Overview over the BACC project and a summary of the BACC book

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Climate, detection and attribution

- Climate = statistical properties of some variables as for example temperature. Need to be characterized.
- Climate change = any change in climate over time whether due to natural variability or a result of human activity. Need to be characterized.
- Climate variability = climate variations not related to anthropogenic influence. Need to be characterized.
- Anthropogenic climate change = climate change when human cause are attributable. Could be due to several reasons.
- Detection of climate change need good data
- Attribution of climate change need models

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Uppsala winter air temperature

Maximal ice cover extent

Ice winter severity index

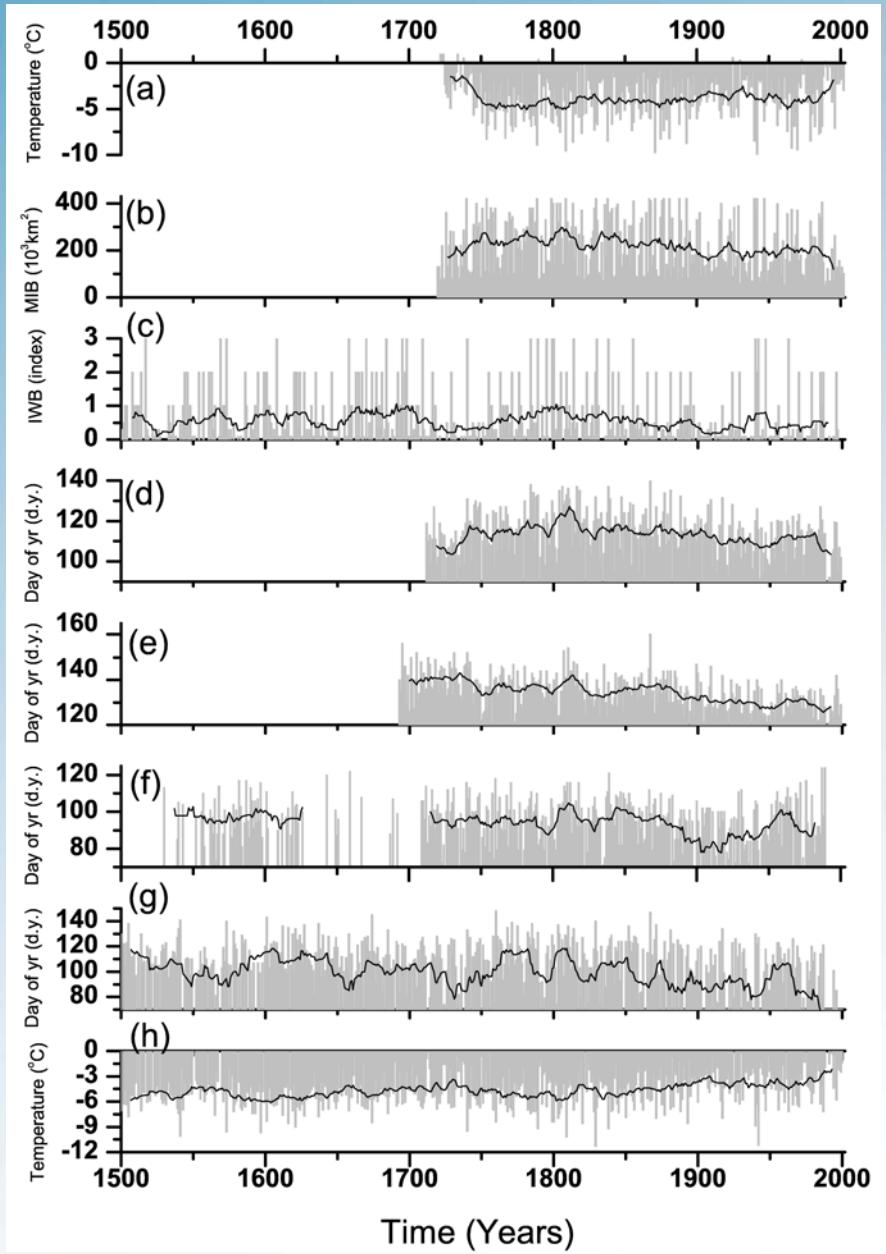
Ice break-up, Lake Mälaren

Ice break-up, Torne river

Ice break-up, port of Riga

Ice break-up, port of Tallin

Tallin winter air temperatures



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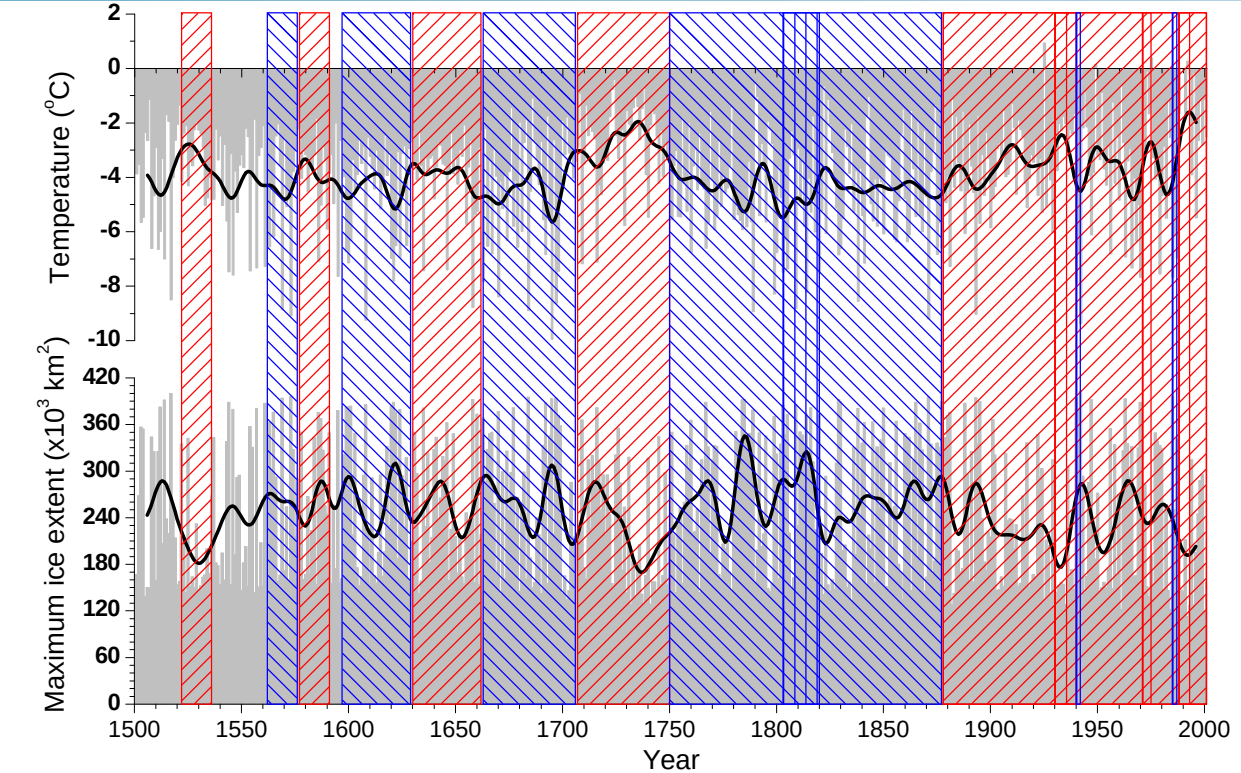
Characterizing the European sub arctic winter climate (Eriksson et al., 2007)



Perioder

1522-36	Mild
1562-76	Cold
1577-91	Mild
1597-1629	Cold
1630-62	Mild
1663-1706	Cold
1707-50	Mild
1750-1877	Cold
- 1803-20	Cold
1878-2000	Mild
- 1930-39	Mild
- 1940-42	Cold
- 1971-75	Mild
- 1985-87	Cold
- 1988-93	Mild

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Inter relations and correlations air-temp and ice extent (Omstedt and Chen, 2001)

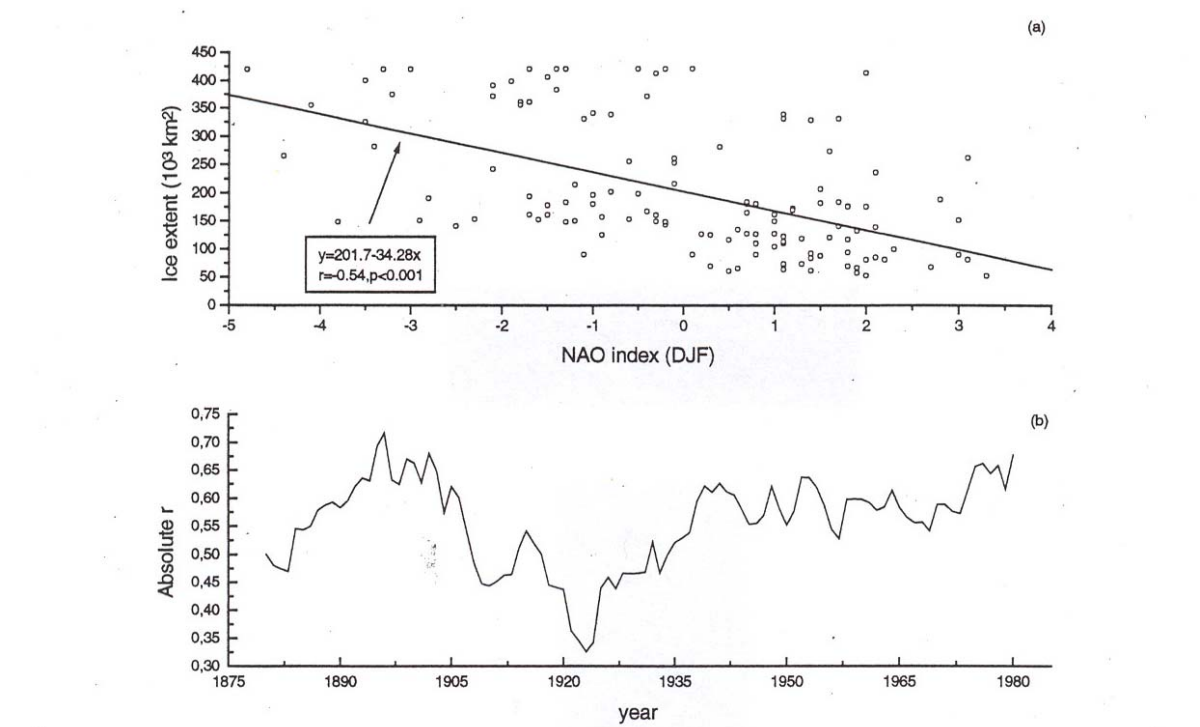

Figure 4. (a) Scatterplot and (b) 31 year moving correlation between the seasonal NAO_i and the annual maximum ice extent. The line in Figure 4a indicates the least squared fit given by the equation in Figure 4a.

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Climate in the BALTEX region

- Large and long deviations from averages
- Decadal climate variability more “Event-like” than regular oscillations
- Stochastic: Little deterministic predictability

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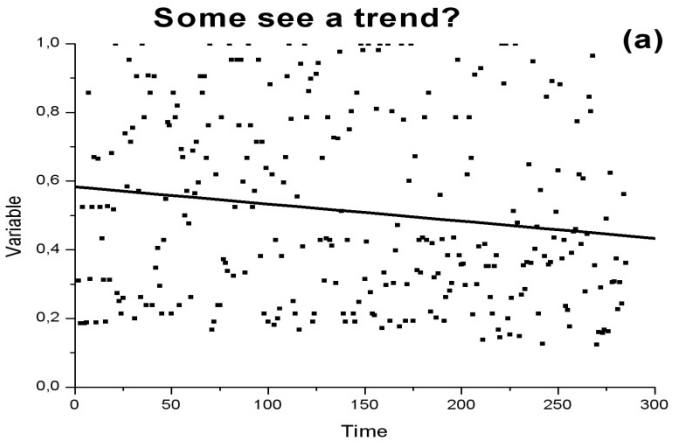
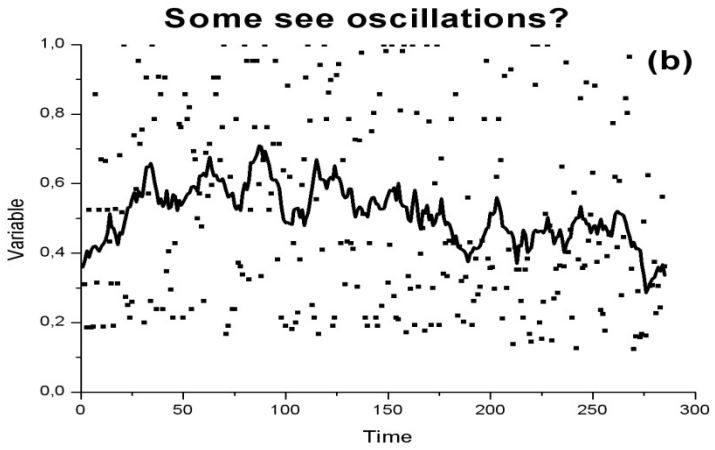
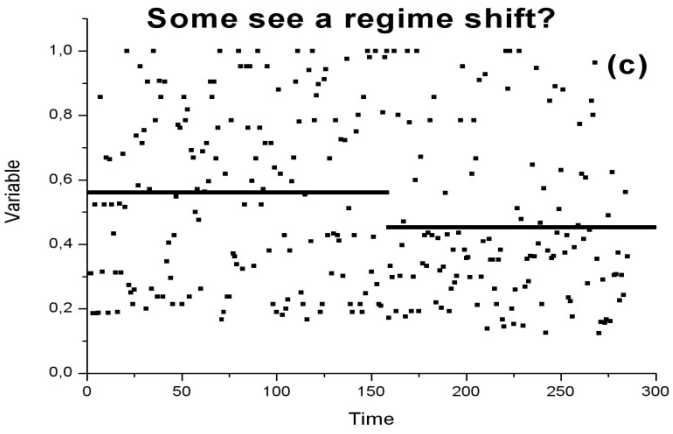
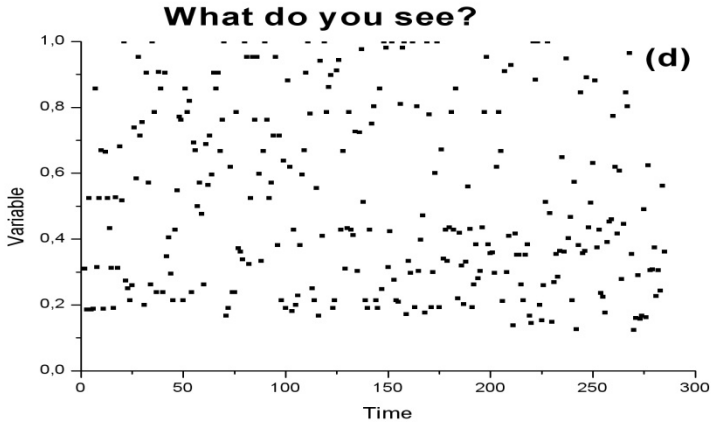
What can we say from data?









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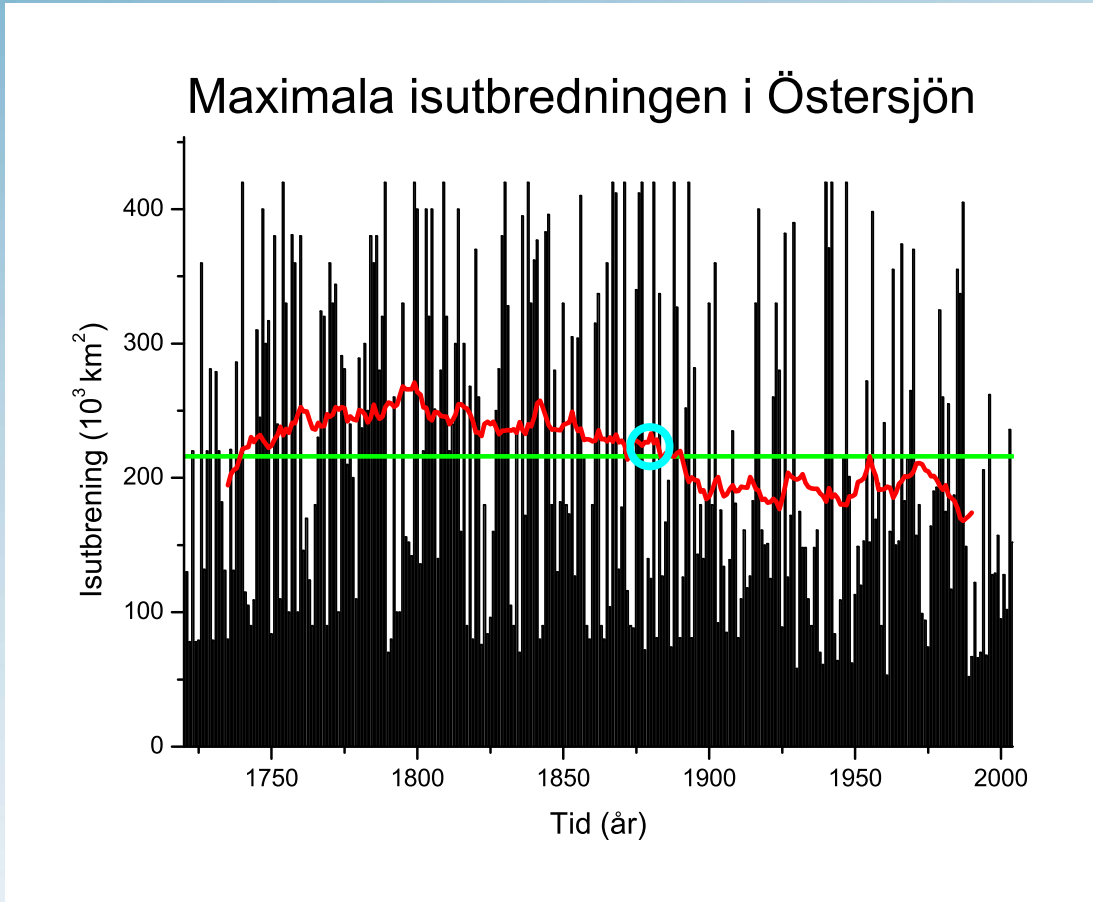
Annual maximum ice extent in the Baltic Sea



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Overselling takes place in the triangle between policy, media and science. Scientist are part in this play and building marine policy on best available knowledge should not be done based on a single scientist but through systematic scientific assessments.

Question: How can we build scientifically legitimized knowledge through systematic Baltic Sea assessments?

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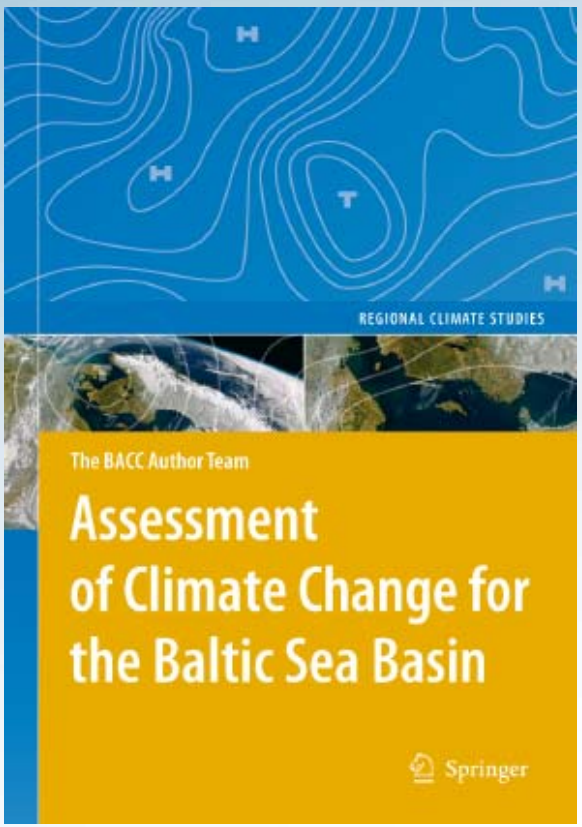
Our assessment model

BACC
BALTEX ASSESSMENT OF CLIMATE CHANGE
for the Baltic Sea Basin

Publication in January 2008:

More than 30 contributing institutions
More than 80 contributing authors from 13 countries
More than 475 pages
More than 2000 references (~150 non-English)

Ch1: Introduction and summary
Ch2: Past and current climate change
Ch3: Projections of future climate change
Ch4: Climate-related change in *terrestrial and freshwater ecosystems*
Ch5: Climate-related change in *marine ecosystems*
Ch6: Annexes



www.baltex-research.eu/BACC

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BACC and HELCOM

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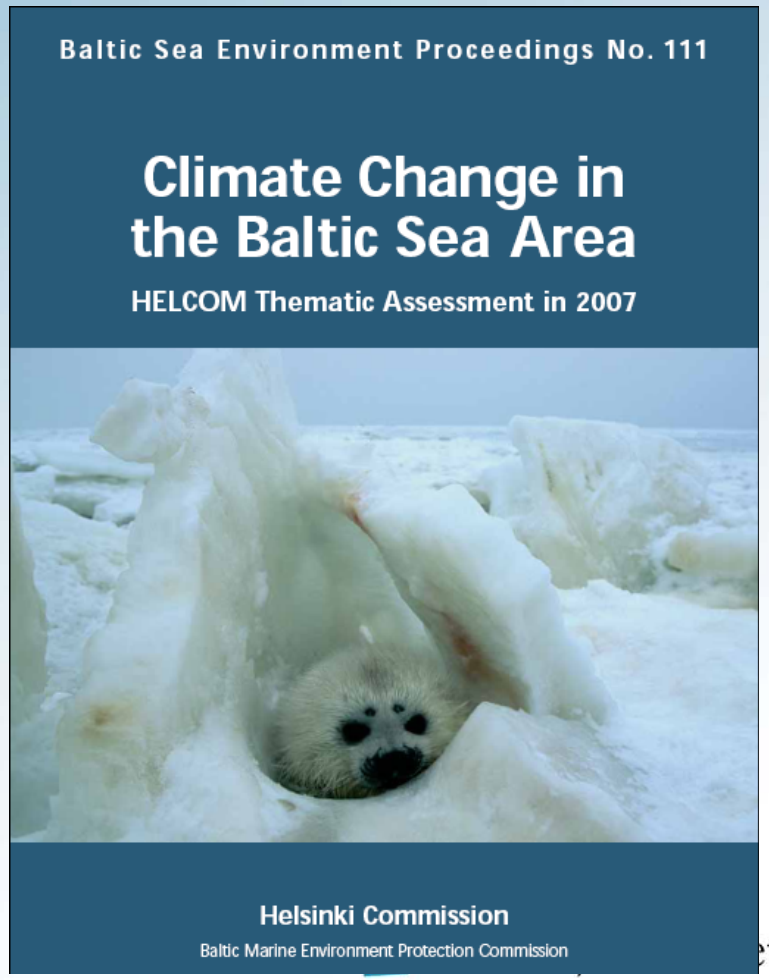
BALTEX ASSESSMENT OF CLIMATE CHANGE
for the Baltic Sea Basin

HELCOM Thematic Assessment published May 2007

The report is based on the BACC material but condensed to 59 pages with a focus of the marine environment of the Baltic Sea. It has been approved by the HELCOM contracting governments of 9 countries and the European Commission.

An unprecedented cooperation of a climate-related research program and an intergovernmental body



The purpose

of BACC was to provide the scientific community and the public with an assessment of ongoing and future climate change in the Baltic Sea Basin. This is done by reviewing and assessing published scientific knowledge on climate change in the Basin.

An **important element** was the comparison with the historical past (until about 1800) to provide a framework for the severity and unusualness of the change.

The **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.

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It is the first systematic scientific effort for assessing climate change in the Baltic Sea Basin.

No additional or external funding was needed.

The results have not been influenced by either political or special interests.

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for the Baltic Sea Basin

Major findings

-a marked increase of mean surface air temperature of more than 0.7 C in the region during the **recent century**;

- consistent changes in other variables such as extreme temperatures, increase of winter runoff, shorter ice seasons and reduced ice thickness on rivers and lakes in many areas;

- a spatially non-uniform pattern of upward and downward trends in precipitation, which is difficult to be related to anthropogenic climate change;

- evidence on increasing Baltic Sea SST only significant for the 3 recent decades, the century-long data records may have severe inhomogeneities;

- assessment of indications that at least part of the recent warming in the Baltic Sea basin is related to the steadily increasing atmospheric concentrations of greenhouse gases;

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- for the **future**, projections indicate that increased 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 Baltic Sea, a tendency towards lower salinity and less ice coverage could be expected;

-no clear signals, whether for the past or for future scenarios, are available with regard to wind conditions;

- observed changes in past temperature 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, these changes are expected to continue and become more pronounced in the future;

- an assessment for the marine ecosystem of the Baltic Sea is particularly difficult because of the presence of strong non-climatic stressors such as eutrophication, fishing, release of pollutants, related to human activities.

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Thanks

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Past and current climate change

- Air temperature increased by about 1.2 C since 1871 until 2004.
- Most pronounced warming in spring.
- Related observed changes in winter runoff, ice duration and snow.
- More precipitation in the 2nd half of the 20th century with major regional variations.
- No systematic change in windiness found.
- No clear long-term trends in Baltic Sea salinity.

Ongoing changes in regional ecosystems

- Associated changes in terrestrial ecosystems include
  - earlier spring phenological phase,
  - northward species shift, and
  - increased growth and vigour of vegetation.

- Robust assessments of changes in marine ecosystems related to climate change are hardly possible at this time. Further research is needed to discriminate between climate change and other anthropogenic drivers such as over-fishing, euthrophication, air pollution and land use changes.

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Projections of future **regional** climate change

- Increasing temperatures very likely during the entire 21st century, but size of the trend depends considerably on model.

- Projected mean precipitation increases, largest increase in winter throughout the basin and decrease in summer in the southern basin.

- No clear projection for wind speed and storms.

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Draft time line for BACC II (as of 15 November 2010)

23-24 Nov 2010	1st BACC II Lead Author Team meeting (Göteborg)
June 2011	2nd BACC II Lead Author Team meeting (Hamburg)
December 2011	BONUS conference (Göteborg), BACC II side event
Mid 2012:	First version of BACC II chapters established (deadline)
Autumn 2012:	Review/stakeholder conference
	(Tallinn, of the "BACC/Göteborg 2006" type)
End 2012:	External peer-review completed
March 2013:	BACC II material revised according to review
Mid 2013:	BACC II report published
End of 2013:	BACC II book manuscript print-ready
Beginning of 2014:	BACC II book published