



BALTEX science, WCRP and BALTEX phase II

**BALTEX Data management workshop
St. Petersburg 6 December 2006**

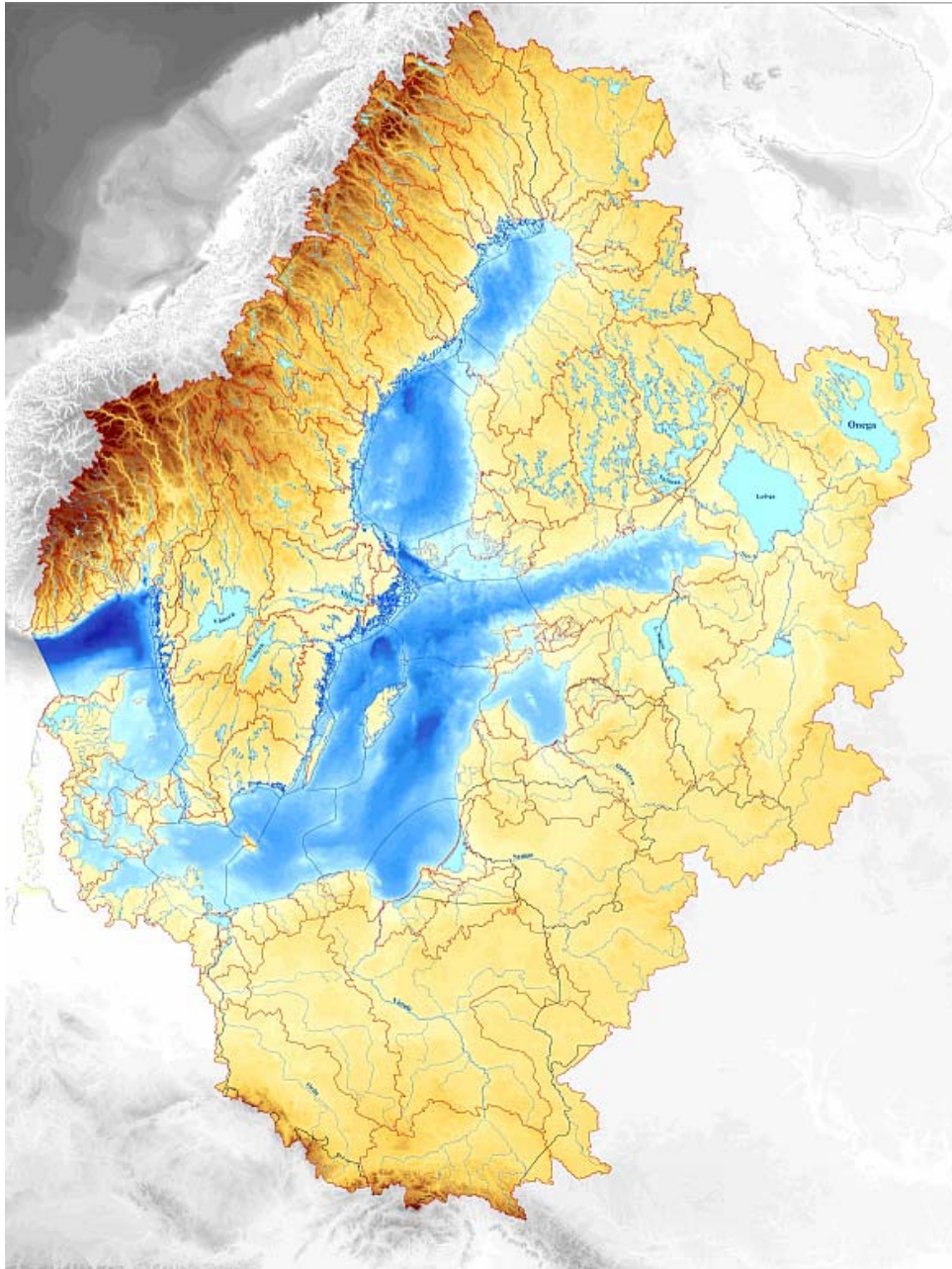
Joakim Langner

Swedish Meteorological and Hydrological Institute, SMHI

Joakim Langner, Timo Vihma FMI, Anders Omstedt GU

Chair and vice-chairs of BALTEX SSG

The Baltic Sea Basin = The BALTEX Region

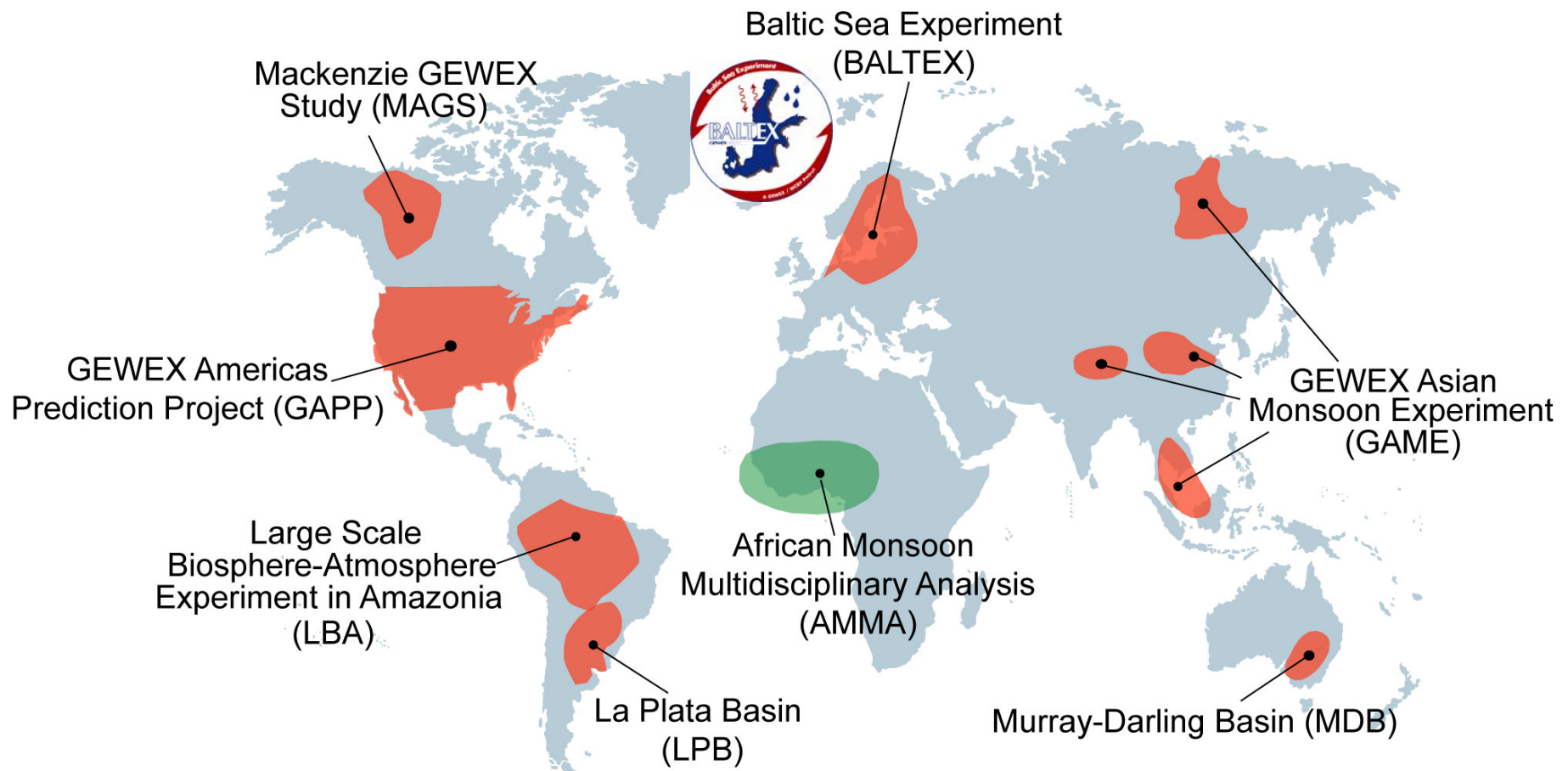


- Basin: 2.13 Mill. km²
- Baltic Sea: 380 000 km²
- 85 million in 14 countries
- Variable climate and topography
- Considerable seasonal, inter-annual, decadal and long-term variations
- Unique, challenging region for climate and environmental studies (data, models and observations, budgets)
- Challenges related to political and economic development
- Environmental issues of concern

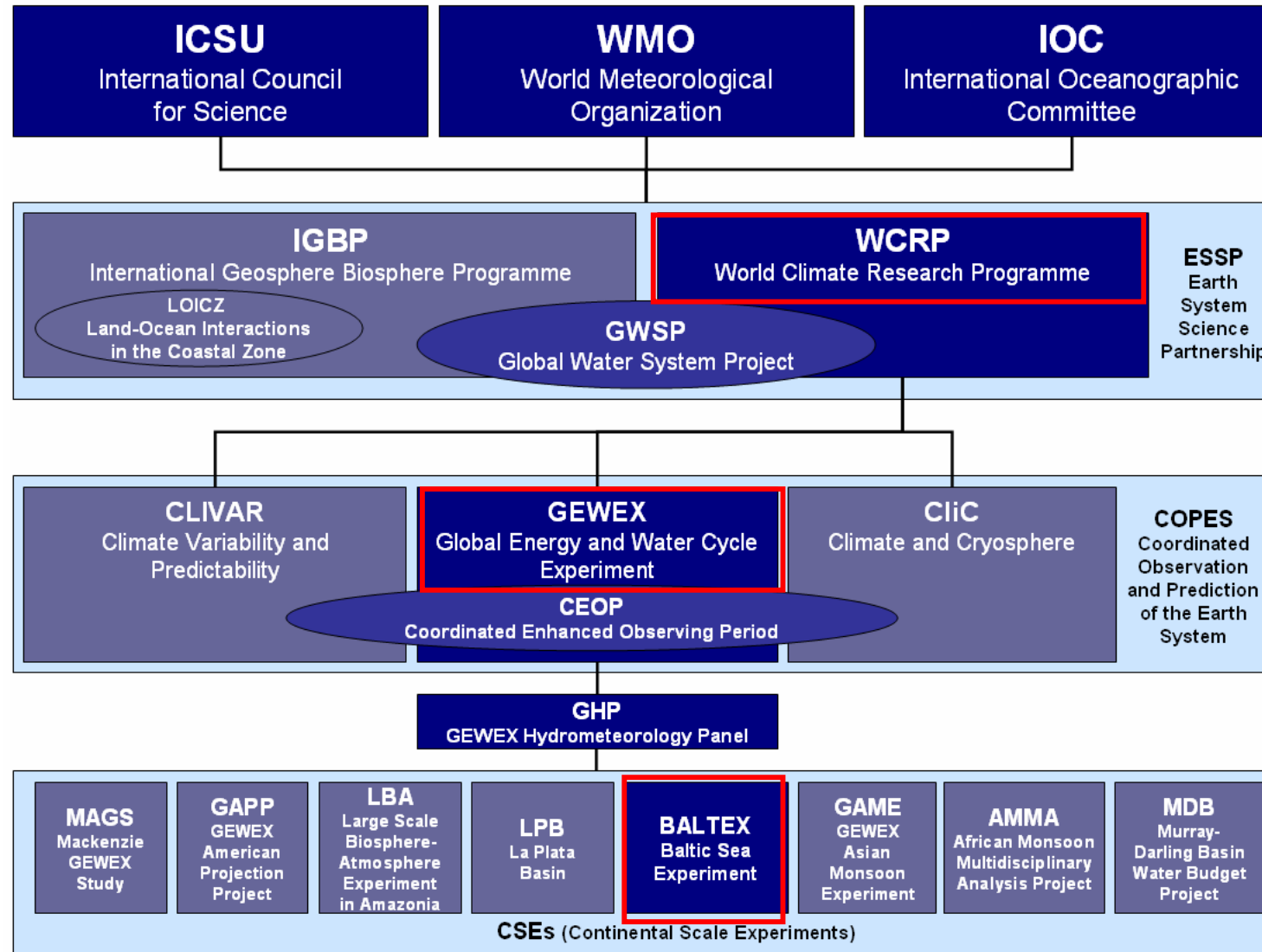
The Roots of BALTEX



Continental-scale Experiments in GEWEX



The Roots of BALTEX



Global and regional research programmes and projects relevant for BALTEX.
BALTEX Phase II Science and Implementation Strategy, 2006, page 72.

The Roots of BALTEX



WMO



World Meteorological Organisation



WCRP



World Climate Research Programme



GEWEX



Global Energy and Water Cycle Experiment



GHP



GEWEX Hydrometeorology Panel



BALTEX



The Baltic Sea Experiment



What does BALTEX do?

BALTEX Phase I (1993-2002)

- **Collection of in situ and remote sensing data**
- **Re-analysis of existing data sets**
- **Data assimilation**
- **Numerical experiments and coupled modelling**
- **Process studies including field experiments**

BALTEX Phase II (2003-2012)

Extension to

- **Climate variability and change**
- **Water management**
- **Air and water quality**
- **Cooperation with stake-holders and decision-makers**

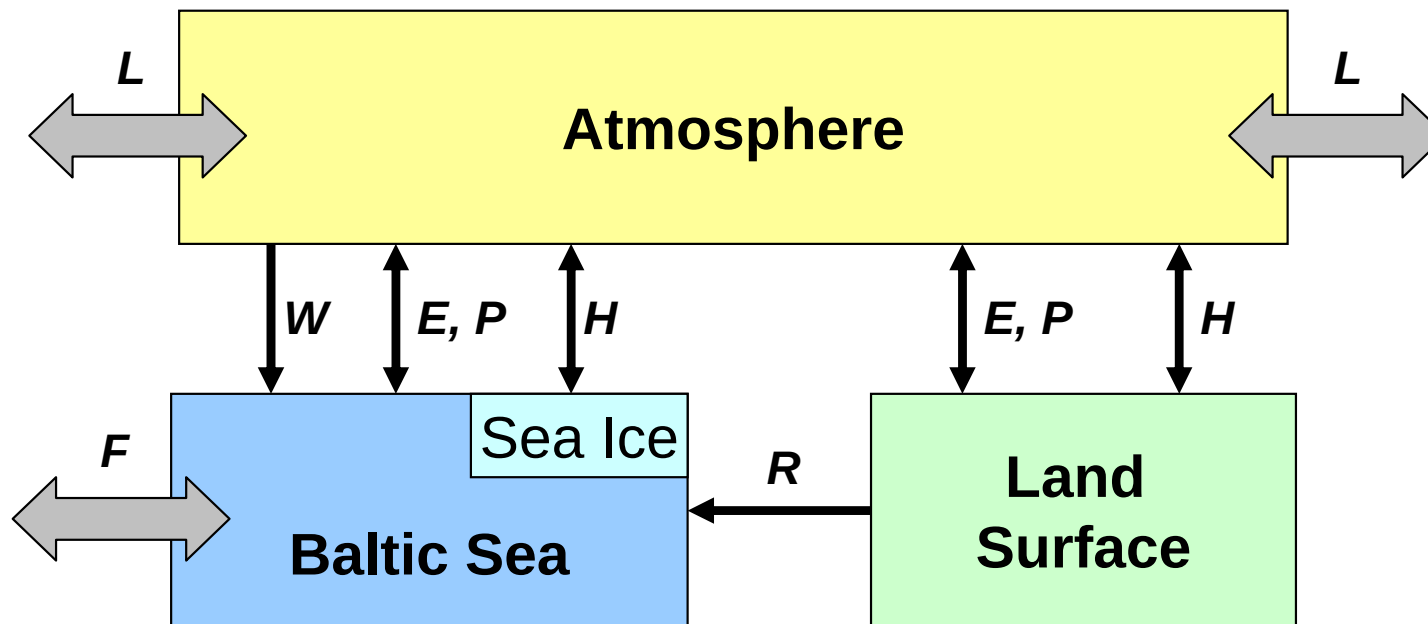




Important BALTEX Phase I Goal:

A coupled regional model for the entire Baltic Sea basin

The „BALTEX Box“



BALTEX Phase I (1993-2002): Achievements



Numerical experiments and coupled modelling

Two coupled model systems developed

BALTIMOS (BALTEX Integral Model System)

by a German consortium led by the
Max Planck-Institute for Meteorology in Hamburg, Germany



DEKLIM

Max-Planck-Institut für Meteorologie
Max Planck Institute for Meteorology



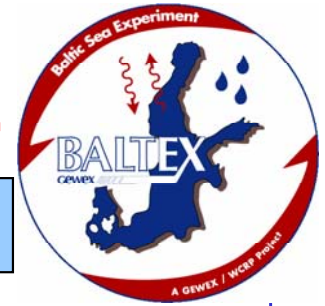
RCAO (Rossby Centre Regional Atmosphere-Ocean)
at the Rossby Centre of the Swedish Meteorological
and Hydrographical Institute (SMHI), Norköpping, Sweden

Rossby Centre

SMHI

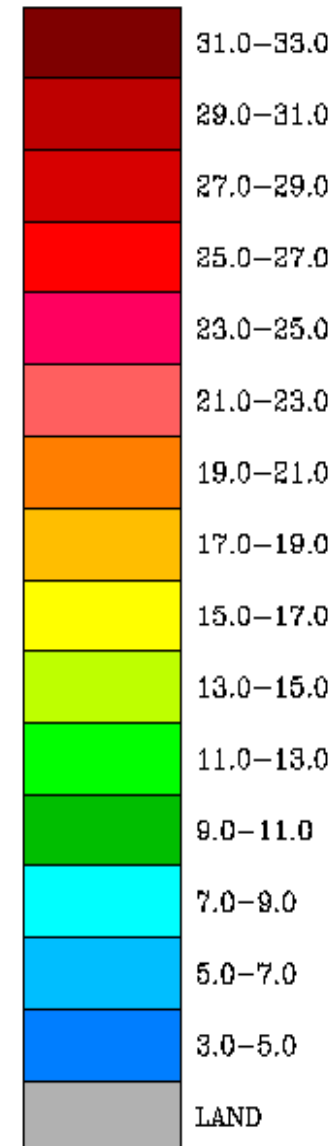
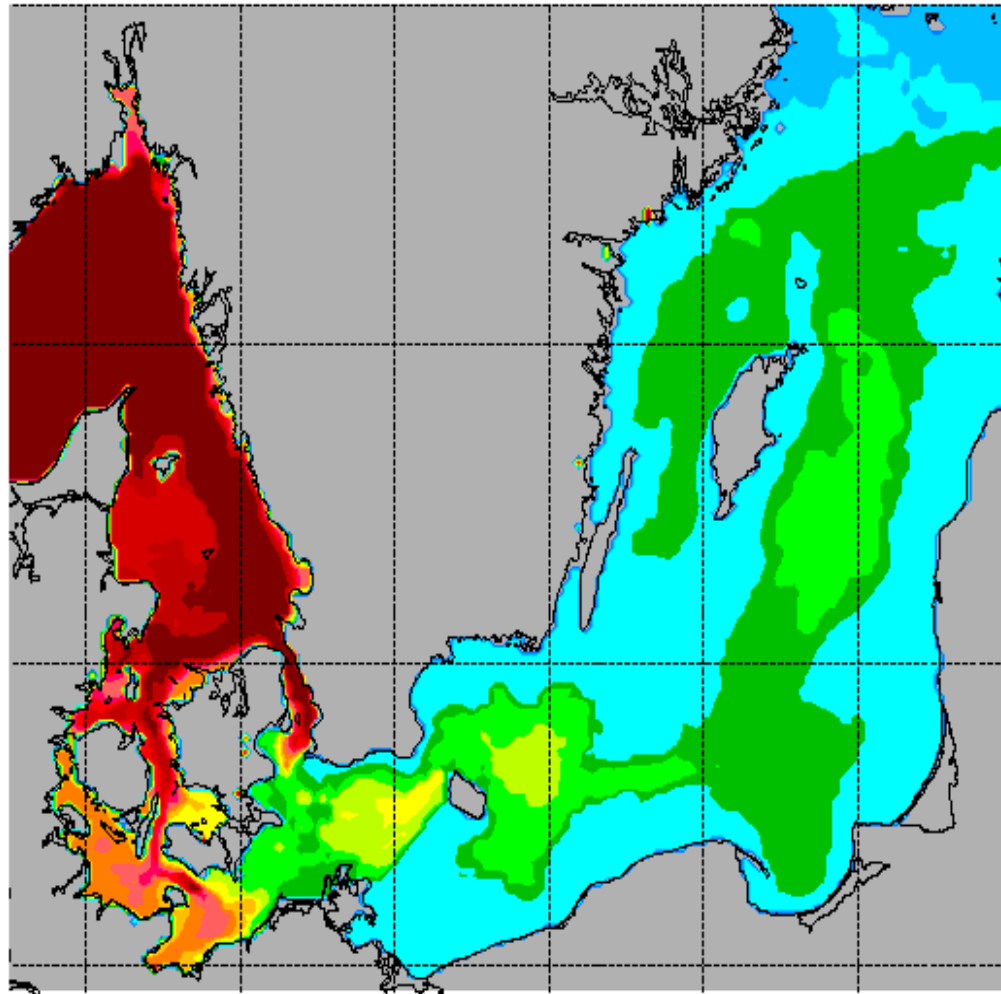
... with the collaboration of scientists from all BALTEX countries!





Numerical experiments and coupled modelling

BALTIMOS: Major Inflow Event January 2003



Bottom Salinity
January –
March
1993



Andreas Lehmann, IfM GEOMAR

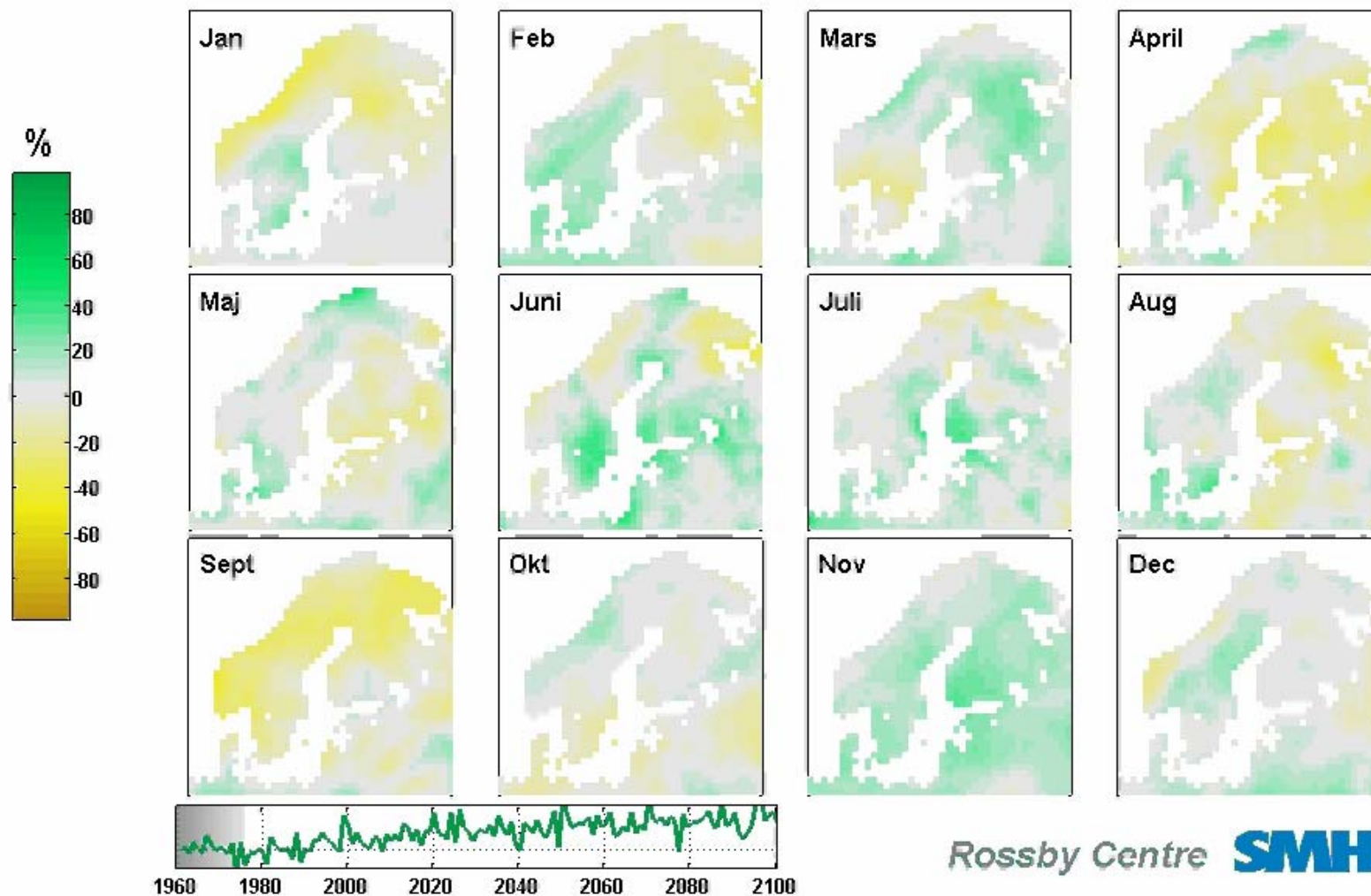
BALTEX Transition to Phase II



Simulated monthly means of precipitation – 1961-2100
relative to the reference period 1961-1990



Månadsnederbörd (SRES B2) -- avvikelse från perioden 1961-1990 1961



Rosby Centre **SMHI**





BALTEX structure and working groups

- **BALTEX Science Steering Group**

Working groups

- **BALTIC GRID –**
Further development, validation and application of BALTEX coupled modelling systems (BALTIMOS, RCAO), implementation of the nutrient-carbon cycle and modules for pollutants
- **BACC – BALTEX Assessment of Climate Change**
- **RADAR**
- **Data Management – Data centers**
- **International secretariat, GKSS, Germany**



Current interdisciplinary activities within BALTEX Phase II



BALTIC GRID

Overall Objective:

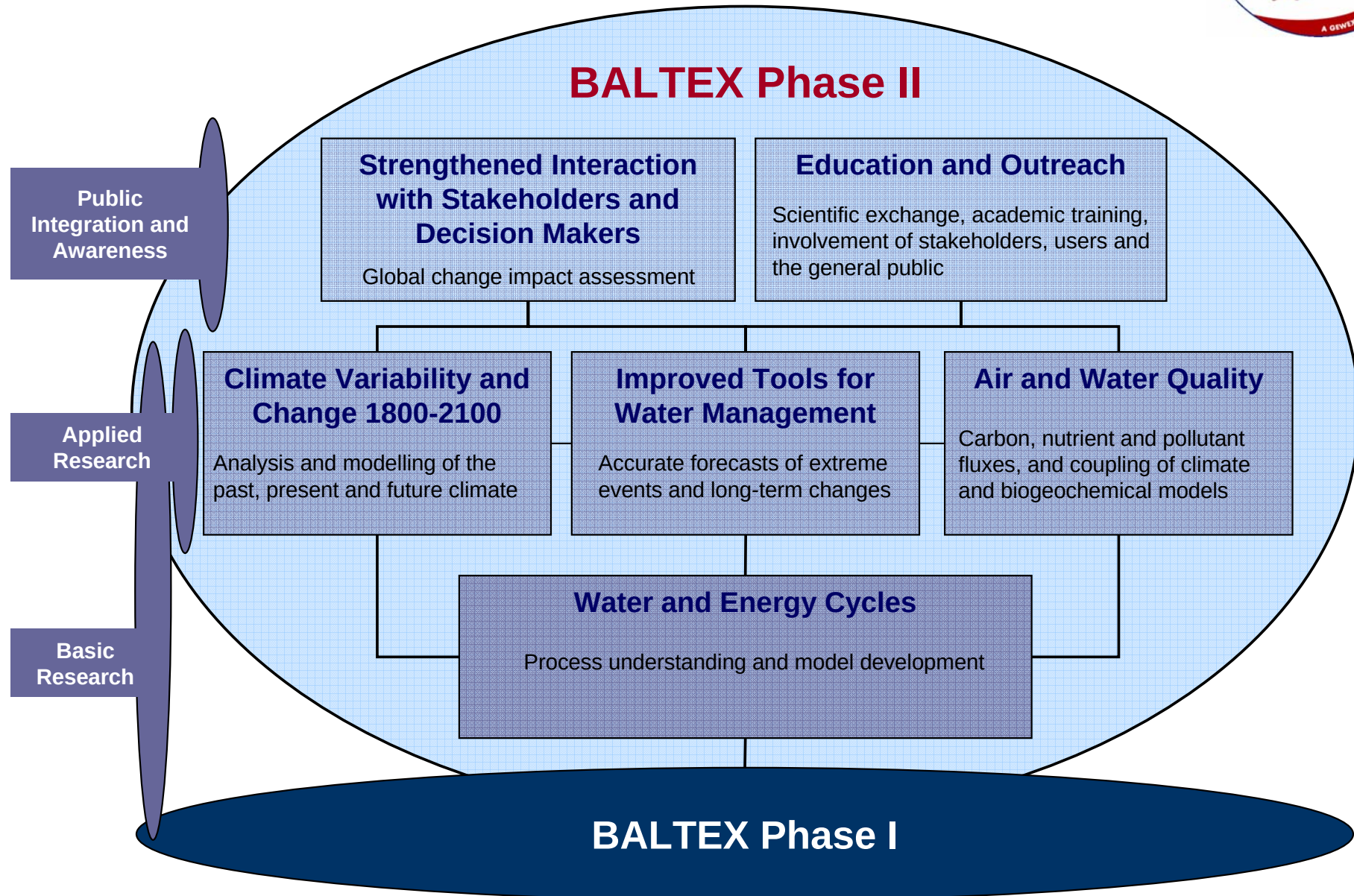
- Further development, validation and application of BALTEX coupled modelling systems (BALTIMOS, RCAO), implementation of the nutrient-carbon cycle and modules for pollutants

Implementation aspects:

- Establishing a network of scientists (modelling, re-analysis, experiments, remote sensing, *in-situ* data) from various disciplines
- Sharing resources (model data, observations, codes, expertise) using the established BALTEX communication network
- Applying as free as possible information and data exchange and policies
- Using modern data exchange media
- A contribution to *e-Science*

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BALTEX Phase II (2003-2012): Objectives, Activities and Prospects





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



Major Goals

- Evaluation of regional models
- Better and more comprehensive observations from the Baltic Sea basin
- Further development of numerical regional climate model systems
- Closing the energy and water budgets
- Improvement of quantitative precipitation forecast

... i.e. largely a selective continuation of Phase I ...



BALTEX Phase II: Objectives, Activities and Prospects

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



Major Goals

- Reconstruction of the history of climate of the past 200 years as well as detailed re-analysis of the past 40 years
- Detection and attribution studies on climate change
- Scenarios based on evolving global and regional forcing and response
- Regional assessment of changing climate in the Baltic Sea basin



BALTEX Phase II: Objectives, Activities and Prospects



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



- Development and validation of coupled hydrological-atmospheric models
- Improvement of flood forecasting

- To assess how both present and future climate variability impacts on water resources
- To develop methods/tools to quantify and reduce associated risks from climate extremes



BALTEX Phase II: Objectives, Activities and Prospects

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



Major Goals

- Modelling nutrient and pollutant budgets and fluxes in the Baltic Sea basin
- Including biogeochemical models into the existing BALTEX coupled regional models with particular focus on the nutrient-carbon cycles
- Inclusion of new data sources and flux measurement techniques
- Dedicated field experiments



BALTEX Phase II: Objectives, Activities and Prospects



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



Major Goals

- To establish and foster interaction with governmental and non-governmental organisations and decision makers
- To identify research with a high application potential in conjunction with major stakeholders



BALTEX Phase II: Objectives, Activities and Prospects



6 Education and outreach at the international level



Major Goals

- Involvement of stakeholders and users
- Scientific exchange
- Academic training
- Involvement of the general public
- Establishment of a comprehensive web site





Vision:

- further develop and apply an **extended coupled modelling** system, integrating all disciplines describing the **Earth System on the regional scale** of the Baltic Sea basin
- A **communication network** across disciplines





Vision for BALTEX:

- A common scientific platform towards **Earth System Modelling**, integrating **physical disciplines** (Meteorology, Hydrology, Oceanography), **Biogeochemistry** and **Ecology**
- A modelling system for the entire Baltic Sea drainage basin, towards an integration of physical and biogeochemical processes
- A shared database of observations
- A communication network across disciplines
- Establish a long-lasting strategic partnership with stakeholders, such as HELCOM
- Develop BALTEX towards **THE** future environmental international research programme for **the entire Baltic Sea basin**

Importance of data and data management



- **Needs for science**
- **Links to other disciplines and scientific communities**
- **Responsibilities of national services – PSI, INSPIRE**
- **Links to international efforts – WCRP/CEOP, GMES, GEO**
- **Needs of stakeholders – HELCOM, EU-Marine Strategy, Governments**