Minutes of

13th Meeting of the BALTEX Science Steering Group

held at

Estonian Business School (EBS)
Centre for Baltic Studies
Tallinn, Estonia
17 - 19 June 2002

edited by
Hans-Jörg Isemer

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Participants at the 13th BALTEX Science Steering Group Meeting

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Second row from left to right: A. van Ulden, T. Vihma, C. Fortelius, P. Seuna, M. Rummukainen, C. Simmer, D. Jacob, S. Hafner, S. Schöttle.
Back row from left to right: J. Piechura, S. Halldin, J. Koistinen, S. Zhuravin, I. Skuratovich, J. Fischer, S. Keevallik, B. Håkansson, J. Launiainen, A. Omstedt.
Behind the camera: H.-J. Isemer

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Summary of Action Items

Action #1: Jürgen Fischer and Clemens Simmer to finalize objectives and organisational issues for a BALTEX Satellite Data Centre Function (BSDCF) along the lines presented at this BSSG meeting and, to start actions towards implementing BSDCF in close cooperation with satellite data users (see item 4 of this meeting's agenda).

Action #2: Hartmut Graßl to write a letter to Mr Leitass on behalf of the BSSG to receive more information on the background for his negative attitude towards BALTEX and explore possibilities for improving the situation (see item 5 of this meeting's agenda).

Action #3: Carl Fortelius and Daniela Jacob to compare results of the *BRIDGE* reanalysis project with model results obtained as part of the DEKLIM-BALTIMOS projects (see item 8 of this meeting's agenda).

Action #4: Hans-Jörg Isemer to build up a monitoring document on *BRIDGE* activities and data sets and compare the resulting inventory with the original *BRIDGE* plans (see item 8 of this meeting's agenda).

Action #5: Hans-Jörg Isemer and Bengt Carlsson to review existing runoff data for the *BRIDGE* period (at either BHDC or elsewhere) and their availability for interested researchers (see item 8 of this meeting's agenda). In particular monthly mean runoff data for the main rivers discharging into the Baltic Sea shall be derived with high priority (if not already available).

Action #6: Aad van Ulden and Daniela Jacob to investigate KNMI's possibilities to produce and make available results of a model run to be used as homogeneous atmospheric forcing fields tailored for BALTEX-*BRIDGE* requirements (see item 8 of this meeting's agenda).

Action #7: Daniela Jacob to provide information on the BALTIMOS evaluation concept for *BRIDGE*, to prepare a related summary article for the forthcoming issue of the BALTEX newsletter, and to report to the BSSG at its forthcoming meeting.

Action #8: Daniela Jacob to continue all possible steps towards meeting the objectives of WGEW, where the finalization of a state-of-the-art review on BALTEX by WGEW has highest priority (see item 13 of this meeting's agenda).

Action #9: Bertil Håkansson, with assistance of the ODCB Implementation Group (**Anders Omstedt, Andreas Lehmann, Jan Piechura, Pekka Alenius and Hans-Jörg Isemer**), to continue implementing ODCB along the lines given in the approved ODCB implementation document (see item 14 of this meeting's agenda).

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

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

Action #12: Hans-Jörg Isemer to prepare for the 14th BSSG meeting at Lund University on 18 to 20 November 2002, in close cooperation with **Anders Lindroth** acting as the local organiser (see item 16 of this meeting's agenda).

Action #13: Hans-Jörg Isemer to organize a workshop dedicated to results based on *BRIDGE* data in conjunction with the 14th BSSG meeting (see item 16 of this meeting's agenda).

Action #14: Hans-Jörg Isemer to contact **Sven-Erik Gryning** at Risø National Laboratories, Roskilde, Denmark, to jointly explore possibilities for arranging the 4th Study Conference on BALTEX on the island of Bornholm during summer 2004 (see item 17 of this meeting's agenda).

Introduction

The 13th meeting of the BALTEX Science Steering Group (BSSG) was hosted by the Estonian Business School (EBS) in Tallinn, Estonia. Prior to the BSSG meeting a science workshop on "Eutrophication and Pollution in the Baltic Sea Basin" was held at EBS on Monday, 17 June 2002, 14.00 to 19.00 hours. The agenda of the science workshop is given in Appendix 1. Summaries of workshop presentations are collected in Appendix 2.

Hartmut Graßl, the chairman of the BSSG opened the BSSG meeting on 18 June 2002 at 9.00 hours. The meeting was closed on Wednesday, 19 June 2002 at 13.00 hours. The agenda of the BSSG meeting and the list of BSSG meeting participants including their full addresses may be found in Appendix 3 and Appendix 4, respectively.

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

Item 1.1: Welcome by the Host and the BSSG Chairman

Sirje Keevallik welcomed the BSSG meeting participants and expressed her honour for acting as the host of this 13th BSSG meeting. She highlighted that it was almost 10 years ago that Erhardt Raschke, the former vice-chairman of the BSSG, rang her to initiate a Baltic Sea related cooperation, which has later on fed into the BALTEX programme. Estonian institutions, such as Tartu University, the Estonian Marine Institute and the Estonian Meteorological Service, have contributed to BALTEX ever since its beginning. Dr. Keevallik continued to mention that she became affiliated with the Estonian Business School (EBS) in 1999 and has assisted since then to build up EBS's Centre for Baltic Studies. The latter will include studies on e.g. environmental economics which may become relevant for phase 2 of BALTEX, if more emphasis will be given to user orientation and impact studies. She wished the meeting all success.

Hartmut Graßl, in his capacity as the Chairman of the BSSG opened the meeting and welcomed the BSSG members and all guest participants to this meeting. He expressed his thanks for the informative and pulse releasing workshop the day before, which to his mind has clearly indicated several issues giving directions for the planned enlargement of BALTEX. He appreciated the professional preparations and coordination of both the workshop and the BSSG meeting by Sirje Keevallik and Hans-Jörg Isemer. He welcomed several guests to this meeting (see Appendix 4) and appreciated their interest in particular in defining aspects of phase 2 of BALTEX. Prof. Graßl briefly reviewed the status of BALTEX being one of the Continental-scale Experiments (CSE) in the frame of GEWEX (Global Energy and Water Cycle Experiment). New developments in GEWEX include the recent approval of the Murray-Darling Basin Water Budget Project (MDB) in Australia as a new GEWEX-CSE, and a new proposal for the La Plata River in South America, to become a GEWEX CSE. CEOP, the Coordinated Enhanced Observing Period, is getting into a detailed planning stage now, and BALTEX has initiated valuable contributions to the planning phase of CEOP so far. The Chairman closed his introductory remarks by stressing the importance of the new satellites, the data of which will be collected into international data centres in the frame of CEOP. This huge data flow from satellites, measuring at several thousands of channels, will give a great opportunity for further studies, related to GEWEX and other components of the World Climate Research Programme.

Item 1.2: Introduction to the Estonian Business School

Hartmut Graßl continued to introduce Prof. Olav Aarna as the head of the Estonian Business School (EBS). Prof. Aarna welcomed the BSSG meeting participants and gave an introduction to EBS. Founded in 1988, EBS nowadays is the largest and oldest private business university in the Baltic States with over 2100 students of Estonian, Latvian, Lithuanian, Russian and Finnish origin. It also takes part in international exchange programmes with the European Union (ERASMUS programme) and China. More than 100 students are presently studying at EBS in the frame of these exchange programmes. EBS provides a Master of Business Administration (MBA) programme and an international Bachelor of Business Administration (BBA) programme. In July 2001, EBS received CEEMAN (Central and Eastern European Management Association) international institutional accreditation, and is now the first university in the Baltic States having received this international recognition. CEEMAN is an international institution which facilitates the cooperation between Central and Eastern European business schools and carries out institutional accreditation of business schools. In 2002, EBS was elected to be the best higher educational institute in Estonia.

EBS provides programs in business and public administration as well as IT Management at undergraduate, graduate and doctorate levels. EBS structural units are the Institute of Management, Institute of Languages, EBS College in Saaremaa, Open University, Career and Counseling Centre, Centre for Baltic Studies, Centre for Entrepreneurship and others. Having particular relevance for BALTEX, the Centre for Baltic Studies was specifically mentioned. It was founded in 1999 and covers 3 research topics at present: socio-economic processes, security and social stability, and environmental issues (actually headed by Sirje Keevallik) with the present focus on regional climate resources and their variability in the Baltic Sea catchment area.

Hartmut Graßl closed the introductory part by giving credit and appreciation to Prof. Aarna and Dr. Keevallik for acting as the host of this BSSG meeting.

Item 2: Amendment and Approval of the Agenda

The agenda of the meeting was approved with the following additional issues to be discussed or changes to be included:

- The report on the Working Group on Energy and Water Cycles by Daniela Jacob shall be shifted to follow item 9 of the agenda. These minutes will have the respective notes of this item included, however, under item 13.

- A discussion on the preparation for the science workshop prior to the next BSSG meeting shall be added to item 17.

- A discussion on the preparation for the next BALTEX Study Conference shall be added to item 17.

Item 3: Approval of Minutes of the 12th BSSG Meeting

Upon request by Pertti Seuna, the following sentence of the national Finnish report (see page 31 of the minutes) shall be entirely deleted: *"SYKE is currently being re-structured and will cover marine aspects in the future as well."* The national report for Finland given at the 12th BSSG meeting shall read as follows:

Finland
Major contributions in Finland are presently originating from the Finnish Meteorological Institute (FMI), the Finnish Institute for Marine Research (FIMR), Helsinki University, and the Finnish Environment Institute (SYKE). Mikko Alestalo mentioned a new Finnish research funding programme for the Baltic Sea, which is seen as a potential funding source for national BALTEX contributions. The most important science topics related to BALTEX covered at present by the mentioned Finnish institutions include a data assimilation project for BRIDGE, weather radar issues, air-ice-sea interaction field studies, and sea-ice modelling activities. It was noted that efforts in Finland are strengthened towards developing 3d hydrodynamic eco-system models of the entire Baltic Sea. It was finally noted, that there is currently a somewhat low profile concerning BALTEX research topics at most Finnish universities (except Helsinki University), and it was suggested to further stimulate Finnish Universities to join activities for preparation of phase 2 of BALTEX.

With this correction, the minutes of the 12th BSSG meeting were approved. They are published as Report No. 22 of the International BALTEX Secretariat Report Series.

Item 4: Review of Action Items of Previous BSSG Meetings

The previous BSSG meeting came up with a long list of 24 action items. Hans-Jörg Isemer reported that the majority of these action items was either completed in exact the way as proposed, or covered by a similar action. The following items needed still consideration and were discussed with more detail:

> Action #9: Hans-Jörg Isemer and Anders Omstedt to take steps to transform the earlier *BRIDGE Mangement Group* into a *BRIDGE Evaluation Team* by (i) arranging for the *BRIDGE* Evaluation Team membership, (ii) fine-tuning the objectives of this team, and (iii) initiating steps to meeting these objectives, along the lines suggested by the SSG (see item 7 of the agenda).

Action #9 is still open. Discussion on this issue was postponed to item 8 of this meeting's agenda.

> Action #13: Hartmut Graßl to undertake steps to enhance efficiency of the BALTEX SSG by a balanced number of new members, taking into account the broadened scientific scope envisaged for BALTEX Phase II.

This action is postponed and will be pursued, when more detailed plans for the contents of phase 2 of BALTEX (i.e. revised science and implementation plans) will have been established.

> Action #15: Daniela Jacob (chair of BALTEX WG on Water and Energy Cycles) to constitute the membership and objectives of the BALTEX Working Group on Energy

and Water Cycles along the lines suggested by the SSG, and initiate steps towards meeting the objectives (see item 11 of the agenda).

See item #13 of this meeting's agenda.

Action #18: Hans-Jörg Isemer to identify long climate records relevant for the Baltic Sea basin and compile information on these data at the Secretariat (see item 12 of the agenda).

This action has not been completed so far but will be pursued.

Action #19: Sten Bergström to provide detailed technical information for users on a 1x1 degree meteorological data set for the BALTEX region established at SMHI (see item 12 of the agenda).

The completion of this action item was discussed controversially. It was noted that this data set has been used – and is being used – frequently in the frame of BALTEX, and beyond. Markku Rummukainen (on behalf of Sten Bergström) cited publications where technical information may be found (e.g. Rutgersson et al. 2001, and references therein[1]). Daniela Jacob considered this information as not sufficient for all applications. It was suggested to discuss further documentation needs for this data set between SMHI and the individual users in order to satisfy all user requirements.

Action #20: Anders Omstedt, Andreas Lehmann, Jan Piechura, Pekka Alenius, Jouko Launiainen, Sten Bergström (i) to take immediate actions for a vitalisation of the BALTEX Oceanographic Data Centre, with the option to install the Data Centre at the Göteborg branch of the Swedish Meteorological and Hydrological Institute (SMHI), (ii) to re-consider and define the objectives of the BALTEX Oceanographic Data Centre including in particular the definition of data types to be stored at the Data Centre (see item 12 of the agenda).

This action item will be discussed in detail with item 14 of this meeting's agenda.

Action #21: Hans-Jörg Isemer and Clemens Simmer to investigate whether a dedicated BALTEX Data Centre for satellite data is required for BALTEX and prepare related information for final discussion at the next BALTEX SSG meeting (see item 12 of the agenda).

Both Jürgen Fischer and Clemens Simmer were in particular involved in pursuing this action item. They included several individuals and institutions working presently with satellite data in the BALTEX context. A basic conclusion is, that a specific ***data centre***, where data and data products may be archived physically at one location, shall not be implemented. However, the need for a de-centralized ***data centre function*** was stressed by almost all individuals addressed. Preliminary steps were initiated to define both objectives and organisational issues for a ***BALTEX satellite data centre function***. Clemens Simmer briefed the BSSG on the current status, which is summarized as follows:

[1] Ruttgersson, A. et al. 2001: Precipitation estimates over the Baltic Sea: Present state of the art. Nordic Hydrology 32 (4), 285-314.

A BALTEX Satellite Data Centre Function

Objectives

1. document existence and availability of satellite data and satellite data products relevant for BALTEX (inventory, meta data),
2. improve on the scope of data by providing access to intermediate data types produced during data processing,
3. provide a help desk concerning satellite data and products for the BALTEX community,
4. enhance efficiency of satellite data processing and quality of products by improved interaction of satellite groups.

Organisation

1. Virtual data centre (no central facility) connecting all satellite data processing groups in BALTEX,
2. Individual groups will concentrate on fields of expertise (funding) e.g. special sensors, satellites, products,
3. objectives should be met by
    a) creating and updating a common internet homepage
    b) meetings, workshops.

BSSG suggested that users of satellite data, e.g. from the modelling communities, should be included in the further definition process and their requirements, as appropriate. Uncertainty estimates of the individual data and data products shall in any case be part of the meta data information, in order to facilitate interpretation of satellite data. A workshop was considered as a suitable means, which may have stimulating effects for enhanced usage and application of current and future satellite data products.

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

Item 5: National Reports by Country

Estonia
Sirje Keevallik gave the report on Estonia. Appendix 5 gives the material presented. In her summary S. Keevallik noted an increasing interest in and contribution to BALTEX at Estonian institutions. Researchers have begun to direct their interest towards the regional or even local problems. In particular, climate change and global change issues and their impact on the Estonian region are in the focus of several studies. The publications referenced as examples comprise climate studies on basic "BALTEX parameters", such as clouds, snow cover, surface albedo, troposheric winds, as measured at Estonian stations. 10 papers were presented at the 3rd Study Conference on BALTEX in 2001, and three Estonian institutions participated in the Expression of Interest for an Integrated Project "Baltic Water" (see also item 11 of this meeting's agenda). Sirje Keevallik concluded by indicating that several Estonian institutions are prepared to actively contribute to phase 2 of BALTEX.

Latvia
No representative from Latvia could attend this meeting. The Chairman informed the BSSG on a letter he had received from Andris Leitass prior to the meeting. In this letter Mr Leitass, member of the BSSG and Director of the Latvian Hydrometeorological Agency (LHA) informed the BSSG Chair that he is unable to attend this meeting. He also questioned the usefulness of the BALTEX programme for his Agency and indicated that he cannot guarantee further data delivery to the BALTEX Data Centres in the future.

Several BSSG members expressed concern and feelings of inexplicability for this attitude of a national Hydrometeorological Service. The BSSG gave **Action #2 to Hartmut Graßl** to write a letter to Mr Leitass on behalf of the BSSG to receive more information on the background for his negative attitude towards BALTEX and explore possibilities for improving the situation.

Lithuania
No representative from Lithuania could attend this meeting.

Russia
Sergey Zhuravin gave the report on Russian activities for Valery Vuglinsky. Dr. Zhuravin focused on activities at the Russian State Hydrological Institute (RSHI) and the Main Geophysical Observatory (MGO), both at St. Petersburg. RSHI's activities include river runoff modeling for the river Neva, where the HYDROGRAPH model has recently been extended to a complex lake/river forecast system. Regional climate modeling with relevance for BALTEX is done at MGO. Appendix 6 gives the detailed report.

Belarus
Ivan Skouratovich summarized the activities of the State Committee for Hydrometeorology with respect to data delivery to the BALTEX data centres. See Appendix 7 for details.

Poland
Jan Piechura summarized activities in Poland related to BALTEX.

The Institute for Meteorology and Water Management (IMGW, the Polish national Hydrometeorological Service) is continuing extensive data deliveries for the BALTEX Data Centres. IMGW has recently installed a weather radar at Poznan which is expected to become operational in 2003 and is a candidate to be included in the BALTRAD weather radar network.

The Institute of Oceanology (IOPAS) in Sopot has strong contributions to the oceanographic programme part of BALTEX. Research vessel cruises within all BRIDGE EOPs were conducted and measured data are being analysed now. A focus of IOPAS is on processes governing the water exchanges between the deep basins in the Baltic Sea. IOPAS plans to continue these process oriented studies and will continue to monitor changes in exchange processes between the Baltic Sea deep basins.

Other Polish activities include contributions to climate and climate change research at the Research Centre of Agricultural and Forest Environment (RCAF-PAS) in Poznan. Polish scientists are making progress in getting involved in EU-funded projects of the 5th framework programme (FP5), an example, with relevance for BALTEX, is the MICE (Modelling impacts of climate extremes) project with contributions of RCAF-PAS.

Germany
Daniela Jacob summarized ongoing German activities for BALTEX. Major contributions are funded by the national Ministry for Education and Research (BMBF) through in particular the German national Climate Research Programme (DEKLIM), which includes a specific section of project clusters related to the BALTEX programme. These projects were started at slightly varying times in the second half of the year 2001, and will be funded for three (some even for four) years. In addition to DEKLIM, there are other projects with relevance for BALTEX ongoing such as 4DWOLKEN (funded by the German national Atmospheric Research Programme, AFO2000, again funded by BMBF) and ODRAFLOOD. See Appendix 8 for a list of these project clusters and projects. Other national contributions to BALTEX include the support for the BALTEX Meteorological Data Centre (BMDC) and the CEOP reference site at Lindenberg by the German Weather Service (DWD), as well as the funding for the BALTEX Secretariat by the GKSS Research Centre Geesthacht.

The Netherlands
Aad van Ulden pointed out that the Royal Netherlands Meteorological Institute (KNMI) is the only Dutch institution contributing to BALTEX at present. Two activities were mentioned in particular: the EU-funded project CLIWA-NET (BALTEX cloud liquid water network, see also item 6 of this meeting's agenda), and KNMI's contribution to CEOP by having approved Cabauw as a CEOP reference site. In this context, A. van Ulden noted that Cabauw will be extended to fulfil requirements for a BSRN (Basic Surface Radiation Network) station. Additionally, a larger Dutch consortium, including KNMI, has been founded in early 2002 to establish and support the *Cabauw Experimental Site for Atmospheric Research* (CESAR) project. CESAR has the main objective to set-up and operate an observational facility at the Cabauw site with a comprehensive set of remote sensing and in-situ equipment to characterize the state of the atmosphere, its radiative properties and interaction with the land surface, for the study of physical processes, climate monitoring and validation studies. CESAR is largely in line with the CEOP plans and objectives and, hence, mutual benefits are expected.

Denmark
Lise Lotte Sörensen gave a short summary on Danish activities with relevance for BALTEX. Risø National Laboratories (RISØ) and the Technical University of Denmark (DTU) were noted as major players in this context with RISØ (through Sven-Erik Gryning, L.L. Sörensen and colleagues) contributing mainly through atmospheric boundary layer research, both experimental (e.g. measurements at the small Baltic Sea island Christiansø) and modeling. Future research shall include the coupling of atmosphere and boundary layer models. DTU (Dan Rosbjerg and colleagues) activities are concentrating on hydrological modeling.

Sweden
Anders Omstedt, the vice-chair of the BSSG, noted that the Swedish Working Group on BALTEX is now a functioning group with regular meetings providing for review of and guidance for the individual Swedish BALTEX projects. Prof. Omstedt provided a detailed report on ongoing research activities in Sweden with relevance for BALTEX. See Appendix 9 for details. In addition to the major traditional "centres of activities" in the BALTEX context there are new noteworthy developments. Anders Omstedt mentioned in particular the University at Lund, where a new *Centre for BioGeoSphere Dynamics* will be established comprising several of the University departments. Networking of existing institutions is another important means to structure research efficiently. Examples for such activities in Sweden include the establishment of both a 'Nordic Centre for Studies of Ecosystem Carbon Exchange and Its Interactions with the Climate System (NECC)' and a 'Nordic Centre of Excellence - Network of wave-boundary layer research and application to global change'. Sweden is one of the few

countries represented in the BSSG at present offering a stable and comprehensive funding base for several research activities which are directly or indirectly related to BALTEX.

Finland
Major contributions in Finland are presently originating from the Finnish Meteorological Institute (FMI), the Finnish Institute for Marine Research (FIMR), Helsinki University, and the Finnish Environment Institute (SYKE). Mikko Alestalo mentioned the BRIDGE reanalysis project jointly conducted by FMI and SMHI using the ECMWF computer resources. FMI plays a leading role in weather radar research in BALTEX and has recently started major contributions to CEOP by approving FMI's Arctic Research Centre in Sodankylä as one of the European reference sites. Further activities at FMI related to BALTEX are the participation at the EU-funded project PRUDENCE (Prediction of regional scenarios and uncertainties for defining European climate change risks and effects). FMI has also contributed to studies on the nitrogen input to the Baltic Sea (e.g. in the BASIS program, some results were shown in the scientific workshop prior to this BSSG meeting). The Academy of Finland is now launching a new research program (BIREME) for Baltic Sea research, which is seen as a potential funding source for national future BALTEX contributions.

FIMR's activities were summarized by Jouko Launiainen. Several cruises of the RV Aranda were devoted to BRIDGE EOPs (see Appendix 10). Ongoing projects with relevance for BALTEX concentrate on effects of climate change on sea-ice conditions and sea levels in the Baltic Sea.

Pertti Seuna gave an overview on SYKE's activities. The recent BALTNET and BALTIC WATER initiatives included the research items of SYKE towards the BALTEX programme. Important themes are climate change (SYKE is a participant to PRUDENCE as well), eutropication and hydrology.

Item 6: Workshop and Project Reports

BBC (BALTEX *BRIDGE* Campaign) -Workshop on *Cloud Observation and Modelling,* Leipzig, Germany, 13-14 May 2002
and
Progress of the EU-funded project CLIWA-NET (*BALTEX cloud liquid water network)*
Clemens Simmer reported on a workshop devoted to the first results of airborne and ground-based cloud measurements of microphysical and radiation parameters during the BALTEX *BRIDG*E Campaign (BBC) which took place in Leipzig on 13 and 14 May 2002. The BBC campaign in August/Septemper 2001 marked the largest experimental effort within the EU funded project CLIWA-NET (BALTEX Cloud Liquid Water Network). C. Simmer noted that CLIWA-NET is the only running EU-funded project at present, which originated from the BALTEX programme. The German 4D-Clouds project (with eight national partners) joined its experimental efforts with CLIWA-NET. Additional aircraft measurements were possible through a CAATER initiative. Further ground-based measurements were provided by several other research groups including more than 100 radio soundings by the Metoffice and the Dutch Army. Within the first two weeks of August 2001 the microwave intercomparison campaign (MICAM) took place at the central facility in Cabauw in order to better characterise the accuracy of microwave radiometer estimates of liquid water path (LWP) – the central parameter in CLIWA-NET. After this campaign the microwave radiometer were distributed within a regional network consisting of six stations. Intercomparison measurements with ra-

dars, lidars, radiometers, lidar ceilometers, a 200 m meteorological mast, and a wide range of radiation measurement were made at the central site.

The BBC workshop featured 23 presentations within the different sessions: aircraft and balloon measurements, satellites, ground-based remote sensing measurements and modelling. Data analysis had proceeded impressingly for all instruments since the end of the campaign and first attempts to integrate different data sources were already made. Basically, all data are now available to the BBC participants and the general public (on request) from the central BBC server at KNMI.

The aircraft measurements included, amongst others, imaging spectrometer measurements (Cessna, FUB Berlin), combined radiances and microphysical properties (Partenavia, IfT Leipzig) and detailed microphysics and turbulence (Merlin, Meteo France). From these measurements and a lifting fog layer probed by a tethered balloon (IfT Leipzig) with microphysical instrumentation some cases studies were identified for future integrated studies. Ground-based remote sensing measurements provided time series measurements of cloud water which are currently used in CLIWA-NET for systematic model evaluations. Statistical properties provided from these measurements can also be used to generate synthetic clouds – with similiar statistical properties – which are suited as input for 3D radiative transfer models to study the effect of inhomogeneous clouds.

One example of the results are statistics about super-cooled cloud layers. The ground-based measurements showed that these layers existed at about 12 % of the time. Besides their potential risk for aviation these layers have a strong effect on the radiative transfer. The measurements within the regional network could – for the first time – prove that theses layers can exist over more than 100 km and persist for several hours.

Clemens Simmer finally noted that the scientific coordination of the CLIWA-NET project has recently shifted from KNMI to the Meteorological Institute at the University of Bonn (MIUB), with Susanne Crewell as the new scientific coordinator at MIUB. The administrative and financial coordination will remain with KNMI.

4th Workshop on *Baltic Sea Ice Climate,* Norrköping, Sweden, 22-24 May 2002
Anders Omstedt gave a brief report on a workshop on Baltic Sea ice climate. See Appendix 11 for the material presented. The 2002 workshop was already the 4th one in a series of workshops on the subject, which have been held every 3 years since 1993. These workshops are not officially organised in the frame of BALTEX. The 4th workshop in Norrköping reviewed results in different areas such as new climate sea ice data, new observational evidence on sea ice dynamics, and improved modelling including coupling of the air/sea ice/sea system. Access to the BALTEX Data Centres was in particular mentioned as a benefit for the sea ice research community.

Item 7: Vision for BALTEX Phase 2

With item 7, Hartmut Graßl opened discussions on the central issue of this meeting: the definition of the objectives of phase 2 of BALTEX. The Chairman recalled several elements which in his view may be considered important in this context including: BALTEX/*BRIDGE* and its evaluation phase; the Coordinated Enhanced Observing Period (CEOP) of WCRP; the thematic network funding proposal BALTNET submitted to EC-FP5 in late 2001, which unfortunately failed to receive funding approval; the forthcoming 6th Framework Programme

(FP6) of the EC; and the recently submitted Expression of Interest (EoI) BALTIC WATER to the European Commission, which was designed to indicate the interest of the research community to place BALTEX objectives on the agenda of FP6 thematic priorities. The Chairman also made reference to the discussion of the BSSG on possible 'big issues' for BALTEX phase 2 held at its 12th meeting, where the following topics were noted (see page 18 of the 12th BSSG meeting minutes):

'Big issues' list for future BALTEX research, as suggested at BSSG meeting #12

(i) "Severe weather" issues, i.e. extremes with a focus on floods;
(ii) "Water quality" as relevant for the society, including the Baltic Sea;
(iii) Validation of ECMWF forecasts on time scales of weeks to seasonal.

With these introductory remarks the Chairman stimulated a lively discussion on the future main objectives for BALTEX Phase 2. The following topics emerged from this discussion:

Draft list of objectives for BALTEX Phase 2

1) Further narrowing of uncertainties in the energy and water cycle over the Baltic Sea catchment with emphasis on more accurate forecasts of weather extremes;

2) Documentation of climate variability and change since 1800 and projections of regional climate variability and change in the 21st century for the entire Baltic Sea catchment;

3) Use of coupled circulation models and analysis tools, developed during BALTEX Phase 1, for improved modelling of transport and deposition of nutrients and pollutants in both air and water;

4) Involvement of stakeholders in climate and pollution impact studies in order to respond efficiently to societies' needs;

5) Education and outreach by coordinated PhD students training, summer schools on BALTEX topics, development of high school curricula on solutions for (global) environmental change problems, and information of the public by leading BALTEX scientists.

Item 8: *BRIDGE* Evaluation Strategy

Three introductory presentations were given on ongoing *BRIDGE* related activities. Jan Piechura summarized contributions to the *BRIDGE*-Ocean programme part of which consists of hydrographic measurements taken on specific research vessel cruises during several EOPs within the *BRIDGE* period. Analysis and synopsis of these data have only just begun and are ongoing. It was however noted that in-depth analysis of the data is hampered by a lack of required funding. Data products for the Baltic Sea, such as daily digitised SST (e.g. by FIMR) and sea ice maps are currently being established. The redefinition and new implementation of the Oceanographic Data Centre for BALTEX (ODCB) at SMHI (see item 14 of this meeting's agenda) will be an important step to coordinate access to these data which are presently stored at various institutions. Jan Piechura provided a more detailed written report which is given as Appendix 12 to these minutes.

Carl Fortelius gave first results of a specific *BRIDGE* reanalysis project, which is conducted as a joint project of FMI and SMHI. A publication on first results is available[2]. Finally, Daniela Jacob mentioned numerous *BRIDGE* activities as part of the German projects funded through DEKLIM and AFO2000. Modelling groups in the DEKLIM-funded projects – in particular in the BALTIMOS cluster coordinated by Daniela Jacob – use *BRIDGE* as a model validation phase. In the context of BALTIMOS, a project internal concept for the evaluation of *BRIDGE* data is being established. Daniela Jacob suggested to build a more general evaluation strategy upon experiences gained in the frame of BALTIMOS. All speakers noted that an overarching *BRIDGE* evaluation strategy is missing.

Several other ongoing activities based on *BRIDGE* data, including the CLIWA-NET project, were noted by various participants of the meeting. There was, however, a lack of both coordination of and even information on *BRIDGE* related activities and projects noted by the BSSG. Particular questions posed by meeting participants include:

- Does a complete catalogue on *BRIDGE* related projects exist ?
- How is the runoff data base at BHDC – or elsewhere – advanced for *BRIDGE* ?
- Which atmospheric measurements for *BRIDGE* have been stored at BMDC or elsewhere ?
- Are homogeneous atmospheric forcing fields available for the entire *BRIDGE* period ?

Based on these discussions and questions the following action items were formulated:

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

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

Action #5: Hans-Jörg Isemer and Bengt Carlsson shall review existing runoff data for the *BRIDGE* period (at either BHDC or elsewhere) and their availability for interested researchers. In particular monthly mean runoff data for the main rivers feeding into the Baltic Sea shall be derived with high priority (if not already available).

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

Action #7: Daniela Jacob was asked to provide information on the BALTIMOS evaluation concept for *BRIDGE*, to prepare a related summary article for the forthcoming issue of the BALTEX newsletter, and to report to the BSSG at its forthcoming meeting.

As further future activities a dedicated special issue with a suitable science journal was suggested to be organized for *BRIDGE* results. Candidate journals mentioned include *Tellus*, *Nordic Hydrology*, *Theoretical and Applied Climatology* or *Boreal Environment Research*. Specific actions were considered to be too early at the present stage and were postponed.

[2] Fortelius et al., 2002 : The BALTEX regional reanalysis project. Boreal Environment Research 7, 193-202.

Item 9: The Coordinated Enhanced Observing Period of GEWEX (CEOP)

CEOP has made substantial progress through a series of recent actions, a prominent one of them being the CEOP kick-off meeting held 6 to 8 March 2002 in Tokyo, Japan. As recommended by the BSSG at its 12th meeting BALTEX representatives have been involved increasingly in CEOP preparations. The following individuals from the BALTEX community are now members of CEOP panels or Working Groups (WG): Hartmut Graßl (chair of the CEOP Science Steering Committee), Carl Fortelius (member of the CEOP Water and Energy Cycle Prediction [C-WESP] WG), Jürgen Fischer (member of the CEOP Satellite Data Integration WG), and Hans-Jörg Isemer (co-chair of the CEOP Data Management WG). Two websites inform on recent developments of CEOP:
http://www.gewex.com/ceop.htm, and http://monsoon.t.u-tokyo.ac.jp/ceop/index.html.

Hartmut Graßl summarized the overall CEOP strategy by pointing out that the timing of new satellites and GEWEX CSEs provides a unique opportunity for significant benefits from a coordinated observation period, where the term *observations* refer to the tripod of satellite data, *in situ* data taken at selected reference sites, and model output. New satellites include AQUA, TERRA, ENVISAT, ADEOS II and TRMM, the combination of which promises a global coverage of important energy and water cycle components in the climate system. The science focus of CEOP, which is an element of WCRP with particular ties to both GEWEX and CLIVAR, is on *understanding and modelling the influence of land processes on the predictability of global atmospheric circulation and changes in water resources with a focus on source and sink regions.* The two main objectives of CEOP read
(1) *to document and simulate water and energy fluxes over land for water resource applications,* and
(2) *to document the seasonal march of the monsoon systems, assess their driving mechanisms, and investigate potential physical connections.*

Hartmut Graßl pointed out that CEOP may be seen as a prototype of an advanced future global observing system. He continued to stress the importance of CEOP because CEOP

1. is a natural extension to current CSE WEBS (Water and Energy Balance Studies) efforts, which are currently only loosely coordinated with each other;
2. incorporates global models and analyses. These have been neglected by the Continental Scale Experiments (CSE), which have focused on regional models;
3. brings together all the other GEWEX projects, which have not been adequately coordinated with the CSEs;
4. brings together GEWEX and CLIVAR projects (in particular through its monsoon study component);
5. begins to create pilot global hydroclimatological data sets, which could be continued, depending upon CEOP success;
6. provides new global research opportunities for other ongoing regional and global research efforts;
7. will develop an improved understanding of global water and energy components, which should lead to improved climate prediction.

Hartmut Graßl noted that the timing of the individual CEOP phases has been revised and now reads as follows:

Revised CEOP Schedule

Preliminary Data Period (EOP1)	Jul. 2001-Sept. 2001
Build-up Phase:	Oct. 2001-Sept. 2002
EAOP-I:	Oct. 2002-Sept. 2003
EAOP-II:	Oct. 2003-Dec. 2004

The Chairman closed his overview by indicating that the next annual CEOP general assembly (as the follow-up of the kick-off meeting in Tokyo) has now been scheduled to be held at Free University of Berlin (FUB), during 31 March to 4 April 2003. Jürgen Fischer has agreed to act as the host and local organizer of this meeting.

Carl Fortelius, as the second speaker under this item, briefed the BSSG on the C-WESP Working Group. This Group has been organized to address CEOP's first objective (see above) associated with the use of enhanced observations to better document and simulate water and energy fluxes and reservoirs over land on diurnal to annual temporal scales and to better predict these on temporal scales up to seasonal for water resource applications. The research plan is to conduct a comprehensive 2-year synoptic climatological case study of regional CSE and global water and energy budgets as a guide to the interpretation of longer-term global and regional analyses and data sets. Starting with the current efforts to close simplified vertically integrated water and energy budgets with observations and analysis and beginning efforts to simulate these budgets regionally, CEOP will begin the effort to transfer this knowledge to global scales, include more water and energy cycle processes, and begin to examine the vertical structure in the atmosphere and land. Carl Fortelius continued by summarizing activities of the group started at the CEOP kick-off meeting in Tokyo. The group was established with at least one member of each CSE. Initial initiatives were to collect WEBS (Water and Energy Balance Study) publications. A comparison on the present state-of-the-art error in "closing" the energy budget in the individual CSE catchments is ongoing. From a BALTEX point of view, the reanalysis project for *BRIDGE* (co-ordination C. Fortelius) and the DEKLIM-BALTIMOS project (co-ordination D. Jacob) were considered as ongoing BALTEX contributions to C-WESP.

Jürgen Fischer gave an overview on the satellite data component of CEOP. Following his general overview on available satellite data for CEOP he presented a more detailed table on which water and energy cycle parameters may be obtained from these satellites and explained the different data levels planned for the CEOP satellite data integration (see Appendix 13). He then continued by focusing on future plans and ongoing research and activities at Free University of Berlin (FUB) with satellite data related to BALTEX, which have been concentrated on METEOSAT for the period since 1992, and will include both TERRA-MODIS (Medium Resolution Imaging Spectroradiometer) data and products (beginning in 2001, cloud parameters such as cloud top temperature and pressure, cloud optical thickness, particle phase and size, and cloud water path) and ENVISAT-MERIS (Medium Resolution Imaging Spectrometer) data and products (beginning in 2002, in particular atmospheric water vapour and cloud parameters, such as cloud top pressure, cloud optical thickness and cloud albedo). Jürgen Fischer demonstrated a recently established MODIS data centre function at FUB, the FUB MODIS NRT (non real-time) website (see http://wew.met.fu-berlin.de/nrt), where data of the most recent orbit may be viewed and even copied (with some restrictions) within 5 hours after the recent orbit. He concluded by indicating that the existing MODIS data function, and a similar one planned for MERIS data may be integrated in the overall CEOP satellite data integration activities as a European component of and contribution to CEOP.

The planning for collecting in situ data at CEOP reference sites is among the most advanced components of CEOP, as Hans-Jörg Isemer reported in his summary on CEOP reference sites. More than 30 sites worldwide have now been approved, three of them are coordinated through BALTEX: 1) the *Sodankylä* Observatory in Finland, operated by the Finnish Meteorological Institute (FMI), 2) the Meteorological Observatory *Lindenberg* in Germany, operated by the German Weather Service (DWD), and 3) the experimental Atmospheric Boundary Layer Measurement Site at *Cabauw* in The Netherlands, operated by the Royal Netherlands Meteorological Institute (KNMI). The responsible local CEOP site managers are Bengt Tammelin (FMI), Frank Beyrich (DWD), and Fred Bosveld (KNMI). All 3 sites will deliver high-resolution radiosonde, mast, various modern ground based remote sensing, complete surface radiation and turbulent flux, standard surface meteorology, and soil data, thus meeting requirements for a CEOP 1-D site. H.-J. Isemer continued to review the CEOP reference site data exchange policy, which has been established with major input from BALTEX. It has now been adopted by CSEs and included reference sites. Most of the sites have delivered sample data sets to the Central CEOP Data Archive. The present planning foresees that a composite data set for July to September 2001 (EOP1 of CEOP) shall be put together and be available by January 2003. The main aim is to compile data for the period October 2002 to December 2004 thus archiving composite data for two full annual cycle periods within CEOP. Most recent developments and updates with regard to CEOP reference site issues may be viewed at http://www.joss.ucar.edu/ghp/ceopdm/.

The BSSG expressed satisfaction with the development which CEOP has made and appreciated the contributions of all involved BALTEX individuals and institutions. The engagement of the three national weather services, FMI, DWD and KNMI, in providing reference site data was in particular acknowledged. BSSG also suggested that individual scientists and institutions in the BALTEX community shall now be stimulated to contribute to the science of CEOP and GEWEX by making plans for an extensive use of the CEOP data and products.

In the course of the discussion on CEOP, Sven Halldin suggested to explore whether the twin site Norunda/Marsta, located north of Uppsala in Sweden, may be an additional reference site candidate for CEOP. This site was established in the frame of the NOPEX programme and has meanwhile contributed to several land-air exchange measurement projects. Sven Halldin suggested to contact Anders Lindroth at Lund University for more detailed discussion on the potential of Norunda/Marsta to provide data for CEOP. Hans-Jörg Isemer will contact Anders Lindroth on details of the Norunda data sets and Hartmut Graßl agreed to initialise steps within CEOP to receive approval for Norunda being accepted as an additional reference site.

Item 10: Science and Implementation Plan for BALTEX Phase 2

With this item 10, a more general discussion on strategic steps for the implementation of BALTEX phase 2 was taken up again. Anders Omstedt, in his capacity as the Vice-chairman of the BSSG, opened the discussion. He stressed that the currently existing BALTEX Science and Initial Implementation Plans were established in the early build-up phase of BALTEX. Being valid documents for the past and present ongoing research activities in the BALTEX programme, both would need now either amendments or even a complete re-writing for BALTEX phase 2. Anders Omstedt emphasized the importance of both documents. He pointed out his view that prior to a major funding proposal to EC's FP6, both the Science and Implementation Plans for phase 2 of BALTEX will have to be finalized, for which action steps are now urgently to be put in place. A basis for any documents on the future objectives of BALTEX will have to be built upon a critical, in-depth state-of-the-art review on both the

achievements of BALTEX so far and unresolved issues, related to the objectives formulated at the beginning of BALTEX. He reminded the BSSG that it should be the scientific questions which firstly shall be formulated based on sound and comprehensive discussions of the appropriate groups and individuals. The options for getting financial support for the future research should be clarified as a secondary step. He pointed out the danger that the definition of BALTEX phase 2 may be too much dictated by what the EC may offer as funding possibilities through the FP6 work programme, instead of being founded on science-related issues. BALTEX should not entirely rely on EU funding. A. Omstedt continued to stress that also BALTEX phase 2 should be tightly related to GEWEX. He suggested a closer connection of BALTEX researchers to end-users and stakeholders in order to coordinate research objectives with the main questions society poses to the scientific communities.

A lively discussion followed where the BSSG unanimously agreed to rapidly establish both a science review on BALTEX achievements as well as new (or updated) science and implementation plans for BALTEX phase 2. It was noted that GEWEX will continue to be the overarching frame for BALTEX. Several speakers indicated that other CSEs in GEWEX have already stepped – or are currently in transition - to their second phases, and even GEWEX is presently in transition to its phase 2. A general common feature of these developments are directions towards more application or user-orientation of the research.

The majority of the BSSG stressed the importance of substantial funding for BALTEX at the EU level, in particular in view of the decreasing possibilities at the national level in several countries. It was also noted by several speakers that for the New Accession States (NAS) to the EU (in the case of BALTEX: Poland, Estonia, Latvia and Lithuania) EU funding contributions may be essential to guarantee further BALTEX research at all. A major proposal to FP6 at the next possible call was supported and suggested.

Item 11: Expression of Interest (EoI) to the European Comission

In March 2002, the European Commission (EC) invited the European science community to submit expressions of interest (EoI) which shall be used e.g. for defining details of the work programme for the 1st call of the upcoming 6th Research Framework Programme (FP6). The focus of these EoI is to specify the thematic priorities for the new funding instruments for FP6, Integrated Projects (IP) and Network of Excellence (NoE). An EoI for an Integrated Project BALTIC WATER, coordinated by Max-Planck-Institute for Meteorology, Hamburg (Hartmut Graßl as the BALTEX BSSG Chair) and GKSS Research Centre Geesthacht (Hans-Jörg Isemer as head of the International BALTEX Secretariat) was submitted to the EC on 5 June 2002. A consortium of 43 institutions from 12 countries participated at the Baltic Water EoI, originating not only from the BALTEX and NOPEX communities, but including also new participants with competences in fields with were considered as useful topics for BALTIC WATER, and, hence, phase 2 of BALTEX. Hans-Jörg Isemer briefly reviewed the BALTIC WATER EoI. See Appendix 14 for the complete EoI document.

Several other EoIs were brought to the attention of the BSSG. One of these is an EoI for an IP CAWME (Climate and water management in Europe) which is coordinated by Daniela Jacob of Max-Plank-Institute for Meteorology in Hamburg. CAWME and BALTIC WATER have similar objectives, however, in contrast to BALTIC WATER, CAWME has a broader regional focus including not only the Baltic Sea basin but other catchments in Europe, such as the Mediterranean basin and the Alpine region. The BSSG noted a possible conflict between in particular these two EoI, because, with the limited overall budget available within FP6 on

the one side and the envisaged size of individual IPs on the other side, it seems unlikely that both IP will get funding approved by the EC.

Other EoIs have probably been submitted to the EC with a focus on issues relevant for BALTEX phase 2. The EC will analyse and publish all submitted EoIs later in 2002 on the Cordis website, and this EoI data bank will have to be carefully explored for further EoI with relevance for BALTIC WATER, and BALTEX phase 2 in general.

BSSG expressed satisfaction that, with the BALTIC WATER EoI submitted, a further step has been done to place BALTEX related science issues on the agenda for FP6.

Item 12: New FP6 Funding Instruments

A special presentation was skipped because of the shortness of time. However, aspects of both Integrated Projects (IP) and Networks of Excellence (NoE), the two new funding instruments of the forthcoming 6th Framework Programme (FP6) of EC, were discussed and explained under several other items of this meeting's agenda. Based on earlier discussions in the preparation phase for Baltic Water it became evident that an Integrated Project is considered to be the appropriate funding instrument for a BALTEX proposal to FP6.

Item 13: Report of BALTEX Working Groups

Radar Working Group
Jarmo Koistinen, chair of the BALTEX WG on Radar (WGR), gave a comprehensive overview on the present status of the WGR, the BALTRAD weather radar network and current research related to radar relevant for BALTRAD. See Appendix 15 for his combined detailed report on the WG and the BALTEX Radar Data Centre. BSSG appreciated again with pleasure the continuing contribution of the WG to the BALTEX programme. Particularly promising are the new radars in Estonia, Norway, Denmark, and Belarus. BSSG encouraged WGR and the BALTEX Radar Data Centre to undertake any steps possible towards realizing the inclusion and usage of data of these new instruments for BALTRAD.

Working Group on Energy and Water Cycles
Daniela Jacob, chair of the BALTEX Working Group on Energy and Water Cycles (WGEW), briefed the BSSG on developments related to the group. WGEW has not met since the preceding BSSG meeting, communications were done via e-mail. The central objective of WGEW is a summary state-of-the-art review on BALTEX achievements. A draft skeleton for such a report has been worked out and individuals responsible for individual chapters have been suggested. These individuals include:

Atmosphere:	Daniela Jacob
Precipitation:	Karl Bumke, Franz Rubel
Run-off:	Phil Graham
Lakes:	Timo Huttula
Land-air:	Bart van den Hurk
Sea-air:	Sven-Erik Gryning, Ann-Sofi Smedman
Ocean:	Anders Omstedt, Andreas Lehmann, Jan Piechura
Sea ice:	Matti Leppäranta

D. Jacob pointed out that not all group members have confirmed their participation. BSSG acknowledged that all efforts towards finalizing a report on BALTEX achievements should be taken. **Action #8 was given to Daniela Jacob** to continue all possible steps towards meeting the objectives of WGEW, where the finalization of a state-of-the-art review on BALTEX by WGEW has highest priority.

Item 14: Data Centre Reports

Oceanographic Data Centre for BALTEX (ODCB)
An important issue under item 14 was the introduction of the new Oceanographic Data Centre for BALTEX (ODCB) at the Swedish Meteorological and Hydrological Institute (SMHI) in Göteborg, Sweden. Bertil Håkansson, the appointed head of ODCB, summarized actions, which had been taken as a response to BSSG's decision on implementing OCDB (see the minutes of the 12th BSSG meeting). An ODCB Implementation Group had been set up following earlier suggestions of BSSG, including Anders Omstedt (Chair), Bertil Håkansson, Andreas Lehmann, Jan Piechura, Pekka Alenius, and Hans-Jörg Isemer. Following preparatory e-mail contacts, a telephone conference was held on 19 April 2002, where the Group agreed on principles for the objectives of ODCB. See Appendix 16 for the minutes of this telephone-conference. The Group established an ODCB objectives and implementation draft document (see Appendix 17), which was presented by Bertil Håkansson at this BSSG meeting. The draft document contains ODCB's objectives, the envisaged data types and time periods covered, data quality issues, and an outline of the data exchange policy guidelines. An essential issue of the implementation is that ODCB will build up its data base in two phases, where the 1st phase is dedicated to the time period 1999 to 2004, including both the *BRIDGE* and CEOP periods, while the 2nd phase, which is optional and depending on completion of phase 1, will extend to both earlier and future time periods. Implementation of phase 2 will be detailed in close cooperation with potential ODCB data users.

B. Håkansson confirmed SMHI's support for maintaining the ODCB. He introduced Philip Axe at SMHI / Göteborg as the contact person for all technical issues related to ODCB. Further future activities will include a workshop to be held at SMHI / ODCB's facilities where both data providers and potential data users, in particular representatives from the ocean modelling community, shall meet to learn about ODCB's potential and data accumulated so far, as well as stimulate the use of BALTEX oceanographic data stored at ODCB. This workshop is planned for late 2002 or early 2003, depending on progress in implementing ODCB facilities and data bases.

BSSG acknowledged the rapid progress of ODCB's implementation and appreciated the contributions of all involved persons. The engagement of SMHI to operate ODCB was gratefully acknowledged. BSSG approved the ODCB document (Appendix 17) and encouraged future actions along the lines suggested in this document for an as rapid and smooth as possible implementation of ODCB. BSSG formulated **Action #9 for Bertil Håkansson**, with assistance of the ODCB Implementation Group (**Anders Omstedt, Andreas Lehmann, Jan Piechura, Pekka Alenius and Hans-Jörg Isemer**), to continue implementing ODCB along the lines given in the approved ODCB implementation document.

BALTEX Radar Data Centre (BRDC)
The BALTEX Radar Data Centre (BRDC) is operated by SMHI in Norrköping, Sweden. Jarmo Koistinen, representing Daniel Michelson, the head of BRDC, gave the summary re-

port on BRDC (see Appendix 15). Major achievements include the finalising of several BALTRAD products for the entire BRIDGE period October 1999 to February 2002:

1) DBZC composites of radar reflectivity factor, 2x2 km horizontal resolution, BALTRAD coverage every 15 minutes;
2) Gauge-adjusted accumulated precipitation, 2x2 km horizontal resolution, BALTRAD coverage every 3 hours;
3) Gauge-adjusted accumulated precipitation, 2x2 km horizontal resolution, BALTEX region coverage every 12 hours;
4) Vertical profiles of wind speed and direction at selected BALTRAD radar stations, 1 hour time resolution.

BRDC is currently seeking confirmation to continue producing these products (and possible extensions) for the two annual periods of CEOP. Another current issue is to investigate possibilities to both technically connect new radars (e.g. in Estonia, Norway, Denmark, and Belarus, see also item 13 of this meeting's agenda) to BALTRAD and assure the inclusion of these new data into the BALTRAD products.

BALTEX Hydrological Data Centre BHDC
The BALTEX Hydrological Data Centre (BHDC) is operated by SMHI Norrköping, Sweden. Markku Rummukainen gave the report for Bengt Carlsson, the head of BHDC. Appendix 18 gives an overview on available daily runoff data for the period 1980 to 2001. The years 2001 (and even 2000) may still be incomplete because there is a time delay of one year or more before runoff data are delivered to data centres. The particular success of BHDC is the collection of *daily* data. Delivery of data from Poland and Russia are not regular, and need improvement. Unfortunately, delivery of daily runoff data from several Hydrometeorological Services in Eastern Europe are dependent on financial support, which has been guaranteed in the past through contracts between the BALTEX Secretariat and the respective Hydrometeorological Services. Hans-Jörg Isemer pointed out, that there are no financial resources available to continue such contracts.

BSSG encouraged BHDC to continue efforts in order to complete BHDC's data files from any sources possible. A complete as possible coverage of runoff data for the BRIDGE period was considered to have high priority. **Action #5** was again requested (see item 8 of this meeting's agenda) from **Hans-Jörg Isemer and Bengt Carlsson** to review existing runoff data for the *BRIDGE* period (at either BHDC or elsewhere) and their availability for interested researchers. In particular monthly mean runoff data for the main rivers discharging into the Baltic Sea shall be derived with high priority (if not already available).

BALTEX Meteorological Data Centre BMDC
The BALTEX Meteorological Data Centre (BMDC) is operated by the German Weather Service (DWD) in Offenbach, Germay. Sabine Hafner, head of the BMDC, recalled that DWD is continuously publishing annual reports on BMDC's activities and coverage of its data base. The last BMDC Report #5 was mentioned and a review on available data based on the available report was given. S. Hafner recalled that, in addition to standard synoptical data, several other data types are stored at BMDC. Examples are included in Appendix 19. S. Hafner noted that also long-term climate data are part of BMDC, however, the coverage of these data in different countries is still heterogeneous and needs completion.

Sabine Hafner continued by stating that DWD regrettably has no resources available to maintain and operate the BMDC beyond the year 2004. The new engagement of DWD becoming

the host for other data centres, such as the Satellite Application Facility for Climate Monitoring (CM-SAF), makes this cut in responsibility necessary. Without additional external financial support, DWD will have to close down activities related to BMDC at the end of the year 2004.

BSSG members raised deep concern on DWD's statement concerning BMDC. The role of DWD in operating BMDC, and also the importance of the BALTEX data centres in general for the BALTEX programme, were stressed and definitely acknowledged. It was also noted that national Hydrometeorological Services are favourable candidates for maintaining data centres because of their expertise and available infrastructure. Suggestions were put forward such as merging the BMDC with CM-SAF or with the Global Precipitation Climatology Centre (GPCC), both hosted at DWD. Gerhard Adrian, as the official DWD representative in BSSG, could not attend this meeting, hence, a detailed discussion on finding solutions *integrating* DWD in a solution to the problem beyond 2004 was hampered. BSSG asked **Hartmut Graßl (Action #10)** to contact Gerhard Adrian (DWD) and investigate possible solutions for maintaining BMDC with DWD involvement beyond the year 2004. This issue needs urgently to be taken up at the next BSSG meeting in order to guarantee the full functioning of a BALTEX Meteorological Data Centre beyond 2004.

Item 15: Preparations for BALTEX Phase 2

As a summary of the extended discussions under previous items of this meeting, the following 4 major steps for the future BALTEX programme need to be undertaken:

15.1 Evaluation of BRIDGE data and products
Action items #3 to #7 (see item 8 of this meeting's agenda) relate directly to this topic. Key importance have both a review on ongoing activities and an evaluation plan, hence the following items need priority consideration:

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

Action #7: Daniela Jacob to provide information on the BALTIMOS evaluation concept for *BRIDGE*, to prepare a related summary article for the forthcoming issue of the BALTEX newsletter, and to report to the BSSG at its forthcoming meeting.

15.2 Review of achievements of BALTEX phase 1 (1994 – 2002)
BSSG considered this to be the task of the Working Group on Energy and Water Cycles (WGEW), as has already been discussed under item 13 of this meeting's agenda. The relevant action item #8 was repeated, reading as follows:

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

15.3 Establishment of Science and Implementation Plans for BALTEX phase 2
Several options were discussed. Agreement was obtained that a state-of-the-art review for BALTEX phase 1 is mandatory as input for establishing new plans for BALTEX phase 2, hence, completion of action #8 is a pre-requisite.

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

15.4 Preparation of an Integrated Project proposal to FP6

BSSG concluded that a FP6 proposal should be based on a completed science plan for BALTEX phase 2. Also, the preparations for FP6, as manifest in the BALTIC WATER EoI, have given some directions, and a more detailed effort should be based on clearer knowledge of the FP6 work programme. Several BSSG members noted that the FP6 work programme, or at least indicative draft versions, are expected to be available at the major FP6 Opening Conference, scheduled for 11 to 13 November 2002 in Brussels, Belgium. BSSG concluded to start intensive preparations for an FP6 proposal not before this conference, but suggested to convene for the next BSSG meeting directly after the FP6 Conference for decisions on further steps towards a funding proposal to FP6 (see next item).

Item 16: Date and Place of the next BSSG Meeting

The BSSG decided to schedule the next BSSG meeting for **Monday 18 to Wednesday 20 November 2002**, in due course before the deadline of the 1st FP6 call. With this date the BSSG will meet just one week after the major opening conference of FP6, scheduled for 11 to 13 October 2002 in Brussels, Belgium. It is expected that detailed information on the work programmes for the 1st FP6 call will be readily available at that time for a suitable and final decision on the contents of the Integrated Project proposal to FP6.

Anders Omstedt suggested **Lund University in Sweden** as the host of the next BSSG meeting. Professor Anders Lindroth at Lund University has been a leading scientist in the NOPEX project and recently indicated interest in a closer cooperation with the BALTEX programme. Anders Lindroth agreed to act as the local organiser of the 14th BSSG meeting.

The BSSG gave **Action #12 to Hans-Jörg Isemer** to prepare for the 14th BSSG meeting at Lund University on 18 to 20 November 2002, in close cooperation with Anders Lindroth acting as the local organiser.

In view of the discussion held at this meeting BSSG suggested to hold a scientific workshop with a focus on results based on *BRIDGE* data. **Action #13 was given to Hans-Jörg Isemer** to organize a workshop dedicated to results based on *BRIDGE* data in conjunction with the 14th BSSG meeting.

Item 17: Any other Business

The BSSG suggested to continue the series of International BALTEX Study Conferences. Following BALTEX traditions the 4th Study Conference on BALTEX shall be held during summer 2004. BSSG members suggested the island of Bornholm (Denmark) as a potential location. **Hans-Jörg Isemer accepted Action #14** to contact Sven-Erik Gryning at Risø National Laboraties, Roskilde, Denmark, to jointly explore possibilities for holding the 4th Study Conference on BALTEX on the island of Bornholm during summer 2004.

Item 18 Closing of the Meeting

The Chairman thanked all participants – both BSSG members and meeting guests - for their constructive contributions to this meeting, and to the steering process of BALTEX in general. For the whole group, he heartily appreciated the excellent environment for and support to this meeting provided by EBS as the meeting's host. The Chairman closed the meeting at noon on Wednesday, 19 June 2002.

Acronyms and Abbreviations

ADEOS-II	Advanced Earth Observing Satellite-II
AFO2000	Atmosphere Research Funding Programme of BMBF
AMSR-E	Advanced Microwave Scanning Radiometer
AQUA	Earth Observing Satellite
BALTEX	Baltic Sea Experiment
BALTIC WATER	Name of an EoI sent to the EC in June 2002
BALTIMOS	DEKLIM project funded by BMBF
BALTNET	Thematic network proposal for BALTEX to FP5
BALTRAD	BALTEX Radar Network
BASIS	Baltic Air-Sea-Ice Study
BBA	Bachelor of Business Administration
BBC	BALTEX BRIDGE Campaign
BHDC	BALTEX Hydrological Data Centre
BIREME	Baltic Sea research programme by the academy of Finland
BMBF	Bundesministerium für Forschung und Technologie, Bonn, Germany
BMDC	BALTEX Meteorological Data Centre
BRDC	BALTEX Radar Data Centre
BRIDGE	The Main BALTEX Experiment, 1999-2002
BSDCF	BALTEX Satellite Data Centre Function
BSRN	CEOP Basic Surface Radiation Network
BSSG	BALTEX Science Steering Group
CAATER	Co-ordinated Access to Aircraft for Transnational Environmental Research
CAWME	EoI: “Climate and water management in Europe”
CEEMAN	Central and East European Management Development Association
CEOP	Coordinated Enhanced Observing Period
CESAR	Cabauw Experimental Site for Atmospheric Research
CLIVAR	Climate Variability and Predictability Programme
CLIWA-NET	BALTEX Cloud Liquid Water Network (EU-FP5 project)
CM-SAF	Satellite Application Facility for Climate Monitoring at DWD
CSE	Continental Scale Experiment
C-WESP	CEOP Water and Energy Cycle Prediction
DBZC	Composite images of radar reflectivity, measured in dBZ
DEKLIM	German Climate Research Programme
DTU	Technical University of Denmark
DWD	Deutscher Wetterdienst, Offenbach / Germany
EAOP I/II	Enhanced Annual Observation Period
EBS	Estonian Business School
EC	European Commission
ECMWF	European Centre for Medium Range Weather Forecast, Reading / UK
ENVISAT	Environmental Satellite, ESA
EoI	Expression of Interest from EU for FP6
EOP	Enhanced Observational Period
ERASMUS	European Community programme in the field of higher education
EU	European Union
FIMR	Finnish Institute of Marine Research, Helsinki / Finland
FMI	Finnish Meteorological Institute, Helsinki / Finland
FP5	Fifth Framework Programme of the EU
FP6	Sixth Framework Programme of the EU

FUB	Freie Universität Berlin
GEWEX	Global Energy and Water Cycle Experiment
GKSS	GKSS Research Centre, Geesthacht / Germany
GPCC	Global Precipitation Climatology Centre
IMGW	Institute for Meteorology and Water Management, Polish national Hydrometeorological Service,
IOPAS	Institute of Oceanology, Sopot, Poland
IP	Integrated Project (EU project type within FP6)
KNMI	Royal Netherlands Meteorological Institute, De Bilt / The Netherlands
LHA	Latvian Hydrometeorological Agency
LWP	Liquid Water Path
MBA	Master of Business Administration
MDB	Murray-Darling Basin Water Budget Project (a GEWEX CSE)
MERIS	Medium Resolution Imaging Spectrometer onboard ENVISAT
MGO	Main Geophysical Observatory at St. Petersburg, Russia
MICAM	Microwave Intercomparison Campaign (August 2001, Cabauw)
MICE	Modelling Impacts of Climate Extremes (FP5 project)
MIUB	Meteorological Institute at the University of Bonn, Germany
MODIS	Medium Resolution Imaging Spectroradiometer onboard TERRA
NECC	Nordic Centre for Studies of Ecosystem Carbon Exchange and Its Interactions with the Climate System
NoE	Network of Excellence (EU project type within FP6)
NOPEX	Northern Hemisphere Climate-Processes Land-Surface Experiment
ODCB	Oceanographic Data Centre BALTEX
PRUDENCE	Prediction of regional scenarios and uncertainties for defining European climate change risks and effects, EU FP5 funded project
RASS	Radio Acoustic Sounding System
RCAF-PAS	Research Centre of Agricultural and Forest Environment, Poznan, Poland
RISØ	Risø National Laboratories, Risø, Denmark
RSHI	Russian State Hydrological Institute, St. Petersburg, Russia
SMHI	Swedish Meteorological and Hydrological Institute, Norrköping/Sweden
SSG	Science Steering Group
SYKE	Finnish Environment Institute
TERRA	One Earth Observing Satellite from NASA
TRMM	Tropical Rainfall Measuring Mission – satellite by NASA/NASDA
WCRP	World Climate Research Program
WEBS	Water and Energy Balance Studies
WGEW	BALTEX Working Group on Energy and Water Cycles
WGR	BALTEX WG on Radar

Appendix 1: Workshop agenda

EUTROPHICATION AND POLLUTION IN THE BALTIC SEA BASIN

A Workshop prior to the 13th BALTEX-SSG Meeting
Estonian Business School - Centre for Baltic Studies
Tallinn, Estonia
Monday, 17 June 2002

Chair: Sirje Keevallik, Estonian Business School, Tallinn, Estonia

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

14.10 ***Research priorities for HELCOM monitoring and assessment purposes***
Juha-Markku Leppänen, HELCOM Secretariat, Helsinki, Finland

14.35 ***Regional eutrophication management - status and challenges. Experiences from the Baltic Co-operation BERNET .***
Mogens Michael Möller, Fyns Amt, Odense, Denmark

15.00 ***Sustainable development of the industrial sector in the Baltic Sea Region***
Ingvar Wängberg, IVL Swedish Environmental Research Institute, Göteborg, Sweden

15.10 ***Baltic Sea models and management: The decision support system of MARE***
Frederic Wulff, Stockholm University, Sweden

15.35 ***Modelling and experimental approaches in Baltic Sea biogeochemical research***
Bernd Schneider, Institute for Baltic Sea Research IOW, Warnemünde, Germany

16.00 *Break*

16.20 ***Persistent Organic Pollutants (POPs) in the Baltic Sea: Sources, pathways, fate and environmental and socio-economic impacts***
Jozef Pacyna, Norwegian Institute for Air Research NILU, Kjeller, Norway

16.45 ***Long-term historical reconstructions and future scenario predictions of anthropogenic substances transported in the atmosphere***
Mariza Cabral, GKSS Research Centre Geesthacht, Germany

17.05 ***Fluxes of mercury in the Southern Baltic Sea***
Ingvar Wängberg, IVL Swedish Environmental Research Institute, Göteborg, Sweden

17.25 *Break*

17.40 ***Atmospheric fluxes of heavy metals to the Baltic Sea***
Gerhard Petersen, GKSS Research Centre Geesthacht, Germany

18.00 ***Nitrogen flux to the Baltic Sea: Uncertainties and significance to eutrophication***
Marke Hongisto, Finnish Meteorological Institute FMI, Helsinki, Finland

18.20 ***Air-sea exchange processes as atmospheric contribution to marine eutrophication***
Lise-Lotte Sörensen, Risö National Laboratory, Roskilde, Denmark

18.40 Concluding discussion and closing of the workshop

Appendix 2: Workshop presentation abstracts

Research priorities for HELCOM monitoring and assessment purposes

Juha-Markku Leppänen
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Abstract
The aim of the Convention on the Protection of the Marine Environment of the Baltic Sea Area is, *inter alia*, to protect the Baltic Sea (water, seabed, biota) from any kind of pollution (land-based sources, airborne, marine transport, including dumping, seabed and subsoil exploitation) and to restore the ecosystem into a balance as well as to conserve natural habitats and biological diversity and to protect ecological processes.
HELCOM is not a scientific organization *per se*, but is using best available scientific knowledge for the basis of its decisions.
The priorities of the work of the Monitoring and Assessment Group - HELCOM MONAS include e.g. the following:

- To produce assessments, which cover nutrients, hazardous and radioactive substances, various components of the marine environment (hydrography, chemistry, biology).
- To coordinate, update and develop monitoring programmes according to assessment requirements and scientific knowledge in the Contracting Parties.
- To promote and develop the application of new and effective methods for monitoring and assessment.
- To identify gaps in knowledge and promote corresponding scientific research.

In the preparation of the scientific background assessments, the following shortcomings have been identified:

- The present program is not guaranteed due to the varying scientific priorities of the responsible institutes and changing financial priorities of the CPs.
- Regional coverage of the data is uneven due to the varying capacity and interest of the CPs to carry out their commitments.
- All the essential parameters are not necessarily included in the programs due to the lack of finances or capacity.
- Especially the methods to monitor biological effect of harmful substances are largely lacking.
- Sampling frequency is often too low, especially for the pelagic variables, to allow proper statistical trend analysis.
- QA procedures are not satisfactory to guarantee the comparability of all data.

The following improvements have been proposed:

- The present monitoring program and time series should be guaranteed in the future, including “background information”.
- Despite the varying scientific priorities of the responsible institutes, CPs should keep their commitments in supporting the joint program.
- Monitoring and assessment should be a regular and integrated process including regular data flow form measurements and QA procedures to assessments.

- Numeric models, automatic sampling and recording systems including satellite imagery should be developed and implemented more effectively.
- Assessment work should be made interesting for the scientists.
- Socio-economic driving forces should be included.

Regional eutrophication management - status and challenges. Experiences from the Baltic co-operation BERNET

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Nature Management and Water Environment Division
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DK-5220 Odense S.Ø.
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Coastal eutrophication problems and eutrophication management was compared among 7 administrative regions and their catchments situated along the Baltic Sea coastline from the Bothnian Bay to Kattegat.

The cross-regional analysis were carried out within the frames of BERNET (Baltic Eutrophication Regional Network), which comprises the regions of Ostrobothnia (Finland), Pärnu (Estonia), Kaliningrad (Russia), Gdansk (Poland), Schleswig-Holstein (Germany), Båstad-Laholm-Halmstad municipalities and Hallands Len (Sweden), and Fyn County (Denmark).

The aim of BERNET is to describe the regional eutrophication problems in the Baltic Sea Area, to improving the management of these problems at the sub-national level, and through this support the Ministerial Declaration of the Baltic Sea States on a 50% reduction in nutrient discharges. The assembly of regions offers a unique opportunity to compare eutrophication problems and -management strategies across significant differences in natural pre-conditions, land use, infrastructure, economy and history.

All fjords, lagoons and coastal waters of the 7 regions suffer from eutrophication, but common quantitative criteria are needed to compare eutrophication problems in coastal waters with differing biological structure, hydrographic conditions, and nutrient loads.

Although eutrophication is present in all regional waters, the sources of eutrophication vary among the regions. In the regions belonging to the previous Eastern Europe, waste water significantly contributes to the nutrient load while in the Western European regions, agriculture is a major nutrient source.

A strong correlation was found across the seven regions between input of nitrogen nitrogen fertilizer (manure and artificial) and the diffuse nitrogen run-off, pointing at restrictions in nitrogen input as one of the compulsory means to reduce the diffuse nitrogen run-off from agriculture.

Two scenarios calculated by the BERNET regions show that 1) if nitrogen run-off from agriculture in all the BERNET regions was harmonized at the present average level of Pärnu, Kaliningrad and Gdansk, the total nitrogen load from the seven regions would be reduced by 40% - 80%, and 2) if it was harmonized at the present level of Schleswig-Holstein and Fyn, the nitrogen load would increase by 50% - 75%.

The development of the agricultural sector in the Eastern European regions in the coming years, and the massive nutrient losses from the present intensive agricultural production in most Western European regions, therefore cause serious concern of increased eutrophication of the Baltic Sea in the future, and calls for a converging development of a sustainable agriculture in the Baltic Sea Area.

From the experience of the BERNET co-operation, a number of development needs were identified by the speaker:

Harmonised monitoring strategies and -methods - also at the regional level, and including regional (coastal) waters.

International databases and free flow of data with reliable and comparable data on water quality and pollution sources.

Improved regular reporting to regional decision makers, national authorities, the general public.

Models to describe the consequences of nutrient load from increased agricultural production in the regional waters (bays, lagoons, fjords)

Hydrodynamic models to describe water and nutrient exchanges between regional waters (lagoons, fjords and bays) and the open Baltic Sea - including the transport of particulate matter and macrostructures (algae ...)

Ecological models to describe and predict changes in the biological structure.

Models for water and nutrient exchanges between macroregions in the Baltic Sea. Quantification of water and nutrient exchange in the Baltic Sea. To which extent are nutrients turned over and possibly sedimented before reaching e.g. the Danish Straits? How will an increased nutrient load in the Eastern Baltic Sea countries affect the national waters of other national waters.

Scenarios of alternative options for a sustainable development of agriculture in the Baltic Sea Region:

- Scenarios to describe the consequences of other options (reduced fertilizing, preservation of wetlands, reduced draining ...)
- Development of new inventory techniques
- Relations between agricultural practices and the diffuse nutrient load

Socio-economic studies of agricultural development:

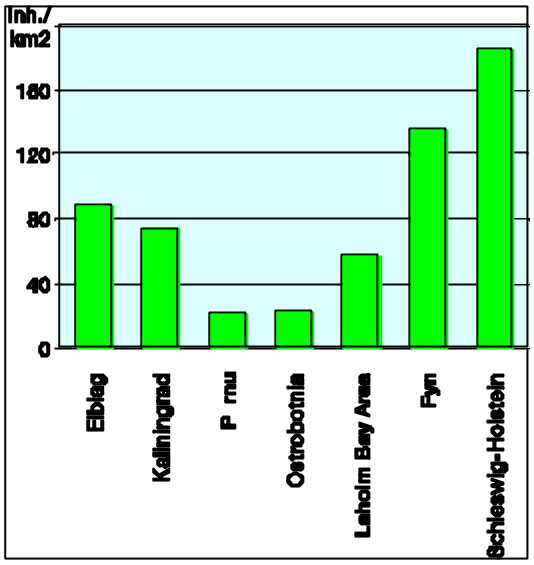
- impact of EU-policies,
- options and consequences of changed EU-policy,
- alternative strategies for a sustainable European agriculture

Definition of pristine conditions

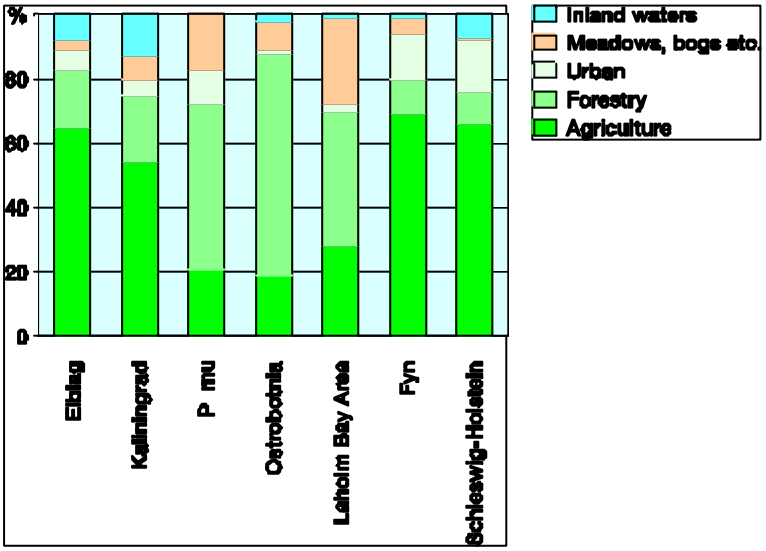
- Comparisons to historic data
- Land/Sea models to predict ecological consequences of regulations
- Estimation of the socio-economic consequences of regulations

Development of institutional settings to assure the concept of identification - action - evaluation of environmental problems.

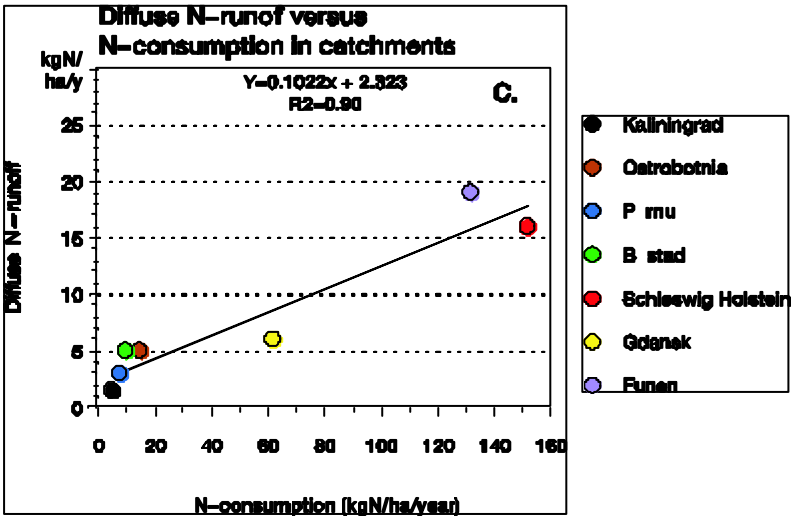
Population density:



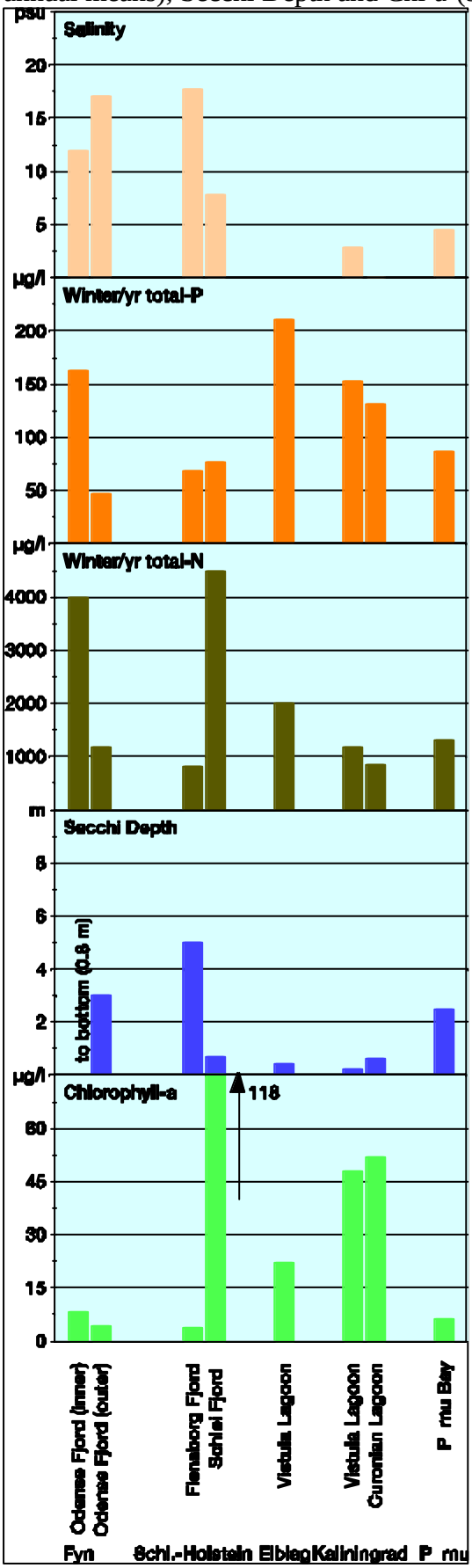
Land use in the BERNET regions in % of region area (Scheswig-Holstein data are for the Baltic Sea catchment only).



Diffuse N-transport in the BERNET regions (representative averages) related to total applied nitrogen fertilizer (manure + chemical fertilizer) in the catchment:



Comparison of selected enclosed waters in the BERNET regions: salinity, TP, TN (winter or annual means), Secchi Depth and Chl-a (summer or annual mean):



Sustainable Development of the Industrial Sector in the Baltic Sea Region

Ingvar Wängberg

IVL Swedish Environmental Research Institute
Göteborg, Sweden

The Agenda 21 for the Baltic Sea Region - Baltic 21 - was initiated by the Prime Ministers in 1996 and adopted by the Foreign Ministers 1998 in the Baltic Sea countries including Iceland. Activities within Baltic 21 are divided into 9 sectors.

- Agriculture
- Energy
- Fisheries
- Forestry
- **Industry**
- Tourism
- Transport
- Spatial Planning
- Education

The aims of the industry sector are:

- Reaching eco-efficiency
- Improved working environment and industrial safety
- Applying sustainable strategies - resources, processes, products and services

Activities within the Baltic 21 Industry Sector has been initiated in the following countries

Estonia:	Department of Research and Institutional Development, University of Tartu
Latvia:	Latvia Technology Park
Lithuania:	Institute of Environmental Engineering (APINI), Kaunas University of Technology
Poland:	Central Mining Institute
Russia:	St Petersburg Scientific Research Centre for Environmental Safety of Russian Academy of Sciences
Sweden:	IVL, Swedish Environmental Research Institute - Secretariat

The Goals of the Baltic 21 Industry Sector will be realized through

- Networking
- Research and technological development
- Technology and knowledge transfer
- Pilot and demonstration projects
- Training and education

The networks will involve Research Institutes, Universities, Companies, Business associations and Authorities.

Baltic 21 Institute Activities

- Best Available Technology
- Pilot projects
- Environmental Management Systems
- Eco-efficiency tools (e.g. life cycle analysis)
- Training and education programmes
- Indicators

Project ideas

- Indicators for sustainable industry
- Education program/transfer of knowledge - LCA and Eco-design
- Waste as an energy resource for industry - creation of a waste market
- Use of biomass by industry - demonstration
- Resource-efficiency within the iron and steel industry
- Forum Environmental Technology North-Western Russia

Further information can be obtained from The Baltic 21 institute's homepage on www.baltic21institute.org (http://217.16.195.64)

or by contacting the Swedish coordinator at IVL,

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Giving scientific advice on cost effective measures for a cleaner Baltic Sea using linked models in a decision support system

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Abstract

The Baltic Sea is one of the areas of the world that is most severely affected by human activities. Although there is an international agreement that nutrient input should be reduced, the measures taken so far have not resulted in major reductions in nutrient inputs nor in environmental improvements. The reasons are partly due to lack of knowledge on large-scale relationships and couplings between physics, biogeochemistry and ecological properties. But there is also a lack of overall drainage basin wide analyzes on cost effective measures. There is a danger in making wrong decisions, e.g. implement reduction schemes that are at worst ineffective or at best, far from cost effective.

Now researchers from many disciplines are faced with a common challenge: To develop a decision-support system, which can be used as the scientific base for cost-effective measures for the entire Baltic Sea. Such an effort is now made within the research program MARE (http://www.mare.su.se . A first prototype of this system, called NEST, is now ready for testing, evaluation and further development, in dialogues with scientist and environmental managers.

NEST link models of physical transports and biogeochemical transformations of nutrient in seven sub-basins of the Baltic, nutrient retentions in 23 different coastal regions adjacent to 23 sub-drainage basins for which retentions as well as cost estimates for 17 different abatement measures are calculated. The user of the NEST can select a desired environmental improvement, currently Secchi depth improvement, for any or several of the sub-basins and the system calculates the minimum cost solution to reach this, distributing cost between measures and countries.

Persistent Organic Pollutants (POPs) in the Baltic Sea: Sources, pathways, fate and environmental and socio-economic impacts

Jozef M. Pacyna, Elisabeth Pacyna and Knut Breivik
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Abstract

NILU has been involved in several research projects related to the sources, pathways, fate and environmental and socio-economic impacts of Persistent Organic Pollutants (POPs) in the Baltic Sea region. In this presentation, an overview of key methodologies and selected results will be presented for four of these research projects.

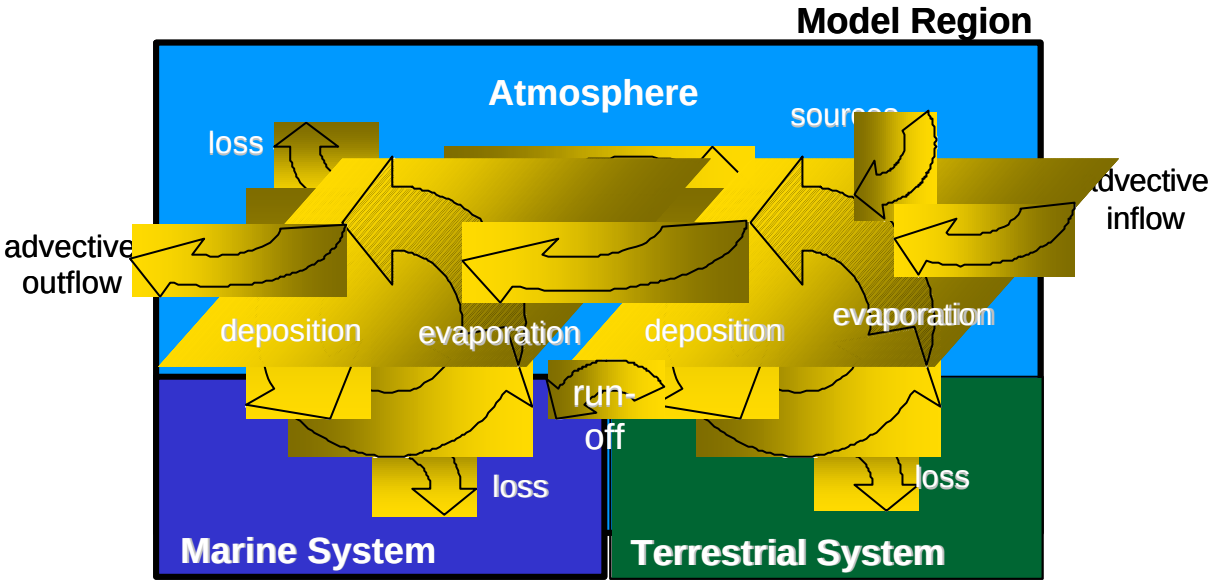

Figure 1: The POPCYCLING-Baltic model and key processes studied (Wania et al. 2000).

The EU POPCYCLING-Baltic project (1996-1999) aimed to develop a non-steady-state mass balance model for describing the behaviour of persistent organic pollutants in the Baltic Sea and its drainage basin (Pacyna et al. 1999; Wania et al. 2000). This model is shown here to successfully reproduce many aspects of the long-term fate of two Hexachlorocyclohexane (HCH) isomers in the Baltic Sea environment. Concentrations in air, seawater, marine sediments and needles are predicted well within an order of magnitude, in most cases within a factor of two (Breivik and Wania, 2002a). The model reproduces the relatively uniform concentrations of HCHs observed in seawater across the Baltic Sea region. The model also captures the time trends of α-HCH observed in air, seawater, fresh water fish and marine fish. The spatial and temporal patterns of HCHs in the Baltic Sea environment are found to be

controlled mostly by chemical input, both through direct emissions within the drainage basin and through advective inflow from adjacent areas, but variable environmental conditions can significantly modify the spatial distribution patterns. Simulations with different boundary conditions, i.e. variable assumptions concerning advective atmospheric inflow, suggest that sources within the drainage basin alone are not capable to explain the observed HCH levels and significant transport into the region must occur. Deviations between predicted and measured HCH concentrations can often be explained by uncertain estimates of usage and advective import, illustrating the usefulness of the model for evaluating the reasonability of emission estimates and boundary conditions (Breivik and Wania, 2002b).

The POPCYCLING-Baltic model is believed to provide invaluable insight into the complex set of interactions that determine the overall fate of an environmental contaminant, but which are inaccessible to measurements. Further use of the POPCYCLING-Baltic model for PCBs, has been approached in the NMR-project "BALPOP". In this particular project, the impacts of input changes of selected PCBs to the Baltic Sea on the fate, intercompartmental cycling and biotic uptake of these pollutants have been studied.

At present, NILU is also involved in a project funded by the European Chemical Industry Council (CEFIC). In this research project, the aim is to further develop and evaluate a regional multimedia fate and transport model for the Baltic Sea and its drainage basin in terms of its capability to predict the exposure and human residue concentrations of bio-accumulating organic compounds.

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Reassessing Past European Gasoline Lead Policies

Hans von Storch, Charlotte Hagner, Mariza Costa-Cabral, Frauke Feser
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Józef Pacyna and Elisabeth Pacyna
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For the foreseeable future, the atmosphere and the environment will remain a dumping ground for various anthropogenic substances. Some substances will have negative properties, and society will sooner or later begin regulating their emissions. To that end, science must provide society with the tools for the retrospective evaluation of the physical and economical impacts of past regulations, and for evaluating scenarios in which alternative future regulations are implemented.

A tool for reconstructing lead air concentrations and depositions across Europe from 1958 through 1995 has been developed that incorporates detailed emissions (Pacyna and Pacyna, 2000), a regionalized history of weather events (Feser et al., 2001), and an atmospheric transport model (Costa-Cabral, 1999). A detailed summary is provided in von Storch et al. (2002). This tool was used in conjunction with lead measurements in both biota and human blood and with economic analysis to assess past European gasoline-lead regulations (Hagner, 2000; 2001; 2002). Some of the specific questions asked in this assessment were: How did lead emissions, atmospheric concentrations, and depositions develop since the 1950s? Was the decline in air concentrations matched by corresponding declines in plants, animals, and humans? Did the regulations result in considerable economic burdens in Germany, for example?

There were several reasons for choosing gasoline lead additives as the basis for a case study of European emission regulations. First, lead emissions underwent significant changes; there was an unabated increase in lead concentrations followed by a post-1970s series of sometimes drastic reductions. Thus, there is a strong and well-defined signal to be detected. Second, once released into the atmosphere, lead accumulates and persists indefinitely in some environmental compartments such as aquatic sediments. What might the ecological and human health impacts of this neurotoxin's environmental distribution be? Finally, airborne lead behaves to a first order approximation as inert, so simulating its transport and deposition is relatively simple. In principle, our tool can be used for any other particle-bound substance of limited reactivity.

This approach is successful for describing the temporal evolution of the spatial distribution of lead deposition in Europe. Demonstrating the effectiveness of gasoline-lead policies, the reconstructed concentrations in the atmosphere, in plant leaves, and in human blood show a steady decline since the early 1980s, while concentrations in marine organisms along the North Sea coast, however, seem unaffected to date. Contrary to initial expectations, the German mineral oil industry was not negatively affected. While competition conditions changed in the German gasoline and automobile markets, no impacts of the regulations could be identified in the macro-economic indicators.

In the case of the Baltic Sea, as an example, the total simulated input of lead from the atmosphere peaked in the mid-1970s, surpassing 3,500 tons annually, and declined to under 500 tons in 1995 (Figure 3). Simulations compare favorably with comprehensive analyses based on observational evidence in the second half of the 1980s (Figure 1).

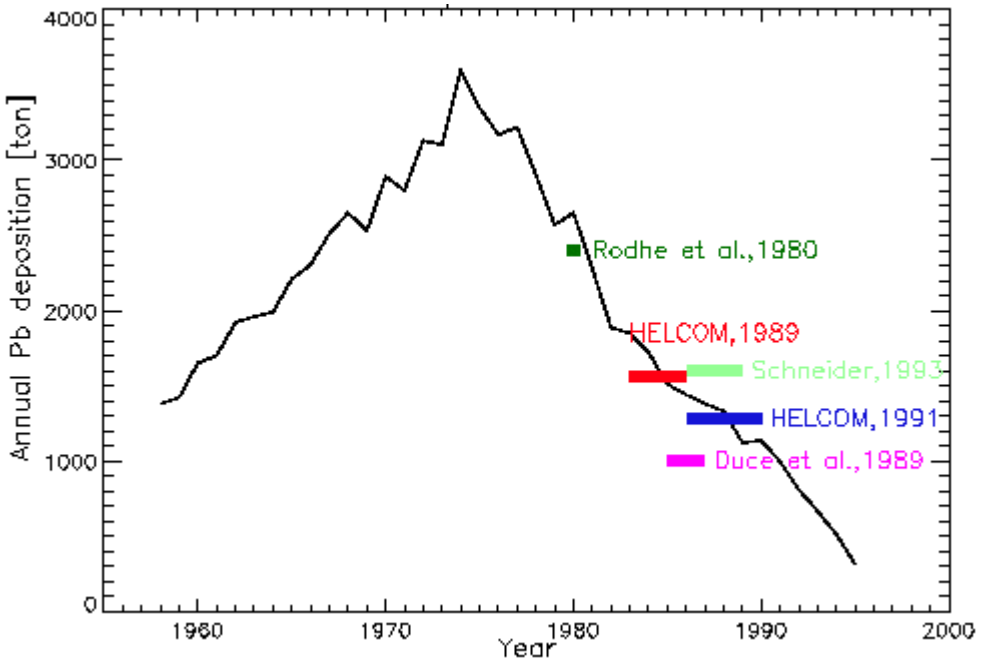

Fig. 1. The input of lead into the Baltic Sea is simulated (line), and estimates based on comprehensive analyses of observational data (colored bars) are also shown.

Modeled data show that European reduction regulations for lead additives in gasoline may be considered a successful example of environmental policy. However, the success of lead policies was limited to atmospheric pathways, which had little effect on some marine biota, underscoring the fact that a low residence time is a necessary condition for substance abatement through emission regulations in a given environmental compartment, once considerable substance amounts have already been released. For those anthropogenic substances that persist for a long time in the environment, that are subject to bioaccumulation, and whose main route of human exposure is the food chain, late emission regulations may be ineffective for protecting human health. In such cases, the principle of prevention, by which any significant releases are precluded from the start, may be appropriate.

One should, however, not forget that the large amounts of lead emitted in the past 50 years have not simply vanished but now reside for good—and are ubiquitous--- in the global environment. The use of lead in gasoline was indeed a large-scale geophysical pollution exercise, and it remains to be seen if long-term effects may later emerge.

In the future, the modeling system needs to be extended by modules; by describing the transport in river catchments and channels; and through substance transformations, depositions and resuspension, and the interactions with the ecosystems. Furthermore, the methodology should be applied to other substances; a few candidates are persistent organic pollutants, radioactive substances, and pollens. Because of the increased complexity with respect to such substances, in particular concerning chemical transformations, cooperation partners are sought.

For additional information, refer to: http://w3g.gkss.de/staff/blei.

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Fluxes of Mercury in the Southern Baltic Sea

Ingvar Wängberg,

IVL Swedish Environmental Research Institute Göteborg Sweden

Summary

The concentrations of total gaseous mercury (TGM) in air over the Southern Baltic Sea and dissolved gaseous mercury (DGM) in the surface seawater were measured during summer and winter. The summer expedition was performed on July 02-15, 1997, and the winter expedition on March 02-15, 1998. Average TGM and DGM values obtained were 1.70 and 17.6 ng m^{-3} in the summer and 1.39 and 17.4 ng m^{-3} in the winter, respectively. Based on the TGM and DGM data, surface water saturation and air-water fluxes were calculated. The results indicate that the seawater was supersaturated with gaseous mercury during both seasons, with the highest values occurring in the summer. Flux estimates were made using the thin film gas-exchange model. The average Hg fluxes obtained for the summer and winter measurements were 38 and 20 ng m^{-2} day^{-1}, respectively. The annual mercury flux from this area was estimated by a combination of the TGM and DGM data with monthly average water temperatures and wind velocities, resulting in an annual flux of 9.5 µg m^{-2} y^{-1}. This flux is of the same order of magnitude as the average wet deposition input of mercury in this area. This indicates that re-emissions from the water surface need to be considered when making mass-balance estimates of mercury in the Baltic Sea as well as modelling calculations of long-range transboundary transport of mercury in Northern Europe. The data presented here is published in Wängberg et al., 2001.

Experimental

Ship All measurements were made onboard the German Research vessel Alexander von Humboldt. The ship is 64.2 m long and 10.6 m wide and is operated by a Nautical/technical staff of 16 persons. The ship is equipped with winches and lifting gears for collecting water samples, a data collecting and distribution system (DATADIS) and an automatic weather station. It has room for 15 scientists and is equipped with 115 m^2 laboratory space.
TGM measurements An automatic gas phase mercury analyser (Tekran Model 2537A) was installed under deck onboard the ship. The analyser was equipped with a Teflon sampling line with inlet at the front mast top, 20 m above the sea surface and about 15 m above the deck of the ship.
Dissolved Gaseous Mercury Water samples were collected at 3 - 10 m depths in the well-mixed surface column above the thermocline, using GO-FLO, (model 1080) water collectors of 5-10 L volume. All water samples were immediately analysed in the laboratory onboard the ship. A 2.0 L volume of the sample was poured into an acid cleaned Teflon impinger. The impinger consisted of a tube of 1.80 m length and 4.1 cm inner diameter. The sample was extracted by introducing a stream of pre-purified nitrogen via a glass frit in the bottom of the impinger. The gaseous mercury extracted was collected on an Au-trap connected to an outlet at the top of the impinger. The Au-traps were analysed using standard dual amalgamation and CVAFS detection technique.

Results

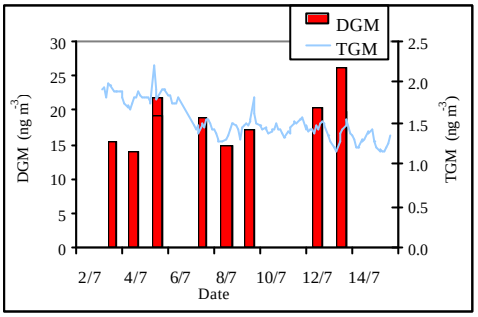

Figure 1. DGM (Hg^0 in water) and TGM (Hg^0 in air) on the Baltic Sea, Summer 1997

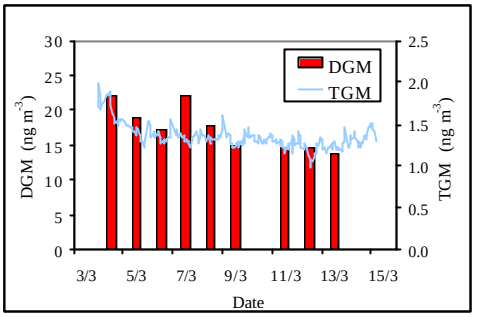

Figure 2. DGM (Hg^0 in water) and TGM (Hg^0 in air) on the Baltic Sea, Winter 1998

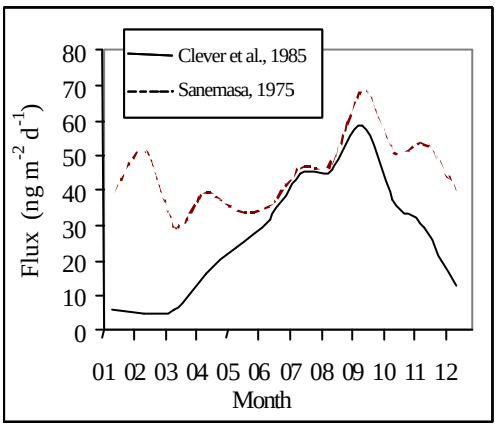

Figure 3. Estimated annual mercury flux from the Southern Baltic Sea using Henry's Law coefficientsfrom Clever et al. and Sanemasa, respectively.

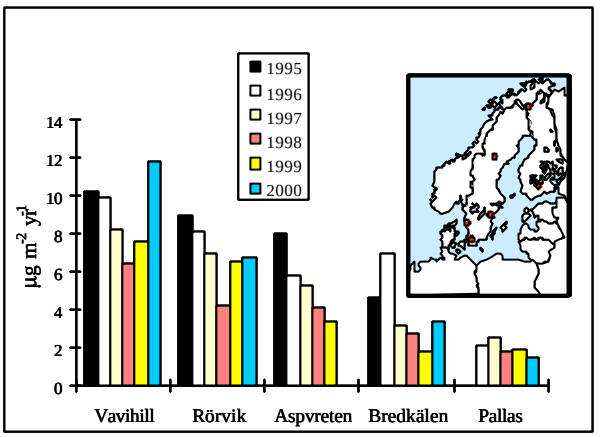

Figure 4. Hg(tot) wet deposition during 1995-2000. The measurement stations Vavihill to Pallas form a south to north transect as is shown on the map. At the station Uraani Janakkala in Southern Finland, as also is shown on the map, mercury precipitation amounts are similar to that of Aspvreten on the Swedish West coast.

Conclusions

The air-sea exchange of mercury is an important process in the overall cycling of mercury in the Baltic Sea. The annual flux of elemental mercury from the Proper Baltic Sea was estimated to be in the range of 9 to 16 mg m^{-2} yr^{-1}. This flux is in the same range as the wet deposition of mercury in this area. More work is needed to further assess the importance of air-sea exchange of mercury in the Baltic Sea.

References

Clever, H.L., Johnson, S.A, Derrick M.E., 1985. The Solubility of Mercury and Some Sparingly Soluble Mercury Salts in Water and Aqueous Electrolyte Solutions. J. Phys. Chem. Ref. Data 14(3), 631-680.

Sanemasa, I., 1975. The solubility of elemental mercury vapor in water. Bulletin of the chemical society of Japan 48(6), 1795-1798.

Wängberg, I., Schmolke, S., Schager, P., Munthe, J., Ebinghaus, R., Iverfeldt, Å. 2001. Estimates of Air-Sea Exchange of Mercury in the Baltic Sea. Atm. Environ. 35, 5477-5484.

Atmospheric Fluxes of Heavy Metals to the Baltic Sea Basin

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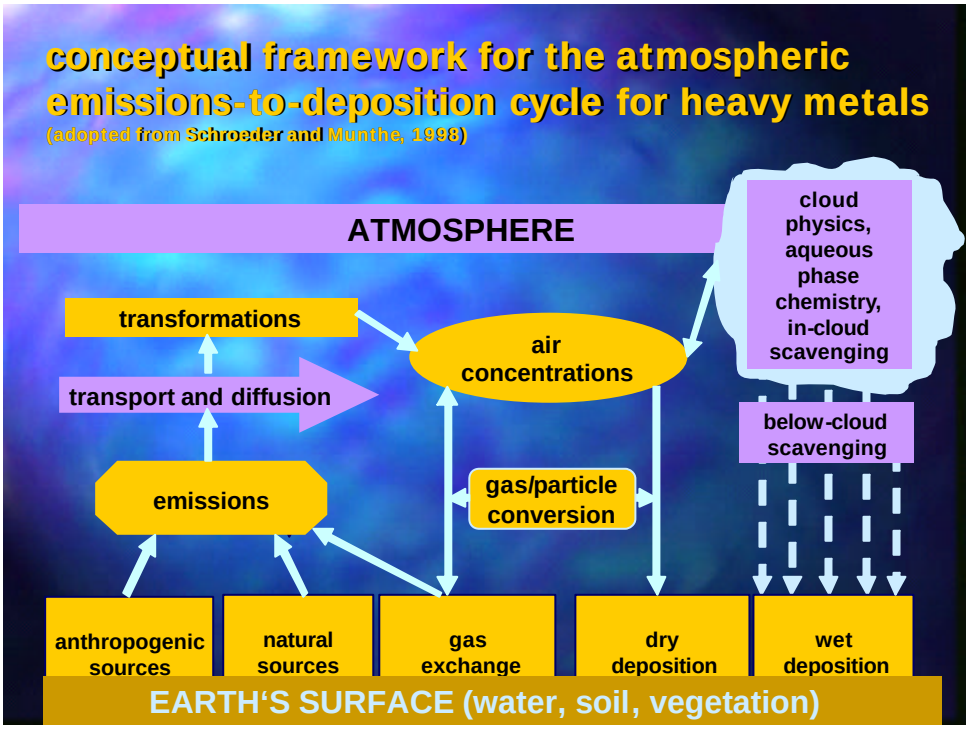
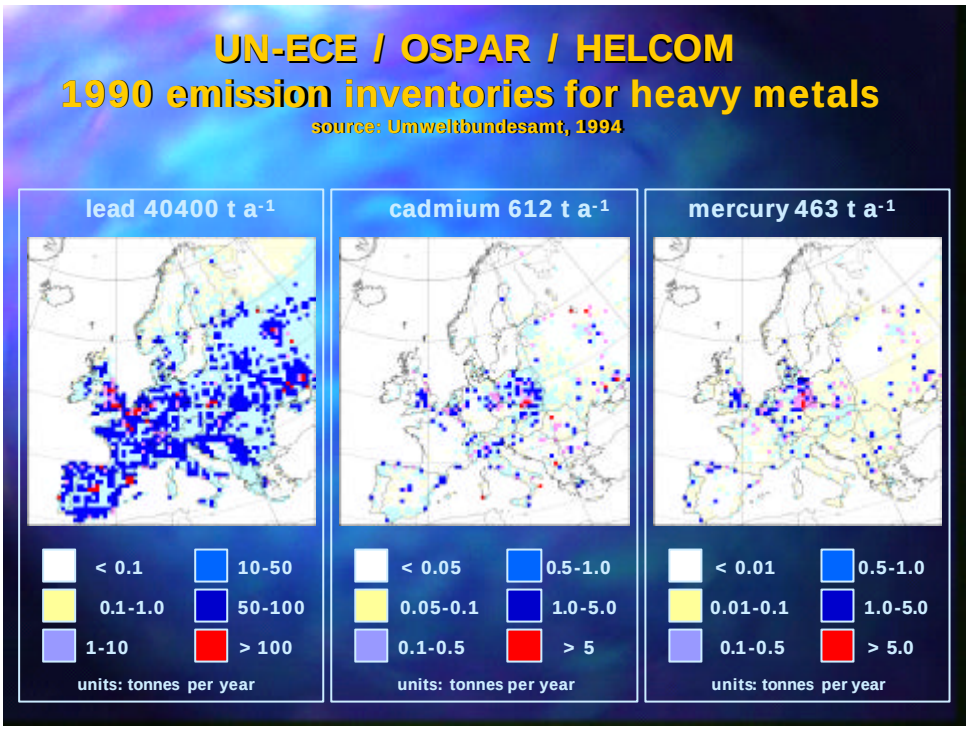
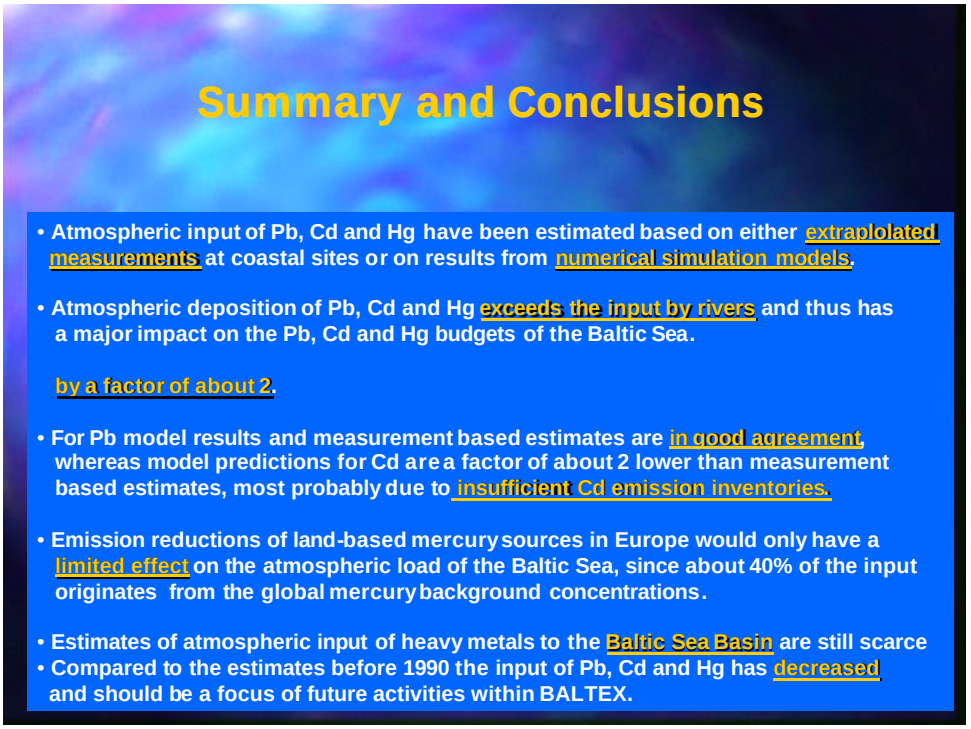
ABSTRACT
Concern over the quality of marine waters and biota has highlighted the numerous geochemical pathways for the transfer of terrestrial and anthropogenically derived heavy metals from their sources to the marine environment. Traditionally these pathways have been assumed to be riverine, but there is much evidence that atmospheric inputs contribute significantly to marine areas and may be comparable to those of riverine inputs for the Baltic Sea as an almost totally enclosed water body.



Despite the fact that the metals in question exist almost solely in particulate form (with the exception of mercury) there are still massive problems in making reliable estimates of atmospheric input. These problems include uncertainties in both wet and dry deposition flux contributions to the overall atmospheric input due substantially to inadequate knowledge of pollutant concentration fields over the sea area, together with a poorly defined precipitation field, and in quantification of the dry deposition velocity for particulate material to the sea surface.



Estimates of atmospheric input of heavy metals to the Baltic Sea presented in this paper are either based on extrapolations from measurements made on the edges of the surrounding landmasses or on applications of numerical simulation models. Most recent results for lead, cadmium and mercury achieved in the framework of the EU MAST III Baltic Sea System Study (BASYS) and the UN-ECE Convention on Long Range Transboundary Air Pollution do suggest that the atmospheric input for the three metals has significantly decreased during the past 10-15 years but that the atmospheric input still exceeds the riverine input by about 50%. Compared to extrapolated measurements model results show a tendency for underprediction of annual inputs, which may be due to inaccurate emission data bases used with the model calculations.



Nitrogen flux to the Baltic Sea: Uncertainties and Significance to Eutrophication

Marke Hongisto
Finnish Meteorological Institute FMI, Helsinki, Finland

Eutrophication has already taken place in large areas on the bottom of the Baltic Sea. The damaging of the coastal areas became obvious with macrovegetation changes. Eutrophication depends not only upon the flux into the sea of the last years but also on the total amounts of nutrients in the sea.

Future research requirements:
- accuracy of the flux estimates, uncertainties in air-sea exchange,
- processes controlling air-sea exchange, which fluxes are bi-directional,
- marine meteorology: sea breeze, coastal modelling, low level jets, influence of waves, swell conditions, validity of the MO theory, swallow MABL, stable stratified situations; needs to have feedback from state of water surface to air and needs to have coupled air-sea models,
- marine air chemistry: Baltic Sea as a source and sink of particles, chlorine depletion from sea salt and it's consequences, other problems with aerosols, DMS-chemistry, iron limitation for phytoplankton productivity, dust deposition. Connections with marine water chemistry.
- accuracy of emissions
- release of nutrients from ice,
- interconnections with nutrient flux and the ability of the Baltic Sea to act as carbon storage, studies on biological pump and role of marine phytoplankton in global climate regulation,
- other climatic studies needed (aerosol formation, effects of chlorine depletion on surface- and stratospheric ozone)
- time- and space resolutions, improvement in model parameterisation and additional input data needed to study the problems by models
- what kind of additional network measurements and field campaigns are needed (meteorological, chemical (in air and sea), hydro-dynamical, biological)
- local or global scale: eutrophication versus other problems: climate change, other poisonous pollutants, water temperature increase, fluxes during mild winters, Baltic Sea as carbon sink pool, open sea/coastal problems

Marine research needs with respect to eutrophication:
- Monitoring of nutrients in the sediments according to sediment types and physical forcing
- nitrogen fixation
- denitrification
- regulating processes
- release of nutrients from sediments
- parameterisation of biological food chains in the models

Appendix 3: BSSG meeting agenda

13th BALTEX SSG Meeting

at

Estonian Business School (EBS)
Centre for Baltic Studies
Tallinn, Estonia
17 – 19 June 2002

PROVISIONAL AGENDA AND EXPLANATORY MEMORANDUM

Both the workshop and the BSSG meeting will be held at the main facilities of the Estonian Business School located at Lauteri 3, 10114 Tallinn, Estonia.

Monday, 17 June 2002

14.00 Workshop on „**Eutrophication and Pollution in the Baltic Sea Basin** "
See separate workshop agenda

19.00 Closing of the workshop

Tuesday, 18 June 2002

9.00

Item 1: Welcome by the Host and the Chairman (S. Keevallik, H. Graßl)
Introduction to Estonian Business School (EBS) (O. Aarna, Rector EBS)

Item 2: Amendment and Approval of the Agenda

Item 3: Approval of the Minutes of the 12th SSG Meeting

Item 4: Review of action items of previous SSG meetings
(H. Graßl, H.-J. Isemer)

Break

10.30

Item 5: National reports by country
One representative per country shall give an overview on BALTEX-related activities during 2001 and 2002 in his/her country. The co-chairs of the SSG have emphasized that these reports are expected to cover the entire national activities and not only individual institutions' contributions. This will definitely require some co-ordination steps and preparation actions among the BSSG members from one country. Each report shall be confined to 10 minutes duration, and shall also include some visions and plans on what national contributions may be expected for BALTEX phase 2.

Tuesday, 18 June 2002 *(continued)*

Item 5: National reports by country *(continued)*
Reports from all BALTEX countries are suggested to be given in the following order with suggested BSSG members given in brackets to report :
Estonia (S. Keevallik), Latvia (A. Leitass), Lithuania (P. Korkutis),
Russia (S. Zhuravin), Belarus (I. Skuratovich), Poland (J. Piechura),
Germany (D. Jacob), The Netherlands (A. Van Ulden),
Denmark (L. Sörensen), Sweden (A. Omstedt), Finland (M. Alestalo).

Lunch break

14.00

Item 6: Workshop and Project Reports

Major results of two recent workshops and progress of a major European project with relevance for the BALTEX programme will be summarized (10 minutes each talk at maximum).

BBC[3]-Workshop on *Cloud Observation and Modelling*, Leipzig, Germany
May 13-16, 2002 (C. Simmer)

4th Workshop on *Baltic Sea Ice Climate*, Norrköping, Sweden,
May 22-24, 2002 (A. Omstedt)

Progress of the EU-funded project CLIWA-NET (*BALTEX cloud liquid water network)* (C. Simmer)

The following items will be dedicated to **visions and plans for BALTEX phase 2.** The contributions and presentations under items 7 to 14 are in particular meant to trigger intensive discussions on implementation steps for BALTEX phase 2. Hence, these contributions should be short and have the character of summary reports leaving plenty of time for questions, discussion and decisions.

Item 7: Vision for BALTEX phase 2 (H. Graßl)
This introductory presentation shall overview possible elements important for BALTEX phase 2 as presently foreseen and shall put them into a common context and action plan. These elements include for example BALTEX/*BRIDGE* and its evaluation phase, the Coordinated Enhanced Observing Period (CEOP) of GEWEX/WCRP, possibilities for an enlarged scope of BALTEX phase 2 as indicated by recent actions such as the BALTNET proposal and the Expression of Interest (EoI) BALTIC WATER to the European Commission, BALTEX and the 6th Framework Programme of the European Community (FP6), international, national and institutional funding options and perspectives, and the development of the BALTEX infrastructure (such as the BSGG, WGs, Data Centres, Secretariat, etc.).

[3] BALTEX/*BRIDGE* Campaign

Tuesday, 18 June 2002 *(continued)*

The following presentations will give more details on some elements with relevance for BALTEX phase 2.

Item 8: *BRIDGE* evaluation strategy
A discussion shall be opened on how *BRIDGE* data will be evaluated. Planned short presentations on this item include:

- The *BRIDGE* Ocean Programme (J. Piechura)
- The *BRIDGE* Data Assimilation Project (C. Fortelius)
- *BRIDGE* contributions of German DEKLIM-funded projects (D. Jacob)

Item 9: The Coordinated Enhanced Observing Period of GEWEX (CEOP)
CEOP has made substantial progress through a series of recent actions, a prominent one of them being the CEOP kick-off meeting held 6 to 8 March 2002 in Tokio, Japan. As recommended by the BSSG at its 12th meeting BALTEX representatives have been involved increasingly in CEOP preparations, which will be summarized by the following overview presentations:

- CEOP general strategy and BALTEX contributions (H. Graßl, chairman of CEOP SSC)
- Water and Energy Cycle Predictions (C. Fortelius, CEOP WESP WG)
- Satellite applications (J. Fischer, CEOP Satellite WG)
- Reference sites (H.-J. Isemer, CEOP WG Data Mangement co-chair)

Break

16.00 **Item 10: Science and Implementation Plan for BALTEX phase 2**
(A. Omstedt)
This item will introduce visions on new science and implementation plans for BALTEX phase 2. The currently existing BALTEX Science and BALTEX Initial Implementation Plans were established in the early build-up phase of BALTEX. Being valid documents for the past and present ongoing research activities in the BALTEX programme, both would need now either amendments or even a complete re-writing for BALTEX phase 2. The importance of both documents shall be emphasized and the presentation shall stimulate discussion and decision on the future process for updating these basic BALTEX documents.

Tuesday, 18 June 2002 *(continued)*

Item 11: Expesssion of Interest (EoI) to the European Commission (H. Graßl, D. Jacob, C. Simmer, S. Halldin and others)

The European Commission recently invited the European scientists to submit expressions of interest (EoI) which shall be used e.g. for defining details of the work programme for the 1st call of the upcoming 6th Research Framework Programme (FP6), and where the focus of these EoI is on the new funding instruments for FP6, Integrated Projects and Network of Excellence (NoE). An EoI for an Integrated Project BALTIC WATER coordinated by the BSSG chairman, H. Graßl, was submitted to the European Commission (EC) on 5 June 2002. Other EoIs have probably been submitted to the EC with a focus on issues relevant for BALTEX phase 2. A summary of these EoIs with relevance for BALTEX shall be given under this item.

Item 12: New FP6 funding instruments (H.-J. Isemer)

The European Commission recently designed so-called Integrated Projects (IP) and Networks of Excellence (NoE) as the new funding instruments to be used with priority within the 6th Research Framework Programme (FP6). The presentation will summarize the main strategic, administrative, financial and legal features of both IP and NoE, as a contribution to the decision making process on how these new instruments may be instrumental for BALTEX proposals in the course of FP6. The actual status of the preparations for FP6 will be summarized as well.

18.30 *Closing of Tuesday's session*

Wednesday, 19 June 2002

9.00 **Item 13: Working Group reports**

- Radar WG (J. Koistinen)
- WG on Energy and Water Cycles (D. Jacob)

Item 14: Data Centre reports

The focus of this item will be on the new Oceanographic Data Centre for BALTEX (ODCB), which will be hosted and operated by the Swedish Meteorological and Hydrological Institute (SMHI) in Göteborg, Sweden. A draft document on the objectives of the ODCB will be presented to the BSSG for approval.

Wednesday, 19 June 2002 *(continued)*

Item 14: Data Centre reports *(continued)*

- Oceanographic Data Centre for BALTEX ODCB (B. Håkansson)
- BALTEX Radar Data Centre BRDC (D. Michelson)
- BALTEX Hydrological Data Centre BHDC (B. Carlsson)
- BALTEX Meteorological Data Centre BMDC (S. Hafner)

This item shall also include a review discussion on the actual BALTEX data exchange policy.

Break

11.00

Item 15: Preparations for BALTEX phase 2
This item shall discuss and review future steps towards BALTEX phase 2. It is largely based on the discussions held during the previous items 5 to 14.

Item 16: Date and Place of the Next Meeting

Item 17: Any other Business

13.00 Closing of the BSSG meeting

Appendix 4: Meeting participants

BSSG Members, WG Chairs, Data Centres, Secretariat

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Appendix 5: Material presented for the Estonian National Report

1. DATA PREPARATION

Estonian prepares routinely the following non-real-time data:

- precipitation at 06 and 18 GMT at 39 meteorological stations (earlier at 60 stations)
- precipitation at 03, 06, 15, and 18 GMT at 21 meteorological stations (earlier 25)
- daily snow depth at 60 meteorological stations (earlier 85)
- daily actinometry and 6-hour synoptic data at Tõravere
- 10-day soil temperature at 5 stations
- 10-day soil water content at several (15…20) sites
- hourly sea-level data at 3 stations (Ristna, Pärnu, Narva-Jõesuu)
- 6-hour sea-level data at 1 station (Virtsu)
- 8-hour sea-level data at 1 station (Paldiski)
- daily run-off of 5 rivers (Narva, Kasari, Keila, Pärnu, Emajõgi) at 8 stations

Synoptic data are transmitted via GTS in real-time mode

2. DATA ANALYSIS

2.1. BALTEX data sets

Five institutions or groups of scientists have registered as BALTEX Data Users.

Requests:

Baltic Sea Catchment area (BACAR) data set:

- Tartu Observatory has ordered radiation data (O. Kärner and S. Keevallik)
- Tartu University has ordered precipitation and synoptic data (P. Post)

BALTEX Model Area (BAMAR) data set:

- Tartu University has ordered elevation data (M. Kaasik)

2.2. Data sets from the archives of EMHI

S. Keevallik and V. Russak, 2001. Changes in the amount of low clouds in Estonia (1955-1995). *International Journal of Climatology,* Vol. 21, No 3, 389-397

H. Tooming and J. Kadaja, 2000. Snow cover and surface albedo in Estonia. *Meteorol. Zeitschrift*, N. F. 9, Nr. 2, 97-102

S. Keevallik and R. Rajasalu, 2001.Winds on the 500 hPa isobaric level over Estonia (1953-1998). *Physics and Chemistry of the Earth.* **26,** No 5-6, 425-429

Sirje Keevallik, Kai Loitjärv, Rene Rajasalu, Viivi Russak, 2001. Meteorological Regime of Lake Peipsi. In: *Lake Peipsi, Meteorology, Hydrology, Hydrochemistry,* Ed. T Nõges. Sulemees Publishers, Tartu, 18-37.

T. Soomere and S. Keevallik. 2001. Anisotropy of moderate and strong winds in the Baltic Proper. *Proc. Estonian Academy of Sci. Engineering,* Vol. 50, No. 1, 35-49.

3. SCIENTIFIC ACTIVITIES

- 10 Estonian scientists participated in the Third Study Conference on BALTEX in Mariehamn in 2001. They presented also 10 papers.

- Currently 3 groups are involved in the Expression of Interest for an Integrated Project BALTIC WATER:
  - Marine Systems Institute of TTU (S.Keevallik, J.Elken)
  - Institute of Geography of TU (J.Jaagus, A.Järvet)
  - EMHI (J.Kadaja, H.Tooming)

- Since the beginning of BALTEX, Estonia has organised 2 workshops on data preparation in 1996 and in 1999. These workshops are intended for Estonia, Latvia, Lithuania, Byelorussia, Poland and Russia.

- June 17-19, 2002 - the 13th BALTEX Science Steering Group

4. RESEARCH

The Institute of Environmental Physics of Tartu University -

HIRLAM (R. Rõõm and A. Männik)

The Institute of Geography of Tartu University -

Large-scale atmospheric circulation over Estonia (J. Jaagus)

Tartu Observatory -

UV climatology (U. Veismann)

Atmospheric transparency (V. Russak)

Global temperature and radiation time-series analysis (O. Kärner)

Marine Systems Institute of Tallinn Technical University (J. Elken) -

Transport mechanisms (straits and gulfs)

Vertical fluxes in quasi-permanent frontal areas

Historical hydrographic and meteorological time series within simplified flux models

Modeling the thermohaline circulation

SUMMARY

Participation in BALTEX has

- accelerated inventory of measurement programmes and equipment in the meteorological stations of Estonia;
- intensified data processing;
- laid the foundation of digital data base;
- given the access to the data stored at the BALTEX data centres;
- encouraged research associates to direct their activities towards the local problems.

Appendix 6: Material presented for the Russian National Report

Main research fields, current and future activity within framework of the BALTEX Project in Russia

According to the goals of the GEWEX projects in general and BALTEX project in particular, studies carrying out in Russia within its framework includes climatic, hydrological and oceanographic studies, i.e. study processes in atmosphere, land surface and sea over the region. These studies includes continuation of the following main topics:

- Development of the regional climate model (RCM)
- Study of the regional hydrological regimes with emphasis to the Neva River regime modeling;
- Study regimes of the Baltic Sea selected areas.

Current activity (2001-2002) :

Climate studies

Climate studies include further development, testing and validation of the Main Geophysical Observatory Regional Climate Model (MGO RCM) for the Baltic Sea domain. The MGO RCM is a finite-difference model with the horizontal Cartesian 105x121 grid and ~50 km spatial step. The model is based on the primitive equations, which describe a compressible fluid flow in hydrostatic approximation. Horizontal difference scheme conserves mass and momentum on an A grid. In the vertical, the model has 15 unequally spaced σ-levels.

The modeling domain covers a 32x106 km2 area including the Eastern Europe, part of Western Europe, the Northern, the Baltic, the Caspian and Black seas catchments, and adjacent parts of the Atlantic and Arctic.

The MGO RCM sensitivity runs was the basis of a current activity. The two simulations have been carried out both 5 years long. The first uses 1xCO2 condition and suggested to be control. Under this condition the model is intended to reproduce contemporary climate variability and mean circulation in the climatic sense. The seasonal cycle of temperature and precipitation observed and obtained using RCM and MGO AGCM as well as water balance computed as a residual of precipitation and evaporation are shown in Fig.1. Both models well reproduce the phase and magnitude of temperature. Precipitation magnitude is largely overestimated by RCM, meanwhile its underestimated by AGCM. Correlation with observed precipitation is 0.71 for RCM and 0.35 for AGCM. The discrepancies of net water balance estimated by RCM and AGCM are -4% and 12% correspondingly. The other 2xCO2 condition simulation currently is underway.

Hydrological studies

Hydrological studies included monitoring of hydrological regimes on the basis of long-term runoff records, further development, validation and testing of hydrological model able to simulate runoff from complex lake river systems (Neva River case-study).

It was found that general trends to winter warming and increase of solid precipitation are observed for the last decades. But climate conditions over the Russian part of the Baltic Sea catchment are still less favourable for the river runoff formation if compared with conditions of the middle of XIX century (according to the long-term observations of the Neva River runoff since 1859).

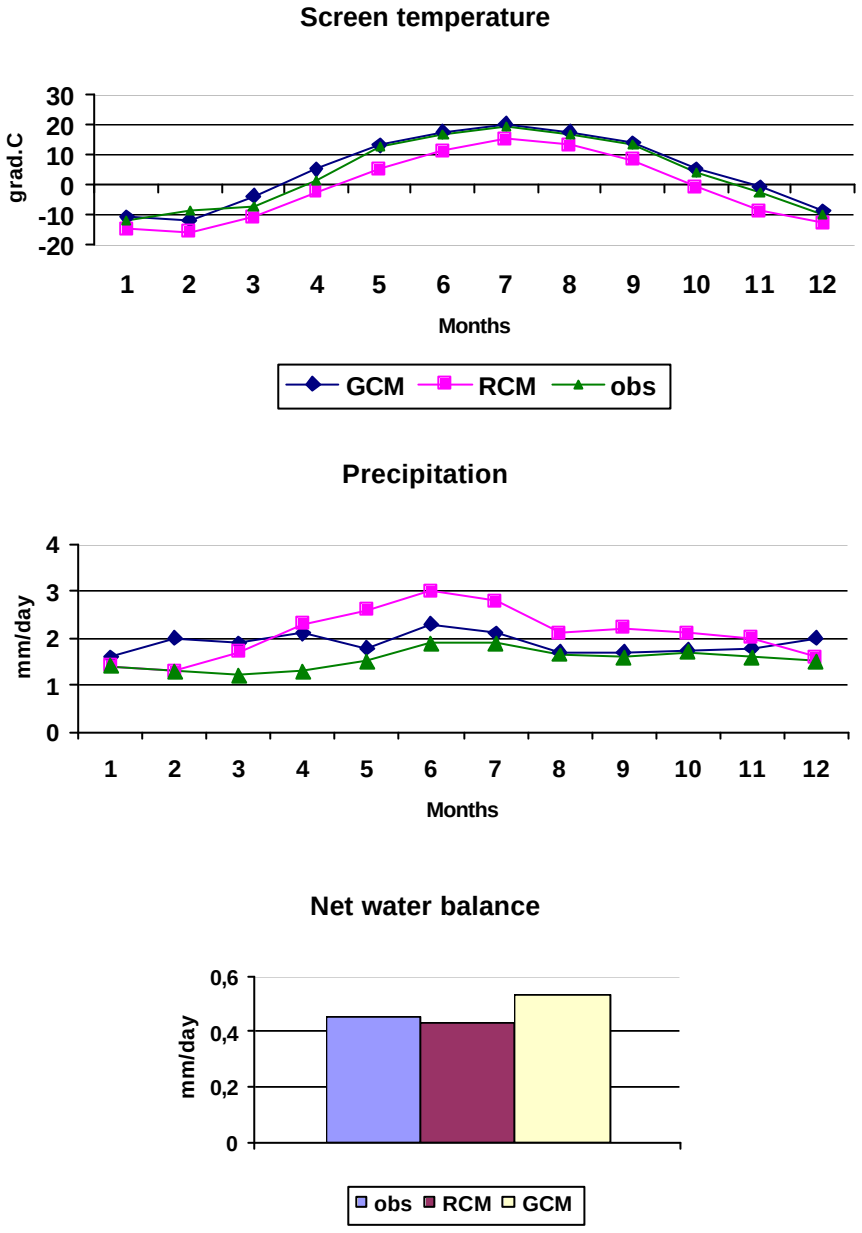


Fig.1 Results of air temperature, precipitation and net water balance simulations by MGO RCM and AGCM in comparison with observed values.

Main attention was paid to the development and improvement of the HYDROGRAPH model able to simulate river runoff for the basins with strong lake control. The first object for modeling was the Lovat River (A=14700 km^2) discharging to the Lake Ilmen. The preparation of

input data and model parameters were carried out as well as test simulations (an example of such simulation see in Fig.2).

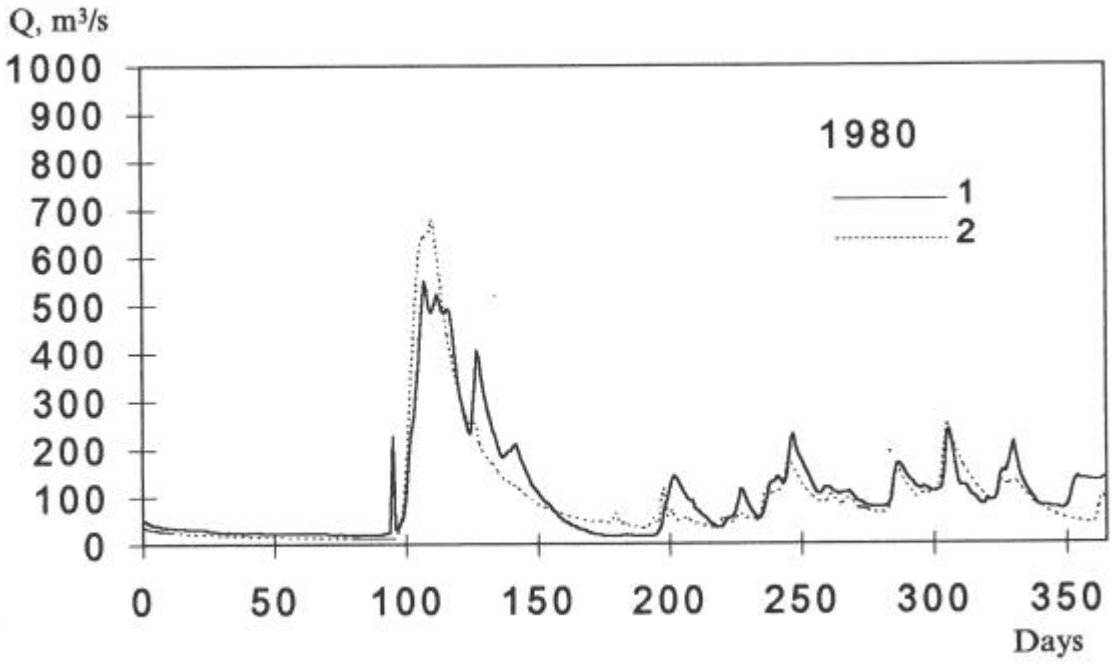


Fig.2 Observed (1) and simulated (2) hydrographs of the Lovat River for 1980

The results of river runoff simulations were considered. The Olonka River (A=2120 km^2) located in northern-eastern part of the Neva River basin is the next object for hydrological modeling. The work is currently on the preparatory stage.

Oceanography

Sea studies include further development of a three-dimensional non-hydrostatic model and using of this model for the numerical study of a dense bottom flow into the Gotland basin (i.e. to simulate bottom water flow from the Stolp Channel to the Baltic Proper). Study area is shown in Fig.3.

The model is based on a set of governing equations including equations of vorticity and vector potential, equation of salinity conservation and equation of state. According to the results of bottom water flow simulations this flow initially spreads along southern boundary and then divides on two pathways. The first is directed to the Gotland deep and the other – to the Gdansk deep. The time of bottom water spreading to the Gotland and Gdansk deeps obtained by model is close to the observed time. The results of computation of bottom salinity distribution are shown in Fig.4.

Further activity

The further activity of Russian side within framework of BALTEX suggested include the following main directions:

- To continue current studies on regional climate and hydrology;

- To extend studies of long-term climate variations and corresponding changes in water and energy cycles over the study area;
- To launch studies of hydrochemical and hydrobiological regimes of the eastern part of the Gulf of Finland and Neva Bay under impact of St.Petersburg water waste.

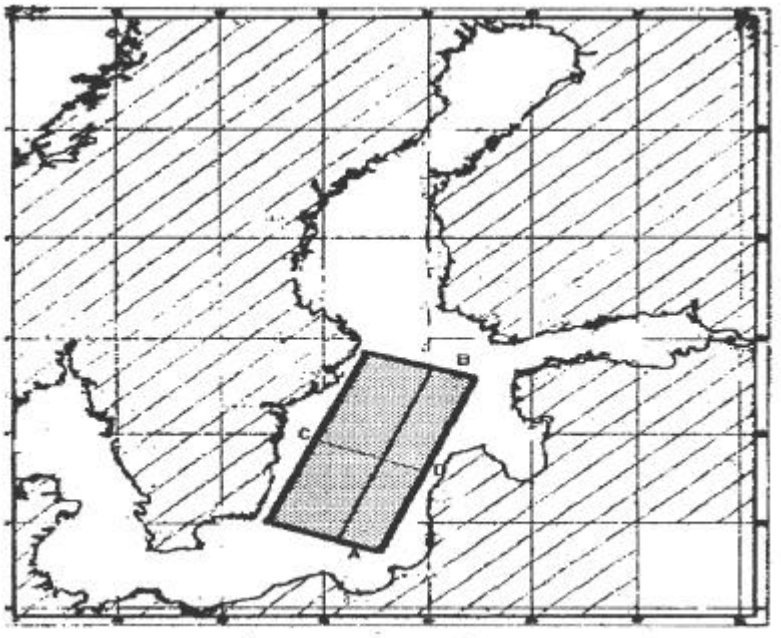


Fig.3 Model area location

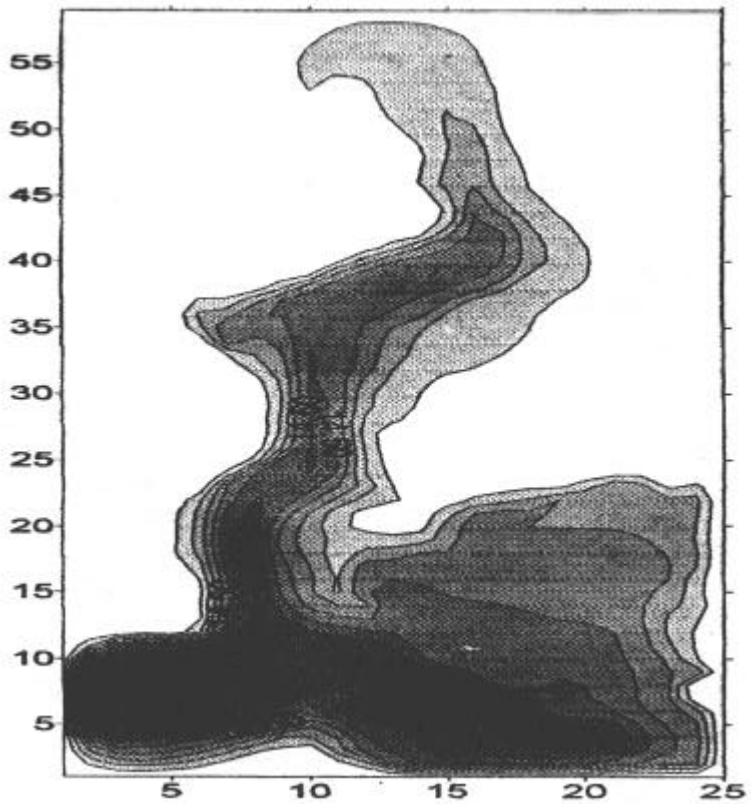


Fig.4 Computed bottom salinity distribution

Appendix 7: Material presented for the Belorussian National Report

The information about participation of the Republican Hydrometeorological Center of the Republic of Belarus (RMHC) in the BALTEX activities.

RMHC of the Republic of Belarus participated in the international projects on basin of Baltic sea since 1994 to 2000. For this period as the basic meteorological and hydrological information, for the period of experiment, and the additional information for the last years were prepared .

Amount of stations, kinds and the periods of the meteorological measurement prepared within the framework of experiment

The period of measurement	Solar radiation	Soil moisture	Synop data	Snow deep	evapotranspiration	Soil temperature	Precipitation
November - December 1986	3	21	21	21	3		55
January - April 1987	3	21	21	21	3		58
1992-1993	3	21	21	21	3		60
August - December 1995	3	21	21	21	3		60
1996	3	21	21	21	3		60
1997	3	21	21	21	3		60
1998	3	21	21	21	3		60
1999	3	21	21	21	3	5	60
2000	3	21	21	21	3	5	60

Amount of stations and the periods for the basic water discharge data within the framework of experiment

Period of measurement	Water discharge
1996-1997	48
1998-1999	15

The additional data were prepared for the period 1980-1995, excepting data prepared during experiment.

Amount of stations and the periods for the additional water discharge data.

Period of measurement	Water discharge
1980-1995	15

Amount of stations and the periods for the additional water meteorological data.

Piriod of measurement	Solar radiation	Soil moister	Synop data	Snow deep	evapotranspiration	precipitation
1980-1985	1	1	21	21	1	58
1987-1995	1	1	21	21	1	60

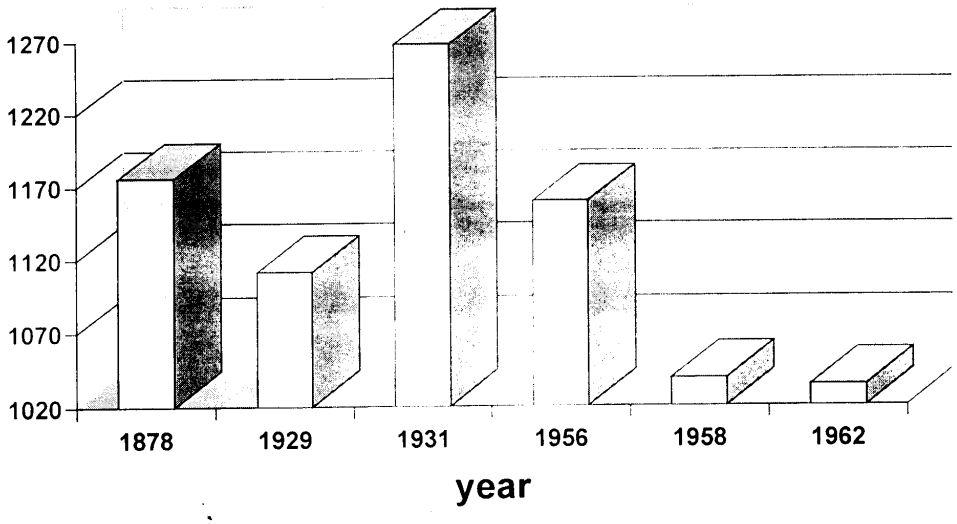
For this period equipment for two actinometric stations were received from Germany and installed Minsk's and Berezinsky reserve stations.

RHMC transferred data from 14 synoptic stations through GTS for BRIDGE period regularly.

Now in RHMC there were processed a lot of measurement data and there are prepared the Handbook especially dangerous phenomena observed on territory of the Republic of Belarus: such as dangerous high levels of the water, dangerous low water levels and all observed dangerous meteorological phenomena. Areas of a Baltic sea basin also are included in it .

For the basic hydrological posts of the rivers Neman and West Dvina for all period of observations (125 years) dangerous water levels with flood are chosen. For example for observing station Vitebsk (West Dvina) a dangerous level is increase of water up to a mark 1020 cm. For the period since 1878 this mark were exceeded 6 times (see. The diagram)

The most hight level West Dvina (Vitebsk)



Appendix 8: BALTEX projects funded in Germany

DEKLIM Funding Programme (BMBF):

Project cluster **IBSEN**
„Integrated Baltic Sea Environmental Study: Analysis and Simulation of Hydrological and Ecological Variability in the last 1000 years“
Co-ordination: W. Fennel and J.W. Dippner, IOW Warnemünde, 3 projects

Project cluster **EVA-GRIPS**
„Regional Evaporation on Gridpoint/Pixel Scale over Heterogeneous Landsurfaces“
Co-ordination: T. Mengelkamp, GKSS, 8 projects, 2.2 Mill Euro

Project cluster **BASEWECS**
„BAltic SEa Water and Energy Cycle Study“
Co-ordination: W. Krauss, IfM Kiel, 4 projects, 1.2 Mill Euro

Project cluster **BALTIMOS**
„(BALTEX-Integral Model System): Development and Validation of a Coupled Model System in the Baltic Region“
Co-ordination: D. Jacob, MPIfM, 9 projects, 2.3 Mill Euro

Project cluster **APOLAS**
„Accurate Areal Precipitation Measurements over Land and Sea “
Co-ordination: H. Graßl, MPIfM, 4 projects, 0.8 Mill Euro

Project cluster **BOBA**
„BOBA-DEKLIM: Soil frost and snow metamorphism simulations for the BALTEX-region with a complex hydro-thermodynamic soil-vegetation scheme“
Co-ordination: H. Elbern, Cologne University, 2 projects

2 individual projects on a) “Hyperspectral satellite data analysis over land surfaces for climate modeling applications“(HyperSatAn) and b) “The influence of C and N fluxes on the water and energy budget of the terrestrial biosphere in the Baltic Sea drainage basin” (CANIBALT) Co-ordinations at Uni Köln and MPIfM

Total: 32 projects, 8,3 Mill Euro funding
Projects startet in 2001
Joint kick-off co-ordination meeting planned for early 2002

AFO2000 Funding Programme (BMBF):

Project 4DWOLKEN
„**Inhomogeneous clouds - their influence on exchange and transport processes in the atmosphere**“
Co-ordination: C. Simmer, Uni Bonn

Other projects with relevance to Water and Energy Cycles in the Baltic Sea Basin:
BMBF Project:

Project **ODRAFLOOD**
„**A flood forecasting system for the Odra drainage basin**“
Co-ordination: T.Mengelkamp/W.Rosenthal, GKSS, with participation of Polish Institutions.

Appendix 9: Swedish National Report
Swedish national report on some contributions to BALTEX and BRIDGE: Report from 2002 activities

By

Anders Omstedt (Chairman of the Swedish working group on BALTEX)

Several interesting programs and research activities are now taking place in Sweden.

At Göteborg University we are now forming a ***Baltic Sea research*** group that will be the hub for several Baltic Sea initiatives. Two new PH D students have started this spring. A joint BALTEX/Bridge project between Göteborg University and Institute of Oceanology, Sopot, Poland has started. Göteborg University is also involved in the SWECLIM and MARE programs and have taken the initiative to arrange two international workshops during 2002. The first one is "Fourth Workshop on Baltic Sea Ice Climate", 22-24 May 2002, Norrköping, Sweden. The second one is "Processes of importance for the large-scale salinity distrubition of a semi-enclosed sea as the Baltic", 4-6 November 2002, Kristineberg, Sweden.
The DIAMIX program (Anders Stigebrandt) is now in a writing phase.

Some recent papers are:

Axell, L.B, 2002. Wind-driven internal waves and Langmuis circulation in a numerical ocean model of the southern Baltic Sea. J. Geophysical Research in press.

Gustafsson, K. E., 2002. Tidal energy losses by baroclinic wave drag and their importance for the thermohaline circulatin. Ph D. thesis, Earth Sciences Centre, Göteborgs University, No A 80, Sweden.

Gustafsson, B.G., 2001. Quantification of water, salt, oxygen and nutrient exchange of the Baltic Sea from observations in the Arkona basin. Continental Shelf Research, 21, 1485-1500.

Omstedt, A., and D., Chen (2001). Influence of atmospheric circulation on the maximum ice extent in the Baltic Sea. J. Geophysical Res, 106, No. C3, 4493-4500.

Rutgersson, A., Omstedt, A. and J., Räisänen (2002)
Net precipitation over the Baltic Sea during present and future climate conditions. Climate Research, in press.

Raschke E., Meywerk J., Warrach K., Andrea U., Bergström S., Beyrich F., Bosveld F., Bumke K., Fortelius C., Graham L.P., Gryning S.-E., Halldin S., Hasse L., Heikinheimo M., Isemer H.J., Jacob, D., Jauja I., Karlsson K.-G., Keevallik S., Koistinen J., Van Lammeren A., Lass U., Launianen J., Lehmann A., Liljebladh B., Lobemeyr, M.,Matthäus W., Mengelkemp T., Michelson D.B., Napiorkowski J., Omstedt A., Piechura J., Rockel B., Rubel F., Ruprecht E., Smedman A.-S. and A., Stigebrandt (2001).
The Baltic Sea Experiment (BALTEX): A European Contribution to the investigation of the Energy and Water Cycle over a Large Drainage Basin. Bullertin of the American Society, 82, No. 11, 2389-2413.
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Rutgersson, A., Smedman, A.-S., and A., Omstedt (2001). Measured and simulated latent and sensible heat fluxes at two marine sites in the Baltic Sea. Boundary Layer Meteorology, 99, 53-84.

Rutgersson, A. ,Bumke, K., Clemens, M., Foltescu, V., Lindau, R., Michelson, D., Omstedt , A., (2001). Precipitation Estimates over the Baltic Sea: Present State of the Art, Nordic Hydrol., 32(4), 285-314.

Stigebrandt, A., Lass, Liljebladh, Alenius, Piechura, and Hietala, 2002. DIAMIX-An experimental study of diapycnal deepwater mixing in the virtually tide-less Baltic Sea. Boreal Research. In press.

Winsor, P., J. Rodhe, and A. Omstedt (2001). Baltic Sea ocean climate: an analysis of 100 yr of hydrographic data with focus on the freshwater budget, Clim. Res., 18, 5-15, 2001.

Lund University is now creating a Center for Studies of ***BioGeoSphere Dynamics***, including Department of Geology, Climate impact Group, Department of Ecology, Deparment of Physical Geography and Ecosystem analysis, Department of Physical Geography. An impressive initiative for measuring fluxes over land are organised by A. Lindroth, A. Grelle, L. Klemedtsson, M. Nilsson and T. Christensen. Measured are now made continuously by eddy-covariance method from the following ecosystems in Sweden:

- Forest pine/spruce 50 yrs-old, CO2 and N2O
- Kyotoforest (Salix) 2 yrs-old, CO2
- Forest pine/spruce 100 yrs-old, CO2, CH4
- Forest pine/spruce 60 yrs-old, CO2
- Forest pine 30 yrs-old, CO2
- Forest clearcut, CO2
- Forest spruce 30 yrs-old, CO2
- Forest spruce 40 yrs-old, CO2
- Mire sub-arctic CO2, CH4
- Mire (poor sedge fen), CO2
- Birch sub-arctic, CO2 (starting 2002)

A Nordic initiative: 'Nordic Centre for Studies of Ecosystem Carbon Exchange and Its Interactions with the Climate System (NECC)' has also been taken to focus all flux measuring sites into one network

Some recent papers are:

Lundblad, M. and Lindroth, A. 2001. Transpiration of a coniferous forest in relation to weather and stand characteristics. Basic and Applied Ecology (in press).

Lagergren F. and Lindroth, A. 2002. Transpiration of Pine and Spruce in a Swedish forest : response of individual trees to weather and soil moisture. Agricultural and Forest Meteorology (in press).

Gustafsson, D., Lewan, E., van den Hurk, B.J.J.M., Viterbo, P., Grelle, A., Lindroth, A., Cienciala, E., Mölder, M., Halldin, S. and Lundin, L.-C. 2002. Boreal-forest surface parameterisation in the ECMWF model - 1D test with Nopex longterm data. Journal of Applied Meteorology. (accepted).

Studies on ***air-sea interaction*** are an active research field at Uppsala University. The measuring site at Östergarnsholm (PEP in BALTEX) has continued and new Ph D students are analysing the data. In May, 2002 Anna Sjöblom made her Ph D defence at Uppsala University with the title: The Turbulent Structure of the Marine Atmospheric Boundary Layer and its implications for the inertial dissipation method.

Another Nordic initiative: 'Nordic Centre of Excellence- Network of wave-boundary layer research and application to global change' has been taken to focus on the air-sea exchange.

Chalmers is working on the GPS information. ***The GPS technique*** appears to be a valuable tool for climate applications as the time series becomes longer. GPS data were compared to climate models [Jacob et al. 2001]. We have also assessed the possibility of using GPS data for climate monitoring. The first seven years of data indicate regional as well as seasonal differences in the water vapour trends over the area of Sweden [Gradinarsky et al. 2002]. Winter and summer trends in the atmospheric water vapour content show a high degree of consistency but regional differences over the area of Sweden can be seen.

Some recent papers are:

Gradinarsky, L.P., J.M. Johansson, H.R. Bouma, H.-G. Scherneck,
and G. Elgered, Climate monitoring using GPS,
Physics and Chemistry of the Earth, in press, 2002.

Jacob, D., B.J.J. Van den Hurk, U. Andrae, G. Elgered, C. Fortelius, L.P.,Graham, S.D. Jackson, U. Karstens, Chr. Koepken, R. Lindau, R. Podzun, B., Rockel, F. Rubel, B.H. Sass, R.N.B. Smith, and X. Yang,
A comprehensive model intercomparison study investigating the water budget
during the BALTEX-PIDCAP period, Meteorology and Atmospheric Physics, 77, 19-43, 2001.

SMHI is strongly involved in the BALTEX work and the main activities are summarized below:

Re-analysis the BALTEX/Bridge period

The BALTEX-BRIDGE reanalysis project presented the first results at the Åland conferens in summer of 2001. During the autumn, however, a serious bug was found in the surface scheme. The analysis was restarted again and finished in March 2002 (Fortelius et al., 2002).

The results are compared with atmospheric state observations and direct measurements of near ground fluxes. The atmospheric parameters compare well with SYNOP and radiosonde data. Precipitation compares well with estimates by BRDC and Franz Rubel. The momentum and sensible heat flux compare reasonably with the inland Finnish site Hyytiälä and the marine site Östergarnsholm. The largest discrepancy compared to observations is found in

evaporation and runoff. The runoff is heavily underestimated compared to HBV simulations mainly due to an overestimation of the evaporation.

Two articles are in preparation. The first one concerns the comparison of the precipitation with BRDC and Franz Rubel. The second will discuss the comparison with observation and close the atmospheric water as well as the surface heat and water budget for the period.

Parallel to the reanalysis a similar run has been performed but without data assimilation. This in order to try to answer questions about the capability of the model to produce reliable budget estimates without data assimilation. The results are not yet analysed.

Runoff

Development of improved runoff modeling in the Baltic Sea catchment continues. Recent improvements to the Rossby Centre Regional Climate Model (RCA) include better representation of sub grid variability in soil moisture parameterization and river routing (lateral flows) of runoff to the Baltic Sea. Use of the HBV-Baltic hydrological model continues to provide estimates of observed river discharge to the Baltic Sea, updated for 2000/2001 using synoptic precipitation and temperature observations. A contribution has been made to the HELCOM Fourth Periodic Assessment of the State of the Environment of the Baltic Marine Area, 1994-1998.

SMHI made a significant contribution to the experimental design and dataset creation for the PILPS Phase 2(e) high latitude land surface scheme intercomparison organized under GEWEX. The land surface scheme of the RCA Model also participated in the intercomparison, which included models from the other continental scale experiments

Development of a coupled atmosphere-ocean regional climate model and on the heat and water cycles

The Rossby Centre regional models for ocean/sea ice (RCO) and atmosphere/land surface (RCA) have been coupled during 2001 into one model system called RCAO.

The Baltic Sea as a part of the overall northern European regional model domain is now interactively coupled via fluxes and state variables. The coupled model is validated in a 5-year hindcast experiment. Sea surface temperature observations are well matched. The system is free of drift, does not need flux corrections and is suitable for multi-year runs. With flux forcing from the atmospheric model, the regional ocean model gives sea surface temperatures statistically equivalent to the uncoupled ocean model forced by observations. In general, both approaches give realistic estimates of the heat and water cycles and are in good agreement with results of other studies. Sensible and shortwave heat fluxes are generally satisfying. Longwave downward and latent heat fluxes need priority in further improvements. Other ocean surface quantities (e.g. surface height) do not reach this quality in combination with the current atmosphere model.

Regional climate scenarios

The work on future regional climate scenarios and their impacts on the Baltic Sea region including e.g. freshwater flows to the Baltic Sea and the Baltic Sea itself has continued. In addition to the further development of the regional climate model and simulation techniques, new regional simulations are presently being conducted. These will be conducted using the coupled RCAO system mentioned above, forced with global model results from two climate

modeling centers in the form of a number of 30-year time slices for the present-day and future scenarios A2 and B2 (viz. IPCC SRES).

Cloud parameterization

Within the EU FP5 project CLIWA-Net, a prototype network of 12 cloud observation stations has been operated for 2 common periods, the second of which in April-May 2001 to measure the vertically integrated cloud liquid water path (LWP), cloud base height and integrated water vapor. Four modeling groups (Rossby Centre, KNMI, ECMWF & DWD) made 36 hour forecasts on each day of the campaign to evaluate the simulation of clouds and cloud liquid water in the models. Also satellite retrievals cloud were made available for the models. The ground based measurements and model integrations are being used to assist in developing algorithms to retrieve LWP from the AVHRR sensor data, over land. The Rossby Centre has led the work package on parameterization development. The primary work has been on evaluating the vertical structure of simulated clouds, using cloud penetrating radar observations from 3 of the sites. The sensitivity of cloud simulation to vertical resolution and type of parameterization approach is receiving particular attention.
In the summer of 2001, the BBC campaign was held in the Netherlands in which the distributed cloud observational network was brought together into a mesoscale network for the evaluation and observation of cloud mesoscale dynamics and organization. In particular the role of model horizontal resolution is being addressed.

Data Centres

SMHI is running the BALTEX Hydrological Data Centre, the BALTEX Radar data centre and during 2002 starting up the Oceanographic Data Centre for BALTEX.

Some relevant publications in 2001/2002:

Bowling, L. C., Lettenmaier, D. P., Nijssen, B., Graham, L. P., Clark, D. B., Maayar, M. E., Essery, R., Goers, S., Habets, F., van den Hurk, B., Jin, J., Kahan, D., Lohmann, D., Mahanama, S., Mocko, D., Nasonova, O., Samuelsson, P., Shmakin, A. B., Takata, K., Verseghy, D., Viterbo, P., Xia, Y., Ma, X., Xue, Y. and Yang, Z.-L. 2002. Simulation of high latitude hydrological processes in the Torne-Kalix basin: PILPS Phase 2(e) - 1: Experiment description and summary intercomparisons. Glob. Planet. Change (accepted).

Fortelius, C. Andrae, U. and Forsblom, M., 2002. The BALTEX regional reanalysis project. Accepted by Boreal Environment Research.

Graham, L. P. and Bergström, S., 2001. Water balance modelling in the Baltic Sea Drainage Basin - analysis of meteorological and hydrological approaches. *Meteorol. Atmos. Phys. 77*, 45-60.

Haapala, J., Meier, H. E. M. and Rinne, J. 2001. Numerical investigations of future ice conditions in the Baltic Sea. Ambio 30:4-5, 237-244

.

HELCOM 2002. Fourth Periodic Assessment of the State of the Environment of the Baltic Marine Area, 1994-1998. *Baltic Sea Environment Proceedings*, Helsinki Commision, Helsinki, (in press).

Meier H. E. M. 2001. On the parameterization of mixing in 3D Baltic Sea models. *J. Geophys. Res. 106(C12),* 30,997-31,016

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Meier, H. E. M. and Faxén, T. 2002. Performance analysis of a multiprocessor coupled ice-ocean model for the Baltic Sea. *J. Atmos. Oceanic Technol. 19,* 114-124.

Samuelsson, P., Bringfelt, B. and Graham, L. P. 2002. The role of aerodynamic roughness for runoff and snow evaporation in land surface schemes - comparison of uncoupled to coupled simulations. *Glob. Planet. Change* (accepted).

van den Hurk, B. J. J. M., Graham, L. P. and Viterbo, P. 2002. Comparison of land surface hydrology in regional climate simulations of the Baltic Sea catchment. *J. Hydrol. 255,* 169-193.

Appendix 10: Research Vessel Cruises during *BRIDGE*

BRIDGE field studies by the Finnish Institute of Marine Research.

R/V Aranda cruises under BALTEX related projects in 1999-2001.

Cruise name/ year	Start date	End date	Areas of investigation	Number of stations	Main observation types
DIAMIX-1999	1. March	12. March	Baltic Sea Proper	194	CTD, ADCP, dissipation, Ship AWS
BRIDGE-1999	11. October	19. October	Baltic Sea Proper	109 27	CTD, ADCP, Ship AWS, Meteor. soundings
DIAMIX-2000	29. August	15. September	Western Gulf of Finland, Baltic Sea Proper	246 40	CTD, ADCP, dissipation, Ship AWS, Meteor. soundings
BRIDGE-2001	29. January	8. February	Baltic Sea Proper	98 31	CTD, ADCP, Ship AWS, Meteor. soundings
BASIS-1999 Winter air-ice-ocean expedition	18. March	26. March	Gulf of Bothnia	32	Ship AWS, Meteor. soundings, Air-Ice fluxes, Sea ice
BASIS-BALTIMOS-2001 Winter air-ice expedition	12. February	24. February	Gulf of Bothnia	38	Ship AWS, Meteor. soundings, Air-Ice fluxes, Meteor. res. Aircraft (Dornier) by Univ. Hamburg

Appendix 11: Baltic Sea Ice Climate Workshop

Baltic Sea Ice Climate Workshops

- First workshop on the Baltic Sea Ice Climate, Tvärminne, Finland,1993
- Second workshop..Otenpää, Estonia, 1996
- Third workshop..Stawiska, Poland, 1999
- Fourth workshop…Norrköping, Sweden, 2002
- Fifth workshop…Hamburg, Germany,2005
- ..

Main achievements since last workshop, 1999

- New data sets are soon freely available as data from BALTEX/BASIS and the ice station Santala.
- More long-term ice data sets are under analyze
- Easier to get forcing data (BALTEX data centers).
- New data on optical and ecological properties are coming up.
- Improved modeling (sea ice dynamics and thermodynamics, including snow).
- Coupling of the air-ice-sea system have started.

Future challenges

- Non-linear aspects of ice dynamic from engineering to geophysical scales.
- Clever, accepted and simple statistical methods for trend and time series analysis.
- Better understanding and modelling of low frequences changes in the atmosphere on decadal (NAO) and century (Little ice age) time scales.
- To measure albedo and develop albedo models.
- Improved knowledge on the interaction of snow and ice.
- New ice data sets from the Baltic Sea including measurements on ice thickness distribution.
- Improved sea ice climate data bases.
- Increased understanding of how biota influence the physical properties in ice (eg. optical properties)
- Increased understanding on how ice influence the ecological conditions.
- Better understanding of the skill in climate scenarious

Actions

- Action A: The IDA-data base should be expanded with some long-term ice data series as illustrative examples from each country around the Baltic Sea.
- Action B: All who are interested should be invited to construct a future ice winter for the next 100 years including mean and extreme properties.
- Action C. Next meeting should actively invite scientists from other marginal ice zone seas.

Appendix 12: BALTEX/*BRIDGE* Ocean Programme

Information on activities related to the Ocean Programme of the BALTEX / BRIDGE

Content

1. Introduction
2. Program realization
2.1 DIAMIX
2.2 EOPs Hydrography
2.3 EOPs special activities
3. Routine, oceanographic measurements and observations
3.1. Inflow-outflow through the Danish Straits
3.2. Sea level, sea surface temperature, ice
4. Oceanographic Data Center
5. Final remarks

1. Introduction

Presence of oceanographic component in the BALTEX Project makes it unique in the GEWEX's projects family. To estimate the role of the Baltic Sea in water and energy exchange and balance in the Baltic catchment region additional field campaigns and modelling activity were planned. (BALTEX / BRIDGE). Five Enhanced Observations Periods (EOPs), special project DIAMIX and continues measurements in straits water exchange, and at permanent share stations (T, S, sea level) were foreseen.

2. Program realization

2.1. DIAMIX – An experimental study of diapicnal deep water mixing in the tide-less Baltic Sea.

The experimental are a of 30 by 30 nautical miles was located on south-eastern slope of Gotland Island and include part of East Gotland Basin (fig.1). Two pilot experiments were conducted in the springs of 1997 and 1998 to fine-tune the observational scheme with the given instrumentation. Thereafter two main experiments were conducted, a winter experiment in 1999 and a summer experiment in 2000. All experiment lasted about 2 weeks. Three ships have participated in all the DIAMIX experiments, namely Aranda (FIMR, Helsinki), Skagerrak (OI, Göteborg) and Oceania (IOPAS, Sopot). A. v. Humboldt (IOW, Warnemünde) participated in all except the final summer experiment.

To get a description of the actual large-scale fields of density and currents, continuous CTD (Conductivity-Temperature-Depth) and ADCP (Acoustic Doppler Current Profiler) measurements along the 30 nautical miles long

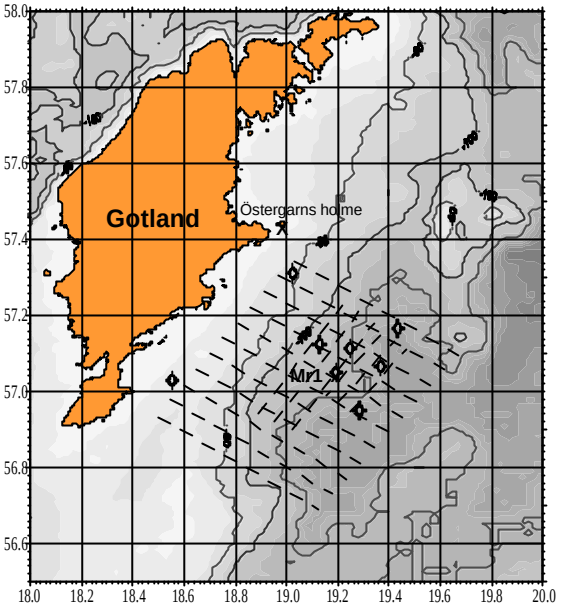


Figure 1; The experimental area of DIAMIX

transects perpendicular to the coast were made. Vessel-mounted ADCP and vertically undulating vehicles carrying CTD's have been used for this. The distance between transects is 3 nautical miles. Each ship was able to cover about four transects a day. Unfortunately, it turned out that the ship-borne ADCP measurements have a lot of scatter why it was hard to make quantitative estimates. During the main winter and summer expeditions, R/V Aranda was used as a non-anchored platform in an almost fixed position for CTD profiling and profiling of turbulent dissipation, in bursts of five profiles per hour, from the sea surface to the sea bed. A second profiler for microstructure was used in the final summer experiment to observe dissipation just above the bottom around the halocline. At the start of each experiment, moorings with current meters (mostly ADCP's) and CT (Conductivity-Temperature)-sensors were deployed in the experimental area for studies of the frequency domain.
Detailed description of DIAMIX project and preliminary results can be found in the paper by Stigebrandt et al. submitted to BOReas.

2.2. EOPs - Hydrography

The Enhanced Observation Periods (EOPs) were scheduled according to seasons:

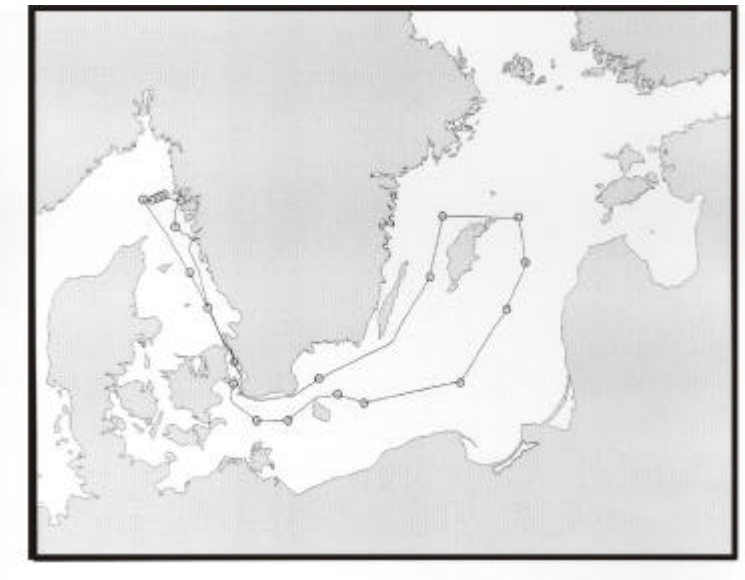
- EOP 1 and 3 to be conducted in the late summer/early fall season (Aug./Sep.2000 and 2001)
- EOP 2 and 5 to be conducted during wintertime (Jan./Feb. 2001 and 2002)
- EOP 4 to be conducted during spring in April/Mai 2001 which is representative for the snow melting season.

Some activities within the BALTEX/BRIDGE programme started even earlier (in 1999) and can be considered as an pilot EOP.
Summery of research activities during EOPs is presented in the table below:

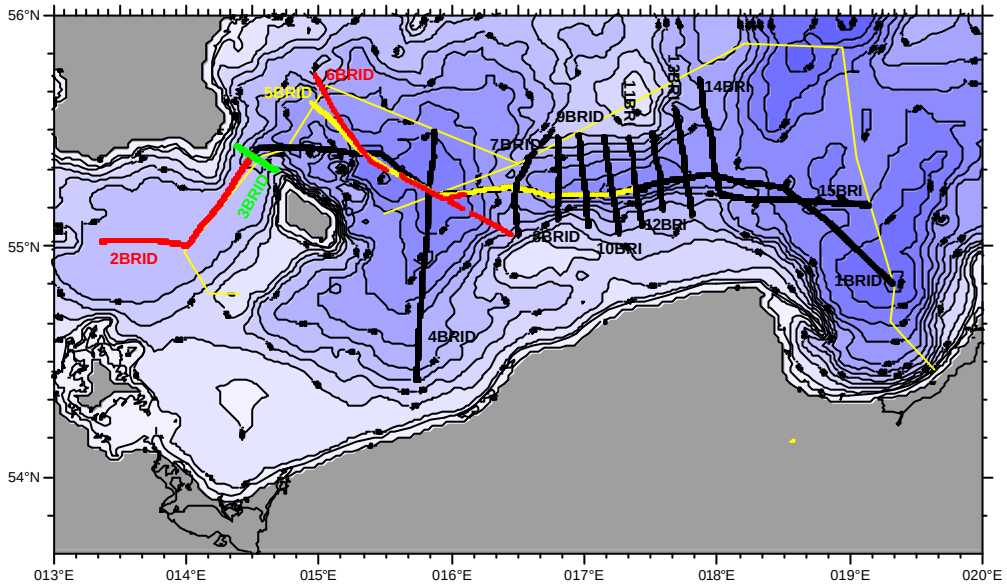
Institute	Ship	Date	Area *	Parame-ters	Remarks
Pilot EOP Autumn 1999					
FIMR Helsinki	Aranda	11-19 Oct.99	Gotland Deep	T, S	
SMHI Göteborg	Argos	24-29 Oct.99	Skagerrak, Kattegat, Baltic Proper	T, S.0_2 , Nutrients	
IO PAS Sopot	Oceania	19-23 Oct. 99	Gdansk Deep Stolpe Channel, Borh. Deep	T, S, Currents ADCP	
IFM Kiel	Alkor	13-19 Oct. 99	Belts Sea, Western Baltic Sea	T, S, 0_2	
EOP 1. Summer 2000					
SMHI Göteborg	Argos	27.08 - 1.09	Skagerrak, Kattegat, Baltic Proper	T, S.0_2 , Nutrients	
IFM Kiel	Alkor	13.07 - 08.08	Western Baltic Sea, Baltic Proper	T, S, 0_2	
EOP 2. Winter 2001					
FIMR Helsinki	Aranda	29.01 - 08.02	Gotland Deep	T, S	
SMHI Göteborg	Argos	15-21.01	Skagerrak, Kattegat, Baltic Proper	T, S.0_2 , Nutrients	
IO PAS Sopot	Oceania	27.01-11.02	Gdansk Deep, Stolpe Channel, Borh. Deep	T, S, Currents ADCP	
EOP 3 Spring 2001					
SMHI Göteborg	Argos	25-28.04	Skagerrak, Kattegat, Baltic Proper	T, S.0_2 , Nutrients	
IO PAS Sopot	Oceania	19-29.04	Gdansk Deep, Stolpe Channel, Borh. Deep	T, S, Currents ADCP	
IFM Kiel	Alkor	17-20.04	Western Baltic Sea, Baltic Proper	T, S, 0_2	
EOP 4 Summer 2001					
SMHI Göteborg	Argos	27.08 - 01.09	Skagerrak, Kattegat, Baltic Proper	T, S.0_2 , Nutrients	
IO PAS Sopot	Oceania	23.09-04.01	Gdansk Deep, Stolpe Channel, Borh. Deep	T, S, Currents ADCP	
IFM Kiel	Alkor	04-14.08	Western Baltic Sea, Baltic Proper	T, S, 0_2	
EOP 5 Winter 2002					
SMHI Göteborg	Argos	25-28.04	Skagerrak, Kattegat, Baltic Proper	T, S.0_2 , Nutrients	
IO PAS Sopot	Oceania		Gdansk Deep, Stolpe Channel, Borh. Deep	T, S, Currents ADCP	
IFM Kiel	Alkor	28.01-05.02	Western Baltic Sea, Baltic Proper	T, S, 0_2	

* Areas of research cruises of R.Vs. Aranda, Argos and Oceania, are shown at fig. 2

a)



b)



c)

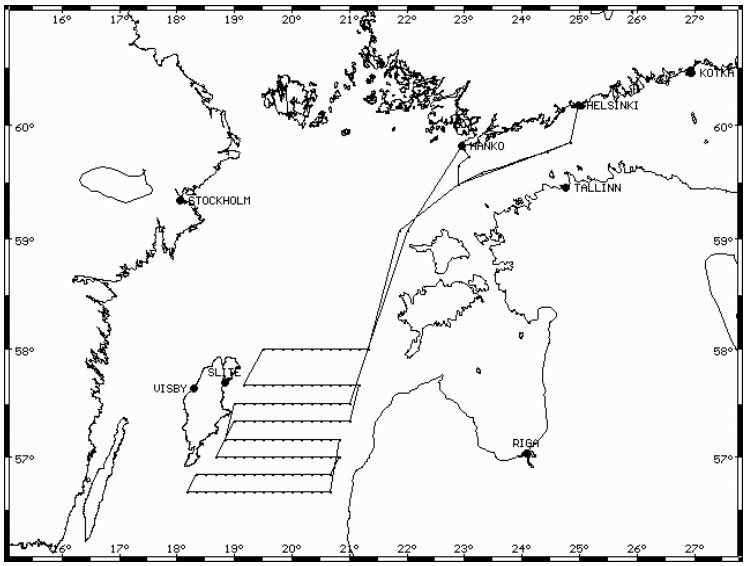


Fig. 2: Cruise route of (a) r.v. ‘Argos, (b) r.v. ‘Oceania” and (c) r.v. ‘Aranda”

All EOPs were generally well covered, on average 3 research vessel were working in the Western Baltic and the Baltic Proper and 2 in the Danish Straits, nearly at the some time.

2.3. EOPs special activities

Besides standard hydrography during EOPs and in some cases additional cruises the special process oriented studies of deep water dynamics in the Stolpe Channel by IOPAS and R.V. Oceania were made.

High resolution measurements with towed CTD and ship mounted ADCP in the deep basins (Gdansk, Bornholm and Arkona Deeps) and connecting channels (Stolpe, Channel Bornholm Gate) were aimed to learn about interbasin exchanges of water and energy, deep - inflowing and waters transport in particular. During the BALTEX/BRIDGE period over 10 cruises and nearly 70 high resolution CTD/ADCP transect were made. They show very complicated, pulsating transport of deep waters with many "disturbances" by mesoscale structures and internal waves.

3. Routine, oceanographic measurements and observations

3.1. Inflow-outflow through the Danish Straits.

Water exchange through the Danish Straits is monitored by the coastal states' (Sweden, Denmark, Germany) services and data are available at national data centers there, and at the BODC in Göteborg (?)

3.2. Sea level, sea surface temperature, ice

Continues long-term measurements of sea-level, water temperature and salinity and ice observations were carried out by coastal state's services and data are or will be collected at NODCs and BODC in Göteborg (?).

4. Oceanographic Data Center

Oceanographic Data Center has been or is being moved to SMHI Göteborg.
Details will be presented at another agenda item.

5. Final remarks

Planing the oceanographic research during EOPs it was realized, that this part of BALTIX/BRIDGE research can not be extended much without additional funds, because of high ship cost. So the sea going activities went not much beyond the national programmes and the Helcom's Baltic Monitoring Programme. Further on, collected data can not be exploit to the full extend because of the same reason.
To get better results in BALTEX Phase II additional financing would be necessary.

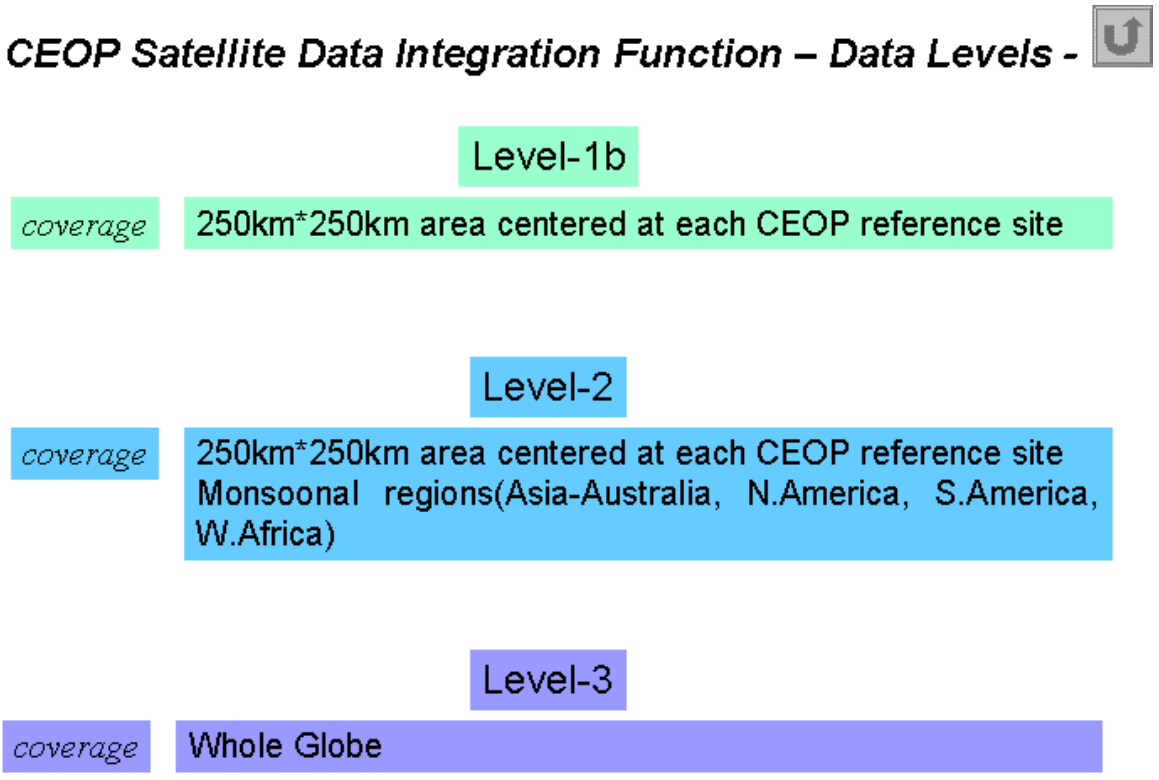
Appendix 13: CEOP Satellite Water and Energy Cycle Parameters

CEOP Satellite Data Integration Function – Data List-

	In-situ Meas.	Satellite Data
Atmospheric Profiles over Land	Temperature	Aqua/AIRS, Terra & Aqua/MODIS
	Water Vapor	Aqua/AIRS, Terra & Aqua/MODIS, ADEOS-II/GLI
	Dry Static Energy	Aqua/AIRS
	Wind	
	Water Vapor Flux	
	Dry Static Energy Flux	
	Vapor Flux Divergence	
	Longwave Flux	TRMM & Terra & Aqua/CERES, Aqua/AIRS
	Shortwave Flux	TRMM & Terra & Aqua/CERES, Aqua/AIRS
	TOA Flux	TRMM & Terra & Aqua/CERES
	Cloudiness	TRMM & Terra & Aqua/CERES,Terra & Aqua/MODIS Terra/MISR, ADEOS-II/GLI
	Net Radiative Heating	TRMM & Terra & Aqua/CERES, Aqua/AIRS
	Condensation Heating	TRMM/PR, Aqua/AIRS
	Aerosol Concentration	Terra & Aqua/MODIS, Terra/MISR, ADEOS-II/GLI
	PBL	

CEOP Satellite Data Integration Function – Data List -

	In-situ Meas.	Satellite Data
Land Surface	Elevation	
	Vegetation	Terra & Aqua/MODIS, ADEOS-II/GLI
	Precipitation(liquid)	TRMM/PR & TMI, Aqua & ADEOS-II/AMSR
	Snow Water Equivalent	Aqua & ADEOS-II/AMSR, ENVISAT/ASAR
	Snow Depth	Aqua & ADEOS-II/AMSR
	Streamflow	
	Stream Discharge	
	Reservoir Storage	
	Air Temperature	
	Albedo	Terra & Aqua/MODIS,ASTER, ADEOS-II/GLI
	Specific Humidity	
	Skin Temperature	Terra & Aqua/MODIS, ADEOS-II/GLI
	Wind	
	Sensible Heat Flux	
	Latent Heat Flux	(Terra & Aqua/MODIS)
	Longwave Radiation	TRMM & Terra & Aqua/CERES, Terra/MISR
	Shortwave Radiation	TRMM & Terra & Aqua/CERES, Terra/MISR
Sub-Surface	Water Table	
	Soil Moisture	Aqua & ADEOS-II/AMSR
	Soil Temperature	Aqua & ADEOS-II/AMSR


CEOP Satellite Data Integration Function – Data Levels -
Level-1b
coverage
250km*250km area centered at each CEOP reference site
Level-2
coverage
250km*250km area centered at each CEOP reference site
Monsoonal regions(Asia-Australia, N.America, S.America, W.Africa)
Level-3
coverage
Whole Globe

Appendix 14: Expression of Interest *BALTIC WATER*

EXPRESSION OF INTEREST
for an
INTEGRATED PROJECT

"Observed and future water cycle variability and changes in the Baltic Sea Basin"

BALTIC WATER

submitted by
Max-Planck-Institut für Meteorologie, Hamburg, Germany
and
GKSS Forschungszentrum Geesthacht, Germany

and a consortium of 41 partner institutions

submitted in response to Invitation EOI.FP6.2000

5th June 2002

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1. AIM

The aim of BALTIC WATER is to document the past, characterise the present and project the future variability and changes of the water cycle in the climate system of the entire Baltic Sea Basin. Impacts of variability and changes to Baltic Sea Basin ecosystems, availability and quality of water, and risk of natural hazards, will be assessed. Decision support strategies for both politicians and environmental managers will be derived in order to contribute in particular to requirements of the **European Water Framework Directive** (2000/60/EC) and other European policies. Central tools of the integrated project will be coupled regional atmosphere / hydrology / land-surface / Baltic Sea / sea-ice models enhanced by eco-system model components, accompanied and supported by evaluation of climate records, field studies, monitoring activities and new remote-sensing applications. These tools will be established and applied by integration of the relevant research institutions, environmental agencies and stake-holders in all countries with larger territories in the Baltic Sea Basin, and beyond, thus including EU Member states as well as Candidate Accession Countries.

2. BACKGROUND

Our ability to understand and predict the climate system and climate change depends critically on our capabilities to observe, understand and model the hydrological cycle as well as the related heat budgets. Understanding the water cycle is also of crucial importance for gaining insight into the pathways of nutrients and pollutants both in the atmosphere and in the land surface-river-sea system. As such, observation and modelling of processes in the water cycle are essential tools for all sectors in the **D**rivers-**P**ressures-**S**tate-**I**mpacts-**R**esponses (DPSIR) concept, such as detecting pressure-state relations, identifying impacts and their routes to pressures, and establishing future scenarios as decision support for policy responses and management directives. A motivation for confining this Integrated Project to the **Baltic Sea Basin**[4] is given by the European Water Framework Directive (WFD), which

[4] The entire water catchment of the Baltic Sea, including the Baltic Sea itself, is referred to as Baltic Sea Basin here covering roughly 2.1 million km^2, or 20 % of the European continent.

suggests Europe to be divided into units limited by major watershed boundaries. There are specific challenges of global climate change for the Baltic Sea Basin, because the particular conditions of this region make it especially vulnerable to the combination of several aspects of global change and regional pressures. The basin encompasses the majority of European lakes, boreal running waters, many bogs, and a large proportion of pristine waters. The large north-south gradient of hydrological characteristics makes this region unique among European water basins. Highly variable present-day weather conditions affect the natural environment and human societies. Vulnerable structures include e.g. traffic systems and power generation[5]. The effects of further climate change on these factors are not known.

Due to the release of an ever-increasing number of new chemicals, and because of the very restricted water exchange with the North Sea, the Baltic Sea Basin is especially vulnerable with respect to agreed environmental targets under global change. A central concern is the influence of global change on both the availability and quality of water, as well as on extreme hydrological events. While water quality is a concern shared by all Baltic Sea countries, parts of the basin (e.g. Poland and eastern Germany) already suffer from occasional water shortages. Projecting the availability of water on different time scales ranging from days to decades is an important economical factor, having in mind the large demands of water for e.g. domestic use, power generation, agriculture, industry and tourism.

Our understanding of the environmental dynamics in the Baltic Sea Basin has greatly improved in recent years as a result of several national and international research projects that involved a large number of research institutions in many countries. Among the most prominent of such projects were BALTEX (Baltic Sea Experiment), NOPEX (The northern hemisphere climate-processes land-surface experiment) and BASYS (Baltic Sea system study). The knowledge gained from these projects has however not yet been adequately recognised, integrated and applied in the user community and in other science sectors.

3. OBJECTIVES AND DELIVERABLES

The major **objectives** of BALTIC WATER are defined as follows:

3.1: To finalize the development of *fully* coupled regional atmosphere/land-surface/hydrology/Baltic Sea/sea-ice models tested and validated by the use of new remote sensing data and infrastructures (such as ENVISAT, GPS, MSG, BALTRAD) and GEWEX-CEOP reference site data, to be applied to the Baltic Sea Basin and its surrounding areas; several model systems with different degree of complexities and forecast capabilities including weather and climate prediction are envisaged;

3.2: To link models of water balance, water quality and bio-geochemical cycles to the coupled regional models, to be used to interpret and predict societal consequences of past and future land-use and climate scenarios;

3.3: To use advanced coupled regional model systems to reconstruct the past evolution of environmental variables in the Baltic Sea Basin (with the aid of collection and analysis of long time series), and to forecast future climate scenarios;

3.4: To define desired model output via a debate with stakeholders and end-users based on major environmental issues and requirements of the Water Framework Directive, and to demonstrate the relevance and capabilities of the new modelling tools for stake-holders and end-users, including water resource managers, hydropower companies, insurance companies, the agricultural community and authorities of various cities.

BALTIC WATER is designed to lead to specific **deliverables**, focussing on the entire Baltic Sea Basin and thus with relevance in general for Northern and Central Europe:

3.5: A hierarchy of different coupled model systems (see objectives 3.1 and 3.2), designed and used as decision support tools for both environmental managers and politicians, for i) short-term and seasonal forecast of high impact weather conditions, ii) analysis and forecast of pathways and deposition of pollutants and nutrients relevant for the environment and society, iii) climate anomaly prediction, and, iv) regional climate change scenarios;

[5] Norway and Sweden produce more than 90 % and 50 %, respectively, of their electricity by hydropower generation.

3.6: Full documentation including uncertainties of variability and changes in the water cycle components (such as atmospheric water vapour, clouds, precipitation, soil moisture, runoff, evaporation, sea-ice); and
3.7: White papers for strategies on i) implementation of the Water Framework Directive and other European policy documents and directives; ii) efficient reduction of eutrophication and pollution of the Baltic Sea; iii) reactions to regional water cycle changes with relevance for water quality and availability; iv) management tools for weather-related disaster reduction.

4 APPROACH

Based on the recently improved understanding of physical processes governing the hydrological cycle of the Baltic Sea Basin, BALTIC WATER shall integrate research on climate variability and change, and on fluxes and budgets of nutrients and pollutants in both air and water and how these are influenced by natural and socio-economic drivers both within and outside the basin. Studies on impacts of climate change and climate variability on water availability and quality will be included as well as exemplary studies on related policy measures based on retrospective analyses, mitigation and adaptation scenarios. Users and stakeholders will be partic ipants in BALTIC WATER and have a platform to meet and communicate with the research community. A major effort will be devoted to the establishment of a two-way concept between stakeholders and end-users on the one side and the scientific arena on the other side. BALTIC WATER will involve all meteorological, hydrological and oceanographic services of the countries in the Baltic Sea Basin, thus not only guaranteeing the immediate application of models for weather, flood and environment forecasting, but at the same time supplying relevant in situ data from their monitoring networks, such as the Baltic-HYCOS Regional Hydrological Information system. Hence, no major funding for observational networks or monitoring activities will be requested in this project, except for innovative, ground-based systems necessary for e.g. quality upgrade and assurance of satellite derived products (e.g. from ENVISAT, MSG, EOS-Aqua).

5 NEED AND RELEVANCE

Contribution to EU policies: BALTIC WATER is designed to support the implementation of the European Water Framework Directive (WFD) and the treaty of the Helsinki Commission. As concluded by the Baltic Sea Status report of the Helsinki Commission (March 2001), the Baltic States, and especially the Accession Countries, require support in implementing the WFD in the coastal area with regard to water quality and monitoring. The results of BALTIC WATER will be of direct relevance to the River-Basin Management Plans preconized by the WFD. BALTIC WATER will also contribute to the development of European integrated coastal zone management [COM (2000) 545: *Proposal for a European Parliament and Council Recommendation concerning the implementation of Integrated Coastal Zone Management in Europe*, and COM (2000) 547: *Communication from the Commission to the Council and the European Parliament on Integrated Coastal Zone Management: a Strategy for Europe*]. BALTIC WATER addresses three of the prominent environmental issues identified by the EU 5th Environmental Action Programme "Towards Sustainability" (C138 of 17/05/1993) and the Dobris-report on the state of Europe's environment: toxics, eutrophication, and climate change. Additionally, BALTIC WATER will contribute to the UN Conventions on Climate Change, and on Long-Range Transboundary Air Pollution (and associated protocols).
Contribution to FP6 priorities: BALTIC WATER encompasses the water cycles of a major continental-scale water catchment, and therefore is in obvious accord with the FP6 research priority 1.1.6.3. *Global change and ecosystems*, sub-area 1.1.6.3.ii *Water cycle, including soil-related aspects*. Elements of this proposed Integrated Project are also relevant for sub-area 1.1.6.3.v *Strategies for sustainable land management, including coastal zones, agricultural land and forests*, and sub-area 1.1.6.3.vi *Operational forecasting and modelling, including global climate change observation systems*. Part of the observational activities of BALTIC WATER are based on new space-borne remote sensing techniques and instruments (such as sensors on the new ENVISAT satellite) and, hence, will contribute to the FP6 research priority 1.1.4.2 *Space*, sub-area 1.1.4.2.ii *Global Monitoring for Environment and Security (GMES).* BALTIC WATER will in particular help to get the synergy of the above mentioned FP6 thematic priorities for the Baltic Sea Basin.
Contribution to the European Research Area: BALTIC WATER will support developments towards a European Research Area (ERA), addressing primarily *the fragmentation of the research base in Europe* and *under financing of European research*. For a meaningful contribution to sustainable

solutions related to *environmental* questions in the context of climate change and its consequences for water availability and quality, the competences recently established must now be integrated with expertise in *climate variability research, eco-system studies* and *social and economic sciences*. Interaction and co-ordination between these communities are presently weak, and a consolidated and integrative approach is clearly necessary to overcome fragmentation of these research components. Participants of the BALTIC WATER consortium are spread over 12 European countries, both EU Member and Accession states. In these countries, the level of available funding for the topics BALTIC WATER is addressing, ranges from almost non-existent to adequate, while the overall available funding and the existing problems do mostly not correlate at all. Integration and funding at European level is needed since sustainable solutions cannot be accomplished on the national level only.

6 SCALE OF AMBITION AND CRITICAL MASS

Combination of required expertise into one European research programme

An integrated research initiative at the European level is required in order to i) create cross-disciplinary linkages with mutual benefits within the natural sciences envisaged to be involved, and ii) support decision makers on the political level in environmental issues related to the availability and quality of water in the Baltic Sea Basin. The required time scale together with the range of disciplines and integrated research involved clearly indicate that BALTIC WATER will have the character of a *programme*, rather than a *project*. A substantial contribution to funding of actual costs of R&D and other activities, distinctly *beyond a grant to integration*, is definitely required for BALTIC WATER, which strongly requires implementation through means of an *Integrated Project*, rather than a traditional R&D project or a network of excellence.

The Consortium: At present, 43 institutions from 12 countries expressed firm intention to join BALTIC WATER. A list of these institutions including their expertise provided is given in the appendix.

Time scale and budget frame: BALTIC WATER is planned for a time period of 5 years, with both a flexible consortium membership and structure, as well as regularly evaluated and updated success criteria. A core group will permanently contribute to BALTIC WATER, while a group of assistant contractors will temporarily be in the consortium. BALTIC WATER will follow the "open shop" approach, with new contractors being added when required by e.g. project-specific open calls to be published jointly with the European Commission. The total eligible cost of this Integrated Project are presently estimated to be in the range of 30 to 40 million euro.

7 INTEGRATION

Integration of **R&D activities** will be in both *horizontal* and *vertical* dimensions: *horizontally* across disciplines, and *vertically* to include competences in different work categories. Expertise in the following disciplines will be integrated in BALTIC WATER creating a new dimension of multi-disciplinarity at the European level in one research programme: Meteorology, oceanography, hydrology and water management, climate research, air and water chemistry, marine biology and geo-biochemistry, marine and terrestrial eco-system research. Expertise in several work categories will be integrated including modelling and data assimilation techniques, field studies and experiments, environmental monitoring and remote sensing both groundbased and space-borne.

BALTIC WATER will integrate major activities in the fields of **dissemination** and **exchange of knowledge** as well as **training and education**. This will be achieved through the following major activities: 1) regularly conducted BALTIC WATER scientific study conference, 2) at least two one-week open summer schools at the PhD and post-doctoral levels on all aspects of BALTIC WATER; 3) a co-ordinated university course programme at under-graduate and graduate levels to be held at selected universities in riparian countries of the Baltic Sea, partially co-ordinated through the Baltic University programme; 4) a specific user information programme; 5) organisation of Working Group (WG) meetings focussed on specific BALTIC WATER issues; 6) a public BALTIC WATER web-page; 7) a regular BALTIC WATER newsletter (electronic & hard copy); 8) publication of research results in peer-reviewed journals.

This two-dimensional integration is envisaged to create a new, unprecedented level of excellence at the European level. The scale of the integration calls for efficient **management and coordination**.

The whole programme will be divided into sub-programmes and projects. The planned management elements will include an external advisory board (with expected participation of the European Commission), a project-internal Steering Committee, an international project office, and several working groups. The management and co-ordination structure for BALTIC WATER will be built upon and benefit from the existing structures of both the BALTEX and NOPEX projects. In particular, the International BALTEX Secretariat presently implemented at GKSS Research Centre Geesthacht will act as the project office for BALTIC WATER, and existing support infrastructures of BALTEX and NOPEX, such as dedicated data centres, are planned to be used and extended.

Appendix

List of 43 participants from12 countries to BALTIC WATER including key scientists and major competences.

Institution	Country	Key scientists	Competences and role in this project
Max-Planck-Institute for Meteorology	Germany	H. Graßl , D. Jacob, G. Peters	Regional climate modelling, climate impact and change studies, groundbased and satellite remote sensing
GKSS Research Centre Geesthacht	Germany	H. von Storch, M. Cabral, G. Petersen, T. Mengelkamp, M. Quante, H.-J. Isemer	Climate reconstruction and scenarios, coastal zone modeling and monitoring, remote sensing, project management,
Technical University of Denmark	Denmark	D. Rosbjerg	Hydrology and water management, pollution studies, groundwater research
Research Centre of Agricultural and Forest Environment PAS	Poland	Z. W. Kundzewicz	Climate change - impacts, adaptation and vulnerability (water, ecosystems); sustainable development
IVL Swedish Environmental Research Institute	Sweden	J. Munthe, I. Wängberg, U. Fortkamp	Air chemistry, air pollution studies. Catalysing sustainable development of the industrial sector in the Baltic Sea Region
University of Gothenburg	Sweden	A. Omstedt, B. Gustafsson	Physical oceanography, marine system analysis, Baltic Sea modelling
Tallinn Technical University - Marine Systems Institute	Estonia	S. Keevallik, J. Elken	Baltic Sea internal processes and modelling
Finnish Meteorological Institute	Finland	C. Fortelius, S. Joffre, M. Hongisto	NWP modelling, data assimilation, coupled air-sea modelling, CEOP reference data
Stockholm University	Sweden	F. Wulff	Marine systems ecology
State Hydrological Institute, St. Petersburg	Russia	V. Vuglinski	Hydrological modelling and operational forecasts
Institute for Baltic Sea Research IOW	Germany	B. Schneider	Biogeochemical modelling and field experiments
Swedish Meteorological and Hydrological Institute, Rossby Climate Centre	Sweden	S. Bergström, M. Rummukainen	Coupled regional modelling, hydrology, water resources, data assimilation and reanalyses, remote sensing
Uppsala University	Sweden	S. Halldin, A.-S. Smedman, L. Rydén	Hydrology, air-sea/air-land exchange processes, training and education
Norwegian Institute for Air Research	Norway	J. Pacyna, A. Lükewille	Airborne pollution studies, integration of policy issues
National Environmental Research Institute (NERI)	Denmark	C. Heinze, O. Hertel, T. Christiansen	Physcal / ecological / geochemical modeling of ocean and atmosphere
Risoe National Laboratory	Denmark	S.-E. Gryning, L. L. Sörensen	Air-sea / air-land surface exchange processes, boundary layer meteorology
German Weather Service	Germany	F. Beyrich, S. Hafner	Atmospheric boundary layer processes, CEOP reference data, meteorological data centre function
University of Lund	Sweden	A. Lindroth, M. Sykes, L. Bärring	Soil-vegetation-atmosphere interactions, aircraft measurements, climate variability, extreme weather

Institute of Oceanology, PAS	Poland	J. Piechura	Marine sciences and modelling
Rheinische Friedrich Wilhelm University Bonn	Germany	C. Simmer, S. Crewell	Remote sensing (atmosphere and land surface parameters), climate studies
Chalmers University of Technology	Sweden	G. Elgered	Atmospheric measurements using GPS and microwave radiometry
Bayreuth University	Germany	T. Foken	Atmospheric boundary layer processes
Institute for Marine Research Kiel (IfM)	Germany	A. Lehmann, A. Macke, K. Bumke	cloud remote sensing and radiation budget, ocean modeling, air-sea interaction processes
University of Veterinary Medicine Vienna	Austria	F. Rubel	Precipitation analysis
Technical University Dresden	Germany	F. Berger	Atmospheric radiation budgets using remote sensing techniques
University of Tartu	Estonia	J. Jaagus, A. Järvet	Regional hydro-meteorology, regional climate change
Danish Institute of Agricultural Sciences	Denmark	J. E. Olesen	Nitrogen cycling in agriculture and adaptation to climate change
University of Lodz	Poland	J. Wibig	Regional water cycle changes, user training and education
Stichting Nederlands Instituut voor Onderzoek der Zee, Den Burg	The Netherlands	H. Thomas	Biogeochemistry
Institute for Meteorology and Water Management Wroclaw	Poland	A. Dubicki	Operational meteorological and hydrological forecast and warning
Geological Survey of Denmark and Greenland (GEUS)	Denmark	J. C. Refsgaard	monitoring, process studies and modeling of the land phase of the hydrological cycle at different scales
Estonian Meteorological and Hydrological Institute (EMHI)	Estonia	J. Kadaja, H.Tooming	Operational forecasts, regional climate change, agrometeorology
University of Szczecin	Poland	H. Kowalewska-Kalkowska, R. Marks	Oceanography, Hg air-sea exchange, studies on high impact weather forecast
Free University Berlin	Germany	J. Fischer	Atmospheric water vapour and cloud parameters from satellite data
Latvia University of Agriculture	Latvia	A. Zieverts, J.Valters	Water cycle variability, water resources
Institute of Geophysics, PAS, Warszawa	Poland	Z. Kaczmarek, M. Liszewska	Climate variability and change, water resources, natural hazards
International Council for the Exploration of the Sea (ICES)	Denmark	J. N. Jensen	International marine databank, integration of users, stake-holders and policy makers
Finnish Environmental Institute	Finland	P. Seuna	Process and catchment hydrology, impact studies, monitoring
Institute for Meteorology and Climatology, Hannover	Germany	T. Hauf	Convective precipitation studies
Finnish Institute of Marine Research	Finland	M. Perttilä, J. Launiainen	Marine observing systems and modeling, sea-ice studies, marine ecology
DHI Water & Environment	Denmark	M. Butts	Integrated water cycle modelling
Royal Netherlands Meteorological Institute, KNMI	The Netherlands	A.van Ulden, F. Bosveld	Coupled regional modelling, CEOP reference data
The Republican Hydrometeorological Centre	Belarus	I. Skuratovich, V. Zukovsky	Operational weather and hydrological forecasts

Appendix 15: BALTEX WG Radar and Radar Data Centre

BSSG Jun 18-19, 2002

STATUS REPORT OF THE BALTEX WORKING GROUP ON RADAR (WGR) AND OF THE BALTEX RADAR DATA CENTER (BRDC)

Jarmo Koistinen (FMI) and Daniel Michelson (SMHI)

Radar activities:

- **Detailed description of the ongoing work and plans will be found from the Minutes of the 7th Meeting of the WGR, to be held in StPetersburg, most likely in October, 2002.**

- **The second European Radar Conference (ERAD 2002) will be held in Delft, The Netherlands, 18-22 Nov. Several papers from BALTEX-related work will be presented (see http://irctr.et.tudelft.nl/sector/rs/frames.htm).**

- **A NORDRAD Workshop will be arranged at FMI in Helsinki, 3-4 Oct. It will be focused on operational applications and development (see http://nordrad.fmi.fi/meeting2002).**

- **Several scientific actions, useful for BALTEX, are going on (see below). BALTRAD Institutes are also expressed their interest to several Proposed EU FW6 actions dealing with radar+satellite based precipitation measurements.**

The network (see the attached map):

- **<u>Poland</u>: The coordination of the establishment and planning of the new Polish radar network is now taken care by Mr. Zdzislaw Dziewit, a member in the WGR. Thus we live in the expectation that the development there is in good and capable hands from the point of knowledge in the field of weather radars and their applications.**

- **<u>Russia</u>: FMI has signed a contract with Roshydromet in May to receive data in real time from a radar close to St. Petersburg. This data can be transmitted to BRDC. The quality of the data seems good but a long lasting break in the operation has prohibited any data transmission so far.**

- **Estonia: The Estonian radar in Tallinn is operating, technical problems are solved and data is flowing to FMI (EMHI is an associated NORDRAD member). It is also available to BRDC but commercial concerns at SMHI have prevented the actual use. The quality is relatively poor due to the bad siting of the antenna (see the image). EMHI has shown interest to buy a second radar. It will be located either in SE or in SW of Estonia, depending on the possible site of the new Latvian radar.**

- **Norway: Two new radars are in the process of being installed, one outside Trondheim and one on the coast outside Bergen. Both radars are expected to be operational by the autumn and data is expected to be available through NORDRAD.**

- **Finland: No major changes. The monthly availability of radar data is very high, on average 98-99%.**

- **Sweden: Radar Göteborg has been moved to more inland site near the town of Vara. Data is expected to be operational by the end of June. There is a plan for later this year to move radar Norrköping to a site around 60 km south, near Åtvidaberg. Better radar horizon will improve the quality considerably.**

- **Denmark: Radar Stevns is a new radar which has replaced radar Copenhagen, although the new site is around 50 km to the south. The old radar has been moved to Bornholm and SMHI is currently negotiating access to this data with DMI.**

- **Germany, The Netherlands and Czech Republic: The BRDC is currently in dialogue with the NMSs in order to gain access to wind profile products from the radar networks. These products are valuable for data assimilation into NWP models. There are no plans to expand the BALTRAD reflectivity composite with data from additional Central European radars.**

- **In Belorussia two old MRL-5 radars are in 24 h operation: at Minsk and at Brest. The radar at Minsk is planned to be digitised during the year 2002 and icluded to the BALTRAD composite thereafter.**

- **There are rumours that Latvia will have a new radar next year but this same rumour existed two years ago. As Latvian Hydrometeorological Institute has expressed a strong opinion to leave all BALTEX work it remains unclear whether any new radar data could be applied.**

- **There are no positive radar signals from Lithuania.**

Technical status of BRDC:

- **The production is stable and automatic. No major changes are planned. In total 28 recipients of BRDC data sets exist and at least 4-5 of them are applying the data to scientific problems at the moment.**

Ongoing research:

- **A summary of the BALTRAD products and their accuracies by Koistinen and Michelson is accepted in final form to be published in BER. The main result is that biases have been eliminated in the BALTRAD accumulations (RR products) applying gauge-radar adjustment techniques (presented in the 3rd Study Conference).**

- **The EU Framework 5 Application CARPE DIEM (2002-2004) includes the Partners SMHI and FMI. Topic: improvement of quantitative radar based precipitation estimates applying NWP data and assimilation of Doppler winds into NWP (see http://carpediem.ub.es/). As a result a real time correction procedure to bring the radar measurements from aloft to ground level will improve the accuracy of BALTRAD dBZ and RR products. A large sample of classified vertical reflectivity profiles above the FMI radars will be available as a reference data e.g. for satellite-based precipitation and ice cloud algorithms as well as for vertical distributions of latent heat release (see the example images).**

- **NORDRAD Quality Assurance project has proven that intercomparison of the data from overlapping radars can solve elevation angle errors of ±0.1 degrees and system calibration errors of 0.5 dB (typical time scale 1-3 weeks). Final report has been published and FMI will take care of the operational comparisons through the NORDRAD network. The tool is excellent for validation of the siting of individual radars (see the example images).**

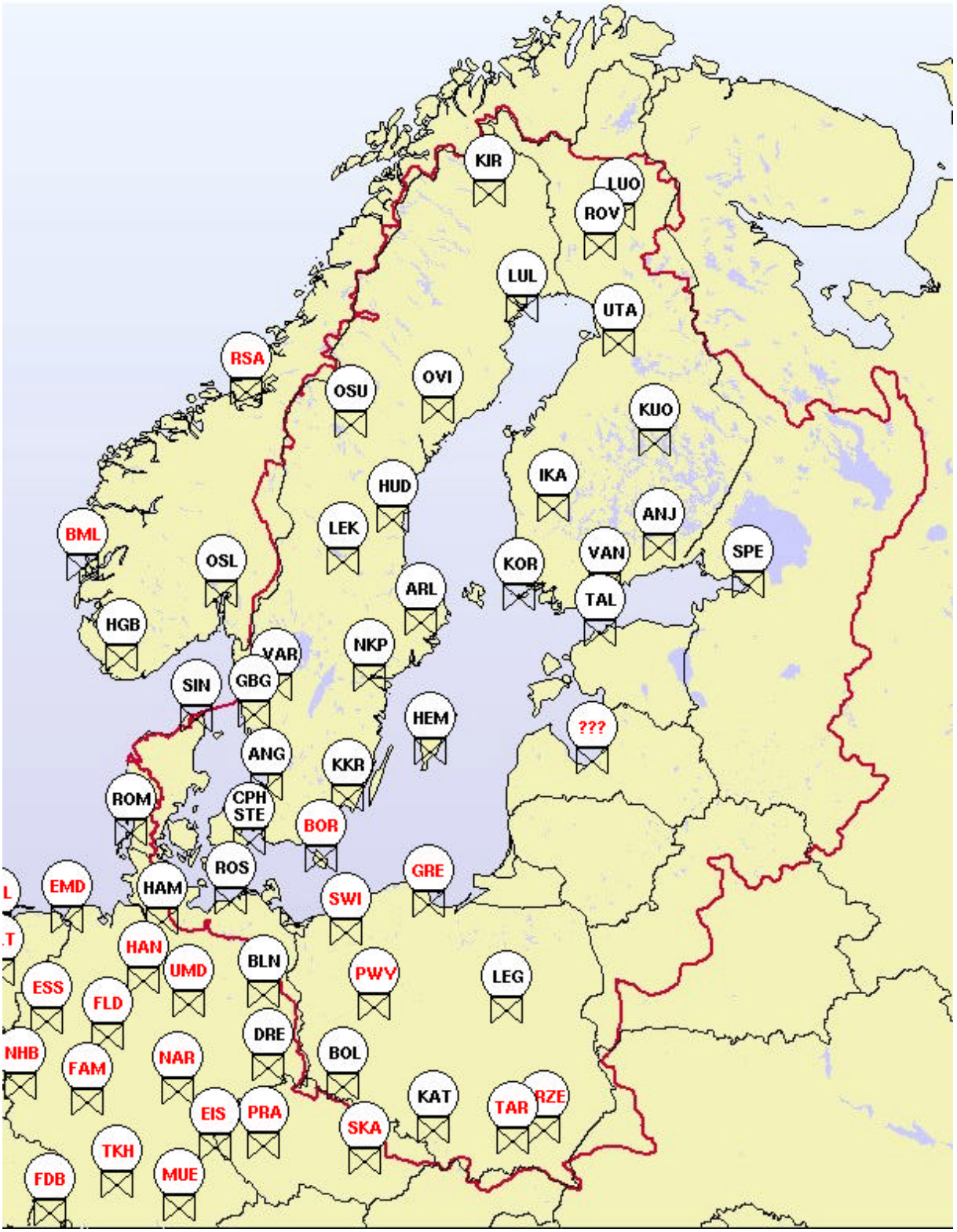
- **HIRLAM together with COST 717: the methods on the use of Doppler winds in NWP assimilation are evidently becoming established. The Doppler winds are accurate and good but a proper quality control is always needed (to avoid e.g. birds and aliasing due to the Doppler dilemma). Some studies have applied dealiased Doppler winds from FMI**

inducing a misunderstanding of the wind measurement capability of those radars (real time wind soundings from Doppler radars are available at http://www.meto.gov.uk/research/interproj/cwinde/wradar/index.html#).

A study will be started at FMI by Heikki Järvinen in which wind measurements from a Doppler radar will be compared to respective measurements from sounding station and from a wind profiler at the same site, close distance to the radar.

⑩ **National research is quite active at FMI, SMHI, met.no and DWD to improve the accuracy of real time operational precipitation measurements . A good example is the pattern recognition technique developed at FMI to remove non meteorological echoes (birds, sea clutter, ships, the sun) from the measurements. Much of this work is expected to be implemented in the BRDC product generation in near future.**

Attachment: The map of operational and planned BALTRAD radars (see next page).



Existing BALTRAD radars in black. Potential BALTRAD radars in red. The Baltic Sea's drain basin is outlined by a red polygon. Background map courtesy of UNEP GRID-Arendal.

Appendix 16: ODCB Teleconference

Oceanographic Data Centre for BALTEX

Notes of a Telephone Conference held 19 April 2002 Final version as of 24 May 2002

Participants:

Anders Omstedt, University of Göteborg, Göteborg, Sweden
Bertil Hakansson, Swedish Meteorological and Hydrological Institute SMHI, Vastra Folundra, Sweden
Andreas Lehmann, Institute for Marine Sciences, Kiel, Germany
Jan Piechura, Institute of Oceanology PAS, Sopot, Poland
Pekka Alenius, Finnish Institute of Marine Research, Helsinki, Finland
Hans-Jörg Isemer, GKSS Research Centre Geesthacht, Germany

Introduction

The objective of the telephone conference (telecon) was to discuss details on how to implement the Oceanographic Data Centre for BALTEX (ODCB) at the Swedish Meteorological and Hydrological Institute (SMHI) in Göteborg, Sweden. The BALTEX SSG, at its 12th meeting held November 2001 in De Bilt, The Netherlands, had decided to extend the objectives of the former BALTEX Oceanographic Data Centre (BODC) and to move the Oceanographic Data Centre from FIMR to SMHI. This telecon is part of the action to plan and implement the new ODCB at SMHI.

The telecon was held 19 April 2002, 10 – 11.15 am. Anders Omstedt chaired the telecon, Hans-Jörg Isemer took the notes.

The telecon had been prepared by a draft document on the objectives of the ODCB, which had been put together iteratively by the telecon participants prior to the telecon. This draft document will be referred to as "ODCB paper" throughout these notes.

Minutes and action items

1. Anders Omstedt welcomed in particular Bertil Hakansson, who confirmed SMHI's preparedness to establish and maintain the OCDB in Göteborg. Bertil Hakansson mentioned, that he himself will be responsible for the overall management of ODCB. Jan Szaron will work on the technical aspects of the ODCB at SMHI. SMHI will allocate two person months in 2002, and is planning to extend its engagement in 2003 and beyond.

2. The name "Oceanographic Data Centre for BALTEX" with the acronym "ODCB" was officially accepted by all participants. The structure and general form of the ODCB paper was approved by all participants.

3. Pekka Alenius briefly summarised the status of the former BODC. The meta data function of BODC was primarily a virtual task, because very view requests concerning information on

available data were actually received at the former BODC. The only data which were physically archived at BODC comprise sea level measurements for parts of the Baltic Sea coast.
Action #1: Pekka Alenius to establish a summary overview on available data stored at BODC/FIMR.
Action #2: Pekka Alenius and Bertil Hakansson to transfer the available BODC data to SMHI as a base for building up the ODCB archive.
It was noted that both actions 1 and 2 shall be accomplished as quickly as possible, preferably before the next BSSG meeting, 17-19 June 2002, in Tallinn.

4. On section 2 of the ODCB paper: Objectives 1 shall include the setup of linkages to other data centres, which is presently formulated as a separate fourth objective, the latter will be deleted. The second objective will be expanded to include a hint to section 3.2, where details are to be explained, how the quality of the data stored at ODCB shall be guaranteed.
Action #3: Hans-Jörg Isemer to re-write section 2 of the ODCB paper.

5. On section 3.1 of the ODCB paper: During a first phase it is envisaged to cover both the BRIDGE and CEOP time periods. Phase 2 will define extensions both in the past and in the future, this is presently however seen as an future option for which the realisation will depend on criteria such as the success of phase 1 of the ODCB, available resources, and scientific requirements.
Detailed specifications of data shall be deleted from the ODCB paper. Instead, a technical annex to the ODCB paper shall contain technical details. This annex will gradually be established under responsible leadership of Bertil Hakansson.
Sea level data storage will be done using the stations' local height system. As an option, depending on future ODCB's resources and related scientific requirements, additional storage in a common reference level system was discussed.
Action #4: Hans-Jörg Isemer to re-write section 3 (introduction) and 3.1 of the ODCB paper accordingly.

6. On section 3.2 of the ODCB paper: The responsibility for an adequate quality control was discussed to some extent. The group agreed that the data providers need to transfer quality-controlled data to ODCB. ODCB will define technical requirements for the data formats to be used at ODCB. The data providers will be asked to follow ODCB's data format requests as closely as possible. Both, data quality control and data formats will be defined in close agreement to existing ICES standards, which are anyway followed by probably the majority of the potential data providers.
It was suggested to re-write section 3.2 accordingly. The second part of section 3.2 starting with "Meteorological data from RV cruises….." shall entirely be deleted.
Action #5: Pekka Alenius and Bertil Hakansson to re-write the second part of section 3.2 along the lines discussed during the telecon.

7. On section 4 of the ODCB paper: Basically, the existing BALTEX data exchange policy, as is being in use at the other BALTEX data centres, shall apply also for ODCB.
Action #6: Hans-Jörg Isemer to add the basic principles of the BALTEX data exchange policy to section 4.

8. Jan Piechura noted that Polish sea level data are taken and controlled by the national Institute for Meteorology and Water Management (IMGW). He accepted **Action #7** to clarify future data delivery of the Polish sea level data to ODCB.

9. Hans-Jörg Isemer noted that at least part of the sea level data from Russia, the Baltic States and Poland have been prepared and are still being prepared in the frame of research contracts between GKSS and the respective national services in the mentioned countries.
Action #8 was given to Hans-Jörg Isemer to summarise the status of these contracts and their periods covered.

10. Bertil Hakansson will represent the ODCB at all relevant future meetings within BALTEX and beyond. Anders Omstedt invited Bertil Hakansson in particular to attend the forthcoming BALTEX SSG meeting in Tallinn, 17-19 June 2002, and to report on this occasion on progress made related to the implementation of the ODCB. Anders Omstedt and Bertil Hakansson will present the revised ODCB paper to the BALTEX SSG in order to get the paper and suggested implementation measures for ODCB approved by the SSG.
Hans-Jörg Isemer took the **Action #9** to include Bertil Hakansson in the future information flow on meetings' invitation and preparation.

11. Future steps:

11.1 A meeting of this group will be held during the forthcoming BALTEX SSG meeting in Tallinn, 17-19 June 2002. Anders Omstedt and Bertil Hakansson have the **Action #10** to prepare for this meeting in due time.

11.2 A workshop will be held later this year, preferably in late summer/early autumn at SMHI in Göteborg. The preliminary objectives of this workshop are:

- for ODCB to present its facilities to interested researchers from the BALTEX oceanographic community,
- for ODCB and this group to proceed implementing ODCB;
- to discuss future scientific applications of ODCB data, thus stimulating and fostering closer co-operation between the modelling community and data providers, and oceanographic research in BALTEX in general.

Draft notes as of 23 April 2002
Hans-Jörg Isemer

Final version as of 24 May 2002
Hans-Jörg Isemer

Appendix 17: ODCB Objectives and Implementation

The Oceanographic Data Centre for BALTEX

(ODCB)

Objectives and Implementation

Draft document

as of 26 May 2002

1. Introduction

For several years, a BALTEX data archive for oceanographic data, the BALTEX Oceanographic Data Centre, was maintained at the Finnish Institute of Marine Research (FIMR) in Helsinki, Finland. This data centre was designed and operated as a meta data centre where *information* on existing data sources and archives relevant for BALTEX was stored and offered to BALTEX data users. Almost no data, except some sea level data, were physically stored, processed and archived at FIMR in the context of the BALTEX Oceanographic Data Centre.

At its 12th meeting in De Bilt, The Netherlands, the BALTEX Science Steering Group (BSSG) suggested to install an Oceanographic Data Centre for BALTEX (ODCB) with the central new objective to physically build up and maintain a dedicated data archive for the purposes and requirements of oceanographic research in the frame of the BALTEX research programme.

The Swedish Meteorological and Hydrological Institute (SMHI) generously offered to host the ODCB at Vastra Frolunda/Göteborg, Sweden. The SMHI Oceanographic Services is the national data host of all physical and chemical data within the Swedish open sea environmental monitoring programme. Standard data is collected including some biological parameters. The database SHARK is used at SMHI for all data. A data quality assurance system is in use.

The BALTEX SSG established a small subgroup with the action item to define detailed objectives of the future ODCB, define details on data to be archived at ODCB, and initiate related actions towards implementing the ODCB at SMHI.

The subgroup should additionally further the data exchange between oceanographic modellers and those who submit data to the ODCB by initiating common research topics where both modellers and observers can mutually benefit from.

2. Objectives of the Oceanographic Data Centre for BALTEX (ODCB)

2.1 **Objective 1:** To continue the meta data centre function of the former BALTEX Oceanographic Data Centre which was maintained at FIMR and to take over all information (meta and physical) stored at FIMR so far. It will also be the task of ODCB to set up links to and, whenever suitable, physical data exchanges with existing oceanographic data centres such as ICES, BALTIC (at Institute for Baltic Sea Research in Warnemünde, Germany, IOW) and SHARK (SMHI). ODCB shall also establish and maintain links to the BALTEX Hydrological Data Centre (BHDC) for exchange and update of the BALTEX runoff data, and other BALTEX Data Centres (such as the BALTEX Meteorological Data Centre, BMDC, and the BALTEX Radar Data Centre, BRDC).

2.2 **Objective 2:** To collect, quality control, and archive oceanographic data. A general description of the data to be stored and time periods to be covered is given in section 3. A detailed list of parameters is established in Annex 1. The main responsibility for the data qual-

ity will remain with the data providers, details on data quality issues in relation to ODCB are given in section 3.3.

2.3 **Objective 3:** To build up a data centre archive with user-friendly access possibilities for BALTEX data users following a data exchange policy similar to the policy already used with other BALTEX Data Centres (see section 4 for some details).

3 Time periods and data types

3.1 Time periods

The process of building-up the ODCB archives is foreseen in two phases.

In **phase 1**, priority will be given to the time period **1999 to 2004**. Within this time period, a first focus will concentrate on archiving data from the BALTEX-*BRIDGE* period, covering October 1999 to December 2002. Extension to the years 2003 and 2004 is based on the planning for the Coordinated Enhanced Observing Period (CEOP) which is an element of the World Climate Research Programme (WCRP), initiated by the Global Water and Energy Cycle Experiment (GEWEX). CEOP foresees global continuous data collection and archival during October 2002 to December 2004.

As a further option, during **phase 2**, ODCB may extend data periods to both future and past time periods. Implementation of related actions will critically depend on criteria such as the success with phase 1 of ODCB build-up activities, available resources, and requirements from the scientific data user community.

3.2 Data types of phase 1: *BRIDGE*

BRIDGE has been defined as the main intensive observational and modelling period within the framework of BALTEX. The major purpose was to provide observational and model-based data for detailed analysis of water and energy cycle budgets and processes in the whole Baltic Sea drainage basin. Activities during *BRIDGE* are generally divided into:

- Base-line observational and modelling programmes which will deliver continuous observational and model data during the entire *BRIDGE*-period.
- Specific enhanced observational and modelling programmes confined to limited periods (EOP) of typically a few weeks or months.

The oceanographic parts of *BRIDGE* distinguish between the following main observational activities and data types (EOP = Enhanced Observational Periods):

1. EOPs with hydrographic surveys of the whole Baltic Sea and Kattegat,
2. EOPs with special field activities (e.g. in the frame of DIAMIX, PEP in BALTEX, BASIS),
3. Base-line observations related to the in- and outflows through the Baltic entrance areas,
4. Base-line observations related to sea levels, sea surface temperatures (SST) and sea ice.

The base-line observations will include both station data and gridded products. The latter form is preferred for both SST and sea ice. Sea level data shall be delivered to ODCB, using local station reference systems. As an option, ODCB will translate these data into a common reference level system. The preferred time resolution for sea level data is at least hourly.

3.3 Data quality

The quality of the data offered at ODCB, together with the data availability, will be key to the success of the ODCB and the oceanographic part during *BRIDGE* in general. The ODCB will primarily compile and archive the data, no data analysis is expected. Hence, ODCB will mainly act as a service agent for the BALTEX research community.

ODCB will have to largely rely on the data providers with respect to performing data quality controls and establishing common and harmonized formats. This will require clear instructions to the data providers on both expected quality levels and data formats. Data delivery and data quality guidelines for ODCB shall be prepared, which are expected to include issues of data quality, data formats, delivery procedures and related time schedules. It is suggested in this context, that close interactions between the ODCB and relevant data providers, similar to procedures established and maintained for such communication at both the BALTEX Hydrological Data Centre (BHDC) and the BALTEX Meteorological Data Centre (BMDC), shall be established.

Data shall be exchanged in basic format, for example as in ordinary ASCII-files, following standard ICES formats, including ROSCOP and other related and established metadata information.

4 Data Exchange Policy

Archiving all relevant oceanographic data into *one* central ODCB using harmonized data formats at ODCB is an essential element of the BALTEX data policy in order to provide easy access to oceanographic data for the BALTEX Research Community. The latter will be referred to as *data users* in the following. A variety of institutions and individuals are taking and measuring oceanographic data relevant for BALTEX research. Henceforth, these will be referred to as *data providers*. Maintaining continuous, high-quality measurements, performing quality and error checking procedures, and submitting data and related documentation to the ODCB will require substantial financial and logistical efforts of the *data providers*. The necessary support for these activities originate from a variety of international, national and institutional sources.

The Data exchange policy regulates conditions for the data flow between data providers and the ODCB on the one side (commitments of data providers), and the data flow between ODCB and data users on the other side.

The data exchange policy used for ODCB closely follows the general BALTEX Data Exchange Policy. The cornerstones of this policy are as follows:

4.1 Using ODCB data requires that any potential data user shall register at the BALTEX Secretariat following established procedures. Only *registered BALTEX data users* may obtain ODCB data upon request. In the following section, the term *data user* is used for *registered BALTEX data user* for simplification reasons.

4.2 No financial implications are involved for the ODCB data exchange. BALTEX *data providers* shall transfer their measured data to the ODCB free of charge. Also, ODCB data files established at ODCB shall be offered free of charge to *data users*.

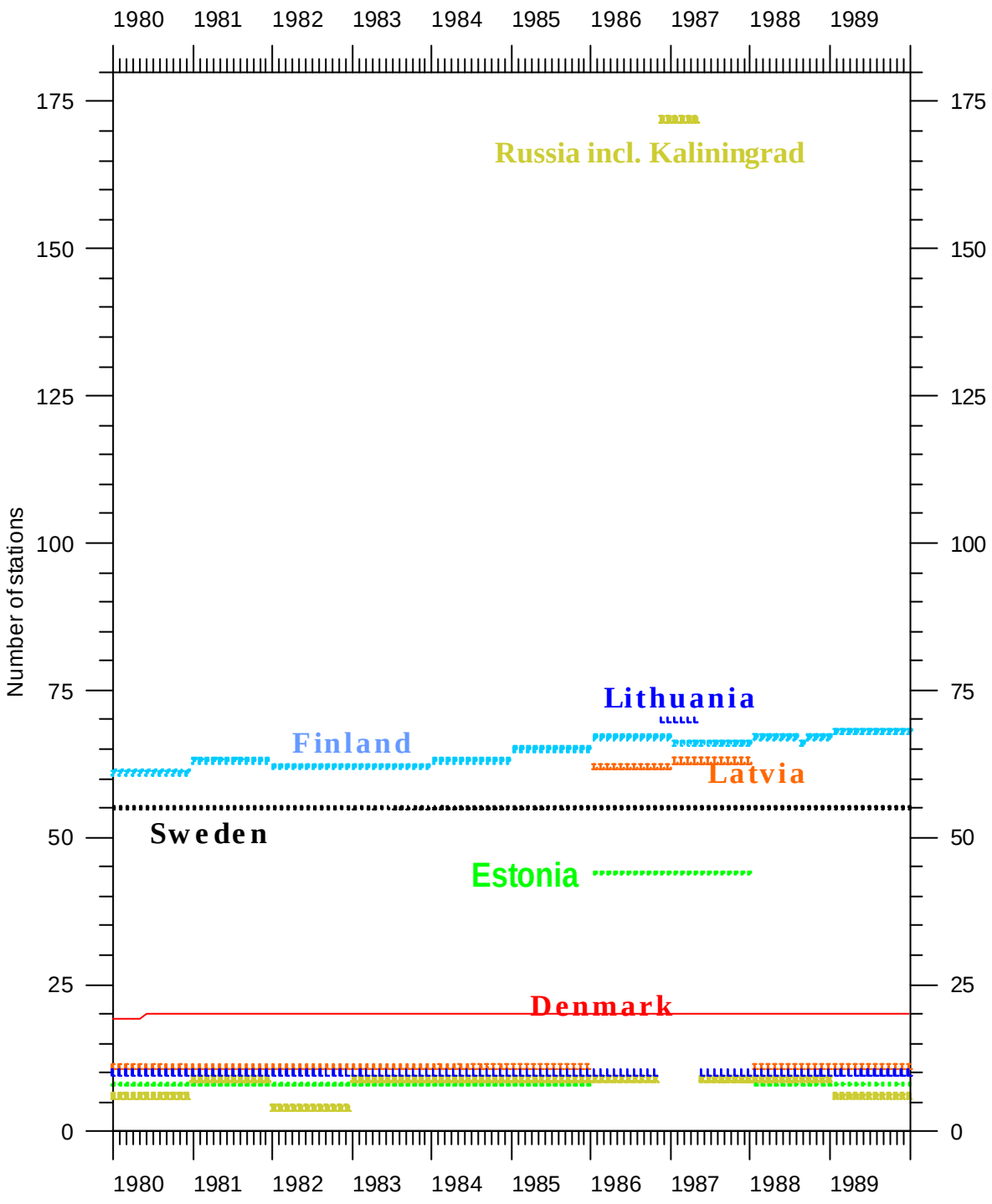
4.3 It is understood that all ODCB data shall be delivered to *data users* only for scientific studies designed to meet BALTEX objectives. Commercial use and exploitation by either the *data users* or the ODCB is prohibited, unless specific permission has been obtained from the *data providers* concerned in writing.

4.4 Transfer of ODCB data to third parties, that means from one *data user* to another *data user* is prohibited.

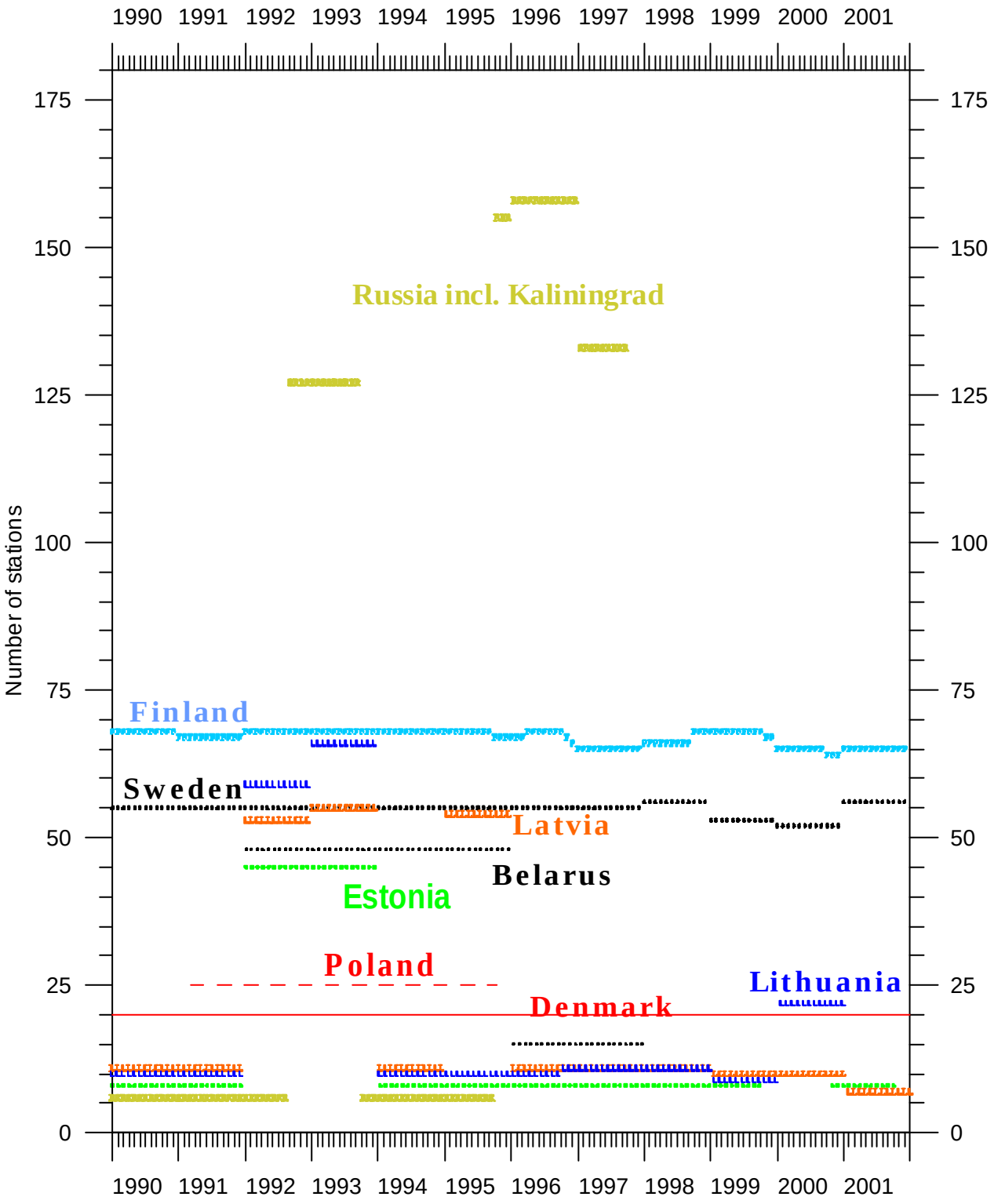
4.5 Whenever data distributed by ODCB are being used for publication of scientific results, the data's origin must be acknowledged and referenced. Also, the author(s) shall sent a copy each of the respective publication, preferably in electronic form, to the ODCB and the BALTEX Secretariat.
The ODCB shall make proper reference to all *data providers* and, if required, to their funding sources.

4.6 Co-authorship of *data providers* on papers making extensive use of ODCB data is justifiable and highly recommended, in particular, if a *data provider* has responded to questions raised about the data's quality and/or suitability for the specific study in question, or has been involved in directly contributing to the paper in other ways. It is highly recommended that any *data user* should contact the *data provider* and ask him/her if he/she wishes to become co-author, or if an acknowledgement would be sufficient. If co-authorship is requested, the *data provider* and the *data user* should establish a basis for collaboration.

Appendix 18: BHDC Data Coverage

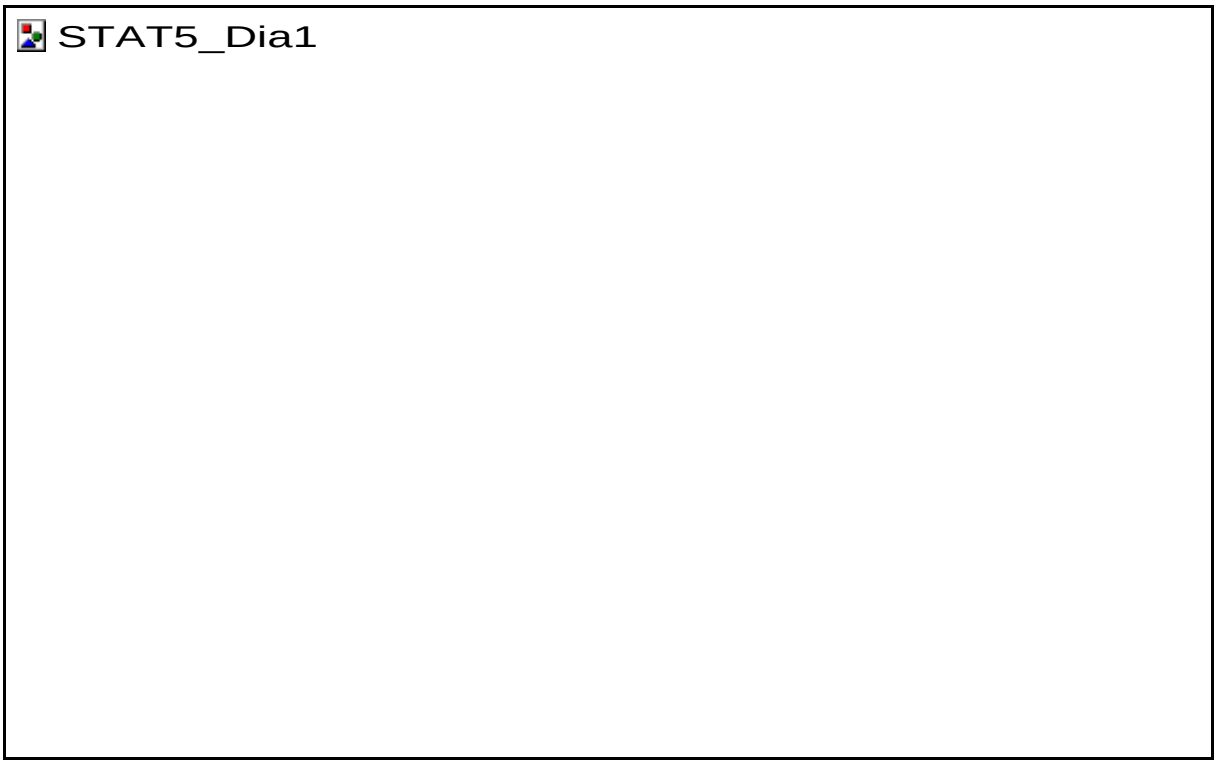


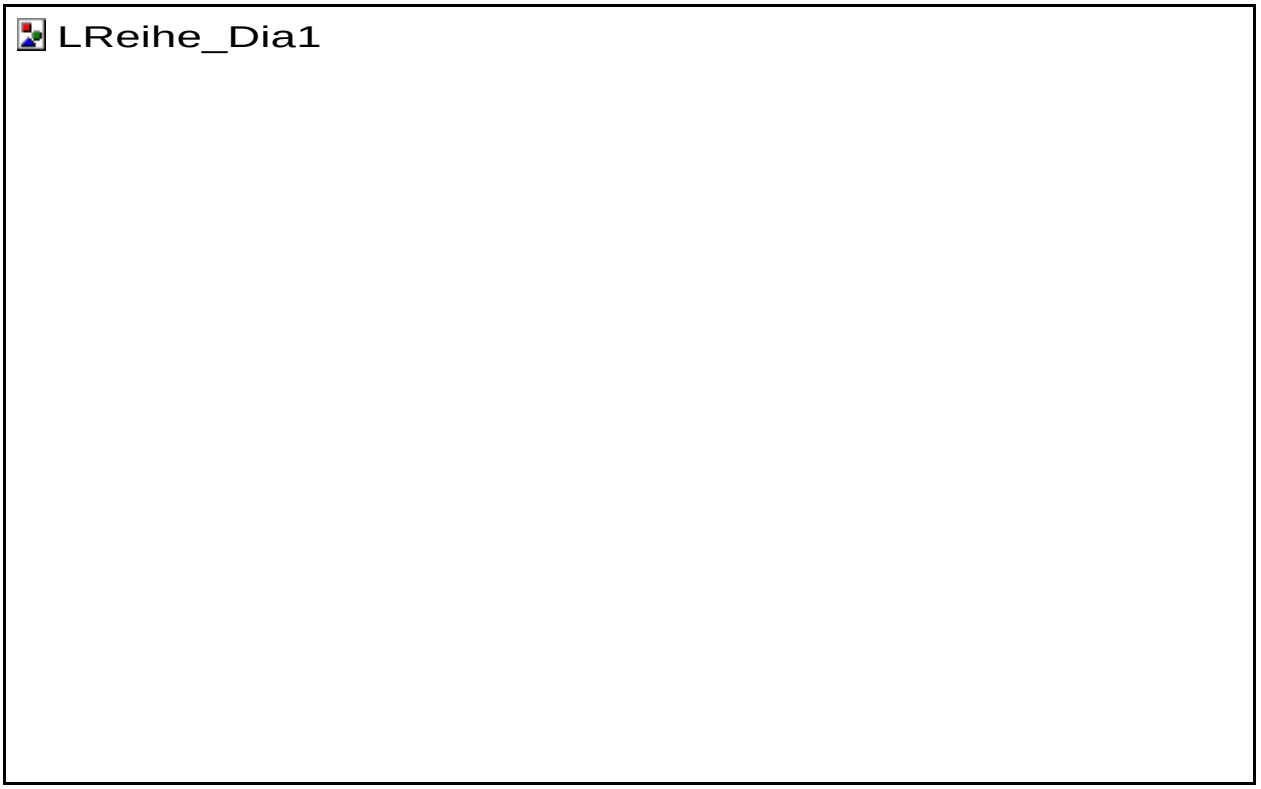
Number of stations with daily data included in the data base of the BALTEX Hydrological Data Centre for the years 1980-1989.



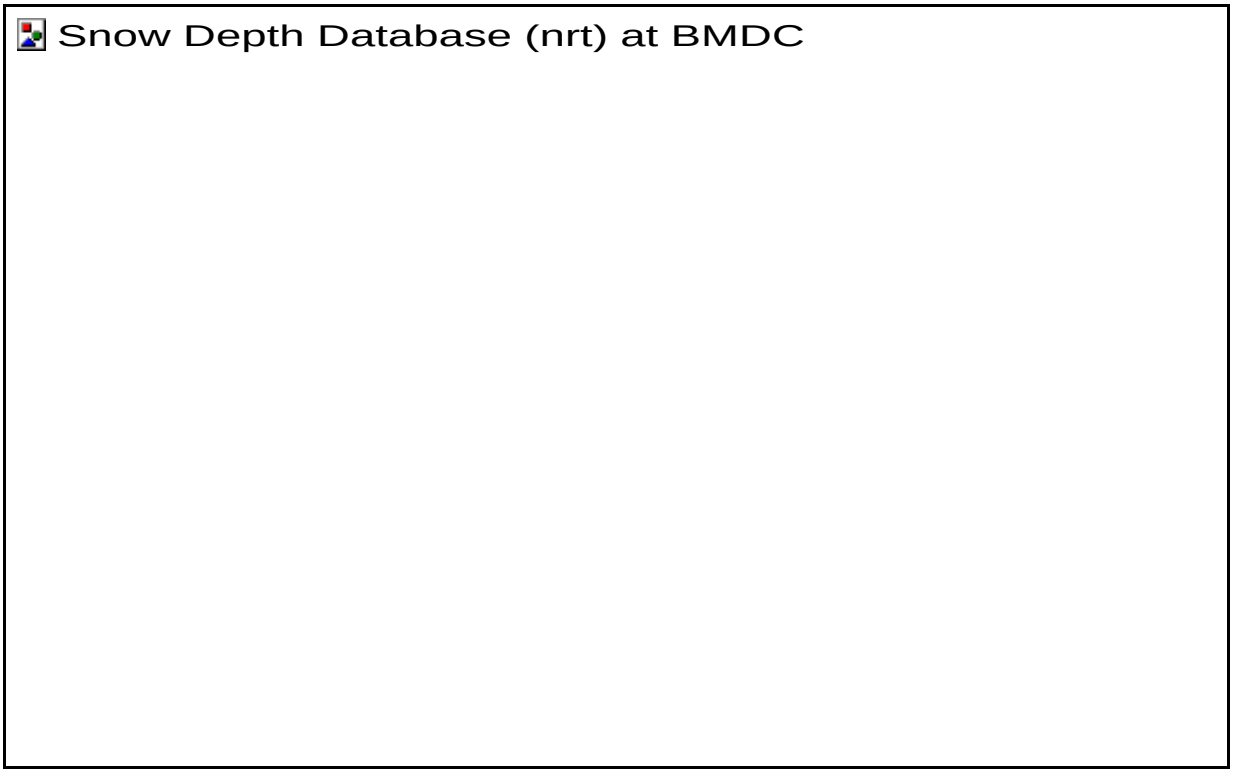
Number of stations with daily data included in the data base of the BALTEX Hydrological Data Centre for the years 1990-2001.

Appendix 19: BMDC Examples of Data Base Coverage

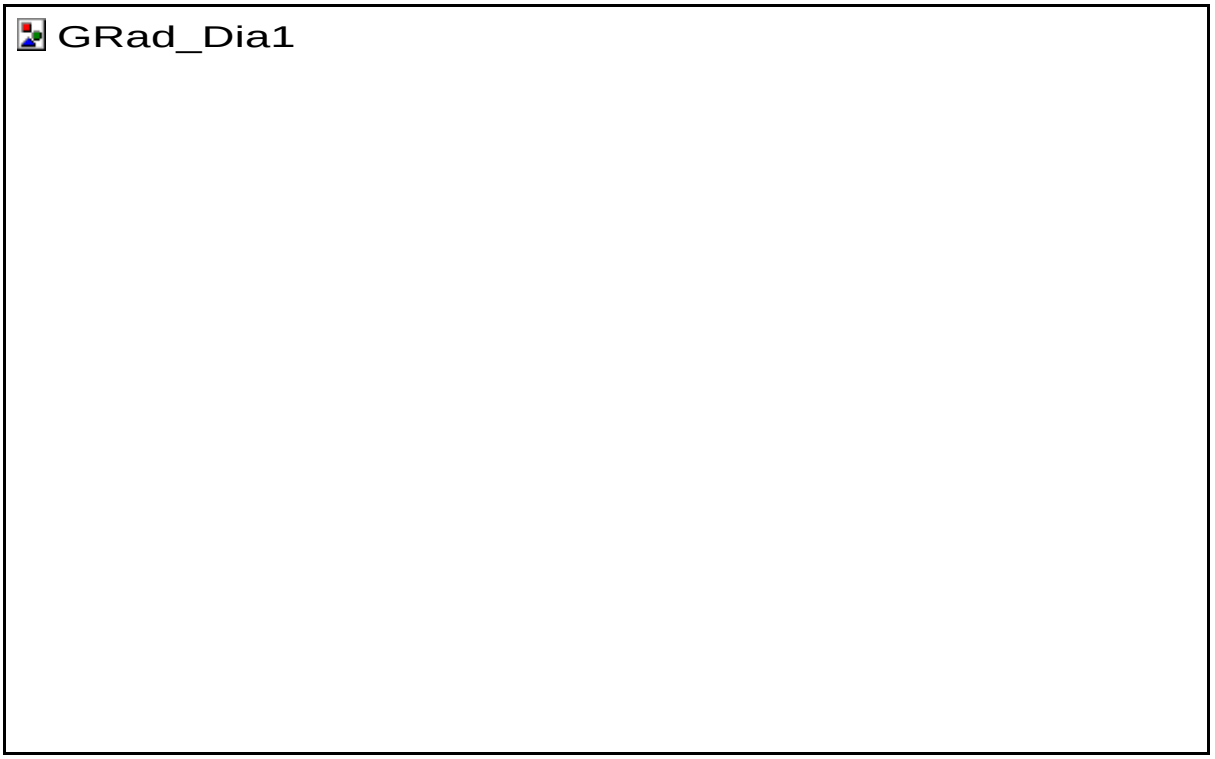




Snow Depth Database (nrt) at BMDC



GRad_Dia1



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No. 9: The Main BALTEX Experiment 1999-2001 – ***BRIDGE*****.** Strategic Plan. October 1997, 78 pages

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

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

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