Minutes of

22nd Meeting of the BALTEX Science Steering Group

held at

Swedish Meteorological and Hydrological Institute
Norrköping, Sweden

23 - 25 January 2008

Edited by

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and
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Participants of the 22nd BALTEX Science Steering Group Meeting, Norrköping, from left to right: Valery Vuglinsky, Ryhor Chekan, Andreas Lehmann, Jüri Elken, Marcus Reckermann, Piotr Kowalczak, Jan Piechura, Anders Omstedt, Benjamin Smith, Bernd Schneider, Timo Vihma, Ole Bøssing Christensen, Phil Graham, Dan Rosbjerg, Franz Berger, Sven-Erik Gryning, Hans-Jörg Isemer, Joakim Langner.

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Supplementary material to these minutes are available online at
www.baltex-research.eu/supplementary/

Summary of Decisions

DECISION 1: Ryhor Chekan, Head of the Department of Hydrology at the Republican Hydrometeorological Centre of Belarus, Minsk, was approved as new BSSG member.

DECISION 2: The revised Terms of Reference for the BALTEX Working Group on BALTIC GRID were approved by the BSSG.

Summary of Action Items

Action Item 1 to the BALTEX Working Group on Data Management to continue to report on relevant and reliable data sets for BALTEX research and, together with the BALTEX Secretariat, make them available on the BALTEX web site.

Action Item 2 to Marcus Reckermann and the BALTEX Secretariat to prepare a draft version of a *BALTEX website for the public* and make it available to BSSG members for review.

Action Item 3 to all BSSG members and Working Group members to contribute to the contents of the *BALTEX website for the public* in terms of texts on BALTEX objectives and results written in a style understandable to non-professionals, including material like animations, video clips, images and figures.

Action Item 4 to BSSG chairs to complete the official BSSG membership approval procedure for the three new proposed candidate members Juha-Markku Leppänen, Andris Andrusaitis and Janusz Pepkowiak and inform the candidates accordingly.

Action Item 5 to the BALTEX Working Group on BACC II to monitor how the recently released BACC book is being taken up by the research and stakeholder communities and to collect information and publications relevant for BACC II.

Action Item 6 to the BALTEX Secretariat to monitor the press resonance to the BACC book, and to keep an inventory of new publications and initiatives which are relevant for the scope of BACC II.

Action Item 7 to BSSG chairs to propose a suitable format for BALTEX Phase II activity reports.

Action Item 8 to the BALTEX Working Group on Regional Climate Models and the BALTEX Secretariat to prepare for a workshop on coupling regional climate models with marine and terrestrial biogeochemical and ecosystem models.

Action Item 9 to the BALTEX Working Group on Regional Climate Models and the BALTEX Secretariat to prepare for a workshop on Regional Climate Modelling in Lund in 2009.

Action Item 10 to the BALTEX Secretariat to prepare for a summer school in 2009 in cooperation with EurOceans.

Action Item 11 to the BALTEX Secretariat to start preparations for the 6th BALTEX Study Conference in 2010.

Introduction

The 22nd meeting of the BALTEX Science Steering Group (BSSG) was held on 24 and 25 January 2008 at the Swedish Meteorological and Hydrological Institute (SMHI) in Norrköping, Sweden. On 23 January, a workshop was held on the "Utility of Regional Climate Models". The workshop was the start-up event of the new BALTEX Working Group on the Utility of Regional Climate Models (RCM), chaired by Markus Meier of SMHI.

BALTEX Workshop on the Utility of Regional Climate Models

The workshop was attended by more than 50 scientists from Sweden, Germany, Denmark, Poland, Estonia, Russia and Belarus. This demonstrated the wide resonance in the research community and the interest in the key objective of the new BALTEX Working Group on the Utility of Regional Climate Models, namely to infer added value from regional climate models as compared to global climate models.

The presentations demonstrated the state of the art in regional climate modelling in Northern Europe, with examples from SMHI´s Rossby Centre, and from recent international projects like PRUDENCE and ENSEMBLES and other international initiatives like CEOP/GEWEX and ERAMESAN. Added value for RCMs was demonstrated by the presentations focussing on coupling wave physics to RCMs, on the use for hydrological applications, and particularly on coupling marine and terrestrial biogeochemical models to RCMs.

A lively discussion evolved around the question what the added value of RCMs are and could be. The improved coupling of different components of the Earth system into the RCMs was considered be a challenge for the future. The integration of biogeochemical processes into RCMs was shown to be a good example in the attempt to arrive at a regional Earth System Model. This was demonstrated by the fact that 3 presentations dealt with the extension of RCMs to biogeochemical (resp. ecological) processes. The presentations given at the workshop as well as general information on the BALTEX Working Group on the Utility of Climate Models can be viewed at *www.baltex-research.eu/organisation/bwg_rcm.htm*.
The workshop agenda is available in Appendix 1.

BALTEX Science Steering Group meeting

Opening and welcome

The deputy director general of the Swedish Meteorological and Hydrological Institute (SMHI), Mr Tord Kvick, welcomed the BSSG to Norrköping. He confirmed the long-term commitment of SMHI to BALTEX and stressed the importance of research cooperation around the Baltic Sea in order to improve decision support to combat pressing environmental problems. Joakim Langner, chairman of the BALTEX Science Steering Group and host of the meeting, gave a short overview over SMHI´s research activities. 14 BSSG members were present at this meeting (Appendix 2).

TOPIC 1: Organisatorial issues

1.1 Approval of the agenda

The agenda for the 22nd BSSG meeting was unanimously approved (Appendix 3).

1.2 Approval of the previous BALTEX SSG meeting minutes

The minutes of the 21th BSSG meeting were unanimously approved.

1.3 Review of previous BALTEX SSG meeting Action Items

Action Items of BSSG #20 and #21 were reviewed. Most action items could be considered settled; however, Action Items 2-5 of BSSG #20 (the establishment of a "web catalogue" of available links to useable data bases, and the definition of data needs for BALTEX projects) were further discussed. Data bases presently accessible via the BALTEX web site were shortly reviewed. The need for good long term physical but also biogeochemical data sets for model development and validation was stressed once again. Also, re-analysis data sets should be made available.

Action Item 1 to the BALTEX Working Group on Data Management to continue to report on relevant and reliable data sets for BALTEX research and, together with the BALTEX Secretariat, make them available on the BALTEX web site.

A further topic discussed shortly was the establishment of an additional BALTEX web site dedicated to inform non-professionals on the objectives and results of the BALTEX program as part of the dissemination activities within BALTEX (Action Items #14 and #15 of the BSSG #20 minutes). The preparation of this *BALTEX web site for the general public* has made considerable progress but has not been completed yet. A first version of this web site will be made available to BSSG members for approval via the existing BALTEX web site as soon as possible.

Action Item 2 to Marcus Reckermann and the BALTEX Secretariat to prepare a draft version of a *BALTEX website for the public* and make it available to BSSG members for review.

Action Item 3 to all BSSG members and Working Group members to contribute to the contents of the *BALTEX website for the public* in terms of texts on BALTEX objectives and results written in a style understandable to non-professionals, including material like animations, video clips, images and figures.

1.4 BALTEX SSG and Working Group membership changes

Changes in BSSG membership were announced. **Andris Leitass,** Head of the Latvian Hydrometeorological Agency, and **Aad van Ulden**, KNMI, the Netherlands, had indicated their wish to resign from the BSSG. The group noticed these wishes with regret and thanked both former members for their contribution to the steering process of BALTEX. **Jan Piechura** announced his wish to withdraw from the BSSG for the next BSSG meeting and proposed a follow-up member, see below.

The following new members were proposed to the BSSG:

Ryhor Chekan of the Ministry of Natural Resources and Environmental Protection of Belarus, Minsk, had been proposed as new BSSG member from Belarus by Joakim Langner to succeed Ivan Skouratovitch. This nomination including Dr Chekan's CV had been made available to BSSG members prior to this meeting. His membership was approved by the BSSG.

DECISION 1: Ryhor Chekan, Head of the Department of Hydrology at the Republican Hydrometeorological Centre of Belarus, Minsk, was approved as new BSSG member.

Jan Piechura proposed **Janusz Pempkowiak**, Deputy Director of the Institute of Oceanology of the Polish Academy of Sciences, as his successor to the BSSG.

Andris Andrusaitis, Professor at the University of Latvia in Riga, and Chairman of Department of Hydrobiology, was proposed by Joakim Langner as new BSSG member from Latvia.

Juha-Markku Leppänen, Director of the Programme for the State of the Baltic Sea and Glbal Change in the Finnish Institute for Marine Research in Helsinki, was proposed by Timo Vihma as new BSSG member.

CVs of these candidates were made available to BSSG members. With these potential new members, expertises across the different BALTEX Phase II objectives would be fairly evenly balanced. Any further nominations should take this balance into account. Following the BSSG membership rules, the formal decision on approval of the nominees was made conditional upon receipt of the complete CVs of all three proposed members by all BSSG members. If no objections will be voiced by BSSG members, the membership of the proposed candidates shall be approved by the BSSG chair and vice-chairs.

Action Item 4 to BSSG chairs to complete the official BSSG membership approval procedure for three new proposed candidate members Juha-Markku Leppänen, Andris Andrusaitis and Janusz Pempkowiak and inform the candidates accordingly.

Furthermore, Jörgen Nilsson announced his wish to step back from the chairmanship of the BALTEX Working Group on Data Management (BWGD). He will remain a Working Group member. Jörgen proposed **Michael Lautenschlager** of the World Data Center for Climate (WDCC) at Max-Planck-Institute for Meteorology as new chairman of BWGD. This was acknowledged by the BSSG.

TOPIC 2: Status of BALTEX Phase II Implementation and Achievements

2.1 Report of the BSSG Chairman (J. Langner)

Joakim Langner gave a short overview on BALTEX activities in the past year. The most prominent BALTEX event in 2007 was the 5th Study Conference on BALTEX in Kuressaare, Estonia. The conference was considered a success, with more than 140 participants and about 120 both oral and poster presentations given covering all BALTEX objectives. SIDA, the Swedish Agency for International Development Cooperation, paid the travel expenses for 10 young researchers. Presenters were invited to submit their presentation as papers to Boreal Environment Research (BER), who will publish a Special Issue on the 5th Study Conference on BALTEX. This special issue is presently in work, and 26 papers were submitted. Publication can be expected in late 2008/early 2009. Another large effort in 2007 was the finalization of the BACC project ("Assessment of Climate Change for the Baltic Sea basin"), and the publication as text book in January 2008 (see Secretariat Report, Item 2.3).

With Jüri Elken, Phil Graham, Benjamin Smith, Bernd Schneider and Michael Lautenschlager, five new members joined the BSSG in 2007. The BSSG thus gained

additional expertise in the fields of oceanography, hydrology, terrestrial ecology, marine chemistry and data management.

For the first BONUS call in 2007, three BALTEX Letters of Intent (stage 1 proposals) were submitted:

- COFFEX (Coastal and Offshore Exchange Processes), Coordinator: Andreas Lehmann, IfM-GEOMAR
- ECOSUPPORT (Advanced modelling framework for scenarios of the Baltic Sea ecosystem to support decision making), Coordinator: Markus Meier, SMHI
- BALTIC-C (Building predictive capability regarding the Baltic Sea organic/inorganic carbon and oxygen systems), Coordinator: Anders Omstedt, Göteborg University

The outcome of this first round is expected in the middle of March 2008. BONUS provided a short statistics on the submitted material: Altogether 149 Letters of Intent were submitted, with a total number of 928 participants asking for a total of roughly 190 Mio €. Available funds, on the other hand, amount to 23.3 Mio €.

Note to the protocol: Both the ECOSUPPORT and the BALTIC-C proposals have meanwhile been positively evaluated and elected for establishing a full proposal to be submitted by mid-April 2008.

2.2 Working Group Reports (WG Chairs)

a. Working Group on BACC II (H.-J. Isemer for H. von Storch)

Hans-Jörg Isemer reported on the publication of the BACC (BALTEX Assessment of Climate Change for the Baltic Sea Basin) book, which is a major achievement of BALTEX Phase II. Following the press releases in German and English, there were numerous articles in German web and print publications, and also TV presentations including interviews with Hans von Storch. All in all, the press resonance in Germany was overwhelmingly large. Press resonance was reported also from Sweden, Estonia, and Latvia.

With the publication of the BACC book, the BACC Steering Group has now officially been dissolved. As has been decided at the recent BSSG meeting, BACC will continue (with the present acronym BACC II) and a new Working Group on BACC II was installed to continue the BACC assessment efforts and to organize an updated assessment report to be published in about 2012. Furthermore, the “old” and the “new” BACC groups are asked to monitor how the recently released BACC book is being taken up by the research and stakeholder communities and the public; the evaluation and analysis of such feedbacks should contribute to an improvement of the new report.

Action Item 5 to the BALTEX Working Group on BACC II to monitor how the recently released BACC book is being taken up by the research and stakeholder communities and to collect information and publications relevant for BACC II.

Action Item 6 to the BALTEX Secretariat to monitor the press resonance to the BACC book, and to keep an inventory of new publications and initiatives which are relevant for the scope of BACC II.

b. Working Group on BALTIC GRID (Andreas Lehmann)

Andreas Lehmann presented revised Terms of Reference for the WG. He reported on the meeting of the Working Group with interested researchers at the BALTEX Study Conference on Saaremaa, Estonia. At this meeting, Daniela Jacob and Andreas Lehmann explained the intentions of the BALTIC GRID, namly to bring together experts from different research fields and make results of model runs available to them. To realize this, regular workshops/seminars with different users are envisaged. The new WG on BALTIC GRID and the revised Terms of Reference (see Appendix 4) were approved by the BSSG.

DECISION 2: The revised Terms of Reference for the BALTEX Working Group on BALTIC GRID was approved by the BSSG.

c. Working Group on Radar (J. Langner for J. Koistinen)

Joakim Langner gave a short report on the status of the WG on Radar. Discussions to include weather radars from Russia, Belarus and Latvia to the BALTRAD Network are progressing. Valery Vuglinsky announced a small meeting in spring 2008 with participants from the new contributors to the radar network, and the BALTEX Working Group on Data Management.

d. Working Group on Data Management (M. Reckermann for J. Nilsson)

Marcus Reckermann summarized activities of the BALTEX Working Group on Data Management (BWDM), based on the report Jörgen Nilsson had provided (see Appendix 5)

e. Working Group on RCMs (O.B. Christensen for M. Meier)

The BALTEX Workshop on the Utility of Regional Climate Models, held at SMHI on 23 January 2008, was the start-up event of the BALTEX Working Group on the Utility of Regional Climate Models (RCM), chaired by Markus Meier (SMHI, Sweden). The workshop was considered a successful event, providing a good momentum for the new BALTEX WG (see above).

A main delivery of the WG will be a report on the Utility of Regional Climate Models by 2010. An international workshop, entitled "21st Century Challenges in Regional Climate Modelling" is scheduled to take place in Lund, Sweden in 2009, and the organizers of this workshop have agreed to run the planned workshop also under the umbrella of BALTEX The scheduled workshop will therefore be a major milestone of the WG. The BALTEX Secretariat offered its support in organizing this event. The next meeting of the WG-RCM will be on 23 September 2008 in Hamburg.

All BALTEX Working Groups now have their own pages on the BALTEX web site (*www.baltex-research.eu/organisation/bwg.html*). These pages can be used as communication platform, and chairs are encouraged to contact the BALTEX Secretariat for changes and updates to be included at the web site.

2.3 Report of the BALTEX Secretariat (H.-J. Isemer)

Hans-Jörg gave an overview over the BALTEX Secretariat´s activities in 2007. This is shortly summarized here.

5th Study Conference on BALTEX
A major event in 2007 was the 5th Study Conference on BALTEX in Kuressaare on the Estonian island Saaremaa. Preparation and wrap-up of the conference absorbed the Secretariat for much of the first half of the year. The preparation of the Special Issue on the 5th Study Conference on BALTEX in Boreal Environment Research (BER) involved the receipt of 26 manuscripts, checking for formal requirements, and the en-suite delivery to the BER subject editor on 5 October 2007. The entire review process including all communication between BER and the authors is being organized by BER. The latest information we have received to date (February 2008) is that the first round of reviews has been largely completed. A publication of the Special Issue can be expected either in late 2008 or in early 2009.

The BACC book
The second large project which the Secretariat was involved in was the editing and preparation of the BACC book, from the raw manuscripts and the review process to the print-ready file which was delivered to Springer, and finally the preparation of press releases and the managing of the press contacts. Copies of the published book were finally sent out to all authors and directly involved individuals by the Secretariat.

The BACC project has been a success and represents a major delivery of Objectives 2, 5 and 6 of BALTEX Phase II, with certain sections of the book also contributing to Objectives 1, 2 and 4. The BACC report was used by a major stakeholder in the Baltic Sea region, the Baltic Marine Environment Protection Commission, HELCOM. This was acknowledged as a fruitful dialogue between science and policy. The entire BACC process started in September 2004 and was terminated with the publication of the book in January 2008. The BACC process is currently being planned to be adopted by various projects all over the globe (e.g. Bohai and Yellow Sea, Laptev Sea, Hamburg Region) as it represents an important regional complement to the global IPCC reports. The BALTEX Working Group on BACC II envisages the preparation of an updated climate assessment report for the Baltic Sea Basin in 2012, again in close collaboration with HELCOM (see Item 2.2).

Other activities

CEOP/GEWEX issues
A re-organization of GHP, the *GEWEX Hydrometeorological Panel* took place in 2007. GHP merged into a new CEOP, which is now the *Coordinated Energy and Water Cycle Observations Project*. It encompasses the former *Continental Scale Experiments*, now *Regional Hydroclimate Projects* (such as BALTEX), regional studies (high altitudes, monsoon, polar, and semi-arid), cross-cutting studies (water and energy budget WEBS, extremes, aerosols, stable isotopes), and several modelling studies (global models, land surface models, regional models including ICTS (Intercontinental Transferability Study), and the GEWEX Modelling and Prediction Panel. A draft Strategic Implementation Plan (SIP) for the new CEOP has been established in 2007 to be presented to the GEWEX SSG meeting in early 2008. BALTEX is represented in the RHP section of CEOP by Hans-Jörg Isemer. Further agreed-upon contributions are the lead in the ICTS study (Burkhardt Rockel, GKSS) and nominated participation by Ole Bössing Christensen and Hans von Storch in the Extremes Study. Following the objectives of the new Baltic Grid Working Group, future BALTEX representation in the WEBS group should be through members to the Baltic-Grid WG.

Links to other programmes
The preparation of a joint summer school in 2009 and possibly a workshop in 2008 together with EurOceans was started in late 2007. The further preparation of these events will be organized by the Secretariat.

The well-established cooperation with HELCOM is planned to be continued and even strengthened through HELCOM participation in the future BACC II Working Group. A HELCOM representative has already been identified and approved.

A presentation on BACC was given at the final conference of the ASTRA (Developing Policies and Adaptation Strategies to Climate Change in the Baltic Sea Region) project in Helsinki in December 2007 by Hans-Jörg Isemer.

New BALTEX web site
The BALTEX web site was completely refurbished in April 2007. The original structure was largely maintained and complemented with new elements. The service character for Working Groups and ongoing projects like BACC and BALTIC GRID was reinforced, while maintaining a comprehensive structure and easy navigation. The BALTEX web site is increasingly to be used as communication and information platform for the BALTEX scientific community.

A new web site with the focus on explaining BALTEX research to the public is currently being established.

Inventory of biogeochemical models on BALTEX web site
In order to endorse a better communication and collaboration between the physical and biogeochemical modelling communities, a survey on ongoing biogeochemical modelling activities in the Baltic Sea area has been initiated by the Secretariat. Based on personal contacts and internet research, 75 scientists in the Baltic Sea basin were addressed and asked to fill in a questionnaire, in which the model should be described in a general manner. The results of this survey are available on the BALTEX web site (*www.baltex-research.eu/projects/survey_bgcm.html*). The models are ordered alphabetically according to their acronyms, and the linked pdf files contain summary information on the model as well as contacts and web links.

BALTEX Newsletter #10
In October 2007, the BALTEX Newsletter #10 was published.

Funding of the BALTEX Secretariat
Hans-Jörg closed his report by recalling that the Secretariat is entirely and exclusively been financed by the GKSS Research Centre Geesthacht GmbH including staff salaries for Marcus Reckermann (full-time), Silke Köppen and Hans-Jörg (part-time) and other costs including travel, printing and consumables. The total expenses for the Secretariat in 2007 amounted to almost 150 k€.

In the name of the entire BSSG, the Chairman expressed his gratitude to the Secretariat staff members for their essential contributions to the BALTEX program and in particular to GKSS for making the work of the Secretariat as a key management tool for BALTEX possible by providing the financial background for the Secretariat.

2.4 National Reports

National reports for Belarus (by Ryhor Chekan, page 30), Denmark (Dan Rosbjerg, page 32), Estonia, Latvia and Lithuania (Jüri Elken, page 33), Finland (Timo Vihma, page 37), Germany (Andreas Lehmann, page 39), Poland (Jan Piechura, page 41), Russia (Valery Vuglinsky, page 43), and Sweden (Anders Omstedt, page 44) were presented. The detailed national reports are available in Appendix 6; supplementary material is available at *www.baltex-research.eu/supplementary/*).

Following the presentations, a discussion evolved around the question whether the so far chosen format of *national* reports is the appropriate means of summarizing BALTEX achievements at BSSG meetings. A suggestion was to substitute the national reports by subject (i.e. objective) based review presentations. This would imply a dedicated preparation beforehand by expert in the field, but might provide a better scientific overview over the actual state of the art in BALTEX research than national reports. The BSSG chair and vice-chairs were asked to propose a suitable format for the forthcoming BSSG meeting.

Action Item 7 to BSSG chairs to propose a suitable format for BALTEX Phase II activity reports.

TOPIC 3: The future of BALTEX

3.1 Summary assessment of achievements for BALTEX Phase II (H.-J. Isemer)

This summary makes reference to both the BALTEX Phase II Science Plan (BALTEX 2004[1]) and the BALTEX Phase II Implementation Strategy (BALTEX 2006). A particular step forward in BALTEX (2006)[2] was the prioritization of the science objectives by defining Potential Activities (PA) for each objective (overall 29) and the definition of 16 GEWEX-related milestones for objectives 1 to 3. It is on the one hand based on peer-reviewed publications, papers presented at the 4th and 5th Study Conferences on BALTEX and on themes covered by recently submitted papers, and on other visible activities such as research projects, collaborations, workshops and other events.

Publication record
Of the 80 peer-reviewed BALTEX publications since 2004, which could be attributed to one of the 4 BALTEX Phase II objectives, the vast majority are alluding to objective 1 (54) and 2 (19), only a minority of 7 publications deal mainly with water management issues (objective 3) and no publication addresses air and water quality issues (objective 4). Within **Objective 1 (Energy and Water Cycles)**, no or very few publications address potential activities 1.3, 1.4 and 1.5, although in particular 1.3 (Closing the Energy and Water Budget on a High Level of Confidence) is on the program's agenda since its very beginning. It is also noteworthy that 24 publications, although having a clear focus on objective 1, cannot easily be attributed to a specific potential activity. Given the fact that **Climate Change and Variability (Objective 2)** is a new objective in BALTEX Phase II, the number of 19 publications is encouraging and potential activity 2.4 (Assessment of climate changes) has published a comprehensive book in January 2008. On the other hand, only 7 publications contributing to **Objective 3 (Water**

[1] BALTEX (2004) Science Plan for BALTEX Phase II 2003–2012. International BALTEX Secretariat Publication 28, 43 pages.
[2] BALTEX (2006) BALTEX Phase II 2003 – 2012 Science Framework and Implementation Strategy. International BALTEX Secretariat Publication 34, 95 pages.

Management) have been released. No publication has been reported in the area of **Objective 4**; however, water and air quality is a totally new area in BALTEX phase II, beyond the GEWEX profile and objectives of phase I of the program.

A comparison of the themes covered in poster and oral presentations given at the 4th (2004) with those at the 5th BALTEX Study Conference (2007) may be indicative of 1) how the science community has adopted the new BALTEX Phase II objectives, and/or 2) how these objectives are attributed with the BALTEX programme. The percentage of submitted conference papers dealing with objectives 2 to 4 (new BALTEX Phase II themes) increased from 32% in 2004 to 73% in 2007. The distribution of papers to objectives 1 to 4 is uneven with strongest focus on objective 2 (climate, 36%), and weakest on objective 3 (water management, 16%).

The respective contribution of the 26 papers submitted to a special journal issue of Boreal Environment Research (BER) dedicated to the 5th Study Conference for BALTEX (2007) reflects the paper contribution distribution at the Conference, with a dominating part of papers related to objective 2. Particularly satisfying are 7 submitted papers dealing with objective 4 (air and water quality) where 3 of the 4 relevant potential activities are covered by these papers.

BALTEX projects
9 individual ongoing projects are documented on the BALTEX web site (disregarding BACC and BALTIC GRID). Four of those allude to objective 1, three to objective 3, none to objective 3 and two projects to objective 4. The distribution of these projects is fairly even; however, *no project related to objective 3* is noteworthy.

7 of these 9 projects are under leadership or with participation of only two BALTEX SSG members (A. Omstedt, T. Vihma). Based on these project identifications it seems clear that this imbalance is due to an uneven documentation or identification of currently running projects as "BALTEX projects". It is therefore urgently suggested to address again all BALTEX SSG members to complete the list of identified BALTEX projects, and, subsequently, to address the wider BALTEX community to further identify projects which contribute to meeting BALTEX Phase II objectives. A definition of what a "BALTEX project" is, and what the benefits of the "BALTEX label" are, should be communicated in a better way (see below).

Three BALTEX proposals (COFFEX, BALTIC-C, and ECCOSUPPORT) were recently submitted to the first stage call of the new BONUS programme. With respect to BALTEX Phase II objectives, all proposals seem to contribute to more than one objective, and all appear to address Objective 4, while Objectives 2 and also 1 (in this order) are partly addressed. Objective 3 seems not to be alluded to in either of the proposals.

BALTEX Phase II Objectives
Below, a brief analysis of the potential activities (PAs) defined in the "BALTEX Phase II Science Framework and Implementation Strategy" (2006), and their implementation as to date, is given.

Objective 1 is, briefly stated, the follow-up of BALTEX Phase I. The wished focus on potential activities is however at present only partially in place. Many (24 out of 54) of the peer-reviewed publications can hardly be attached to one of the PAs (Table 3) and the remaining publications are almost all contributing to PA1.1 and PA1.2. In particular, PA1.1

and 1.2 seem to enjoy considerable attention in the community and may be considered successful parts of the BALTEX Phase II program. However, PA1.3, PA1.4 and PA1.5 have no or very few publications and related activities seem still to be scarce.

Objective 2 has developed rapidly and successfully. The recent 5th BALTEX Conference saw the majority of papers related to Objective 2. For PA2.4 ("Assessment of climate change"), a comprehensive book (BACC) was published in January 2008 with contributions of more than 80 authors from 13 countries. With the related cooperation with HELCOM, BALTEX has successfully set up links to one relevant stakeholder community (see also Objective 6 further below). From a strategic point of view, it appears that "Climate change in the Baltic Sea Basin" may be a core theme, which BALTEX has started to occupy at the international level in northern Europe.

Objective 3. Hydrological applications are not new to BALTEX, however, BALTEX publications and conference papers have been scarce on this subject. Objective 3 deals with different facets and aspects of "water management" and cooperation with related stakeholders and decision-makers, but a clear and distinct definition of "water management" seems to be lacking in BALTEX (2006). It appears that decisions related to management of river basins (such as *e.g.* reservoir dimensions, flood protection measures and the like) are taken at local, regional or national levels at best. Thus, BALTEX may be faced with a scale mismatch between the research dimension so far mainly addressed in BALTEX (this being basically of continental dimension), and the needs of decision makers (this being of river basin scale, local to regional). Numerous regional and national projects dedicated to particular river catchments, sub-catchments, lagoons and the like are on going, however, almost none of them relate their work to BALTEX. It needs to be critically assessed which potential benefits and input BALTEX may offer (and is indeed offering) to decision makers, or more generally, to projects targeted to local or regional issues in the field of water management.

Objective 4 has opened up an entirely new dimension of research compared to both Phase I and the mother program GEWEX, and at least partly covers areas of research which have been on the agenda of several other national and international programs and projects in the Baltic Sea region for a long time. Given the above, the appearance of related papers at the 5th Study Conference on BALTEX is encouraging and very positive. It is also noteworthy, that objective 4 is subject of two (out of 9) identified BALTEX projects visible at the BALTEX web site, and all three BALTEX-related proposals submitted to BONUS (see Item 2.1). However, the objectives and achievements of the similar other programs active in this field need to be taken into account to avoid too much overlap. Instead, focus should be put on the unique expertise BALTEX may have to offer (e.g. regional coupled climate modelling).

Objective 5. The outstanding achievement related to this objective is the BACC project, with a dedicated conference involving stakeholders and decision makers in Göteborg in May 2006. In particular, the collaboration with HELCOM can be viewed as a big success and as an example for a successful cooperation between the scientific community and political decision makers. A casual link to the ASTRA project ("Developing Policies and Adaptation Strategies to Climate Change in the Baltic Sea Region") has been established with exchanges of papers at respective conferences (BALTEX in June 2007, ASTRA in December 2007). ASTRA covers in particular sea level variability and change and related coastal zone management topics. In terms of identification of research funding possibilities, the three BONUS proposals are to be mentioned (Item 2.1). Furthermore, there are some FP6 projects, which cover regional aspects of the Baltic Sea basin, and BALTEX is expected to benefit from deliverables and results of such projects (such as ENSEMBLES).

Objective 6. BALTEX themes have been successfully addressed in at least one summer school in 2007. A summer school is currently being planned together with EUROCEANS for 2009. In terms of outreach to the public, the establishment of a web site dedicated to the general public is an ongoing activity at the BALTEX Secretariat. A stronger collaboration with both science experts and individuals from the target group(s) may be needed to establish a useful site for the target groups.

How is a "BALTEX project" defined? Preconditions, benefits and responsibilities

Discussions evolved around the question how a "BALTEX project" is defined. It was stated that for some institutes or research groups, virtually all activities might fall into the framework spanned by the "BALTEX Phase II Science Framework and Implementation Plan". Thus, it was discussed whether a somehow stricter definition should be considered; however, in the light of the absence of a central funding and the nature of BALTEX as open science network, this was considered unrealistic and not feasible.

A "BALTEX project" should be based on a scientific question related to one or more of the BALTEX Phase II objective. The "BALTEX label" should be provided based on scientific quality and relevance to one or more of the BALTEX Phase II objectives. BALTEX should be referred to in the project documentation. The benefits for registering as "BALTEX project" are:

1. *The quality label.* The project is part of a large international research programme with high quality standards;
2. *Publicity and discussion platform.* A project description and details are accessible through the BALTEX web site; interested scientists can directly contact the project representatives.
3. *Access to BALTEX data bases*.

Details are available on the BALTEX web site at www.baltex-research.eu/participate.html.

3.2 Future development of BALTEX Phase II (plenary and breakout groups)

Considering that BALTEX Phase II is entering its second half, a discussion on potentially necessary changes or amendments to BALTEX Phase II objectives, potential activities and milestones was opened. The discussion was also motivated by the fact that the BSSG has undergone quite some changes in its membership during the recent year and new BSSG members have recently suggested several adjustments to the BALTEX Phase II science and implementation plans. Emphasis was on the rational and feasibility of research to be conducted in the final 4 to 5 years of BALTEX Phase II.

The plenary discussion centred on the "identity" of BALTEX. On the one hand it was argued that BALTEX Phase II objectives should stay close to the original GEWEX-based aims, where concern was raised that particularly Objective 4 should not be extended further. On the other hand, the new objectives, especially Objective 2, but also Objective 4, might have the potential to be very successful in merging classical BALTEX science with the new challenges in climate, hydrological and environmental research. Also, it was argued that the relevant questions call for a cross-cutting rather than monothematic approach. Thus, a re-definition of major or minor research goals was considered to be potentially necessary. For this purpose, three breakout groups were established which should come up with a revision of Objective 1,

3 and 4 research goals, potential activities and milestones. The outcome was by no means pre-determined and entirely up to the group; e.g. could span from no changes at all to a complete re-definition of an objective. Objective 2 was excluded as it was considered well under way, with no obvious needs for modifications at this time.

The breakout groups reviewed and, as appropriate, re-formulated the objectives, goals and potential activities (PAs). Rapporteurs' draft protocols of the analyses of the breakout groups are to be found in Appendix 7.

3.3 Conclusions, suggestions and decisions

The BSSG re-convened to plenary in the morning of the last meeting day and summarized major findings and conclusions as follows: A partial revision of the "BALTEX Phase II Science Framework and Implementation Strategy" (2006) seems to be advisable, considering the changes and amendments proposed by the breakout groups. The documentation of this revision will be decided on later; possibly it will be an amendment document to be attached to the original document which will be available via the BALTEX web site.

Three potential major BALTEX events are expected to take place in 2008 and 2009:

1. A **workshop** is envisaged in the latter half of 2008, intending to bridge the scopes of Objectives 2 and 4, with the aim to bring together the **regional climate modelling community** with the **marine and terrestrial biogeochemical modelling** communities to foster an integrative approach to assess climate change impacts on the marine and terrestrial environments of the Baltic Sea basin. Venue, date and scope of the workshop, as well as co-organizers will have to be identified as soon as possible.

Action Item 8 to the BALTEX Working Group on Regional Climate Models and the BALTEX Secretariat to prepare for a workshop on coupling regional climate models with marine and terrestrial biogeochemical and ecosystem models.

2. A **workshop** on **Regional Climate Modelling** is planned to take place in Lund, Sweden, in 2009, as a follow-up event to a similar workshop conducted in Lund earlier in 2004. Exact time and scope will be discussed and a first announcement will be prepared by the WG-RCM (see item 2.2) and published by summer 2008.

Action Item 9 to the BALTEX Working Group on Regional Climate Models and the BALTEX Secretariat to prepare for a workshop on Regional Climate Modelling in Lund in 2009.

3. A **summer school** on the **impact of climate change on ecosystems** is envisaged in collaboration with EurOceans, the FP6 funded European Network of Excellence for Ocean Ecosystems Analysis This summer school would bring together the modelling expertise of BALTEX (regional climate modelling) and of EurOceans (ecosystem modelling in the Baltic Sea). Suggested venue is Bornholm, with DTU Aqua (National Institute of Aquatic Resources of Technical University of Denmark), and the Fishnet Danish Network of Fisheries and Aquaculture Research acting as local organizers. Suggested time slot is the second half of August 2009, for a duration of 8-10 days. A list of topics and potential lecturers is to be drafted still in February 2008. Lecturers may be asked to prepare their lecture notes in a way that they can be published as comprehensive text book. The workshop mentioned above under 1. could serve as a preparatory event for the summer school.

Action Item 10 to the BALTEX Secretariat to prepare for a summer school in 2009 in cooperation with EurOceans.

3.4 BALTEX Study Conference in 2010

Marcus Reckermann summarized available information on the suggested venue for the next BALTEX Study Conference. In the attempt to follow the BALTEX tradition to have BALTEX Study Conferences on islands in the Baltic Sea, while keeping a geographical balance, the Polish island *Wolin* was proposed as conference site. Internet research revealed that there are sufficient facilities for a conference of size and duration similar to the previous BALTEX Conferences, both in terms of conference facilities and hotels of different categories. The holiday resort *Międzyzdroje* seems to be a suitable location. Travel is not problematic; Międzyzdroje can be reached by car, train or ferry (via Swinoujscie, just 10km from Międzyzdroje); closest international airports are Szczecin/Goleniow (65km) or Berlin (250km), both conveniently connected to Międzyzdroje by public transportation.

Jan Piechura agreed to act as local organizer, irrespective of his status in the BSSG (he had announced his wish to retire from the BSSG, see item 1.4). Jan and the Secretariat will meet in Międzyzdroje this spring to examine the potential location of the 6th Study Conference on BALTEX in 2010. A final decision on the venue shall be taken after this visit, at the latest in the autumn of 2008.

Action Item 11 to the BALTEX Secretariat to start preparations for the 6th BALTEX Study Conference in 2010

Presentations on BALTEX-related projects

Mistra-SWECIA – Swedish Research programme on Climate, Impacts and Adaptation *(Markku Rummukainen)*
Markku Rummukainen presented the Swedish research programme on adaptation to climate change "SWECIA". The national Swedish research programme, with a duration from 2008-2011, follows an interdisciplinary concept: it aims at coupling climate and economic research and modelling as well as impacts and decision making in a consistent and comprehensive framework for analyses on a global, regional and local scale. A presentation is available at *www.baltex-research.eu/supplementary*/.

HYDROLARE, the "International Data Centre on the hydrology of lakes and reservoirs" *(Valery Vuglinsky)*
Valery Vuglinsky gave an overview presentation of HYDROLARE the "International Centre on the Hydrology of Lakes and Reservoirs". This data centre was installed at the State Hydrological Institute in St. Petersburg by ROSHYDROMET (Russian Federal Service for Hydrometeorology and Environmental Monitoring) and works under the auspecies of WMO. A first meeting of the Steering Committee was held in St. Petersburg on 14-15 June 2007. Objectives of HYDROLARE are the establishment, development and regular update of international database on hydrological regime of lakes and reservoirs in order to stimulate the development of the global monitoring system on lakes and reservoirs for rational use, the preservation and management of their water resources, to improve the knowledge of lateral fluxes transformation within lakes and reservoirs, and to supply data for scientific and

educational purposes, modelling, and the development of different global and regional projects/programmes. A presentation is available at *www.baltex-research.eu/supplementary/*.

GRUAN, the GCOS Reference Upper Air Network *(Franz Berger)*
Franz Berger presented GRUAN, the GCOS Reference Upper Air Network. GRUAN represents a network for atmospheric reference sites for high quality climate observations. GRUAN will be part of a system of networks to which both the GCOS Upper-Air-Network (GUAN) and the WMO Global Observing System (GOS) belong. The German Weather Service (DWD) will host a GRUAN Lead Centre at its Meteorological Observatory Lindenberg – Richard-Aßmann-Observatory for training, education and detailed quality control. A presentation is available at *www.baltex-research.eu/supplementary/*.

Date and place of the next BSSG meeting (BSSG #23)

The next BSSG (#23) will take place at the Finnish Meteorological Institute (FMI), on 12-14 January 2009. Timo Vihma will act as host.

Any other business

None.

Acronyms and Abbreviations

AR4	4th Assessment Report of the IPCC
ASTRA	Developing Policies and Adaptation Strategies to Climate Change in the Baltic Sea Region
ATMI	Department of Atmospheric Environment of DTU
BACC	BALTEX Assessment of Climate Change for the Baltic Sea basin
BALTEX	The Baltic Sea Experiment
BALTIC GRID	A network to share expertise and data in BALTEX
BALTIMOS	BALTEX Integral Model System
BALTRAD	BALTEX Radar Network
BER	Boreal Environment Research
BONUS	BONUS Network for the Baltic Sea Science - Network of Funding Agencies
BRIDGE	The Main BALTEX Experiment 1999-2001
BSSC	Baltic Sea Science Congress
BSSG	BALTEX Science Steering Group
BWG	BALTEX Working Group
BWGD	BALTEX Working Group on Data Management
CEOP	Coordinated Energy and Water Cycle Observation Project
CLISAP	Integrated Climate System Analysis and Prediction
DAAD	German Academic Exchange Service
DFG	German Research Foundation
DKRZ	German Climate Computing Centre
DOC	Dissolved Organic Carbon
DTU	Danish Technical University
DWD	German Weather Service
ECOMET	Economic Interest Grouping of the National Meteorological Services of the European Economic Area
ECSN	European Climate Support Network
ENSEMBLES	Ensemble prediction systems for climate change (an FP6 project)
EPA	Environmental Protection Agency
ERAMESAN	2D meso-scale re-analysis of precipitation, temperature and wind over Europe (at SMHI)
EUMETNET	Network of European Meteorological Services
EUROCEANS	European Network of Excellence for Ocean Ecosystems Analysis (an FP6 project)
FMI	Finnish Meteorological Institute
FP6	6th Framework Programme of the EU
GCM	Global Climate Model
GCOS	Global Climate Observing System
GEWEX	Global Energy and Water Cycle Experiment
GHP	GEWEX Hydrometeorology Panel
GKSS	GKSS Research Centre in Geesthacht, Germany
GOS	Global Obervation System
GRUAN	GCOS Reference Upper Air Network
GUAN	GCOS Upper Air Network
HELCOM	Baltic Marine Environment Protection Commission
HYDROLARE	International Centre on the Hydrology of Lakes and Reservoirs
ICTS	Intercontinental Transferability Study
IPCC	Intergovernmental Panel on Climate Change
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
KNMI	Royal Netherlands Meteorological Institute
Mistra-SWECIA	Swedish Research Programme on Climate, Impacts and Adaptation
MOL-RAO	Meteorological Observatory Lindenberg – Richard Aßmann Observatory of the DWD
MPI-M	Max Planck Institute for Meteorology
PA	Potential Activity
PRUDENCE	Prediction of regional scenarios and uncertainties for defining european climate change risks and effects
RCAO	Rossby Centre Regional Atmosphere-Ocean Model
RCM	Regional Climate Model
ROSHYDROMET	Russian Federal Service for Hydrometeorologyand Environmental Monitoring
SIDA	Swedish International Development Cooperation Agency
SINCOS	Sinking Coasts - Geosphere, Ecosphere and Anthroposphere of the Holocene Southern Baltic Sea
SIP	Strategic Implementation Plan
SMHI	Swedish Meteorological and Hydrological Institute
SSG	Science Steering Group
UKMO	UK Meteorological Office
WDCC	World Data Centre for Climate
WEBS	Water and Energy Budgets
WMO	World Meteorological Organisation
WP	Work Package

Appendix 1: Agenda of the 1st BALTEX Workshop on the Utility of Regional Climate Models

BALTEX Workshop:
Utility of Regional Climate Models

at

Swedish Meteorological and Hydrological Institute

Norrköping, Sweden
23 January 2008
Chair and Organisation: Markus Meier (SMHI)

The workshop is the start-up event of the recently approved new BALTEX Working Group on the Utility of Regional Climate Models (RCM), chaired by Markus Meier (SMHI, Sweden). It is being held in conjunction with the 22nd BALTEX Science Steering Group meeting. The workshop is open to interested participants. The new Working Group will address a number of topics including

1) dynamical downscaling of Global Climate Models (GCMs),
2) regional reanalyses utilizing data assimilation schemes,
3) sampling network design,
4) supply hypotheses, among others guiding detection and attribution studies,
5) test dynamical hypotheses.

A key objective of this new working group is how to infer added value by studying the above topics with RCMs instead of using a global model framework or statistical analysis of observational evidence derived from a network.

Workshop schedule: Speakers and Presentation Titles

13.30 Erik Kjellström and Lars Bärring
Swedish Meteorological and Hydrological Institute, Norrköping, Sweden
Status of dynamical downscaling at the Rossby Centre and future plans

13.50 Philip Lorenz
Max-Planck-Institute for Meteorology, Hamburg, Germany
Regional climate change simulations from Ensembles

14.10 Burkhardt Rockel
GKSS-Research Centre Geesthacht, Germany
The Inter-Continental Transferability Study as part of CEOP/GEWEX

14.30 Ole Bøssing Christensen
Danish Meteorological Institute, Copenhagen, Denmark
Validation and model weighting for PRUDENCE and ENSEMBLES simulations

14.50 Daniela Jacob
Max-Planck-Institute for Meteorology, Hamburg, Germany
From regional climate models to regional system models for the Baltic Sea and its drainage basin

15.10 Leif Klemedtsson
Göteborg University, Göteborg, Sweden
Tellus: The Centre of Earth System Science at Göteborg University

15.30 *Coffee break*

16.00 Johan Andreasson
Swedish Meteorological and Hydrological Institute, Norrköping, Sweden
On the need of dynamical downscaling for hydrological applications

16.20 Markus Meier
Swedish Meteorological and Hydrological Institute, Norrköping, Sweden
Scenarios of the Baltic Sea ecosystem calculated with a regional climate model

16.40 Benjamin Smith
Lund University, Lund, Sweden
Land surface dynamics and biogeochemistry in RCMs: state of art and future prospects

17.00 Anna Rutgersson-Owenius
Uppsala University, Uppsala, Sweden
A coupled wave-atmosphere RCM

17.20 Anna Jansson and Christer Persson
Swedish Meteorological and Hydrological Institute, Norrköping, Sweden
Meso-scale reanalysis of precipitation, temperature and wind over Europe – First attempt based on ERAMESAN and an outlook for future initiatives

17.40 Discussion

18.30 Food and refreshments on the SMHI premises

Appendix 2: Participants of the 22nd BSSG meeting

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Appendix 3: Agenda of the 22nd BSSG meeting

22nd BALTEX SSG Meeting

Hosted by
Swedish Meteorological and Hydrological Institute (SMHI)

Norrköping, Sweden

23 – 25 January 2008

PROVISIONAL AGENDA AND EXPLANATORY MEMORANDUM
(as of 22 January 2008)

The BSSG meeting will start with a **Workshop on the Utility of Regional Climate Models** scheduled to take place on Wednesday afternoon, 23 January 2008. The **business part of the BSSG meeting** will begin in the morning of Thursday, 24 January (Day 2 of the meeting) and is scheduled to be concluded early afternoon on Friday 25 January 2008. The key topic of this meeting is to discuss and decide on possible updates of the BALTEX Phase II science and implementation plans published in 2004 and 2006, respectively. It is expected to include a summary of achievements during BALTEX Phase II so far (2004 until present) and an assessment of said achievements against the plans as laid down in the science and implementation plans. The meeting will therefore start with a series of reports during the first half day. The second part of Day 2 is planned to continue with discussions on amendments or changes to the BALTEX plans. Day 3 (Friday) is basically expected to continue and conclude the discussions and to take concrete decisions, as appropriate. The structuring elements for both reporting and discussions are the six key objectives for BALTEX Phase II. All reports are expected to be available in written form prior to the meeting in order to keep the oral presentations short and to the point.

Day 1: Wednesday, 23 January 2008

Workshop on the Utility of Regional Climate Models (see separate agenda)

Day 2: Thursday, 24 January 2008

9:00 **Welcome by the host and the Chairman**

TOP 1: Organisational issues
1.1 Approval of the agenda
1.2 Approval of the previous BALTEX SSG meeting minutes
1.3 Review of previous BALTEX SSG meeting action items
1.4 BALTEX SSG and Working Group Membership changes

9:30 **TOP 2: Status of BALTEX Phase II Implementation and Achievements**

2.1 Report of the BSSG Chairman (J. Langner)
(Activities in 2007, including Conference, BER special issue, BONUS activities, cooperation with other programmes)
30 minutes allocated

Break

10:30 **2.2 Working Group Reports** (WG Chairs)

- BACC II (H.-J. Isemer for H. von Storch)
- BALTIC GRID (A. Lehmann)
- Data Management (M. Reckermann for M. Lautenschlager)
- Regional Climate Models (L. Bärring for M. Meier)

Time allocated: 60 minutes

2.3 Report of the BALTEX Secretariat (H.-J. Isemer)
Activities in 2007
Time allocated: 20 minutes

2.4 National Reports
Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Belarus,
Poland, Germany, Denmark
Time allocated: On average 10 minutes per country, about 100 minutes

13:00 **LUNCH**

14:00 **National Reports** *(continued)*

Overview presentation on
Mistra Swedish Research Programme on Climate, Impacts and Adaptation (M. Rummukainen)

Break

15:30 **TOP 3: The Future of BALTEX**

3.1 Summary assessment of achievements

Introduction (J. Langner and H.-J. Isemer)

Discussion
An attempt will be made to critically assess achievements of BALTEX Phase II against the plans formulated in the science and implementation plan. The assessment is expected to be structured according to the six BALTEX Phase II objectives.

3.2 Future development of BALTEX Phase II /
Plenary and breakout groups
Particularly new BSSG members are expected to give their views on how BALTEX Phase II should further develop until 2012. The discussion is

expected to start **in plenary** followed by **breakout group meetings** which may be dedicated to the four science objectives of BALTEX Phase II or to any other useful division. The whole group shall reconvene in plenary prior to concluding Day 2 of the meeting.

18:00 **Closing of Day 2**

Day 3: Friday, 25 January 2007

9:00 **Summary of yesterday's discussion / Plenary**

Day 3 is expected to start with short rapporteurs reports for each of yesterday's breakout groups, thereby highlighting major discussion points and suggestions of the individual breakout groups.

Discussion to be continued in plenary.

11:00 **3.3 Conclusions, suggestions, decisions on the Future of BALTEX Phase II**
This topic is expected to also summarize dates and locations of future BALTEX-related events such as workshops, summer schools and conferences.

12:00 **3.4 BALTEX Conference 2010**: Options for location and date

Date and place of **the next BSSG meeting (BSSG #23)**

Any other business

13:00 **Closing of the BSSG meeting**

Appendix 4: BALTEX Working Group on BALTIC GRID – Terms of Reference

Mission

As a first step to BALTIC GRID, a Working Group on BALTIC GRID has been established to coordinate activities and promote a BALTIC GRID Pilot Study. The basis of the pilot study are model data from the coupled atmosphere-ocean models (RCAO & BALTIMOS) or stand alone model runs which will be made available in cooperation with the BALTEX Working Group on Data management for the members of the BWG-BGRID. These data will serve as nuclei for co-operative research within BALTIC GRID. The intention of the pilot study is to intensively utilize the BALTEX Community Network to initiate the formation of international research groups to start important research within BALTEX Phase II. Furthermore, the research groups will be ideally suited as core groups to initiate funded projects which will be of interest for the EU or other funding agencies

The target period for the pilot study is 1980 to 2006, with special focus on the extended BRIDGE period 1999 to 2006. The target period includes recent extreme inflows to the Baltic Sea, as well as extreme hot summers and flooding. Thus, this period is extraordinarily suited to study variability and trends, as well as extreme events in the Baltic catchment. A synthesis of BALTEX BRIDGE is up to now still missing. With modelled data and corresponding observations including satellite data, a synthesis would be possible including a detailed quantification of the energy and water cycles of the Baltic catchment. The BALTIC GRID Pilot Study should last about 2 years. Participating research groups should take advantage of existing observations and satellite data in conjunction with model simulations of the target period. Thus, data needs will be: model data from process models and coupled atmosphere-land-ocean models, and observations consisting of basic measurements of atmosphere, land and ocean, flux-measurements and satellite data.

Terms of Reference

- maintaining links to the Water and Energy Budget Studies Group (WEBS) in CEOP / GEWEX
- initiating and conducting (interdisciplinary) research within BALTEX Phase II (BONUS+)
- conducting the BALTIC GRID Pilot study; conducting model runs for the target period and deliver data to a data bank system where they are easy accessible by BALTIC GRID members (still in progress)
- initiating resources sharing (expertise, observations including satellite model data) (BONUS+)
- setting up international collaboration with focus on the following research questions (BONUS+):
    - determination of variability and trends of the water and energy budget of the Baltic Sea catchment, including an estimation of uncertainties
    - study of extreme events and their causes
    - quantification of fluxes between atmosphere-land and atmosphere-seaice-ocean, and the exchange between the coastal area and the open Baltic Sea

www.baltex-research.eu/organisation/bwg_grid.html
www.baltex-research.eu/projects/grid.html

Appendix 5: Report of the BALTEX Working Group on Data Management

1. Open seminar at the conference in Estonia
BWDM organized an open seminar at the 5th BALTEX Study Conference. Although it was held in the evening after a long day with presentations, more than 1/3 of the participants attended and the dialog after the lectures were lively. SIDA (the Swedish Agency for International Development Cooperation) provided the travel expenses for a Dutch expert. From BWGD side, the workshop was a success.

2. Acceptance of Max Planck Institute for Meteorology and SMHI/Rossby Centre to provide long datasets from model runs
The Baltex Phase II Science Plan identifies the time period of interest as from 200 years before present to 100 years ahead of now. An important means to create homogeneous and continuous data sets for this 300 years period is through model runs. Both Max Planck Institute for Meteorology and SMHI/Rossby Centre have agreed to provide datasets of that duration.

3. Acceptance of the German Weather Service (DWD) to allow BALTEX researchers to use the UNIDART data portal
EUMETNET (European Network of National Meteorological Services) financed a project called UNIDART (Uniform Data Request Interface for the access to meteorological data and products), which established a direct, password-protected access to observed climate data sets via the Internet. This project was organised by DWD with other countries participating. The project, which officially ended in 2007, created an operational internet-based access to climate data from Germany, Norway, Korea and some data from Finland and Holland. BALTEX researchers can now get access to these data with a password provided by the BALTEX Secretariat following BALTEX rules. However, to date (February 2008), there has been no request by researchers to get access to UNIDART, despite having promoted this possibility at the Data Management meeting at the BALTEX Study Conference in Estonia, June 2007, in the BALTEX Newsletter #10, and on the BALTEX web site.

4. Acceptance from DKRZ to store datasets in their infrastructure
BSSG has decided on a Data Management Plan to be introduced during a "3 step program". In order to store modelled datasets to provide direct access to these data sets, DKRZ has offered to the BALTEX community to use the infrastructure of DKRZ. Financing of a project to finalize this facility is still lacking.

5. Opened discussions with Russia and Belarus to include weather radars to the BALTEX Radar Network
The BALTRAD weather radar network has an almost complete data coverage over Sweden, Finland, Denmark, Estonia, Latvia and parts of Norway, but the coverage in the southern and eastern part of the BALTEX region (particularly Lithuania, Poland, Belarus and Russia) is insufficient. Discussions have now started to include radars from Russia and Belarus.

6. Opened discussions with the EUMETNET program "Show case EUROGRID" to get access to its results
"Showcase Eurogrid" is a EUMETNET financed project aiming to produce high quality gridded datasets for climate parameters with high resolution. The project is well under way and the results will be made available to BALTEX researchers.

7. Data Policy development in ECOMET
ECOMET is an Economic Interest Group of the National Meteorological Services in Europe and deals with data policy and – exchange of the services. Some of the countries in the Baltic Sea area are members and some of the new EU member states are considering membership. Especially the PSI (Public Sector Information) Directive, the Environmental Data Directive and the newly introduced INSPIRE Directive have been discussed.

8. Development of the WMO Information System (WIS)
WIS is a major system for meteorological and climate data all over the globe and is planned for direct access by accepted users. The system is also discussed to be a basic component in the GEO data system. UNIDART and the EU funded project SIMDAT (Data grids for process and product development using numerical simulation and knowledge discovery) are two possible systems forming WIS. The use of data from these systems will probably follow Resolution 40 and Resolution 25 of the WMO Congress. WIS is in a planning and testing phase.

9. INSPIRE Directive
The directive is taken by the European Parliament and under way to be included in national laws of all EU countries. It is expected that comprehensive work constructing metadata and computer programmes handling metadata will be necessary.

10. Development in the EUMETNET program INSPIMET
Some meteorological services are concerned with the risk of running two similar data management systems creating double costs. To follow the development and to give advice, EUMETNET has started a project called INSPIMET under the lead of UKMO. One idea is to see if WIS can satisfy the demands of the INSPIRE Directive.

11. Preparation work for a "Work Package" to finance the implementation of the "three step approach" to the Data Management Plan decided by BSSG
It is not likely that a Data Management project for BALTEX can be funded as a stand alone activity in an EU funded project, but more likely as a WP together with other, more research oriented, WPs forming a joint proposal. The ideas of forming such a work package have just started to evolve.

12. BONUS excluded "Theme 8" from their call
In the original plans for the BONUS call, there were 8 themes. Theme 8 involved "joint infrastructure" and could have been a possible way to finance the BALTEX Data Management system. Unfortunately, Theme 8 was excluded from the call.

13. INTERREG VI Baltic Sea Region
We are now looking at the INTERREG IV BSR (Baltic Sea Region) programme as a possible financing source for WPs, both for Data Management and a possible WP on Radar (see #5). The call is expected in February, at the earliest.

www.baltex-research.eu/organisation/bwgd.html

Appendix 6: National Reports

A. Belarus

The state institution "Republic Hydrometeorological Center" of the Department of Hydrometeorology of the Ministry of the Natural Resources and Environmental Protection is responsible for providing regular observations for hydrometeororlogical elements under the WMO programme. The second task is to carry out the analysis of the materials from observing stations for providing with trustworthy information about changes which occur in the system "atmosphere-surface-water" within the territory of Belarus. The state institution "Republic Center of Radiation Control and Environmental Monitoring" of the Department of Hydrometeorology of the Ministry of the Natural Resources and Environmental Protection is responsible for providing of observation for contamination of air, water, soil and precipitation.

Republic Belarus joined to the Baltic Sea Experiment in 1993. The main task of the republic as a participant of the Baltex was to prepare and transfer of the materials from observing stations without participation in the process of the analysis and generalization. Within the framework of Baltex Phase I the Republic Hydrometeorological Center took part in the projects dialed with gaining information for the model building and model testing.

The territory of Belarus is situated in the South-West of the Baltic Sea basin. The watershed of the Baltic and Black Seas divides the territory of Belarus into two almost equal parts. 43% or 89 thousands square kilometers belong to the Baltic Sea basin.

Belarus participated in the Baltic Sea Experiment since 1993. The following tasks have been carried out:

- preparation of the main hydrometeorological parameters around the territory of Belarus in network points for the numerical model within the Baltic Sea basin;
- preparation current meteorological and hydrological information for target period and information for previous period;
- metadata have been prepared;
- participation in the Baltex conferences have been taken.

The following information have been prepared and transferred to the Baltex Data Centers:

- discharges for the period 1980-1994 by 15 observing stations, 1995-1997 by 48 stations, 1998-2000 by 1 station;
- data of surface meteorological observations (temperature, precipitation, pressure) for three-hour terms for the period 1980-2000;
- half day sum of precipitation by 58 stations for the period 1980-1986 and by 60 stations for the period 1987-2000;
- data of solar radiometry by 1-3 stations for the period 1980-2000;
- ten-day data of water supply in soil in the depth of 0-20 sm, 0-50 sm, 0-100 sm for the period 1980-2000;
- five-day data of evapotranspiration from soil and growth by 1-3 stations for the period 1980-2000;
- data of snow depth by 21 station for the period 1986-2000;
- soil temperature in the depth by 5 station for the period 1999-2000.

With the beginning Baltex Phase II in 2003 Republic of Belarus is interested in the continuation of the Baltic Sea Experiment. More over we are interested to improve the cooperation with members of the Baltex. Republic Hydrometeorological Center would like to participate more actively in the Baltex projects that mean not only preparing of the information sources but further generalization and analysis of the information to include the results of investigations in the total report. Republic

Hydrometeorological Center has a high qualified stuff, computer techniques, resources of information and facilities to use them.

Specialists of the Republic Hydrometeorological Center are ready to carry out following types of work: creation and completing of data bases with all kinds of hydrometeorological information around Belarus part of Baltic Sea basin, statistical data manipulation for research and applied purposes, generalization and analysis of information, testing numerical models using the data form observing stations in Baltic Sea basin within the territory of Belarus.

After close examination with Baltic Grid project and its sub-projects Republic Hydrometeorological Center and Republic Center of Radiation Control and Environmental Monitoring would like participate in BALTIC GRID Pilot Study (SP BRIDGE, SP Großwetterlagen and Extreme Events) and BACC: Assessment of Climate Change for the Baltic Sea Basin.

The observation for streamflow are carried out on 48 stream-gaging stations in Belarus part of Baltic Sea basin. There are 18 precipitation station and 3 evaporation stations.

Water resources of Baltic Sea basin within Belarus are formed from the Zapadnaya Dvina, Neman, and Narev river basins and average about 26 cubic kilometers. The flow-out in the neighboring countries average 13.9 cubic kilometers in Latvia by the Zapadnaya Dvina river, 9 cubic kilometers in Lithuania by the Neman and Viliya, 3.1 cubic kilometers in Poland by the Zapadny Bug and Narev.

Precipitation dynamic during last decades is characterized by difficult distribution. In the Belarus part of Baltic Sea basin the increasing of precipitation is registered during last 15 years. The most significant increase has been recorded in January, June, August, and October. The precipitation increase is higher in the North of Belarus in comparison with other part of republic. The precipitation decrease is characterized for September.

Evaporation from water surface for May-October is low in Baltic Sea basin in comparison with other part of Belarus. Seasonal dynamic of evaporation corresponds to the dynamic of the main meteorological parameters in Belarus – air temperature, moisture and solar radiation. The maximal year values evaporation usually reaches in June-July. The dynamic is characterized by slow increasing since May to June or July and slow decreasing to October. Evaporation from water surface in the Belarus part of Baltic Sea basin average 418-450 mm during observing season (May-October) for longstanding period. During last decades the decreasing of evaporation is registered. It is explained by increasing of precipitation and decreasing of wind speed. It should be noted that observation for evaporation from water surface is carrying out with evaporator GGI-3000. It is necessary an additional calculations to count real values of evaporation from water surface.

SP Großwetterlagen and Extreme Events (Forcing and Response)
Climatic and hydrological investigations became more active in Belarus in the last decades. It is caused by climate warming and by intensifying of its extremes in our country. However, previous research in this field has been limited due to the lack of data for analysis and generalization. The changes have regional peculiarities in the Belarus part of Baltic Sea basin. During target period 1999-2005 the greatest quantity of dangerous hydrometeorological phenomena have been observed in 1999. The most destructive of them have been observed in 2005. During last decades there is not tendency of increasing of quantity dangerous hydrometeorological phenomena in the Belarus part of Baltic Sea basin.

A supplementary presentation is available at *www.baltex-research.eu/supplementary/*.

B. Denmark

RISØ – DTU activity report January 2008

Bonus letters of interest:
Participation in COFFEX (Andreas Lehman).

Ship track: Measurements of N-deposition from ship traffic in the Baltic Sea (Hongisto, FMI).

Grundforskningsfonden:
Application for an investigation of CO_2 (air/sea interaction, deposition and release) in coastal areas – including the Baltic Sea (Lotte Sørensen).

ATMI:
Participation in Baltic Nest. Develop and use of models for management of the environmental, fishing and economy for the Baltic Sea. (*www.dmu.dk/Vand/BNI/*). There is a long lasting cooperation with MIUU (Uppsala University) on air/sea exchange. At the moment ALvaro is developing an air/sea exchange module for a coupled model.

GALATHEA:
Investigation of air/sea exchange of CO_2 in coastal areas, including upwelling zones. Measurements in ice covered areas (Greenland).

Høvsøre test site:
Investigation of wind profiles in a coastal area.

HYACINTS
HYdrological Modelling for **A**ssessing **C**limate Change **I**mpacts at differe**NT** **S**cales (**HYACINTS**) will develop new methodologies and tools to enable easier and more accurate use of regional scale climate and hydrological models to address local scale water resources problems. A new fully dynamic coupling exploiting OpenMI technology will be established between the climate model code HIRHAM and the distributed physically based hydrological model code MIKE SHE. Based on the coupled model system, an integrated climate-hydrological model for the entire Denmark will be established by combining the regional climate model HIRHAM and the national hydrological model (DK model). As part of the coupling a statistical downscaling and bias correction method will be developed for conversion of data from large (25 km) climate grids to small (e.g. 1 km) hydrological grids. Remote sensing data and techniques will be utilised and further developed with respect to assessing and downscaling of global precipitation datasets in mountainous areas where precipitation is controlled by orographic effects. In order to facilitate downscaling of hydrological models from regional models (e.g. the existing DK model) to local scale models with more detailed geological and topographical resolution, improved grid refinement methods will be developed. Furthermore, improved methods will be developed for handling complex geological environments when changing model scale. The total uncertainty in hydrological change predictions taking all sources of uncertainty into account will be assessed and an improved methodology for assessing the effects of geological uncertainty will be developed.

HYACINTS has 12 partners: two universities, two research institutes, one GTS institute, one SME research and consulting company, one large consulting company, three water companies from the largest cities in Denmark and two Environment Centres. The overall objectives are to establish improved tools and methodologies for assessing effects of climate change on water resources at both regional and local scales and to test these on cases relevant for the water supply sector in Denmark and for an international case relevant for export of Danish water resources management expertise. The specific scientific objectives are:

- To make a full dynamic coupling of a climate model code (HIRHAM) and a distributed
- physically based hydrological model code (MIKE SHE).

- To further develop precipitation downscaling and bias correction methods when converting
- climate model results to hydrological model inputs.
- To develop grid refinement methods for hydrological models and methodologies for optimal conceptualisation, simulation and downscaling of complex geological environments.
- To develop new methods for estimation of precipitation from remote sensing data, particularly aimed at mountainous regions with poor data coverage.
- To establish a coupled climate-hydrological model for the entire Denmark based on the regional climate model HIRHAM and the MIKE SHE based national hydrological model (DK-model) and to assess the hydrological change at local scale at selected cases.
- To assess the uncertainties related to prediction of climate change effects on water resources at local scale, including all sources of uncertainty (climate scenarios, model structure, geological interpretations, model parameters and adaptation strategies).

The presentation on HYACINTS is available at *www.baltex-research.eu/supplementary/*;
see also *www.baltex-research.eu/projects/hyacints.html*.

C. Estonia

Report of the Estonian activities in the BALTEX Phase II Implementation (2007)
compiled by Jüri Elken and Sirje Keevallik, Marine Systems Institute at TUT

De facto involved institutions:

Department of Environmental Engineering, Tallinn Technical University
Department of Environmental Physics, University of Tartu
Estonian Marine Institute, University of Tartu
Estonian Meteorological and Hydrological Institute
Institute of Cybernetics, Tallinn University of Technology
Institute of Ecology, Tallinn University
Limnology Centre, Estonian University of Life Sciences
Marine Systems Institute, Tallinn University of Technology
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Further:
Publication records taken from: *www.etis.ee* Estonian Research Portal. Acknowledgment to BALTEX are shown only rarely.

1. Better understanding of the energy and water cycles over the Baltic Sea basin

Study topics: Processes related to upwelling, their impact on SST, air-sea and nutrient fluxes [7, 8, 9, 10, 14, 16], coastal wind fields [1, 12], ice deformation [2], waves [6], currents [10, 15], precipitation [11, 13]. Development of nonhydrostatic weather forecast model [3, 4, 5].

Peer-reviewed papers

1. Keevallik, Sirje; Soomere, Tarmo; Pärg, Riina; Žukova, Veera (2007). Outlook for wind measurement at Estonian automatic weather stations. Proceedings of the Estonian Academy of Sciences. Engineering, 13(3), 234 - 251.
2. Pärn, Ove; Haapala, Jari; Kõuts, Tarmo; Elken, Jüri; Riska, Kaj (2007). On the relationship between sea ice deformation and ship damages in the Gulf of Finland in winter 2003. Proceedings of the Estonian Academy of Sciences. Engineering, 13(3), 201 - 214.
3. Rõõm, R.; Männik, A.; Luhamaa, A. (2007). Nonhydrostatic semi-elastic hybrid-coordinate SISL extension of HIRLAM. Part I: Numerical scheme . Tellus Series A-Dynamic Meteorology and Oceanography, 59(5), 650 - 660.
4. Rõõm, R.; Männik, A.; Luhamaa, A. (2007). Nonhydrostatic semi-elastic hybrid-coordinate SISL extension of HIRLAM. Part II: Numerical testing. Tellus Series A-Dynamic Meteorology and Oceanography, 59(5), 661 - 673.
5. Rõõm, R.; Zirk, M. (2007). An Efficient Solution Method for Buoyancy-Wave Equation at Variable Wind and Temperature . Monthly Weather Review, 135(10), 3633 - 3641.
6. Soomere, Tarmo; Zaitseva, Inga (2007). Estimates of wave climate in the northern Baltic Proper derived from visual wave observations at Vilsandi. Proceedings of the Estonian Academy of Sciences. Engineering, 13(1), 48 - 64.
7. Suursaar, Ü.; Aps, R. (2007). Spatio-temporal variations in hydro-physical and -chemical parameters during a major upwelling event off the southern coast of the Gulf of Finland in summer 2006. Oceanologia, 49(2), 209 - 228.
8. Uiboupin, Rivo; Sipelgas, Liis (2007). Comparison of satellite sea surface temperature with in situ surface layer temperature. Proceedings of the Estonian Academy of Sciences. Biology, Ecology, 56(1), 47 - 56.
9. Zhurbas, Victor; Laanemets, Jaan; Vahtera, Emil (2007). Modeling of the mesoscale structure of coupled upwelling/downwelling events and the related input of nutrients to the upper mixed layer in the Gulf of Finland, Baltic Sea . Journal of Geophysical Research [accepted]

5th BALTEX Conference presentations

10. Recent Advances in the Physical Oceanography of the Gulf of Finland. Kai Myrberg, T. Soomere, M. Leppäranta, A. Nekrasov (p. 19)
11. Precipitation Pattern in the Baltic Sea Drainage Basin and its Dependence on Large-Scale Atmospheric Circulation. Jaak Jaagus (p. 31)
12. Examination of Wind Data from Automatic Weather Stations. Sirje Keevallik, T. Soomere (p. 121)
13. Relationships between Extreme Daily Rainfall in Estonia and Atmospheric Circulation. Piia Post (p. 127)
14. Upwelling Parameters Derived from Satellite Sea Surface Temperature Data in the Gulf of Finland. Jaan Laanemets, R. Uiboupin (p. 137)
15. On the Quasi-Steady Current along the Northern Slope of the Gulf of Finland. Juss Pavelson, T. Huttula, U. Lips, K. Myrberg (p. 142)
16. Estimation of Lateral Mixing in the Gulf of Finland Caused by Upwelling/Downwelling Squirts. Victor Zhurbas, J. Laanemets (p. 150)

2. Analysis of climate variability and change since 1800 and provision of regional climate projections over the Baltic Sea basin for the 21st century

Study topics: Changes of wind fields and air pressure [17, 23, 26], sea level [19, 24], ice [22], waves [25], river discharge [20], aerosols [21], coastal zone system [19], impact on fish stocks [28].

Peer-reviewed papers

1. Jaagus, J., Post, P., Tomingas, O. Changes in storminess on the western coast of Estonia in relation to large-scale atmospheric circulation. Climate Research (accepted).
2. Kont, A.; Endjärv, E.; Jaagus, J.; Lode, E.; Orviku, K.; Ratas, U.; Rivis, R.; Suursaar, Ü.; Tõnisson, H. (2007). Impact of climate change on Estonian coastal and inland wetlands — a summary with new results. Boreal Environment Research, 12, 653 - 671.
3. Kont, A.; Jaagus, J., Aunap, R.; Ratas, U.; Rivis, R. (2008). Implications of Sea-Level Rise for Estonia. Journal of Coastal Research, 24 [accepted]
4. Reihan, A.; Koltsova, T.; Kriauciuniene, J.; Lizuma, L.; Meilutyte-Barauskiene, D. (2007). Changes in water discharges of the Baltic states rivers in the 20th century and its relation to climate change. Nordic Hydrology, 38(4-5), 401 - 412.
5. Russak, V.; Kallis, A.; Jõeveer, A.; Ohvril, H.; Teral, H. (2007). Changes in spectral aerosol optical thickness in Estonia (1951-2004). Proceedings of the Estonian Academy of Sciences. Biology, Ecology, 56(1), 69 - 76.
6. Sooäär, J., Jaagus, J. (2007). Long-term variability and changes in the sea ice regime in the Baltic Sea near the Estonian coast. Proceedings of the Estonian Academy of Sciences. Engineering, 13, 189 - 200.
7. Suursaar, Ü.; Jaagus, J.; Kullas, T. (2007). Recent tendencies in wind storm climatology with implications to storm surge statistics in Estonia. Hernandez, S.; Brebbia, C.A. (Toim.). The Art of Resisting Extreme Natural Forces (41 - 50). Southampton, Boston: WIT Press
8. Suursaar, Ü.; Sooäär, J. (2007). Decadal variations in mean and extreme sea level values along the Estonian coast of the Baltic Sea. Tellus Series A-Dynamic Meteorology and Oceanography, 59(2), 249 - 260.

5th BALTEX Conference presentations

9. Trends, long-term Variations and Extremes of the Northern Baltic Proper Wave Fields. Tarmo Soomere (p. 41)
10. Changes in Frequency and Mean SLP of Cyclones Formed over the Baltic Sea Region. Mait Sepp (p. 167)
11. Simulated Crop Yield – An Indicator of Climate Variability. Triin Saue, J. Kadaja (p. 178)
12. Justification of the First Long-Term Prediction on the Main Environmental Factors and Fish Stocks in the Baltic Estimated after 20 Years. Evald Ojaveer, M. Kalejs (p. 204)

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

Study topics: Extreme events in the coastal zone: coastal damages [29], operational marine forecasts [30].

Peer-reviewed papers

1. Tõnisson, H.; Orviku, K.; Jaagus, J.; Suursaar, Ü.; Kont, A.; Rivis, R. (2007). Coastal Damages on Saaremaa Island, Estonia, Caused by the Extreme Storm and Flooding on January 9, 2005. Journal of Coastal Research [accepted]

5th BALTEX Conference presentations

2. Performance of the Operational HIROMB Model in Relation to the Oceanographic Extreme Events and Seasonal Fluxes in the Gulfs of Finland and Riga. Jüri Elken, T. Kõuts, U. Lips, U. Raudseoo, P. Lagemaa, T. Liblik (p. 77)

4. Gradual extension of BALTEX methodologies to air and water quality studies

Study topics: Ecosystem modelling in Baltic Sea coastal zone [31, 32, 36], small bays [34], large lakes [33], bog [35].

Peer-reviewed papers

1. Lessin, Gennadi; Lips, Inga; Raudsepp, Urmas (2007). Modelling the nitrogen and phosphorus limitation on phytoplankton growth in Narva Bay, south-eastern Gulf of Finland. Oceanologia, 49(2), 259 - 276.
2. Lessin, G.; Raudsepp, U. (2007). Modelling the spatial distribution of phytoplankton and inorganic nitrogen in Narva Bay, southeastern Gulf of Finland, in the biologically active period. Ecological Modelling, 348 - 358.
3. Nõges, T.; Järvet, A.; K., Anu; Laugaste, R.; Loigu, E.; Skakalski, B.; Nõges, P. (2007). Reaction of large and shallow lakes Peipsi and Võrtsjärv to the changes of nutrient loading. Hydrobiologia, 584, 253 - 264.

5th BALTEX Conference presentations

4. Coastal Zone Management in Haapsalu Bay Area, Estonia. Arvo Iital, K. Vilta, E. Loigu, K. Roosalu (p. 85)
5. Impact of Anthropogenic Airborne Nutrients to the Bog Ecosystem in the Eastern Baltic Sea Basin. Marko Kaasik, T. Ploompuu, E. Meier, Ü. Sõukand, H. Kaasik, T. Alliksaar, J. Ivask, R. Ots (p. 95)
6. High Resolution Atmosphere-Sea Hydro-Ecological Modelling in the Coastal Zone. Rein Tamsalu, V. Zalesny, R. Rõõm, R. Aps (p. 99)

Some Latvian BALTEX activities in 2007

Contributing BACC authors

Agrita Briede
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5th BALTEX Conference presentations

1. Air Mass Seasonality and Winter Season Cold Air Masses in Latvia

Anita Draveniece
Latvian Academy of Sciences

2. The Application of the Conceptual Model Metq2006 for the River Iecava Basin as Case Study in Latvia

Ansis Ziverts[1], Anda Bakute[2] and Elga Apsite[3]
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[2] Obervational Network Department, Latvian Environment, geology and meteorology agency,
[3]Faculty of Geographical and Earth Sciences, University of Latvia,

3. River Discharge Regime in Latvia in Respect to Climate Variability

Maris Klavins and Valery Rodinov
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4. Climate Change Impacts on the Total Annual Rivers' Runoff Distribution in Latvia

Elga Apsīte, Līva Širiņa and Anda Bakute
Faculty of Geographical and Earth Sciences, University of Latvia,

5. Storm Surges in the South Coast of the Gulf of Riga

Tatjana Koltsova and Jelena Belakova
Latvian Environment, Geology and Meteorology Agency

6. Participation of Ventspils City Council in the Project „Coastal Zone Management in the Baltic Sea Region / COASTMAN"

Ilga Zīlniece, Tatjana Valdmane and Ineta Kraule
Ventspils City Council,

7. Changes of Flows of Major Dissolved Substances from Territory of Latvia

Ilga Kokorite, Maris Klavins and Valery Rodinov
University of Latvia, Department of Environmental Sciences

8. Classification of the Water Quality for Nutrients in Agricultural Runoff.

Ainis Lagzdiņš, Viesturs Jansons and Kaspars Abramenko
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Some Lithuanian BALTEX activities in 2007

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Egidijus Rimkus
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5th BALTEX Conference presentations

1. Klaipeda Sea Deepwater Port Development Issue
Olga Belous, Saulius Gulbinskas and Rosita Mileriene
Klaipeda University, Klaipėda, Lithuania

2. Meteorological Features of Spring Flood Formation in Nemunas River
Egidijus Rimkus, Gintautas Stankunavicius, Gintaras Valiuskevicius and Arunas Bukantis
Department of Hydrology and Climatology, Vilnius University,

3. The Dynamics and Protection of the Sea Coasts and Dunes in Lithuania as a Result of Extreme Climate Events (according to ASTRA Project Activities)
Regina Morkunaite[1], Arunas Bukantis[2], Gintas Zilinaskas[1]
[1]Quarternary Research Department, Institute of Geology and Geography, Vilnius, Lithuania
[2]Vilnius University, Department of Hydrology and Climatology, Vilnius, Lithuania

4. Effect of Hydrological Regime and Nutrient Loadings on Lake Zuvintas Eutrophication
Edvinas Stonevicius
Vilnius University, Department of Hydrology and Climatology

D. Finland

Report of Finnish activities in BALTEX Phase II Implementation in 2007

Timo Vihma, Finnish Meteorological Institute
20 January 2008

1. Better understanding of the energy and water cycles over the Baltic Sea basin

The Finnish Meteorological Institute (FMI) has studied precipitation on the basis of radar data analyses and high-resolution numerical modelling. Part of the radar-based research has been carried out in the framework of BALTEX Working Group on Radar. The research has focused on further development of quantitative estimates of areal precipitation with operational methods, and on intensive small-scale precipitation events, which can be much better detected by radar than by a gauge network. In 2007, FMI operated 8 C-band Doppler radars, and delivered 1400 radar products per hour *(radar.fmi.fi)*.

FMI has maintained and further developed the Sodankylä observatory as a CEOP reference site. In 2007, the data was made easily available via the internet at *http://litdb.fmi.fi* .
Sodankylä data will also be continuously delivered to CEOP through its phase 2 in 2007-2010.

FMI has studied the measurement of air humidity using GPS and assimilation of the data to numerical weather prediction (NWP). Other NWP-related research activities include application of Polar MM5 for a cold-air outbreak over the Gulf of Finland, and research on convection, cloud physics and precipitation in HIRLAM and the non-hydrostatic mesoscale model AROME and its follow-up HARMONIE.

Research on snow cover in 2007 has included remote sensing and thermodynamic modeling of snow. Snow emission model development has been made by FMI and the Helsinki University of Technology

(TKK), with validation of snow depth, snow water equivalent, and on-set of snow melt. The Sodankylä-Pallas site has been further developed as a calibration and validation site for remote sensing satellites.

With respect to research of the Baltic Sea ice cover, the Finnish Institute of Marine Research (FIMR) has paid attention to sea ice thickness applying (a) altimeter remote sensing and (b) modeling the dynamic redistribution of ice thickness with validation against helicopter electromagnetic measurements. TKK, FIMR and FMI have modeled snow and ice thermodynamics in the Baltic Sea to improve interpretation of satellite SAR remote sensing of sea ice. FIMR and FMI have collaborated in research on snow and sea ice surface albedo and its effects on sea ice mass balance. Radiative forcing on snow and ice surface during the spring melt period have been studied by the University of Helsinki (UH), FMI, the University of Lapland (UL), and FIMR, with focus on the cloud effects on shortwave and longwave radiation. FIMR has also contributed to observational and modeling studies of brine release, sea ice drift, mixing, and sea ice formation.

Research on the Baltic Sea oceanography has focused on the following topics. Advances in physical oceanography in the Gulf of Finland as well as upwelling in the Baltic Sea have been reviewed by FIMR and UH together with Estonian, Russian and German collaborators. Separate focus has been paid on the quasi-steady current along the northern slope of the Gulf of Finland, with contribution also from the Finnish Environmental Institute (SYKE). FIMR has studied the statistics of surface temperature and salinity variations in the Baltic Sea between Helsinki and Travemünde using ship observations and numerical modeling. UH and FIMR have modeled the major Baltic Sea inflow of 1993.

2. Analysis of climate variability and change since 1800, and provision of regional climate projections over the Baltic Sea basin for the 21st century

Finnish scientists from FMI, FIMR, UH, SYKE and the Universities of Turku and Joensuu (altogether three lead authors and 12 contributing authors) have participated in the finalization of the BACC book.

Together with Russian collaborators FMI has studied the tendencies of seasonal variability of snow storage in conditions of regional climate changes over northern Europe.

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

The radar-based precipitation research, described in Section 1, is linked with development of mesoscale analysis and nowcasting methods using the Local Analysis and Prediction System (laps.noaa.gov) and NWP models, as well as Helsinki Testbed (testbed.fmi.fi) data for validation. The FMI radar and NWP data are used operationally in the Finnish Environmental Institute (SYKE) in river models in the whole Finland. Radar based (urban) flood research and product development have been made through the collaboration of FMI, SYKE, TKK, and private companies. Mesoscale precipitation climatologies have been calculated on the basis of 65 billion radar measurements to calculate new area-time accumulation statistics for hydrological and hydraulic planning.

Climatology of heavy precipitation, prolonged periods with little rain, and annual maximum snow depth have been analysed in FMI based on observations. Monthly precipitation data series were in case of a few stations more than 100 years long. Daily data were available for about 50 years. When constructing scenarios for the future, output both global and regional climate model experiments has been utilized.

4. Gradual extension of BALTEX methodologies to air and water quality studies

FMI participates in the EU COST Action 728, which aims at integration of mesoscale meteorological models (some of them utilized in BALTEX, as mentioned in Section 1) and air pollution and dispersion models.

Methods for assessing the impact of climate change on nutrient flows from catchments have been analysed at the Pirkanmaa Regional Environment Centre. The results for the 2071-2100 period suggest that in June – October, the phosphorus loading will slightly decrease, while in the rest of the year the loading will increase up to 100% depending on the scenario selected.

The drift and dispersion of an oil spill in the Baltic Sea ice season has been analysed in UH, SYKE, and FIMR.

Coupled modeling of thermodynamics and biogeochemistry of snow, snow ice, and sea ice has been initiated in FIMR in collaboration with the University of Bologna. Algea in sea ice is important for the development of summertime algae blooms.

There is much more research in air and water quality in Finland, but traditionally these groups have not belonged to the BALTEX community. Hence, efforts have been made to integrate air and water quality research into BALTEX. For example, a presentation on BALTEX Phase II activities was given at a FMI/FIMR BONUS seminar on 12 June 2008.

5. Strengthened interaction with decision makers, with emphasis on global change impact assessments

To better organize research on aquatic sciences and its funding strategies, the Academy of Finland organized an international evaluation on aquatic sciences in Finland.

With increasing public attention to climate change and its impacts as well as environmental problems in the Baltic Sea, Finnish research institutes and universities have been very active in delivering information and evaluations to decision makers in the government and municipality level.

6. Education and outreach at the international level

An international summer school "Geophysical turbulence and boundary layers: nature, theory and role in Earth's systems" was organized in Helsinki, 28 May – 1 June, 2007. In addition to topics relevant to Section 1, the role of turbulence in ecosystem modelling (Section 4) was also addressed.

E. Germany

BALTEX German National Report BSSG 22nd

Better understanding of the energy and water cycles over the Baltic Sea basin

- IFM-GEOMAR: has contributed by organizing a special session on upwelling in the Baltic Sea at the BSSC in Rostock 2007; two presentations about upwelling, two papers are submitted which will probably be published 2008; DAAD upwelling project with FIMR.
- IFM-GEOMAR: investigation of brine release in the northern Baltic Sea (paper in preparation); investigation of winter water formation (published in 2007); BALTEX Newsletter contribution.
- IFM-GEOMAR: assisted in preparation of BALTEX Study conference, Saaremaa 2007, poster and presentations
- IFM-GEOMAR: Interdisciplinary project group IFM-GEOMAR on tracking the invasive species Mnemiopsis (comb Jelly fish) in the Baltic Sea
- IFM-GEOMAR: COFFEX – BONUS+ proposal
- MOL-RAO: Accomplishment and delivery of complete quality controlled data of the of the BALTEX/CEOP reference site Lindenberg to the CEOP data archive in Boulder. The data sets comprise interim years (between CEOP I and CEOP II) 2005/2006. Lindenberg is one of the first reference sites for which a 4-years data set is available from the CEOP archive. BALTEX climate modeller community can download the data set from the CEOP-CDA or directly from MOL-

RAO. Additionally, MOL-ROA contributed to the discussion of the revision/extension of data sets for CEOP II.
- MOL-RAO: At Lindenberg a 3 month validating measurements campaign of humidity measurements of MetOp-IASI has been organized

Analysis of climate variability and change since 1800, and provision of regional climate projections over the Baltic Sea basin for the 21st century

- GKSS: Coordination scientific leadership and several contributions to BACC; hosting BALTEX secretariat
- GKSS: SINCOS Influence of regional climate drivers (e.g. wind, air pressure. precipitation, temperature) on decadal variations of the water level of the Baltic Sea for the last millennium and for some IPCC scenarios (DFG funded until 2009). Basis is a statistical analysis of observations, empirical climate reconstructions and climate simulations with global climate models.
- GKSS: Detection and attribution on the regional scale
- GKSS: ICTS – Inter-Continental Transferability Study within GEWEX/CEOP. The transferability of regional climate models to other regions (including BALTEX) is studied
- IFM-GEOMAR: BALTEX Newsletter: Warming trend in the Baltic Sea, Long-term variability of Baltic Sea winter water mass formation and the impact on secondary and tertiary production, Hinrichsen et al. 2007.
- IFM-GEOMAR: RECENT – BONUS+ proposal
- WDCC, Models & Data/MPI-M/: contribution to BALTEX working group in Data Management.
- MPI-M (terminated): Accomplishment of regional climate projections in 50 km horizontal resolution (3xA1B, 1xB1, 1xA2) for Europe (1950-2100) and analysis of the hydrological cycle for the Baltic region; accomplishment of regional climate projections in 25 km horizontal resolution for Europe (A1B, 1950-2100); presentations at BALTEX Study Conference, Saaremaa 2007.
- MPI-M (ongoing): Participation in 6 BONUS+ proposals; paper submitted (BER): Future trends and variability of the hydrological cycle in the Baltic Sea region; contact to Interreg/ASTA established; contact to Baltic Sea Solution established.
- MPI-M (planned): Detailed analysis of the hydrological cycle in the 25 km projection for the Baltic region; Analysis of inflow events to the Baltic Sea in the frame of CLISAP (Excellence Cluster HH); accomplishment of climate change projections with BALTIMOS

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

Gradual extension of BALTEX methodologies to air and water quality studies

Strengthened interaction with decision makers, with emphasis on global change impact assessments

- IFM-GEOMAR/IOW: BONUS+ proposals: COFFEX, RECENT and BASMATI

Education and outreach at the international level

- IOW/IFM-GEOMAR: BASMATI – BONUS+ proposal
- IFM-GEOMAR: ALKOR 309, teaching survey into the southern Baltic Sea (Natworking, Future Ocean), students from Norway, Poland and Germany

F. Poland

1. Institute of Oceanology, Polish Academy of Science (IOPAS)

Jan Piechura

6 research cruises by R.V. Oceania were carried out during the period from November 2006 until November 2007. Due to bad weather, the January cruise could not be completed, so there was only one transect in the Bornholm Basin. High resolution transects along the line Gdansk Deep - Slupsk Channel - Bornholm Deep, Bornholm Gate - Arkona Basin was obligatory for each cruise. Depending on weather and time available, additional perpendicular transects in Slupsk Furrow, Bornholm Deep and Gate and Arkona Basin were performed.

Some results

During the reporting period, no major or even middle inflow was observed, and only some short, very weak intrusions were noted in Arkona Basin, Bornholm Gate and Bornholm Deep in autumn 2006 and 2007. Salinity in the Bornholm Gate showed minor inflow of saline bottom water in both Novembers 2006 and 2007 only. January through October, low salinity was recorded. In the Arkona Basin bottom salinity increased significantly in November 2007 only, but temperature increased there already in October 2007, and was high in November as well. In the Bornholm Deep, a warm water intrusion in the intermediate layer in October 2007, still seen in November that year is worth of mentioning. Long term changes of highest bottom salinity in Slupsk Channel show substantial variability, from below 13 (November 2005) to 15 (October 2007), showing a decreasing general trend in 2003-2005, but increasing until October 2007, and decreasing after that. Water circulation and upwelling modelling is done at the Institute of Oceanology.

A presentation on results is available at www.baltex-research.eu/supplementary/.

2. Research Centre for Agricultural and Forest Environment (Polish Academy of Sciences)

Zbigniew Kundzewicz

In 2007, the Research Centre for Agricultural and Forest Environment (Polish Academy of Sciences) was active in three EU projects (ENSEMBLES, ADAM, WATCH) and one Polish integrated project (Extreme meteorological and hydrological events in Poland), with Professor Z.W. Kundzewicz as principal investigator. All these activities are of relevance to BALTEX.

The principal study area is climate change and its impacts, with particular reference to weather-related extremes; both in the context of observations and projections. Projections indicate the possibility of increasing frequency and severity of weather-related extremes, such as heat waves, droughts, intense precipitation, and river floods. An interesting finding, which is valid for much of Europe including the Baltic Sea Basin, is the detection of the highest mean temperature on record within adjacent 12 months. In 2006/2007, the highest 12-month mean temperature ever observed was exceeded by a wide margin over large areas. Restricting analysis of calendar years reveals nothing special - neither the calendar year 2006 nor 2007 (during which temperature records were observed on some stations) were as extreme as the 12-month period from June 2006 to July 2007.

Professor Kundzewicz has actively contributed to a number of products of the IPCC, within the process of the Fourth Assessment Report. Among the topical areas of particular interest were adaptation options in water management, and – in particular – adaptation to extremes. Professor Kundzewicz attended the BALTEX Conference in Kuuressaare (Estonia) in June 2007 with a keynote oral contribution. He also submitted a manuscript, which is now being considered for a possible publication in *Boreal Environmental Research* special issue related the BALTEX Conference. He has participated, with contributions, in many scientific conferences, including those organized in Brussels by the European Commission, on the occasion of launching the Green Paper on Adaptation on 3 July, and the conference *Future Climate, Impacts and Responses* (19-20 November 2007). Professor Kundzewicz and colleagues have published a number of papers in the area. Dr Maciej Radziejewski paid a contribution to the recent BACC book.

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3. Institute of Meteorology and Water Management

Piotr Kowalczak

Publications

Analysis of anthropogenic impact on surface water (I. Hołda)

A new concept of hydrological map of Poland (Ł. Chudy)

Characteristics of sea freezing in the Polish coastal zone in the 20th century (M. Sztorbryn)

Modelling of water levels at river mouths in littoral areas – Assessment of flood risk caused by maximum water levels (M. Sztobryn)

Sea-level trends of the Baltic Sea in the second half of the 20th century (B. Kowalska)

Meteorological conditions producing flood-causing rainfalls in the area of Poland (H. Lorenc)

Analysis of frequency of flash flood occurrences depending on various climate and physicogeographic conditions in Polish basins in the post-WWII period (M. Mierkiewicz)

Analysis of tendencies of flash flood occurrences and estimate of meteorological, climatological and hydrological conditions in Poland in the post-WWII period (J. Ostrowski)

Research programme for study of tools for flash flood detection (A. Dobrowolski)

Thermal and precipitation estimate of months, seasons and years on the basis of multi-year (mean) values as a criterion of climate condition changeability in Poland (E. Dołęga, H. Lorenc)

Catalogue of maximum precipitation values in Poland and meteorological analysis of their causes (M. Karzyński, A.Fiema, T. Nodzyński, J. Konieczek, M. Kolarczyk)

Changeability of solar conditions in the area of Poland (in 1971-2005) in relation to the progressing global warming (B. Bogdańska)

Improving of classification method of circulation types on the basis of geostrophic wind variables (Z. Ustrnul)

Identification of types of pressure areas above the sea-level and upper surfaces of the northern hemisphere as analogues for long-term forecasts (R. Kozieł)

Indicators of atmospheric circulation according to J. Lityński for different tropospheric levels (K. Pianko)

Characteristic of climate changeability in Poland based on the homogeneous instrument measurements series conducted since the beginning of the 19th century (M. Miętus)

Tasks performed for international organizations and programmes (CCI, JCOMM, IPCC), transboundary co-operation in climate research:

- works for JCOMM and CCI – preparation of guidelines for the new system of preparation of marine climate characteristics, preparation of the CLIMAR-III conference;
- works for IPCC. Conducting the national contact point, co-operation in the AR4 works;
- participation in the European Climate Assessment project realized within EUMETNET/ECSN;
- participation in the HELCOM Ministrial Meeting in Krakow, Poland on 15 November 2007.

G. Russia

Report on the activities of Russian organization in relation to the BALTEX Phase II Implementation (2006)
Prof. Valery Vuglinsky, State Hydrological Institute, Russian Federation

1. Better understanding of the energy and water cycles over the Baltic Sea basin
Long-term studies of lakes and rivers ice regime formation in the Russian part of the Baltic Sea basin are being carried out at the State Hydrological Institute. The changes of this parameter for the last 50 years has been estimated on the basis of statistical methods.

Possible features of bottom flow from the Stolp Channel into the Central Baltic were investigated by numerical simulation at the Russian State Hydrometeorological University (RSHU). The accounts were carried out for rectangular area located in the central part of the Baltic sea , including the Gotland and Gdansk Deeps.

3. Provision of improved tools for water management, with an emphasis on more accurate forecasts of extreme events and long-term changes
Methodological approaches have been developed and assessments of maximal ice cover thickness on rivers and lakes for the last 20 years as compared with the previous 30 years have been made at the State Hydrological Institute. Assessments have also been made of possible changes in maximal ice cover thickness for the nearest 15-20 years on the basis of winter air temperature rise scenarios. Recommendations have been developed on adaptation of water resources utilization system to expected changes in ice regime of rivers and lakes.

4. Gradual extension of BALTEX methodologies to air and water quality studies
Studies of flow of organic matter along the river Neva and its tributaries within St. Petersburg area and the organic outflow into the Neva Bay making use of the hydrochemical and ecological analyses as well as the analysis of the dynamics of the Neva basin contamination by organic matter have been carried out at the Russian State Hydrometeorological University. Moreover, RSHU in collaboration with its Finnish colleagues is currently studying to assess contamination of bed load in the Okhta channel and Okhta reservoir (the Neva basin) within the framework of the Russian-Finnish project "Collaboration for development of ecological feasibility of channel dredging for the river Okhta" financed by EU. The final aim of the study is to develop recommendations on ecological feasibility of channel dredging for small rivers in large cities and industrial zones.

The 5 years investigations on the inventory of rivers and lakes within the St.Petersburg city area and the assessment of their hydroecological status have been finished at the State Hydrological Institute . The manual "Rivers and lakes of St.Petersburg" has been prepared for publication during 2008.

5. Strengthened interaction with decision makers, with emphasis on global change impact assessments
Problems of restoration of lakes (including Lake Ladoga), impacted by human activity, situated in the Russian part of the Baltic Sea basin, were discussed at the scientific conference "Theory and practice of lake restoration" held in St. Petersburg, 15-18 October 2007. This conference was organized by the Institute of Limnology of Russian Academy of Sciences. Representatives of local authorities of St. Petersburg as well as of "Vodokanal" organization participated actively in the conference. Proceedings of the conference were published in "Theory and Practice of Inner Water Bodies Restoration", St. Petersburg, 2007 (in Russian).

6. Education and outreach at the international level
Various courses for students are now being organized within the framework of the "Baltic University" project at the Russian State University. Major themes are: "Sustainable development of the Baltic Region", "Baltic environment" and "Sustainable water management". Students from more than 30 universities of St. Petersburg (mainly 2-5 year students) are taking part in these courses. Every year 4-5 students of the Geography and Geoecology department take part in various "Summer schools" dealing with ecology and sustainable development of the Baltic Region within the framework of this programme.

The report is available as presentation at *www.baltex-research.eu/supplementary/*

H. Sweden

Report of the Swedish activities in relation to the BALTEX Phase II Implementation (2007)
Anders Omstedt, Joakim Langner, Anna Rutgersson and Ben Smith,
2008-01-17

1. Better understanding of the energy and water cycles over the Baltic Sea basin

Göteborg University:
BALTEX Research is actively performed at the Climate Ocean Group at Department of Earth Sciences: Oceanography at Göteborg University. During 2007 several calculations on the water and heat balances for the Baltic Sea have been performed and the data is now freely available from the home page *www.oceanclimate.se* under products.

Uppsala University:
Research on atmosphere-ocean coupling is on going research at Department of Earth Sciences: Meteorology, at Uppsala University, where a newly discovered turbulence regime (UVCN-regime) present during high wind speed and unstable atmospheric stratification has been shown to strongly enhance the turbulent surface heat fluxes over sea (Smedman et al. 2007a; Smedman et al. 2007b; Sahlée et al. 2007a). The impact this turbulence regime in regional model simulations for the Baltic Sea region was investigated for the ocean using the process oriented PROBE-Baltic model and for the atmosphere the RCA-model. It was shown that including the UVCN regime gives higher turbulent heat fluxes, a more humid surface layer in the atmosphere and a shallower mixed layer in the ocean (Rutgersson et al. 2007). New research using data from the Östergarnsholm site in the Baltic Sea have also shown very similar turbulent behaviour of carbon dioxide as of humidity indicating that once in the atmosphere the carbon dioxide acts as any other passive scalar (Sahleé et al, 2007b).

SMHI
SMHI continues the development of regional climate models at Rossby Centre with main applications over Europe and focus on northern Europe and the BALTEX region. A new version, RCA3, has been finalised with a range of improvements in process descriptions. Water and energy budgets have been evaluated over the BALTEX area and publication of the results is in progress.

Regional 2D reanalysis using an optimum interpolation technique, ERA-MESAN, has been tested.

The BALTEX radar data centre has been updated and continues its operation

2. Analysis of climate variability and change since 1800, and provision of regional climate projections over the Baltic Sea basin for the 21st century

Göteborg University:
Göteborg University, Department of Earth Sciences has contributed to BACC-book in particularly in chapter 1 and 2. The Baltic Sea climate during the last 500 years has been analysed, classified and

reconstructed by models with several implications on climate variability etc. (Ericsson et al., 2007, Hansson and Omstedt, 2007).

Lund University:
Swedish researchers played an active part in the BALTEX Assessment of Climate Change (BACC) activity, the results of which are currently being published by Springer (BACC 2008). BACC aimed to provide the scientific community with an assessment of ongoing climate variations and their ecosystem impacts within the Baltic Sea basin – including the catchment area – considering potential changes over the coming century, as well as historical variations as a baseline for assessing the magnitude of recent and projected changes. Six Swedish-based researchers contributed to the BACC synthesis of impacts on terrestrial and freshwater ecosystems (Smith et al. 2008), one as coordinating lead author of the relevant chapter. The Swedish institutes involved where the Geobiosphere Science Centre of Lund University, the Dept of Ecology and Evolution, Uppsala University, the Dept of Applied Environmental Science, Stockholm University, and the Abisko Scientific Research Station of the Royal Swedish Academy of Sciences. The synthesis was able to conclude, based on published studies, that climate- and other associated changes in ecosystem drivers (e.g. atmospheric [CO_2], N-deposition) in recent decades have led to measurable changes in the structure and functioning of ecosystems within the Baltic Sea area, while a continuation of current trends – as well as new impacts – may be expected for at least some decades into the future. Robust indicators of recent change include earlier spring phenological phases, northward species shifts and
increased growth and vigour of vegetation. In lakes, higher summer algal biomasses have
been found

SMHI
SMHI was active in BACC and was lead author of one chapter on climate projections.

There has been continued production of regional climate scenarios covering the BALTEX region and the remainder of Europe in the framework of a range of different projects including ENSEMBLES as well as for the Swedish government investigation on Climate and vulnerability. The output from the PRUDENCE project was published with several papers in a special issue of Climatic Change.

SMHI continues its involvement in building operational climate monitoring using meteorological satellites in the EUMETSAT, ”Climate Monitoring Satellite Application Facility”).

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

Göteborg University:
GU-OCG is working on the reconstruction of river inflows to the Baltic Sea during last 500 years. Preliminary results have been published in GEWEX Newsletter (Ericsson et al, 2007).

Uppsala University:
A mass balance model developed for water management at Department of Earth Sciences: Environmental analysis, at Uppsala University, has been tested for several coastal regions of the Baltic Sea (Håkanson and Eklund, 2007; Håkanson and Bryhn, 2007; Håkanson and Blenkner, 2007; Håkanson and Lindgren, 2007; Håkanson et al, 2007a,b).

SMHI
Operational flood forecasting using NWP ensemble forecast input is in place and is further developed.

4. Gradual extension of BALTEX methodologies to air and water quality studies

Göteborg Lund, Uppsala and Stockholm Universities:
Interesting development has started at Göteborg University related to Earth System Science where the Baltic Sea and the Arctic Ocean are the two first systems to study (Tellus platform: wwww.tellus.science.gu.se).

A research project led by the Climate Ocean Group at Department of Earth Sciences of Göteborg University and also involving researchers from Lund, Uppsala and Stockholm Universities as well as several international research groups will develop and apply a new integrated ecosystem model framework based on the cycling of organic carbon and carbon dioxide in the Baltic Sea water, drainage basin, atmosphere, and sediments, providing a new tool with which to support the management of the Baltic Sea. A proposal for funding of the project has been submitted to under the BONUS+ Call for Proposals 2007. The approach will entail the development, evaluation, and application of the first fully integrated model framework for the predictive analysis of the functioning and dynamics of the Baltic Sea organic/inorganic carbon and oxygen systems, accounting *inter alia* for inputs (DOC) in runoff from land ecosystems. Lund University will contribute by providing modelling of DOC production of ecosystems within the Baltic Sea drainage basin, accounting for responses of vegetation structure, composition and ecosystem functioning under climate change. Plausible changes in land use and their effects on DOC loads will also be accounted for.

SMHI
Coupling of the biogeochemical model SCOBI to the 3D-Ocean model RCO has been finalized. Hindcast and scenario simulations have been performed.

Regional Atmospheric chemistry and deposition modelling over Europe using both ERA40 and regional climate model input (RCA3) has been evaluated over the BALTEX region.

A new framework for hydrological modelling including nutrient input and cycling has been developed. University cooperation in Sweden with five Phd students from different universities working on different aspects of the model system has been established.

5. Strengthened interaction with decision makers, with emphasis on global change impact assessments

SMHI
SMHI has delivered a wealth of material to the Swedish government investigation on Climate and vulnerability. The material includes regular climatological information as well as scenarios evaluated for a range of climate indices and effect studies for water resources, water and air quality. SMHI experts have contributed to different expert groups and consultations with the investigation. The SMHI input to the investigation has been presented at open seminars at SMHI twice during 2007.

Two SMHI climate experts were involved in the expert panel set up to support the government with a scientific basis for the development of future climate policies. The panel delivered its report in September. Both the start and finalisation of the work included public hearings (TV and webcast) with minister level attendance and prominent participation from SMHI.

Four open seminars (TV and webcast) were organized by the Swedish EPA in connection with the release of the three summary documents from the three IPCC working groups and the synthesis report. These were major events with hundreds of participants. SMHI co-organized the second seminar on adaptation and seconded an expert to the IPCC panel meeting in Brussels for the second working group.

6. Education and outreach at the international level

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Appendix 7: Ad-hoc protocols of breakout meetings

GROUP A

Objective 1. Better understanding of the energy and water cycles over the Baltic Sea
Redefined as: **Energy and Water Cycles under Changing Conditions**

All 5 Potential Activities (Pas) were discussed
PA1.1. Regional analysis and re-analysis for different variables for specific purposes
Redefined as: **Regional analyses and re-analyses with a high resolution and time span**

Still very relevant objective

For better understanding of energy and water cycles, BALTEX needs (a) analyses or reanalyses of the past conditions and (b) regional climate model results for the past, to be validated against re-analysis, and for the future.

For the ocean, there is no long-term gridded data set available (comparable to ERA-40), but the objective of COFFEX is to produce one (for the last 30 years).

SMHI: improvement of MESAN; high resolution is needed, only surface quantities?

ENSEMBLES: climate models with 25 km resolution forced by ERA-40 (1958-2002)

ERA-Interim: 4DVAR, 80 km horixontal resolution, 1989-2008, will reach real time in 2008, and then continue as a climate data assimilation system

COFFEX: downscaling of atmospheric analyses for coastal regions

New potential activity: to take into account land-use changes in re-analyses

PA1.2 Further development of models and model improvement
Redefined as: **Evaluation and further development of models and model improvement**

Relevant, continuous process

Processes listed in the Implementation Plan (page 25) are still relevant challenges.

New ground-based remote sensing methods to measure vertical profiles with high temporal and spatial resolution offer new methods / approaches for model validation. Propability density finctions of the temporal and spatial variability based on observations and regional climate models.

Potential for a new BALTEX project in collaboration with EUMETSAT

PA1.3 Closing the Energy and Water Budgets on a high level of confidence
Redefined as: **PA1.4 Quantification of the energy and water budgets on a high level of confidence**

Uncertainties remain in estimates of precipitation minus evaporation (P-E) and its variations over the Baltic Sea.

In climate models, budgets are closed, but reliability is a problem.

In re-analyses, problems remain in closing the budgets (P-E vs. flux convergence), although advance has been made e.g. in the ECMWF. Quantification is an additional problem.

The ocean salinity is used to study, if atmospheric models have a correct water budget (supposing that the river run-off is known accurately enough).

Quantification of the budgets will be an overall result from the other PAs

PA 1.4 Improvement of quantititive precipitation forecasts
Redefined as: **PA1.3** (should be before the PA on energy and water budgets)

Active study topic.

Problems not yet solved: accuracy of radar measurements, required resolution of gauge network, and related economic implications.

Black forest: most German groups participating in a large project in 2005-2011. Results and methods could be adapted also to the BALTX region

National meteorological offices have a lot of activities in the field of combined application of adar data, mesoscale analysis techniques (e.g. LAPS), and mesoscale modeling. This yields improved products for water management.

Radar network in Germany will be improved

Links between this PA, the WG on radar and Objective 3 should be more elaborated.

PA1.5 Evaluation of models and data sets for their use in climate impact analysis and environmental issues
Dropped as a PA.

The text in the Implementation Plan is essentially included in PA1-2.

GEWEX-related Milestones

- closely related to PAs 1 and 3. Actual status should be reviewed.

GROUP B
Objective 3. Improved tools for water management

A. Goals

3.2.1 *Development and Validation of Coupled Hydrological-Atmospheric Models*
OK.

3.2.2 *Development and Validation of Hydrological Models for BALTEX Selected River Basins*
Problematic in the sense that no activities have been initiated and no plans developed for large river basins in the Baltic area. Could be revitalised in connection with the goal 3.2.4 (see below).

3.2.3 *Studies of Climate Change Impacts on Water Resources Availability and Extreme Events*
OK except that no particular focus on extreme events has been visible. Could be taken up in connection with the activity 3.4.4 (see below).

3.2.4 *Improvement of Flood forecasting*
No activities have so far been conducted. However, based on the outputs from recent EU projects, a workshop is proposed to be held in Poland in a year's time with focus on the Odra basin. This could lead to new efforts on basin-scale hydrological modelling aiming at improved flood forecasting methods and systems.

B. Potential Activities

3.4.1 *High Resolution Hydrological Modelling*
This will be carried out in Denmark. Special efforts on the impact of lakes are conducted in Russia. Sweden has ongoing activity, which also includes impact of large lakes, among others.

3.4.2 *Improvement of Parameter Estimates for Distributed Hydrological Modelling*
Research on improving parameter estimation techniques is currently being done in connection with activity 3.4.1. Ungauged or poorly gauged basins, however, are not specifically addressed.

3.4.3 *Coupling Hydrological Models to Regional Climate Models*
For the whole BALTEX region this has been done both in Sweden and in Germany. Local studies will be carried out in Denmark. Sweden, Finland, Norway, Latvia and Estonia have been working on this at national level through a common Nordic project on hydropower.

3.4.4 *Analysis of the Consequences of Climate Change for Hydrology and Water Resources Management*
The consequences in relation to aquifers will be investigated in Denmark. Russia will look particularly at lakes, and general assessments for the whole Baltic area are carried out in Sweden and Germany. A particular problem, however, is the disconnection between hydropower-related climate studies and the BALTEX programme. An effort to get the hydropower onboard will be done in early 2008 in connection with a climate-oriented hydropower meeting taking place at SMHI. Ongoing studies concerning hydropower also include dam safety considerations (see also activity 3.4.3).

3.4.5 *Hydrological Modelling with Radar-derived Precipitation Applications*
An upcoming meeting in St. Petersburg will put focus on this potential activity and most likely give rise to some new activities. Inclusion of radar-based product will also be considered in the coming efforts to improve flood forecasting methods.

C. New potential Activities

- *Dam safety* should be considered together with the impact studies on the future hydropower potential.
- *River ice* is a major problem in Russia that needs more focus.
- *Coastal zone management* might be linked to the water resources management activities.

GROUP C
Objective 4. Biogeochemical cycles and transport processes within the regional Earth system under anthropogenic influence

Potential activities

1. Improving the understanding of biogeochemical processes in the sea and on land
2. Quantifcation of biogeochemical fluxes between sea, land and atmosphere
3. Integration of biogeochemical components into coupled regional climate models

BALTEX Workshop on this objective in the fall 2008
Bringing together sea and land research communities

International BALTEX Secretariat Publication Series

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Copies are available upon request from the International BALTEX Secretariat.