

## **The BACC process – what is the scientific knowledge about climate, climate change and impact in the Baltic Sea region?**

Climate change and its associated impacts on society and ecosystems is a scientific “fact”, insofar as there is broad agreement within the scientific community about its reality and seriousness. Societies are concerned, and many demand political consideration and action for dealing with this change and the associated impacts. Science is confronted with questions about assessing the ongoing and potential future changes, and providing options for reducing (mitigation) and adapting to the changes (adaptation).

The Intergovernmental Panel on Climate Change (IPCC) provides the public and stakeholders with an updated assessment about every seven years – mostly from a global perspective. For obvious reasons, this IPCC process has limited capabilities to deal with regionally specific issues, and limits its assessment mostly to English-language sources. Therefore, a group of scientists has created a regional version of such an IPCC, named BACC, the BALTEX Assessment of Climate Change in the Baltic Region. The BACC process mimics the IPCC process to some extent, with an international steering committee, a list of lead authors, and an independent review process. The first report came out in 2008 - named BACC-1; now, a second report (BACC-2) is in its final editorial phase. BACC-1 was written by more than 80 scientists mostly from the Baltic Sea region, and more than 110 scientists contributed to the second BACC report.

BACC differs, however, from IPCC in its practice of replacing all lead authors from one report to the next, so that the newer BACC-II represents not only an update of the previous report but an independent review of the former. Also, the results are not subject to a formal political review process, as is done in case of IPCC. Instead the BACC process runs exclusively within the scientific community.

BACC welcomes questions from stakeholders, from the economic or political realms or NGOs, but uses exclusively scientifically legitimate sources, such as publications in scientific journals or reports by scientific institutions such as weather services. After completion of the key results, the reports were given to HELCOM, who have prepared their own assessments based on BACC, including policy recommendations.

BACC examines to what extent agreement or disagreement exists in the scientific literature on climate, climate change and climate impacts in the Baltic Sea Basin, and abstains from deciding which of two or more opposing views (documented in the scientific legitimate literature) is more plausible or even right or false. No recommendations for political or other decision processes are made.

The overall assessment of BACC-1 from 2008 was

- 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.

Key assertions of the second assessment BACC-2 as of 2014 are:

- Results of BACC-1 are found to be valid.
- Significant detail and additional material has been found and assessed. Some contested issues have been reconciled (e.g. sea surface temperature trends). Other issues remain contested or unclear, such as expectations of future sea level rise in the Baltic Sea.
- Too few efforts have been made to separate the effect of different “drivers” in the climate system; the effect of reducing (industrial) aerosol load in the regional atmosphere in recent decades has not been quantified; the effect of urbanization is also not comprehensively studied and quantified. Too often, regional manifestations of global climate change are summarily claimed to be the cause for regional changes.
- 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.

The positive experience with BACC leads to the suggestion that the future IPCC process may be in part organized less so than one global effort, but as a two-thronged approach – a global effort for issues which are truly global in nature, such as the sensitivity of the climate system to external forcing (greenhouse gases, sun), and many regional efforts, such as BACC, within which regional scientists gathering and bringing together regionally specific competence. The regional “daughters” should be certified by the global “mother” IPCC, with respect to procedures of selecting authors, issues, reviewing and liaising with stakeholders.