



BALTEX

The Baltic Sea Experiment

**Hans-Jörg Isemer and
Marcus Reckermann**

International BALTEX Secretariat
GKSS, Germany



www.baltex-research.eu

**3rd CEOP Annual Meeting, Melbourne, Australia
19-21 August 2009**



BALTEX SSG Chairs

Joakim Langner, **SMHI**, Sweden



National Hydro-Met Services

Timo Vihma, **FMI**, Finland



Anders Omstedt, Gothenburg University, Sweden





Science Steering Group (24 members from 9 countries)

Working Groups

Weather Radar, Energy and Water Budgets,
Climate Assessment, Regional Models, Data Management

International and national projects

Variable geometry, Various funding sources
Contributions from more than 80 institutions
in Europe and beyond

BALTEX Data Centres

International BALTEX Secretariat



Overall timeline: BALTEX in transition

Relevant Environmental Policy in Europe

BALTEX Phase II objectives

Stakeholder interaction

Past and upcoming events, Publications

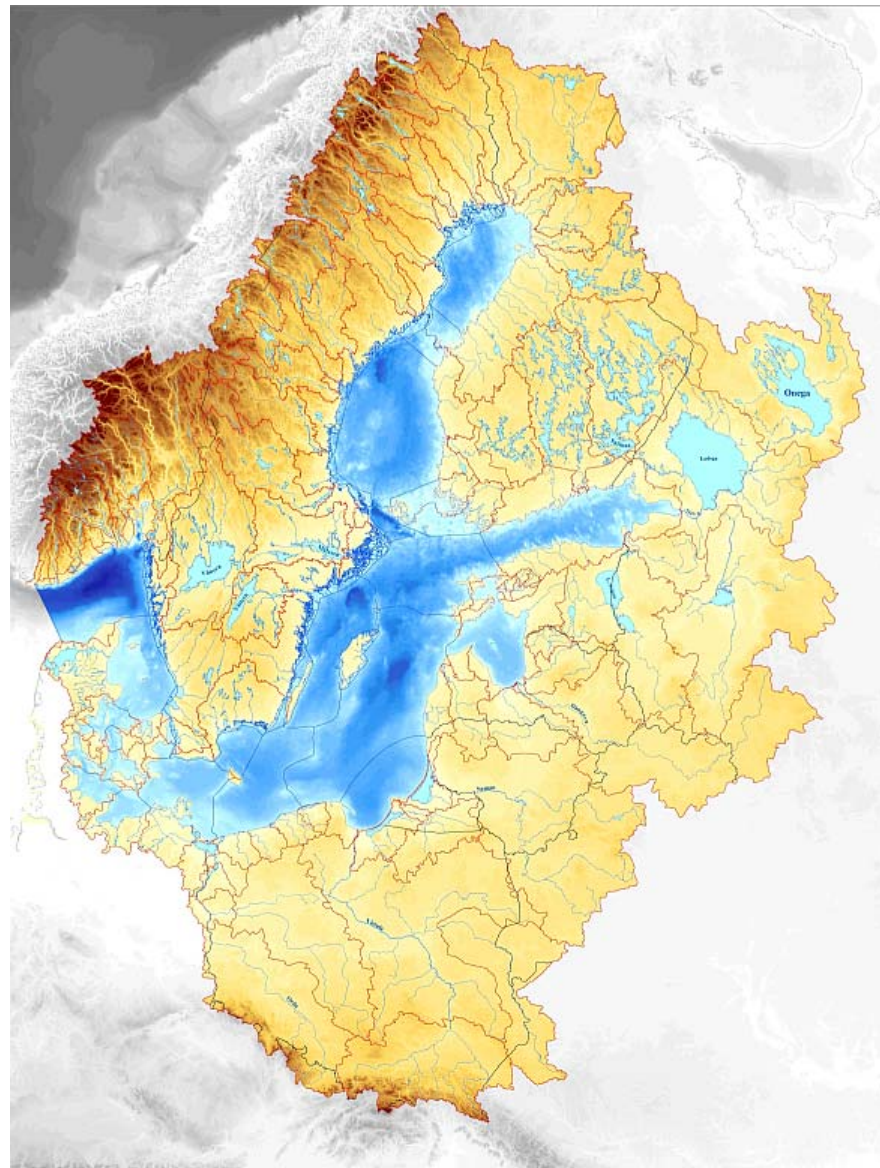
International fund raising: New projects started

3 selected science achievements

CEOP criteria assessment, an attempt

Finally, a question to WCRP

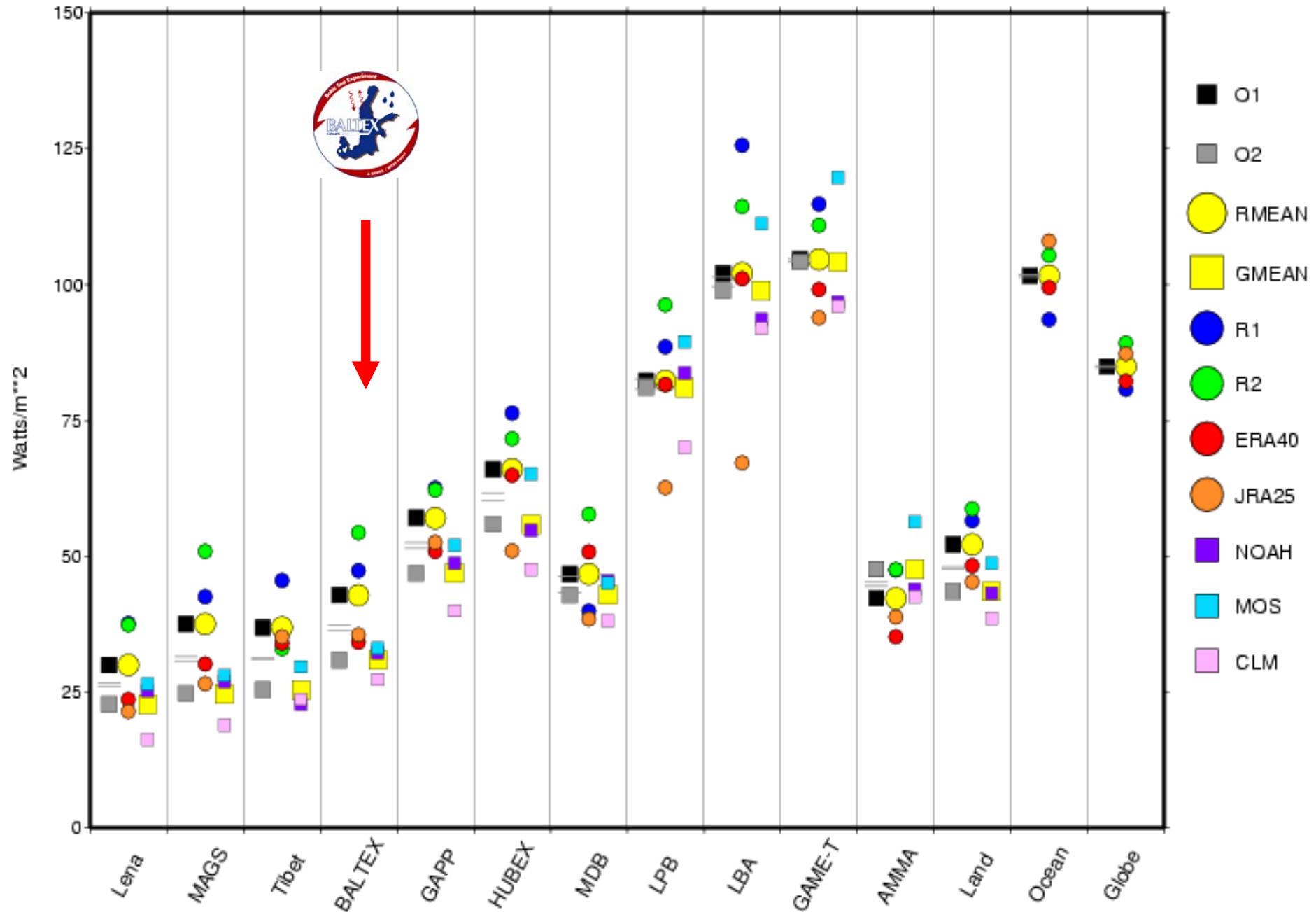
The Baltic Sea Basin = The BALTEX Region



- 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)
- Environmental issues of concern

1986-95 Annual Means, LE

from Roads (2007)



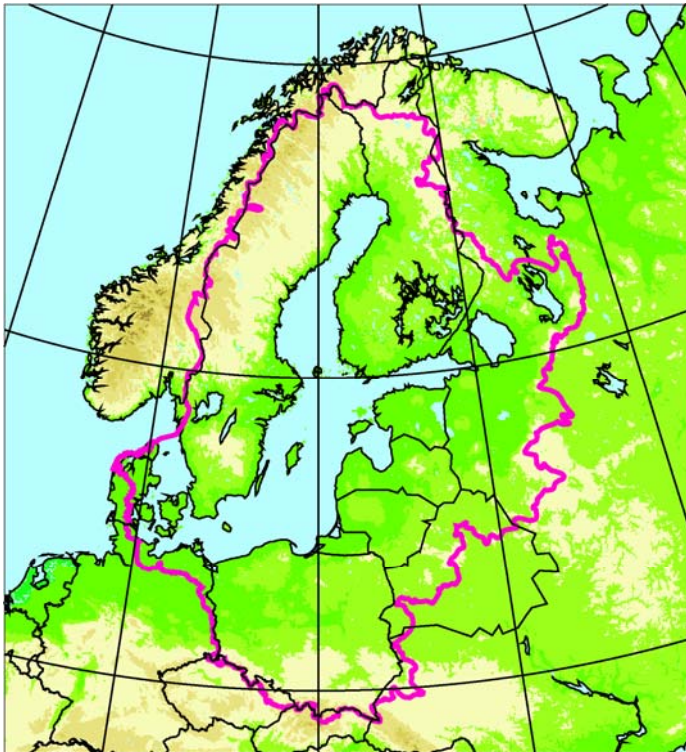
BALTEX in Transition



BALTEX Phase I 1993-2003

BALTEX Phase II 2003-2012

BALTEX Phase II



Science Plan February 2004

Science Framework and
Implementation Strategy April 2006

BALTEX SSG Changes,
Environmental Politics at EU level
2006 – 2009

Adjustment of BALTEX Phase II
Objectives 2008-2009

Political Frame in Europe (1)



Baltic Sea Action Plan – BSAP

The HELCOM Ministers of the Environment adopted in November 2007 an ambitious overarching action plan to drastically reduce pollution to the Baltic Sea and restore its good ecological status by 2021.

Baltic Sea area to get reduction targets and maximum input limits for nutrient discharges

A pilot initiative for other European seas

The concept of the HELCOM Baltic Sea Action Plan has already been widely supported by politicians at various forums, and heralded as a pilot project for European seas in the context of the proposed EU Marine Strategy Directive.





EU White Paper (4/2009)

Adapting to climate change: Towards a European framework for action

„ ... sets out a framework to reduce the EU's vulnerability to the impact of climate change „

„ ... a proactive research and education policy is necessary to promote better understandings of climate change impacts and the developments of skills, methods and technologies to cope with the consequences of climate.“

BALTEX and GEWEX Phase II Objectives



Adjusted 2008/9

Objectives 1 and 2

1. Better understanding of **energy and water cycles**
under changing conditions

Objectives 1 and 2

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

Objectives 3 and 4

3. Provision of improved tools for **water management**, with an emphasis on [...] **extreme hydrological events** and long-term changes

Beyond GEWEX

4. *Biogeochemical cycles in the Baltic Sea basin and transport processes within the regional Earth system under anthropogenic influence*

Objective 4

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

6. **Education and outreach** at the international level

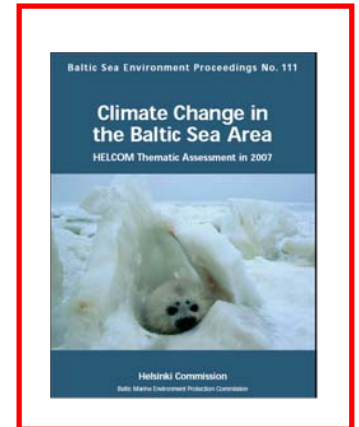
External requirements: Stakeholder interaction



HELCOM - Helsinki Commission
Baltic Marine Environment Protection Commission
Contracting Parties: 9 countries + EU

**Assessment of climate change and its
impacts on the Baltic Sea Ecosystem
(BACC)**

BACC II initiated (Deliverable due in 2012/3)





BSSSC

Baltic Sea States Subregional Co-operation



- Open political network of regional authorities
- More than 100 participating regions from the 10 BSR countries
- Under the umbrella of CBSS
- Founded in 1993
- Open for other BSR organisations to join (new)

One BSSSC key area: Climate change and sustainable development

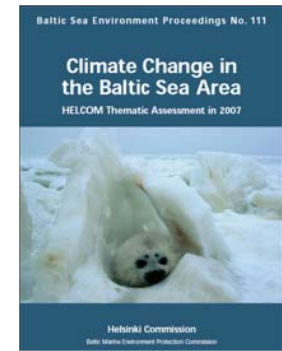
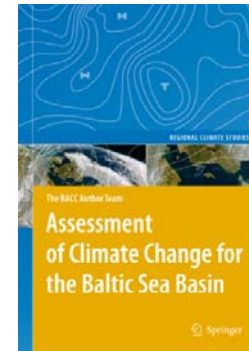
Stakeholder interaction (3)



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Baltic Sea States Subregional Co-operation



- 1. Challenges of global change impact at regional to local scales**
- 2. Response measures, including adaptation**
- 3. Information for decision makers: Who provides *Climate Services* ?**

Major past year's events



The year of the BALTEX events !

TELLUS - BALTEX Workshop on **Biogeochemical Land and Baltic Sea Interactions driven by Climate and Land Use**

1 - 2 December 2008, Göteborg University, Sweden

BALTEX Workshop on **Winters with reduced snow and sea ice**

12 January 2009, FMI, Helsinki, Sweden

BALTEX-BSSSC Seminar „**Meeting the Climate Challenge in the Baltic Sea Region**“

2 February 2009, GKSS Geesthacht, Germany, www.bsssc.com



2nd International Lund RCM Workshop on **21st Century Challenges in Regional Climate Modelling**, 4 - 8 May 2009, Lund University, Sweden

International Conference on **Climate Change – The environmental and socio-economic response in the southern Baltic region**

25 - 29 May 2009, Szczecin, Poland

International Summer School on **Climate Impacts on the Baltic Sea – from science to policy**, 27 July – 5 August 2009, Nexø, Bornholm, Denmark,

Upcoming events (1)



BSSSC Annual Conference 2009, 13-15 October 2009, Ringstedt, Denmark,
BSSSC/BALTEX Workshop „**Regional Policy in View of Climate Change**“ Chair: H.-J. Isemer www.bsssc.com

Guiding questions:

*How do local to regional decisions makers and regional actors (as enterprises) cope with climate change and **how are mitigation and adaptation measures balanced in related regional policy climate action plans in the Baltic Sea Region?***

Which mechanisms are in place for regional decision makers, e.g. exemplified by BSSSC members, to provide access to assessed knowledge on climate change issues as a sound and easily interpretable basis for decision making and regional policy development?

Upcoming events (2)



6th Study Conference on BALTEX
14-18 June 2010, Międzyzdroje, Wolin, Poland

In co-operation with



Past year's publications



9th Special BALTEX Issue

Selected papers from the 6th Study Conference on BALTEX

Boreal Environment Research, Vol. 14, No. 1

23 papers, 260 pages

www.borenv.net

25 additional peer-reviewed BALTEX papers published in 2009

Overall BALTEX publication summary statistics:

1 book (plus 6 books contributing to BALTEX objectives)

9 special journal issues (126 papers)

> 550 peer-reviewed papers, 60 reports

> 600 BALTEX Study Conference papers

12 BALTEX Newsletters

New funded projects as of January 2009



Baltic-C

Building predictive capability regarding the Baltic Sea organic/inorganic carbon and oxygen systems

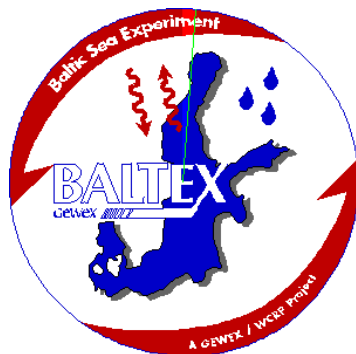
Gothenburg University (Anders Omstedt) and 6 parties in 4 countries



ECOSUPPORT

Advanced modeling tool for scenarios of the Baltic Sea ecosystem to support decision making

SMHI (MarkusMeier) and 10 parties in 7 countries



BALTRAD: An advanced weather radar network for the Baltic Region

SMHI (Daniel Michelson) and 5 parties in 5 countries



www.baltex-research.eu



Venäläinen et al, 2009: Recurrence of heavy precipitation , dry spells and deep snow cover in Finland based on observations, BER 14(1)

BALTEX Objectives 2 and 3



Severe drought of 2002/2003 and exceptionally dry summer 2006 in Finland



Fig: Erkki Raskinen



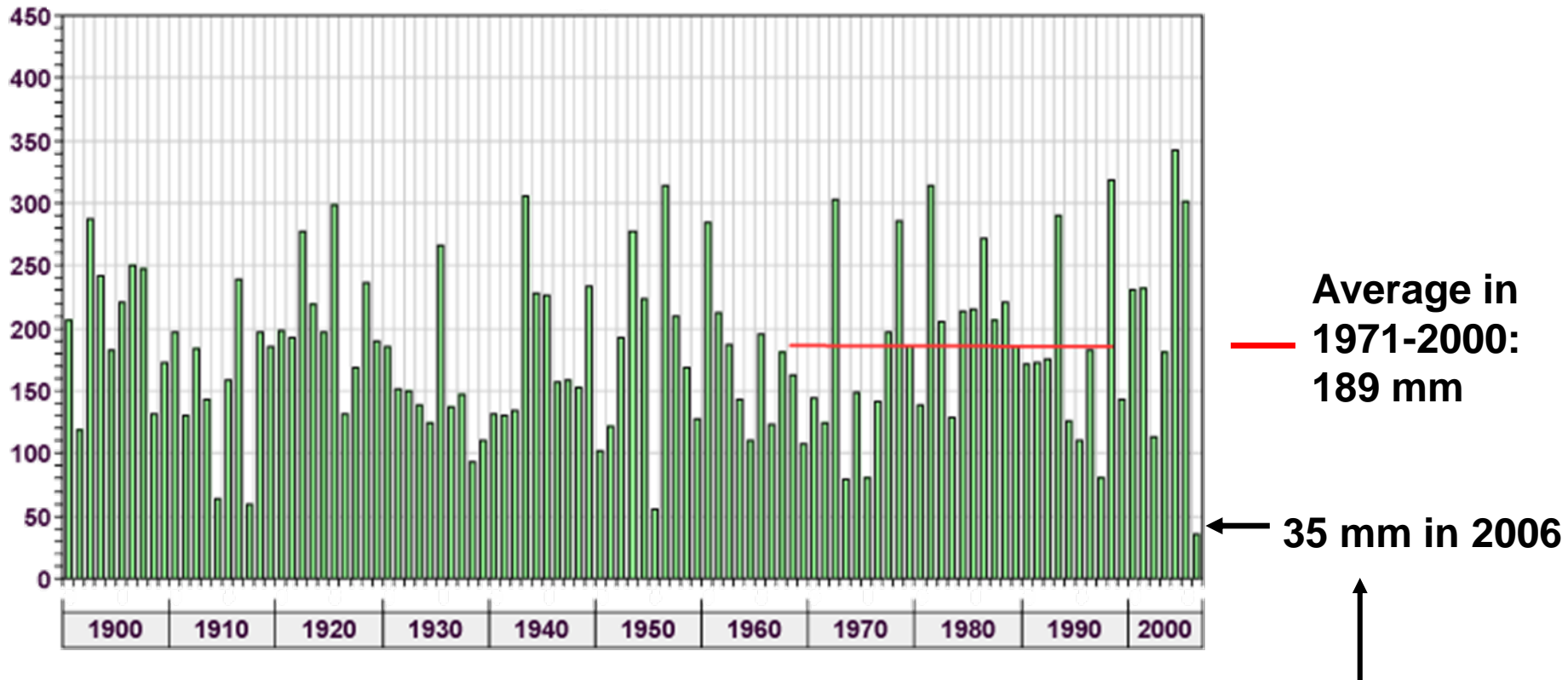
Subsidence and tilting of houses built on clay →

Estimated economic losses of the drought 2002/2003 in Finland: about 100 million €



Exceptionally dry summer 2006 in Finland

Summer (JJA) precipitation (mm) in Helsinki in 1900-2006

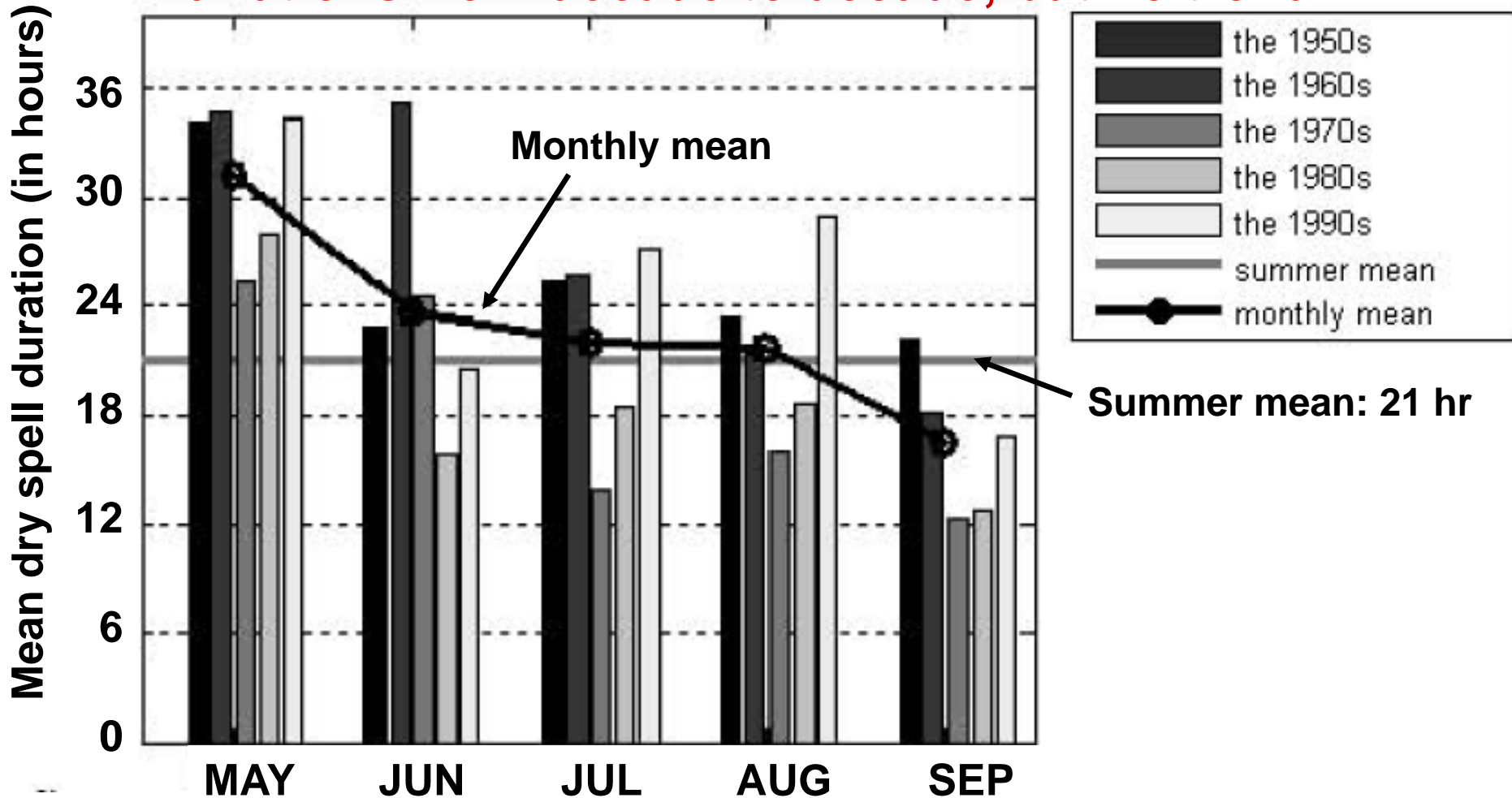


The summer precipitation in 2006: the smallest ever recorded in Helsinki (since 1845).
The previous record in Helsinki: 47 mm in 1868



Mean dry spell duration between rain events

Variations from decade to decade, but no trend !





Kjellström and Lind, 2009: Changes in the water budget in the BALTEX area in future warmer climates as simulated in a regional climate model, BER 14 (1)

BALTEX Objectives 1 and 2

A selection of scientific findings and achievements (2)



The regional climate model RCA3 has been used to downscale results from two general circulation models, with three different emissions scenarios, **for the years 1961–2100**.

The future climate change signal shows a gradually warmer and wetter climate during the 21st century with increased moisture transport into the region via the atmosphere. This leads to an **intensification of the hydrological cycle** with more precipitation and evaporation, except for the summer.

The net precipitation increases in all scenarios in the entire region. The changes are of the order **15%–20%** for annual and areal mean fluxes.

The control climate in the late 20th century is too wet as compared with observations. This wet bias in the simulations is partly attributable to biases in the forcing global models but is also amplified in the regional climate model.

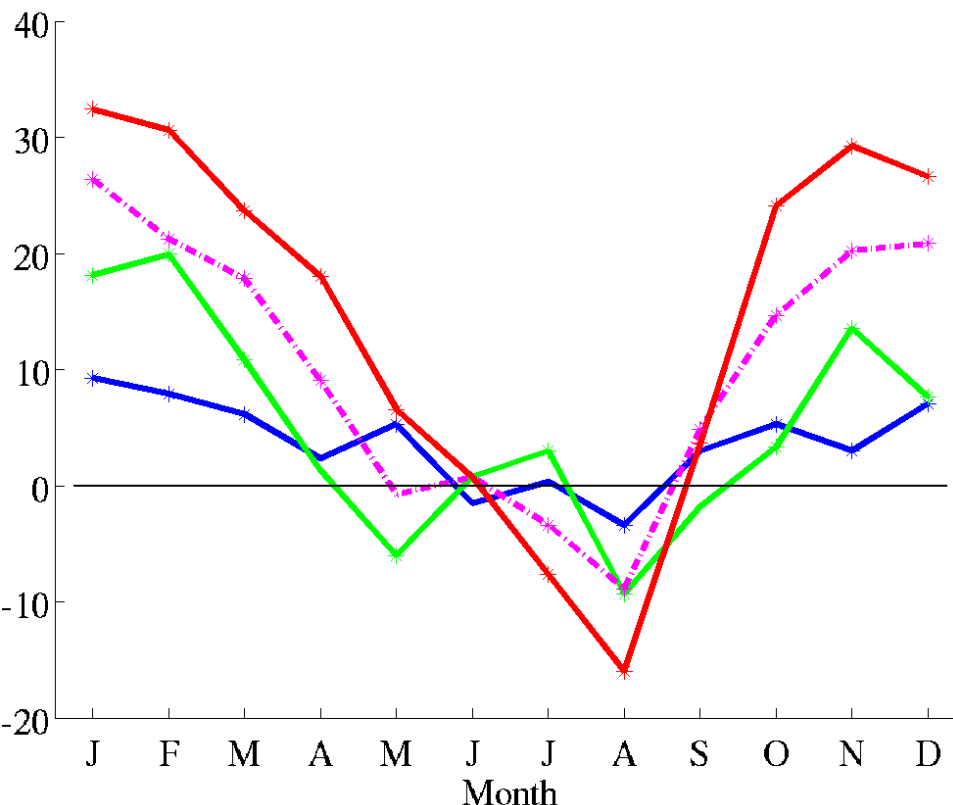
Kjellström and Lind, 2009

Changes in the seasonal cycle of the water budget: Baltic Sea catchment – all land points

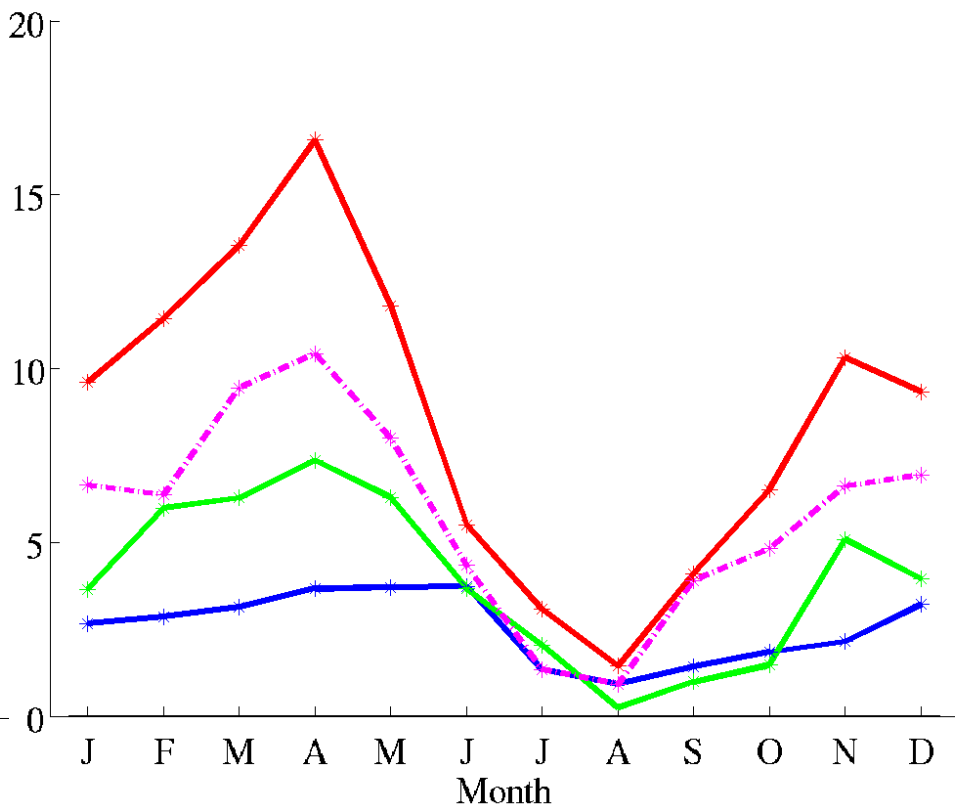
Kjellström and Lind, 2009

RCA3 ECHAM4/OPYC3 A2

Precipitation



Evaporation



Changes (mm/mon) compared to 1961-1990: **1981-2010** **2011-2040** **2041-2070** **2071-2100**

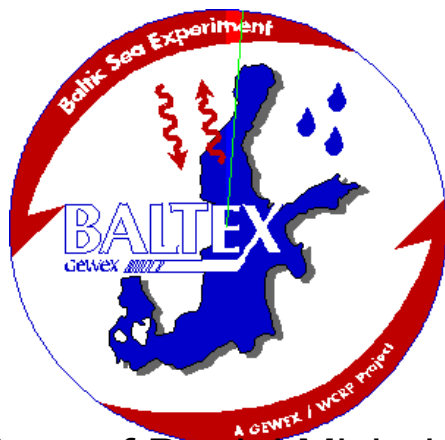


*Daniel Michelson and Jarmo Koistinen, 2007,
2009: Advances in weather radar based
quantitative precipitation measurements for the
purposes of climate research*

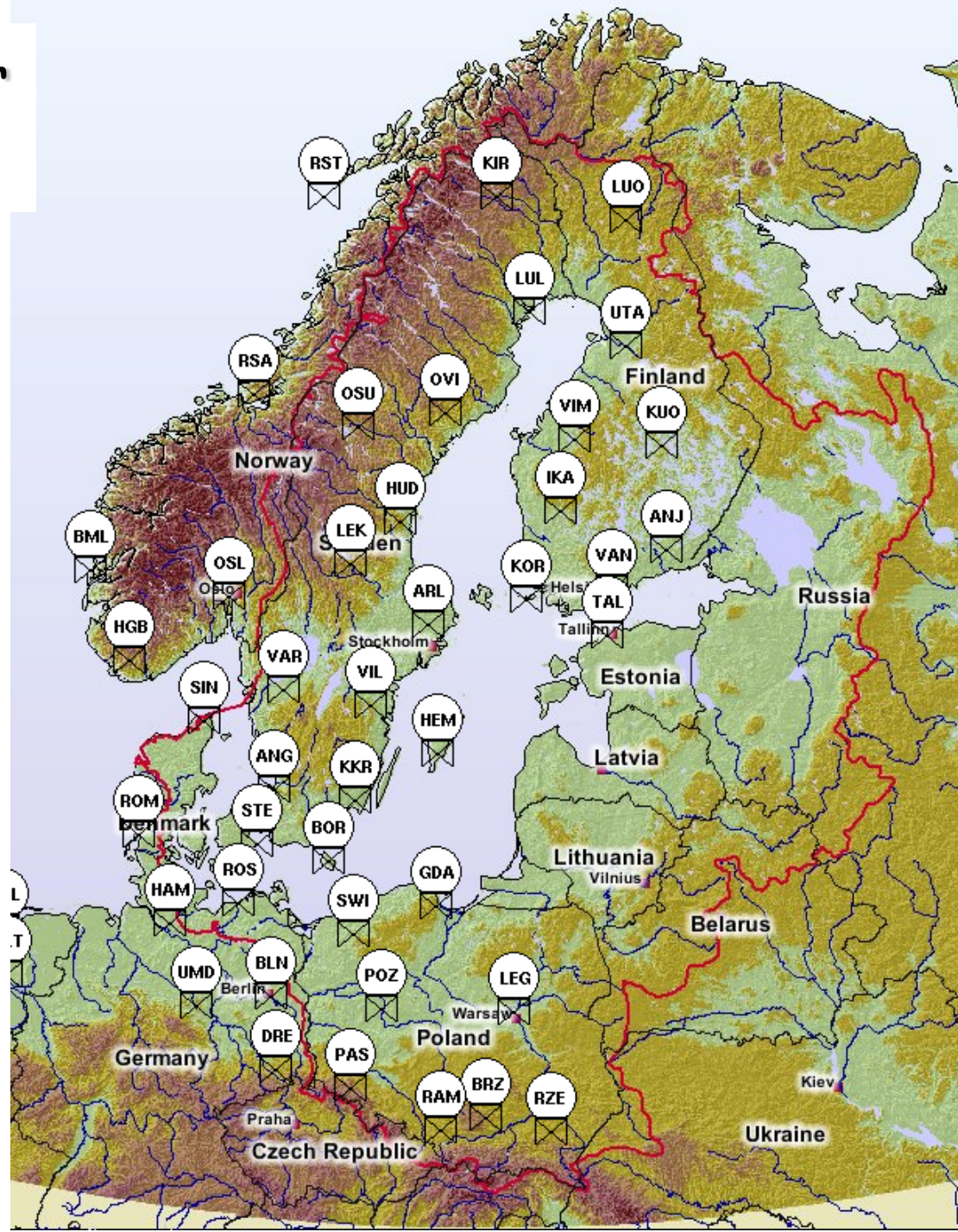
BALTEX Objective 1

Baltex Radar Data Center BRDC (BALTRAD)

- NORDRAD
- All of POLRAD
- Peripheral German radars
- Netherlands (wind profiles)
- One of the BALTEX data centers
- Located at SMHI, data available since Oct 1999
- R&D only
- Test environment for operational implementations



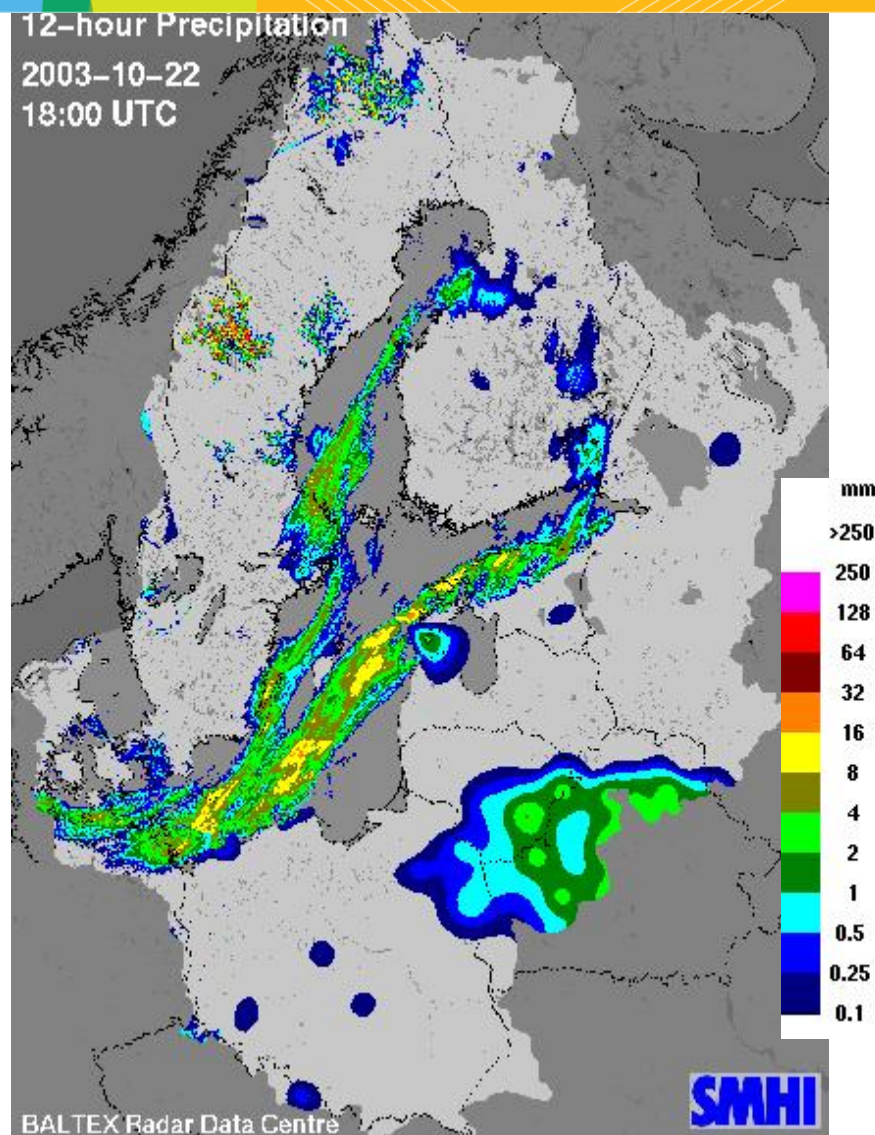
Courtesy of Daniel Michelson





*RR: 3 and 12 hour gauge-adjusted
accumulated precipitation + gauges-only
accumulation*

- 2×2 km horizontal resolution
- Every 3 and 12 hours
- 32-bit depth
- Adjusted by wind corrected gauge observations
- 3-hour BALTRAD area
- 12-hour BALTEX Region
- Available since 1999





1. Cooperation of an NWP center for provision of atmospheric and land surface data assimilation **OK**
2. Atmospheric-hydrologic models for studying transferability and climate variability **OK**
3. Mechanism for collecting and managing adequate hydrometeorological data sets
 - **Some BALTEX Data Centres under revision, number of requests declined**
 - **CEOP-related efforts well on track**
4. Participation in the open international exchange of scientific information and data **OK**
5. Interactions with hydrologic services and related groups **OK**
6. Commitment of adequate resources and personnel
 - **International sources recently improved (EU-BONUS),**
 - **Options for national sources partly improved (adapting to climate change issues),**
 - **Institutional sources stable (science *and* infrastructure)**
7. Evaluation of GEWEX global data products
 - **few, to be improved**



1. Observe, simulate, and predict diurnal, seasonal, annual and interannual variability. **OK**
2. Determine climate system variability and critical feedbacks. **OK**
3. Demonstrate improvements in predictions of water-related climate parameters.
- no systematic approach as to “demonstrate improvements”
4. Demonstrate the applicability of techniques and models for other regions.
- e.g. through ICTS CEOP Regional Model activities
5. Assess the human impact on hydroclimate variations, including vulnerability to climate change
- e.g. the BACC report !!

Finally, an observation and a question



GEWEX/CEOP Regional Hydroclimate Projects (RHPs) do not occur individually in the recent WCRP Accomplishment Report (except for AMMA).

WCRP ACCOMPLISHMENT REPORT 2007-2008

Climate Research in Service to Society

WCRP
World Climate Research Programme

What role do RHPs play in the WCRP-GEWEX context ?



Thank you !

Finally, an observation and a question



Thank you !