **external causes**. Only when **greenhouse gases** are considered a dominant driver, a consistent explanation can be found (attribution)
- The change manifests itself in the **thermal regime**, in **sea level** rise and, plausibly, in more heavy rainfall events.

Dissensus

Details, such as

- the speed of rise of global sea level and of temperature,
- the regional and local manifestations, and
- the co-effect of different "drivers" (say, Greenhouse gases, aerosols, land use change incl. urban effect) are uncertain.

Adaptation

- COP 15 (Paris) has agreed that the warming will be halted at 2K, if not 1.5K.
- Even if this goal is met, **a strong need for adaptation** will emerge.
- The halting of the temperature increase does not imply a halting of **sea level rise** (but a slowing).
- No "climate protection" policy will make adaptation obsolete.
- Adaptation does not make massive reduction of emissions obsolete.
- **Adaptation and mitigation are both needed, but they have different characteristics.**

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Climate Change: Constructions

Climate *change* is a „constructed“ issue. People hardly experience „climate change“.

- One construction is scientific, i.e., an „objective“ analysis of observations and interpretation by theories.
- The other construction is cultural, in particular maintained and transformed by the public media.

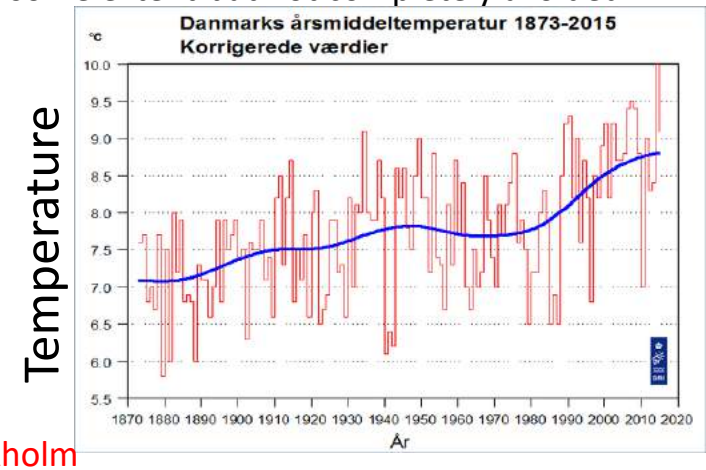
Climate science is in a post-normal phase (where interest-led utility is a significant driver, and less so “normal” curiosity)

von Storch, H., 2009: Climate Research and Policy Advice: Scientific and Cultural Constructions of Knowledge. *Env. Science Pol.* 12, 741-747 http://dx.doi.org/10.1016/j.envsci.2009.04.008

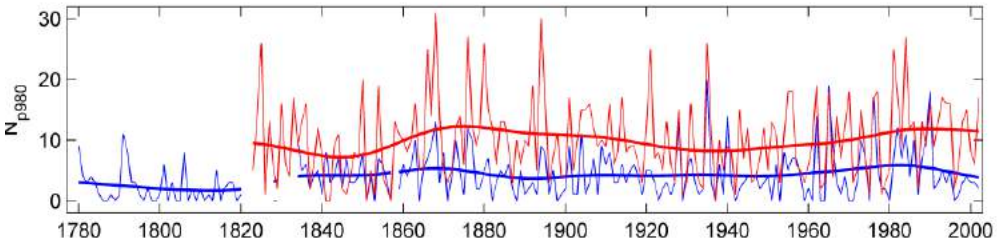
Two different construction of „climate change“ – scientific and cultural – which is more powerful?

Cultural: „Klimakatastrophe“

Scientific: man-made change is real, can be mitigated to some extent but not completely avoided

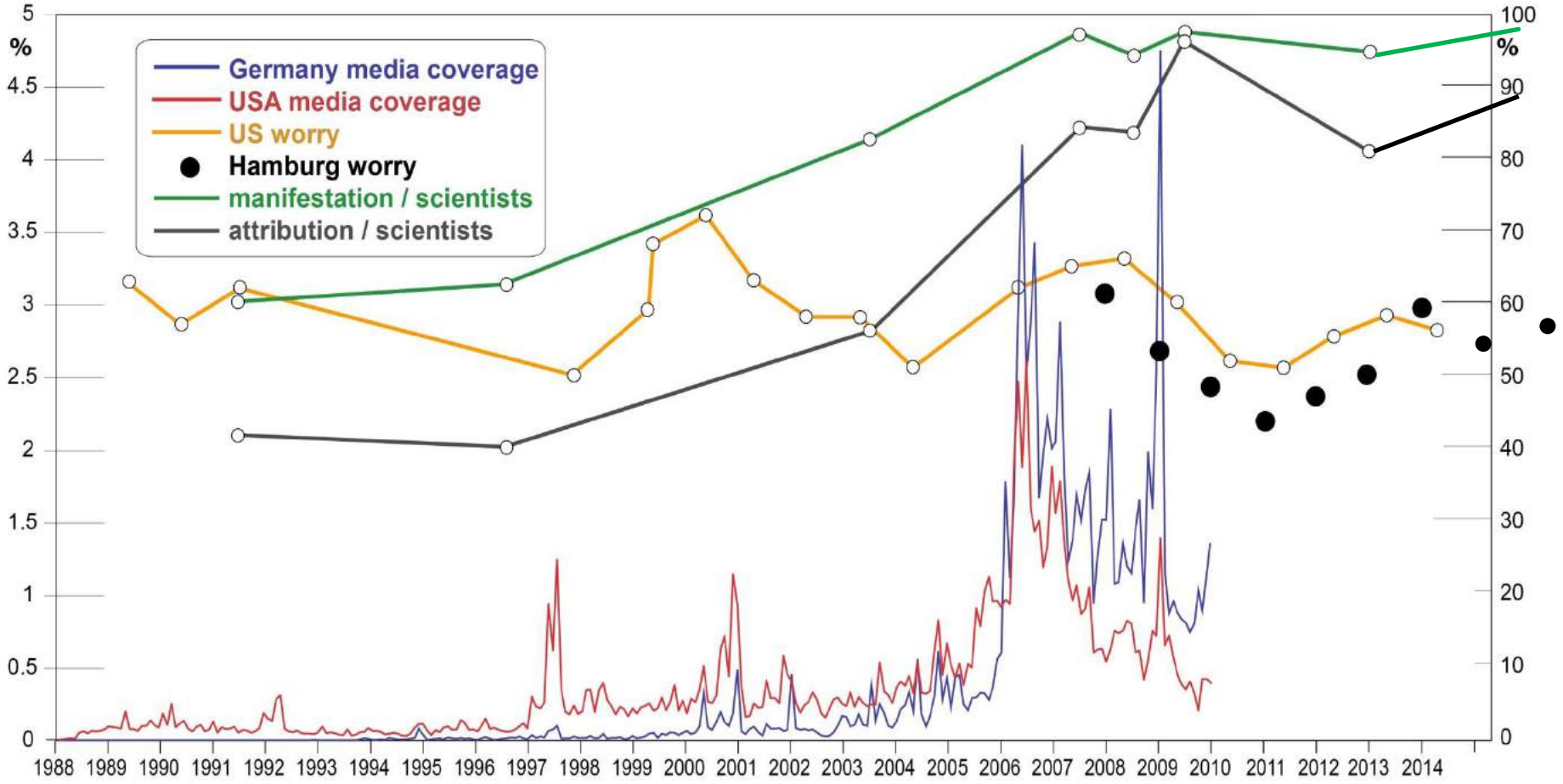


Lund and Stockholm



Storms

Different perceptions among scientists and the public



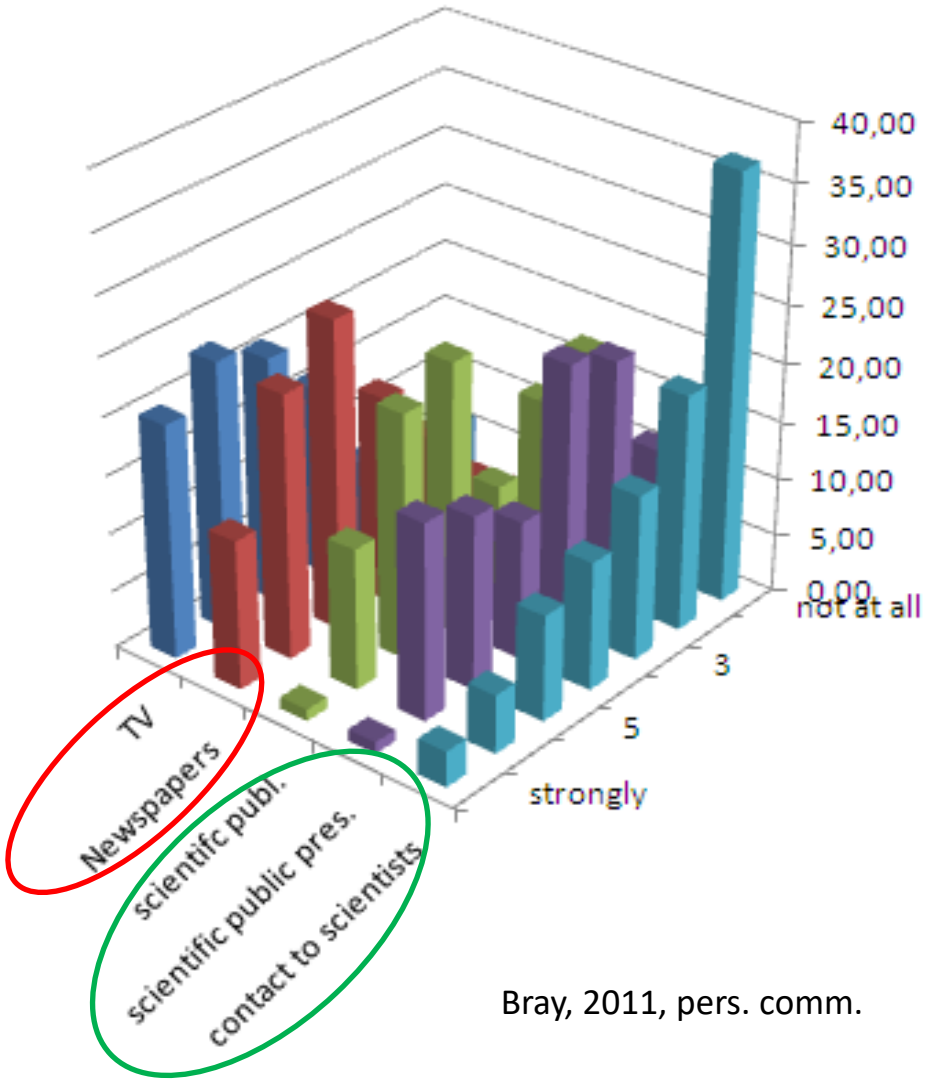
Ratter, Philipp, von Storch, 2012: Between Hype and Decline – Recent Trends in Public Perception of Climate Change, *Environ. Sci. & Pol.* 18 (2012) 3-8

Bray, D., 2010: The scientific consensus of climate change revisited. *Env. Sci. Pol.* 13: 340 – 350

Stakeholder do hardly interlink directly with climate scientists

How strongly do you employ the following sources of information, for deciding about issues related to climate adaptation?

Regional administrators in German Baltic Sea coastal regions.



Bray, 2011, pers. comm.

Regional climate service

von Storch, H., I. Meinke, N. Stehr, B. Ratter, W. Krauss, R.A. Pielke jr., R. Grundmann, M. Reckermann and R. Weisse, 2011: Regional Climate Services illustrated with experiences from Northern Europe. *Journal for Environmental Law and Policy* 1/2011, 1-15

1. Analysis of *cultural construct*, including common exaggeration in the media.

- Determination of *response options* on the local and regional scale: mainly adaptation but also regional and local mitigation.

- *Dialogue* of stakeholders and climate knowledge brokers in „Klimabureaus“.

Norddeutsches Küsten- und Klimabüro

2. Analysis of *consensus* on relevant issues (climate consensus reports).

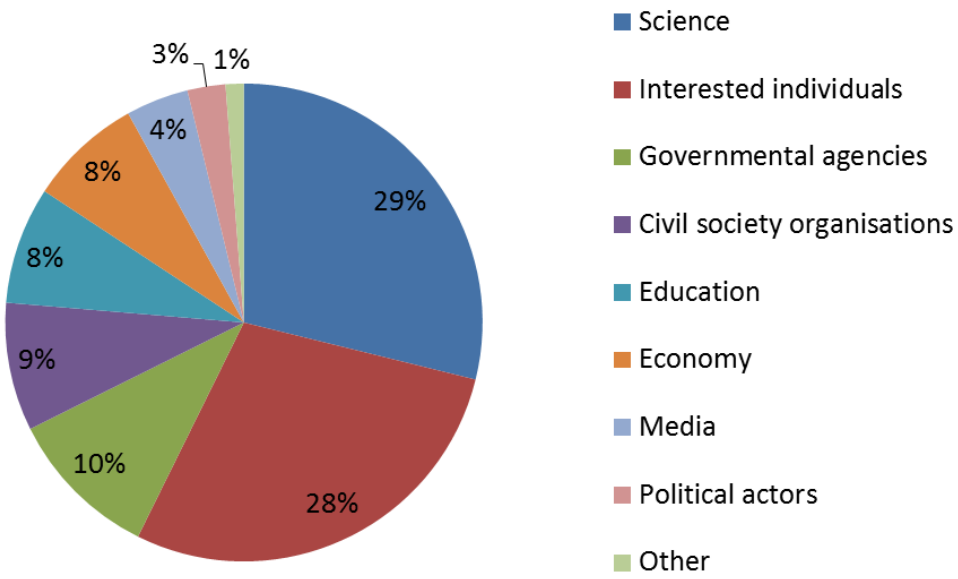
3. Description of *recent and present changes.*

4 Projection of *possible future* changes, which are dynamically consistent and possible („scenarios“)

coastDat by Helmholtz-Zentrum Geesthacht

Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung

User groups and main activities



User groups of the Northern German coastal and climate office (N=2064, January 2018)

Long-term stakeholder dialogue:

- Direct inquiries,
- Talks & discussions
- Workshops and interviews
- Since 2006

Development of various communication formats:

- Regional assessments of climate change in Northern Germany
- Understandable statements and summaries of coastal climate issues in national language
- Web tools on coastal climate change and impacts

Norddeutsches Küsten- und Klimabüro

insa.meinke@hzg.de / www.kuesten-klimabuero.de

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Assessments of knowledge about regional climate change

- for the recent past (200 years), for present change and possible future change
- consensus of what is scientifically documented
- documentation of contested issues.

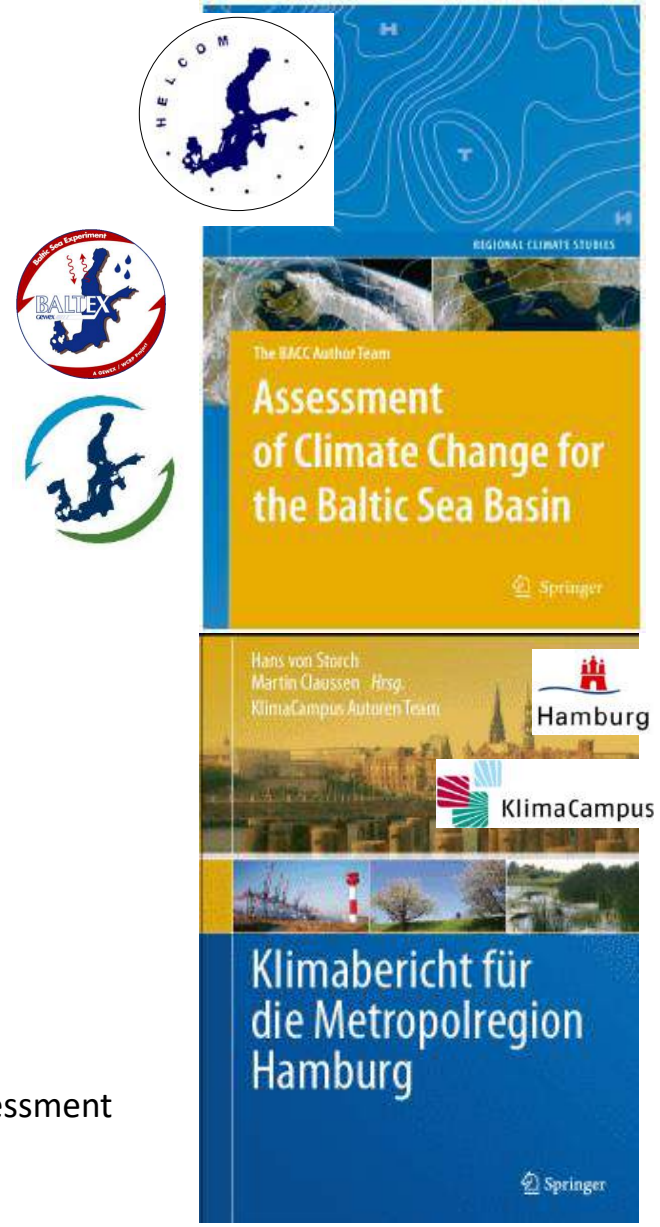
for

+ **Baltic Sea** (BACC)
  - BACC 1 done in 2008,
  - -- BACC 2 done in 2015

+ **Hamburg** region
  - #1 done in 2010
  - #2 done in 2017

+ **North Sea** (NOSCCA)
  - done in 2016

all books available are open-access,
by Springer Verlag



Reckermann, M., H.-J. Isemer and H. von Storch, 2008: Climate Change Assessment for the Baltic Sea Basin. EOS Trans. Amer. Geophys. U., 161-162

IPCC presents and assesses the knowledge about climate change and climate impact on the global and all large regions (such as Europe).

BACC and NOSCCA are small cousins of IPCC doing something similar but only for the Baltic Sea / North Sea region.

The two concepts are broadly similar, but deviate in some significant ways, in particular the non-involvement of governments by BACC and by NOSCCA.

BACC as „regional IPCC“

BALTEX Assessment of Climate Change for the Baltic Sea basin - BACC

An effort to establish which scientifically legitimized knowledge about climate change and its impacts is available for the Baltic Sea catchment.

Approximately 80 scientists from 12 countries have documented and assessed the published knowledge in 2008 in BACC 1;
In May 2015, BACC-2 came out, with 141 contributing authors.

The assessment has been accepted by the intergovern-mental HELCOM commission as a basis for its judgment and recommendations.

Principles

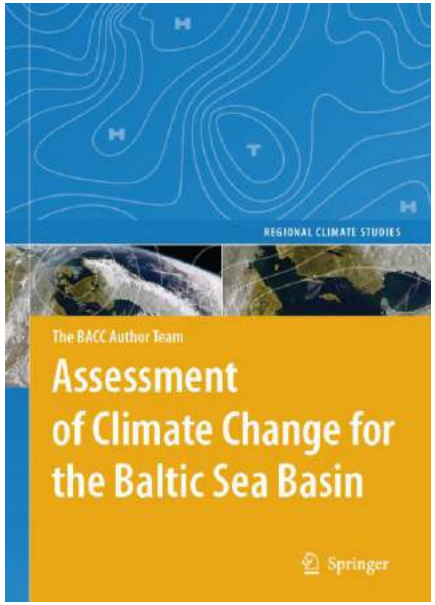
→ The assessment is a synthesis of material drawn comprehensively from the available scientifically legitimate literature (e.g. peer reviewed literature, conference proceedings, reports of scientific institutes).

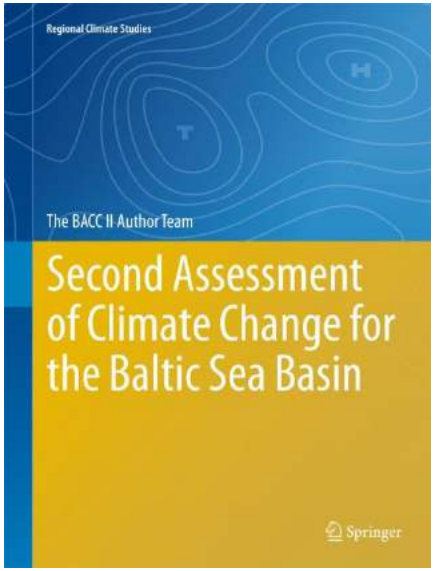
→ Influence or funding from groups with a political, economical or ideological agenda is not allowed; however, questions from such groups are welcome.

→ If a consensus view cannot be found in the above defined literature, this is clearly stated and the differing views are documented. The assessment thus encompasses the knowledge about what scientists agree on but also identify cases of disagreement or knowledge gaps.

→ The assessment is evaluated by independent scientific reviewers.

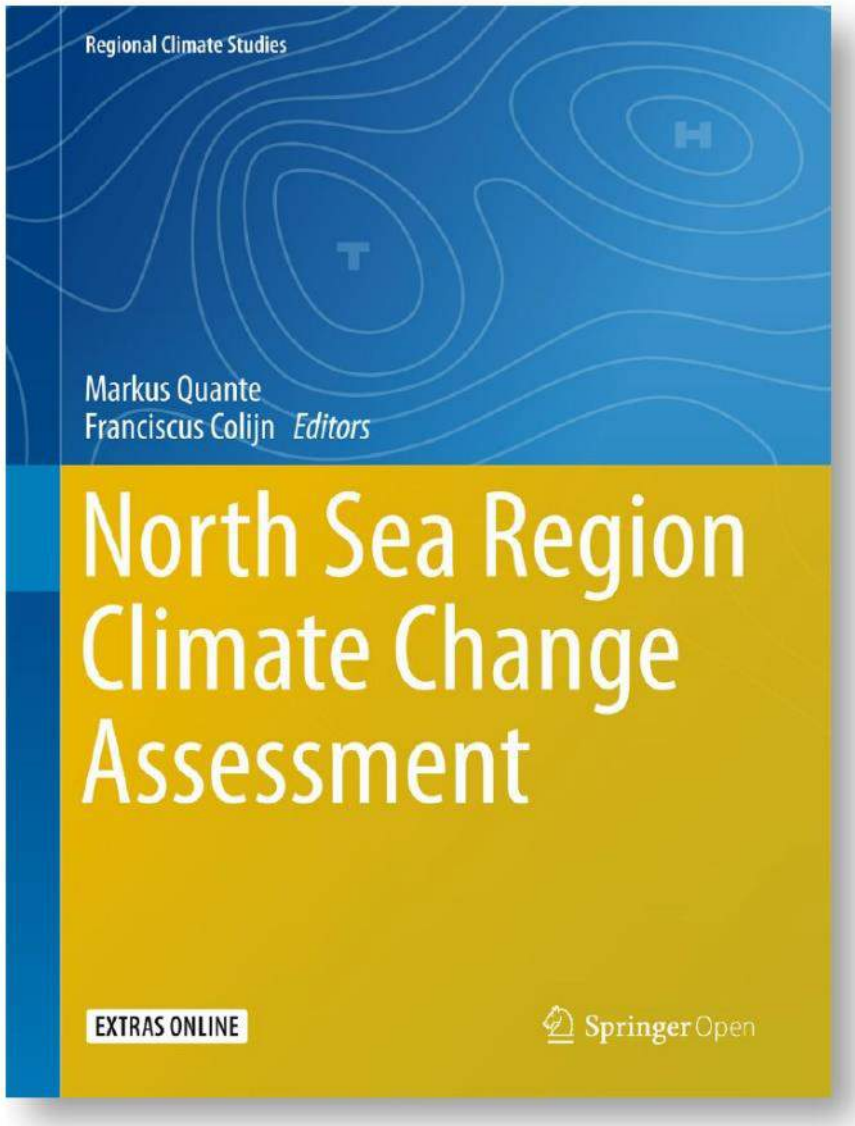
→ Assessors retire from the task, after a report is completed.

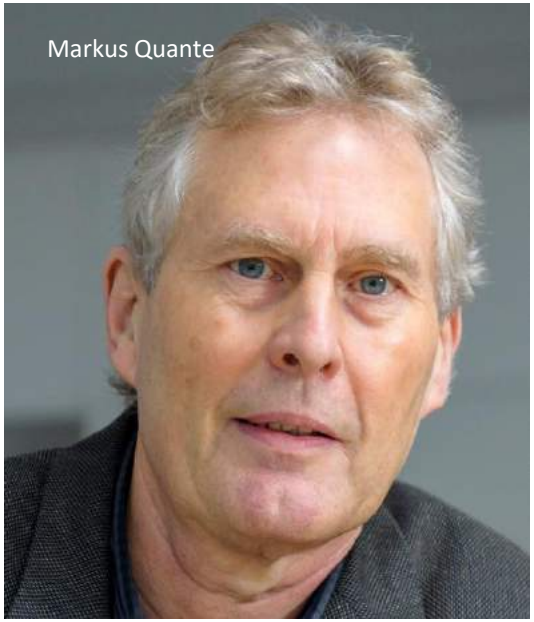




NOSCCA
North Sea Region Climate Change Assessment

Print and open access E-book available since September 2016





North Sea Region Climate Change Assessment






The NOSCCA book report is structured into chapters addressing:

→ past and current climate change,
→ climate change projections,
→ impacts of climate change on marine, coastal, and terrestrial ecosystems, and
→ climate change impacts on socio-economic sectors

- Involved scientists contributed either as Lead (32) or Co-working (95) Authors.
- The overall process was advised by an international Scientific Steering Committee (10).
- All compiled chapters underwent an external review process (61) supervised by an independent review editor.

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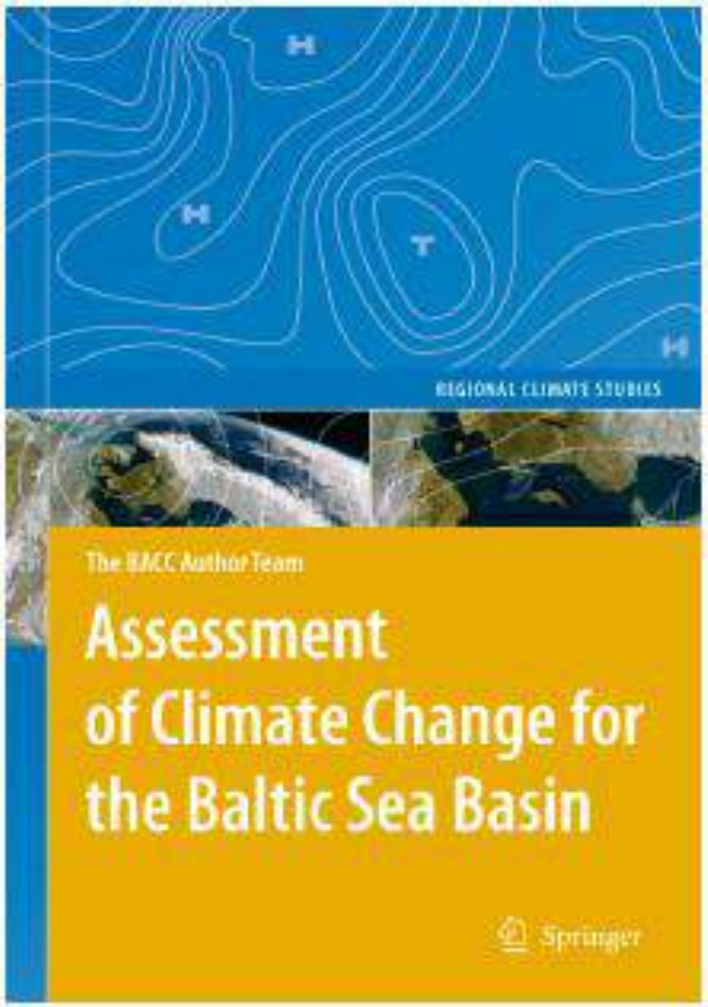
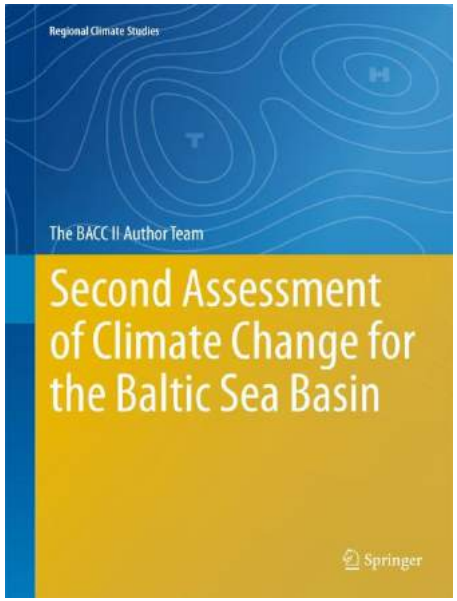
BACC–1 (2008) results – in short

- → Presently a warming is going on in the Baltic Sea region, and will continue throughout the 21st century.
- → BACC considers it plausible that this warming is at least partly related to anthropogenic factors.
- → So far, and in the next few decades, the signal is limited to temperature and directly related variables, such as ice conditions.
- → Later, changes in the water cycle are expected to become obvious.
- → This regional warming will have a variety of effects on terrestrial and marine ecosystems – some predictable such as the changes in the phenology others so far hardly predictable.



Summary of BACC-2 (2015)

- New assessment finds results of BACC I valid
- Significant detail and additional material has been found and assessed. Some contested issues have been reconciled (e.g. sea surface temperature trends)
- Ability to run multi-model ensembles seems a major addition; first signs of detection studies, but attribution still weak
- Regional climate models still suffer from partly severe biases; the effect of certain drivers (aerosols, land use change) on regional climate statistics cannot be described by these models.
- Data homogeneity is still a problem and sometimes not taken seriously enough
- The issue of multiple drivers on ecosystems and socio-economy is recognized, but more efforts to deal with are needed
- In many cases, the relative importance of different drivers, not only climate change, needs to be evaluated.



Summary of BACC-2 (2015)

- Estimates of future deposition and fluxes of substances like sulphur , nitrogen oxides, and carbondioxide depend on future emissions. Atmospheric factors are less important than emission changes.
- In the narrow coastal zone plant and animal communities have to adapt to changing climate and to land uplift.
- Climate change is a compounding factor for freshwater biogeochemistry. The effect of climate change cannot be quantified yet on a Baltic Basin wide-scale.
- Scenario simulations suggest that most probably the Baltic Sea will become more acid in the future.
- Increased oxygen deficiency, increased temperature, changed salinity and increased acidification will impact the marine ecosystem in several ways and may erode the resilience of the ecosystem.
- Increasing need for adaptive management strategies (forestry, agriculture, urban complexes) in the Baltic Sea Basin that deal with both climate change but also emissions of nutrients, aerosols, carbondioxide and other substances.

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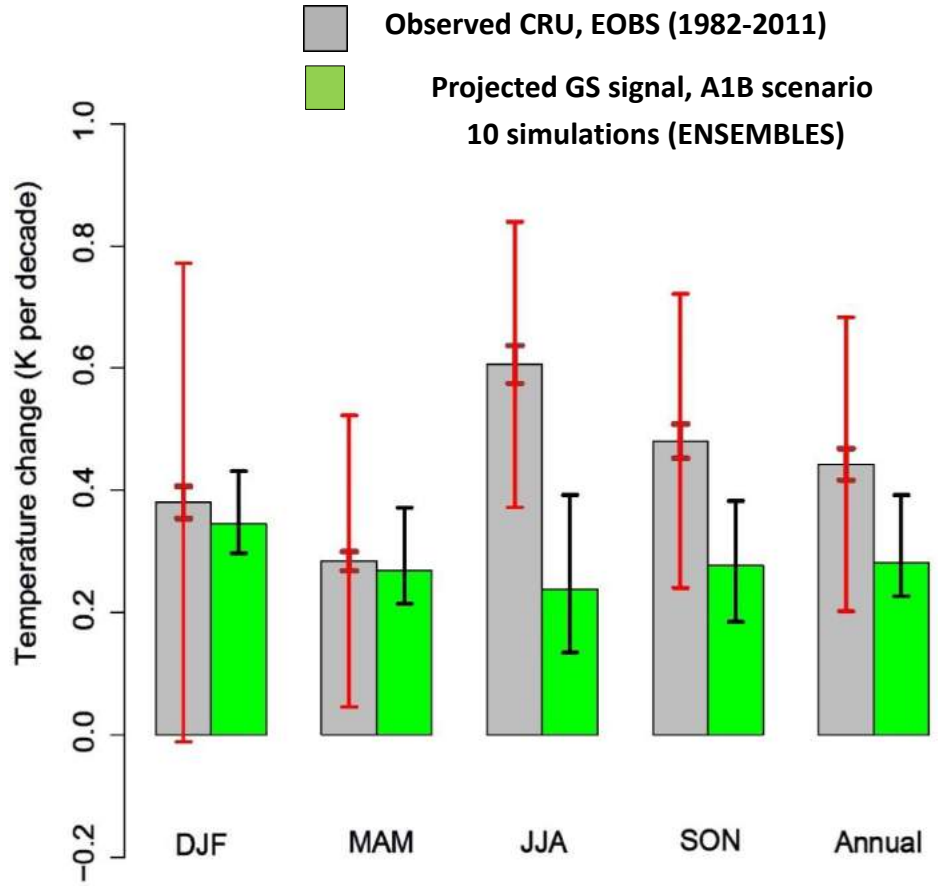
Knowledge gaps

1. The issue of multiple climate change drivers (aerosols, land-user, urbanization)
2. The issue of multiple pressures on ecosystems and economy (eutrophication and related algae blooms, climate change, pollution, but also shipping and off-shore wind power and other off-shore activities, tourism, natural conservation and agriculture, fisheries and pollution)
3. Detection of non-natural regional change of climate and climate impact; attribution of such changes to drivers.

Regional attribution



Observed and projected temperature trends (1982-2011)

The observed (grey) trends are mostly consistent with what the regional climate models (green) suggest as response to elevated GHG levels.

However, the observed warming was in all seasons larger than what the models suggested.

Barkhordarian, pers. comm.

Take home: The issue is - knowledge

- Knowledge about ongoing and expected future climate change and impact is a necessary input for dealing with such phenomena.
- Making claims abut climate change and climate impact , and demanding societal conclusions about how to deal with the issue, is a political act. It is a matter of power.
- Therefore quality control measures are needed when „science“ presents scientific knowledge.
- This should be done by the community, not by self-declared „best“ scientists, or by persons favored by media and politics.
- For global issues, the IPCC does a god job in assessing the available knowledge
- Regional bodies have done similar assessments – for instance BACC and NOSCCA. The format provides some measures to ensure independent, community-based assessment of consensus and dissensus. The process recognizes that science is a social process with scientists as actors.