

11th Meeting
of the
BALTEX Science Steering Group

at the
Max-Planck-Institute for Meteorology,
Hamburg, Germany

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International BALTEX Secretariat

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1 SUMMARY OF MAJOR ACTION ITEMS

- The Secretariat needs to contact all people for an update of their entries and possibly a correction/completion. A complete list of entries of the BALTEX publication library needs to be distributed at the Åland conference.
- Mikko Alestalo needs to contact the members of the scientific organizing committee for the conference and arrange for a meeting in Helsinki to finalize the second announcement and preparations for the conference. The meeting should be before 10 December.
- The secretariat and the chairman need to formally despend the working group members of the WG Process Studies and WG Numerical Experimentation.
- Daniela Jacob and Anders Omstedt need to work on a list of members for the proposed “WG on Energy and Water Cycling” (WGEW) and propose a list of initial tasks.
- The Secretariat need to formally invite the above mentioned potential members of the new WG.
- Daniela Jacob and Aad van Ulden are conducting a literature study on “climatological research in the Baltic Sea area”.
- Hartmut Graßl is attending the next CEOP workshop in Washington. Everybody needs to make comments on the CEOP Science and Implementation Plan by 1 December 2000 so BALTEX can have influence on its development.
- The Secretariat needs to contact all countries from the former Soviet Union and Poland to inform them about funding opportunities for scientist exchange from EU.
- Bruno Rudolf is asked to contact Franz Rubel and get an update from him about the correction scheme for precipitation measurements – what is the status?
- Gerhard Adrian needs to contact Werner Werscheck at DWD to present the status of routine satellite data available at DWD in order to supply this information to a meta data archive.
- Dan Rosbjerg needs to contact DHI and ask for the “Baltic Sea runoff” data.

2 WELCOME BY THE LOCAL HOST

Hartmut Graßl opened the meeting as local host and chairman of the BALTEX Science Steering Group and welcomed all participants. He gave a brief introduction about the MPI and some remarks about its history and future.

Report of the chairman

Hartmut Graßl reminded the participants on the importance of BALTEX being a part of GEWEX by repeating the major goal of GEWEX.

The Global Energy and Water Cycle Experiment (GEWEX) is at present the largest project of the World Climate Research Programme (WCRP) and it is finishing its first phase led by its major goal:

To observe, understand, model and predict the global hydrological cycle, its relationship to energy fluxes, its impacts on water resources, and its responses to changes in land use and atmospheric composition.

GEWEX can already look back to major successes:

First global quality-control data sets for many cloud parameters, precipitation, surface radiation fluxes, water vapor content of thick layers in the atmosphere; realized largely through the joint exploitation of all available quantitative in situ and satellite information with the strong help from several space agencies; build-up and implementation of intensive observing periods for five so-called continental-scale experiments (CSEs) for eight major rivers, catchments or areas GCIP for the Mississippi, MAGS for the MacKenzie, BALTEX for the Baltic Sea catchment, GAME for the Asian monsoon area including the Huei-he basin in China (GAME-HUBEX), the Lena in Siberia (GAME-Siberia), the Chao-Praya in Thailand (GAME-Tropics), and the Tibetan Plateau (GAME-Tibet), and LBA for the Amazon (the latter jointly with IGBP and IHDP).

Improvement of atmospheric general circulation model performance at major numerical weather prediction and research centers through better parameterizations of land surface and cloud processes, thus giving immediate return to society by more skilful weather and climate anomaly predictions, allowing better planning for many societal sectors; stimulation of new earth observation satellite sensors by liaising with the large climate research community to space agencies.

Phase II of GEWEX now aims to:

Reach transferability, i.e., improved water resource predictions in one CSE region should be applicable also outside the CSE with only a small loss in accuracy. A prerequisite for this aim is the validation of the new satellite sensors in all CSEs by additional high quality in situ observations and the interactive coupling of atmospheric and hydrological modelling including lateral flow (run-off);

Launch a Coordinated Enhanced Observing Period (CEOP) in all CSEs from 2001 to 2002 to take full account of the global teleconnections. This might, if marine meteorological and upper ocean observations could be improved, allow for the first time to detect predictability in the monsoon systems, especially in Asia. The CEOP success will thus also depend on the cooperation with subprojects of the Climate Variability and Predictability (CLIVAR) study of

WCRP. The CLIVAR subproject VAMOS (Variability of American Monsoons) and the Joint Air-Sea Monsoon Interaction Experiment (JASMINE), an initiative within the CLIVAR Asian-Australian Monsoon focus, are first candidates for such cooperation between two WCRP projects; Further improve parameterizations of cloud and land surface processes through new field experiments and the use of the new satellite sensors onboard TRMM, EOS-AM, EOS-PM, ENVISAT and ADEOS II besides the existing operational meteorological satellites.

It has to be recognized that any improvement in the measurement of energy fluxes at the surface and at the top of the atmosphere is enhancing our ability to forecast weather, to predict climate anomalies on monthly, seasonal and inter-annual time-scales, and to understand decadal time-scale climate variability. In addition, improved coupled atmosphere/ocean/land models are the prerequisite for climate change detection. Thus, GEWEX is in the center of globally coordinated climate research. Only close cooperation between GEWEX and other WCRP projects will bring us closer to the main WCRP goal: To understand and to predict – to the extent possible – climate variability and climate change, including human influences.

BALTEX does currently not include research, related to changes in land use and its effect on the regional climate. There are also no climate change effects studied in BALTEX. These two gaps might be a chance to further extend BALTEX and a chance for additional funding.

3 REPORT OF THE BALTEX SECRETARIAT

3.1 Activities since last BSSG in Warsaw, February 2000

The **BALTEX homepage** has received a major update. The layout has been changed, the information about *BRIDGE* Plans and information about visiting scientists at GKSS and DWD during 2000 in the frame of BALTEX has been enclosed (see a list below). A dataset for the boundaries of the major islands in the Baltic proper has been posted to the page upon request. In general, news are placed in the main frame of the BALTEX welcome page, whereas more permanent or aged information can be accessed through the frame on the left-hand side. The BALTEX homepage is supposed to be the central marketplace for information to the BALTEX community (<http://w3.gkss.de/baltex/>).

The **BALTEX Publication Library** has been updated as well, but this process is still going on. There are currently 94 entries in the library, some of which need to be corrected/completed. The Secretariat will contact authors to correct/complete the information provided. You can access the BALTEX Publication Library through the BALTEX homepage by using the link to the library and login as 'baltex' with the password 'baltex' as a guest. It is, however, not possible anymore to make entries as a guest by yourself. If there is something you would like to have added to the library, please contact the BALTEX Secretariat at baltex@gkss.de. All papers directly emerging from BALTEX research, as well as all papers being triggered by BALTEX related research with BALTEX participants as authors or co-authors should be considered to enter the library. Storing general scientific information about the Baltic Sea, which is not directly linked to research emerging from BALTEX, is an addition to this library.

A **special issue on BALTEX** has been published in 'Meteorologische Zeitschrift', Vol 9, April 2000, part A and part B. There are 14 selected papers from the Second Study Conference on BALTEX, held on the island of Rügen on 25-29 May 1998. The special issue is divided into the general themes a) Numerical modeling of the atmosphere/continent system, b) Water exchange over the Baltic Sea and c) Climatological Studies with ground-based and satellite data.

The first **Announcement of the Third Study Conference** has been sent out in early June 2000. A proposal has been submitted to EU for funding of the conference. The second announcement for the conference is currently being prepared including a flyer, registration information etc. Since the outcome of the EU proposal is not clear yet, the announcement must be postponed, since information about conference fee, financial support for young scientists etc. will critically depend on whether we receive EU funds or not.

A proposal sketch for modeling the Daugava river catchment has been sent to the **NATO Science for Peace Program (SfP)**. This program supports projects between NATO countries and countries from the former Warsaw Pact to foster exchange of knowledge and to enhance cooperation between scientists. It does not, however, include salaries for any of the participating partners, but covers all other costs like equipment, hard- and software, devices and travel expenses for meetings among the partners. The secretariat sent a proposal sketch together with partners from all countries being part of the Daugava catchment area (Latvia, Russia and Belarus). The sketch has been evaluated positively (125 out of about 900 made it through this first step). We have been asked by NATO SfP to submit the full proposal by 11 December 2000. About 60 out of these 125 will be funded at the end.

A **data workshop** has been held in Jelgava/Latvia, 21-22 July 2000, hosted by the Faculty of Environmental Engineering at Jelgava University of Agriculture and locally organized by Dr.

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Inese Jauja. Participants consisted of representatives from all hydrometeorological services from the Baltic States, Russia, Belarus, Poland and the Kaliningrad area, as well as a representative from the BALTEX Meteorological Data Center in Offenbach. Issues regarding data sampling and exchange have been discussed as well as future cooperation in the frame of BALTEX have been agreed upon. At the meeting a major gap was recognized: it is basically not known what the soil type classification needs to look like for the modelers. The Secretariat was asked to find out about the needs of the modelers. Another issue is still, that according to Valery Vuglinsky, Russia is not allowed to submit any data to the BALTEX community, unless there are joint scientific projects. Even helping Russia financially to digitize data would not work. A first step to solve this problem is done with the NATO SfP proposal. The Secretariat has closed new agreements with Latvia, Lithuania and Estonia about the exchange of BALTEX relevant hydrometeorological data for the years 2001-2003.

Between 4-5 October the **Second BRIDGE Team Meeting** was held at SMHI in Norrköping, Sweden. All *BRIDGE* related activities were summarized and future activities in the upcoming EOP2 and EOP3 in Jan/Feb 2001 and Apr/Mar 2001 were identified. Major findings were:

- The quality of runoff data is unknown, at least we need to identify error bars, since river runoff is a parameter used to evaluate the performance of models.
- All data assimilation relies on the HIRLAM activities at FMI. DWD is not continuing their data assimilation for BALTEX due to missing funding.
- The modeling working groups need to work closer together.
- The remote sensing program is still quite unorganized. This needs to be improved. Data storage issues are not solved.
- We are still looking for a scientific coordinator for EOP2 (Jan/Feb 2001) and for EOP3 (Jan/Feb 2002). Duties of the scientific coordinators for EOPs are defined in the minutes of the 2nd *BRIDGE* Team Meeting.

During 2000 there were **7 scientists visiting GKSS and DWD** in the frame of BALTEX. The financial support came from the BALTEX Secretariat in most cases.

Dr. William B. Rossow from NASA Goddard Institute for Space Studies, New York, NY, USA visited GKSS between 1 and 13 May 2000. He closely worked with Dr. Stuhlmann on issues in cloud physics and satellite data analysis. He also cooperates with scientists from GKSS in regional modeling studies. His work will be beneficial for BALTEX, since subgrid-scale parameterization in regional models will be enhanced and remotely sensed data will be used for data assimilation into regional models.

Dr. Tianliang Zhao was visiting GKSS for a 6 months period from 1 July to 31 December 2000. He is nesting the GESIMA model into the Deutschland Model (DM) of the German Weather Service and couples this to the SEWAB as lower boundary condition. This model chain will be tested in the Odra river basin, simulating the 1997 Odra flood event. He was working closely with Dr. Mengelkamp, Dr. Kirsten Warrach and Jesper Overgaard (visiting scientist at GKSS, see below).

Prof. Dr. John Roads from Scripps Institute of Oceanography Climate Research Division in La Jolla, CA, USA visited GKSS for discussion of joint projects in the frame of GEWEX/BALTEX from 23 August until 1 September. Prof. Roads is conducting regional atmospheric modeling in the frame of GCIP and other GEWEX Continental Scale Experiments. He is one of the important regional modelers in the United States.

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Dr. Piia Post from University of Tartu, Institute of Environmental Physics, Tartu, Estonia was working closely with Dr. Burkhard Rockel, Dr. Rainer Hollmann and Dr. Rolf Stuhlmann, evaluating radiation budget parameters derived from REMO simulations with remotely sensed values from satellites. She stayed at GKSS from 20 September until 20 October 2000.

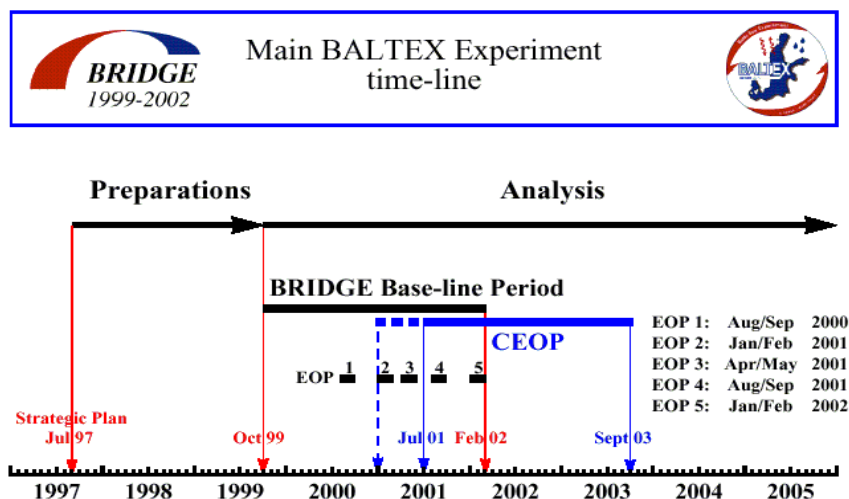
Jesper Overgaard from Technical University of Denmark, Institute of Hydrodynamics and Water Resources, Lyngby, Denmark has been trained to use GESIMA. His task is to couple GESIMA to the Danish hydrological model MIKE-SHE and the Danish SVAT-scheme DAISY. Dr. Kirsten Warrach, Dr. Theo Mengelkamp and Dr. Tianliang Zhao (also visiting scientist at GKSS, see above), are working together with Jesper. Jesper stayed at GKSS from 4 October until 3 November 2000.

Irena Otop - Institute of Meteorology and Water Management (IMGW) in Wroclaw, Poland has been trained at the BALTEX Meteorological Data Center (BMDC) at the German Weather Service (DWD) in Offenbach. Her supervisor and coworker at DWD were Dr. Angela Lehmann and Carola Graute. She stayed at DWD from 5 October - 17 November 2000.

Dr. Inese Jauja from Latvia University of Agriculture, Department of Environmental Engineering and Water Management, Jelgava, Latvia visited GKSS from 9 October until 21 October 2000. She was studying the SEWAB model and took it home for later application to the Daugava river basin in Latvia, which is one of the test basins in BALTEX. Dr. Kirsten Warrach and Dr. Theo Mengelkamp were her contacts at GKSS. Dr. Jauja already visited GKSS from 4 October - 27 November 1998 and 6-17 December 1999. All the above information can be accessed through the BALTEX homepage (link to 'Guest Scientists') including photographs of the respective scientists.

3.2 Most recent schedule for BALTEX and BRIDGE

The most recent schedule for BALTEX and *BRIDGE* can be seen in the figure below. There are basically no changes since the last BSSG in the *BRIDGE* schedule, but the Coordinated Enhanced Observation Period (CEOP) of GEWEX has changed its schedule. It's beginning will be delayed by another year (starting on 1 July 2001) with a preceding 6 months build-up-phase. This leads to a quite short overlap of BALTEX with CEOP of only 7 months. Just EOP4 (Aug/Sep 2001) and EOP5 (Jan/Feb 2002) of *BRIDGE* will fall into this period. It should be discussed whether to extend BALTEX in time, to cover at least one annual cycle. This might be



possible, since it is very likely to receive major funding for BALTEX through the German DEKLIM program.

3.3 Overview of the *BRIDGE* Status

The ***BRIDGE* Plans** are listed below. There are the field experiments, the continuous observing sites, modeling activities and the ocean program scheduled to take place during *BRIDGE*.

The first table lists all extra field activities limited in time during the different EOPs of *BRIDGE*. EOP1 (Aug/Sep 2000) had a total of 5 major activities, consisting of CLIWA-NET, LITFASS, LINEX-2000, DIAMIX (part of the ocean program) and PEP. Ehrhard Raschke has volunteered as the scientific coordinator and will be responsible for providing an overview of field activities in form of a summary field phase report.

		EOP1	EOP2	EOP3	EOP4	EOP5
Activity	Coordinator	Raschke	Meywerk	Simmer	van Lammeren	N.N.
BASIS	Launiainen		X			
CLIWA-NET	van Lammeren	X		X	X	
DIAMIX	Stigebrandt	X				
LINEX-2000	Engelbart	X				
LITFASS	Beyrich	X	X	X	X	X
NOPEX	Halldin					X
PEP	Smedman	X				

The future EOPs do only have very little activities so far – mainly a result of the non-successful proposals sent to EU last year. The EOP3 to EOP5 columns will fill up in the future, once the DEKLIM and other proposals to national funding agencies and EU have been fully evaluated and granted.

A **summary of actions of EOP1** is given here:

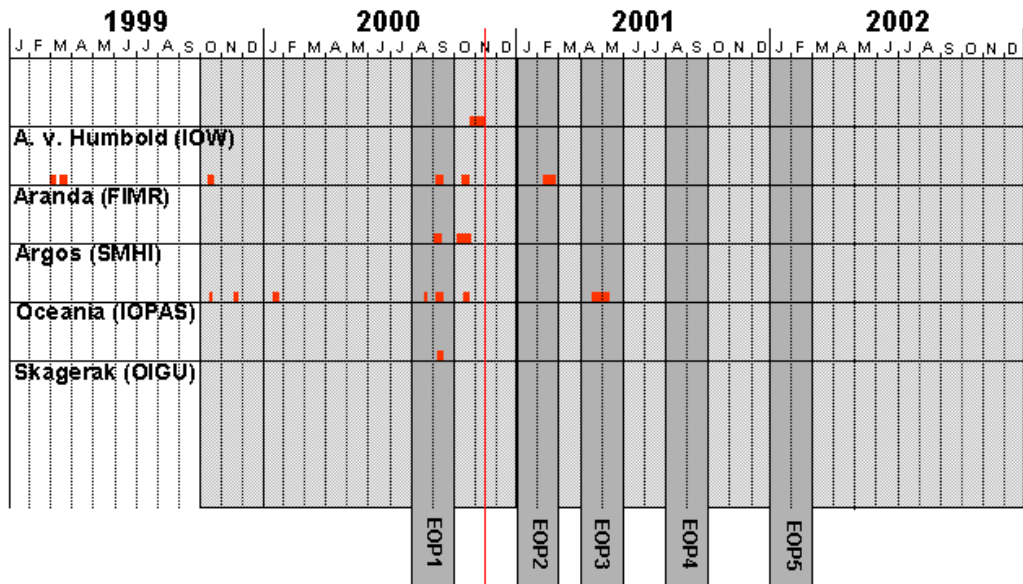
- 1 August – 29 September 2000: CLIWA-NET, CNN1
- 1 August – 30 September 2000: LITFASS: LINEX-2000 (Sodar/RASS network intercomparison)
- 14 August– 25 August 2000: CLIWA-NET, Nordverbund, Post-ARTIST at GKSS including research aircraft operations
- 10 August – 30 September 2000: Extra Radiosoundings from Greifswald and Schleswig (DWD)
- 4 September – 30 September 2000: DIAMIX summer experiment
- 1 September – 15 September 2000: Extra radiosoundings from Utö island (FMI)
- 1 October 1999 – 28 February 2002: Extra radiosoundings from Visby, Gotland (SMHI) twice per day.

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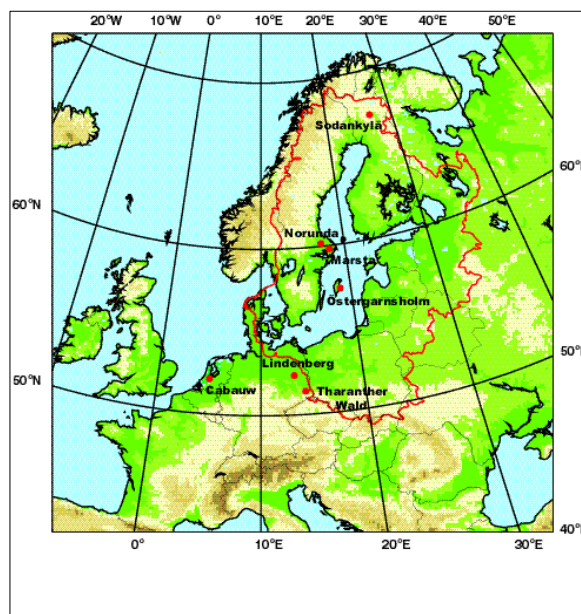
The **Ocean Program** within *BRIDGE* had been defined in September 1998 with Anders Omstedt, being the leader of the program. Since then many changes had to be made, due to the funding problems. However, the following cruises have been conducted in the frame of various projects including the HELCOM Baltic Sea monitoring program:

1 – 11 March 1999 DIAMIX:	Aranda (FIMR)
18 – 26 March 1999 BALTEX-BASIS:	Aranda (FIMR)
11 – 20 October 1999 <i>BRIDGE</i> :	Aranda (FIMR), Oceania (IOPAS)
November 1999:	Oceania (IOPAS)
January 2000:	Oceania (IOPAS)
4 – 15 September 2000 DIAMIX:	Aranda (FIMR), Skagerak (OIGU), Oceania
4 – 23 October 2000:	Argos (SMHI)
11 – 20 October 2000:	Aranda (FIMR)
14 – 23 October 2000:	Oceania (IOPAS)
21 October – 11 November 2000:	A.v.Humboldt (IOW)
16 – 28 November 2000:	Oceania (IOPAS)

There are also cruises planned from 16 – 28 November 2000 and a cruise during EOP3 (Apr/May 2001). Most of the above-mentioned cruises contribute with salinity and temperature profiles to BALTEX/*BRIDGE*. The DIAMIX experiment does in addition to the cross sections dissipation measurements in different parts of the Baltic Sea. These oceanographic surveys are used to determine the status of the Baltic Sea and to initialize ocean models. The schedule listed above can be viewed in the graphic below:



The continuous intensive observations are conducted from 7 different sites: Cabauw/Netherlands, Lindenberg and Tharantler Wald in Germany, Östergarnsholm, Norunda and Marsta in Sweden and Sodankylä in Finland. The map below shows the location of these observatories. Most of them are focussing on long time series of water and energy exchange parameters and conduct process studies in that frame in order to enhance existing parameterizations for surface-atmosphere exchange. Many observatories conduct eddy correlation measurements at different heights from towers up to 100m. The Lindenberg and Cabauw site are considered so-called reference sites in the frame of CEOP (mentioned earlier).



Major **modeling activities** summarize to the following:

Atmosphere: HIRLAM - FMI, DMI, SMHI
REMO/HRM - GKSS, MPI
RCA - SMHI

Hydrology: HBV-Baltic - SMHI
SEWAB - GKSS, LLU
METQ98 - LLU

Ocean: PROBE-Baltic - SMHI
BSIOM - IfM-Kiel
RCO - SMHI

Acronyms: HIRLAM - High Resolution Limited Area Model; REMO - Regional Model; HRM - High Resolution Model; HBV-Baltic - Swedish conceptual hydrologic model; SEWAB - Surface Energy and Water Balance Model; METQ98 - Mathematical model of hydrological processes; PROBE-Baltic - Program for Boundary Layers in the Environment; BSIOM - Baltic Sea Ice Ocean Model; RCA – The Rossby Center Atmospheric model; RCO – The Rossby Center Ocean model.

The HIRLAM activities include data assimilation efforts at FMI. There are several coupling efforts going on at the moment. At GKSS the REMO is being coupled to the SEWAB, At IfM-Kiel the BSIOM has been coupled to the REMO, HIRLAM has been coupled to the HBV at SMHI.

Activities during EOP2 will include all Lindenberg/LITFASS measurements plus BASIS-*BRIDGE*. The LITFASS activities are listed on the Lindenberg web site and will not be repeated here. BASIS-*BRIDGE* is a continuation of BALTEX-BASIS, an EU funded project coordinated at FMI. The major goals of this experiment are the optimization of air-sea-ice exchange parameterization in models. The field phase is scheduled for 5 – 24 February 2001. The first half will take place east of Gotland in the open sea to investigate the horizontal variability of the atmospheric and oceanic boundary layers, including tethered balloons, radiosondes and CTD casts. The second half will be conducted to measure the over-ice turbulence, radiative fluxes, sea ice parameters and will also provide ground truth data for remote sensing applications. CTD casts will be performed. Depending on funding there will eventually be an aircraft operation during BASIS-*BRIDGE* from University of Hamburg.

3.4 Funding Status

As mentioned before the BALTEX Secretariat submitted two proposals, the first proposing a joint Daugava river catchment modeling project to NATO-SfP and a proposal to EU for funding of the conference in Åland, 2 – 6 July 2001. Sven Halldin has resubmitted the Monitoring Surface – Atmosphere Interaction for Modelling and Satellite Application (MONSAI) proposal to EU. There has been a call for proposals from the German Ministry for Education and Research (BMBF) called DEKLIM where about 27 proposals have been submitted to BALTEX related research issues from Germany. These proposals have been grouped into four major proposal clusters:

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- Regional evaporation at Grid/Pixel Scale over Heterogeneous Land Surfaces (EVA-GRIPS) (10-Mengelkamp)
- Influence of Annual Ice Coverage of the Baltic Sea on the Energy and Water Balance (3-Krauß/Lehmann)
- Development and Validation of a Coupled Model System for the Baltic Region (BALTIMOS) (10-Jacob)
- More Accurate Areal Precipitation Measurements over Land and Sea (4-Graßl)

The numbers and names in parentheses behind the titles are the number of single proposers in each cluster and the coordinator of the cluster, respectively.

Information about the preparation of the Åland conference will be given in a later section.

4 REPORTS OF THE DATA CENTERS

4.1 The BALTEX Hydrological Data Center (BHDC)

<http://www.smhi.se/BHDC>

The BHDC consists of:

- Daily runoff data from 600 stations for the period 1980 and onwards
- Monthly runoff data from coast sections for the period 1950 and onwards
- Gridded meteorological data (1 deg. lat x 1 deg. long.) interpolated from 700-800 synoptic stations. The period is 1970-1999. The parameters, sampled every three hours, are pressure, wind, temperature, humidity, cloud cover, precipitation and global radiation.
- Hydrological and meteorological data from the special study basins. Data will be collected depending on their availability and specific requirements from the BALTEX modelling community.

The data collected by the BHDC are supplied by the different national institutes in the countries participating in BALTEX. The structure of the daily runoff data base is identical to the one that SMHI currently uses for the Swedish national runoff network, (Mimer). In that way BHDC can benefit from any progress being made to the current data base structure at SMHI. Meta data and other hydrological data are stored in different data bases designed solely for these purposes.

The regulations for the use of data are set through agreements between

- SMHI/BHDC and the providing institute
- User of the data and SMHI/BHDC

Data delivery by the BHDC is strictly limited to groups of scientists which are officially registered as BALTEX Data Users.

4.2 BALTEX Meteorological Data Centre (BMDC)

The Meteorological Data Centre for BALTEX (BMDC) collects and stores data in two different archives:

- from the whole BALTEX Model Area BAMAR
- from the Baltic Sea Catchment Area BACAR

The BAMAR archive contains synoptic data of about 1700 landstations and 300 ships (with 8 reports / day) and aerological data of about 90 stations (with 1-4 ascents / day).

The BACAR archive comprises the following data types in daily or hourly resolution:

precipitation, radiation, snow depth, climate/synoptic data, soil temperature, soil moisture, Evaporation. A good and complete database exists for precipitation (actual about 3200 stations) and global radiation (about 60 stations). Deficiencies are to be noted for snow data and special types of radiation. Generally is to detect that the number of reporting stations has been reduced since PIDCAP. Data from Russia are missed in general since 1998 and from the Kaliningrad

area of Russia since 1995. More detailed information on data availability and data usage can be found under <http://www.dwd.de/research/baltex/baltex.html> and in the new (November 2000) Status Report No. 4 of the BMDC .

A general lack of data is given so far for some peripheral regions of the BACAR in Czechia, Slovakia, Norway and the Ukraine. First contacts to the Czechian and the Slovakian Hydrometeorological Institutes in Prag and in Bratislava are established by the BMDC for data supply. Special activities are foreseen by the BMDC during *BRIDGE*:

1. Management of corrected precipitation data
 - time series for all stations since PIDCAP
 - gridded data on the REMO grid
 - analysed fields (supplier: Franz Rubel from the Institute of Medical Physics and Biostatistics, Veterinary University of Vienna, Austria)
2. Management of additional radiosoundings (suppliers: FMI, DWD, SMHI)
3. Management of highly resolved precipitation data from ferries and research vessels (suppliers: Institute of Marine Research of the University of Kiel)
4. Efforts for data acquisition, especially efforts for agreements with Czechia, Slovakia and Kaliningrad on data delivery together with the BALTEX Secretariat.

4.3 BALTEX Oceanographic Data Center (BALTEX-ODC)

The Oceanographic Data Center of BALTEX has not formed yet. Pekka Alenius reported about general problems in the community of oceanographers who do not really like to see their data in a more or less publicly accessible data base. He was encouraged by the BALTEX Science Steering group to at least form a virtual data base as soon as possible, so interested scientists at least have a focal point to ask for contact persons regarding oceanographic data in the frame of BALTEX. Pekka Alenius is preparing a web-page for the data center.

5 BRIDGE

5.1 Summary of actions for EOP1

Ehrhard Raschke presented a summary of activities from the first EOP of *BRIDGE* during August/September 2000. The major activities were CLIWA-NET and the joint CLIWA-NET/Nordverbund/post-ARTIST activities by GKSS. Ehrhard Raschke showed examples of radar and lidar observations from that field experiment at GKSS. He also presented an example of salt-water inflow at the Stolpe Channel during one of the cruises of R/V Oceania. Other major extra field experiment activities were the DIAMIX summer experiment (4-15 September 2000) with R/Vs Aranda (FIMR), Skagerah (OIGU) and Oceania (IOPAS) participating. There were also extra radiosoundings launched from Uto Island, Visby and Greifswald and Schleswig, funded by FMI, SMHI and DWD, respectively. A complete list of EOP activities is already included in the report of the Secretariat.

5.2 Planned actions for EOP2

At this time the major EOP2 activity will be the contribution of FIMR in the frame of Baltic Air-Sea-Ice-Study (BASIS). The EU-project BALTEX-BASIS ended late 1999 and is continued as *BRIDGE-BASIS* financed mainly by FIMR and MPI. The major goals are to optimize air-sea-ice exchange parameterizations in models. A field experiment is planned to take place in the open sea east of Gotland and close to the ice edge at about 63°N, between late January and 24 February. During the first half of this experiment R/V Aranda will investigate the horizontal variability of the atmospheric and oceanic boundary layers, including comprehensive intercomparison with the Östergarmsholm site. Other measurements to be included are tethered balloons, radiosondes, CTD and aircraft measurements funded. The other half of the experiment is devoted to investigate the over ice turbulence, radiative fluxes and sea ice properties. This will also include measurements for providing remote sensing ground truth observations. CTD casts and aircraft operation will be conducted as well. For these measurements the Aranda will have to be located at the ice edge, which is typically somewhere between 62° and 63°N at that time of the year.

6 WORKING GROUP REPORTS

6.1 NEWBALTIC and WG on Coupled Modeling

During the last two years the second phase of the NEWBALTIC (Numerical studies of the energy and water cycle of the Baltic region) project addressed two major scientific objectives of BALTEX:

- To determine the various mechanisms determining the space and time variability of energy and water budgets of the BALTEX area and its interactions with surrounding regions, and to relate them to the large scale circulation systems in the atmosphere and oceans over the globe.
- To develop and test high-resolution coupled models for the Baltic region to be applied in other areas of the globe.

This includes:

- the exploration of new observing technologies such as GPS derived moisture content
- the exploration through modeling and data studies of the variation in time and space of the energy and water cycles and understanding the mechanisms behind,
- the development and validation of more accurate climate and weather prediction models and data-assimilation procedures which e.g. can handle extreme meteorological conditions in the Baltic Sea and
- the development and validation of physically based macro-scale hydrological models and coupled atmospheric-hydrological models.

Eleven institutes from six countries were involved and a strong network of co-operations developed, which still continues, although the project ended in March 2000. Detailed information about the scientific work and the results can be found in the final report, which is available at the Max-Planck-Institute in Hamburg (please contact Daniela Jacob). In addition it is planned to prepare a series of posters for the next BALTEX conference in July 2001 describing the major achievements as well as detected shortcomings. A few results will be listed below:

New observing technologies

It could be shown that e.g. atmospheric moisture achieved from GPS data is an important information to describe the state of the atmosphere. The data are now operationally used within the assimilation cycles of NWP models. The establishment of an observing system based on GPS moisture columns which is now underway is a great achievement of this project.

Model inter-comparison

A comprehensive model inter-comparison of the water budget during a 3 months period, August-October 1995 (the BALTEX-PIDCAP field study) has been carried out with eight participating high resolution limited area models. All models were using the same horizontal and vertical resolution (1/6° and 24 vertical levels). Identical surface data were used in all the experiments. The boundary data were obtained from a limited area assimilation in turn driven by

data from the ECMWF operational forecasts. The following general conclusions can be drawn from the study:

- Given the large scale conditions (even as boundary conditions to a regional area) models are able to reproduce daily fields of integrated water vapour and precipitation broadly within the accuracy of observed data, despite some deficiencies in clouds and radiation.
- Evaporation over land is strongly determined by initial soil moisture conditions. The experiments suggest that it may take the order of months of integration to obtain suitable initial conditions. Initialisation of soil moisture (or potential evapo-transpiration) is a primary issue and requires more attention.
- However, in spite of substantial errors in the soil moisture by some of the models daily precipitation is hardly affected because of the dominant influence of large scale synoptic events in the region.
- It is important to validate the entire hydrological cycle, this means all components involved have to be taken into account for validation. It is possible that a single model is capable to reproduce the observed precipitation, but leaves too much moisture in the atmosphere compared to GPS or radiosonde data, whereas another model simulates the atmospheric moisture successfully, but overestimates the precipitation.

Coupled model systems:

Within this project another major achievement was the coupling of hydrological run-off models and atmospheric climate models. Special emphasis has been given to use these systems to identify short-comings in the parameterisations. This was the first step towards fully coupled systems describing all components of the water and energy cycles.

Finally, it can be stated that two fully integrated coupled model systems including the Baltic Sea, the atmosphere, the land surface and the hydrology will be available within the next years. They will be used to study the climate of the BALTEX area.

6.2 Reorganization of Working Groups

During the 10th BSSG in Warsaw in February 2000 it was suggested to have a joint Working group, combining the Working Group on Numerical Experimentation (WGNE) and Working Group on Process Studies (WGP). The Abisko workshop held on 20 and 21 June 1999 showed clearly that it would make sense to have modellers and experimentalists working closer together. At the 10th BSSG it was suggested to have a working group on coupled modeling. Lennard Bengtson wanted to take the lead of such a group and also wanted to include the NEWBALTIC working group. This issue was again raised at this BSSG meeting and was discussed in detail. The following conclusions were drawn from the discussions:

- The WGNE and WGP on Process Studies will be formally dispended. The secretariat will write letters accordingly.
- A new Working group called "Working Group on Energy and Water Cycling" will be formed.

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- The new specific tasks of this working group will be to evaluate the quality of river runoff data (in situ and models) and the test precipitation measurements.
- Daniela Jacob and Anders Omstedt will jointly lead the new working group and first find people to join the group. The secretariat will then invite the new members formally to join the working group.

7 REPORTS BY COUNTRY

7.1 Belarus

Grigory Chekan gave an overview of the activities in Belarus. Report of research activity within BALTEX projects. At the moment the Republican Hydrometeorological Center of the State Committee for Hydrometeorology of the Republic of Belarus is working with three GKSS agreements:

GKSS No. 30009039

This research contract is part of an effort to facilitate and support data exchange in the framework of BALTEX as outlined in the status papers prepared by the BALTEX Data Centers. The status papers foresee a continuous data exchange from January 1996 onwards.

The State Committee for Hydrometeorology of Belarus (CHB) shall prepare the following data sets for the BALTEX research community:

1. Three-hourly, complete synoptic surface observations which are not transmitted routinely via GTS from 21 synoptical stations inside the water catchment area of the Baltic Sea on the territory of the Republic of Belarus (see INTAS project 95-872);
2. Daily precipitation data (12 hourly) from 39 precipitation stations inside the water catchment area of the Baltic Sea on the territory of Belarus (see INTAS project 95-872);
3. Data of measured radiation (daily sums) and soil-moisture at various depths from selected stations inside the water catchment area of the Baltic Sea on the territory of Belarus (see INTAS project 95-872);
4. Daily snow depth from 21 station in winter period;
5. Daily runoff data from 15 stations in Belarus.

The time period for the data mentioned under items 1, 2 and 3 is at least from **July 1998 to December 1999**. The time period for the runoff data mentioned under item 4 is **October 1997 to September 1999**.

Delivery of the aforementioned data shall be in non-real-time mode with a time delay of 5 to 6 months at maximum. The data shall be delivered to GKSS / BALTEX Secretariat at the following times:

a) data mentioned under items 1, 2, 3 from July 1998 to December 1998 not later than 30 June 1999. The information of this article was prepared and sent to GKSS / BALTEX Secretariat 29.06.99. The following data were delivered

- data of available soil moisture content;
- data of evapotranspiration;
- data of meteorological measurement;
- data of precipitation;
- data of solar radiation;

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- data of snow cover.

b) Runoff data mentioned under item 4 from October 1997 to September 1998 shall be delivered to GKSS / BALTEX Secretariat not later than **31 October 1999**.

The information of this article was prepared and sent to GKSS / BALTEX Secretariat by email 06.12.1999.

c) the data mentioned under items 1,2,3 from January 1999 to December 1999 shall be delivered not later than **30 June 2000**. The data mentioned under items 1, 2, 3 from July 1998 to December 1998 not later than **30 June 1999**.

The information of this article was prepared and sent to GKSS BALTEX Secretariat at the workshop in Jelgava. The following data were delivered:

- data of available soil moisture content;
- data of evapotranspiration;
- data of meteorological measurement;
- data of precipitation;
- data of solar radiation;
- data of snow cover.

d) Last data - runoff data mentioned under item 4 from October 1998 to September 1999 shall be delivered during BSSG in Hamburg.

GKSS P5.3.109

Preparation of the historical information from territory of the Republic of Belarus, included in a structure of BALTEX.

The duration of the project is from 1 August 1997 to 30 April 2000 (33 months).

Scientific work schedule

Milestones and work packages:

December 1997: Kick-off meeting, 2 radiation stations (German partner)

March 1998: Purchase, assembly and calibration of 2 radiation stations

July 1998: Field installation of 2 radiation stations in Belarus, Working group meeting in Minsk

March 1999: Inspection of the radiation stations, working group meeting

March 2000: Inspection of the radiation stations, working group meeting. Continuous until June 2000. Data quality checks, archival, exploration and delivery of measured radiation data. In the concrete the equipment has arrived to customhouse at the end of December, its obtaining from customhouse was at the end of May, now there is a preparation for its installation

October 1998: Data set 1980-1995 completed for the Daugava catchment is prepared and is transferred in December 1998. The data on Daugava Catchment is prepared and are transferred only in December 1998;

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March 1999: Data set 1980-1995 completed for the Baltic Sea catchment part in Belarus, the data on Neman and Bug catchment are prepared and are transferred only in October 1999; runoff model for the Daugava River in Belarus tested.

December 1999: Data set 1990-1995 completed for the entire Belarussian territory. Runoff model for the Daugava River completed. Runoff model for Neman River

Both partners delayed the fulfilment of the agreement for objective reasons:

First, the German side has not installed the mentioned equipment yet. The necessary equipment was obtained in late 1999.

Second, because of necessity of preparation of a large volume of the historical data manual and delay of financial support from German Side in 1999 and 2000, there is a delay in preparation and data transfer from the Belarussian side, which has prepared and delivered in time only Data set 1980- 1995 completed for Baltex Sea Catchment.

GKSS 53/99

The new contract GKSS 53./99 providing extension of the contract GKSS 30009039 and data preparation is made:

The Republican Hydrometeorological Center will prepare the following data sets

1. Three-hourly, complete synoptic surface observations from 21 synoptic stations, which are not transmitted routinely via GTS.
2. Daily precipitation data (12 hourly) from 39 precipitation stations.
3. Data of measured radiation (at least daily sums), snow depths, soil-moisture and soil temperature at various depths.
4. Daily runoff data from 15 stations.

The data mentioned under B1, B2 and B3 need to cover the period from **January 1, 2000 to December 31, 2000**. The time period for the requested runoff data mentioned under item B4 is **October 1999 to September 2000**.

Delivery of the aforementioned data sets listed under B1, B2 and B3 shall be in non-real-time mode with a time delay of 3 to 6 months at the most. The full dataset shall be delivered to GKSS/BALTEX Secretariat no later than **30 June 2001**. Delivery of the data listed under B4 shall be no later than **30 September 2001**. Under this project we shall transmit soil temperature profiles for the first time. Besides the padding information of stations is required to prepare: meta-information for BALTEX, soil moisture data, snow etc. This data are in preparation stage. After completion of this work, the preparation of meteorological data will be started.

Our further-cooperation plans

The Republican Hydrometeorological Center of the State Committee for hydrometeorology of Republic of Belarus gives the consent to participation in projects: new INTAS and NATO Science for Peace Program. Our participation will express in check sampling and development of model for a Daugava river catchment runoff simulation and in preparing of necessary hydrometeorological data on Daugava basin:

1. Three-hourly, complete synoptic surface observations from 21 synoptical stations;
2. Daily precipitation data from 39 precipitation stations.

3. Data of measured radiation (at least daily sums), snow depths, soil moisture and at various depths
4. Daily runoff data from 15 stations.

Regarding participation in a new *BRIDGE* (1999-2001), we confirm our agreement to take part in situ network data (*BRIDGE* Interim Memorandum 31.10.98) only on baseline period.

7.2 Denmark

Dan Rosbjerg presented an overview of scientific activities conducted in Denmark in the frame of BALTEX.

RISØ

Measurements and modelling

Risø National Laboratory participates in the project PEP, a pilot experiment with the scope to study precipitation and evaporation over the Baltic Sea.

The activities of Risø National Laboratory were concentrated at Ertholmene, a small group of Danish islands in the Baltic Sea east of Bornholm. The main island is named Christiansø. The main activities are:

- Continuous measurements of turbulent fluxes, including evaporation, at the island of Christiansø
- Radiosoundings at Christiansø during an extensive observation period
- Modelling of the evolution of the boundary layer height during an extensive observation period.

Continuous measurements

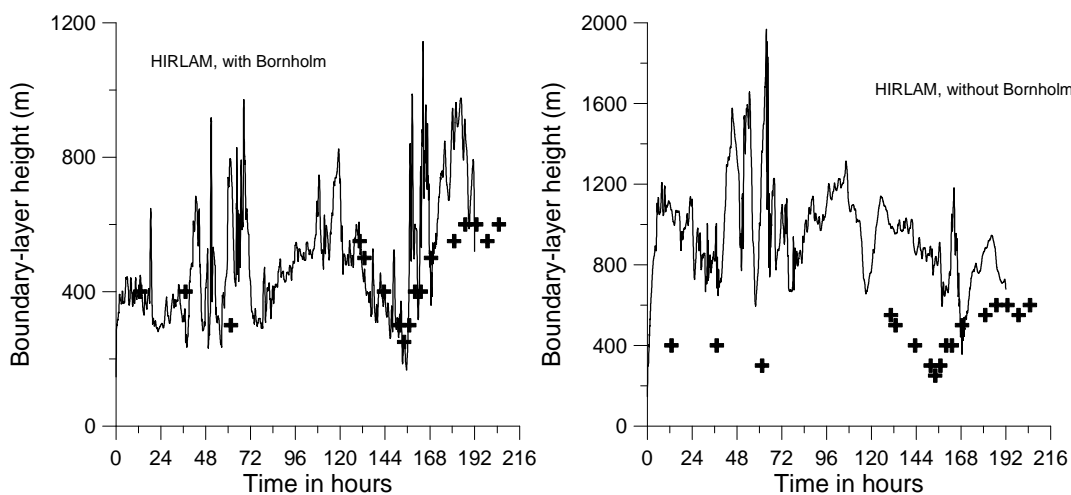
Sonic anemometer measurements were performed of the three components of the wind speed and temperature. Humidity fluctuations were performed with an Optical Infrared sensor. All measurements including the raw data has been transferred to Risø by use of internet and stored for subsequent analysis. Measuring periods are given below.

Start	Stop
start of measurements April 22, 1998	August 22, 1998
September 17, 1998	January 10, 1999
January 17, 1999	April 10, 1999
April 12, 1999	May 10, 1999
May 17, 1999	June 27, 1999
October 6, 1999	stopped on December 31, 1999

Simulation of the boundary layer height

The height of the boundary layer over Christiansø was simulated with a high resolution (grid size 2 km) simple, applied slab type model for the period 26 October to 2 November 1998. The

left panel on **the figure below** shows the evolution of the simulated boundary-layer height over Christiansø, when taking into account the effect of Bornholm. The crosses show the boundary-layer height derived from the radiosoundings observation - overall the agreement is fairly good. The right panel shows in a similar way the evolution of the boundary-layer height but without accounting for the effect of Bornholm. Bornholm is replaced by water. It is seen, that for the period up till about 160 hours after the start of the simulation, the simulated boundary layer is pronounced higher than the measured one. After 160 hours of simulation the agreement becomes fair. Inspecting the wind direction reveals that up till 160 hours, the wind is within the sector that includes Bornholm, and around 160 hours the wind turns towards north and the air that reaches Christiansø has not on its way passed over Bornholm, but comes from the Swedish coast. Therefore, Bornholm has a pronounced effect on the height of the boundary layer over Christiansø when it is upwind of Christiansø.



Simulation with the simple, applied model of the evolution of the boundary-layer height over Christiansø during the extensive observation period. In the left panel the effect of Bornholm is taken into account, in the right panel Bornholm is replaced by water. Crosses show measurements.

Collaboration with other countries/institutions

Of interest for BALTEX are our activities within NOPEX, where most of the measurements from the concentrated field effort in 1994 and 1995 are public, the data from the winter campaign in 1997 are expected to be published on a CD in the very near future, and the NOPEX Committee has expressed its positive attitude towards the use of Continuous Climate Monitoring data from NOPEX within BALTEX.

Fund raising efforts

Risø organised the WINCON application for the EU 5th framework programme.

Complete summary of the contributions to *BRIDGE*

Risø participates in the *BRIDGE* management group. The flux measurements at Christiansø should be of interest for BALTEX, although performed outside the *BRIDGE* period.

Danish Meteorological Institute

DMI's Research and Development Department participated in the BALTEX projects NEWBALTIC I/II during 1995 and 2000. The main activities during NEWBALTIC I included a high resolution regional reanalysis for a 4-month period during summer 1995 (PIDCAP period). In connection with the reanalysis, a study of the energy and water cycle in the BALTEX region was conducted.

The reanalysis products were validated against independent observational data, such as rain gauge observations, ground-based GPS measurements of integrated water vapour, etc. DMI provided reanalysis data to many groups within the BALTEX project and participated in the model inter-comparison activities among BALTEX groups working with regional climate or NWP models. DMI's activities during NEWBALTIC II focused on development and experimentation of new assimilation technique, mainly the three-dimensional variational analysis (3DVAR) scheme in HIRLAM system; the introduction of digital filter initialization to improve the treatment of moisture field at the initial stage of forecast, and use of new observational data. Month-long parallel runs were carried out for a chosen PIDCAP period to validate the 3DVAR system in comparison to the operational HIRLAM OI assimilation. Finally, a reanalysis of the PIDCAP period using improved assimilation system was conducted. During the NEWBALTIC II, DMI staffs also worked closely together with researchers at SMHI, FMI to initiate a new HIRLAM delayed mode data assimilation system dedicated to the BALTEX project. The goal is to have a high quality, continuous delayed mode data assimilation which can potentially make better use of existing observation data and provide realistic diagnosis of the budget components contributing to the energy and water cycles in the Baltic Sea catchment. Work is still going on in this area.

Technical University of Denmark

Completed scientific work

The main activity of ISVA during BALTEX has been distributed, hydrological modelling on regional scale. A modified version of the MIKE SHE model was applied to the Odra Catchment with a spatial resolution of 4x4km². The important parameters were identified and discussed in relation to data availability, and the implications of using a so-called bypass function to downscale coarse resolution climatic input to grid scale, as well as to compensate for the lack of variability in soil parameters was analysed. The model was calibrated and validated against observed discharge from 5 stations in the catchment. The model performed well in simulating both the total outflow from the whole catchment (120.000 km²) as well as discharge from subcatchments larger than ~10.000-15.000 km². For smaller subcatchments, the model performance was poor.

Future work

A Ph.D. project with the purpose of investigating the possible improvement of the hydrological model results that may be obtained by combining the use of meteorological observations with a two-way dynamical coupling between a hydrological model and a meteorological model has just been initiated. In this project, the SVAT-scheme DAISY and the hydrological model MIKE SHE will be used together with the non-hydrostatic atmospheric model GESIMA. The project will be carried out in the period 2000-2003.

Collaboration with other countries/institutions

The Ph.D. project about coupled hydrological and atmospheric models will be conducted in collaboration with the Institute of Atmospheric Physics at GKSS in Germany.

7.3 Finland

Carl Fortelius reported about the activities at FMI. He participated on behalf of Mikko Alestalo.

Summary of scientific work

Within BALTEX, FMI is participating in a project using the limited area NWP system Hirlam for delayed mode data assimilation during BRIDGE. The aim is to quantify the energy and water budgets of the whole BALTEX area at high resolution during one full year using the best available technology. FMI has carried on weather radar algorithm development to improve the accuracy of quantitative precipitation measurements in winter, see Saltikoff et al. (2000) and the Poster presented in the BSSG Meeting. FMI has also studied methods to eliminate the spurious "winds" in Doppler measurements due to the migration of birds, which can introduce a severe bias when Doppler winds will be assimilated into NWP models (see Koistinen, 2000 and Rinne, 2000). Under the framework of NORDRAD Quality Assurance Project FMI has developed a software, which measures statistically time series of single radar reflectivity data and reflectivity differences in the overlapping region of two neighbouring radars. The preliminary results are very promising, suggesting that the method can detect elevation angle errors of the order of 0.1 degrees and also small radar hardware calibration errors. Collaboration with other countries/institutes Data-assimilation: SMHI, ECMWF. In the framework of BALTEX Working Group Radar, FMI (which is chairing the WGR) has cooperation with all countries providing radar data to the purposes of BRDC, see separate report of the WGR (Attachment 1), Michelson and Koistinen (2000) and Michelson et al. (2000). Since the writing of Attachment1 there has been some progress to expand the radar data coverage:

- Under the framework of NORDRAD FMI is taking care of the technical arrangements to receive data from the new Estonian radar near to Tallinn. If the technical and problems with the radar and financial problems with the fast telecommunication line from EMHI to FMI will be solved, we hope to receive the data at BRDC in the beginning of the year 2001.
- FMI and Roshydromet have agreed on a plan to receive data from a MRL5-radar at St. Petersburg. Preliminary tests using Internet have been carried on and FMI is taking care of the work to make the format conversions required. At the moment it is not known when digital data from the radar will be available at BRDC in near real time. FEI (Finnish Environmental Institute) has modified a river model to use real time accumulated precipitation from weather radar of FMI. A report is under preparation at FEI, but the preliminary results show that the model provides equally good results if either radar precipitation alone or gauge precipitation alone is used as input to the model.

Fund-raising efforts

Data-assimilation: Computing resources through ECMWF special project. FMI has received national funding (1 manyear during 2001) for the development of operational real time algorithms to improve quantitative precipitation measurements with weather radars.

Contribution to *BRIDGE* Observations

Extra radio soundings at Utö island (59° 47' North, 21° 23' East) carried out during 1-15 September 2000 (EOP 1) and planned for EOP 2 (Jan/Feb 2001). From 7 radars continuous flow of radar reflectivity data and wind soundings derived from Doppler data to BRDC, for the purposes of BALTEX products (see Michelson et al., 2000).

Data-assimilation

Archive of analyses and forecast products will be maintained at FMI.

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Koistinen, J., 2000: Bird migration patterns in weather radars. *Physics and Chemistry of the Earth*, 25, 1185-1195.

Michelson, D.B.; Andersson, T.; Koistinen, J.; Collier, C.; Riedl, J.; Szturc, J.; Gjertsen, U.; Nielsen, A.; Overgaard, S., 2000: BALTEX Radar Data Centre Products and their Methodologies. Reports Meteorology and Climatology, No 90, SMHI, 76 pp.

Rinne, J., 2000: The use of radar wind observations in numerical assimilation. *Phys. Chem. Earth*, 25, 1273-1276.

7.4 Russia

Valery Vuglinsky reported about the various research activities in Russia. All Russian contributions are financed through national funds. As stated before a future data delivery to the BALTEX data centers depends on joint projects with Russia. Valery Vuglinsky coordinates all Russian activities.

State Hydrological Institute

Daily runoff data at 147 stations in the Russian part of the Baltic Sea basin covering the period from October 1995 to September 1997 has been prepared (under the umbrella of INTAS project). These data were processed and delivered in specific formats to BHDC.

The improved version of the HYDROGRAPH model for river basins with large lakes control was developed. As a first object for modeling the Lovat river basin (14700 km²) was chosen within the Neva river basin. For the Lovat river basin:

- Meteorological data (daily variables of air temperature, humidity, precipitation) for the five years period were collected and regional data base was created;
- Morphometric and physiographical characteristics were obtained for the Lovat river basin, using detailed map;
- Model parameters for the Lovat river basin were estimated;
- River runoff modeling for the Lovat river basin was carried out and model parameters were corrected;

- The results of modeling were analysed.

The Olonka river basin (2120 km²) was chosen as a next object for modeling.

North-West Hydrometeorological Agency

Meteorological data for the period 10.95 - 09.97 in the Russian part of the Baltic Sea basin were collected, processed and delivered to BMDC (within the INTAS project):

precipitation	52 - 110 stations/month
synoptic	31 - 53 stations/month
radiation	1 station/month

A.I.Voeikov Main Geophysical Observatory (MGO)

Current activities with the MGO Regional Climate Model include sensitivity runs. The two simulations have been carried out both 5 years long. The first uses 1xCO₂ condition and suggested being considered as control run. The carbon dioxide concentration has been assumed at 330 ppmv rate. Under this condition the model is intended to reproduce contemporary climate variability and mean circulation in the climatological sense. Seasonal cycle of temperature and precipitation was estimated as well as net water balance was computed as a residual of precipitation and evaporation. Being a minor difference of two large components the precise water balance value can hardly be estimated. The results were obtained by 5-year integration of the 50 km RCM and the driving MGO AGCM T30L14 with spatial resolution of approximately 300 km in the domain. The models incorporate identical physical package. The RCM produces significant cooling over the Volga-Ural catchment area while the global model does warming. Both models well reproduce the phase and magnitude of temperature. The magnitude of precipitation is largely overestimated in the RCM and underestimated in the AGCM. The seasonal cycle is substantially better reproduced by the RCM as compared to the AGCMs. The correlation with the observed data for the RCM precipitation is 0.71, whilst the AGCM precipitation correlation is 0.35 showing a weaker tie. The water balance is better computed by the nested RCM rather than by the AGCM, as well. The resulted discrepancies are -4% and +12%, respectively.

Russian State Hydrological University (RSHU)

The investigation of the main features of the dense bottom flows using a nonhydrostatic three-dimensional model was continued. The model was used for simulation of the bottom water from the Stolp Channel to the Baltic Proper. In accordance with the results of modeling the bottom water initially spreads along southern boundary and then divides at two pathways. The first is directed to the Gotland deep and the other to the Gdansk deep. The time of bottom water spreading from the slope channel to the Gotland and Gdansk deep obtained from the model is close to that obtained from observations. The velocity of the model bottom currents are in agreement with Nof theory. The model results shown that bottom water spreading are very sensitive to the bottom topography.

7.5 Sweden

The report about Swedish activities in the frame of BALTEX and *BRIDGE* was given by Anders Omstedt (Chairman of the Swedish working group on BALTEX).

During 2000 Sweden has been involved into the following BALTEX research programs: BALTEX-BASIS (Bertil Håkansson), PEP in BALTEX (Ann-Sofi Smedman), DIAMIX (Anders Stigebrandt), NEW BALTIC II (Sten Bergström/Nils Gustafsson) and CLIWA-NET (SMHI-If, Rossby).

Two SMHI BALTEX Ph.D. students have defended their thesis' work read as follows:

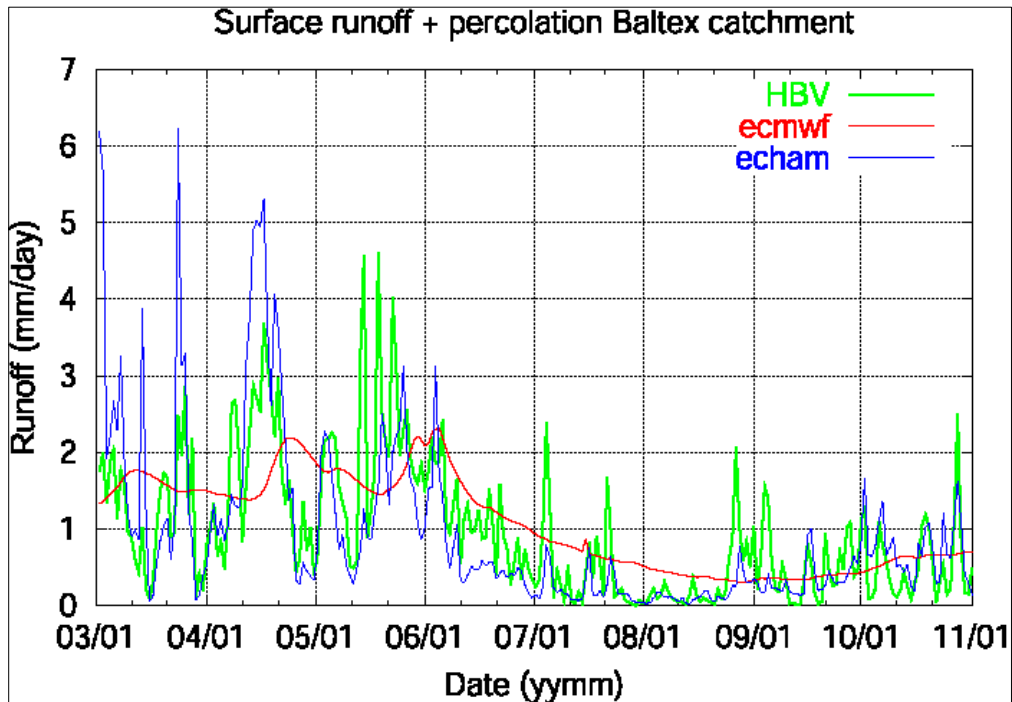
1. Phil Graham, 2000: Large-Scale Hydrological Modelling in the Baltic Basin. Doctoral Thesis, Division of Hydraulic Engineering, Department of Civil and Environmental Engineering, Royal Institute of Technology, Stockholm.
2. Anna Rutgersson, 2000: Water and heat exchange processes over the Baltic Sea. Ph.D. thesis at Department of Earth Sciences, Meteorology, Uppsala University, SE-752 36 Uppsala.

Also a closely related BALTEX research program is SWECLIM (Swedish regional Climate Modelling Programme), with the Rossby Centre located at SMHI. Within SWECLIM regional climate models for the Baltic area are developed and scenarios of river flows to the Baltic Sea are simulated. Scenarios of future ice conditions and change in salinity in the Baltic Sea have also been produced. The Swedish National Science Research Council has allocated funds for the establishment of a new professor chair at Göteborg University (Professor in Geosphere Dynamics, especially the Baltic Sea Water and Mass Transport). SMHI has been responsible for the BHDC and the BRDC activities. SMHI is also contributing to *BRIDGE* by sending up radiosonds from Visby twice a day during the *BRIDGE* period. Of special interest is that SMHI is conducting MESAN (mesoscale atmosphere analysis) since 1997 as well as working on the modelling of the water and heat cycles during the *BRIDGE* period. The measuring site at Östergarnsholm (PEP in BALTEX) has continued and in DIAMIX field experiments in the Baltic proper have been performed. Sweden is involved in the Scientific Committee of the Third Study Conference of BALTEX .

7.6 The Netherlands

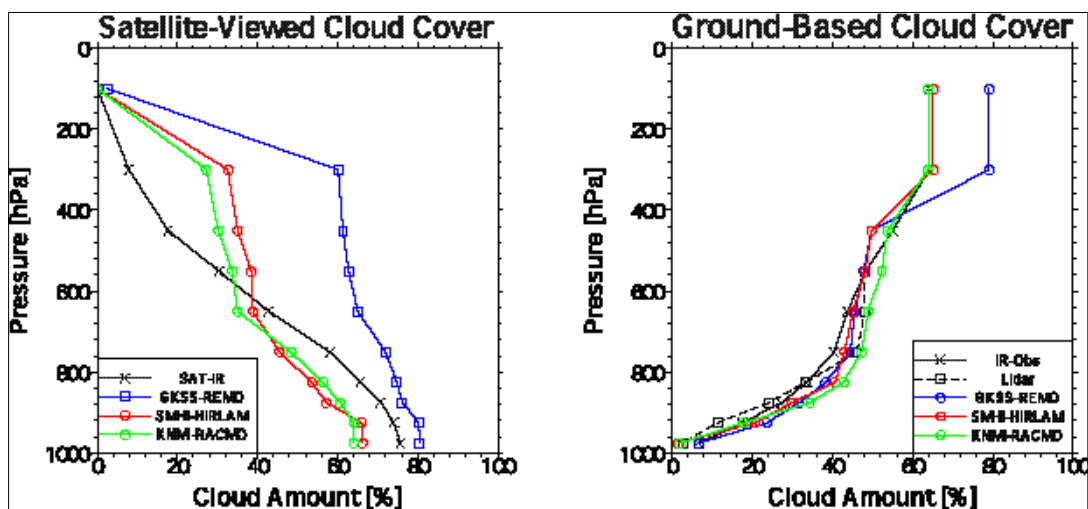
The Dutch activities have been reported by Aad van Ulden.

Figure 1 shows total runoff (surface runoff + deep percolation) simulations with RACMO with two different surface schemes: ECHAM4 with a Variable Infiltration Capacity (VIC) surface runoff generation model, and ECMWF, with virtually no surface runoff generated. Also shown are simulations with the locally calibrated hydrological model HBV-Baltic, treated as closest to truth here.



From the results it is evident that (a) the frequency behavior of the ECHAM VIC-approach resembles the HBV-Baltic much more than the ECMWF model, and (b) the ECMWF model tends to delay the peak runoff and shows a smaller annual cycle than HBV-Baltic. This is of importance for accurate predictions of e.g. flooding.

Figure 2 below shows vertical profiles of cloud cover probed from the Earth's surface (right hand panel) and from Satellite (METEOSAT but NOAA/AVHRR is essentially the same), and model cloud cover profiles derived from prognosed model cloud fraction per layer. Region: 100x100 km² area around Cabauw, the Netherlands. Period: 10-days 27 Aug-6 Sep 1995, based on hourly values.



Observations

Ground-based: Lidar detects cloud base height by measuring minimum traveling time of an emitted laser pulse. Maximum height is about 3000 m. IR-Obs: Measurements of brightness temperatures in the atmospheric window with a passive Infrared radiometer. With the use of radiosonde measurements T_{meas} is transferred into height or pressure. Cold temperatures below $T=-53\text{C}$ are considered clear-sky. Correction for atmospheric contributions is included. The difference between both curves is due the presence of optically thin water clouds. Lidar is essentially insensitive for the optical thickness, whereas the IR radiometers probe temperatures from higher altitudes.

Satellite

Vertical profiles from satellite are taken and are entirely based on temperature information (NOAA channel 4 around the 10.5 micron band). Measured brightness temperatures are transposed into a cloud top temperature using a cloud mask function which includes also information from visual channels. The low value for high cloud amounts might be due to the frequent presence of optically thin high ice clouds, but this is not yet proven.

Models

There are three models (GKSS-REMO, SMHI-HIRLAM, KNMI-RACMO) run in forecast mode for a very large domain (much larger than the observing region), producing a sequence of 10 days with 12-36 hour forecasts. Their thermodynamic cloud fraction profiles (so not corrected for radiative effectiveness) are transferred into cloud cover profiles seen from the surface or from satellite using a maximum-random overlap assumption.

Main conclusions are:

- All models have too many clouds in the lower troposphere, in particular KNMI-RACMO which carries ECHAM4-physics.
- All models have too many clouds in the upper troposphere, especially GKSS-REMO (however it is not clear what the optical thickness is of their clouds).
- Finally, all models tend to underestimate the amount of cloud cover in the middle troposphere (which can be derived from the small vertical gradient in model cloud cover compared to what can be extracted from the observations), but in order to make this a firm conclusion some issues on the observed profiles have to be resolved, in particular on optical thickness but also on aspects of horizontal resolution.

8 TIME AND PLACE OF NEXT BSSG MEETING

Aad van Ulden has invited to hold the next meeting in the at KNMI in De Bilt, the Netherlands. The BALTEX Science Steering Group meeting is scheduled for the 12-14 November 2001. Thanks to Aad van Ulden for this offer to host the meeting.

APPENDIX 1: AGENDA OF THE BSSG MEETING

11th Session of the BALTEX Science Steering Group (BSSG)

13-14 November 2000

at the Max-Planck-Institute for Meteorology, Hamburg

During this meeting of the BSSG a poster presentation had been recommended to show new scientific results from all participating groups parallel to the meeting. All members of the BSSG are reminded to bring a poster to this important meeting, summarizing their scientific work in the frame of BALTEX and *BRIDGE*.

All oral reports should be based on a written summary to be distributed at the BSSG.

Monday, 13 November 2000

- 9:00 Welcome by the chairman and local host – Hartmut Graßl
- 9:10 Report of the chairman - Hartmut Graßl
- 9:30 Report of the BALTEX Secretariat – Jens Meywerk
- 10:00 – 10:30 *Coffee Break (posters)*
- Report of the data centers**
- Overview of activities since last BSSG
 - Summary of data sets available
 - Actions planned for BRIDGE
 - Summary of requests for data
- 10:30 BALTEX Meteorological Data Center (BMDC) – Angela Lehmann
- 11:00 BALTEX Hydrological Data Center (BHDC) – Anders Omstedt
- 11:30 BALTEX Oceanographic Data Center (BALTEX-ODC) – Pekka Alenius
- 12:00 – 13:30 *Lunch Break*
- 13:30 *BRIDGE* – EOP1, Report of the scientific coordinator based on a written report (field phase summary from EOP1) – Ehrhard Raschke
- 13:40 *BRIDGE* – EOP2 Report of the scientific coordinator (complete overview of planned activities) based on a written summary – Jens Meywerk
- 13:50 EOP coordinators for EOP2 and EOP5
- Report from the working Groups**
- 14:15 NEWBALTIC and WGCM – Daniela Jacob
- 14:30 Working Group on Radar (WGR) – Anders Omstedt
- 14:45 Reorganization of Working Groups
- 15:00 – 15:30 *Coffee Break (posters)*
- 15:30 - 18:00 **Report of representatives from the participating countries including:**

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- Summary of scientific work conducted in the frame of BALTEX
 - Collaboration with other countries/institutes
 - Fund-raising efforts, national and international
 - Complete summary of the contribution to *BRIDGE*, especially the EOPs
 - Belarus – Chekan
 - Denmark – Rosbjerg
 - Estonia – Karing
 - Finland – Fortelius
 - Germany – Adrian
 - Latvia – Stikute
 - Russia – Vuglinski
 - Sweden - Omstedt
 - Poland – Kepinska-Kaprzak
 - Netherlands – van Ulden
- ~18:00 Adjourn

Tuesday 14 November 2000

- 9:00 3rd Study Conference on BALTEX:
- a) report of the local organizing – Fortelius
 - b) preparations for the second announcement and endorsement by BSSG
 - c) international funding sources – Meywerk
 - d) invited presentations
 - e) meeting of Scientific committee
- 10:00 – 10:30 *Coffee Break (posters)*
- 10:30 LITFASS – Beyrich
- 10:50 PEP – Smedman
- 11:10 NOPEX – Gryning/Lindroth
- 11:30 BALTEX contribution to CEOP of GEWEX
- 12:00 Membership issues
- Any other business (see below)
- Date and place of the next BSSG
- ~13:00 *Adjourn*

Other points to discuss

1. Additions to the BALTEX data policy – Meywerk presents a draft
2. Young Scientist Exchange Program: Status – Graßl
3. Definition of the goals and objectives of the WGCM

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4. Discussion of the status of the BAMS paper - Raschke.
5. Call for Proposals from EU on 15 November.
6. EU funding for Secretariat

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APPENDIX 3: MINUTES OF THE 5TH MEETING OF THE BALTEX WORKING GROUP ON RADAR

Participants, WGR membership, practical arrangements

The participants were Chris Collier, Neil Fox (expert from the University of Salford), Daniel Michelson, Johann Riedl, Uta Gjertsen and Jarmo Koistinen (the chairman). Nobody from Poland could attend. The chairman welcomed everyone to the meeting, especially the new Norwegian member Dr. Uta Gjertsen from DNMI. The present list of WGR members and their addresses is in Attachment A (There are changes to the previous distribution).

Minutes of the 4th Meeting

The minutes, attached in the information letter 3, from the Meeting at IMWM, Legionowo, Poland, 27-28 April 1999 were accepted.

BRDC operations, product statistics and algorithms

Daniel presented a status report of the BRDC activities. In general everything is operating quite well and the system is stable. The products are available on monthly CD-ROMs and have been distributed to all data providers and to the users. The Y2K symptoms were small, although some effects were detected in the Swedish network and in NORDRAD during the first day. Daniel presented the monthly availability figures (%) of the single radar data during the first 8 months:

Sweden and Denmark: some bad months (20-70 %) due to modem problems or data processing updates, now solved.

Norway: Data available from 2 radars since May.

Finland: Very high availability (monthly average around 97 %). The quality was worse during October-November due to a commercial fight between SMHI and FMI.

Poland: Leginowo availability high (> 90 %) although it is transferred manually - Zdzislaw and Stanislaw deserve special thanks. Katowice radar data has also stabilized to a good level.

Germany: Some confusion occurred during the switch to RMDCN. Daniel explained how the adjustment between the Danish 8 bit and German 3 bit data is done to eliminate the seam between the Nordic and German networks. The German data is adjusted: $\text{dBZ}(\text{adjusted}) = \text{dBZ}(\text{raw}) + \text{correction}$, where the correction is the difference of the classified mode values of dBZ from the overlapping area of Romo (DMI) and Rostock (DWD) radars. It should be noted that the 5 dB error, still present in the Romo radar, is subtracted prior to the comparison of the mode values. Daniel showed that the mode difference varies much in time due to random differences in relative location of the precipitating areas and due to the width of the German mode class. On average, the correction is -4.5 dB, which will be applied in future. Johann told that DWD is producing to Offenbach every 5 minutes so called DX-composites in which the depth of data is 8 bits. However, as the range of this data is only 100 km (115 km in near future) WGR felt that the inclusion of this data will not much improve the precipitation products in the catchment area of the Baltic Sea. The interesting method in this product is the application of an automatically selectable Z-R relation: when $\text{dBZ} > 46$ $Z = 256R^{**1.42}$ is applied, when $37 > \text{dBZ} < 46$ the Marshall-Palmer relationship is applied, and in still weaker rain the relationship is selected automatically from two choices based on the variability of the dBZ field. An internal proposal has been done at DWD to enhance the BALTRAD data to 8 bits. The result will be known this year. Related to this issue there is a misunderstanding on p. 8 in the Minutes of the

10th BALTEX SSG meeting: If this funding is not received there will be no 8 bit data flow from DWD to BRDC but in any case the existing 3 bit data transfer will continue.

In a general level WGR discussed of the potential improvements in the products. It was decided that minor improvements in the algorithms can be done continuously without special notification. It was also decided that in case of major improvements - although there seems to be no need for them - the data prior to the implementation moment will not be rerun. Daniel informed that at present he has a plan to improve the algorithm, which performs the integration of the gauge and radar analysis of precipitation and the gauges-only analysis outside the radar coverage. Daniel showed that the spatially varying adjustment factor (Fs) in the RR product has always a relatively small weight. The natural reason is the use of real time synop-observations in the product generation as their areal density is low compared to the gauge observations. It was decided that the relative role of the spatially varying adjustment field Fs will not be "artificially" enhanced from the present algorithm.

The worst individual error source (at least during the spring and early summer) in the radar data has been anaprop (sea) clutter. The IR-based surface temperature mask from METEOSAT data is applied at BRDC and according to Daniel it works quite well. There is still need to improve the algorithms in sea clutter elimination. This will be discussed at least in NORDRAD cooperation.

Scientific BRDC Report and other WGR publications

The joint report has been written and Daniel has made the final corrections based on the response from the WGR members. It will be published as an SMHI report within the next months, hopefully before ERAD Conference in September. The WGR noted satisfactorily that this document fulfills the BALTEX SSG request of such a report from each Working Group. The WGR felt that in addition to the CD data ROM's distributed from the BRDC, we should prepare a graphical radar precipitation atlas. It would be an easy reference for research groups to select appropriate precipitation cases from the large BRIDGE material. The atlas would consist of two parts:

1. CD-roms containing all 12 hourly accumulated precipitation products (RR) from a period of one year each, in a graphical image format (e.g. gif). The user interface should be plugged as a website.
2. Paper prints of weekly accumulated precipitation sums, one year/volume. Both presentations should have a text page where potential problems in the data and meteorological phenomena during the period could be shortly described. Jarmo will study if FMI could prepare the image files and the www-plugging. Both publications will require some funding from the BALTEX Secretariat.

Presentation of hydrometeorological radar-based research at the University of Salford

Neil and Chris presented the research activities applying the C-band radar of the University (the radar is sited at Warrington). Probability matching between gauges and radar over individual catchments has been used. Chris pointed out that in many cases of long lasting medium intensity rain the improved real time accuracy in radar measurements can lead to savings in the river management actions whereas in cases of flash flooding due to exceptionally heavy but short rain there is no time for any actions and thus no need for excellent accuracy. The companies (formerly part of public Water Authorities), which take care of the sewage systems and drink water supplies have radically changed the attitude to purchasing specific radars reserved only for hydrological research and measurements. A cost/benefit survey has revealed that purchasing data from the Met. Office operational radar network will become much cheaper. Thus it is

probable that economical support from these companies to buy and maintain radar hardware has ended. The support to the national network will continue from the water authorities still responsible of the flood management and warnings. A research project is combining the relative rainfall intensity patterns from the C-band radar and the simultaneous absolute attenuation along three 13.9 and 22.9 GHz microwave links, in which the time resolution is almost continuous. In this way it seems possible to get real time accurate precipitation estimates in urban catchments, where a risk exists that rain and wastewater will spill into streets. The University of Salford will be a member in the Sydney 2000 Forecast Demonstration Project (WMO/WWRP) in which five nowcasting systems will be implemented into operational use during the Olympic Games. The contribution of the University is based on the GANDOLF-system. Although the evaluation output will be purely scientific, Australian weather services can be interested of continuous operational implementations as severe damage has occurred due to mesoscale phenomena. For example, in April 1999 a single hailstorm induced devastation of 3 billion Australian dollars.

Ongoing and planned radar research related to BALTEX.

The preliminary information from the EU 5th Framework evaluation has shown that the proposals BEEOS IN BRIDGE and RAIN-FLOOD, which contained large contributions from the WGR have not got passed status. The results for the OPAS proposal and a microwave attenuation proposal by the Univ. of Salford have not yet appeared. The assimilation research at DWD is frozen as the main person (Christina Köpke) has moved to the ECMWF. The following radar research (in addition to those mentioned in items 2 and 5 above) will continue using more or less internal funding or funding from the existing EU projects: - Doppler wind assimilation in the HIRLAM model (Nordic cooperation) - Development of real time quality assurance methods in the NORDRAD network (NORDRAD cooperation)

- Dynamic Z-R relationships (Daniel in the EU Project CLIWA-NET)
- The Baltic Sea "river" water balance (Chris)
- Radar signal processing applying multiple PRF (Invers company, using the new Luosto radar in Finland).

Developments in the BALTRAD network and data exchange

Daniel said that he is happy with the existing data transmission to and from the BRDC. The recent development in the BALTEX radar network is the following:

Sweden: A plan has been written to modernize the old Ericsson network during 2001-2010. The radars will be dopplerized up to 240 km (now only to 125 km) and Doppler filtering in dBZ will be enabled. Some of the radars will be moved to new sites with better horizons. The dual polarization radar, originally located at Teolo in Italy, has been bought and it will be installed in southern Sweden. There is no information whether the multiparameter properties will be maintained or not.

Denmark: A new radar has been purchased. It will be sited in Sjaelland and the nearby old radar in Copenhagen will be moved to the Bornholm island.

Norway: The second radar (Gematronik hardware and software) has been operational since mid-May. It is located at Hägebostad close to the southernmost tip of Norway. The third radar has been purchased and it will be installed in 2002 close to Trondheim in the Middle of Norway.

Finland: The radar Luosto (Gematronik hardware, SIGMET software and digital IF) will replace the last MRL-5 at Rovaniemi in August.

Estonia: The new Gematronik radar at Tallinn is being installed at the moment. The data will be available through NORDRAD-network via Finland.

Latvia: The state budget draft for the year 2001 contains the sum for a new radar. Confirmation will take place in autumn. The site of the radar will be Riga airport. Latvia is also willing to exchange data via NORDRAD.

Lithuania: The old analog MRL-radars have been dismantled. There is wish to purchase new systems but no money available.

Poland: Radar Wroclaw (Gematronik, which was in boxes for many years) has been installed but it is not yet operationally available. IMWM is evaluating the tenders for the new Polish radar network (about 8 new systems).

Germany: Radar Dresden will be operational in June, which will complete the German radar network. The radar group at Hohenpeissenberg has proposed to DWD that the radar should be upgraded to a dual polarization system around 2002. That radar would act as a test bench for the decision to select between single/multiparameter radars during the upgrading of the German radar network, which would start around 2006.

Russia: A telecommunication and radar delegation from FMI will visit Roshydromet in Moscow in August.

Important meetings related to WGR

The 10th meeting of the BALTEX SSG was held in Warsaw, 7-10 February. Jarmo was attending and gave a presentation of the work of WGR and of the BRDC products and operations. The achievements of WGR were highly appreciated and it was felt that the WGR should continue its functions, whereas the other Working Groups will be reorganized. The SSG recommended that all BALTEX Working Groups should arrange a joint workshop in order to improve interaction between the various components of the BALTEX tasks and to enhance the use of all available data and models. However, so far no proposal to arrange such a workshop has appeared. The document of the meeting can be found in the BALTEX home page: <http://w3.gkss.de/baltex/>

Documents BALTEX Publication Series (online version is the last item at the bottom of the list)
The next SSG meeting will be held at Max-Planck-Institute for Meteorology, Hamburg, 13-14 November 2000. Major part of the WGR members will attend ERAD in September. We may have an ad hoc meeting there.

The third BALTEX Study Conference will be held on the island of Aland, Finland 2-6 July 2001. The first announcement can be found in the BALTEX home page: <http://w3.gkss.de/baltex/>

There will be a collision with the WWRP Quantitative Precipitation Conference in USA (Chris is a member in the Program Committee). Usually there have been very few Europeans in the QP Conferences.

The next AMS Radar Conference is quite probably in Germany (DLR?) in September-October 2001.

The next Conference on Hydrological Applications of Weather Radar is scheduled for 2001 in Kyoto, but probably it will be postponed.

The next WGR meeting

It was agreed that the next meeting will be held during 28-30 May 2001. The location of the meeting will be selected from the following choices (in the order of preference):

1. St. Petersburg in the case that the Finnish-Russian meetings will result to actions which will quite soon lead to operational receiving of the Russian radar data to BRDC.
2. If there is not enough progress in the previous choice, we will have the meeting at DNMI in Oslo, Norway. In case that there will be a joint workshop of all BALTEX Working Groups before the 3rd BALTEX Study Conference, the workshop will replace the WGR meeting.

APPENDIX 4: MINUTES OF THE SECOND BRIDGE TEAM MEETING

Second *BRIDGE* Team Meeting

4-5 October

at the Swedish Meteorological and Hydrological Institute (SMHI)

Folksborgsvägen 1

S-60176 Norrköping/Sweden

Participants: Bengt Carlsson, Carl Fortelius, Hartmut Graßl, André van Lammeren, Sven-Erik Gryning, Angela Lehmann, Jens Meywerk, Daniel Michelson, Anders Omstedt, Ehrhard Raschke (5 October only), Ann-Sofi Smedman.

Pekka Alenius was not able to attend.

The meeting was chaired by Hartmut Graßl, Jens Meywerk took the notes.

Appendix 1 summarizes the action items that came out of the meeting, Appendix 2 is the updated list of *BRIDGE* EOP activities.

The meeting was held on 4 October 2000, 1 p.m. to 5 p.m. and was continued on 5 October (8:30 a.m. until 12:30 p.m. The purpose of the meeting was, after a summary of actions from EOP 1, to identify future tasks in the frame of *BRIDGE*, find gaps and discuss the role of *BRIDGE* and *BALTEX* to CEOP.

After a welcome by the local host Anders Omstedt and some organizational remarks the following topics have been presented and discussed during the meeting:

4 October 2000, 1 p.m. – 5 p.m.:

1. Status of *BRIDGE* and overview of activities (Meywerk)
2. International relations (GEWEX/CEOP) (Meywerk with support from Graßl)
3. CLIWA-NET (van Lammeren)
4. Modelling activities (Fortelius)
5. Radar research and Data Center (Michelson)
6. Meteorological Data Center (Lehmann)
7. Ocean activities including *BALTEX*-ODC (Omstedt)

5 October 2000, 8:30 a.m. – 12:30 p.m.:

8. Hydrological Data Center (Carlsson)
9. Plans for EOP 2 and EOP 3
10. Leader of EOP 2
11. Catalogue of duties for EOP leaders
12. Chairman of the *BALTEX* team
13. Secretariats future
14. Newsletter for *BALTEX* during *BRIDGE*

Status of BRIDGE and overview of activities

Jens Meywerk presented a summary of field experiment activities during *BRIDGE* and its first EOP in Aug/Sep 2000. There were several research vessel cruises organized by the institute of Oceanology, Polish Academy of Sciences (IOPAS) and others between October 1999 and February 2000. These cruises basically surveyed the temperature and salinity profile of the Baltic Sea in different regions, which are important for water mass exchange between the different Baltic Sea basins.

In the frame of DIAMIX summer experiment, R/V Aranda (FIMR), Skagerak (OIUG) and Oceania (IOPAS) took oceanographic measurements between 4 – 15 September in the Baltic Sea. Besides the vertical structure, dissipation measurements were conducted as well as 7 moorings installed on a measurement site east of Gotland.

The next cruises in 2000 will be:

4 – 23 October	R/V Argos (SMHI)
11 – 20 October	R/V Aranda (FIMR)
14 – 23 October	R/V Oceania (IOPAS)
21 October – 11 November	A. v. Humboldt (IOW)

All these experiments will substantially contribute to BALTEX and *BRIDGE*.

During the first Enhanced Observational Period (EOP1) from 1 August - 30 September 2000 the following activities were conducted:

1 Aug – 29 Sept	CLIWA-NET (KNMI)
1 Aug – 30 Sept	LITFASS Sodar/RASS network intercomparison
15 Aug – 25 Aug	CLIWA-NET, Nordverbund, Post-ARTIST at GKSS including aircraft operations equipped with instruments to measure cloud microphysical properties (KNMI, DWD, Uni Bonn)
10 Aug – 30 Sep	Extra radiosoundings from Greifswald and Schleswig by increasing the number of soundings from 2 to 4 a day (DWD)
1 – 15 Sep	Extra radiosoundings from Utö island (FMI)
entire <i>BRIDGE</i> period	Extra radiosoundings from Visby, Gotland, (12 and 00 UT) Sweden (SMHI)

A table of conducted and planned activities was presented which became the focal point for later discussions on activities during EOP2 and EOP3. This table was updated to the most recent status and is attached as Appendix 1.

International Relations (GEWEX, CEOP)

Jens Meywerk briefly repeated the scientific goals and challenges of GEWEX and its planned Coordinated Enhanced Observational Period (CEOP) to be conducted between 1 July 2001 and 30 Sept 2003.

All Continental Scale Experiments (CSE) conducting research in the frame of GEWEX (GAME, MAGS, GCIP, LBA and BALTEX) will have a simultaneous observational period in order to, besides determining the water budgets on the regional scale, investigate teleconnections between these climatic regions and the impact of global anomalies like (ENSO, NAO ...) on the regional water and energy budgets.

The driving idea to CEOP came up about 3 years ago, when in the different GAME catchments the question arose, how the monsoon system (as the heat source of the climate system) influences changes in the water cycle in these areas. Since the major driver for the Asian monsoon system is ENSO this question was extended to the global scale, also addressing the question, how other global anomalies drive the hydrological cycle in other areas (for instance NAO-BALTEX). The BALTEX major contribution to CEOP will be to develop a model system coupling interactively the atmosphere to the underlying surface and, like none of the other CSEs, to the ocean. Since BALTEX has progressed so much, we will be most likely the first to be able to provide a coupled regional model system.

CEOPs second most important challenge is to provide test-beds for all operational and experimental satellites in space today. New sensors will be tested as well as new algorithms developed and evaluated against the ground truth data measured in the CSEs. With these above mentioned objectives it is clear that CEOP will contribute not only to closing regional water and energy cycles but also to a better understanding of the global climate system and its variability. It will also be a major contribution in pushing forward the assimilation of satellite data into weather forecast and climate models.

Other News on CEOP

CEOP will start with a build up phase on 1 January 2001 until 30 July 2001 followed by the main phase ending in September 2003.

In a new Continental Scale Experiment has been accepted to participate:

The coupled tropical atmosphere and hydrologic cycle (CATCH) which covers catchment areas in West Africa. CATCH adds a region from the semi-arid tropics to CEOP. The GEWEX Continental Scale Project (GCIP) area of investigation has been enlarged by addition of the semi-arid regions of the Southwestern United States.

With these most recent additions to CEOP almost all climatic regions are represented. Several other experiments will contribute to CEOP as subproject. These are:

- Continental-scale experiments and transferability studies
 - La PRIMERA: La Plata River-basin Model Evaluation and Research Application
 - SAGE: Saskatchewan GEWEX Experiment
- Monsoons
 - CAMP: CEOP Austral-Asian Monsoon Project
 - NAME: North American Monsoon Experiment
- Global
 - G-LDAS: Global Land Data Assimilation System
 - MICAPS: Monsoon Impacts on Continental Areas - Pilot Studies
 - MOPEX: Model Parameter Estimation Experiment - Contributions
 - NCEP/GAPP: National Centers for Environmental Prediction – Contributions
 - Predictability Studies for Hydrometeorology

Additional information about these sub-projects can be retrieved from:

http://www.msc.ec.gc.ca/GEWEX/GHP/ceop_projects.html

It was recognized that the BALTEX committee is not really aware of this global dimensions of CEOP and BALTEX's contribution to these global climate issues. It is necessary to communicate this to the BALTEX community. Stating out the global dimension in the frame of GEWEX and CEOP will be very useful for the future funding proposals to EU and national funding agencies.

The Science and Implementation Plan of CEOP will be completed by November 2000 and December 2000, respectively. A data management plan is scheduled to be completed in early 2001 as well as a summary of satellite systems. A CEOP workshop is planned for early 2001.

Comprehensive information on GEWEX, CEOP and links to all CSE's can be found at <http://www.gewex.com>.

CLIWA-NET

André van Lammeren presented an overview of the BALTEX Cloud Liquid Water Network (CLIWA-NET) Network Campaign (CNN-I)

The campaign took place at 12 sites in the Baltic Sea catchment area and the model area of the BALTEX regional models between 1 August and 29 September 2000.

The different stations were equipped with microwave radiometers, lidar ceilometers, infrared radiometers and cloud radars operating simultaneously over the entire period.

An extended campaign has been conducted in Geesthacht, including in situ measurements of microphysical cloud parameter with two aircrafts. Preparations for CNN-II (April/Mai 2001) and BBC (Aug./Sep 2001) are going on. While CNN-II consists of basically the same experimental activities as CNN-I, the BBC will, in addition, include aircraft observation and extended radiation measurements through the German "4 D-Wolken" project, aircraft measurements with Merlin-IV through the CAATER project, as well as extensions like tethered balloon, 3 GHz radar and other activities.

A central website has been developed to act as a main information exchange platform between all CLIWA-NET participants. This website includes access to data measured during CNN-I, time series as well as satellite data and output of relevant parameters from various models.

Future CLIWA-NET events will be:

13 Dec 2000:	Workshop on accuracy of microwave radiometer LWP observation – in Bonn
14-15 Dec 2000:	2 nd CLIWA-NET workshop in Bonn (results from CNN-I)
March 2001	BBC planning meeting
2 April – 31 May 2001	CNN-II campaign
1 Aug – 14 Aug 2001	BBC microwave radiometer intercomparison at Cabauw
17 Aug – 30 Sept 2001	BBC campaign in regional network

All this information plus a link to the data (at least examples) can be accessed through:

<http://www.knmi.nl/samenw/cliwa-net>

Modelling activities

Carl Fortelius briefly reported about the atmospheric modelling activities. Most of the NEWBALTIC II project was done for the sake of BALTEX. Discussion about a possible NEWBALTIC III took place in Offenbach. Daniela Jacob would like to develop a fully coupled system to be run in climate mode.

The delayed mode data assimilation for *BRIDGE* has been tested with the HIRLAM model to quantify the water and energy budgets. These first piloting experiments were not satisfying,

which lead to the change of the models physics package. New test runs have been started in late September. The analysis of these new runs still needs to be done.

DWD has no funding for modeling efforts in *BALTEX/BRIDGE* anymore. The whole assimilation efforts rely on the HIRLAM activities. This is a serious gap. A better exchange of information and cooperation is needed between the modeling and remote sensing (RS) groups, since RS becomes increasingly important for initialization of models and validation/evaluation of model output. The working group structures need to be reconsidered. A joint workshop of all working groups is planned.

BALTEX Radar Data Center at SMHI

Daniel Michelson reported from the *BALTEX* Radar Data Center at SMHI.

Almost the entire Baltic Sea catchment area is covered with radar. Estonia has purchased a radar, which will soon be operational. Latvia has budgeted a radar for the next fiscal year. Poland will also install new radars at two sites in the near future. With these radars the entire Baltic Sea region will be covered. The radar group tries to include the German and Dutch radars even though not directly in the catchment area, but still inside the model area of *BALTEX*.

An upgrade to Doppler Radar enables better quantitative estimates of precipitation, which can be even more enhanced if Meteosat IR images are combined with the radar data. Daniel showed several very promising examples of how the estimated precipitation could be improved and compared this to gridded precipitation data derived from rain gauges. Using MSG Rapid Scan IR data a further improvement will be achieved to the more frequent availability of Meteosat data (once every 10 minutes).

The *BALTEX* Radar Data Center at SMHI is distributing its products on a monthly basis by sending CD-ROMs to interested partners in the *BALTEX* community. This service has been established in October 1999 and will be continued until the end of *BRIDGE*

BALTEX Meteorological Data Center

The BMDC collects synoptical and aerological data routinely transmitted via the GTS network, covering the entire *BALTEX* modeling area (BAMAR). In addition to this, BMDC also collects non-real-time, non-GTS (data sets not exchanged on a routine basis) synoptical, precipitation, soil moisture and temperature, snow cover, evapotranspiration, radiation as well as the entire data set provided by climate stations from the whole Baltic Sea catchment area (BACAR) for many years now, beginning during the PIDCAP period in 1995. Non-GTS data has been received through bilateral agreements between GKSS and the Baltic States, Russia, Belarus and Poland.

Financial support has been given by GKSS (through the BMBF project “*BALTEX – Secretariat*”) and by the German Weather Service in Offenbach.

The activities of the Data Center will go on for the *BRIDGE* period.

The number of in situ network stations has decreased by 90% between 1940 and today (23.000 in 1940 and 2.300 in 2000). Remote sensing techniques both, from space and ground based, have to fill up the gaps in the future. Regarding precipitation this goal has almost been achieved by using radar observations.

It is very important to stimulate research in the area of remote sensing to be prepared for the future. We do need a working group for remote sensing, closely working together with modelers and experimentalists to push forward the enhancement of existing and development of new

algorithms. A proposal to the Science Steering Group will be made to add satellite remote sensing specialists to the Radar Working Group .

Ocean activities including BALTEX-ODC

BALTEX Ocean Program

The Ocean Program in BALTEX will not be conducted the way it was planned in 1998 since all activities needed extra funding. This funding had not been granted through the 5FP of EU. Most of the DIAMIX activities had been part of these proposals. At this point it is unsure whether DIAMIX can be continued. The BASIS winter experiment during EOP 2 will be conducted. Jan Piechura is the coordinator for the cruises. All future R/V cruises are planned to be coordinated with the EOPs of BALTEX/*BRIDGE* as they come up.

Pekka Alenius left brief description in writing about FIMR's situation in relation to *BRIDGE*. The FIMR will continue the *BRIDGE* efforts as previously planned. This includes some cruises with R/V Aranda with extra radio soundings of the atmosphere in the open sea areas.

FIMR had conducted three DIAMIX cruises, the latest of which was between 29 August 2000 and 15 September 2000. During that cruise 40 radio soundings were launched. In late 1999 they had a *BRIDGE* cruise to the central Baltic Proper including radio soundings. The next *BRIDGE* cruise will be in January/February 2001 (the exact dates will be defined in near future). It will continue in a reduced manner those efforts that were included in BALTEX/BASIS project. *BRIDGE* data is also planned to be collected during some other cruises.

The BALTEX Oceanographic Data Center has so far received water level data from Latvia and CTD-data from Poland and Finland. The web-pages are under construction. There have also been discussions on water level data from Denmark. The evolution of the Baltic Operational Oceanographic System (BOOS) has increased the amount of online data that should be considered also in *BRIDGE*.

Pekka Alenius will be asked by the Secretariat to establish the BALTEX-ODC as soon as possible and to contact all Ocean Program PIs to submit their data to the data base.

BALTEX Hydrological Data Center report

Bengt Carlsson presented a status report about the Hydrological Data Center at SMHI. The Center stores all river runoff data available in the Baltic Sea catchment region and provides 1°x1° gridded synoptical fields.

The runoff data consists of monthly sums at the river mouths as well as daily runoff at a large number of gauging stations at the river banks.

The quality of the runoff data has been discussed and it was recognized, that especially for the data from the Baltic States, Russia and Belarus no error bars could be given. Since runoff data is, for instance, used to calibrate model output it is of vital importance for the modelers to know the accuracy of the runoff data. This is a serious gap and needs to be solved as soon as possible. Since P-E (precipitation minus evaporation) is already known with an accuracy of 10%, the error in runoff needs to be smaller if used for calibration. It is not clear, who is actually doing at least a rough consistency check with the data. The data center should develop at least some very simple procedure.

The BALTEX HDC also needs to contact BfG in Germany in order to check possible overlaps and gaps in the databases, so a data exchange between the two centers can be started for mutual benefit. The BfG for example stores the data 'as is' without any quality check.

Planned EOP 2 and EOP 3 activities

PEP in BALTEX ends by the end of October 2000 and will not contribute to EOP 2 and EOP 3. The continuously measuring site Östergarnholm will be operated for at least the next 30 months. Östergarnholm is located close to the center of the Baltic proper and represents the conditions in the center of the Baltic Sea. Turbulent flux observations are conducted from a 30 m tower besides other standard meteorological observations.

(Sven Halldin just submitted a proposal to EU asking for financial support for research infrastructures with several others involved in BALTEX.)

NOPEX: The Norunda and Marsta sites are running on a low level. Data from NOPEX is in general available from the respective PI directly. An info about those PIs is available at the NOPEX web site: <http://www.hyd.uu.se/nopex/>. A CD-ROM with information and data from the NOPEX CFE1 and CFE2 has been released to the public.

CLIWA-NET: CNN-2 (EOF 3) will basically be a repeat of CNN-I. Cloud liquid water content will be the major deliverable.

Lindenberg: Besides the already comprehensive continuous observation at MOL there are no specific field experiments planned so far for EOP 2 and EOP 3.

DIAMIX: It was originally planned to have a DIAMIX field experiment during EOP 4 of BALTEX. Anders Omstedt will contact Stigebrand about this.

BASIS: The EU-contract in the frame of BALTEX-BASIS ends in Nov. 2000. Jouko Launiainen is still doing the activities scheduled for EOP 2 of BALTEX/*BRIDGE*. This continuation is called BASIS-*BRIDGE*.

Other activities are still depending on the outcome of funding proposals recently sent in to DEKLIM the most recent call for proposals from the German Ministry for Education and Research (BMBF). As a rough estimate there can be up to 20 additional position for BALTEX for up to 5 years from different universities, research institutes, and the Weather Service in Germany. Funding is scheduled to be started during the first quarter of 2001.

Coordinator of EOP2/EOP coordinator duties

The EOP coordinator duties have been identified to prior to each EOP compile a list of activities scheduled as precise as possible. After each EOP a brief summary of activities needs to be prepared from the respective EOP coordinator. A list of publications also needs to be prepared by the coordinator. All this information needs to be communicated to the BALTEX Secretariat, so the Secretariat can post this to its web-pages.

We still need a coordinator for EOP 2 in Jan/Feb 2001!!

Chairman of the BRIDGE Team / BRIDGE Newsletter

Some time ago it was decided to have a *BRIDGE* manager. The best idea would be to have the leader of the BALTEX Secretariat be the *BRIDGE* leader in one person. Jens Meywerk was

nominated to take over this duty. The duties have been defined as to keep an overview of all activities in *BRIDGE* and to communicate this to everybody involved. This could be done by a *BALTEX/BRIDGE* Newsletter. A brief Newsletter of not more than 2 pages four times a year would be fine. Contributions will be collected from now on. The first Newsletter should be scheduled to be printed in Jan 2001. Before dissemination the Newsletter is supposed to be reviewed by the BSSG members.

BALTEX Secretariats future:

The question of the future of the Secretariat needs to be raised at the next BSSG in Hamburg. Funding for the Secretariat is ending Dec. 2001. Germany expects this position to be paid by another *BALTEX* participating country after that time. Meywerk will ask Isemer how we can obtain funding from EU or other sources and will repeat this at the BSSG in Hamburg.

For new proposals it would help if Denmark, Sweden and Finland are financially contributing to the *BALTEX* Secretariat. This underlines their interest in the Secretariat. DWD already supports the Secretariat through funds for the data exchange agreements with the Baltic States.

Miscellaneous: Paper to be submitted to the Bulletin of the American Meteorological Society (BAMS).

Raschke coordinates an overview/achievement paper of *BALTEX* and tries to submit it to *BAMS*. Contributions from all participating people are required. Raschke and Meywerk will be the first authors followed by all other contributors in alphabetic order.

Contributions (1-2 pages of text plus one or two graphs) are required from everybody by the end of October. Raschke will work on the structure of the paper and will spread the call for contributions to the respective people. Raschke and Meywerk will write the introduction and later edit the paper and put together bits and pieces.

Summary of action items

2nd *BRIDGE* Management Team meeting in Norrköping/Sweden, 4/5 October 2000

1. **Andre van Lammeren** needs to inform CEOP Science Team that *CLIWA-NET* is a contribution of *BALTEX* to CEOP in the frame of satellite data validation.
2. **Hartmut Graßl** is asking Daniela Jacob if there is a data assimilation action planned for *BRIDGE* at MPI.
3. **Ehrhard Raschke** is coordinating the writing of the *BALTEX* paper and makes use of his connections to get it published in the *Bulletin of the American Meteorological Society*.
4. **Jens Meywerk** will encourage Pekka Alenius (Oceanographic data center) to retrieve the oceanographical data measured during *BRIDGE* from the respective sources like Stigebrand, Piechura, Omstedt, Krauss etc directly.
5. **Jens Meywerk** needs to close new contracts about data exchange with Poland and the Baltic States including the maximum number of precipitation and runoff stations possible for the entire *BRIDGE* period as was collected during *PIDCAP*
6. **Bengt Carlsson** is asked to contact BfG in Koblenz (Global Runoff Data Center) and check for overlap of the two data bases. What could we supply to BfG and what would be worth retrieving from BfG?

7. **Jens Meywerk** needs to draft additions to the data exchange agreement. In case the data from any of the BALTEX data centers is used for publication this needs to be acknowledged correctly by either co-authorship of the respective PI from the BALTEX community or at least a formal statement about the origin of data.
8. **Everybody** is urgently asked to check the BALTEX publication Library at <http://w3.gkss.de/baltex> for correctness and submit new publication information.
9. **Jens Meywerk** ask Frank Beyrich if there is any special field observation activity besides the continuous program during EOP2 and EOP3.
10. **Anders Omstedt** is asked to get information about DIAMIX activities during EOP4
11. **Jens Meywerk** to add Krauss and Piechura activities to the list of actions during *BRIDGE* on the web. Westermarkelsdorf need to be added to the continuous observing sites. BALTRAD needs to be added as well.
12. **Anders Omstedt** will contact Göran Karlsson about his contribution to *BRIDGE*. His cloud distributions inferred from satellite would be extremely valuable for *BRIDGE* and BALTEX.
13. **Jens Meywerk** is asked to get information from Hans-Jörg Isemer about possibilities of funding for the BALTEX Secretariat from EU.
14. **Jens Meywerk** send out a copy of the most recent version of the CEOP Science Plan to BSSG participants for review at the next BSSG in Hamburg.
15. A newsletter during the *BRIDGE* period will be issued from the **BALTEX Secretariat** once every 3 months starting in January 2001. Active contributions from **all participants** is required.

Overview of EOP Activities

		EOP1	EOP2	EOP3	EOP4	EOP5
Activity	Coordinator	Raschke	Meywerk	Simmer	van Lammeren	N.N.
BASIS	Launiainen		X			
CLIWA-NET	van Lammeren	X		X	X	
DIAMIX	Stigebrandt	X				
LINEX-2000	Engelbart	X				
LITFASS	Beyrich	X	X	X	X	X
NOPEX	Halldin					X
PEP	Smedman	X				

APPENDIX 5: MINUTES OF THE DATA WORKSHOP IN JELGAVA

Minutes of the Workshop on the status and use of hydro-meteorological data in the BALTEX community 21/22 July 2000 in Jelgava, Latvia

The workshop started by a welcome of the Dean of the Faculty of Environmental Engineering, Prof. Janis Skujans, the local organiser Dr. Inese Jauja (LLU) and the chairperson of the workshop Dr. Jens Meywerk (GKSS).

There has been at least one representative from the National Hydro-meteorological Services of Belarus (Grigory Chekan and Tamara Mikhnevich), Estonia (Rene Rajasalu), Latvia (Inita Stikute, Mira Butina and Janis Kostjakov),

Lithuania (Olga Repinskaja), Russia (Valery Vuglinsky), Poland (Zenon Wozniak and Irena Otop) and Kaliningrad (Nina Blazchishina) as well as interested scientists from Latvia University of Agriculture (Kaspar Abramenko, Janis Valters and Ansis Ziverts).

The representatives from the services presented the status of the data delivery and gave an overview of scientific work done in the frame of BALTEX if any.

Grigory Chekan gave an overview of current data delivery contracts with the BALTEX-Secretariat and listed all parameter measured and delivered to the BALTEX community. He expressed high interest in continuation of the cooperation. It is necessary to close a new contract for the BRIDGE period of BALTEX.

Rene Rajasalu also gave a brief overview of the contracts and data and parameters to be on contract with GKSS. He also showed his scientific work, which relates to BALTEX. Rene studied 500hPa isotropic wind components from radiosoundings from Tallinn during the years 1953-1998. There is a trend to be observed in the wind components:

In general the average wind direction turned from WNW to ESE over the years perhaps exhibiting a slight north ward shift of low pressure system. The causes for this drift will be investigated in the future.

Janis Valters gave an overview of the Department of Water Management at the Faculty of Environmental Engineering. He pointed out the importance of that subject. They are currently preparing a hydrological database for an average drainage basin sizes between 22-45 ha. He is working together with Ansis Ziverts and Inese Jauja on flood protection issues for the Daugava River.

As the deputy director of the Latvian Hydrometeorological Agency, Inita Stikute introduced LHMA in a very impressive way. LHMA is currently restructured into a very sophisticated agency. With its 400 employees LHMA has a big laboratory and a large division for environmental quality monitoring. They are currently in the process to set up an automated station network for weather, climate, air quality and hydrological observation. They do cooperate closely with the Danish Meteorological Institute and Danish companies in setting up the network. Since LHMA is highly commercialised and is providing data to the BALTEX community they are of course worried about their data. The BALTEX community should closely watch the data flow, since if the BALTEX data will be used commercially LHMA might loose customers in the future due to the BALTEX data archives. She would like to know how the data provided by LHMA is being used and who is making use of it.

As representative from Kaliningrad Hydromet-Service Nina Blazchishina gave a presentation about the service and clarified some questions that came up during the last couple of years regarding the contribution of Kaliningrad to BALTEX. The former head of the Governmental Hydrometeorological Service, Dr. Masyagin, has left the Service.

She also reported about the service she can offer to BALTEX in the future and explained details about their network and measured parameters. She is also very interested in cooperating with BALTEX but needs financial support for the data submission. The secretariat will start negotiations with Nina Blazchishina soon.

Olga Repinskaja presented a brief review about the data delivered to the BALTEX databases. She mentioned that the Lithuanian Hydrometeorological Service has benefited a lot since BALTEX had invited them to participate. They had been able to purchase their first computers and started building up an electronic database. Unfortunately the number of hydrometeorological stations has been decreasing by almost 50% within the last couple of years due to missing funding. LHMS has joint projects with LHMA.

Zenon Wozniak reported about the situation in Poland. The number of precipitation and radiation stations is also decreasing over the last years. There are 25% less radiation stations and many precipitation stations have been closed. The soil data is only on paper and needs to be keyed in by hand. Through the Odra-Project with GKSS they are able to digitise most of the data in the future. More data will be available in real time mode soon.

Besides the Odra-Project there are scientific contributions in form of trend analysis of precipitation data over southern Poland. There is a decrease in some parts of southern Poland in precipitation observed over the last decades. A possible explanation would be the change of micro-physical properties of cloud particles due to atmospheric pollution from regional brown coal processing industry, according to Wozniak. It still needs a closer investigation.

Valery Vuglinsky reported briefly on the data preparation from the Russian side. There are currently no contracts between the BALTEX-Secretariat and the Russian State Hydrometeorological Institute (RSHI) for data exchange. He is only allowed to exchange data with externals if there is a scientific program that leads to financial benefits for RSHI.

The BALTEX-Secretariat has recently submitted a joint proposal sketch to the NATO Science for Peace Program, proposing a joint effort between Jauja, Skuratovich, Vuglinsky and Meywerk for Daugava River modelling. If this proposal will not make it, we will try further within the frame of INTAS (their next call is in Sept. 2001).

Valery Vuglinsky also presented briefly what projects he can offer and he seeks collaborators. For the BRIDGE period they will contribute with model runs of the HYDROGRAPH -98 model with lake control. This will only be done for some sub-basins from their own budget. They need money to extend this to the entire Neva-River basin.

The BALTEX Meteorological Data Centre BMDC, Angela Lehmann, gave a comprehensive status report of the data currently stored in BMDC. She also explained what is done to the data before it is being archived. She provided a list of available data to all participants and pointed out still existing issues with the raw data from the different sources. One major problem is still that the centre needs to know what soil moisture data needs to be like for the modellers. There is lack of a consistent soil type classification.

Jens Meywerk gave a report about the BALTEX Hydrological Data Centre (on behalf of Bengt Carlsson), the status of BALTEX/BRIDGE, its link to the GEWEX/CEOP and funding issues regarding the conduction of BRIDGE EOPs. This information is available from the BALTEX homepage at <http://w3.gkss.de/baltex/> and will not be repeated here.

The discussions during and after the presentation lead to the following actions:

1. The Secretariat is providing information on who is using what data from the different data archives
2. The Secretariat tries to gather information from the modellers what kind of soil type classification they need
3. The services are looking into the soil type classification and will provide the Secretariat with information about what they can supply.