# BALTEX-HELCOM Workshop on *Climate Assessments for the Baltic Sea Basin*[1]

**Minutes**
(Final version as of 4 February 2005)

**Date and Location of the Workshop:**
13 January 2005, 11 am to 4 pm
Danish Meteorological Institute (DMI), Copenhagen, Denmark

**Participants** (Affiliation and relevant Capacities):

**Hartmut Graßl** (Max-Planck-Institute for Meteorology (MPIfM), Hamburg, Germany; Director at MPIfM, Chair of the BALTEX Science Steering Group (BSSG));
**Juha-Markku Leppänen** (Helsinki Commission (HELCOM), Helsinki, Finland; Professional Secretary at HELCOM);
**Hans von Storch** (GKSS Research Centre Geesthacht, Germany; Director at the Institute for Coastal Research at GKSS, Chair of the Science Steering Committee (SSC) for the *BALTEX Assessment of Climate Change for the Baltic Basin (BACC)* Initiative);
**Timo Vihma** (Finnish Meteorological Institute (FMI), Helsinki, Finland; Member of the BSSG);
**Jari Haapala** (Finnish Institute of Marine Research (FIMR), contributing author to BACC, FIMR representative);
**Ole Bøssing Christensen** (Danish Meteorological Institute (DMI), Copenhagen, Denmark; Member of the BSSG, contributing author to BACC, host of the Workshop);
**Hans-Jörg Isemer** (GKSS Research Centre Geesthacht, Germany; Head of the International BALTEX Secretariat).

## 1 Introduction and Background

In the introduction round participants recalled two recent developments and initiatives which lead to the conduction of this workshop.

In early 2004, the BALTEX (Baltic Sea Experiment) programme defined its objectives for Phase II of the programme, which - among others - include the *analysis of climate variability and change since 1800, and provision of regional climate projections over the Baltic Sea basin for the 21st century*[2]. In September 2004, being a member of the BALTEX Implementation Plan Writing Team, Hans von Storch initiated to conduct an *Assessment of Climate Change for the Baltic Basin* with the ultimate goal to review existent literature on the subject and publish an assessment book by the end

[1] The whole water catchment region of the Baltic Sea, including the sea, will be referred to as Baltic Sea Basin in this document.
[2] See the BALTEX Phase II Science Plan 2003 to 2012, International BALTEX Secretariat Report No 28, February 2004.

of 2005. In parallel, Timo Vihma and Mikko Alestalo[3], both in their capacities as BALTEX Scientific Steering Group (BSSG) members, contacted Juha-Markku Leppänen at HELCOM, to discuss the revised objectives of BALTEX including possible future linkages to HELCOM, and the idea for a HELCOM *Assessment of impacts of climate change on the Baltic Sea* was developed, at that time independently from the above initiative by Hans von Storch.

Both initiatives were presented and discussed at the 17th meeting of the BSSG held in Poznan, Poland, during 24 to 26 November 2004. The BSSG welcomed and supported both initiatives and suggested close co-operation of the two to the extent possible and agreeable for the involved individuals and institutions.

As a follow-up to the 17th BSSG meeting Hans von Storch welcomed with pleasure the suggested support through the BSSG for the review process of the assessment book, and the BSSG therefore suggested to attach the label "BALTEX" to this initiative which is therefore now called the *BALTEX Assessment of Climate Change for the Baltic Basin (BACC)*. Following further recommendations by T. Vihma, M. Alestalo and J.-M. Leppänen, Hartmut Graßl suggested the rapid conduction of this workshop to clarify and initiate – to the extent beneficial for both initiatives - future co-operation.

## 2 The BACC Assessment Initiative

Hans von Storch stressed the purpose of the BACC assessment to provide the scientific community with an assessment of ongoing climate change in the Baltic Sea Basin. An important element is the comparison with the historical past (until about 1800) to provide a framework for the severity and unusualness of the change. Also changes in relevant environmental systems, due to climate change, shall be assessed – such as hydrological change, ecosystems, and ocean waves. The overall format is similar to the IPCC[4] process, with author groups for the individual chapters, an overall policymaker-summary, and a review process. H.von Storch noted his hope that the results may be established in due time to enter the Fourth Assessment Report (AR4) of the IPCC.

The final form of the assessment is planned to be published as a book with four chapters, as follows:

1. Overall assessment and summary
2. Past and current climate change, detection and attribution (atmospheric, ocean, sea-ice, land-use, hydrology) – *Lead authors: Raino Heino and Heikki Tuomenvirta*
3. Projections of future climate change – *Lead author: Phil Graham*
4. Climate related ecosystem change – *Lead author: Bodo von Bodungen*

Special emphasis is planned to be given to literature in languages other than English, because this body of knowledge all too often is not entering the IPCC process. A BACC Science Steering Committee has been formed (see Annex 1 for its present members). The *Springer* Publishing Company has been approached, and has responded already positively.

[3] Mikko Alestalo is the Deputy Director General at the Finnish Meteorological Institute, Helsinki, Finland.

[4] Intergovernmental Panel on Climate Change

H.von Storch continued presenting and discussing the present structures of chapters 2 to 4 (see Annex 2), which at the time of the workshop have not finally been harmonized across chapters. For chapter 4, the need for a stronger consideration of terrestrial ecosystems was noted. The lead authors have already established writing teams with confirmed contribution from more than 30 distinguished scientists from almost 10 different countries.

The BACC presentation was finished by an outline of the present time schedule, as follows:

| | |
|---|---|
| February/March 2005: | Chapter workshops |
| 1 April 2005: | Chapters 2 to 4 ready |
| April/May 2005: | BACC Workshop[5] |
| 31 May 2005: | BALTEX review available |
| 30 June 2005: | BACC Assessment revised including review |
| 20 August 2005: | Editorial details for a BACC report finalized |
| 1 September 2005: | Publication of the BACC report |
| 1 November 2005: | Completion of a BACC internet presentation |
| End 2005: | Completion of BACC book manuscript |

H.von Storch concluded the time plan to be ambitious but not unrealistic to materialize. He also noted that, with the present road map for IPCC AR4 (see Annex 3), it seems to be not entirely impossible that results of the BACC report and references used therein may enter into the IPCC AR4 process.

## 3 The HELCOM Assessment Plan

Juha-Markku Leppänen firstly reviewed the general HELCOM assessment strategy and secondly explained the specific plan for an HELCOM holistic Thematic Assessment Report on *Effects of climate change on the Baltic Sea*. The general objectives of such HELCOM Thematic Reports are

i) to provide information in order to make sound decisions to restore the Baltic Sea ecosystem to reach good ecological status, and to support the implementation of the HELCOM objectives and actions;
ii) to provide policy relevant information for targeted users at national and Baltic-wide level,
iii) to provide input to pan-European and global fora such as EU, UNEP and IMO;
iv) to raise general public awareness of the Baltic Sea and HELCOM actions.

HELCOM assessments should make use of the guidance provided by the DPSIR scheme [6], as well as use quality objectives and linked performance indicators as central tools.

J.-M.Leppänen stressed the role and status of HELCOM as an intergovernmental international organisation with all countries bordering the Baltic Sea and the European Union being Contracting Parties to HELCOM. Scientific research outside HELCOM should be used as the primary source for defining newly emerging concerns, related assessments and advice.

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[5] Addendum to the minutes, as of 7 February 2005: The BACC workshop is meanwhile scheduled for 19 and 20 May 2005 in Helsinki, Finland.
[6] DPSIR = **D**riving forces, **P**ressure, **S**tate, **I**mpact, **R**esponse

J.-M. Leppänen continued to note that the presently planned HELCOM assessment on climate change could be divided into two volumes where Volume 1 would be almost identical to the outlined Chapter 2 of the BACC assessment including meteorological, hydrological and hydrographic aspects, with few additional items to be added relevant for HELCOM. Volume 2 would contain ecological aspects in general, most of which seem to be subject of Chapter 4 of the BACC assessment book. See Annex 2 for details on both chapters.

J.-M. Leppänen stated that HELCOM would therefore not start a separate activity for establishing the desired assessment but would ask the BACC group to receive permission for making use of the BACC material and establish the HELCOM assessment accordingly, but following HELCOM specific formal rules. Also, as the target groups for BACC and HELCOM are different, the BACC material will have to be subject of rewriting for HELCOM purposes.

## 4 Joint BALTEX - HELCOM Assessment

A lively and constructive discussion followed both presentations. The conclusions of this discussion are summarized as follows:

### 4.1 A joint BALTEX - HELCOM Assessment Project

It was unanimously agreed to establish a joint BALTEX-HELCOM assessment project. It is important to note that three bodies or groups are expected to be involved:
1) the BACC group[7], represented by Hans von Storch;
2) the Helsinki Commission (HELCOM), represented by Juha-Markku Leppänen;
3) BALTEX as a major European science programme, represented through Hartmut Graßl and members of the BSSG, and the International BALTEX Secretariat.

All three bodies act at different stages of the project. The overall **project management** and co-ordination of actions between the three bodies will be through **Hans-Jörg Isemer**, head of the International BALTEX Secretariat (IBS). The IBS will also assist in management tasks of the BACC assessment, in close co-operation with the BACC SSC and chapter lead authors.

### 4.2 Six Major Milestones

The following six major milestones (M1 to M6) of the joint BALTEX-HELCOM assessment project including the suggested time line and main actors are:

**M1, September 2005:** The **BACC Assessment** material is ready to be published as a **Report**. At that time, the report has already been subject to a scientific review supported by the BSSG and the review results were considered for the final report. See the end of section 2 above for detailed action steps for M1. An additional action step will be the establishment and approval of a formal HELCOM-internal project, see topic 4.3 below.

**M2, January 2006:** The **BACC Assessment** material is ready for printing for an assessment **Book** to be published with the *Springer* Company.

[7] The term *BACC group* summarizes all individuals contributing to the BACC Assessment Report, either as an author, lead author, SSC member or in other function.

**M3, March 2006:** The **HELCOM Thematic Assessment Report Volume 1** on *Past and Current Climate Change, Detection and Attribution* (Working title) is ready for printing. This milestone is expected to require the following action steps:

- M1 reached, September 2005;
- The HELCOM Secretariat to extract relevant information and establish the 1st draft;
- BACC experts to review the draft;
- The HELCOM Secretariat to finalize the draft;
- BALTEX experts to approve the scientific validity of the final draft;
- HELCOM to adopt the final draft as a Thematic Assessment Report, March 2006.

**M4, May 2006: A BALTEX-HELCOM International Conference** on *Impacts of climate change on driving forces in the Baltic Sea Basin, pressures, state and impacts in the marine environment (*Working title*).* Suggested Conference locations include Helsinki, Finland, or Gothenburg, Sweden. The objective of the Conference is to lay the scientific base for the HELCOM Thematic Assessment Report Volume 2 (*Ecology*). Conference preparations shall start in April 2005, preferably at the BACC workshop.

**M5, Summer 2006:** Establishment of an ***Expert Group for Conclusions*** (climatologists, ecologists, sociologists, economists) in preparation for the HELCOM Thematic Assessment Report Volume 2. Input is expected to be available in particular from BACC scientists contributing to chapter 4 of the BACC assessment book.

**M6, March 2007: The HELCOM Thematic Assessment Report Volume 2** is ready for printing. Completion of this milestone will require close interaction between the Expert Group (M5) and the HELCOM Secretariat, along the lines as outlined for M3, where the scientific review shall not be confined to the BACC group but should include a larger group of individuals and disciplines.

### 4.3 A Formal HELCOM Assessment Project

Formally the Meeting of the Helsinki Commission scheduled for 1 and 2 March 2005 has to approve the production of the HELCOM Thematic Assessment on climate change. J.-M. Leppänen will inform the Workshop participants on the decision of HELCOM.

### 4.4 Funding Issues

4.4.1 The BACC initiative has by definition no external funding resources available, contributing scientists are expected to cover their own expenses, except for exceptional cases, where invited contributors may otherwise be unable to attend a BACC workshop. Support to cover printing costs for both the BACC report and the BACC book will be made available at least partly through GKSS Research Centre by actions of Hans von Storch.

4.4.2 Printing costs for the HELCOM reports are expected to be covered by HELCOM.

4.4.3 J.-M. Leppänen indicated that limited financial support may be available i) for travel purposes in exceptional cases mentioned under 4.4.1, ii) to support the preparation and conduction of in particular the BALTEX-HELCOM Conference and major workshops.

4.4.4 It was noted that the European Commission through its *Environment* GD is a Contracting Party to HELCOM and possibilities to receive financial support from the EC may need to be explored.

## 5 Concluding Remarks

In concluding the workshop all participants expressed their high satisfaction with the plans established at this workshop. The mutual benefits for all contributing parties expected from the suggested assessment project was highlighted. Hartmut Graßl noted in particular that BALTEX as a major European science programme and a "family member" of the World Climate Research Programme (WCRP)[8] will gain reputation by supporting and officially cooperating with a major intergovernmental organisation such as HELCOM. He in particular appreciated actions by both Mikko Alestalo and Timo Vihma who initiated joint BALTEX-HELCOM plans. In turn, Juha-Markku Leppänen thanked all participants in the name of HELCOM and stressed the planned co-operation being an outstanding and rare example of HELCOM concluding a major project proposal with an European science programme in support of an official HELCOM Thematic Assessment Report.

All participants thanked DMI for hosting the workshop.

Minutes first draft
H.-J. Isemer, 20 January 2005

Minutes final draft
(considering comments by J.-M. Leppänen, T. Vihma, H. von Storch)
H.-J. Isemer, 24 January 2005

Final approval by all participants
4 February 2005

## Annexes

Annex 1: The BACC Science Steering Committee (SSC) and Chapter Lead Authors
Annex 2: The BACC Assessment Book: Tentative Structure of Chapters 2 to 4
Annex 3: IPCC AR4 WG1 and WG2 Road Maps

[8] BALTEX was launched during the early 1990s as one of the first Continental-Scale Experiments (CSEs) within the Global Energy and Water Cycle Experiment (GEWEX) of the World Climate Research Programme (WCRP).

**Annex 1:**
**The BACC Science Steering Committee (SSC) and Chapter Lead Authors**
(as of January 2005)

Hans von Storch (Chair)

Sten Bergström
Jens Hesselbjerg Christensen
Eigil Kaas
Zbigniew Kundzewicz
Anders Omstedt
Jouni Räisänen
Markku Rummukainen
Morten Søndergaard
Bodo von Bodungen

**Lead authors:**

Chapter 1: Hans von Storch
Chapter 2: Raino Heino and Heikki Tuomenvirta
Chapter 3: Phil Graham
Chapter 4: Bodo von Bodungen

## Annex 2:
## The BACC Assessment Book: Tentative Structures of Chapters 2 to 4

**Chapter 2**
**2. PAST AND CURRENT CLIMATE CHANGE, Detection and attribution**
2.1 Executive Summary
2.2 Introduction, incl. a brief paleoclimatic overview (ca. 10.000 years)
2.3 ATMOSPHERIC CHANGES
Changes in surface climate, eg
- Temperature
- Precipitation
- Atmospheric moisture and clouds
- etc.

Changes in atmospheric circulation
Patterns of variability and changes in extreme events
2.4 TERRESTRIAL CHANGES
Lakes (temperature, ice cover…)
Rivers incl. runoffSnow cover and frozen land
2.5 BALTIC SEA
Water temperature
Ice
Sea levels
Salinity
Inflows and stagnation periods

Appendix: Techniques, error estimation and measurement systems

**Chapter 3: PROJECTIONS OF CLIMATE CHANGE**
3.1 Global climate change
3.2 Climate change in the Baltic Sea drainage basin: projections from global climate models
3.3 Climate change in the Baltic Sea drainage basin: projections from regional climate models
3.4 Changes in climate variability and extremes
3.5 Changes in hydrology
3.6 Changes in the Baltic Sea
3.7 Changes in the cryosphere
3.8 Summary of projections

## Annex 2: (continued)

**Chapter 4: CLIMATE RELATED ECOSYSTEM CHANGE**
**3.1 Introduction: The Baltic Sea**
3.1.1 Geological development
3.1.2 Coastal dynamics
3.1.3 Eustasy and isostasy
3.1.4 Oceanographic peculiarities
3.1.5 Climate and climate change
3.1.6 Catchment area of the Baltic Sea
3.1.7 Water cycle in the Baltic Sea
3.1.8 Biocoenosis in the Baltic Sea
3.1.9. Cultural and political development
**3.2 Human related ecosystem change**
3.2.1 Sources and distribution of nutrients
3.2.2 Sources and distribution of organic pollutants
3.2.3 Sources and distribution of trace metals
3.2.4 Agriculture and eutrophication
3.2.5 Aquaculture and eutrophication
3.2.6 Influence of fisheries
3.2.7 Influence of sea traffic
3.2.8 Influence of tourism
3.2.9 Hot spots
3.2.10 Atmospheric input
**3.3 Climate related marine ecosystem changes**
3.3.1 The physical-geo-chemical system
3.3.1.1 Temperature
3.3.1.2 Salinity
3.3.1.3 Sea ice
3.3.1.4 Oxygen
3.3.2 The biological system
- 3.3.2.1 Bacteria
- 3.3.2.2 Phytoplankton
- 3.3.2.3 Harmful algae blooms
- 3.3.2.4 Zooplankton
- 3.3.2.5 Benthos
- 3.3.2.6 Fish
- 3.3.2.7 Marine mammals
- 3.3.2.8 Birds

**3.4 Consequences for the human society (?)**
3.4.1 Lessons from the Medieval Warm Period?
3.4.2 Lessons from the Little Ice Age?
3.4.3 Outlook into the future?

## Annex 3: IPCC AR4 WG1 and WG2 Road Maps

IPCC WG1 Schedule[9]:

| | |
|---|---|
| **2004** | |
| Apr | Selection of author teams by the Working Group I Bureau |
| May | Confirmation of author teams |
| Sep | **First Lead Author meeting**, September 26 to 29, Trieste, Italy |
| Oct | Writing of "zero order draft" begins |
| **2005** | |
| Jan | Zero order draft to be submitted to Technical Support Unit (TSU) by mid January |
| Feb | Informal review of zero order draft by invited experts begins |
| Apr | Informal review comments to be submitted to TSU by early April |
| May | **Second Lead Author meeting**, probably May 10 to 13, Beijing, China. This meeting considers comments on the zero order draft and writing the first order draft starts immediately afterwards.<br>*Note. Literature to be cited will need to be published or available in draft form by this time. Copies of unpublished literature should be sent to the TSU so they can be made available to reviewers if requested.* |
| Aug | First order draft to be submitted to TSU by mid-August |
| Sep | First order draft made available to external reviewers for 8-week review period |
| Dec | **Third Lead Author meeting**, probably December 13 to 16, in New Zealand. This meeting considers comments on the first order draft and writing of the second order draft starts immediately afterwards.<br>*Note. Literature to be cited will need to be published or in press by this time. Copies of literature not available through normal library sources should be sent to the TSU so they can be made available to reviewers if requested.* |
| **2006** | |
| Feb | Second order draft to be submitted to TSU by late-February |
| Apr | Second order draft made available to external reviewers and Government reviewers for an 8-week review period |
| Jun | **Fourth Lead Author meeting**, mid June, venue to be decided. This meeting considers comments on the second order draft and revisions to produce the final draft start immediately afterwards. |
| Sep | Final draft to be submitted to TSU |
| Oct | Final draft made available to Governments |
| **2007** | |
| Jan | IPCC Working Group I Plenary Session of Government representatives to approve Summary for Policymakers line by line and accept the underlying report. The session will probably be held in late January, venue to be decided. At least one CLA from each chapter should be present. |

IPCC WG2 Road map[10]:

Dec. 2004 0th draft submitted to TSU[11]
June 2005 1st draft submitted to TSU
Apr. 2006 2nd draft submitted to TSU
Nov. 2006 3rd draft submitted to TSU
Feb. 2007 Final Government Review
April 2007 WG II Plenary to approve AR4

[9] Source: Presentation of O. Bøssing Christensen
[10] Source: Presentation of Z. Kundzewicz at 17th BSSG meeting, 25 Nov. 2004 in Poznan, Poland
[11] TSU = Technical Support Unit