Minutes of

14^{th} Meeting of the BALTEX Science Steering Group

held at

Lund University
Department of Physical Geography and Ecosystems Analysis
Lund, Sweden
18 - 20 November 2002

edited by
Hans-Jörg Isemer and Sigrid Schöttle

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Participants at the 14th BALTEX Science Steering Group Meeting

From left to right:
P. Axe, P. Seuna, C. Simmer, A. van Ulden, S. Bergstrøm, D. Jacob, S. Keevallik, H. Graßl, M. Alestalo, J. Fischer, M. Rummukainen, T. Vihma, A. Omstedt, M. Kepinska-Kasprzak, S.-E. Gryning, H.-J. Isemer, J.Piechura, A. Lehmann.
Missing or behind the camera: P. Graham, A. Lindroth, A. Leitass, D. Rosbjerg, S. Schöttle

Contents

Section .... **Page**

Summary of Action Items

Action #1: Gerhard Adrian to continuously report to the BSSG Chairman Hartmut Graßl on developments in the prolongation of DWD's operation of the BMDC (see item 4 of this meeting's agenda).

Action #2: Hartmut Graßl to write official letters to new and resigned BSSG members (see item 5 of this meeting's agenda).

Action #3: Hartmut Graßl to write an official letter to all BSSG members informing them of the revised BSSG membership rules (see item 5 of this meeting's agenda).

Action #4: Dan Rosbjerg and Sven-Erik Gryning to explore DMI's intention and possibilities to further contribute to BSSG activities, and include **Hartmut Graßl** in any necessary action to stimulate DMI to return to BSSG with a strengthened profile (see item 5 of this meeting's agenda).

Action #5: Daniela Jacob and the BALTEX Working Group on Energy and Water Cycles (WGEW) to establish a draft state-of-the-art review on BALTEX achievements by the end of January 2003 (see item 7 of this meeting's agenda).

Action #6: Hans-Jörg Isemer to suggest details on formats for the Draft Science Plan to the members of the Science Plan Core Group **as soon as possible** (see item 7 of this meeting's agenda).

Action #7: Members of the Science Plan Core Group (A. Omstedt, M. Rummukainen, D. Rosbjerg, S.-E. Gryning, H. Graßl, H.-J. Isemer) to write a two pages summary draft on the respective general BALTEX phase 2 objective and suggest one related key figure, and to submit both the summary draft and the figure to H.-J. Isemer by e-mail **before 15 January 2003** (see item 7 of this meeting's agenda).

Action #8: Hans-Jörg Isemer to immediately return a composite draft document on all BALTEX phase 2 objectives, based on the individual contributions, to all members of the Science Plan Core Group with the subsequent

Action #9: All members of the Science Plan Core Group to iterate and agree on a Preliminary Draft Science Plan for BALTEX phase 2 **before the end of January 2003** (see item 7 of this meeting's agenda).

Action #10: Hans-Jörg Isemer to immediately circulate the Preliminary Draft Science Plan to all BSSG members **in early February 2003** for further comments, iterations and improvements, where the detailed time planning for further steps are to be determined accordingly (see item 7 of this meeting's agenda).

Action #11: Andreas Lehmann to lead and coordinate initial preparatory steps towards establishing the Implementation Plan for BALTEX phase 2, with support of **Daniela Jacob and the BALTEX WGEW** (see item 7 of this meeting's agenda).

Action #12: Hartmut Graßl to draft a skeleton straw man paper as a foundation for the IP proposal, preferably to be circulated to the FP6-IP Proposal Group before Christmas 2002 (see item 8 of this meeting's agenda).

Action #13: The "FP6-IP Proposal Group" (Hartmut Graßl, Anders Omstedt, Markku Rummukainen, Clemens Simmer, Anders Lindroth, Sven-Erik Gryning, Hans-Jörg Isemer and Sylvain Joffre) to take all necessary steps in order to submit an IP proposal, which is based on the EoI "Baltic Water" and linked in particular to the general objectives 1, 2 and 3 of BALTEX phase 2, in due time to meet the deadline of the 1st FP6 call (see item 8 of this meeting's agenda).

Action #14: **Sven-Erik Gryning, Dan Rosbjerg and Hans-Jörg Isemer** to initiate and follow-up with all necessary organisational steps for a timely preparation of the 4th Study Conference on BALTEX and to report on progress in this respect at the next BALTEX SSG meeting (see item 10 of this meeting's agenda).

Action #15: Hans-Jörg Isemer to prepare for the 15th BSSG meeting at Risö National Laboratories, Roskilde, Denmark on 8 to 10 September 2003, in close cooperation with **Sven-Erik Gryning** acting as the local organiser (see item 11 of this meeting's agenda).

Action #16: Hans-Jörg Isemer and Sven-Erik Gryning to organize a workshop dedicated to results based on *BRIDGE* data in conjunction with the 15th BSSG meeting (see item 11 of this meeting's agenda).

Introduction

The 14th meeting of the BALTEX Science Steering Group (BSSG) was hosted by the Department of Physical Geography and Ecosystems Analysis is at Lund University, Sweden. Prior to the BSSG meeting a science workshop on "Achievements of and Perspectives for the BALTEX Programme" was held at Lund University on Monday, 18 November 2002, 14.00 to 18.30 hours. The agenda of the science workshop is given in Appendix 1. Summaries of workshop presentations are collected in Appendix 2.

Hartmut Graßl, the chairman of the BSSG, opened the BSSG meeting on 19 November 2002 at 9.00 hours. The meeting was closed on Wednesday, 20 November 2002 at 13.00 hours. The agenda of the BSSG meeting and the list of BSSG meeting participants including their full addresses may be found in Appendix 3 and Appendix 4, respectively.

The structure of the minutes follows chronologically the items numbered as given in the meeting agenda (see Appendix 3).

Item 1: Welcome by the Host and the BSSG Chairman

Hartmut Graßl, in his capacity as the Chairman of the BSSG opened the meeting. He welcomed the BSSG members and all guest participants to this meeting. He introduced Professor Anders Lindroth as the host of the meeting.

Anders Lindroth welcomed the BSSG meeting participants and gave a short introduction to Lund University one of the biggest and the 2nd oldest university within Sweden with 30.000 students. This BSSG meeting took place at the Department of Physical Geography and Ecosystems Analysis, where Anders Lindroth is affiliated with. The following three main areas of this department can be discerned: 1) Satellite-based remote sensing and geographical information system (GIS) for surveillance and analysis of land degradation, and changes in the environment and natural resources; 2) Climatology, especially climatic changes at present and in an historical perspective as well as local climatology; and 3) Geomorphology with particular interest in erosion processes and periglacial environments. The Department is currently reorganised into a new Centre for Geo-Biosphere Dynamics. Anders Lindroth continued to mention the Nordic Centre for Studies of Ecosystem Carbon Exchange and its Interaction with the Climate System (NECC), which was installed at Lund University as well. It constitutes one of 26 Centres of Excellence funded by the Council of Nordic Ministers. Substantial infrastructure support was allocated to the new Centre in Lund with two new erected and one existing building substantially refurbished. The new Centre for Geo-Biosphere Dynamics is well equipped with new laboratories, an aircraft for measurement of fluxes with its own hangar and modelling labs for computational studies. Anders Lindroth concluded by pointing out the long-lasting contribution of his group in Lund to the NOPEX programme and his interest to contribute to phase 2 of the BALTEX programme.

Item 2: Amendment and Approval of the Agenda

The agenda of the meeting was approved after amending it by:

- Membership of the BSSG to be inserted after item 4.
- Timing of the 4th Study Conference on BALTEX to be added to item 10.

Item 3: Approval of the Minutes of the 13th BSSG Meeting

The minutes of the 13th BSSG meeting had been distributed before the meeting to all BSSG members and participants at the 13th BSSG meeting. Hans-Jörg Isemer reported that prior to this BSSG meeting few minor corrections were requested by meeting participants including a revised figure showing the BHDC data coverage on page 106 in Appendix 18 (Bengt Carlsson), a more precise description of the re-analysis project mentioned on page 16 and page 19 (Mikko Alestalo), and editorial details notified by Jarmo Koistinen and Timo Vihma.

Two more changes were suggested at the meeting including a changed description of Cabauw as a future BSRN station on page 15 (Aad van Ulden) and a revised list of BALTEX projects funded in Germany on page 70 in Appendix 8 (Daniela Jacob).

With these corrections included the minutes of the 13th BSSG meeting were approved. They are published as Report No. 23 of the International BALTEX Secretariat Report Series.

Item 4: Review of Action Items of the 13th BSSG Meeting

The previous BSSG meeting put forward 14 action items. Hans-Jörg Isemer reported that several of them were either completed or were covered by a similar action. The following action items still needed consideration and were discussed in more detail:

> Action #1: Jürgen Fischer and Clemens Simmer to finalize objectives and organisational issues for a BALTEX Satellite Data Centre Function (BSDCF) along the lines presented at this BSSG meeting and, to start actions towards implementing BSDCF in close cooperation with satellite data users.

This topic will be reported under item 9.5 of this meeting, which is directly dealing with the BALTEX Satellite Data Centre Function.

> Action #2: Hartmut Graßl to write a letter to Mr Leitass on behalf of the BSSG to receive more information on the background for his negative attitude towards BALTEX and explore possibilities for improving the situation.

This had been accomplished. Andris Leitass took the opportunity and explained the situation in Latvia as follows: The Latvian Hydrometeorological Agency (LHMA) is directly responsible to report and react to a minister of the government. At the moment, the most important priorities of Latvia's government are to join both NATO and EU. Activities supporting actions in this respect receive almost the entire national governmental financial support leaving little money for other business, in particular science. Andris Leitass stressed that there are no science activities with relevance for the BALTEX programme ongoing in Latvia at present. Also LHMA currently has no significant scientific potential and sees therefore no benefit of taking part in BALTEX. LHMA will fulfil its obligation in the frame of data delivery contracts concluded between LHMA and GKSS, but will stop these activities after completion of the current contract. He continued to express his disappointment that LHMA has so far not been allowed to get direct access to digital products and codes of the HIRLAM weather forecast model, although the HIRLAM model has frequently been used for research purposes in the frame of BALTEX. He also mentioned that LHMA is using HIRLAM products for its national operational forecast duties and is cooperating with SMHI in this respect.

BSSG discussed this issue to some extent. Several BSSG members mentioned the structure of the European HIRLAM consortium and explained formal requirements to become a member of this consortium in order to get full access to data and codes. The issue of adequate training of those scientists and technicians, which are allowed to work with HIRLAM data and codes, was stressed. It was also mentioned that the HIRLAM consortium is exclusively focussing on the *research aspects* of numerical weather forecast in Europe, while ECMWF is also covering the *operational aspects*. A prerequisite of the HIRLAM consortium membership is to join the ECMWF consortium of national European weather services, which would of course raise further costs for LHMA. BSSG members suggested that LHMA should take steps to become an associated member of ECMWF. BSSG members, who are in leading positions at major national weather services in Europe were asked to support LHMA's efforts to become an associated ECMWF member, whenever possible.

> Action #3: Carl Fortelius and Daniela Jacob to compare results of the BRIDGE reanalysis project with model results obtained as part of the DEKLIM-BALTIMOS projects.

This action is still pending. Results will be presented in fall l of 2003.

> Action #4: Hans-Jörg Isemer to build up a monitoring document on BRIDGE activities and data sets and compare the resulting inventory with the original BRIDGE plans.

This action is ongoing and will be completed by the end of 2002.

> Action #6: Aad van Ulden and Daniela Jacob to investigate KNMI's possibilities to produce and make available results of a model run to be used as homogeneous atmospheric forcing fields tailored for BALTEX-BRIDGE requirements.

This had not been done so far, but is being pursued by Daniela Jacob and Aad van Ulden. Aad van Ulden will report about progress in this respect at the next SSG meeting.

> Action #8: Daniela Jacob to continue all possible steps towards meeting the objectives of WGEW, where the finalization of a state-of-the-art review on BALTEX by WGEW has highest priority.

The WGEW met on 18 November 2002, one day before this BSSG meeting. The group decided to write a state-of-the-art review on BALTEX in form of a text book. Up to the end of 2002, as a preparatory step, WGEW group members will put together the major BALTEX achievements and also recommendations for the future, to be collected by the WGEW chair Daniela Jacob. She will then send around a summary report in January 2003. See also item 7 of this meeting's agenda.

> Action #9: Bertil Håkansson, with assistance of the ODCB Implementation Group (Anders Omstedt, Andreas Lehmann, Jan Piechura, Pekka Alenius and Hans-Jörg Isemer), to continue implementing ODCB along the lines given in the approved ODCB implementation document.

This has been achieved. Philip Axe will give a report under item 8.4 of this BSSG meeting.

> Action #10: Hartmut Graßl to contact Gerhard Adrian (DWD) and investigate possible solutions for maintaining BMDC with DWD involvement beyond the year 2004.

Hartmut Graßl reported that he had discussed this issue with DWD several times. He also mentioned that the German Federal Research Ministry (BMBF) is in contact with DWD on this matter. At the recent 50th anniversary of the DWD Gerhard Adrian offered a prolongation of DWD's support for BMDC. He tries to ask Mrs Lehmann, the former head of the BMDC, to maintain BMDC for a transition phase beyond the end of 2002. Hartmut Graßl continued to indicate that the BMDC may be taken over by the Model and Data Group in Hamburg (a service group for entire Germany) after DWD's final retreat from maintaining the BMDC.

The BSSG welcomed both DWD's intention to guarantee the operation of BMDC for a longer transition period and the possibility to move the BMDC subsequently to MPIfM.

Action #1 was given to **Gerd Adrian** to continuously report to the BSSG chairman Hartmut Graßl on developments in the prolongation of DWD's operation of the BMDC.

> Action #11: Hartmut Graßl and Anders Omstedt to follow up the finalisation of the state-of-the-art review on achievements of BALTEX phase 1 and constitute a drafting group for a revised science and implementation plan for BALTEX in due time.

These topics are part of this meeting's agenda and will be discussed under item 7.

Item 5: Membership of the BSSG

Suggestions for new BSSG members and wishes of some members to resign were brought forward, as follows:

Sten Bergstrøm suggested **Dr. Markku Rummukainen** as a new member to the BSSG. Markku Rummukainen is currently head of the Swedish Regional Climate Modelling Programme SWECLIM and the Rossby Centre operated at SMHI, who would as a new member add competence in climate modelling to the BSSG.

Mikko Alestalo communicated the wish of Jouko Launiainen to withdraw from the BSSG. Mikko Alestalo suggested – again also in the name of Jouko Launiainen – **Dr. Timo Vihma** of the Finnish Institute of Marine Research to replace **Jouko Launiainen** and become a new member of the BSSG.

Anders Omstedt suggested **Professor Anders Lindroth** as a new member to the BSSG. Anders Lindroth will contribute to BALTEX with his expertise in land surface dynamics and his long-lasting involvement in the NOPEX programme. Anders Omstedt continued to announce the wish of **Erland Källen** to end his membership in the BSSG.

Dan Rosbjerg suggested **Professor Sven-Erik Gryning** of Risö National Laboratories in Roskilde, Denmark, to become a full member of the BSSG. Sven-Erik Gryning has already been with the BSSG as a permanent representative of the NOPEX programme.

The BSSG unanimously agreed with the suggested membership changes and approved Anders Lindroth, Markku Rummukainen, Timo Vihma, and Sven-Erik Gryning as new BSSG members. They received a hearty welcome as full new members of the BSSG. The BSSG at the same time thanked Jouko Launiainen and Erland Källen and appreciated their engagement for the BALTEX programme. In particular, Jouko Launiainen's long-lasting leadership and substantial contributions to BALTEX, such as the coordination of the EU-project BASIS, were highlighted.

Hartmut Graßl accepted **Action #2** to write official letters to the new and resigned BSSG members.

The membership of BSSG was discussed more generally. Hartmut Graßl noted that the BSSG is a rather large group compared to similar bodies in GEWEX and WCRP. He also mentioned that, while most of the BSSG members are contributing to the steering process of BALTEX with continuous, high-level engagement, there are few members with a rather low profile in their leadership of the BALTEX programme. In this context, the Chairman suggested to adopt an additional rule: BSSG members who do not show up at three BSSG meetings in a row and do not send a representative shall no longer be members. This rule was approved by the BSSG. **Hartmut Graßl (Action #3)** will write an official letter to all BSSG members informing them of the revised BSSG membership rules.

The Danish BSSG members raised concern that the Danish Meteorological Institute (DMI), as the national weather service of Denmark, has contributed little in the past to the BALTEX programme and also to its steering process. Leif Laursen, as the official representative of DMI in the BSSG, had unfortunately not participated at several BSSG meetings in the recent past. BSSG members suggested approaching the Climate Group at DMI in order to identify a possible new BSSG member. Other BSSG members noted that it is important to include a person from the operational forecast section at DMI into the BSSG.

Action #4 was given to **Dan Rosbjerg and Sven-Erik Gryning** to explore DMI's intention and possibilities to further contribute to BSSG activities, and include **Hartmut Graßl** in any necessary action to stimulate DMI to return to BSSG with a strengthened profile.

Item 6: Objectives of BALTEX phase 2

Hartmut Graßl started this item by reviewing the original objectives for BALTEX as described in the science and initial implementation plans for BALTEX. He continued to review both the future topics for BALTEX as suggested at the BSSG meeting No. 12 as well as the BALTEX phase 2 draft objectives defined at BSSG meeting No. 13.

An in-depth and lively discussion followed with numerous contributions of all meeting participants. Various aspects and constraints important for the approval of the new objectives for BALTEX phase 2 were covered, including the necessity for BALTEX phase 2 to continue with studies directed to process understanding (to the extent necessary to meet the original objectives of BALTEX), the need to comply with GEWEX and GEWEX CSEs objectives, the need to address climate and climate variability aspects (relation to the CLIVAR programme), and the issue of including water management topics and studies related to air and water quality. The last issue mentioned took a major part of the discussion where quite different opinions were formulated on how to open the BALTEX programme to studies related to nutrient and pollution in both air and water.

The BSSG reached consensus on all discussed topics. The unanimously approved final version of the objectives for BALTEX phase 2 read as follows (Note, this wording includes several editorial corrections to the language applied by native English-speaking individuals, as of 4 December 2002):

General Objectives of BALTEX phase 2
(as of 20 November 2002, editorial changes as of 4 December 2002)

Objective 1: Better understanding of the energy and water cycles over the Baltic Sea catchment;

Objective 2: Analysis of climate variability and change since 1800, and provision of regional climate projections over the Baltic Sea catchment for the 21st century;

Objective 3: Provision of improved tools for water management, with an emphasis on more accurate forecasts of extreme events and long-term changes;

Objective 4: Gradual extension of BALTEX methodologies to air and water quality studies;

Objective 5: Strengthened interaction with decision-makers, with emphasis on global change impact assessments;

Objective 6: Education and outreach at the international level.

Item 7: Towards Implementing BALTEX Phase 2

7.1 State-of-the-art review on BALTEX

As a conclusion, BSSG stated the necessity of establishing a critical state-of-the-art review and acknowledged first steps of the BALTEX Working Group on Energy and Water Cycles (WGEW) towards establishing such a review (see also item 4 of this meeting's agenda). Daniela Jacob, chair of WGEW, indicated that WGEW would establish a first draft review by the end of January 2003, in time to have such a draft as input contribution to the FP6 proposal in support of BALTEX phase 2 (see item 8 of this meeting's agenda). **Action #5** was given to **Daniela Jacob and the BALTEX Working Group on Energy and Water Cycles (WGEW)** to establish a draft state-of-the-art review on BALTEX achievements by the end of January 2003. BSSG members noted that the Initial Implementation Plan (IIP) for BALTEX, established in 1995, includes detailed plans, aims and suggested sub-projects, including the related time planning for 1994 to 2001 for BALTEX. The BALTEX IIP shall in any case be used as a reference guideline for the BALTEX Review (see also item 7.2 of this meeting's agenda).

7.2 New Science and Implementation Plans for BALTEX Phase 2

The BSSG unanimously suggested to establish both a new Science Plan and a new Implementation Plan for BALTEX Phase 2.

The **Science Plan** shall be written first. A core group was established where each group member is at first hand responsible to draft a two page summary and suggest one key figure for each of the 6 general objectives for BALTEX phase 2 (see item 6 of this meeting's agenda). This ‘Science Plan Core Group’ is composed of the following individuals who are responsible for one BALTEX phase 2 objective each:

Objective 1: Anders Omstedt
Objective 2: Markku Rummukainen
Objective 3: Dan Rosbjerg
Objective 4: Sven-Erik Gryning
Objective 5: Hartmut Graßl
Objective 6: Hans-Jörg Isemer

The following action items related to the establishment of the Science Plan for BALTEX Phase 2 were defined:

Action #6: Hans-Jörg Isemer to suggest details on formats for the draft Science Plan to the members of the Science Plan Core Group as soon as possible.

Action #7: Members of the Science Plan Core Group (A. Omstedt, M. Rummukainen, D. Rosbjerg, S.-E. Gryning, H. Graßl, H.-J. Isemer) to write a two pages summary draft on the respective objective and suggest one related key figure, and to submit both the summary and the figure to H.-J. Isemer by e-mail **before 15 January 2003**.

H.-J. Isemer has the **Action #8** to immediately return a composite draft document on all BALTEX phase 2 objectives, based on the individual contributions, to all members of the Science Plan Core Group with the **Action #9** again for all members of this group to iterate and agree on a Preliminary Draft Science Plan for BALTEX phase 2 **before the end of January 2003**.

This Preliminary Draft Science Plan shall then immediately be circulated to all BSSG members in early February 2003 for further comments, iterations and improvements, where the detailed time planning for further steps is to be determined accordingly (**Action #10 for Hans-Jörg Isemer**). The entire process of establishing the Draft Science Plan shall jointly and responsibly be steered by the BSSG co-chairs Hartmut Graßl and Anders Omstedt with executive support by Hans-Jörg Isemer.

The establishment of **the Implementation Plan** for BALTEX phase 2 was considered to develop together with the science plan, however, with a certain, albeit limited time delay. As a preparatory step, the existing Initial Implementation Plan for BALTEX shall be examined critically in order to identify completed, partially completed and still open BALTEX aims and subprojects, where, as a subsequent step, the latter two shall be examined and decisions need to be taken, which of these shall be included in the future Implementation Plan for BALTEX.

Andreas Lehmann has the **Action #11** to lead and coordinate these initial preparatory steps towards establishing the Implementation Plan for BALTEX phase 2, with support of **Daniela Jacob and the BALTEX WGEW** (see also action #5 and item 7.1 of this meeting’s agenda).

Item 8: FP6 Funding Proposal in Support of BALTEX

Hans-Jörg Isemer reviewed the structure of the forthcoming sixth Framework programme of the EU. He concentrated on the draft Work Programme for the FP6 thematic priority 1.1.6.3: *Global Change and Ecosystems*. Within the area “Water Cycle” the following suggested Integrated Project (IP) was discussed in detail (copy of the Work Programme, version as of 11 November 2002):

II.1.1) Climate modelling at catchment-regional scale

*Topic for up to one Network of Excellence or Integrated Project to implement **in 2003***

II.1.1.a) **Improved modelling of climate-water interactions at catchment-regional scale**. Development of advanced modelling approaches at scales relevant for assessing the potential effects of climate changes on water resources management, their validation and application for major impact and mitigation studies. This should consider the various atmospheric, surface and sub-surface hydrological processes and their temporal and spatial scale of occurrence, and should take into consideration recent advances in climate and hydrological modelling and advances in observation techniques.

Having reviewed other potential proposal possibilities (including the GMES related part of the Work Programme of the 4th FP6 thematic priority *Aeronautics and Space*, 1.1.4), BSSG considered "Climate modelling at catchment-regional scale" as the number one priority for a FP6 funding proposal in support of BALTEX. It was noted that several aspects of the Expression of Interest (EoI) "Baltic Water", which had been submitted earlier in 2002 to the EC, could be identified in the description of the above cited IP.

Hans-Jörg Isemer continued to review features of the new EC-FP6 funding instruments Integrated Projects (IP) and Network of Excellence (NoE). As a major difference, an IP was identified as a means to receive substantial funding for research activities, while a NoE was considered to establish an integrating and structuring frame around already funded, but fragmented research activities at the European level. During an extended discussion, BSSG members made suggestions in support of both instruments. The majority of the meeting participants however argued in favour of submitting a proposal for an Integrated Project, because most of the institutions, which have indicated their interest to participate in "Baltic Water", are in need of substantial additional funding, rather than interested in structuring funded activities into a European NoE.

A final decision was made by the BSSG to suggest the preparation of an IP proposal in response to the above cited theme "Climate modelling at catchment-regional scale", the EC call for which is foreseen to be opened on 17 December 2002 with an expected proposal submission deadline in early April 2003.

A brief analysis of other EoIs with a similar focus as "Baltic Water", based on the EoI data bank on the Cordis website, was presented by Hans-Jörg Isemer with additional comments by several BSSG members. An albeit limited number of EoIs could be identified with similar objectives, but with a different regional focus, such as the Arctic Ocean region, the Alpine region and Danube basin, and the Mediterranean Sea. Very few EoIs focussed on more than one of these regions, a prominent one among those being the CAWME (Climate and Water Management in Europe) EoI, coordinated by Daniela Jacob. CAWME has participants from the BALTEX community, and was identified as a potential concurrent to "Baltic Water", if CAWME will be submitted to the same Global Change and Ecosystem Work Programme theme. Daniela Jacob reported that the CAWME consortium has not yet decided on the detailed proposal strategy, but another option for CAWME would be to address the Water Management theme in order to not directly compete with "Baltic Water". Daniela Jacob will inform the BSSG chairpersons on decisions of the CAWME consortium on its proposal priorities and strategies in due time.

The BSSG established a "FP6-IP Proposal Group" with the following confirmed members: Hartmut Graßl, Anders Omstedt, Markku Rummukainen, Clemens Simmer, Anders Lindroth, Sven-Erik Gryning and Hans-Jörg Isemer. Additionally, Sylvain Joffre (FMI) was suggested to join this group, and Mikko Alestalo was asked to discuss and confirm Prof. Joffre's membership. As an initial step **Action #12** was given to **Hartmut Graßl** to draft a skeleton straw man paper as a foundation for the IP proposal, preferably to be circulated to the FP6-IP Proposal Group before Christmas 2002. BSSG suggested to concentrate the objectives of the IP proposal around the objectives 1, 2 and 3 of BALTEX phase 2 (see above), excluding issues related to water and air quality. In the course of January 2003, the FP6-IP proposal Group shall further elaborate a draft proposal taking into account the details of the FP6 call. It is the responsibility of this group to undertake any further necessary actions to submit a sound IP proposal along the lines discussed at this BSSG meeting in time to meet the deadline of the 1st FP6 call (around early April 2003). **Action #13** was given to the **"FP6-IP Proposal Group" (Hartmut Graßl, Anders Omstedt, Markku Rummukainen, Clemens Simmer, Anders Lindroth, Sven-Erik Gryning, Hans-Jörg Isemer and Sylvain Joffre (tbc))** to take all necessary steps in order to submit an IP proposal, which is based on the EoI "Baltic Water" and linked in particular to the general objectives 1, 2 and 3 of BALTEX phase 2, in due time to meet the deadline of the 1st FP6 call.

Item 9: Important other Issues

Item 9.1: BALTEX Meteorological Data Centre (BMDC)

This item was already discussed together with the action items of the previous BSSG meeting and is to be found under item 4 of this meeting's agenda.

Item 9.2: WRAP Working Group of GEWEX

Phil Graham reported on the WRAP (Water Resources Application Project) Working Group meeting in New York in September this year. WRAP aims at summarizing and stimulating water resources application studies within GEWEX and its CSEs with a particular primary focus on identifying institutions and groups in the hydrological community which may have an interest as a potential user of scientific results created in the frame of GEWEX. The New York meeting (as well as a previous meeting in Dresden, Germany, earlier this year) highlighted exemplary studies and events from all CSEs. A major conclusion from these reports is that there are no common users of the scientific output, but that water resources application issues vary considerably among the CSEs. The BALTEX presentation given by Phil Graham at the meeting in New York focussed on flooding events (where details of the catastrophic Elbe river event in August 2002 were included) and issues related to hydropower generation. Phil Graham concluded that there is little direct benefit from the WRAP group for BALTEX studies, where a major weakness may be seen in the lack of users in the WRAP WG.

Following the presentation, Sten Bergstrøm raised the question whether BALTEX should further participate in WRAP. It was concluded that a BALTEX representative will most probably join the next WRAP meeting scheduled in conjunction with the IUGG General Assembly in Sapporo, Japan, in July 2003. A decision on further BALTEX contributions to WRAP will be taken after this next WRAP meeting.

Item 9.3: Cold Region Hydrology Working Group for CEOP

Hartmut Graßl briefed the BSSG on a recent activity within CEOP. While a strong community is currently establishing with a focus on monsoon circulation issues and related science topics to be addressed in the context of the future CEOP data, there is no parallel activity ongoing with a focus on extra-tropical science issues, which might be addressed using CEOP data. The CEOP management recently suggested to implement a Working Group on Cold Region Hydrology for CEOP.

BSSG members mentioned several ongoing activities in Europe and beyond in this context. While the importance of such a CEOP WG was generally acknowledged, no ad-hoc interest to join such a CEOP WG was noted among the meeting participants.

Item 9.4: Oceanographic Data Centre for BALTEX (ODCB)

Philip Axe who is now responsible for the technical implementation of the ODCB at SMHI in Gøteborg briefed the BSSG on recent developments. See Appendix 5 for parts of his presentation. The actual focus is on completing sea level data from the Baltic Sea, where parts of the data stored at FIMR, the former operator of the Oceanographic Data Centre within BALTEX still need to be transferred to SMHI. Upon request by H. Graßl, Philip Axe noted that the inclusion of historical data in the ODCB data base, beyond the primarily defined data periods for the ODCB, are not considered to cause major problems. It was, however, noted by Anders Omstedt that the regional focus of the ODCB should further be confined to the Baltic Sea.

Item 9.5: BALTEX Satellite Data Centre Function (BSDCF)

Jürgen Fischer recalled that the BALTEX Satellite Data Centre Function (BSDCF) is depending on activities at individual institutions, which volunteer to make satellite data available to a larger community. He reviewed activities at the Free University of Berlin where no data facility specifically established for BALTEX was created so far. However, a satellite data distribution function is already available (with the possibility of making online copies of data). At the moment near real time (NRT) MODIS level 2 data are available via the Internet page: http://www.fu-berlin.de/iss/research.html. These data are available since May 2002, it is planned to elongate this period back to January 2001 within the next half year.

Meteosat data will be available to all BALTEX data users since 1991 with hourly time resolution. A new overview and a summary will be created. Furthermore water vapour and cloud products are also available. In the next half year it is envisaged to have MSG data in NRT as well. Jürgen Fischer finished by indicating that data requirements for specific future time periods (such as dedicated experiments) may be considered, if data users let him know specific requirements for future NRT data so that a reliable data flow can be especially set up for these time periods.

Moreover, Clemens Simmer pointed out that SSM/I and ADEOS data are available via the Meteorological Institute at the University of Bonn. He has one person working on MSG data in connection with microwave data to investigate precipitation. His intention is to make these results available to BALTEX data users as well.

Item 10: Any other Business

At the 13th BSSG meeting, it had been suggested to hold the **4th Study Conference on BALTEX** during summer 2004 on the island of Bornholm. Hans-Jörg Isemer reported that Sven-Erik Gryning identified several potential candidate sites on Bornholm. A final decision on the conference site will be taken by the end of 2002. Two candidate time periods for the Conference were suggested and approved by the BSSG: 24 to 28 May 2004, or 10 to 14 May 2004.

A Scientific Committee for the 4th Study Conference on BALTEX was established with the following membership: Hartmut Graßl (chair), Anders Omstedt (co-chair), Sven-Erik Gryning, Dan Rosbjerg, Sirje Keevallik, Andreas Lehmann, Markku Rummukainen, Clemens Simmer and Anders Lindroth.

The core of the Organising Committee for the 4th Study Conference on BALTEX will be composed of Sven-Erik Gryning, Dan Rosbjerg and Hans-Jörg Isemer, with further members to be appointed, if necessary. **Action #14** was given to **Sven-Erik Gryning, Dan Rosbjerg and Hans-Jörg Isemer** to initiate and follow-up with all necessary organisational steps for a timely preparation of the 4th Study Conference on BALTEX and to report on progress in this respect at the next BALTEX SSG meeting.

Item 11: Date and Place of the Next Meeting

The BSSG decided to schedule the next BSSG meeting for **8 to 10 September 2003**. Sven-Erik Gryning offered hosting the meeting at Risø National Laboratories, Roskilde, Denmark, which was highly appreciated by the BSSG members.

It was decided to start the next BSSG with a scientific workshop, where first results focussing on the *BRIDGE* period shall be presented.

Action #15 was given to **Hans-Jörg Isemer** to prepare for the 15th BSSG meeting at Risø National Laboratories, Roskilde, Denmark on 8 to 10 September 2003, in close cooperation with **Sven-Erik Gryning** acting as the local organiser. Both will also have to follow **Action #16** to organize a workshop dedicated to results based on *BRIDGE* data in conjunction with the 15th BSSG meeting.

Item 12 Closing of the Meeting

The Chairman thanked all participants – both BSSG members and meeting guests - for their constructive contributions to this meeting. For the whole group, he heartily appreciated the hosting and support for this meeting by Anders Lindroth and his group at Lund University. The Chairman closed the meeting at noon on Wednesday, 20 November 2002.s

Acronyms and Abbreviations

ADEOS	Advanced Earth Observing Satellite
BALTEX	Baltic Sea Experiment
BALTIC WATER	Acronym of an EoI sent to the EC in June 2002
BALTIMOS	DEKLIM project funded by BMBF
BASIS	Baltic Air-Sea-Ice Study
BHDC	BALTEX Hydrological Data Centre
BMBF	Bundesministerium für Forschung und Technologie, Bonn, Germany
BMDC	BALTEX Meteorological Data Centre
BRIDGE	The Main BALTEX Experiment, 1999-2002
BSDCF	BALTEX Satellite Data Centre Function
BSRN	CEOP Basic Surface Radiation Network
BSSG	BALTEX Science Steering Group
CAWME	EoI: "Climate and water management in Europe"
CEOP	Coordinated Enhanced Observing Period
CLIVAR	Climate Variability and Predictability Programme
CSE	Continental Scale Experiment
DEKLIM	German Climate Research Programme
DMI	Danish Meteorological Institute
DWD	Deutscher Wetterdienst, Offenbach / Germany
EC	European Commission
ECMWF	European Centre for Medium Range Weather Forecast, Reading / UK
EoI	Expression of Interest for FP6
FMI	Finnish Meteorological Institute, Helsinki / Finland
FP6	Sixth Framework Programme of the EU
GEWEX	Global Energy and Water Cycle Experiment
GIS	Geographical Information System
GKSS	GKSS Research Centre, Geesthacht / Germany
GPCC	Global Precipitation Climatology Centre
HIRLAM	High Resolution Limited Area Model
IIP	Initial Implementation Plan
IP	Integrated Project (EU project type within FP6)
KNMI	Royal Netherlands Meteorological Institute, De Bilt / The Netherlands
LHMA	Latvian Hydrometeorological Agency
MPIfM	Max-Planck Institute for Meteorology, Hamburg, Germany
MODIS	Medium Resolution Imaging Spectroradiometer onboard TERRA
NECC	Nordic Centre for Studies of Ecosystem Carbon Exchange and Its Interactions with the Climate System
NoE	Network of Excellence (EU project type within FP6)
NOPEX	Northern Hemisphere Climate-Processes Land-Surface Experiment
ODCB	Oceanographic Data Centre BALTEX
RASS	Radio Acoustic Sounding System
SMHI	Swedish Meteorological and Hydrological Institute, Norrköping/Sweden
SSG	Science Steering Group
SSM/I	Special Sensor Microwave Imager
WCRP	World Climate Research Program
WGEW	BALTEX Working Group on Energy and Water Cycles
WRAP	Water Resources Application Project

Appendix 1: Workshop agenda

Achievements of and Perspectives for the BALTEX Programme

A workshop prior to the 14th BALTEX SSG Meeting
Lund University
Department of Physical Geography and Ecosystem Analysis
Lund, Sweden
Monday, 18 November 2002

The workshop venue in Lund is Sölvegatan 37, Ecology Building, room 'Blå hallen'.

Chair: Hartmut Graßl, Max-Planck-Institute for Meteorology, Hamburg, Germany

14.00 ***Introduction***
Hartmut Graßl, Max-Planck-Institute for Meteorology, Hamburg, Germany

14.10 ***Recent development in our understanding of the interaction between the land surface and the atmosphere***
Anders Lindroth, Lund University, Sweden

14.40 ***Hydrological and land surface modelling in BALTEX***
Phil Graham, Rossby Centre, SMHI, Norrköping, Sweden

15.10 ***Long term water budgets for the Baltic Sea and its drainage basin***
Daniela Jacob, Max-Planck-Institute for Meteorology, Hamburg, Germany

15.40 ***The BALTEX/BRIDGE re-analysis project***
Carl Fortelius, Finnish Meteorological Institute, Helsinki, Finland

16.10 *Break*

16.30 ***Knowledge gained about the Baltic Sea during the BALTEX programme***
Anders Omstedt, Göteborg University, Sweden

17.00 ***Reconstruction of historical climate in the Baltic region***
Hans von Storch, GKSS Research Centre Geesthacht, Germany

17.30 ***Modeling the climate, environment and processes of the Baltic Sea: Examples and ideas based on the regional model system at the Rossby Centre***
Markus Meier, Rossby Centre, SMHI, Norrköping, Sweden

18.00 ***Remote sensing of atmospheric properties in the BALTEX region***
Jürgen Fischer, Free University of Berlin, Germany

18.30 Concluding discussion and closing of the workshop

Appendix 2: Workshop presentation abstracts

Recent developments in our understanding of the interaction between the land-surface and the atmosphere

Anders Lindroth[1], Achim Grelle[2], Meelis Mölder[1], Harry Lankreijer[1], Fredrik Lagergren[1]
[1]Department of Physical Geography and Ecosystems Analysis, Lund University
[2]Department for Production Ecology, SLU, Uppsala

Abstract

The presentation is focused on which factors that are controlling the exchange of water vapour between boreal forests and the atmosphere. Recent developments in measurement techniques have made it possible to measure the exchange between the land-surface and the atmosphere that was not possible just a few years ago. The new data emerging from the networks of tower flux stations around Europe, thus, gives new possibilities to better understand the processes. However, the old picture that stomata have a strong control over forest evaporation is still valid. It is also somewhat of a consensus that the main factors that control the opening of the stomata, and, thus, the canopy resistance, are air vapour pressure deficit and solar radiation. There are different semi-empirical models available that can describe the canopy resistance in a reasonably good way but they still need calibration. An interesting development is that including assimilation as a controlling factor of the stomata, seems to improve both precision in the estimates and generality. The new data sets have also given more information about how soil moisture is affecting forest evaporation. In general, the reduction seems to start at fairly low levels of soil moisture indicating the relatively high drought tolerance of boreal forests. Another observation is that spruce is more drought sensitive than pine.
Taking a 7-year long time series of data from the Norunda forest in central Sweden as an example, it can be shown that net radiation is the variable that explains most of the variation in forest evaporation at all time scales. On a monthly basis, net radiation explained 86% of the variation. The time series also show a decreasing trend in evaporation with time that is partly explained by a decrease in net radiation but also correlated with the decreasing number of dry days per year.

Measurements from a age-series of coniferous forest in the same region show that the age has a large impact on the evaporation. The highest evaporation was shown by a 60-years old stand, which was about 30% higher than that from a 100-years old stand and 50% higher as compared to a clear cut. It is obvious that type of land-cover, i.e., forest, is not enough to characterize the evaporation but that a distinction has to be made also within a certain land-cover type.

Hydrological and Land Surface Modelling in BALTEX

L. Phil Graham

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Abstract

In the beginning of BALTEX, there existed a database of observed monthly river discharge to the Baltic Sea for the period 1921-1990. This came from the work of Bergström and Carlsson (1994) who built on earlier work by Mikulski (1982). There were no hydrological models in existence that covered the entire Baltic Sea Drainage Basin. Land surface parameterization in most climate models was rudimentary and often did not close the water balance.

By the latter part of the 1990s, a large-scale application of the HBV model (HBV-Baltic) had been developed (Graham, 1999). This provides both estimates of total freshwater inflow to the Baltic for periods when observations are not available and regional estimates of other hydrological variables that are not typically measured on large scales, such as soil moisture, evapotranspiration and snow water equivalent. This model is updated at the start of every year with synoptic station inputs of daily precipitation and temperature. To date, HBV-Baltic estimates of daily inflow to the five main basins of the Baltic Sea are available through the end of 2001. Corresponding observations of monthly river discharge are only available through the end of 1998.

Efforts to improve modelling of both the water and energy balances in climate models led to an intercomparison of several regional models over the Baltic Basin (Jacob et al., 2001). Hydrological modelling proved useful as an analysis tool during this process (Graham and Jacob, 2000). This work led to both improved communication between hydrological and atmospheric modellers and improvements to the land surface schemes of regional models (Graham and Bergström, 2000; Graham and Bergström, 2001; Lindström et al., 2000; Samuelsson et al., 2002; van den Hurk et al., 2002). Some regional models are now even beginning to produce routed river discharge directly from the climate models (Graham, 2002; Hagemann and Dümenil, 1999). This aids in consistent coupling between the atmosphere, land surface processes and the Baltic Sea, as performed with the Rossby Centre Regional Climate Model (Döscher et al., 2002).

Another aspect of hydrology that is starting to develop within BALTEX is applications to water resources management. This is exhibited by ODRAFLOOD, the coupled flood forecasting system for the Odra River being jointly developed by German and Polish researchers (Klein et al., 2001). A further example is modelling on the Daugava River (Butina and Nikolushkina, 2001; Ziverts and Jauja, 1998). Smaller scale water management studies have also been performed on upstream tributaries (Ziverts et al., 2001). Specific studies of the effects of river regulation on the Neva River have been carried out by Vinogradov (1998). Studies are also ongoing to address the effects of climate change on water resources (Bergström et al., 2001a; Bergström et al., 2001b; Butina et al., 1998).

BALTEX is now poised to begin phase two, which will have a stronger focus on applications. This new scope is highly relevant for hydrological problems of the Baltic Basin as: 1) environmental problems are growing, 2) energy markets are de-regulated, 3) vulnerability grows, and 4) global warming affects everyone.

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Long term water budgets for the Baltic Sea and its drainage basin

Summary of the presentation at the BSSG Workshop in Lund, November 2002

Daniela Jacob, Max-Planck-Institute for Meteorology, Hamburg, Germany

The investigation of long term water budgets for the Baltic Sea drainage basin can be based on measurements, modelling efforts or a combination of both. This presentation will focus on the modelling activities inside BALTEX and aims to summarize existing knowledge, define missing parts and initiate further research.

A comprehensive dataset of the hydrological components of the water cycle of the Baltic Sea drainage basin can be simulated by global and regional climate models. State of the art global climate models still have a relative coarse horizontal resolution of either T42 or T106 corresponding to 250 km or 100 km respectively, while regional climate models usually run of 0.5° or 0.16° (50 km or about 18km).

Analysing the long term water budgets from re-analysis data, which are seen as *the best representation of reality* show very strong difference.

ERA15 over land (km**3 /year):	precipitation	1148	evaporation	845	runoff	358
NCEP	precipitation	1191	evaporation	1015	runoff	677

The observed long term mean of runoff into the Baltic Sea is estimated to about 480 km**3 per year, which can be simulated realistically by regional climate models. As an example two different versions of the MPI regional climate model REMO driven by ERA15 re-analysis data at the lateral boundaries deliver the following:

REMO5.0: 0.5° versus 0.16° runoff: 479 versus 484 km**3/year

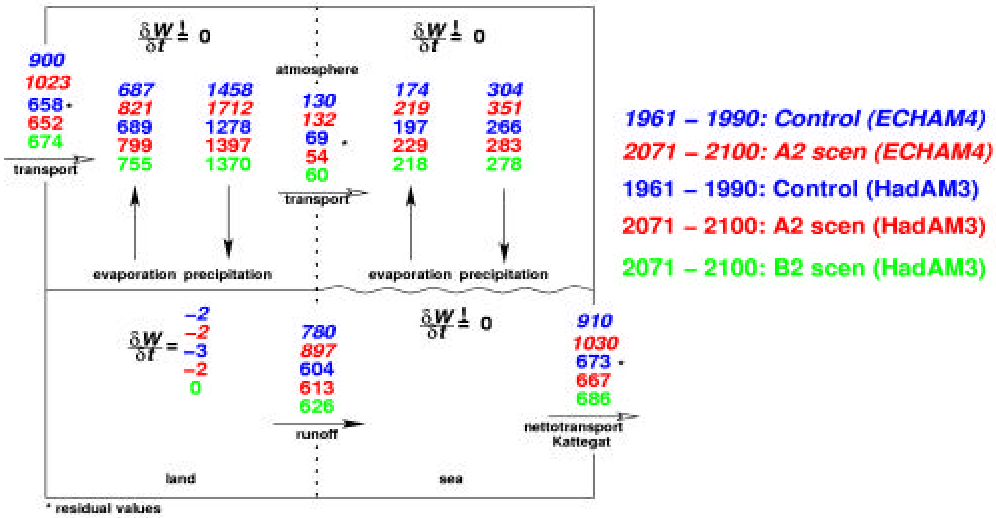
REMO5.0 versus REMO5.1 both on 0.5° resolution

runoff: 479 versus 497 km**3/year

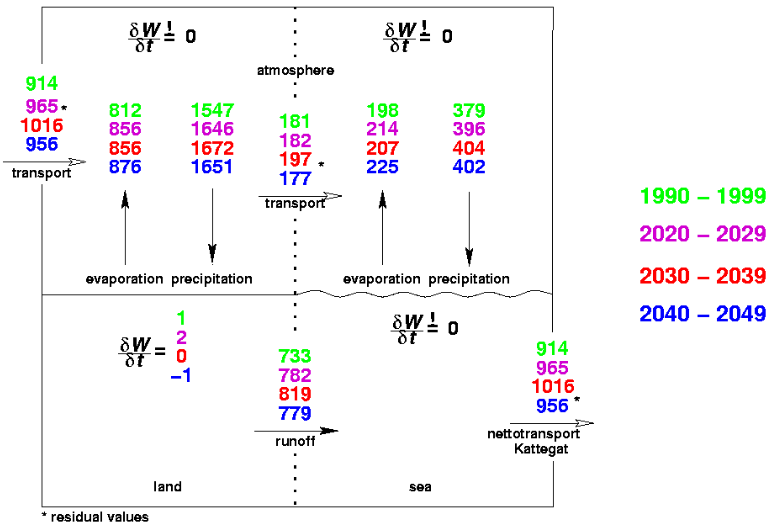
A slight enhancement of the hydrological cycle over land can be seen in the 0.16° simulation. As a result it can be stated that the water budget over the Baltic Sea is mainly influenced by the large scale flow.

Climate change scenarios done either with the Rossby Centre modelling system and different driving models or with the REMO model and ECHAM 4 driving fields, show an intensification of the hydrological cycle within the drainage basin. A few examples are given in the following figures. Numbers are in km**3/year.

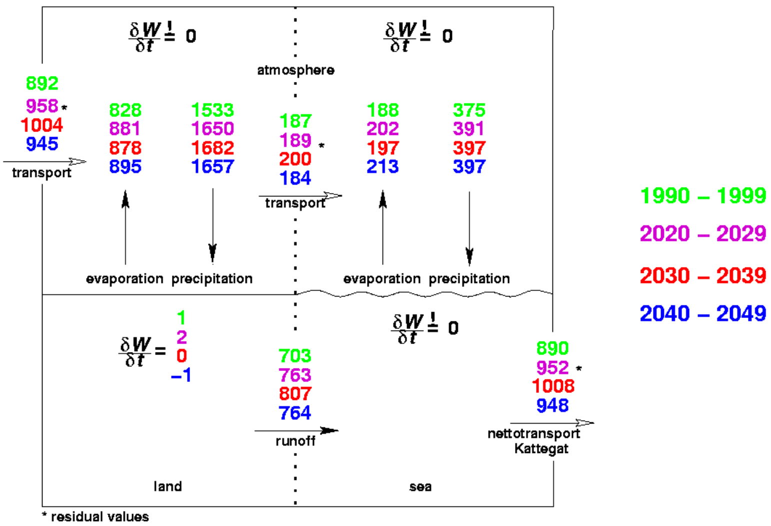
ROSSBY Centre results in km**3/year:



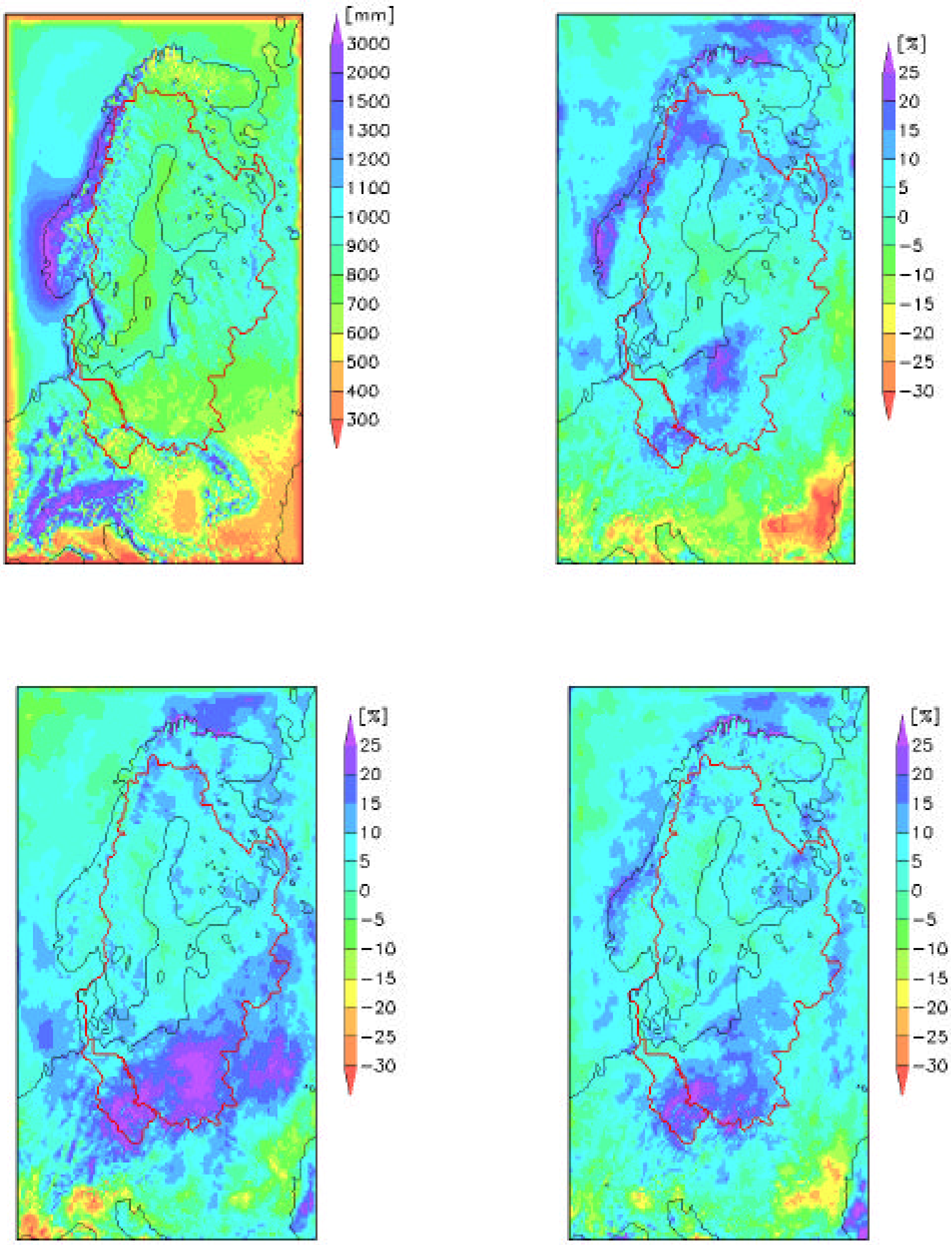
REMO simulations on 0.5° in km**3/year, B2 scenario:



REMO simulations on 0.16° in km**3/year, B2 scenario:



Not only the long term budget for the entire drainage basin is of interest, but also the horizontal distribution of for example changes in precipitation. The results of one possible B2 scenario calculated with REMO5.0 on 0.16° horizontal resolution are given in the following figure.

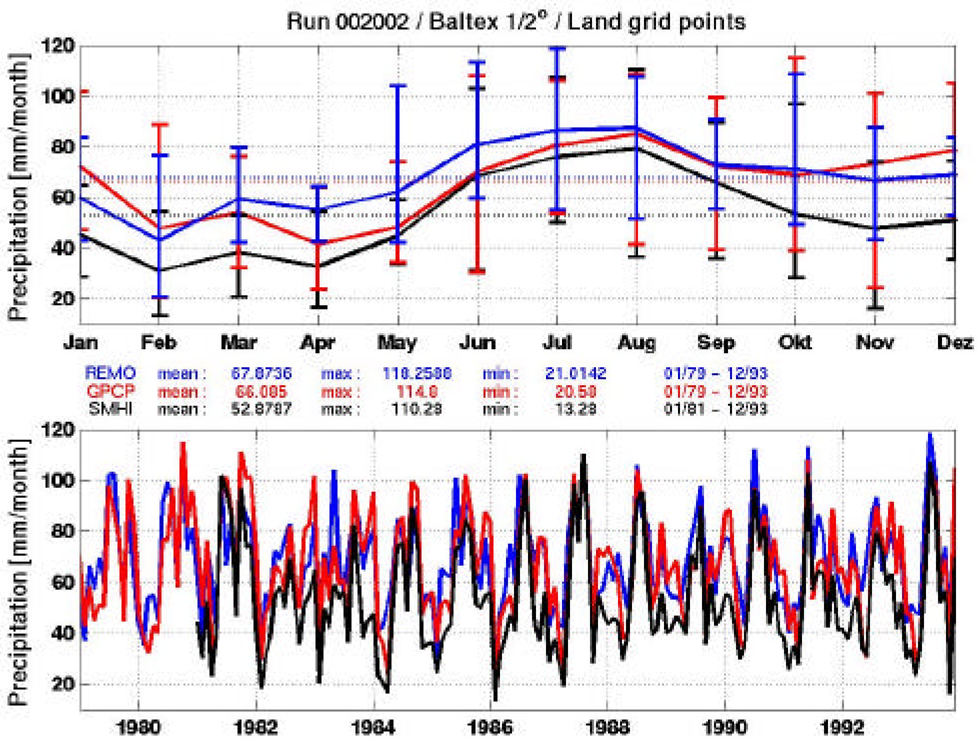


Ten year mean precipitation in mm/year for the control run (1990 to 1999, upper panel left) and changes in percent for the following decades:
Upper panel right side: 2020 to 2029
Lower panel left side: 2030 to 2039
Lower panel right side: 2040 to 2049

The variety of climate change results asks for a definition of uncertainty measures, which is a difficult task. One methodology is to validate the models under today's climate against as many observations as possible and to carry out ensemble climate change simulations. The last has not been done yet, but will be a task for the next years.

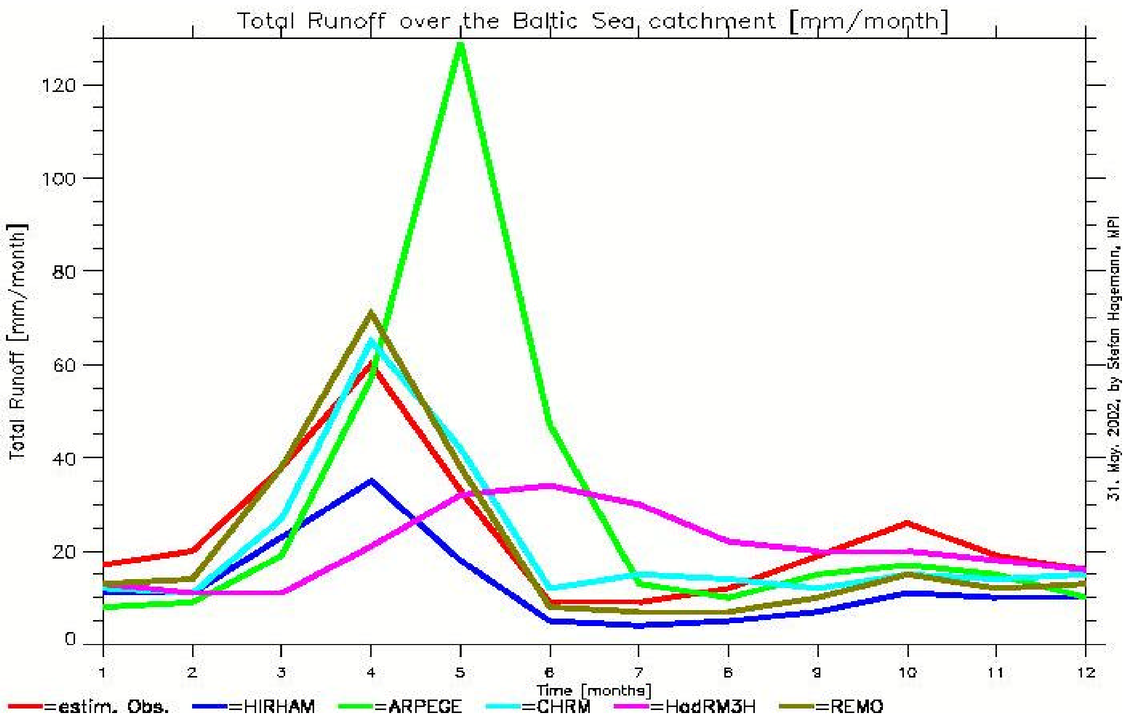
The comparison against measurements can not be done for all hydrological quantities and time scales, but for example the precipitation over land is relatively well observed. Over water almost no long term observations exist, only for certain periods measurements have been made. Here comprehensive model calculations are very useful. In addition the quantification of the uncertainty in the observations is also difficult.

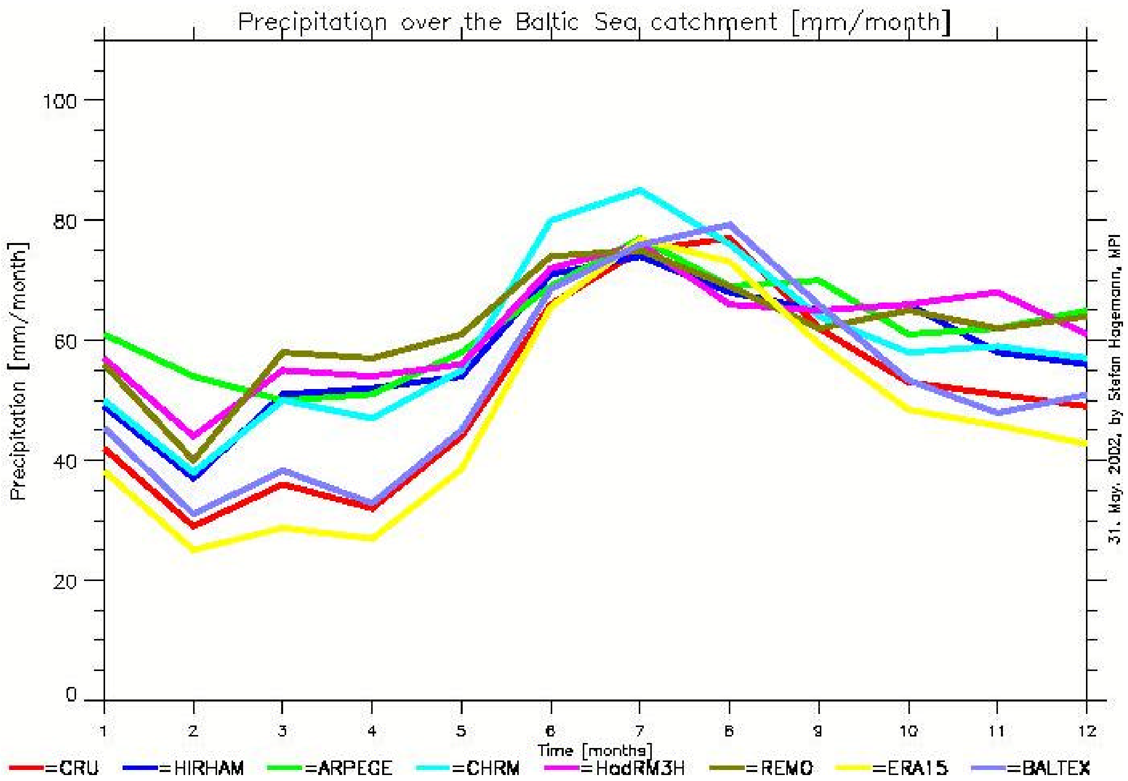
As an example the annual cycle of precipitation over land for the period of 1980 to 1993 is shown in the next figure. REMO results on 0.5° resolution are compared against two different precipitation climatologies.



The investigation of the annual cycle of the water budget is of course of major importance. For example, a shift in the runoff regime will effect Nordic power industries and many more sectors.

An other possibility to quantify uncertainties is the model inter-comparison. As an example a few results from different regional climate models and one global model (Arpeche) for the period 1979 to 1993 are shown in the next figures. The study was part of the EU-funded project, MERCURE.


Total Runoff over the Baltic Sea catchment [mm/month]
Total Runoff [mm/month]
Time [months]
=estim. Obs.
=HIRHAM
=ARPEGE
=CHRM
=HadRM3H
=REMO
31. May. 2002, by Stefan Hagemann, MPI


Precipitation over the Baltic Sea catchment [mm/month]
Precipitation [mm/month]
Time [months]
=CRU
=HIRHAM
=ARPEGE
=CHRM
=HadRM3H
=REMO
=ERA15
=BALTEX
31. May. 2002, by Stefan Hagemann, MPI

Conclusions:

Regional climate models, which have been developed during the last 10 years, play a major role in the definition and investigation of long term water budgets for the Baltic Sea drainage basin. They can be used to study today's long term means as well as annual and inter-annual variability. In addition, they can be used for climate change studies, which will estimate changes in means as well as in extremes. Changes in the annual cycle can also be detected.

However, the above mentioned results show that there are still large uncertainties in the estimations of the water budget. The annual cycle is quite well reproduced within the regional climate model simulations, but the accuracy of the long term budgets is still insufficient.

Detailed investigations using coupled regional climate systems as well as all available observations are needed to decrease uncertainties and increase our understanding about the water budget for the Baltic Sea drainage basin.

The BALTEX/BRIDGE reanalysis project

BALTEX workshop in Lund 18. 11. 2002

Carl Fortelius

The BALTEX/BRIDGE regional reassimilation project offers a comprehensive and detailed description of the climatic energy and water cycles of the catchment basin of the Baltic Sea and its surroundings during the annual cycle between October 1999 and October, 2000. The components of the energy and water cycles are generated by a custom made version of the numerical weather prediction model HIRLAM, operated in data assimilation mode. A detailed presentation of the system is available in the article: Fortelius, Andræ and Forsblom, 2002: The BALTEX regional reanalysis project, Boreal Env. Res.,7,193-201.

HIRLAM is a regional atmospheric general circulation model (RAGCM) based on the primitive equations. Prognostic variables are surface pressure, horizontal wind components, temperature, specific humidity, specific cloud condensate and the kinetic energy of unresolved turbulence. Parameterized physical processes include radiation, turbulence, convection, cloud and precipitation micro physics and surface interactions. The model is integrated on 31 levels, with a horizontal grid spacing of approximately 22 km. Operational analyses from the European Centre of Medium Range Weather Forecasting are used as lateral boundary conditions needed at the edges of the domain.

The data assimilation uses routine observations from weather balloons, air craft and surface weather stations. The upper-air fields are analysed by a variational (3D-VAR) method. Of the surface variables, only snow cover and sea surface temperature (SST) are analysed. In the Baltic Sea, SST and ice cover are provided by a coupled ice-ocean model forced by HIRLAM and constrained by SST-observations through a nudging procedure. The surface temperature of the numerous lakes in Scandinavia is computed by a thermodynamic lake model forced by HIRLAM.

Analyses based on observations and a background state consisting of a six-hour forecast, are generated at hours 00, 06, 12 and 18 UTC each day. A 30-hour forecast is made from every analysis. During the forecasts, model state variable and the effects of parameterized processes are archived every six hours. For a sub-domain covering the catchment basin of the Baltic Sea, energy and water budget components
of the surface are archived every hour. Technical information and a list of all available fields can be found under the BALTEX web-site: //www.gkss.de/baltex/.

Fig. 1, showing the average amount of precipitation in June, July and August 2000 as a function of time of the day, provides an example of products from the reanalysis project. The contrast between land and sea is visible in the distribution of precipitation in a realistic manner. At night-time, the precipitation is mostly related to moving frontal systems, and there is no clear difference between land and sea. During day-time, by contrast, a large fraction of the rainfall is associated with convective cells forming mainly over the heated land, so there is a clear difference between land and sea. This is very obvious in fig.1.

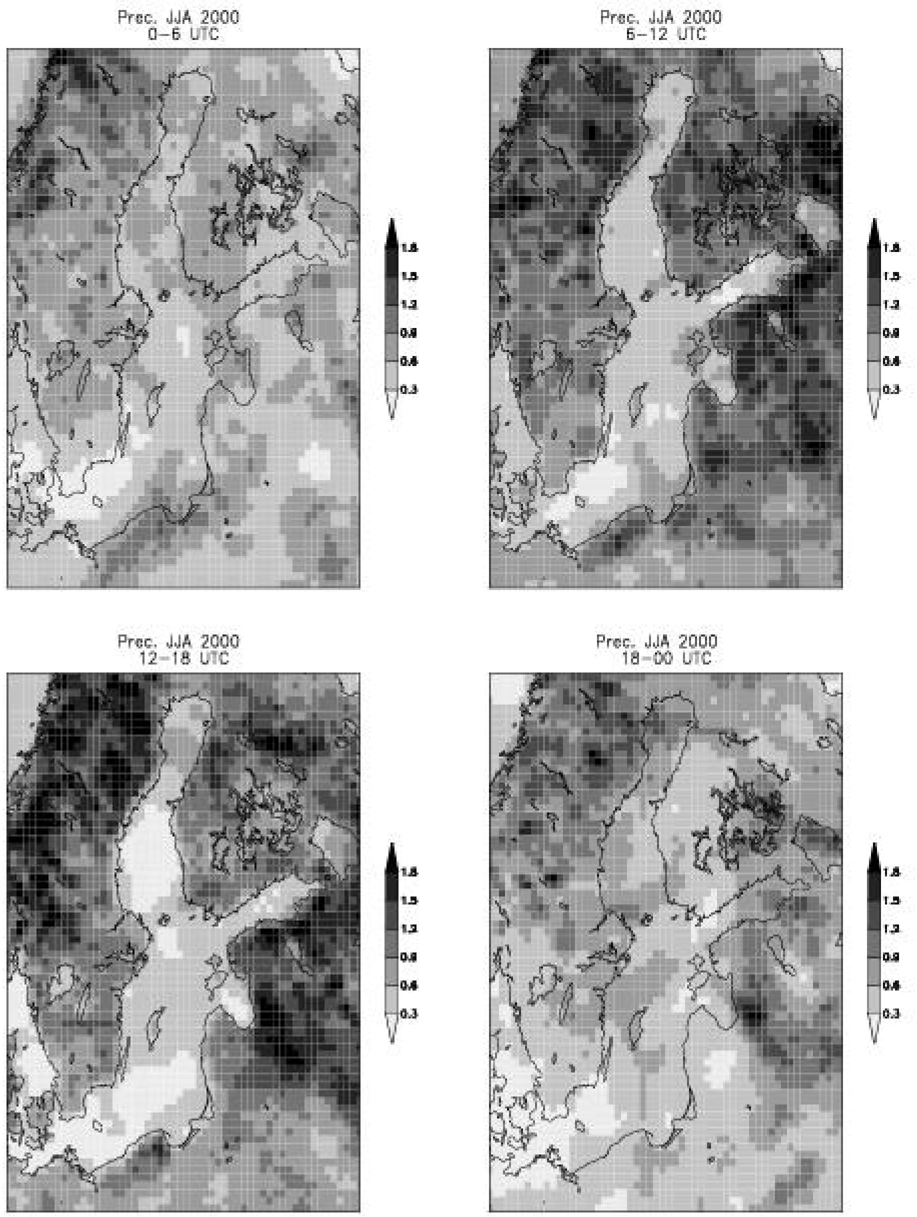


Figure 1. The average amount of precipitation in June, July and August, 2000, given by the BALTEX/BRIDGE reassimilation system (forecast hours 6-12) as a function of the time of the day. The unit is mm in six hours.

In general, the reanalysis data seem to give a realistic picture of the variability of the climatic energy and water cycles in time and space. However, the absolute accuracy is more uncertain, and individual budget components may be significantly biased.

The talk associated with the following abstract was shortly hindered to be held at the BSSG meeting in Lund, due to external reasons. To give an introduction into what would have been presented, the following summary is included in these minutes.

Reconstruction of Baltic Sea data

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The reconstruction of the history of weather and climate in the Baltic Sea region is not only an intellectual challenge but also of practical importance for societal planning and decision making. One aspect concerns the statistics of extreme events, which may be estimated much more reliably if longer times series are available. This is in particular so since extreme events tend to emerge in clusters and not in well separated time intervals. Thus, 40 years of data will in many cases be insufficient of determining rare but possible events (such as the extraordinary storm surge in the Western Baltic sea and the end of the 19th century, which was much stronger than anything else since then). The other application is related to the detection of climate changes not related to natural climate variability, and the plausible attribution of such changes to human causes such as increased greenhouse gas concentrations.

Reconstructions based upon instrumental and proxy data

Historical climatology (e.g., Pfister et al., 2001) is an expanding field within climate research. In this interdisciplinary community, a variety of data sets, both instrumental, documentary and indirect, is used to reconstruct past weather and climate variations. Examples are Rutgersson et al.'s (2002) 1901-1988 analysis of river runoff, maximum ice extent and derived net precipitation, using instrumental data, whereas Koslowski and Glaser (1999) have used documentary material to reconstruct ice conditions in the western Baltic sea since the early 18th century (Figure 1). Obviously, marked variations have taken place in the past. Sometimes these variations may be related to anomalies in the forcing of the climate system (as in case of the Late Maunder Minimum at the end of the 17th century (Zinke et al., 2003); see figure 1), but many episodes of extended reduction or excess intervals of ice extent can not be related to a specific "cause".

Many historical data can be successfully be used for reconstructing seasonal mean conditions (e.g. Pfister et al., 1998), but the frequency and intensity of extreme events is more difficult to reconstruct. One of the problems is that the impact of extreme events is not stationary but dependent on the social organization. For limited pre-modern times, such assessments can be reliably made (e.g., dyke damages in the Netherlands (de Kraker, 1999); or river flooding in the Alpine region (Pfister, 1999)). These studies demonstrate convincingly the temporal clustering of extreme events on time scales of decades of years. However, they hardly provide a quantitative reference for modern or even contemporary extreme events.

In case of wind-storms a number of indicators have been developed, mainly based on local air pressure observations (WASA, 1998). One such indicator for the strength of the storm climate is the width of the distribution of the short term temporal change of air pressure changes (?p/?t, with ?t several hours, often 12 hours) at a fixed location. Bärring (1999) has examined the distribution at Lund, in Southern Sweden, since 1780 (Figure 2). According to this storm indicator, storminess in Southern Sweden has not undergone significant changes in the past 200 years, even if at the very end of the time series, a slight increase in the 95%iles can be seen. The apparent increase in storminess in the late 20th century has caused some concern, but when compared to the history of storminess, this increase appears all but significant.

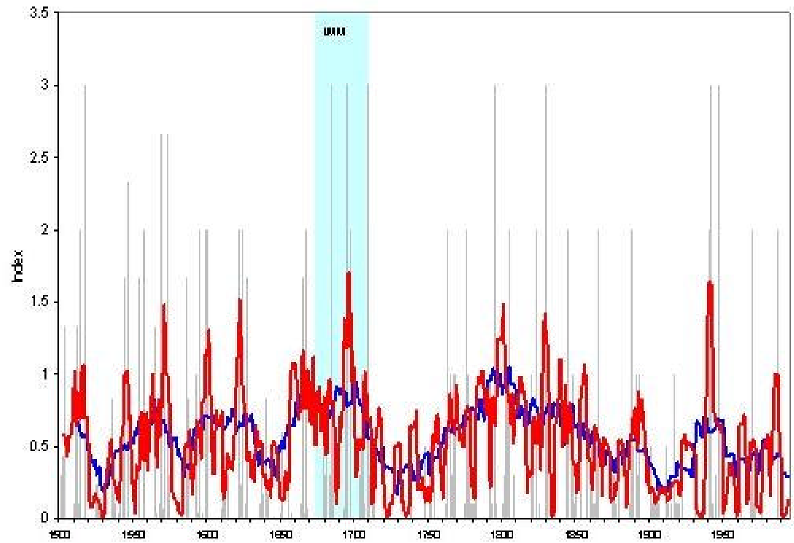

Figure 1: Severity of ice conditions in the Western Baltic Sea (grey vertical bars). Two smoothed cuvres are added as well. The Late Maunder Minimum episode is marked. From Koslowski and Glaser (1999).

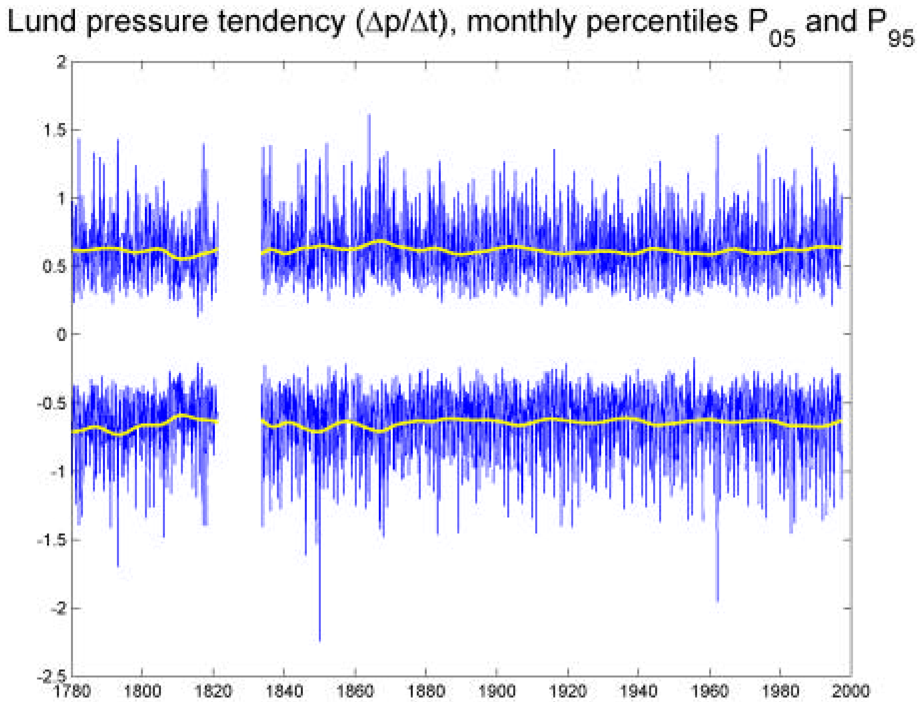

Figure 2: Monthly 5% and 95%iles of daily air pressure tendencies recorded at Lund, Southern Sweden for the years 1780 until 1997 (Bärring, 1999). During 1820 and 1840 the timing of the observations is insufficient.

Reconstructions with climate models

Downscaling, i.e. the estimation of regional or local characteristics using information about the large scale state (von Storch, 1995), can be achieved with statistical models and with dynamical models of the regional climate. A variety of downscaling methods have been used to deal with the climate in the Baltic Sea catchment, such as Busuioc et al. (2001). Also dynamical methods are routinely used (Christensen et al., 2001).

The success of such simulations for the simulation of extreme event is presently examined (Christensen et al., 2001). Here we present a case dealing with wind storms and associated ocean wave heights in the North Sea (Weisse and Feser, pers. comm.). First a regional climate model was integrated using the NCEP re-analyses 1958-1997 with the spectral nudging method; then the resulting wind field were used to force the WAM model for ocean surface waves. The results for the location Ekofisk in the middle of the North Sea in terms of annual 50, 90, 95 and 99%iles of wind speed and significant wave height is shown in Figure 3. For comparison, earlier estimates form the WASA project (1998) as well as percentiles derived form local observations are added. The curves agree generally fine, but the observations are affected by some problems in the early 1980s; also, the WASA estimate, extending only until 1985, exhibit a slight overestimation since about 1980. Consistent with the findings of WASA (1998) and Bärring (1999), does the regional climate model not point to a recent widening of the tails of the distrib utions of wind speeds.

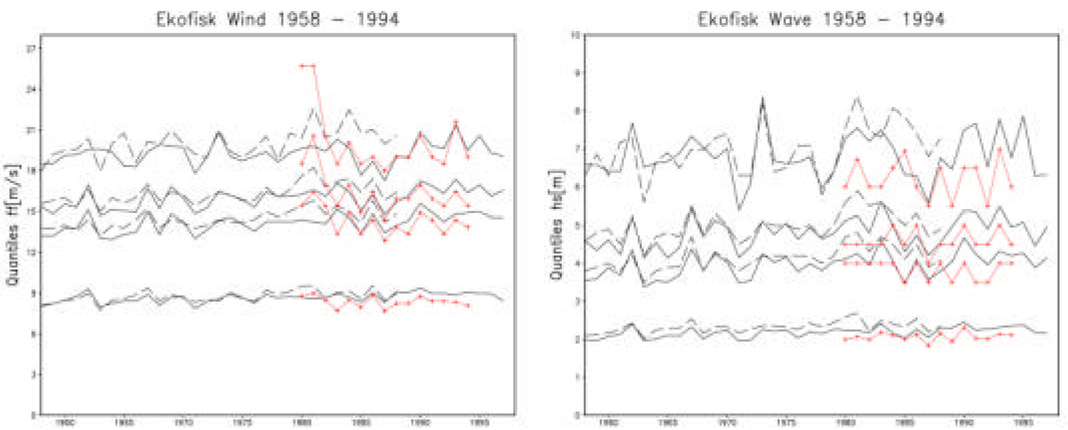

Figure 3: Annual 50, 90, 95 and 99%iles of wind speed and significant wave height at Ekofisk. Red: observations. Dashed: WASA project results (based on high res. DNMI analyses). Solid: Results obtained from regional climate model (Weisse and Feser, pers. comm.)

Historical climate can to some extent be reconstructed with global climate models, when external forcing in terms of solar output, and atmospheric loads of volcanic aerosols and greenhouse gas are given. One such integrations with ECHAM4/HOPE-C has recently be completed for the time 1550-2000 (Fischer-Bruns et al., 2002).

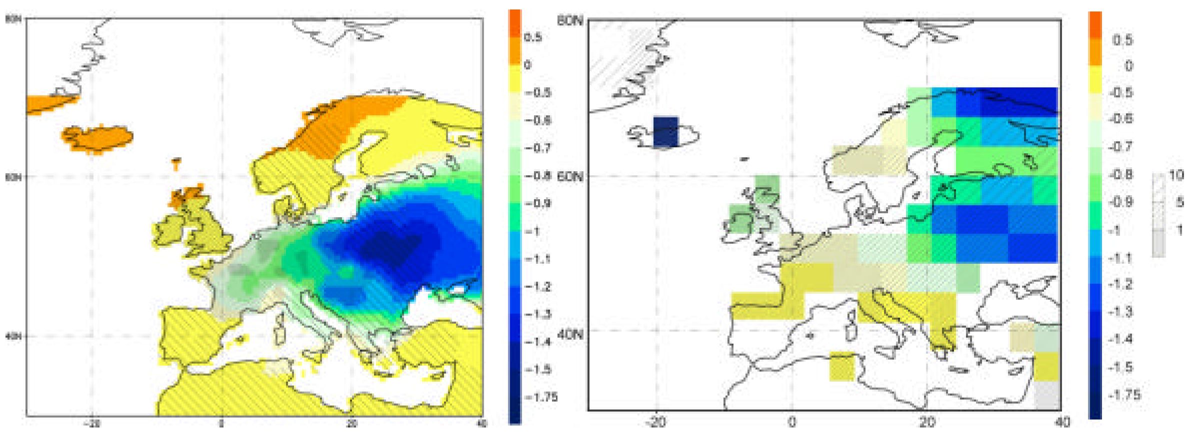

Figure 4: Winter tempeature anomalies during the Late maunder Minimum (1675-1710) compared to a 1550-1800 preindustrila normal. Left: Estimate based upon historical evidence; right: model result. the hatching indicates the confidence in the data

In the end of the 17th century, a marked, almost global cooling emerges, which coincides with the observed phenomenon "Late Maunder Minimum". Figure 4 shows the winter temperature anomalies, relative to a 1550-1800 normal, as simulated as estimated from historical evidence

(Luterbacher, pers. comm.). The hatching in both figures indicates the confidence in the reconstruction, in terms of statistical significance (model) and proportion of variance described (historical data). Obviously, the model results are rather similar to the historical reconstruction. Presently, regional climate simulations are made to dynamically downscale the climatic anomalies during the Late Maunder Minimum (Müller, pers. comm.) to allow for an assessment of changing extreme conditions.

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Knowledge gained about the Baltic Sea during the BALTEX programme

by

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1. Introduction

This presentation is a part of a coming review paper and is only a draft version intended for discussions within the BALTEX community.

The Baltic Sea system constitutes a unique and important environment that undergoes large changes due to eutrophication, pollution, misuse of the natural resources as over fishing, and climate change. The Baltic Sea is highly dynamic and strongly influenced by the large scale atmospheric circulation with restricted water exchange due to narrow entrance area. How the Baltic Sea function and how future changes will influence the Baltic Sea are major question of concern. To answer these questions we need to develop our understanding of the Baltic Sea and in particularly how energy, water and material are transported and transformed in the system. The Baltic Sea water and energy cycles have been extensively studied during the twentieth century and some major efforts have been taken as HELCOM (1986) and BALTEX (1995). The Helsinki Commission summarized an over ten year joint effort in determining the different terms in the Baltic Sea water balance in 1986. However, the different terms were calculated in isolation and not using Baltic Sea modelling.

In the later 1980s the Global Energy and Water Experiment (GEWEX) was developed within the framework of World Climate Research Programme (WCRP). The aims were to provide a better understanding of global, regional, and local processes that exchange energy and water in the climate system. Within GEWEX six continental-scale experiments were initiated in different region, with the Baltic drainage basin as one. In the Baltic Sea Experiment (BALTEX), the whole drainage basin is included a region which has about 90 million inhabitants. The planning for the BALTEX program started in the beginning of 1990th and has now been running for 10 years (BALTEX, 1995). Up dated information on BALTEX and the different data centres formed within BALTEX can be found on the BALTEX Home page (http://w3.gkss.de/baltex/baltex_home.html).

The main aim with the present work is twofold: (1) to trace the development of Baltic Sea research and in particularly the water and heat cycles and the Baltic Sea modelling during the last 10 years; and (2) to lay out where we are today; what is known and what seems to be the key questions.

2. The water and heat budgets of the Baltic Sea water body

The water and heat cycles of the Baltic Sea are affected by a number of small-scale features as, for example, the complex coastlines and the many islands. The complex bathymetry of the

Baltic Sea with narrow straits and channels, the strong stratification, the quit small Radius of Deformation (some kilometres) and heterogeneous sea ice structure, also influence the dynamics of the Baltic Sea. As a consequence, there are many physical processes at different time and space scales that are involved when calculating the water and heat cycles. In general there is insufficient knowledge about these cycles, with regard to observations as well as models. For example how wind and precipitation field are modified by the Baltic Sea and how wind energy enters into the Baltic Sea and feed deep-water mixing are questions that we do not yet understand. Still during the BALTEX period several important achievements have been reached, these are summarized and shortly discussed in Section 5.

BALTEX research is mainly dealing with the water and heat cycles. The heat energy is only a part in the energy cycle which also includes various interactions between mean and turbulent kinetic energy, internal wave energy and potential energy. Very little is still known about how the external energy is transformed in the Baltic Sea (Axell, 2001).

In the present work we limit our self to the water and heat budgets of the Baltic Sea water body. Starting from the volume conservation principal we can write the water balance equation as (Omstedt and Rutgersson, 2000, Stigebrandt, 2001):

$$A_s \frac{dz_s}{dt} = Q_i - Q_o + (P-E)A_s + Q_r + Q_{ice} + Q_{rise} + Q_T + Q_S + Q_g \qquad \{1\}$$

where A_s is the surface area of the Baltic Sea, z_s the water level of the Baltic Sea, Q_i and Q_o the in- and outflows through the Baltic entrance area, P and E the precipitation and evaporation rates, Q_r the river runoff, Q_{ice} the volume change due to ice advection out from the Baltic Sea, Q_{rise} the volume change due to land uplift, Q_T and Q_S the volume changes due to thermal expansion and salt contraction and Q_g the groundwater inflow.

In the following discussion we will neglect contributions from Q_{ice} (order of 10^2 m^3/s, Omstedt and Rutgersson, 2000), Q_{rise} (order of 10^1 m^3/s, Omstedt and Rutgersson, 2000), Q_T, Q_S (probably small on annual time scales) and Q_g (order of 10^2 m^3/s, Peltonen, 2002).
An estimate of Q_S can be derivate by considering that 1 salinity unit (psu) corresponds to about 1 cm amplitude in sea level(the slope from Bohnian Bay to Skagerrak drops about 35 cm as the salinity increases about 1 cm per psu). From Winsor et al., (2001), it is illustrated that the Baltic Sea salinity varies about 1 psu per 30 years. We use this and estimate that the volume change due to salt contraction on annual scale is about 1/15 cm or in the order of 10^1 m^3/s (Baltic Sea surface area inside the entrance sills is about 370 000 km^2). The thermal expansion due to heating and cooling may cause a seasonal variation in volume flow in the order of 10^3 m^3/s (Stigebrandt, 2001), but on annual scale the volume flow is at least one order of magnitude less. The left term in Equation(1) is the change in water storage and is an important part for short term estimations of the water balance (Lehmann and Hinrichsen, 2001). See Table 1 for an order of estimation of the different terms.

Table 1. Estimated annual mean volume flows for the Baltic Sea (order of magnitude).

Q_i (m^3s^{-1})	Q_o (m^3s^{-1})	Q_o-Q_i (m^3s^{-1})	(P-E)A_S (m^3s^{-1})	Q_r (m^3s^{-1})	Q_{ice} (m^3s^{-1})	Q_{rise} (m^3s^{-1})	Q_g (m^3s^{-1})	Q_T (m^3s^{-1})	Q_S (m^3s^{-1})
10^5	-10^5	-10^4	10^3	10^4	-10^2	-10^1	10^2	$\pm10^2$	$\pm10^1$

From heat conservation principals we can write the heat balance equation for the Baltic Sea water body according to (Omstedt and Rutgersson, 2000):

$$\frac{dH}{dt} = (F_i - F_o - F_{loss})A_s \qquad \{2\}$$

Where $H = \iint rc_p TdzdA$ is the total heat content of the Baltic Sea water body, F_i and F_o the heat fluxes associated with in- and outflows and F_{loss} the total heat loss to the atmosphere (note that the fluxes are positive when going from the water to the atmosphere). F_{loss} reads:

$$F_{loss} = (1 - A_i)(F_n + F_s^o) + A_i(F_w^i + F_s^i) - F_{ice} + F_r + F_g \qquad \{3\}$$

where

$$F_n = F_h + F_e + F_l + F_{prec} + F_{snow} \qquad \{4\}$$

The different terms in Equations (3) and (4) are denoted as follows: A_i is the ice concentration, F_h the sensible heat flux, F_e the latent heat flux, F_l the net long wave radiation, F_{prec} and F_{snow} the heat fluxes associated with precipitation in the form of rain and snow respectively, F_s^o the sun radiation to the open water surface, F_w^i is the water flux to the ice, F_s^i sun radiation through the ice, F_i the heat sink associated with ice advection out from the Baltic Sea, F_r and F_g heat flows associated with river runoff and ground water flow. See Table 2 for an order of estimation of the different terms.

Table 2. Estimated annual mean energy fluxes for the Baltic Sea (order of magnitude).

F_n (Wm^{-2})	F_s^o (Wm^{-2})	F_w^i (Wm^{-2})	F_s^i (Wm^{-2})	F_{prec} (Wm^{-2})	F_{snow} (Wm^{-2})	F_{ice} (Wm^{-2})	F_r (Wm^{-2})	F_g (Wm^{-2})	F_o-F_i (Wm^{-2})	F_{loss} (Wm^{-2})
10^2	-10^2	10^0	-10^0	10^{-1}	10^{-1}	-10^{-1}	10^{-1}	10^{-1}	10^0	-10^0

3. Some major developments during BALTEX and related programs (up to 2002)

The rapid developments within technology (internet, computers and remote sensing) have really improved our ability to get access to data and run numerical models. Also the dramatic political changes during last decade have open up our possibilities to communicate and exchange ideas in a new way. These aspects have strongly influenced the development within Baltic Sea research during last 10 years. Below some of the major achievements during the last decade within Baltic Sea research are outlined and discussed. The perspective is mainly from an oceanographic point of view. Some major developments are:

- *Forcing data on annual and decadal scale available.*
- *Ice and Ocean data available.*
- *Increase understanding about the strong impact of large-scale atmospheric circulation on the state of the Baltic Sea*

- *New understanding related to the importance of the Skagerrak-Kattegat ocean front in the control of the Baltic Sea overall salinity.*

- *New understanding of the importance of strait flows for the exchange of water into and within the Baltic Sea.*

- *New understanding of deep water mixing.*

- *New observational insights into the dynamics of Baltic Sea inflows.*

- *New atmospheric turbulent flux measurements and new insights in the marine (air-sea, air-sea ice) atmospheric boundary layer).*

- *Improved ocean turbulence modelling*

- *Ocean models introduced in Baltic Sea water and energy studies.*

- *New understanding related the role of sea ice in the Baltic Sea water and energy cycles*

- *Improved Baltic Sea ice modelling and increased understanding about the need for coupled atmosphere-ice-ocean-land models*

- *Decadal and long-term modelling is possible.*

- *Inter-disciplinary work around coupled modelling started*

4. Recent water and heat flux estimations

Table 3. Mean water balance for the Baltic Sea (the Belt Sea and the Kattegat excluded) average. Unit 10^3 m^3 s^{-1}. The flows are denoted by: River runoff (**Q_f**), net precipitation (**P-E**), inflow (**Q_i**), outflow (**Q_o**) and Storage change. Different investigated periods and methods have been used.

AUTHOR	Q_i (m^3s^{-1})	Q_o (m^3s^{-1})	Q_o-Q_i (m^3s^{-1})	Q_r (m^3s^{-1})	A_s(P-E) (m^3s^{-1})	Storage Change (m^3s^{-1})
Early estimates						
HELCOM, -86, Table 11g			14.94	13.83	1.26	0.15
Runoff estimates						
Bergstöm and Carlsson (1994)				14±4		
COADS						
Lindau (2002)					0.70	
Ocean modeling						
Omstedt et al, (1997)					1.99	
Omstedt and Rutgersson (2000)	40.42	57.72	17.30	15.14	1.87	-0.29
Winsor, et al (2001)[1)]		80±10	15±5	14±4		
Omstedt and Axell (2002)	39.96	57.08	17.12	15.12	1.53	-0.47
Rutgersson et al (2002)					1.5±1	
Meier and Döscher (RCO,2002)				15.07	1.8	
PEP in BALTEX						
Hennemuth et al, (2002)					1.8±0.6	
Atmosphere modeling						
Jacob et al.(1997), run 1			19.09	15.32	3.77	0
Jacob et al.(1997), run 2			19.22	15.76	3.46	0
Jacob (2001)			16.39	13.92	2.47	
RCA-E [2)]				18.93	3.60	
RCA-H [2)]				24.64	5.69	
Coupled modeling						
Meier and Döscher (RCAO,2002)				16.09	0.12	

1) The outflow estimate was calculated as mean during calculated outflow events only and not as a mean during the whole studied period as has been done in the other estimations.

2) Control runs using the Rossby Centre model from Rutgersson et al. (2002, Table 10)

Table 4. Mean heat balance of the Baltic Sea (the Belt Sea and the Kattegat excluded). The fluxes are positive when going from the water to the atmosphere. Unit: Wm^{-2}.The **fluxes** are denoted as: Sensible heat (**F_h**), latent heat (**F_e**), net long-wave radiation (**F_l**), sun radiation to the open water surface (**F_{so}**), sun radiation through ice (**F_{si}**), heat flow from water to ice (**F_{wi}**) and net heat loss $F_{loss}=(1-A_i)(F_{so}+F_h+F_e+F_l)+A_i(F_{si}+F_{wi})$. Different investigated periods and methods have been used.

AUTHOR	F_h (Wm^{-2})	F_e (Wm^{-2})	F_l (Wm^{-2})	F_s^o (Wm^{-2})	F_w^i (Wm^{-2})	F_s^i (Wm^{-2})	F_{loss} (Wm^{-2})	$F_{out}-F_{in}$ (Wm^{-2})
Early estimates								
Henning, (1988)	18	39		-41[1)]			16	
COADS								
Lindau (2002)	12	42	69	-122			1	
Ocean modeling								
Omstedt and Rutgers-son(2000)	7	35	43	-90	3	-0	-1	1
Omstedt and Axell (2002)	9	37	37	-88	4	-0	-1	1
Meier (2001)	12	33	45	-91			-1	
Atmosphere modeling								
Jacob et al. (1997), run 1	7	32	44	-88			-5	
Jacob et al. (1997), run 2	11	36	44	-86			5	
Jacob (2001)	11	35	57	-119			-16	
Coupled modeling								
Meier, Döscher (RCO,2002)	10	41	53	-105			0	

1) Net radiation

5. Present knowledge related the Baltic Sea water and energy cycles and key questions

- The major water balance components in the Baltic Sea are in and outflows to the entrance area, river runoff and net precipitation. Change in water storage need also to be considered.
- The large inter-annual variability in the Baltic Sea region is mainly driven by the large scale atmospheric circulation. This can bee seen in time series of e.g. ice and sea levels.
- As a long-term mean the Baltic Sea is almost in thermodynamically balance with the atmosphere and the thermal memory in surface water properties are less then one year.

- The variations of the freshwater storage (or converted into a mean salinity) in the Baltic Sea reflect the accumulated changes of the river runoff.

- Net precipitation over the Baltic Sea during present climate (last 100 yrs) is estimated to 1500 m^3/s with an inter-annual variability of ±1000 m^3/s.

- River runoff during present climate (last 100 yrs) is estimated to 14 000 m^3/s with an inter-annual variability of ±4000 m^3/s.

- Outflows to the Baltic Sea during present climate (last 100 yrs) is estimated to 80 000 m^3/s with an inter-annual variability of ±10 000 m^3/s.

- Several studies of net precipitation over the Baltic Sea even for the same time period differ quit strongly.

- Still uncertainties in measuring and modelling turbulent fluxes, wind, and precipitation over the sea as well as proper parameterization of the air-sea boundary layer processes.

- Still uncertainties in the understanding of diapycnal mixing, strait flow dynamics and dense bottom currents.

- Regional atmosphere climate models for the present climate indicate that they are to wet, do not resolve the seasonal cycle correct and do not resolve the land-sea contrast in the Baltic drainage basin correct. Improvements are thus needed.

- Radiation fluxes over the Baltic Sea are highly parameterized and uncertain

- High resolution forcing data sets are almost missing.

- For increasing our understanding we need a good balance between effort spent on modelling and effort spent on new and innovative observations.

- BALTEX still strongly needed!

Acknowledgements

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Modelling the climate, environment and processes of the Baltic Sea: Examples and ideas based on the regional model system at the Rossby Centre

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An overview over ocean modeling activities at the Rossby Centre is presented including:

1. the regional model system at the Rossby Centre (RCAO)
2. water and heat cycles
3. climate scenarios (1961-1990, 2071-2100)
4. 20th century Baltic Sea simulations with reconstructed forcing

A regional coupled atmosphere-ice-ocean general circulation model for northern Europe is introduced for climate study purposes. The Baltic Sea is interactively coupled. The coupled model is validated in a 5-year hindcast experiment with a focus on surface quantities and atmosphere-ocean heat fluxes. The coupled sea surface temperature matches observations well. The system is free of drift, does not need flux corrections and is suitable for multi-year climate runs. With flux forcing from the atmospheric model the regional ocean model gives sea surface temperatures statistically equivalent to the uncoupled ocean model forced by observations. Other oceanic surface quantities do not reach this quality in combination with the current atmosphere model. A strong dependence of sea ice extent on details of the atmospheric radiation scheme is found. Our standard scheme leads to an overestimation of ice, most likely due to a negative bias of long-wave radiation. There is indication that a latent heat flux bias in fall contributes to the ice problem. Other atmosphere-ocean heat fluxes are generally realistic in the long term mean.

The heat and water cycles of the Baltic Sea are calculated utilizing multi-year model simulations. For the period 1988-93, results of the ocean model RCO forced with observed atmospheric surface fields are compared with results of RCAO using re-analysis data at the lateral boundaries. The annual and monthly mean heat budgets for the Baltic Sea are calculated from the dominating surface fluxes, i.e. sensible heat, latent heat, net longwave radiation and solar radiation to the open water or to the sea ice. The main part of the freshwater inflow to the Baltic is the river runoff. A smaller part of about 11% is added from net precipitation. The heat and water cycles are compared with the results of a long-term simulation (1980-93) using the stand-alone Baltic Sea model forced with observed atmospheric surface fields. In general, both approaches, using the uncoupled or coupled Baltic Sea model, give realistic estimates of the heat and water cycles and are in good agreement with results of other studies. However, in the coupled model the parameterizations of the latent heat flux and the incoming longwave radiation need to be improved.

Based on RCAO a series of scenarios according to IPCC standard has been performed. In these 30-year long simulations lateral boundary data from two global general circulation models, HadAM3 and ECHAM4/OPYC3, have been used. Two control simulations represent the recent (1961-1990) climate and four scenario simulations (A2, B2) represent the climate in the late 21st century (2071-2100). The biases of the control climates are relatively small. ECHAM4/OPYC3 scenarios are milder compared to HadAM3 scenarios. In all scenarios we found ice during every winter.

In cooperation between the Rossby Centre and the Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany, the decadal variability of the Baltic Sea system has been investigated. Sensitivity experiments for the period 1902-1998 have been performed using RCO. Baltic Sea climate of the period 1902-1998 is simulated realisticly with RCO. About half of the decadal variability of Baltic Sea salinity is related to the accumulated freshwater inflow. The second half of the decadal variability of mean salinity is related to decadal variations of the volume transports through Stolpe Channel caused by the low-frequency variability of the sea level pressure over Scandinavia. Stronger westerly winds cause increased eastward surface-layer transports. Consequently, the mean eastward lower-layer transport through the Stolpe Channel is reduced. Thus, the entrainment of the deepwater flow between Bornholm Basin and the eastern Gotland Basin decreases.

Perspectives of future research at the Rossby Centre

1. unified earth model system for climate research and operational forecasting
2. development of a portable system (e.g. Arctic Ocean)
3. increased horizontal resolution
4. reconstruction of historical climate of the past 300 years
5. coupling with a biochemical model to address eutrophication in past and future climate
6. further process studies are needed

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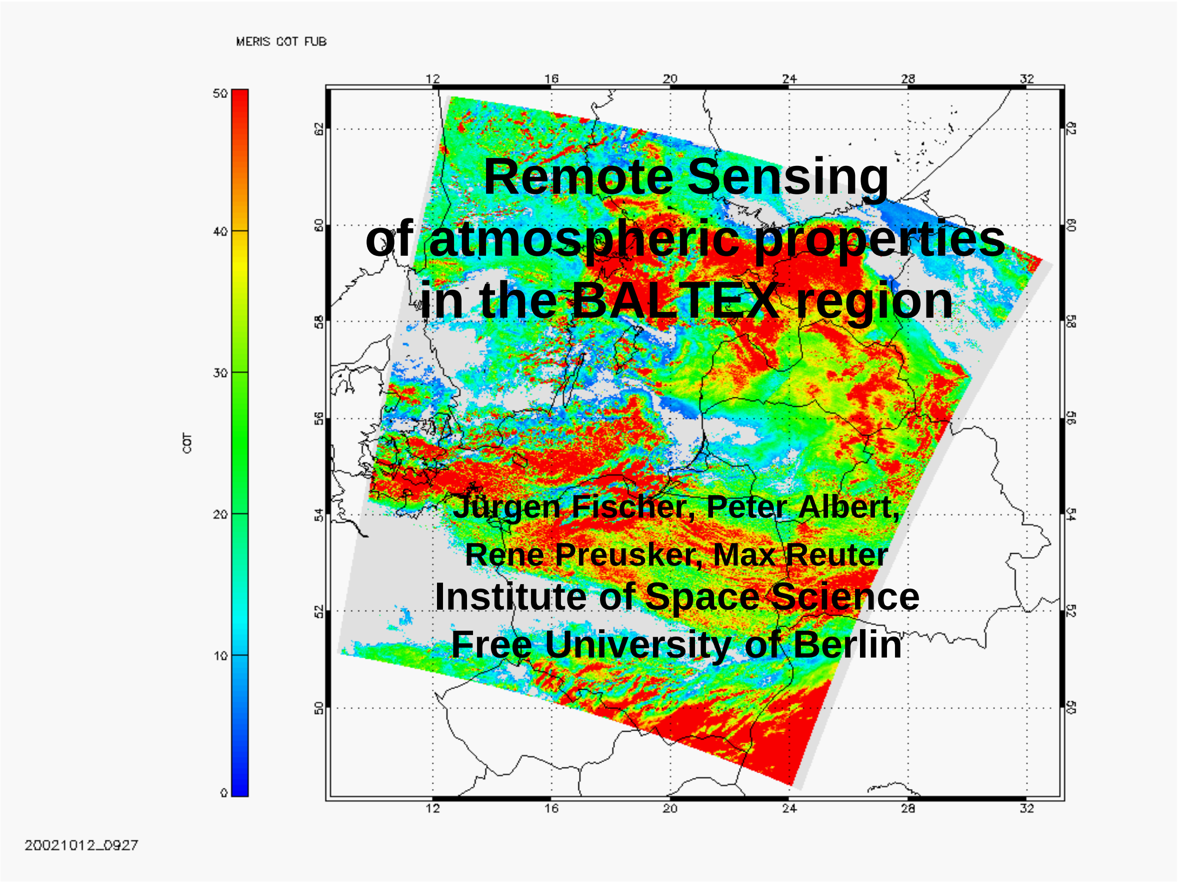
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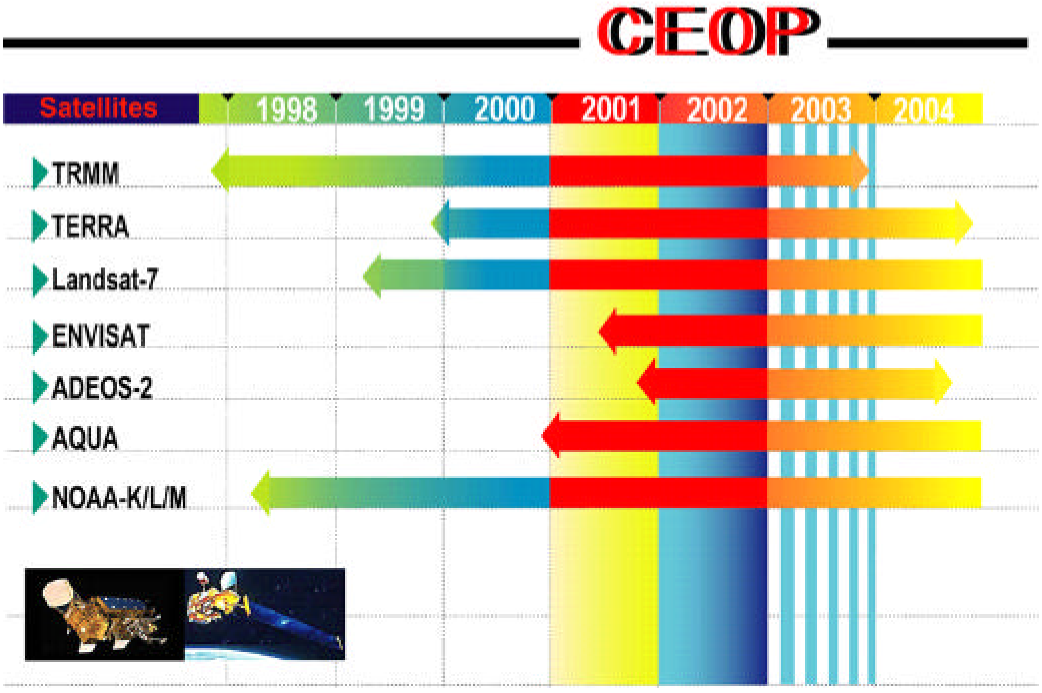
COT
Remote Sensing
of atmospheric properties
in the BALTEX region
Jürgen Fischer, Peter Albert,
Rene Preusker, Max Reuter
Institute of Space Science
Free University of Berlin
20021012_0927


CEOP
Satellites
1998
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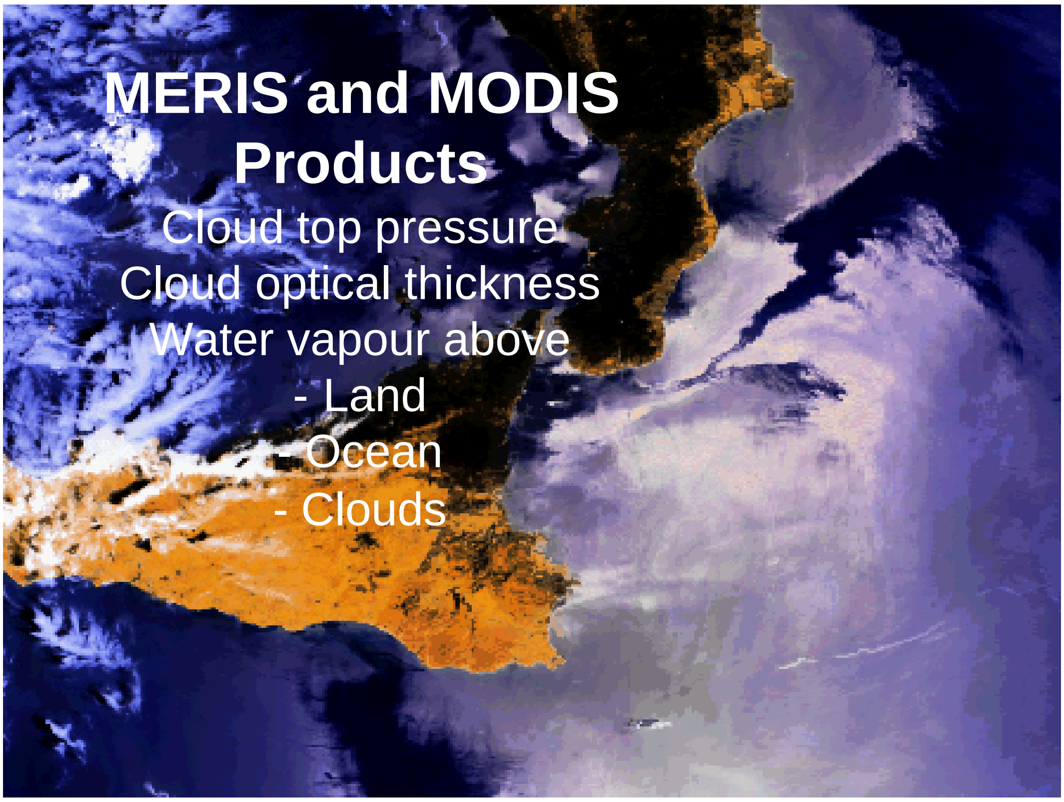
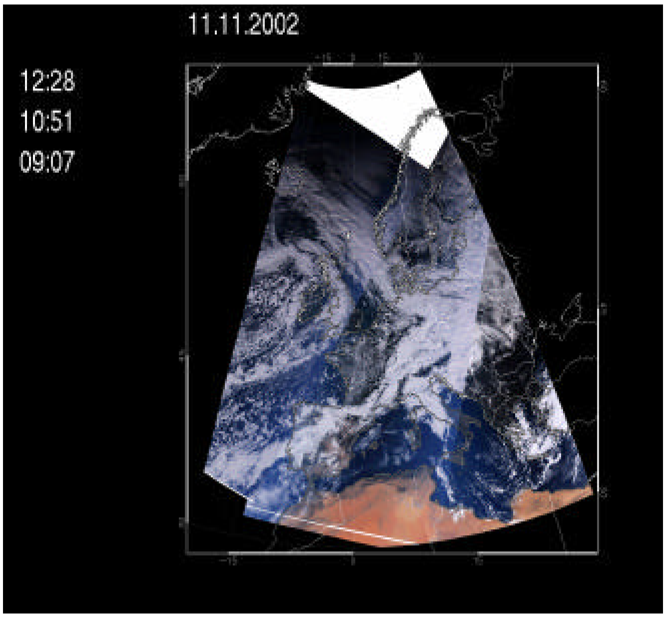
TRMM
TERRA
Landsat-7
ENVISAT
ADEOS-2
AQUA
NOAA-K/L/M



Satellite `near real time` products: MODIS and MERIS*



- cloud top pressure (O_2+CO_2)
- cloud top temperature
- cloud phase (NIR+TIR)
- effective radius (NIR+TIR)
- condended water path
- optical thickness (NIR+TIR)
- droplet number concentration (NIR)
- cloud geometrical thickness (NIR)
- water vapour content

* MERIS products will be available 2-4 weeks later

Appendix 3: BSSG meeting agenda

14th BALTEX SSG Meeting

at

Lund University

Departement of Physical Geography and Ecosystem Analysis

Lund, Sweden

18 – 20 November 2002

Note: The workshop and the BSSG meeting will take place at different locations !

The workshop venue on Monday will be
Sölvegatan 37, Ecology Building, room 'Blå hallen'.

The SSG meeting venue on Tuesday and Wednesday will be at
John Ericssons väg 1, V-huset, 1st floor, room 'Naturgeografi/GIS-lab'.

PROVISIONAL AGENDA AND EXPLANATORY MEMORANDUM

The major objectives of the 14th BALTEX SSG meeting are:

1) to finally decide on the main objectives of BALTEX phase 2,
2) to initiate immediate actions to establish revised science and implementation plans for BALTEX, and,
3) to analyse FP6 funding opportunities for BALTEX phase 2, in particular related to the recently submitted expression of interest BALTIC WATER, and beyond; and initiate necessary steps for a successful proposal preparation and submittal in due time.

This meeting's agenda will therefore deviate from usual BSSG meeting agendas in that several regularly included items will be skipped or reduced to the necessary minimum leaving a maximum of time for discussions and decisions on the three major issues mentioned above. The latter are to be discussed under items 5, 6 and 7 of the agenda. Item 8 includes several other important issues, which need to be addressed by the BALTEX SSG, for which however only limited time will be allocated. On the second meeting day, items 5, 6 and 7 will be taken up again to the extent necessary for concluding the meeting with final decisions.

Monday, 18 November 2002

14.00 „ **Achievements of and Perspectives for the BALTEX Programme** "
The workshop prior to the official BSSG meeting includes presentations which contribute to both a state-of-the-art overview on BALTEX achievements and related possible future perspectives for the BALTEX programme.
See separate workshop agenda.

Note: The workshop venue is Sölvegatan 37, Ecology Building, room 'Blå hallen'.

18.30 Closing of the workshop

Note: The SSG meeting venue on Tuesday and Wednesday is
John Ericssons väg 1, V-huset, 1st floor, room 'Naturgeografi/GIS-lab'.

Tuesday, 19 November 2002

9.00

Item 1: Welcome by the Host and the Chairman (A. Lindroth, H. Graßl)
Introduction to Lund University (A. Lindroth)

Item 2: Amendment and Approval of the Agenda

Item 3: Approval of the Minutes of the 13th SSG Meeting

Item 4: Review of important action items of previous SSG meetings

Break

10.30 **Item 5: Objectives of BALTEX phase 2**

Discussions under this item will be based on the conclusions of the BALTEX SSG meetings #12 and #13. The conclusions of these meetings related to objectives of BALTEX phase 2 will be summarized by **Hartmut Graßl** in an opening statement. All BSSG members and guests are expected to comment. This discussion is expected to conclude with a final list of objectives for BALTEX phase 2.

Time allocated to item 5 at this part of the meeting is 2 hours at maximum. Item 5 may be taken up again Wednesday morning, in case that time is too short for final and conclusive decisions.

Lunch break

14.00 **Item 6: Towards Implementing BALTEX phase 2**

Based on decisions made for item 5, item 6 includes discussions and decisions on how to implement the revised objectives for BALTEX phase 2. In particular, steps to revise BALTEX documents for the new objectives of BALTEX phase 2 need to be agreed upon. The following questions may serve as a guideline:

6.1: Do we need **a state-of-the-art review** report on BALTEX and who will do it within which time period ?

6.2: Do we need a completely **new BALTEX science and/or implementation plan** or is it sufficient to establish amendments ? A group, or two, of competent individuals, where each individual is ad-hoc most enthusiastic on contributing to this exercise, need to be set up and start activities still in 2002.

6.3: Which further steps in the field of e.g. public relation, promotion, etc shall be undertaken in connection with BALTEX phase 2 ?

Time allocated to item 6 at this part of the meeting is 1 hour at maximum. Item 6 may be taken up again Wednesday morning, in case that time is too short for final and conclusive decisions.

Break

Tuesday, 19 November 2002 *(continued)*

15.30 **Item 7: FP6 Funding Proposal in Support of BALTEX**

Item 7 contains discussions and decisions related to funding proposals for the 6th European Framework Programme (FP6) in support of BALTEX phase 2. As an initial action, an Expression of Interest (EoI) for an Integrated Project (IP) BALTIC WATER were submitted to Brussels earlier in 2002. The following issues will be discussed, each of them opened by a summary statement:

7.1: FP6 Priority Themes relevant for BALTEX.

The aim of this section is the identification of potential priority themes in FP6, suitable for BALTEX phase 2. A review of FP6 potential thematic priorities and related call, based on the FP6 opening conference and available FP6 work programmes, will be given (**Hans-Jörg Isemer**). Comments and discussion by all participants are expected.

7.2: Features of an Integrated Project

Summary of FP6 administrative, legal and management requirements for a FP6 Integrated Project (**Hans-Jörg Isemer**).

7.3: Analysis of other EoI

Analysis of other EoIs submitted to Brussels earlier in 2002 with relevance for the BALTIC WATER EoI: Who plans to submit similar proposals, which would be in competition to BALTIC WATER ? (**Hans-Jörg Isemer and others**)

7.4: FP6 funding proposal strategy

Definition of a FP6 funding proposal strategy in support of BALTEX phase 2. Opening statements will be given by **Hartmut Graßl and Anders Omstedt**, discussion and comments are expected by all BSSG members and guests.

7.5: FP6 proposal writing

Discussion and decision on next steps towards implementing the FP6 funding proposal strategy are expected here. Based on previous actions, it is envisaged already now that at least one proposal for an Integrated Project, following the BALTIC WATER EoI, will be submitted. If so, a group of ad-hoc enthusiasts willing to contribute continuously to actions required for a sound IP proposal in due time for the relevant FP6 deadline, shall be identified

Time allocated to item 7 at this part of the meeting is 1.5 hours at maximum. Item 7 may be taken up again Wednesday morning, in case that time is too short for final and conclusive decisions.

17.00 **Item 8: Important other issues**

This item will include important issues which are not closely, but in most cases indirectly, related to the major objectives of the meeting. It is expected that both an introductory report or statement and a related discussion of the group shall be confined to 15 minutes each on average. Issues to be discussed will include:

<u>Tuesday, 19 November 2002</u> *(continued)*

8.1: BALTEX Meteorological Data Centre (BMDC)
DWD has recently indicated that it will not continue to maintain BMDC beyond the end of 2002. Options for the continuation of the BMDC need urgently to be discussed. Introduction by **Gerd Adrian**.

8.2: Water Resources Application and Prediction Working Group of GEWEX (WRAP)
BSSG will be briefed on recent activities of the GEWEX-WRAP group by the BALTEX representative in WRAP, **Phil Graham**.

8.3: Cold Region Hydrology Working Group for CEOP
The CEOP SSC has recently discussed possibilities for a closer inclusion of scientists interested in extra-tropical (or non-monsoon) issues to CEOP. A CEOP WG on Cold Region (Arctic) Hydrology has been suggested to be discussed in particular in non-tropical CSE communities (such as BALTEX, MAGS, GAME-Tibet) with the objective to stimulate research interest and projects making use of CEOP data products. **Hartmut Graßl** will introduce the subject.

8.4: Oceanographic Data Centre for BALTEX (ODCB)
A brief summary on recent developments in implementing ODCB will be given by **Philippe Axe**.

8.5: BALTEX Satellite Data Centre Function (BSDCF)
A brief summary on recent developments in implementing BSDCF will be given by **Jürgen Fischer / Clemens Simmer**.

Time allocated to item 8 is 1 hour 15 minutes.

18.15 Closing of day 1 of the meeting

<u>Wednesday, 20 November 2002</u>

9.00 Item 5: Objectives of BALTEX phase 2

Wrap-up and conclusions

10.00 Item 6: Towards Implementing BALTEX phase 2

Wrap-up and conclusions

Break

11.30 Item 7: FP6 Funding Proposal in Support of BALTEX

Wrap-up and conclusions

Wednesday, 20 November 2002 *(continued)*

12.30 Item 9: Date and Place of the Next Meeting

Item 10: Any Other Business

13.00 Closing of the BSSG meeting

Appendix 4: Meeting participants

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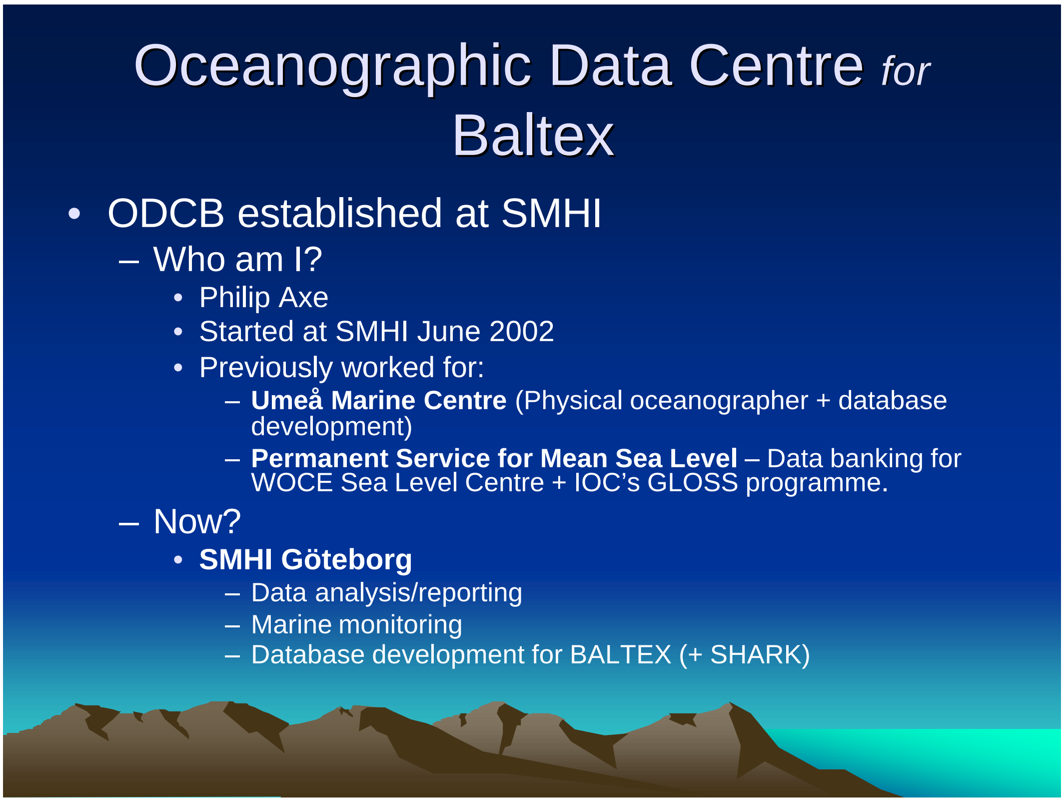
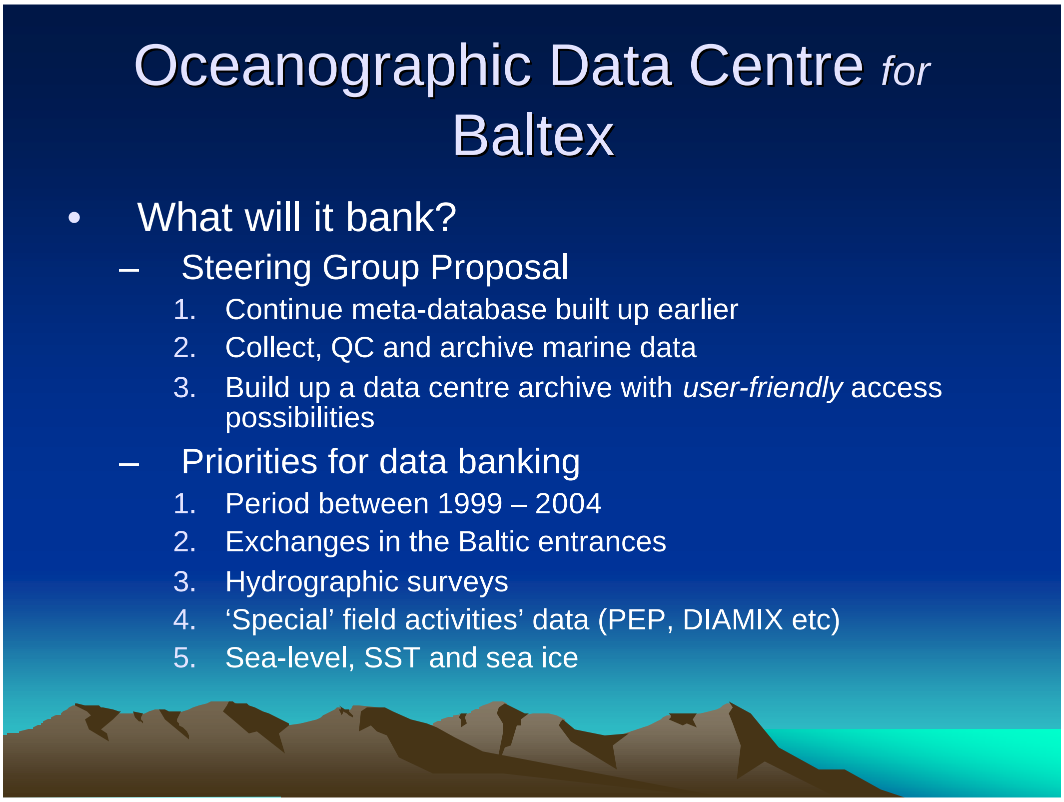
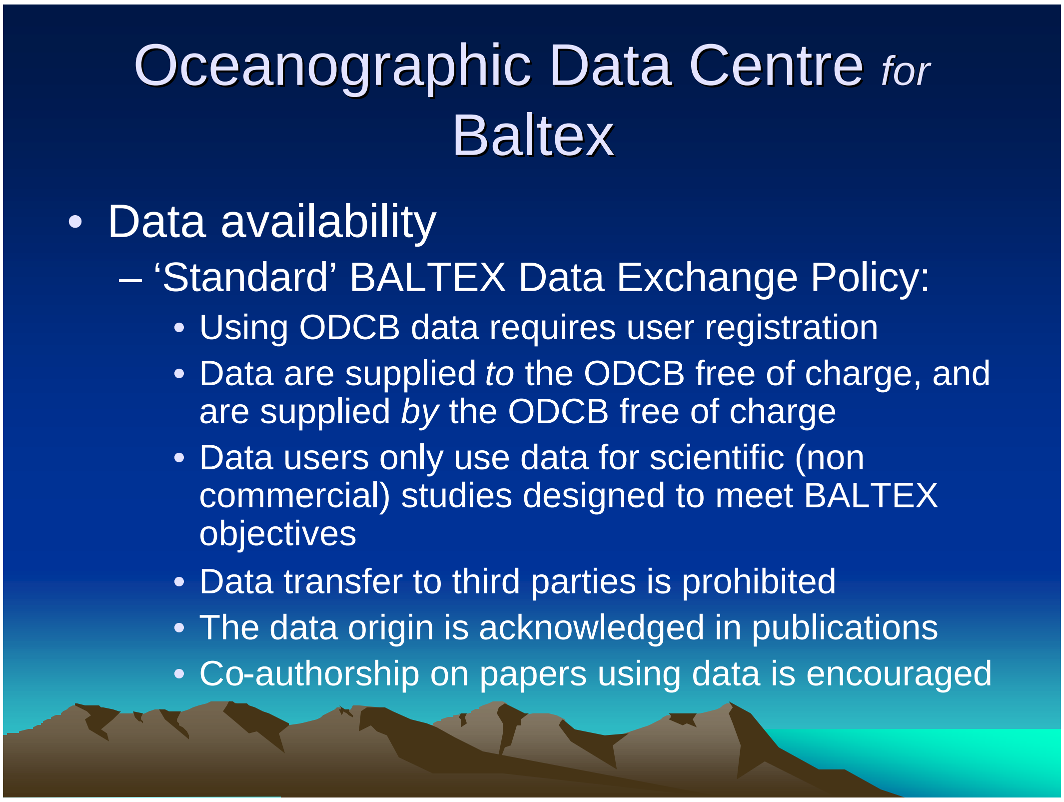
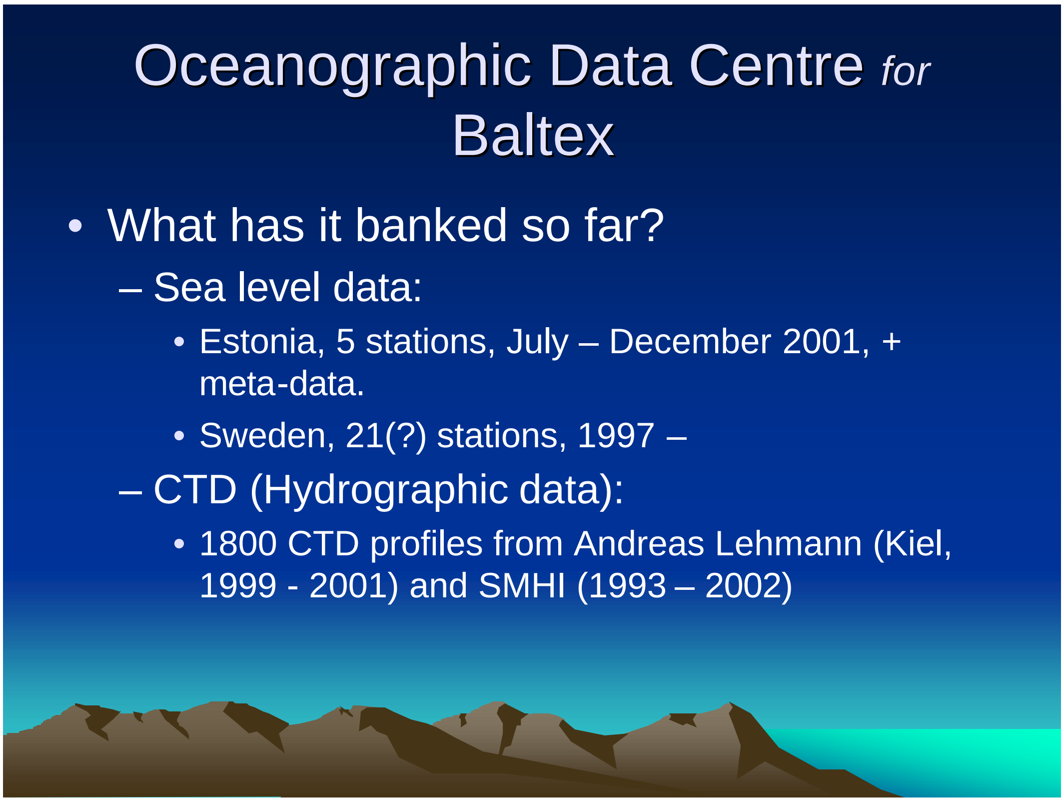
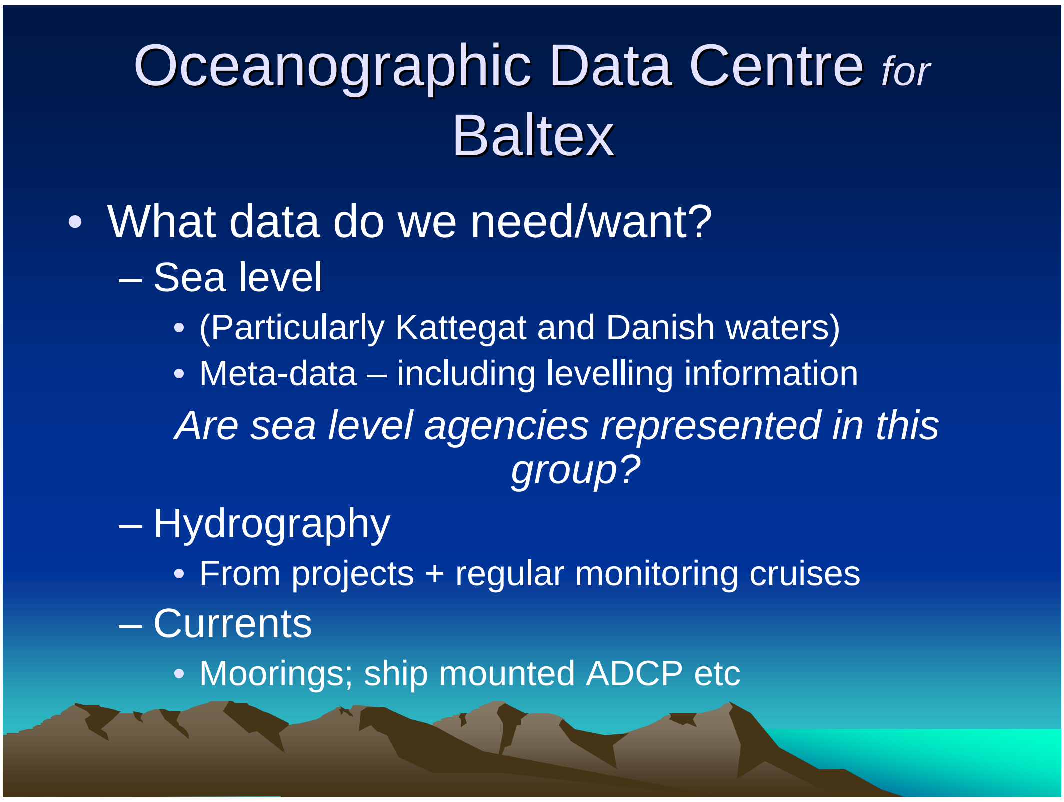
Appendix 5: Report of the Oceanographic Data Centre for BALTEX

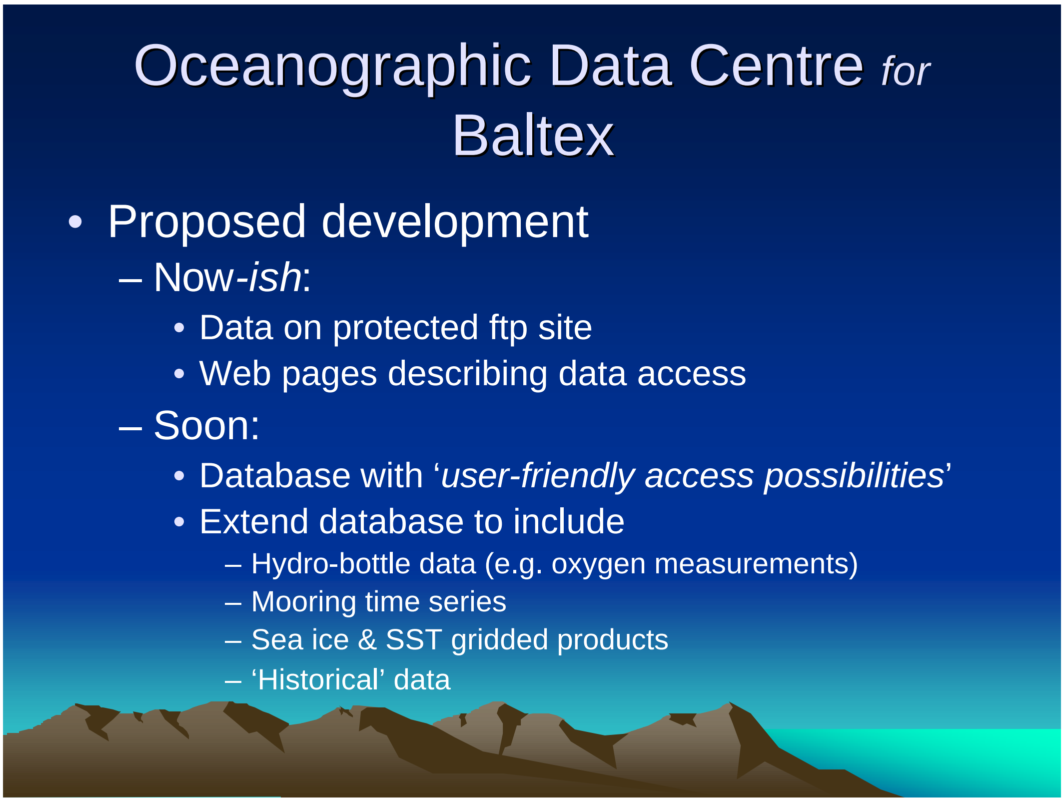





Oceanographic Data Centre *for* Baltex
• Data availability
– 'Standard' BALTEX Data Exchange Policy:
• Using ODCB data requires user registration
• Data are supplied *to* the ODCB free of charge, and are supplied *by* the ODCB free of charge
• Data users only use data for scientific (non commercial) studies designed to meet BALTEX objectives
• Data transfer to third parties is prohibited
• The data origin is acknowledged in publications
• Co-authorship on papers using data is encouraged


Oceanographic Data Centre *for* Baltex
• What has it banked so far?
– Sea level data:
• Estonia, 5 stations, July – December 2001, + meta-data.
• Sweden, 21(?) stations, 1997 –
– CTD (Hydrographic data):
• 1800 CTD profiles from Andreas Lehmann (Kiel, 1999 - 2001) and SMHI (1993 – 2002)


Oceanographic Data Centre *for* Baltex
• What data do we need/want?
– Sea level
• (Particularly Kattegat and Danish waters)
• Meta-data – including levelling information
Are sea level agencies represented in this group?
– Hydrography
• From projects + regular monitoring cruises
– Currents
• Moorings; ship mounted ADCP etc


Oceanographic Data Centre *for* Baltex
• Proposed development
– Now-*ish*:
• Data on protected ftp site
• Web pages describing data access
– Soon:
• Database with '*user-friendly access possibilities*'
• Extend database to include
– Hydro-bottle data (e.g. oxygen measurements)
– Mooring time series
– Sea ice & SST gridded products
– 'Historical' data

International BALTEX Secretariat Publication Series
ISSN 1681-6471

No. 1: Minutes of First Meeting of the BALTEX Science Steering Group at GKSS Research Center in Geesthacht, Germany, 16-17 May, 1994. August 1994

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No. 11: Second Study Conference on BALTEX, Juliusruh, Island of Rügen, Germany, 25-29 May 1998. Conference Proceedings. Editors: E. Raschke and H.-J. Isemer. May 1998, 251 pages

No. 12: Minutes of 7th Meeting of the BALTEX Science Steering Group at Hotel Aquamaris in Juliusruh, Island of RÜGEN, Germany, 26 May 1998. November 1998

No. 13: Minutes of 6th Meeting of the BALTEX Science Steering Group at Danish Meteorological Institute in Copenhagen, Denmark, 2-4 March 1998. January 1999

No. 14: BALTEX – BASIS Data Report 1998. Editor: Jouko Launiainen, 96 pages. March 1999.

No. 15: Minutes of 8th Meeting of the Science Steering Group at Stockholm University in Stockholm, Sweden, 8-10 December 1998. May 1999

No. 16: Minutes of 9th Meeting of the BALTEX Science Steering Group at Finnish Meteorological Institute in Helsinki, Finland, 19-20 May 1999. July 1999

No. 17: Parameterization of surface fluxes, atmospheric planetary boundary layer and ocean mixed layer turbulence for BRIDGE – What can we learn from field experiments? Editor: Nils Gustafsson. April 2000

No. 18: Minutes of the 10th Meeting of the BALTEX Science Steering Group in Warsaw, Poland, 7-9 February 2000. April 2000

No. 19: BALTEX-BASIS: Final Report, Editors: Jouko Launiainen and Timo Vihma. May 2001

No. 20: Third Study Conference on BALTEX, Mariehamn, Island of Åland, Finland, 2-6 July 2001, Conference Proceedings. Editor: Jens Meywerk, 264 pages. July 2001

No. 21: Minutes of 11th Meeting of the BALTEX Science Steering Group at Max-Planck-Institute for Meteorology in Hamburg, Germany, 13-14 November 2000. July 2001

No. 22: Minutes of 12th Meeting of the BALTEX Science Steering Group held at Royal Netherlands Meteorological Institute (KNMI), De Bilt, The Netherlands, 12-14 November 2001. April 2002

No. 23: Minutes of 13th Meeting of the BALTEX Science Steering Group held at Estonian Business School (EBS), Centre for Baltic Studies, Tallinn, Estonia, 17-19 June 2002. September 2002

No. 24: The eight BALTIMOS Field Experiments 1998-2001. Field Reports and Examples of Measurements. Editors: Burghard Brümmer, Gerd Müller, David Schröder, Amélie Kirchgäßner, Jouko Launiainen, Timo Vihma. April 2003, 138 pages.

No. 25: Minutes of 14th Meeting of the BALTEX Science Steering Group held at Lund University, Department of Physical Geography and Ecosystems Analysis, Lund, Sweden, 18 - 20 November 2002. May 2003

Copies are available upon request from the International BALTEX Secretariat.