

## **BALTEX Assessment of Climate Change (BACC) for the Baltic Sea basin**

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The purpose of BACC (BALTEX Assessment of Climate Change for the Baltic Sea basin) is to provide the scientific community and the public with an assessment of ongoing and future climate change in the Baltic Sea region. This was done by reviewing published scientific knowledge about climate change in the Baltic Sea region. The book with the report and a comprehensive summary came out in January 2008:

The BACC author team, 2008: [\*Assessment of Climate Change in the Baltic Sea Basin.\*](#), Springer Verlag Berlin - Heidelberg; ISBN 978-3-540-72785, 473 pp

BACC offers an up-to-date overview over the most recent scientific findings in regional climate research in the Baltic Sea basin, including climate changes in the recent past, climate projections until 2100 using the most sophisticated regional climate models available, and an assessment of climate change impacts on terrestrial, freshwater and marine ecosystems. This overview was authored by a consortium of more than 80 scientists from 13 countries and was published as the comprehensive text book mentioned above.

A unique feature of BACC was the combination of evidence on climate change and related impacts on marine, freshwater and terrestrial ecosystems in the Baltic Sea basin (catchment and water body). It is the first systematic scientific effort for assessing climate change in the Baltic Sea region. Another unique feature was that BACC made sure that political and economic interests did not participate in the assessment activities.

The results were presented in four chapters, two dealing with the geophysical (atmosphere, ocean, sea ice) side and two with the ecological (terrestrial and marine) dimension. Particularly the former two chapters are relevant in the context of regional hydroclimate and are therefore established as a contribution to WCRP/GEWEX/CEOP.

Since 1871, there has been a marked increase of **2 meter air-temperature** of more than 0.85°C in the region, see Figure 1. Consistent with this increase in mean and extreme temperatures, other variables show changes, such as increase of winter runoff, shorter ice seasons and reduced ice thickness on rivers and lakes in many areas. These trends are statistically significant but they have not been shown to be larger than what may be expected from natural variability. In addition, no robust link to anthropogenic warming, which on the hemispheric scale has been causally related to increased levels of greenhouse gases in the atmosphere in “detection and attribution” studies, has been established. However, the identified trends in temperature and related variables are consistent with regional climate change scenarios prepared with climate models. Therefore, it is plausible that at least part of the recent warming in the Baltic Sea basin is related to the steadily increasing atmospheric concentrations of greenhouse gases. Efforts are needed which systematically examine the inconsistency of recent trends with natural variability, circulation changes as well as the consistency with elevated greenhouse gas concentrations as a potential cause.

The situation is much less clear regarding **precipitation**: in the past, a spatially non-uniform pattern of upward and downward trend has been observed, which can hardly be related to anthropogenic climate change. For the future, intensified winter precipitation may emerge later in this century over the entire area, while summers may become drier in the southern part – but this expectation is uncertain for the time being. For the water body of the Baltic Sea, a tendency towards lower **salinity** is expected. Similarly, no clear signals, whether for the past or for the scenarios, are available with regard to **wind** conditions.

In view of the large uncertainty in our knowledge about the changing climatic conditions, it is not surprising that knowledge about ecological implications of ongoing and future climate change is far from complete and also very uncertain. The observed changes in temperature in the past have been associated with consistent changes in **terrestrial ecosystems**, such as earlier spring phenological phases, northward species shifts and increased growth and vigour of vegetation. In the **marine ecosystem** of the Baltic Sea the assessment is particularly difficult because of the presence of strong non-climatic stressors (eutrophication, fishing, release of pollutants) related to human activities.

A second BACC report is presently prepared, using the same philosophy of the first report. A new scientific Steering committee has been formed, and new lead authors are presently selected. The results are expected for 2012. For further information, refer to [http://www.baltex-research.eu/organisation/bwg\\_bacc2.html](http://www.baltex-research.eu/organisation/bwg_bacc2.html).

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