BALTEX

10 to 20 years ago

(invited special)

Ehrhard Raschke

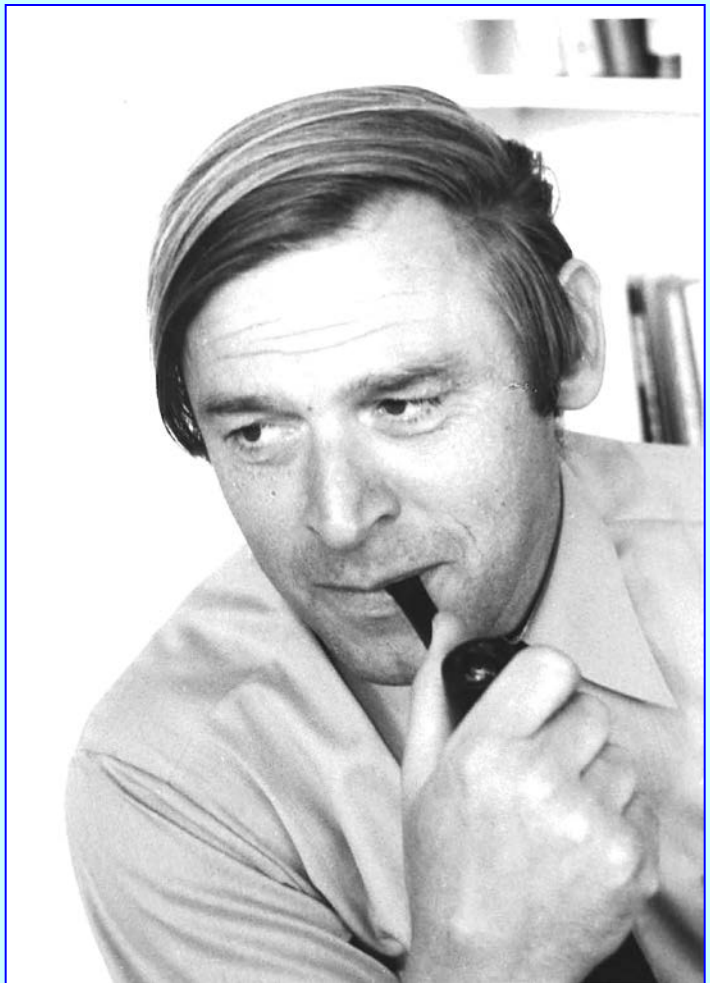
Inst. of Meteorology of University Hamburg

BALTEX was founded and established during the years 1990 to 1992 with the motivation that Europe must provide its own contributions to the solution of basic climate and environmental questions

Prof. Dr. Wolfgang Krauss (†), Kiel, created the acronym

BALTEX

during a meeting at the DFG in Bonn, 1991.

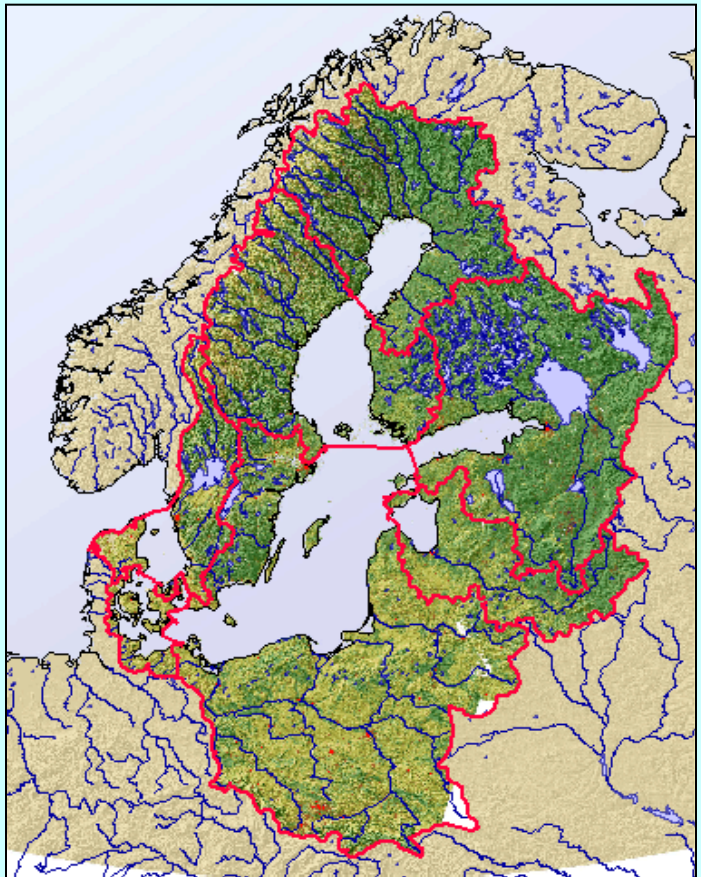


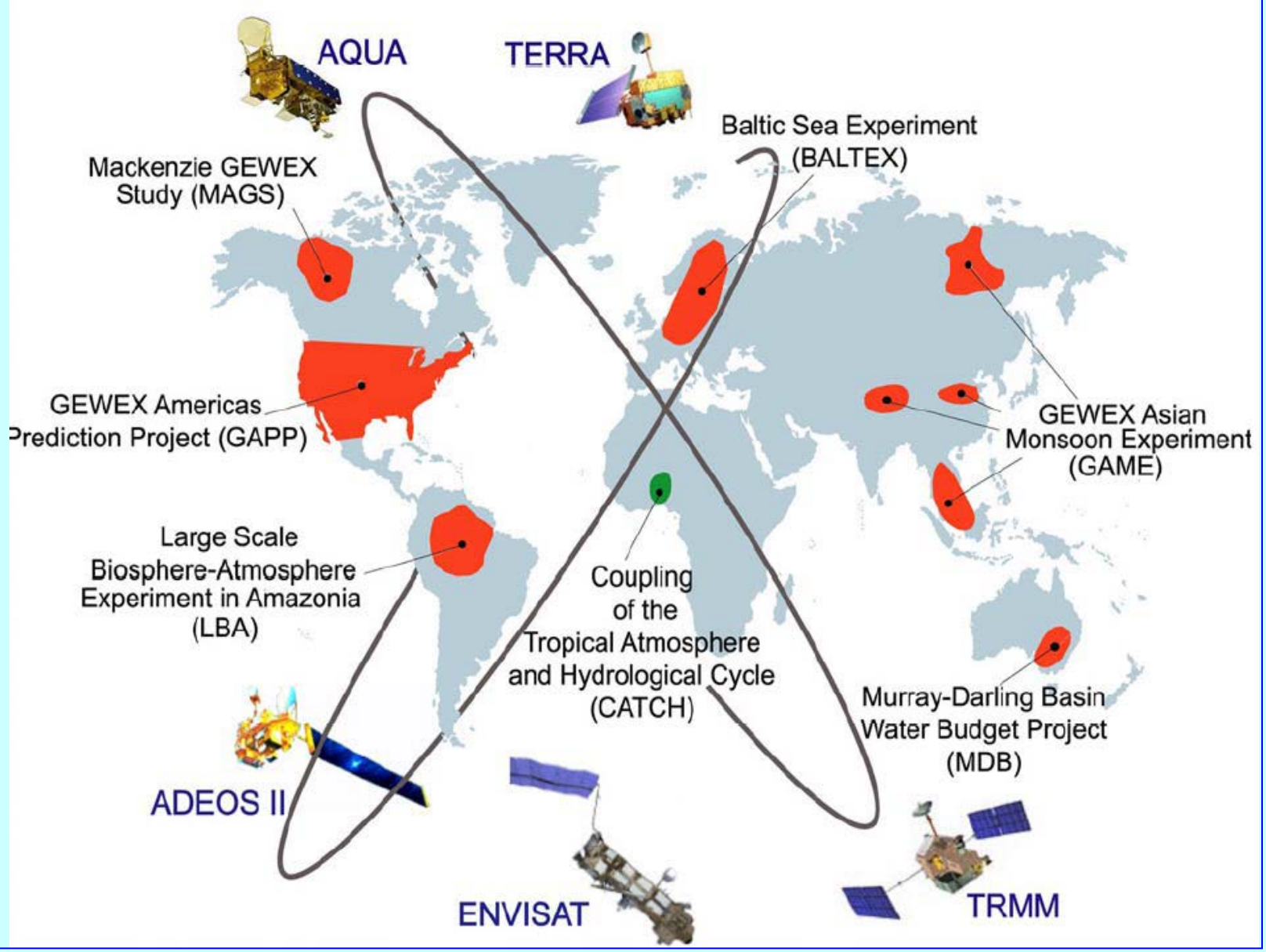
Research within BALTEX is a huge challenge:

Coordinated joint research between atmospheric, hydrological and oceanographic groups is required to solve basic and applicational questions.

The Baltic Sea and its drainage area form a system with only one single exit at the surface.

The area is populated by more than 80 Mio people, and after 1991 the "Iron Curtain" was gone, cooperation became very easy.





GEWEX basin wide experiments and various environmental satellites supported GEWEX research and operational activities.

INTERNATIONAL COUNCIL
OF SCIENTIFIC UNIONS

WORLD METEOROLOGICAL
ORGANIZATION

WORLD CLIMATE RESEARCH PROGRAMME

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TEL : 41 22 730 81 11
FAX : 41 22 734 23 26

Professor E. Raschke
GKSS
Postfach 1160
D-2054 Geesthacht
Germany

11 February 1992

Dear Professor Raschke,

As you know from our recent GEWEX Scientific Steering Group meeting (27-31 January 1992) in Tokyo, there is a great interest in the GEWEX science community in large river basin hydrology. For this reason WCRP is interested in following the development of national and multi-national projects which may help our understanding of how this component of the fast climate system is affected by various external forcings, especially variations in climate.

It is our hope that such activities will lead to even more ambitious efforts that could include extensive tundra regions as well as arctic rivers in areas perhaps not too far removed from the location of the BALTEX experiment. Unfortunately I am unable to participate in the 25-27 February planning meeting for the Baltic Sea Experiment in Geesthacht but Mr. S. Benedict, who is part of the Joint Planning Staff of WCRP working on the GEWEX Programme, is available to attend on my behalf. Mr. Benedict will contact you directly for additional details on the meeting but hotel reservations are required by him for 24 to 27 February 1992. I hope your meeting is a productive one and I look forward to hearing more about the detailed development of BALTEX as plans progress.

With my best personal regards.

Yours sincerely,

P. Morel

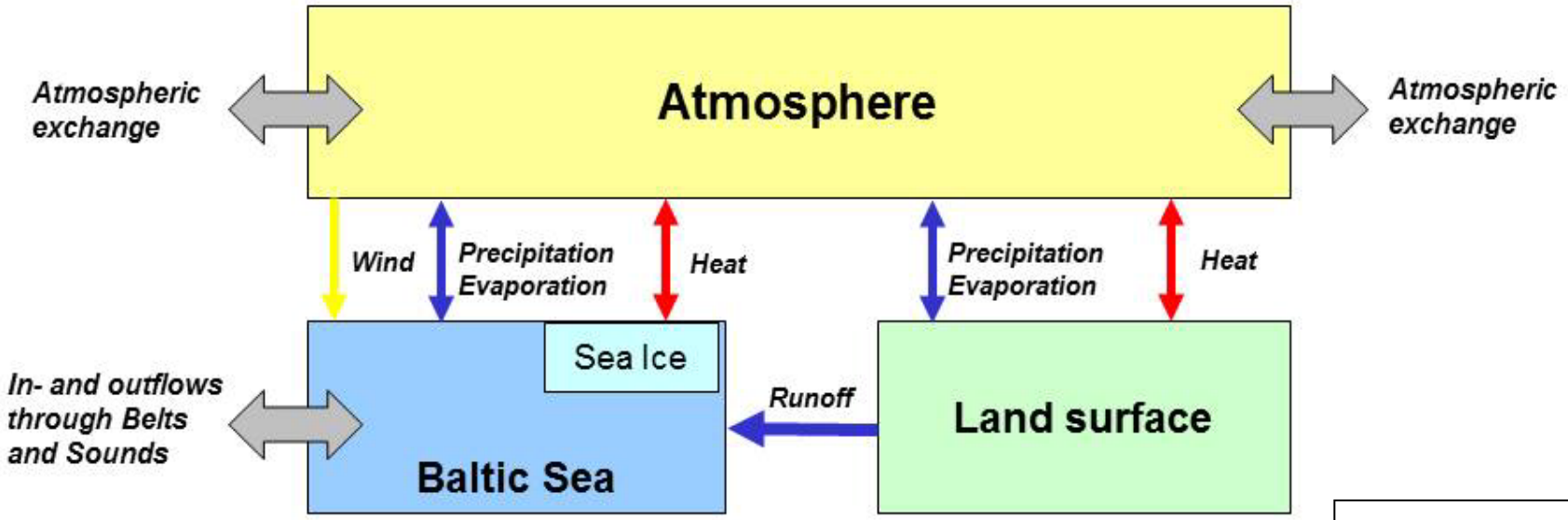
Letter of the Director of the WCRP supporting activities towards BALTEX

11 February 1992

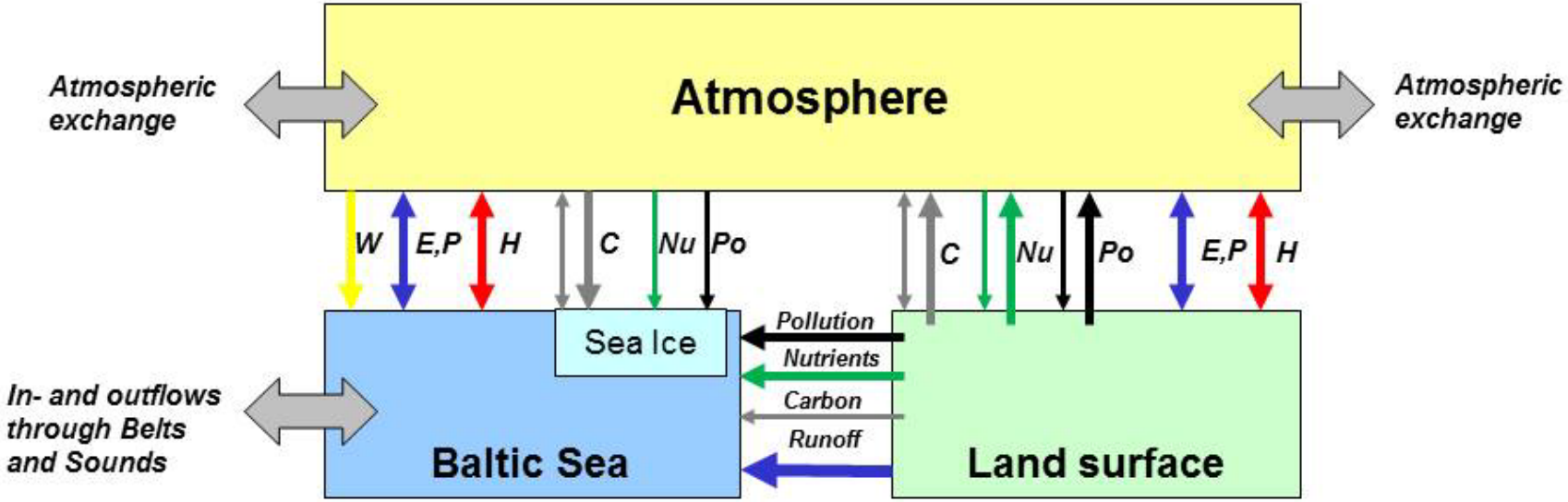
"… It is our hope that such activities will lead to even more ambitious efforts that could include sensitive tundra regions as well as arctic rivers …"

Deep thoughts about the BALTEX science program

in Norrköping, 26 to 30 October 1992



BALTEX Phase 1



BALTEX Phase 2

Borrowed from A. Omstedt, 2013

Prime Objectives of Phase 1:

- **Investigation and modeling of mechanisms, which are determining the *space and time variability of the energy and water cycles* in the BALTEX area and their interaction with its environment.**

- **Investigation of the *dependence of those mechanisms on the large-scale circulation systems* in the atmosphere and oceans.**

-.-.-.-.-.-.-

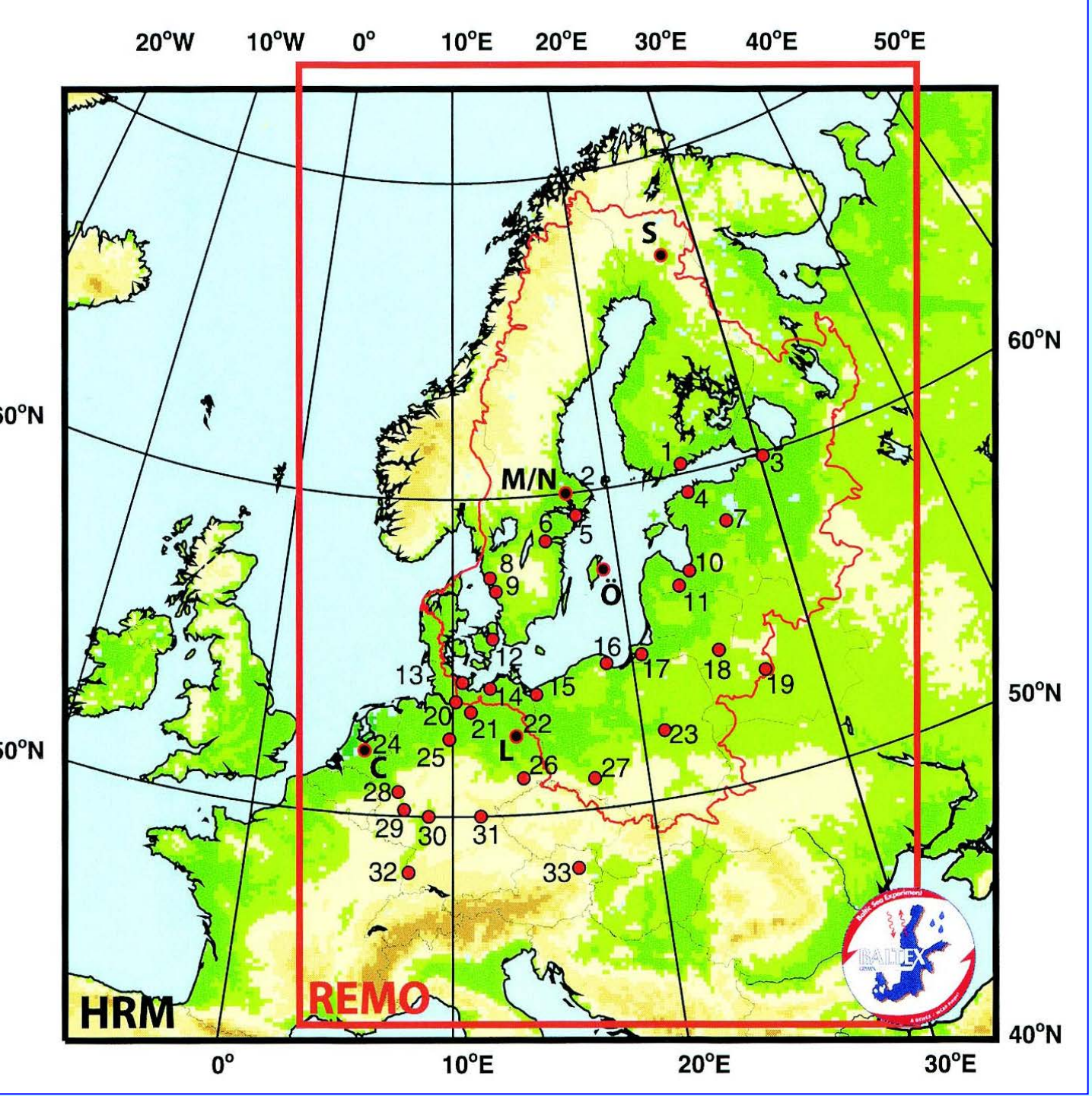
- ***Transfer of knowledge and models to other geographic regions* to meet their *basic needs of climate, climate impact and environmental research*.**

Members of first BSSG:

Lennart Bengtsson (chair)	Germany
Sten Bergström	Sweden
Jerzy Dera	Poland
Eero Holopainen	Finland
Zdzislaw Kaczmarek (vice-chair)	Poland
Peter Kaaring	Estonia
Petras Korkutis	Lithuania
Wolfgang Krauß	Germany
Leif Laursen	Denmark
Pentti Mälkki	Finland
Eberhard Müller	Germany
Ehrhard Raschke (vice chair)	Germany
Gert Schultz	Germany
Ivan M. Skouratovich	Belarus
Anders Stigebrandt	Sweden
Hilding Sundqvist	Sweden
Valery S. Vuglinsky	Russia
Evgeny Zaharchenko	Latvia
Hans-Jörg Isemer (ex-officio)	Germany

1st BALTEX SSG Meeting, 16-17 May 1994, Geesthacht, Germany

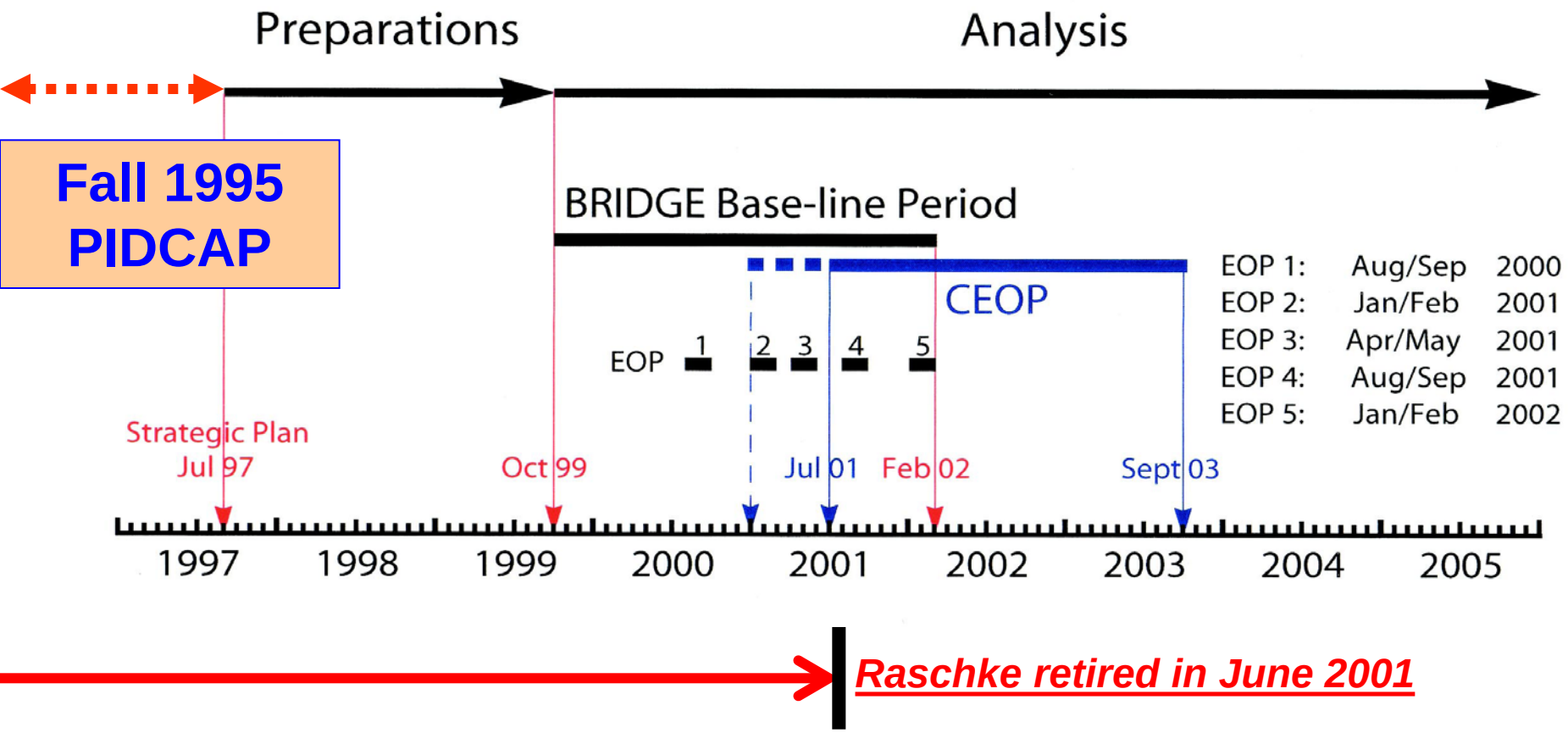
From top to bottom and left to right:
First row: Isemer, Willebrand, Skouratovich, Alenius, Woetmann-Nielsen;
second row: Launianen, Zaharchenko, N. Gustavsson, Ruprecht;
third row: Krauss, Vent-Schmidt, Kaaring, Holopainen;
fourth row: Dera, Omstedt, Vuglinsky;
bottom row: Kaczmarek, Raschke, Mrs. Smelstoriute, Bengtsson.



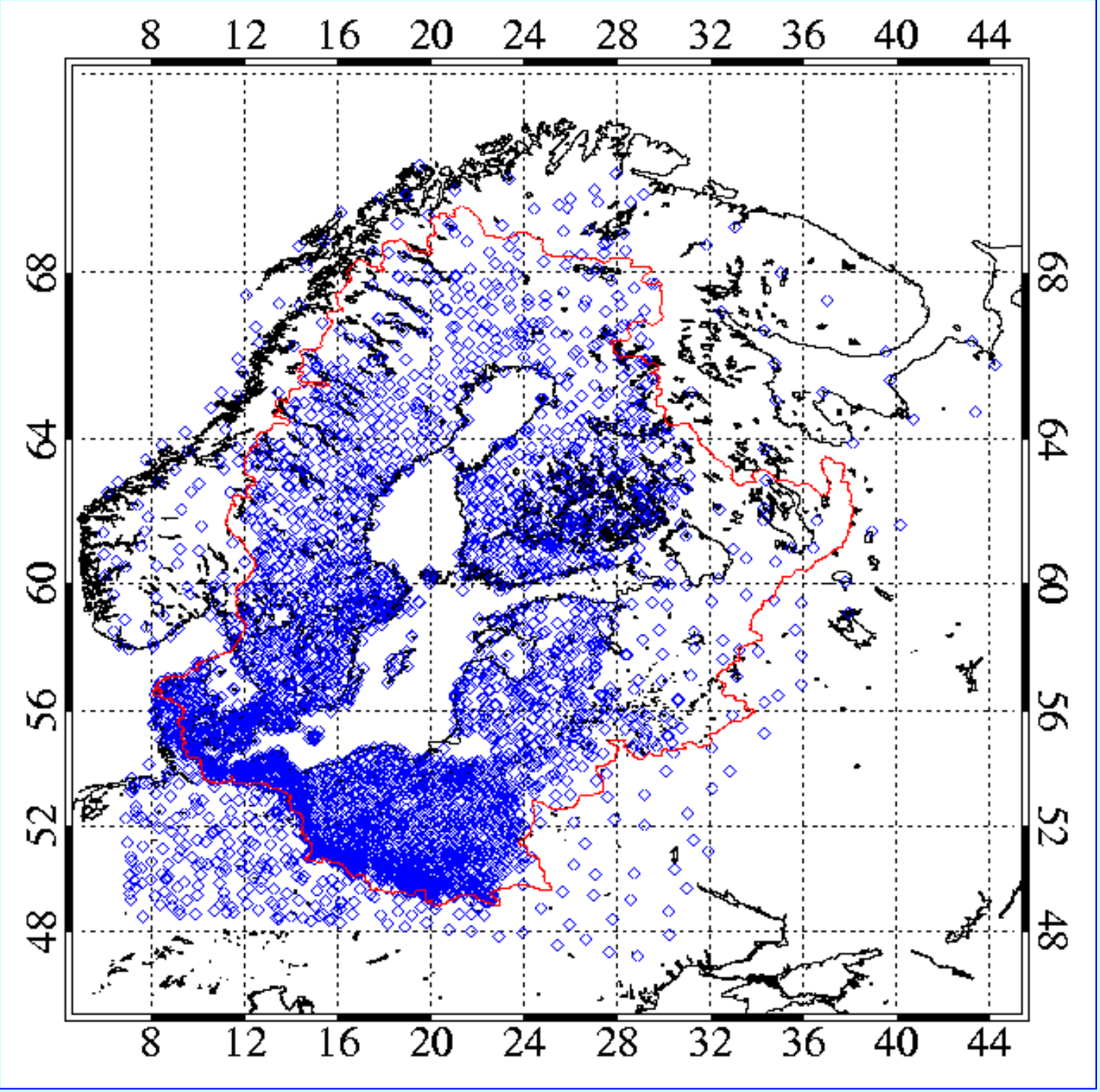
Contributions from >33 institutions

Main BALTEX Experiment time-line

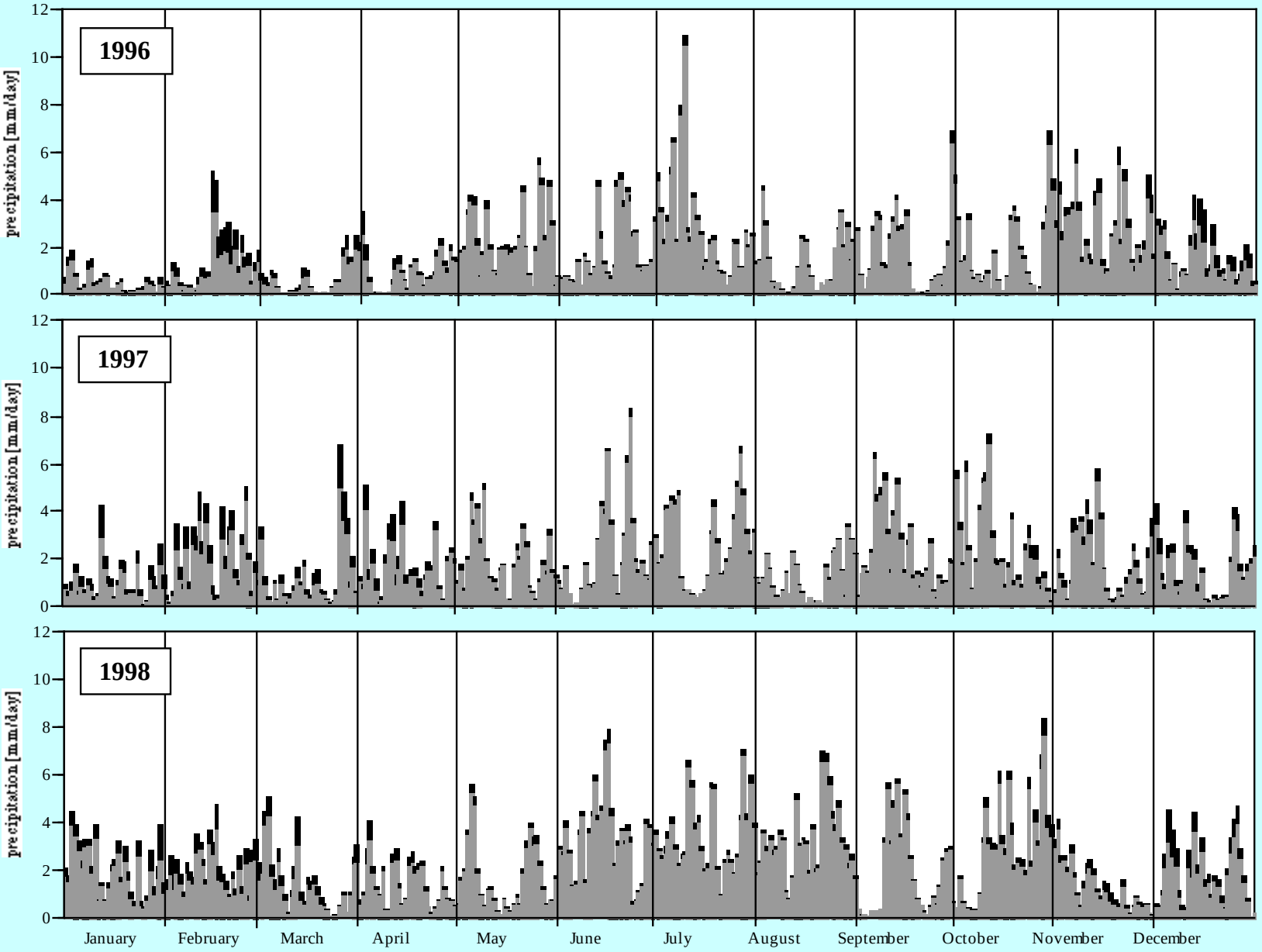
BRIDGE 1999-2002



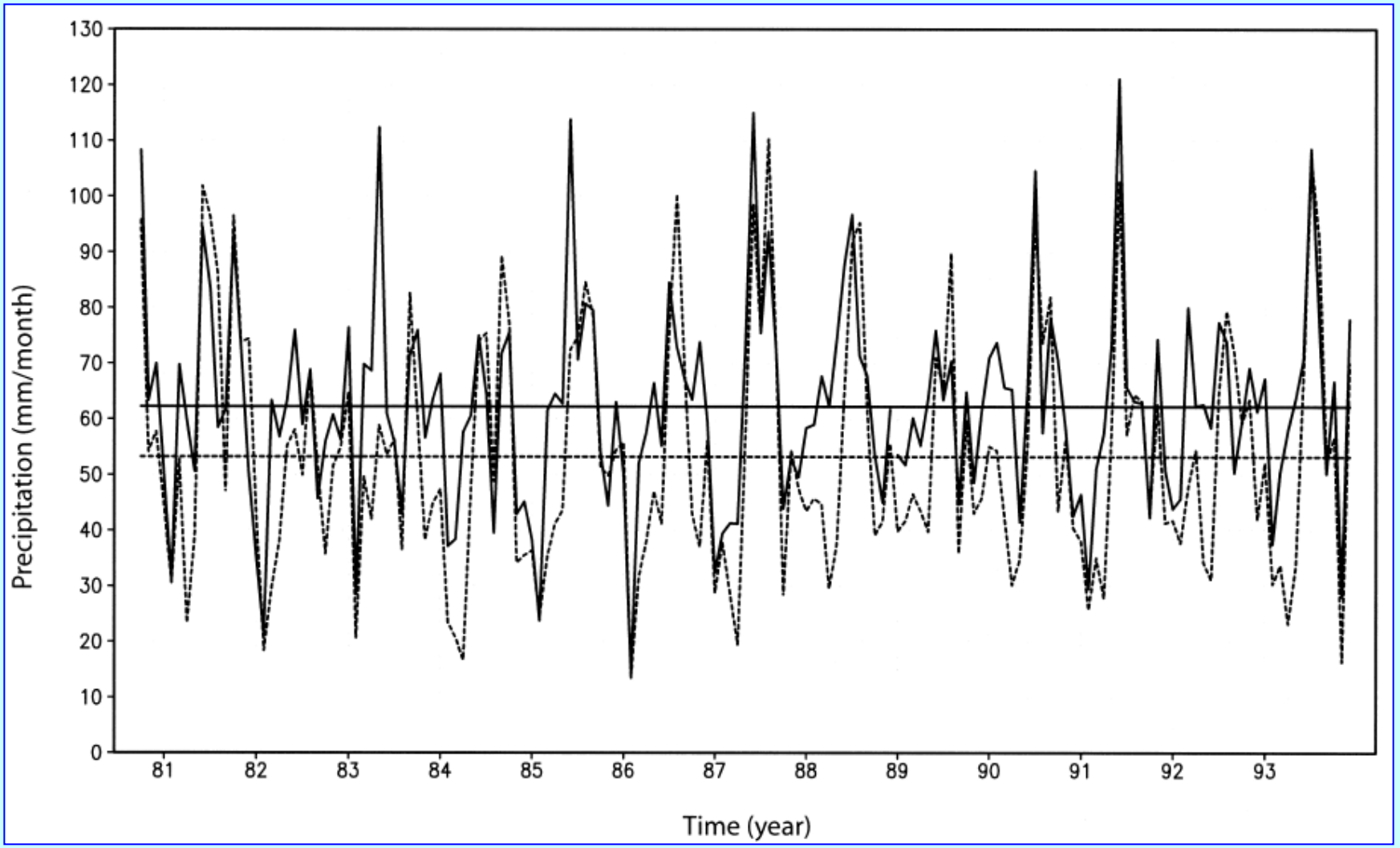
CEOP is the Coordinated Enhanced Observational Period of all CSEs.



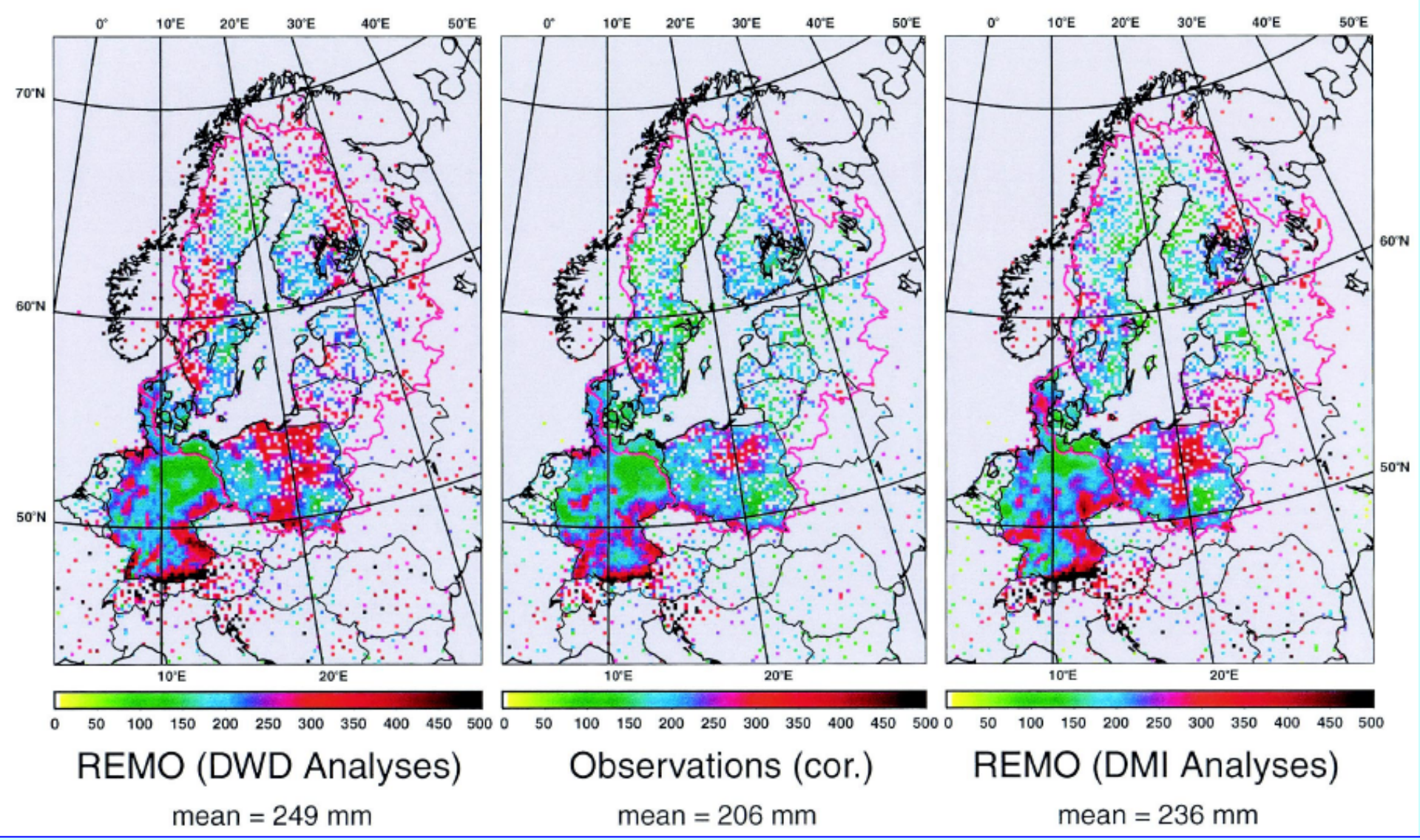
Synoptic precipitation stations



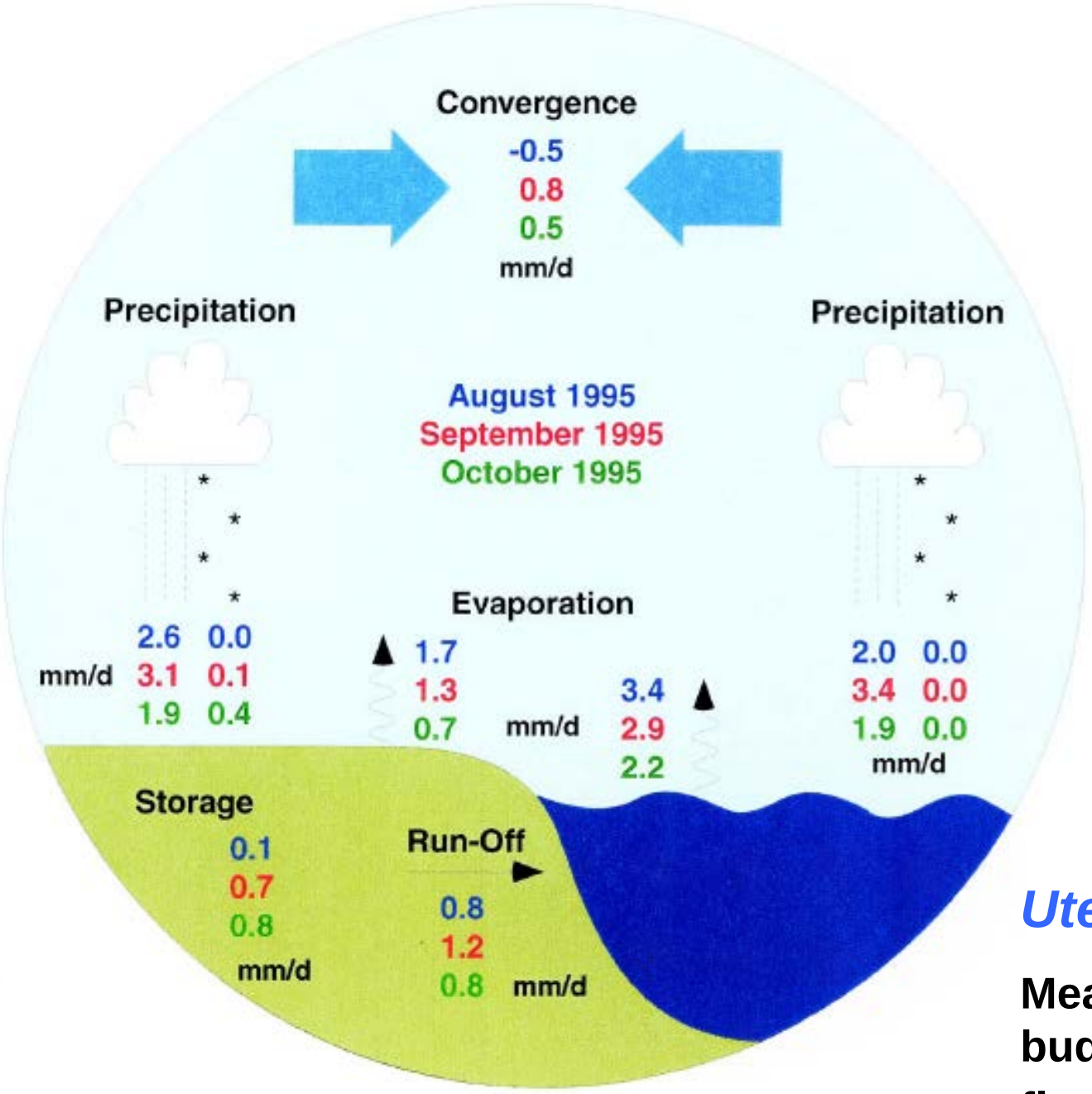
Time series of daily precipitation sums within the Baltic Sea drainage basin based on both uncorrected (grey) as well as corrected (black) rain gauge data. Period 1996 - 1998, units mm/day ***(Rubel and coll.)***



Time series of calculated (solid lines) and measured (broken lines) uncorrected mean precipitation budget of the entire BALTEX model area. Horizontal lines mark the averages.



Precipitation during the PIDCAP period (1 Aug–31 Oct 1995), measured and corrected data (center) and modeled with analyses of the DWD (left) and DMI (right). Each dot indicates a grid area with at least one rain station.
The precipitation was corrected with the model by Førland et al. (1996).



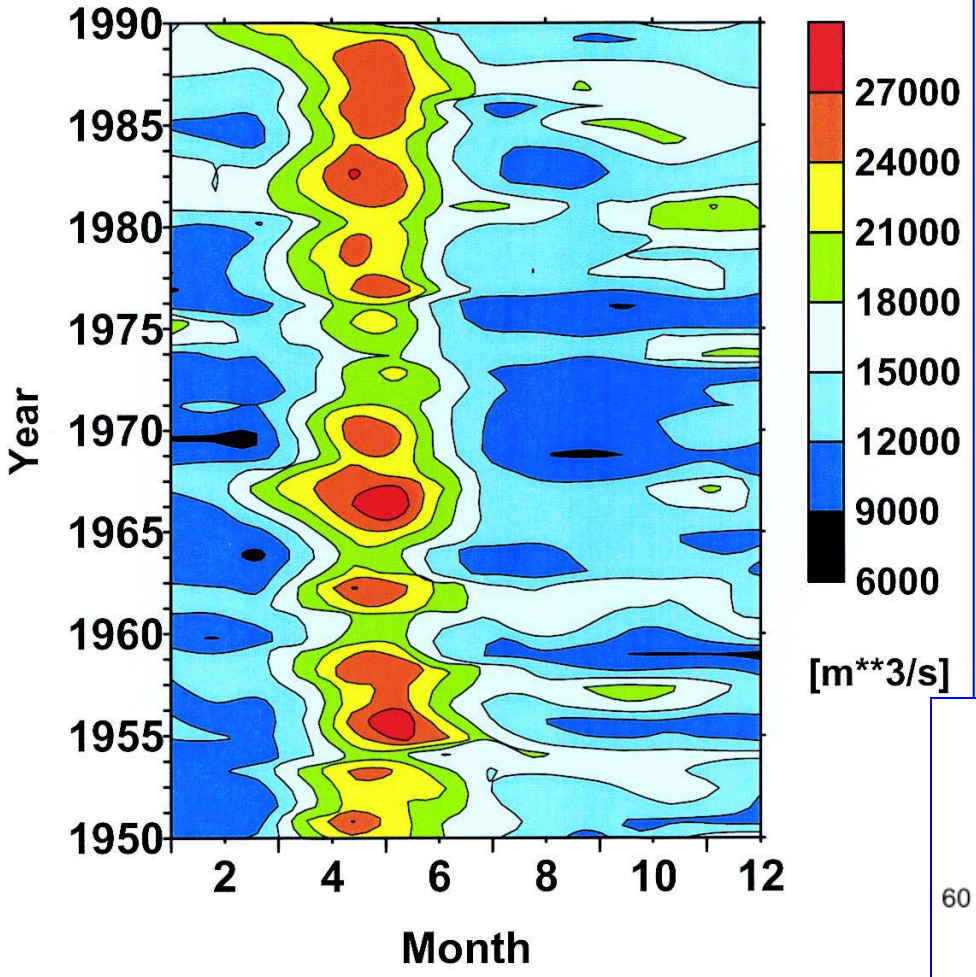
Ute Karstens (1998):

Mean monthly water budgets and exchange flows during PIDCAP

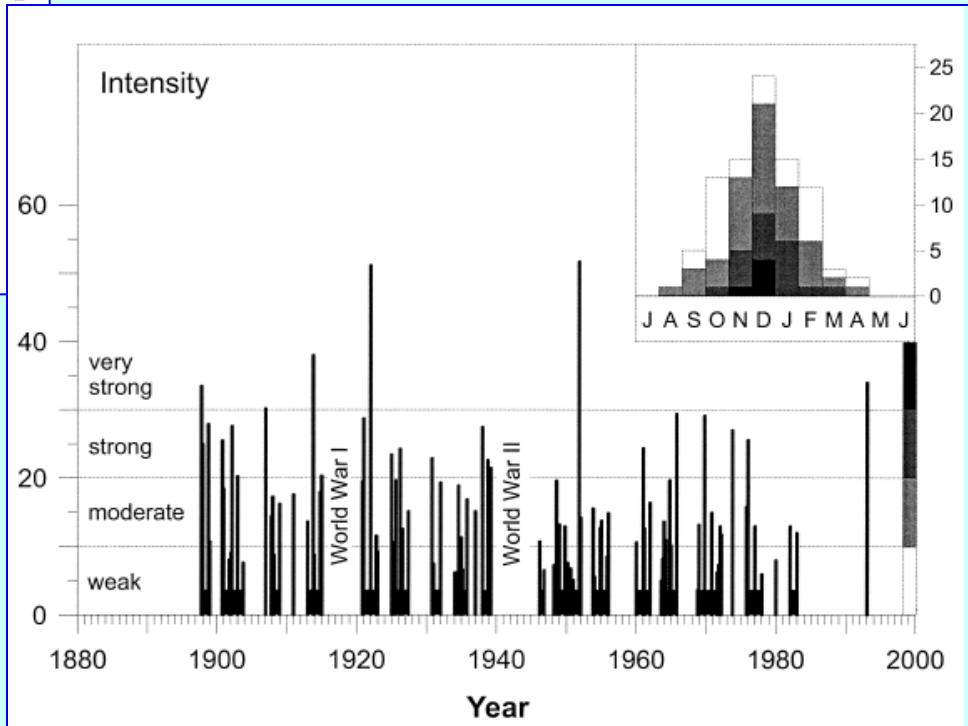
Precipitation over the Baltic Sea is still not exactly known. The uncertainties are of the same order as uncertainties in evaporation (Smedman et al., 2001, Hennemuth et al., 2003).

Thus, it is still an open question whether precipitation exceeds evaporation or vice versa.

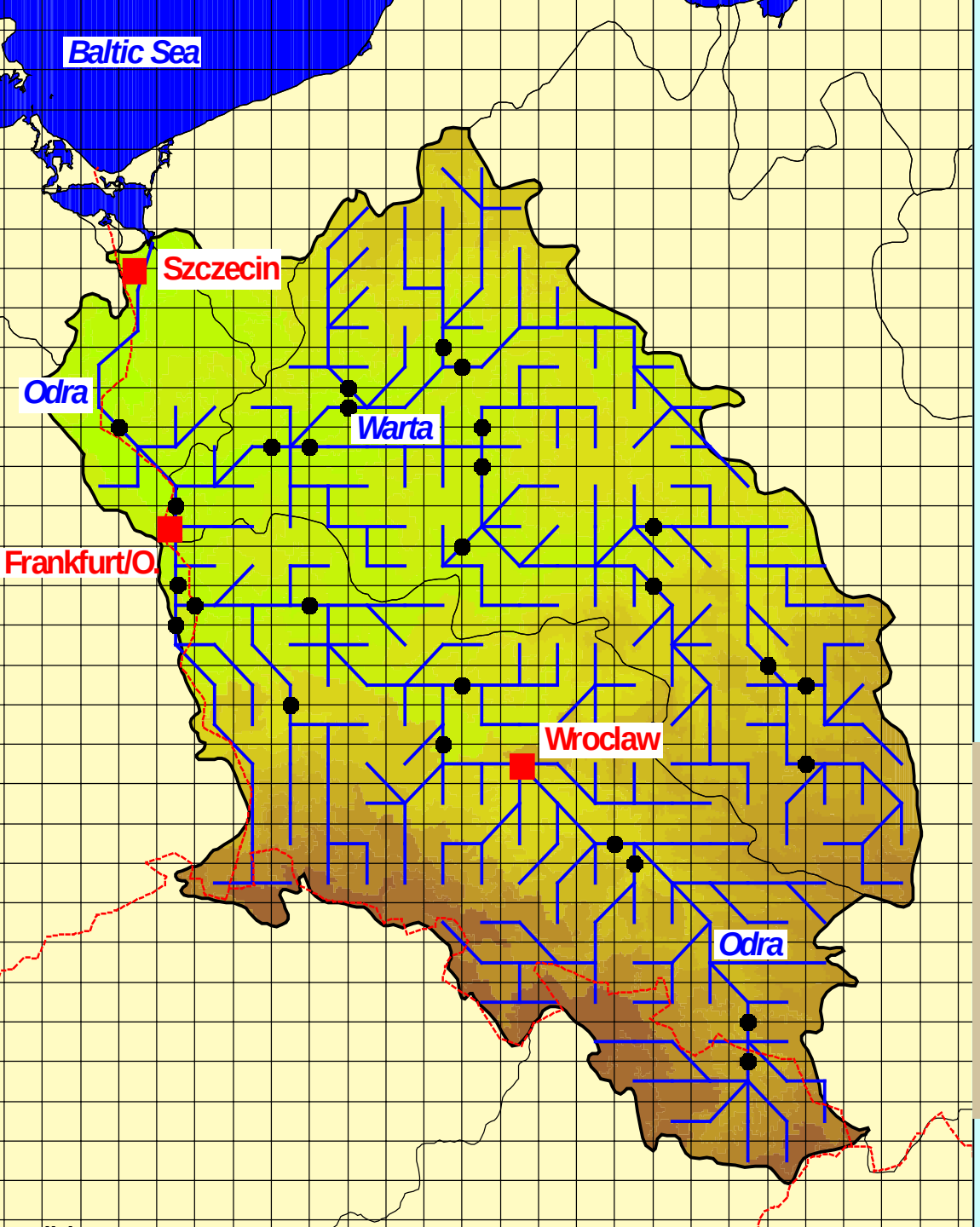
(Bumke and Rubel, 2005)



Seasonal runoff (in m3 s−1) into the Baltic Sea, showing a strong interannual variability during the summer and fall (***Bergström and Carlsson 1994***).



Frequency of major saltwater intrusions through the Danish belts and straits into the Baltic Sea after the year 1900 (from ***Schinke and Matthäus 1998***). The histogram on top right explains the seasonal distributions of these events.

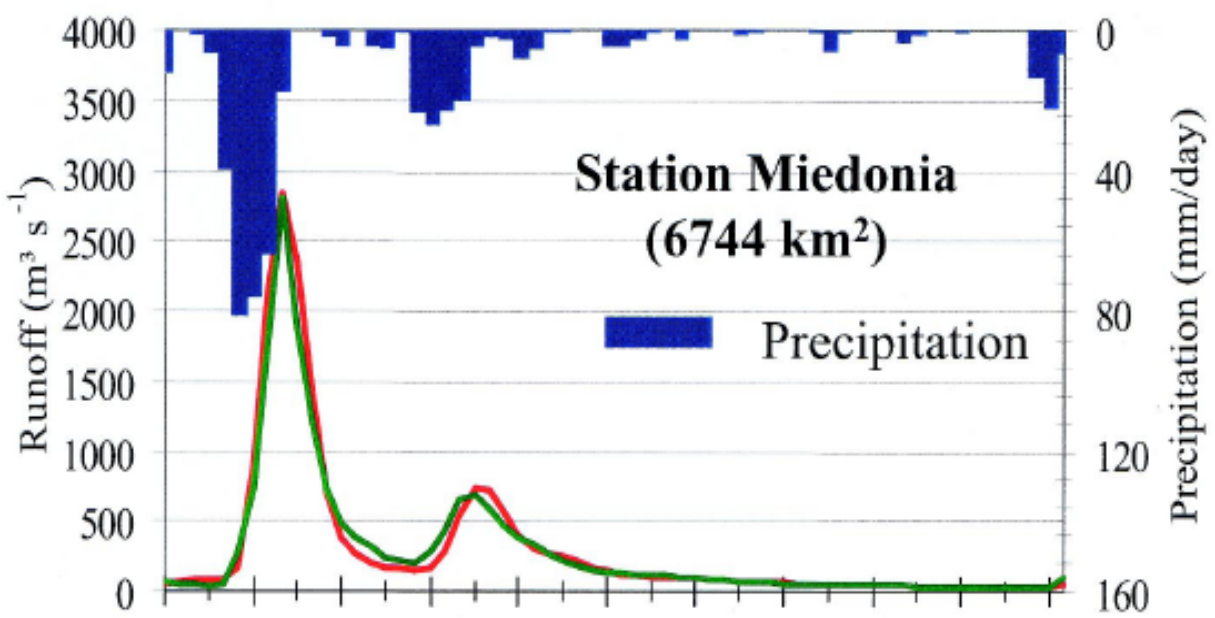


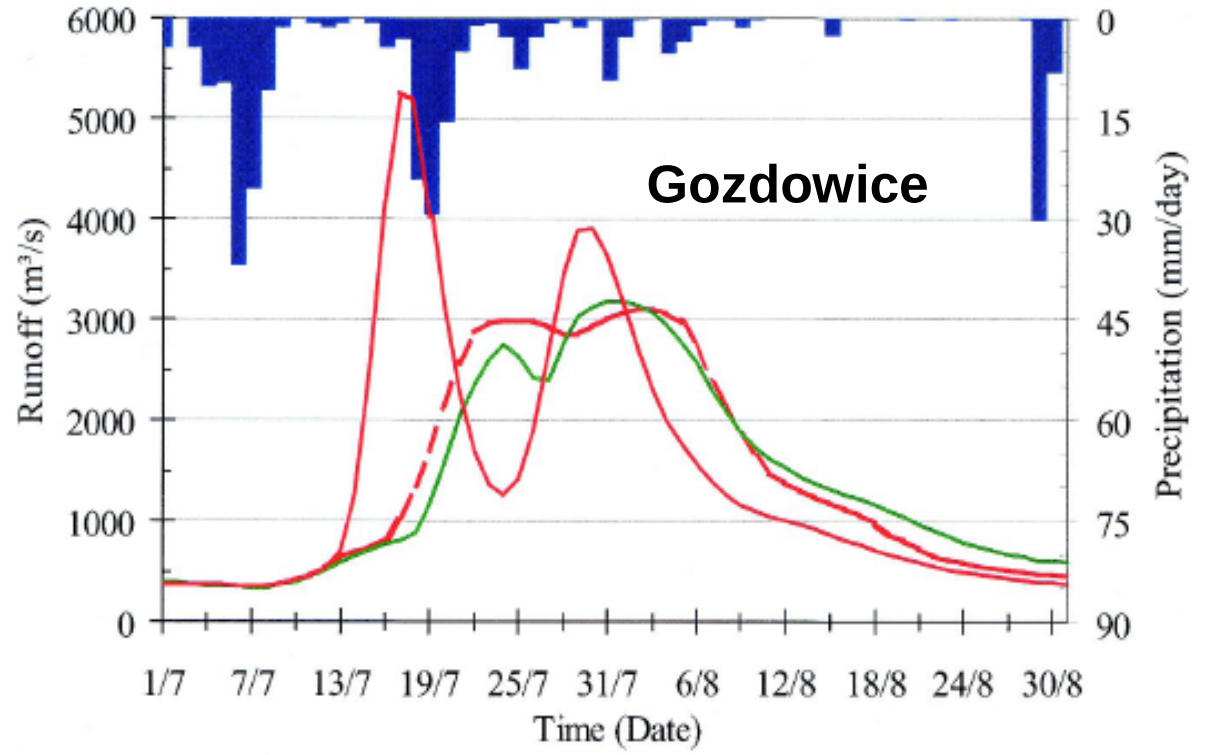
Important applications:

Flood analyses and forecasts (Odra)

Mean annual values [mm/y]

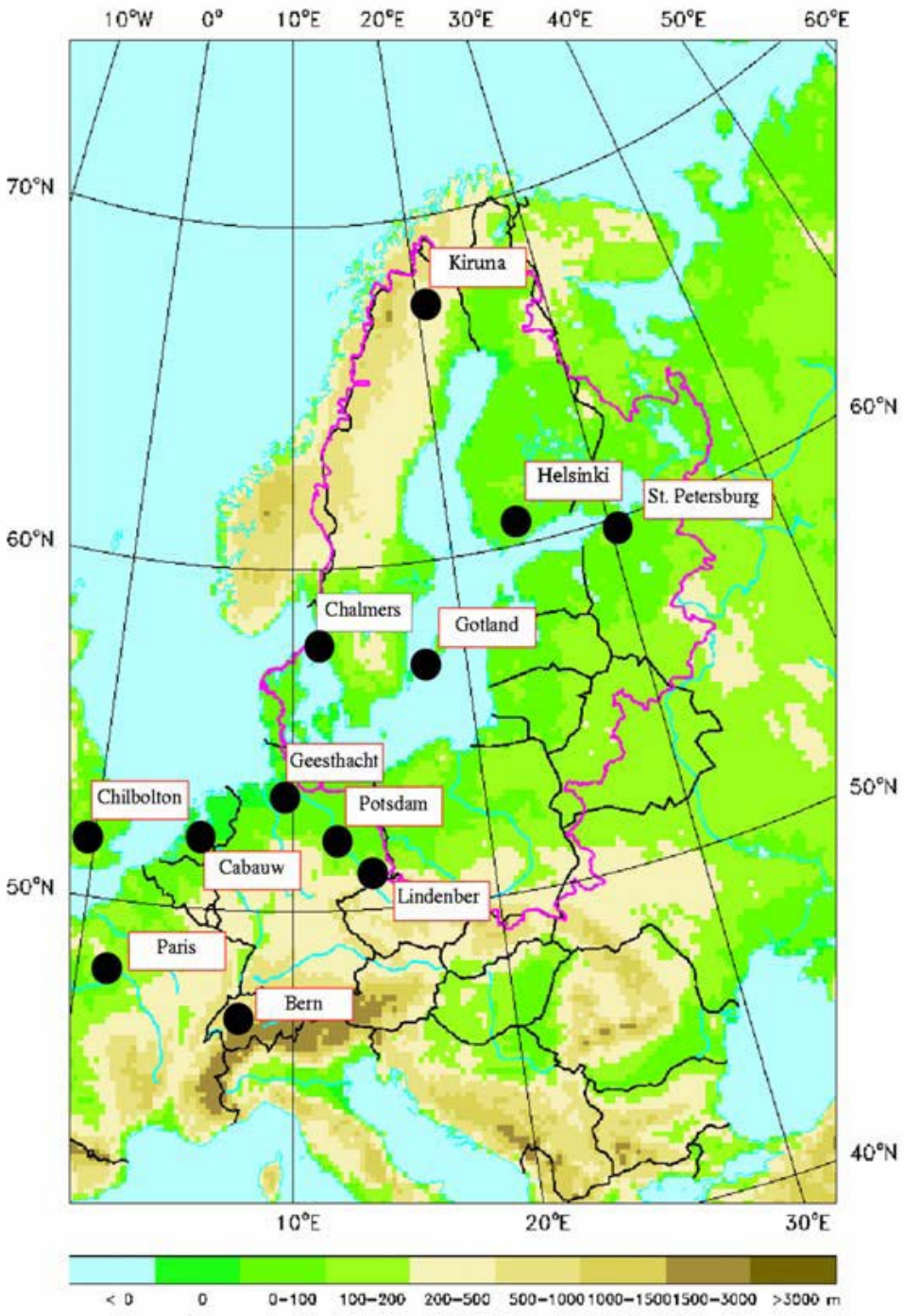
Precipitation	**600**
Runoff	**145**
Evapotranspiration	**455**



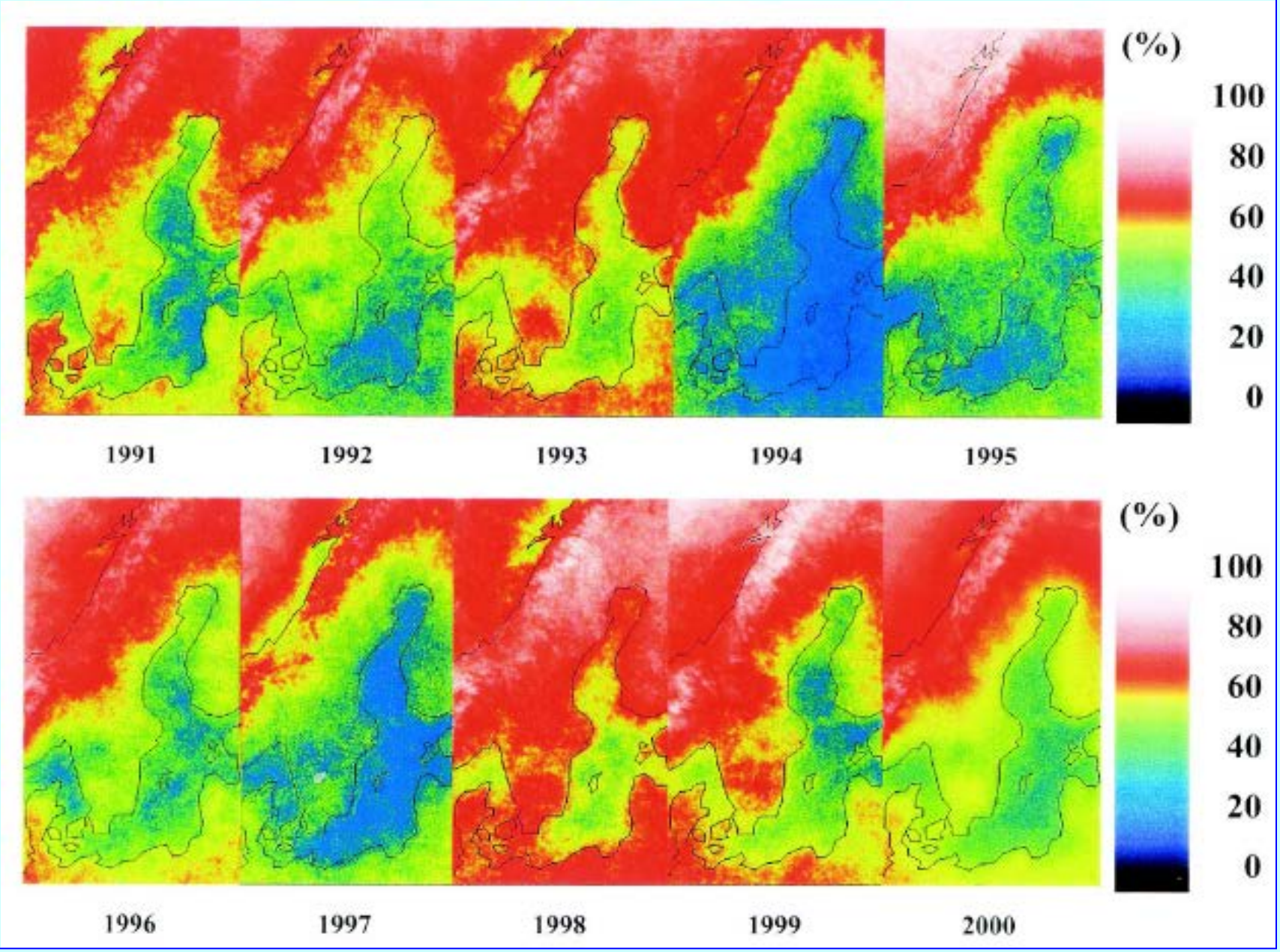


Measured and modeled hydrograph at stations Miedonia (upper panel) and Gozdowice (lower panel) during the Odra flood in

July 1997



Position of stations during the CLIWA-NET observation periods in 2001



Summer cloud frequencies (%) over Scandinavia in the period 1991–2000 derived from NOAA-AVHRR data. ***(K.-G. Karlsson, 2000)***

Bulletin of the American Meteorological Society, **Vol. 82, No. 11, November 2001, 2389-2413, 104 references**

The Baltic Sea Experiment (BALTEX): A European Contribution to the Investigation of the Energy and Water Cycle over a Large Drainage Basin

E. Raschke,[a] J. Meywerk,[a] K. Warrach,[b] U. Andrea,[c] S. Bergström,[c] F. Beyrich,[d] F. Bosveld,[e] K. Bumke,[f] C. Fortelius,[g] L. P. Graham,[c] S.-E. Gryning,[h] S. Halldin,[i] L. Hasse,[f] M. Heikinheimo,[g] H.-J. Isemer,[a] D. Jacob,[b] I. Jauja,[i] K.-G. Karlsson,[c] S. Keevallik,[k] J. Koistinen,[g] A. van Lammeren,[e] U. Lass,[l] J. Launianen,[m] A. Lehmann,[f] B. Liljebladh,[n] M. Lobmeyr,[a] W. Matthäus,[l] T. Mengelkamp,[a] D. B. Michelson,[c] J. Napiórkowski,[o] A. Omstedt,[c] J. Piechura,[p] B. Rockel,[a] F. Rubel,[q] E. Ruprecht,[f] A.-S. Smedman,[r] and A. Stigebrandt[n]

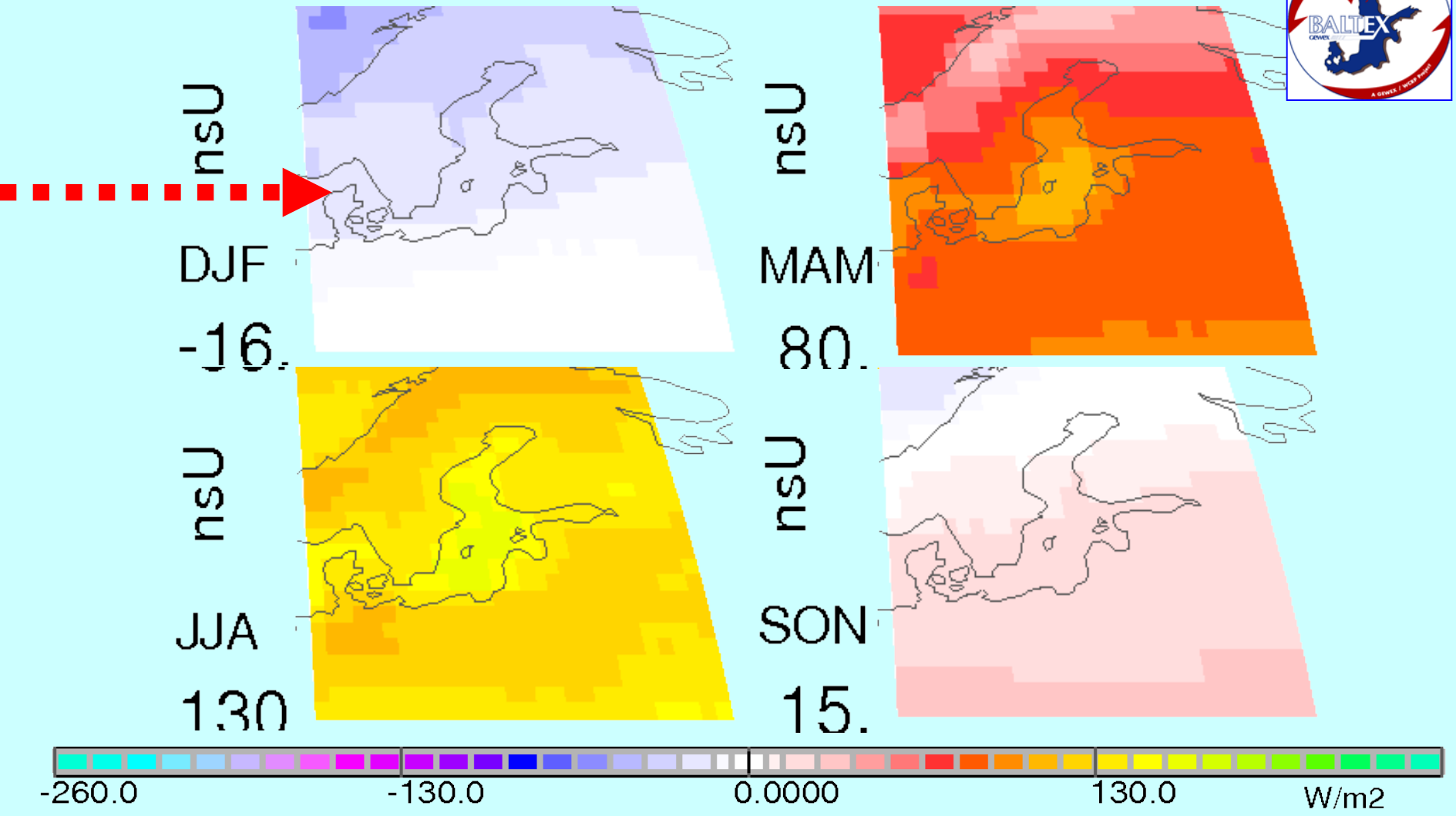
My personal interest in BALTEX has been kept alive

(and stirred up during sleepless nights) **by a serious problem:**

Is the radiation budget at the surface during winter over the BALTEX area positive (Isemer) or negative (Raschke) ?

Raschke et al., WCRP-GEWEX Report No. 19, 2012, available at:
http://gewex.org/gdap/gdap_assessment_wgs.html

The Radiation Budget at the Surface is during the winter season (DJF of the period 2000 to 2003) negative over the BALTEX area. The local spread ranges between 5 Wm^{-2} over the Baltic Sea to 20 Wm^{-2} over northern Sweden and Finland!

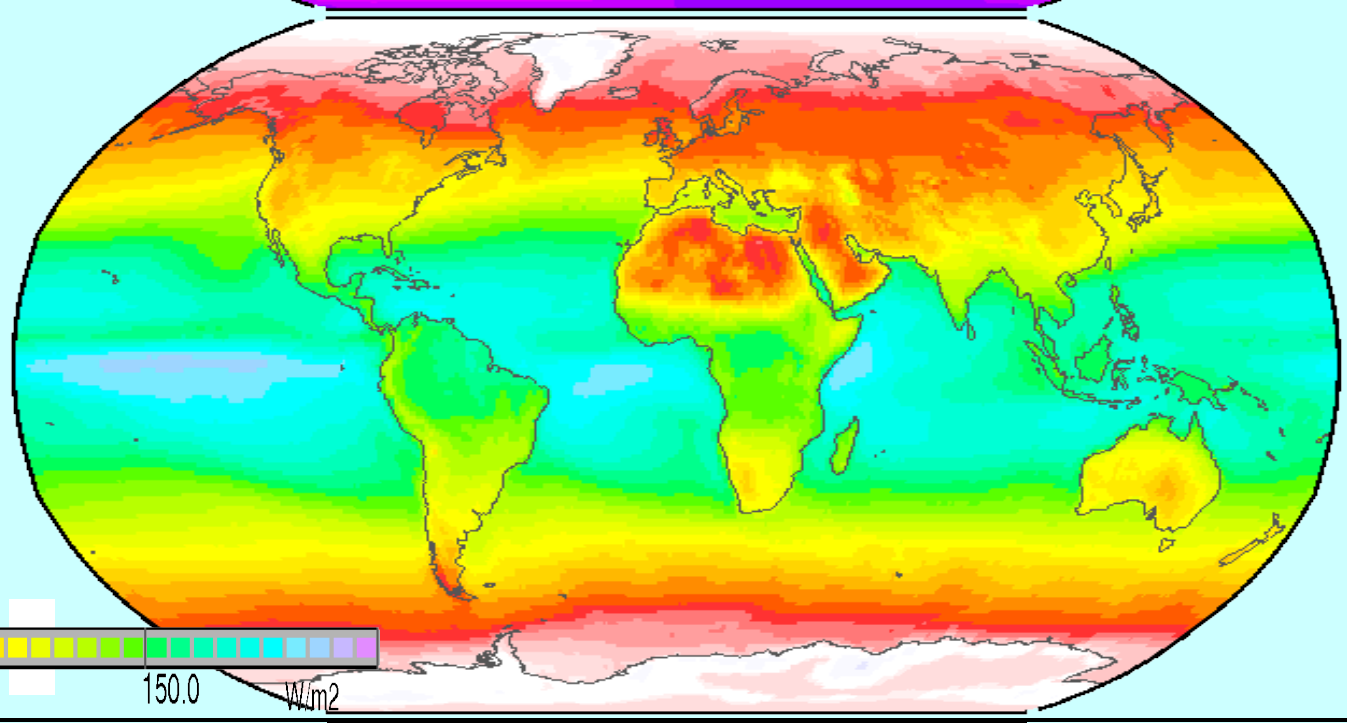


Annual Radiation Budget at the Surface:

CIS data set

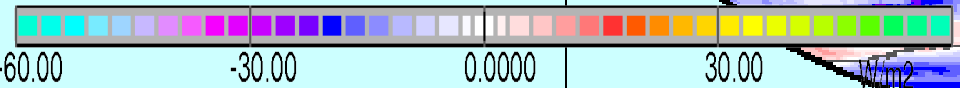
CIS = (CERES + ISCCP + SRB)/3,

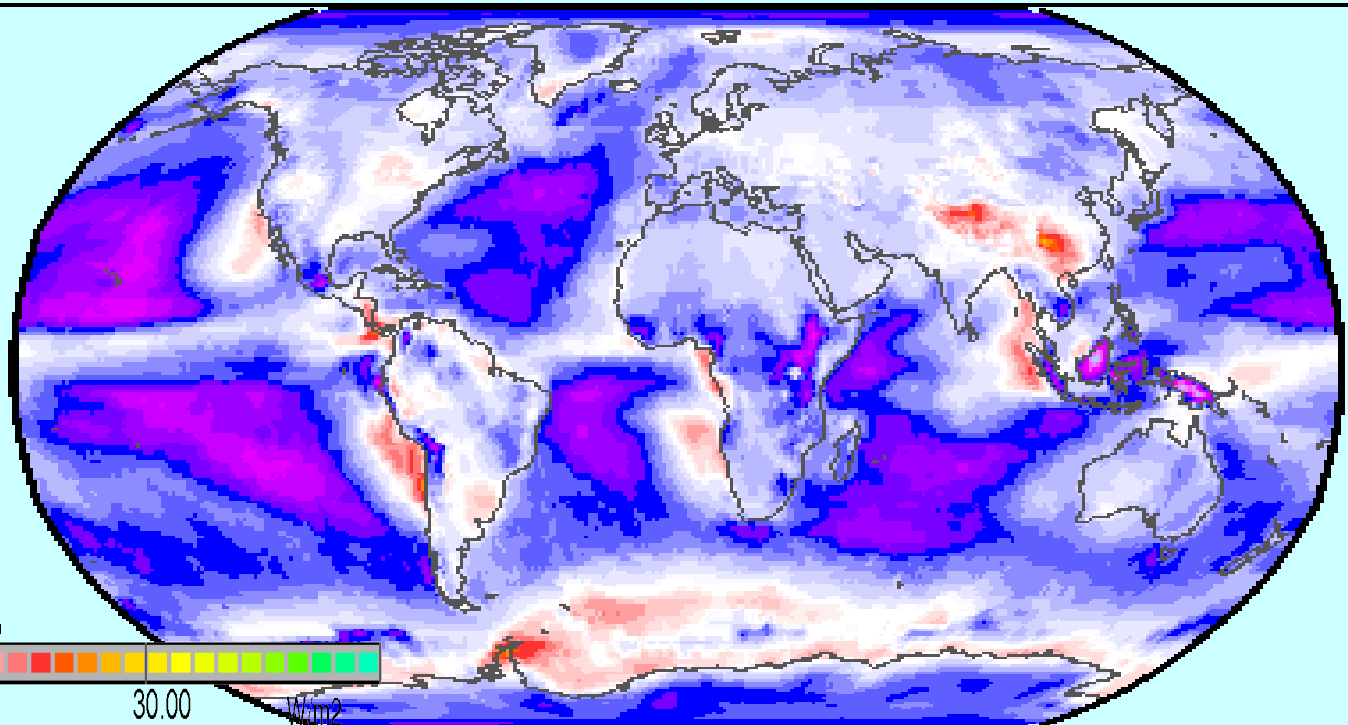
IPCC = IQav of ~20 models of 4th assessment



IPCC minus CIS

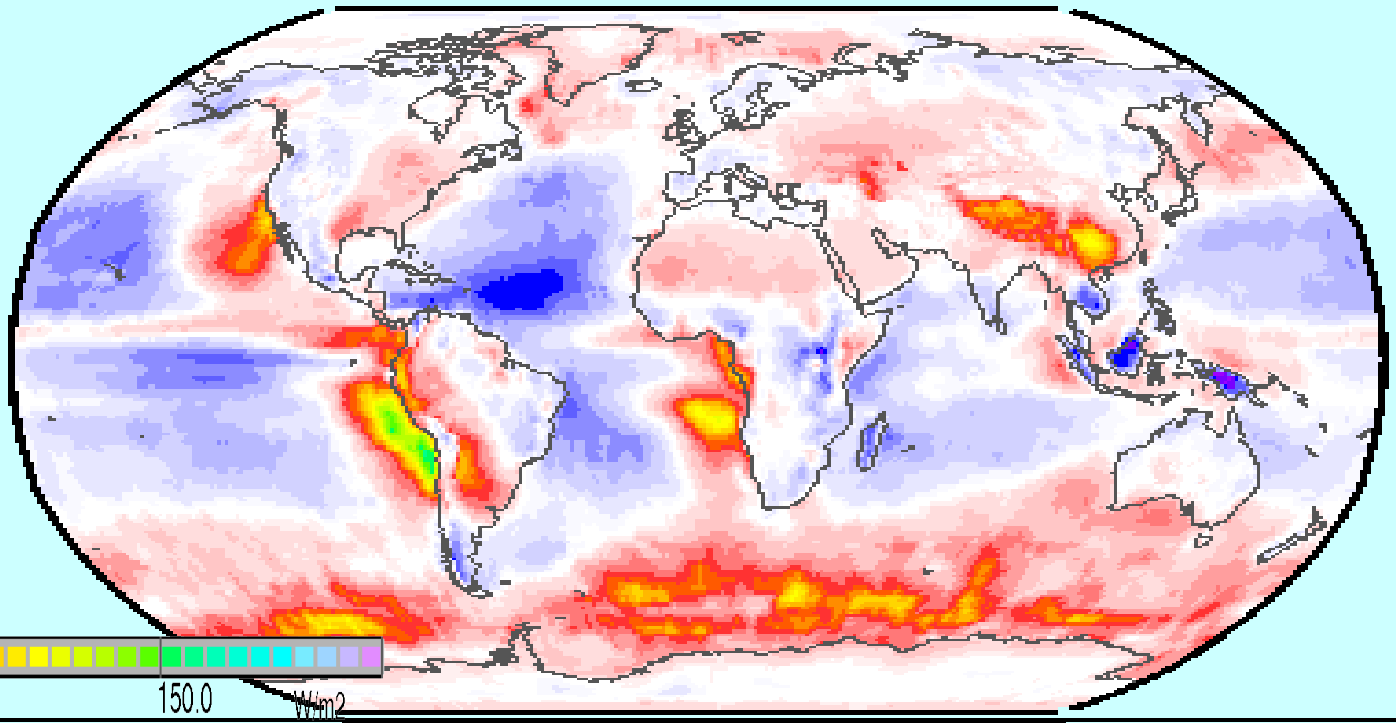
(E. Raschke & S.Kinne)



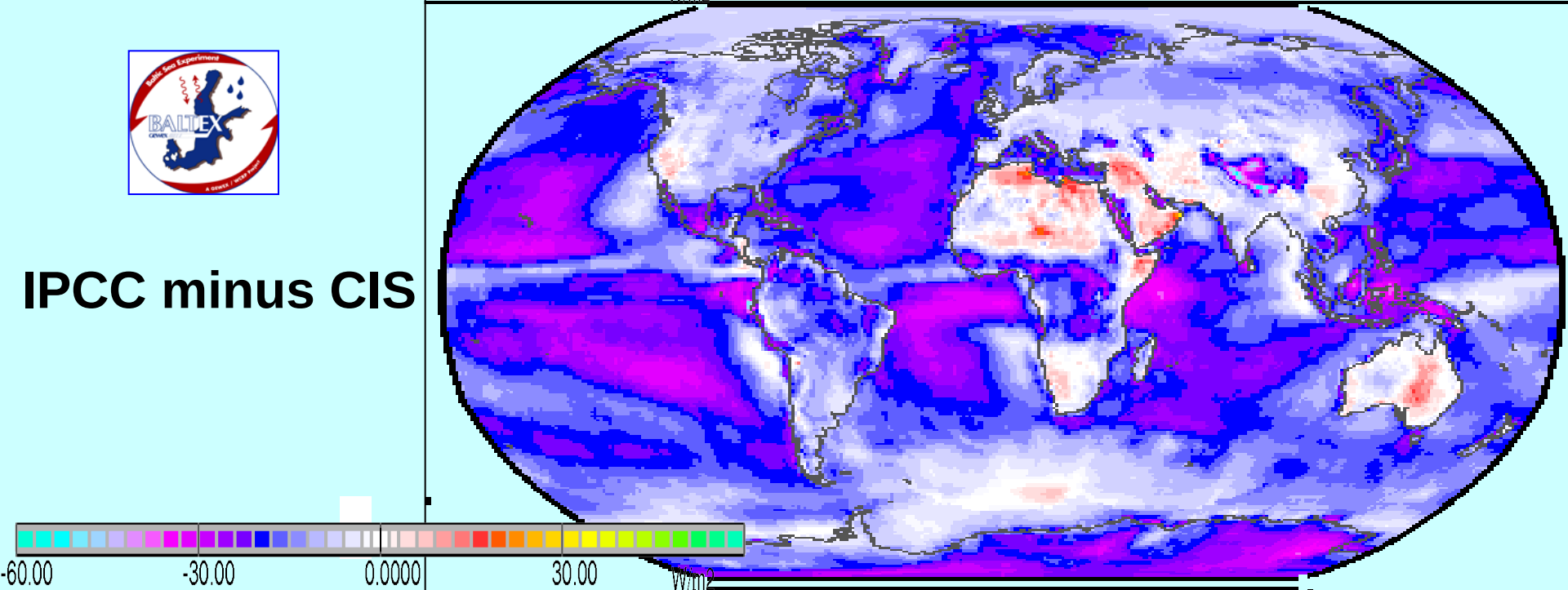


CRE on Annual Radiation Budget at Surface:

CIS



IPCC minus CIS



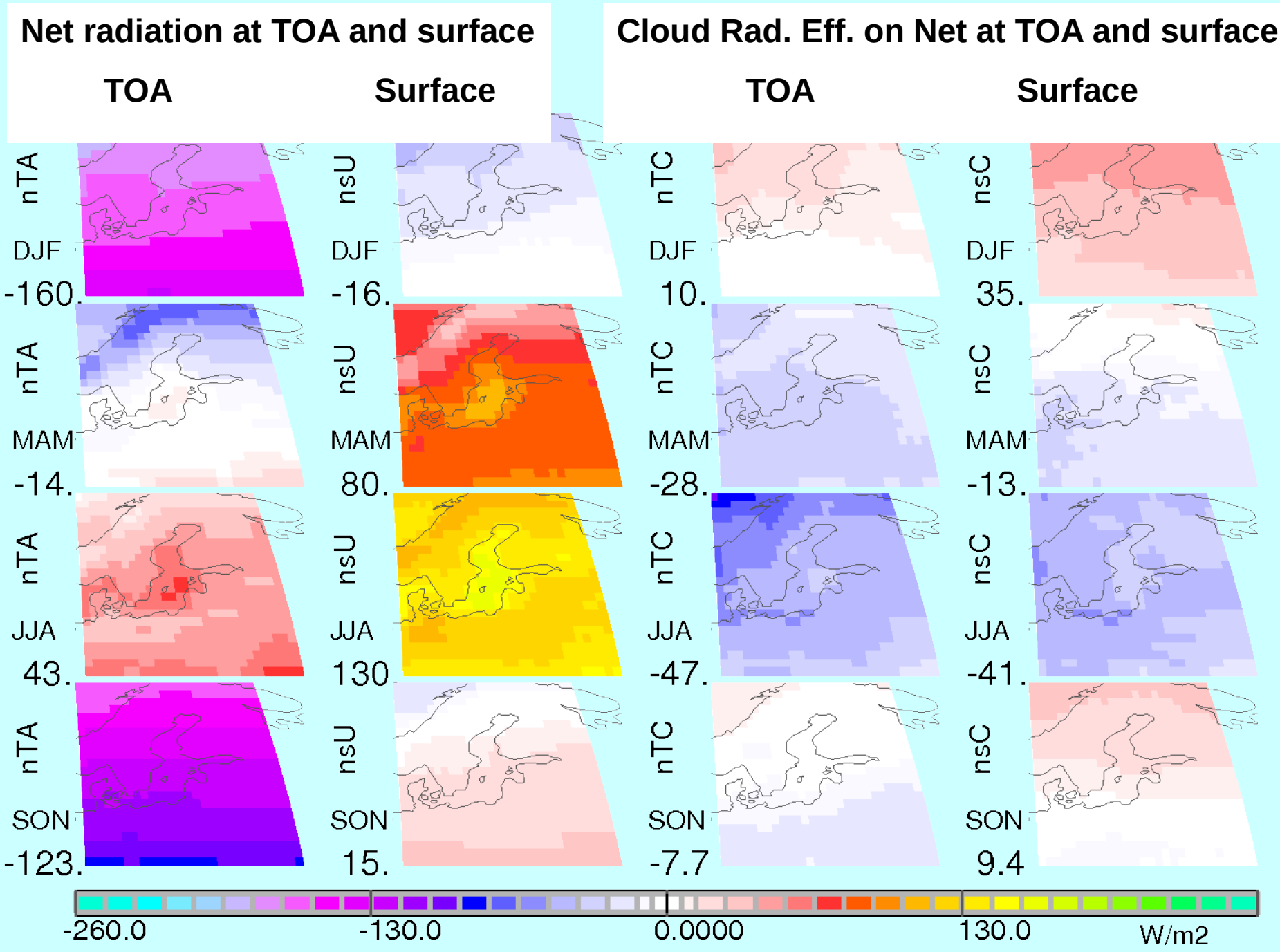
While most other GEWEX regional-scale projects disappeared, BALTEX is still alive !

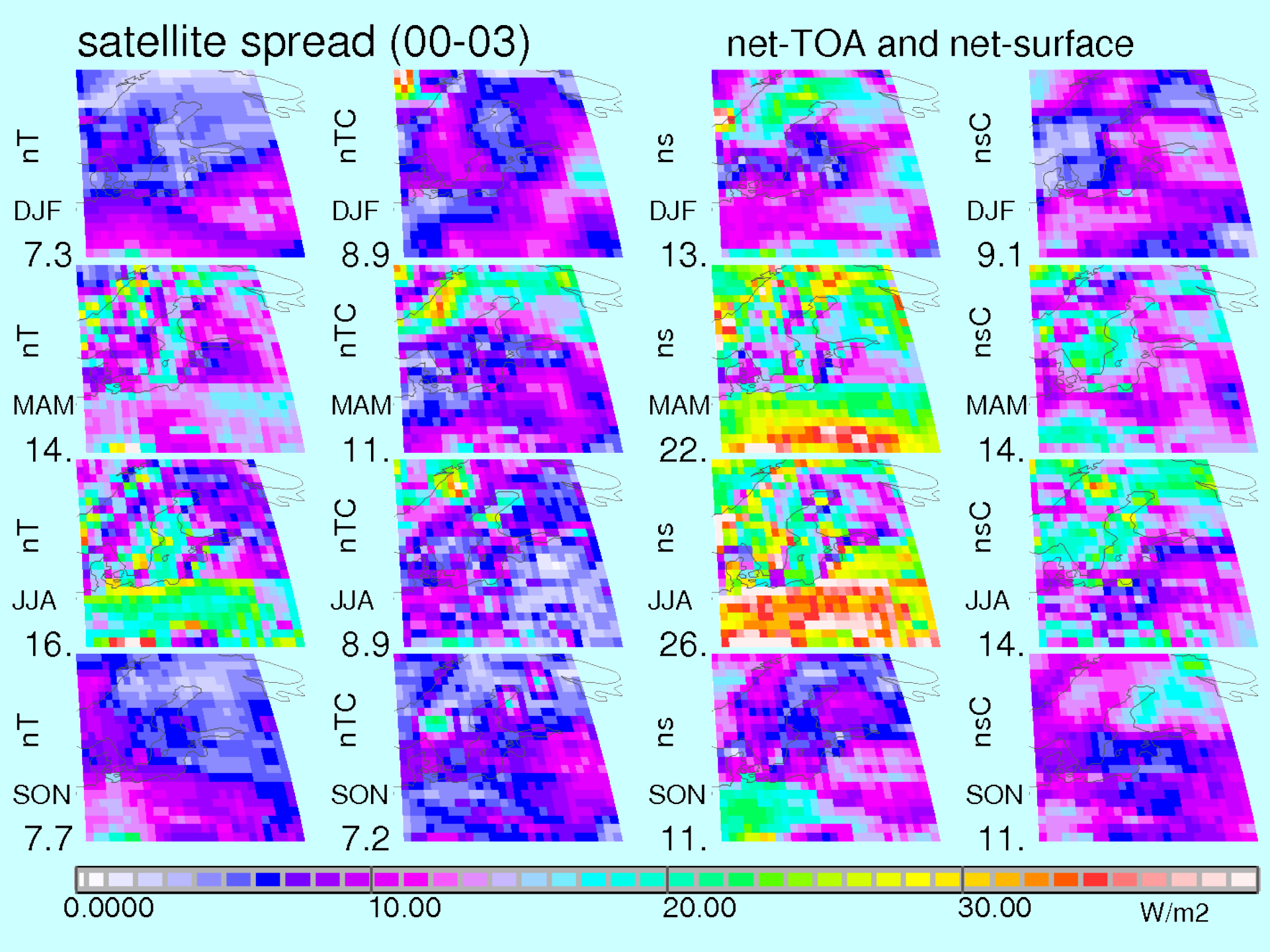
BALTEX (or ??)
KEEP GOING,

but

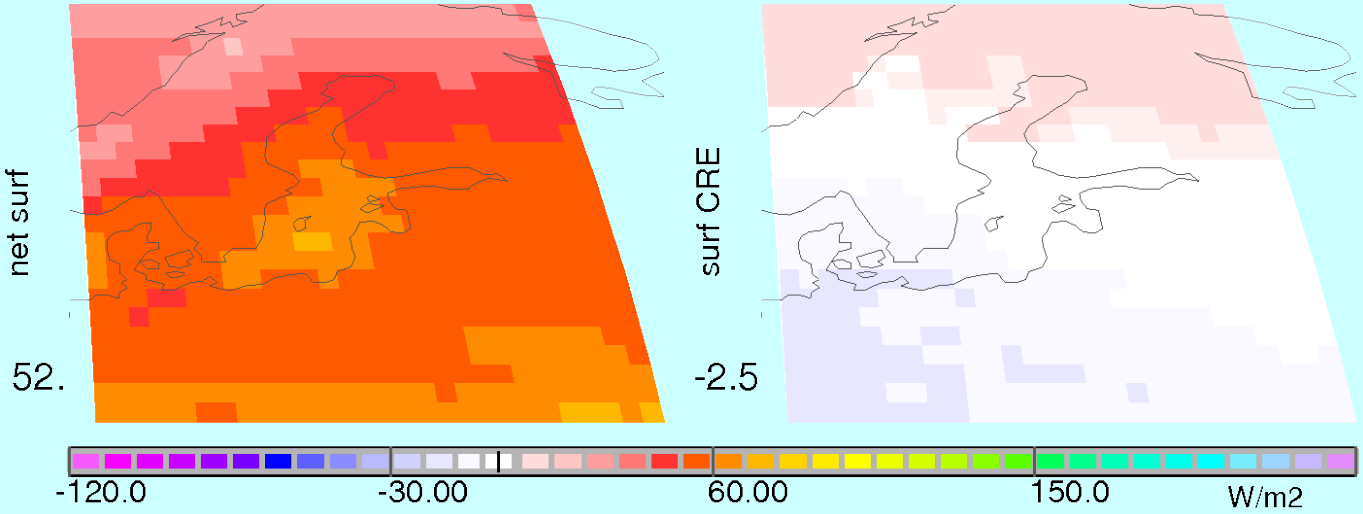
SHOW MORE VISIBILITY
AS AN ENTITY!!

Thank You !

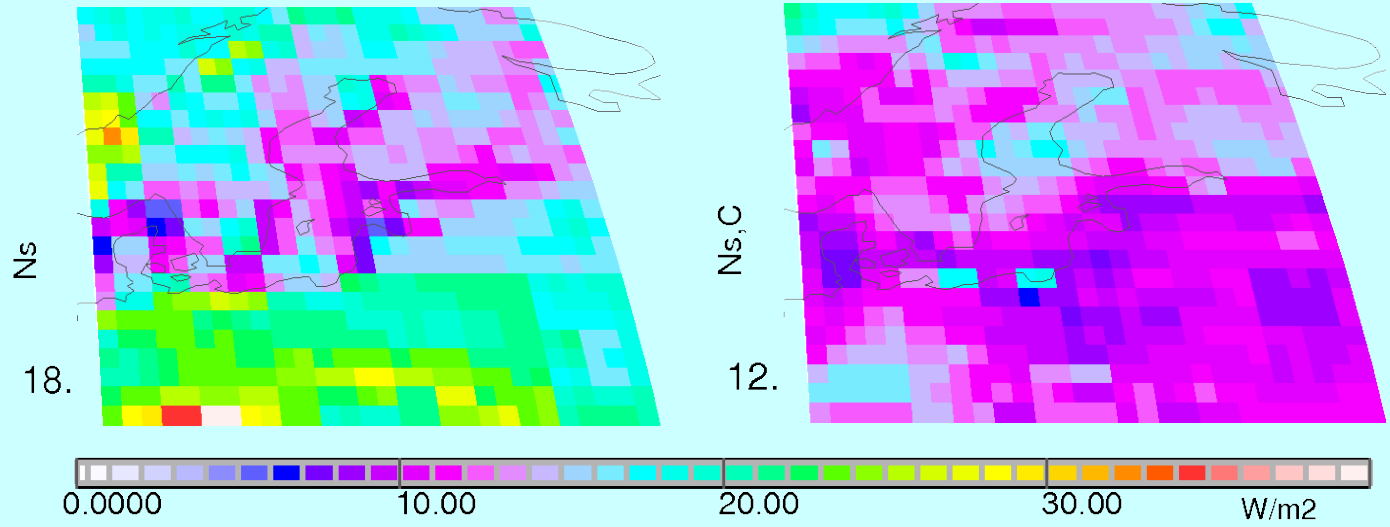

Net radiation at TOA and surface
TOA
Surface
Cloud Rad. Eff. on Net at TOA and surface
TOA
Surface
nTA
DJF
-160.
nsU
DJF
-16.
nTC
DJF
10.
nsC
DJF
35.
nTA
MAM
-14.
nsU
MAM
80.
nTC
MAM
-28.
nsC
MAM
-13.
nTA
JJA
43.
nsU
JJA
130.
nTC
JJA
-47.
nsC
JJA
-41.
nTA
SON
-123.
nsU
SON
15.
nTC
SON
-7.7
nsC
SON
9.4
-260.0
-130.0
0.0000
130.0
W/m2


satellite spread (00-03)
net-TOA and net-surface
nT
DJF
7.3
nTC
DJF
8.9
ns
DJF
13.
nsC
DJF
9.1
nT
MAM
14.
nTC
MAM
11.
ns
MAM
22.
nsC
MAM
14.
nT
JJA
16.
nTC
JJA
8.9
ns
JJA
26.
nsC
JJA
14.
nT
SON
7.7
nTC
SON
7.2
ns
SON
11.
nsC
SON
11.
0.0000
10.00
20.00
30.00
W/m2

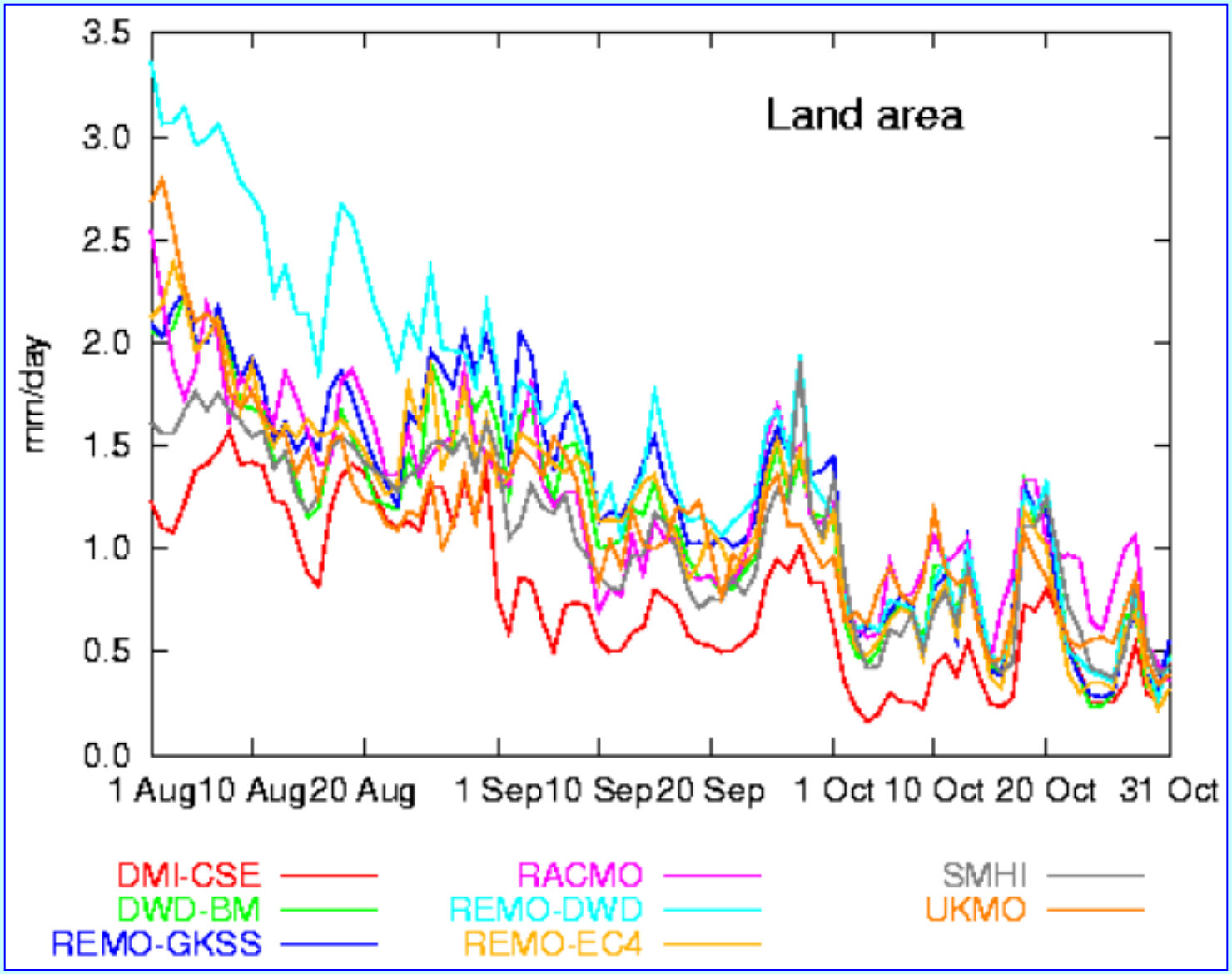
CIS = (CERES + ISCCP + SRB)/3



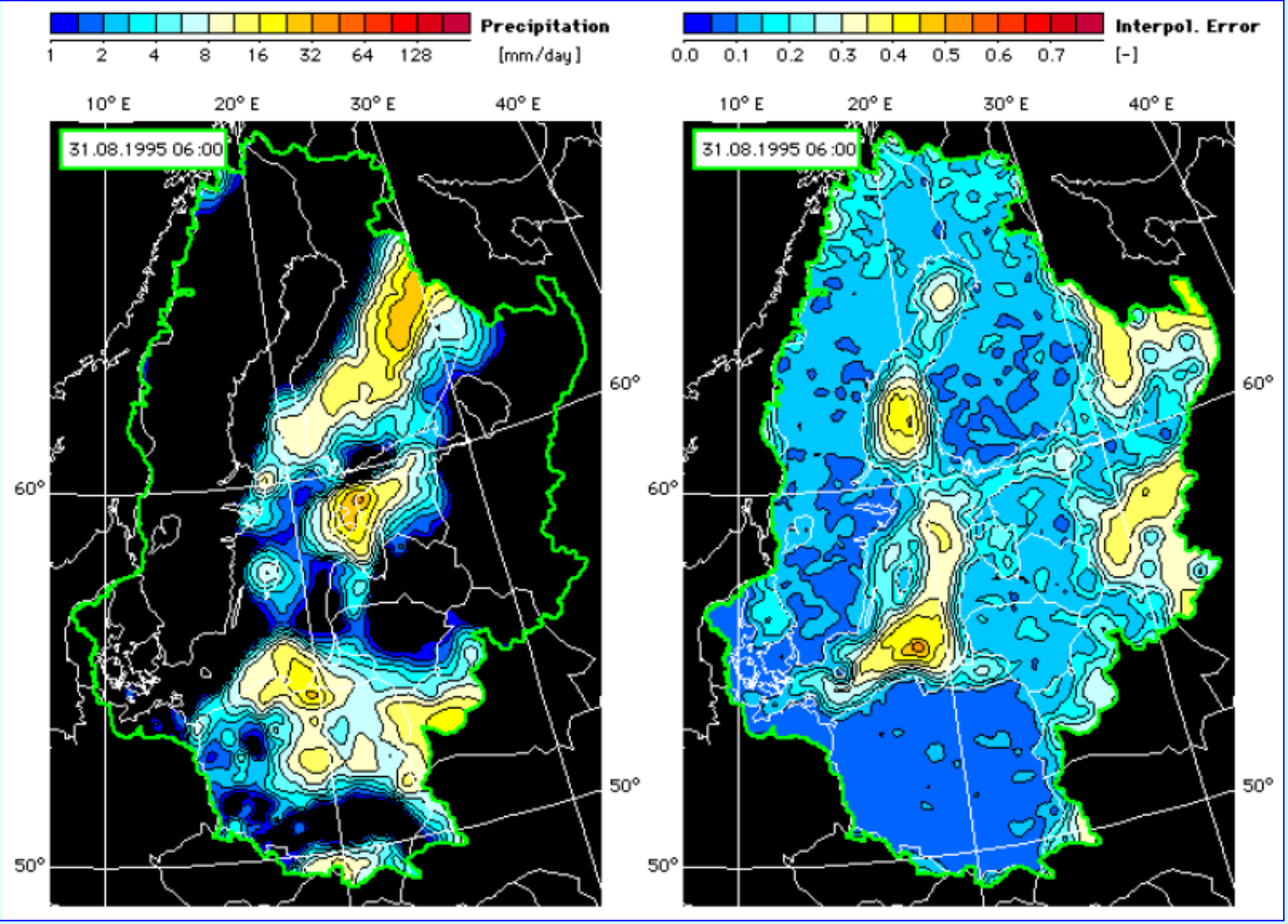
Annual net radiation and CRE at surface



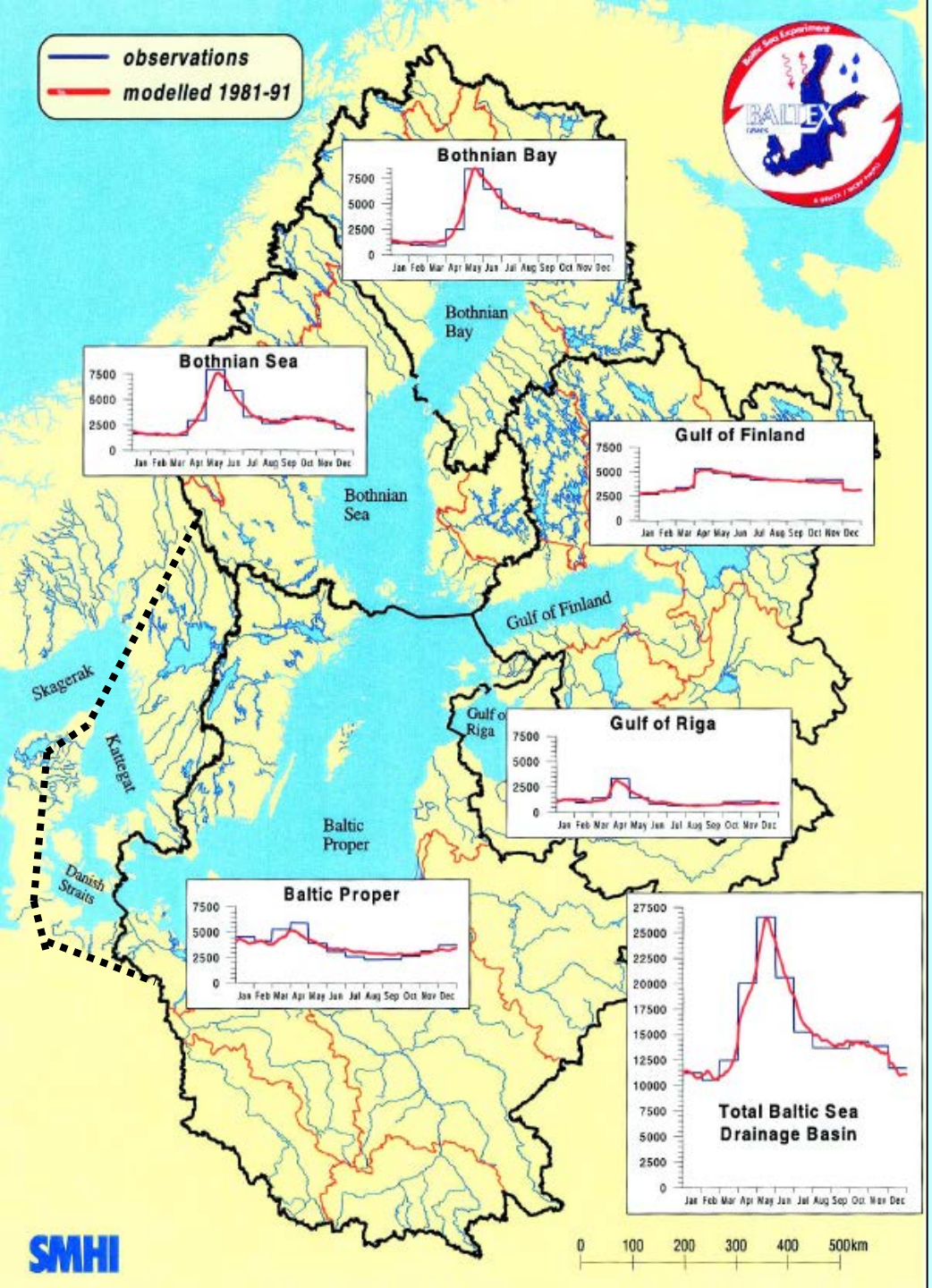
Local spread of annual net radiation and CRE at surface



Surface evaporation over land in the Baltic Sea catchment, as predicted by the limited area models participating in the PIDCAP-intercomparison (Jacob et al, 2001). Soil moisture initialization appeared to be responsible for the major portion of the variability.



Objectively analysed precipitation field and the normalized interpolation error (Rubel, 1998)

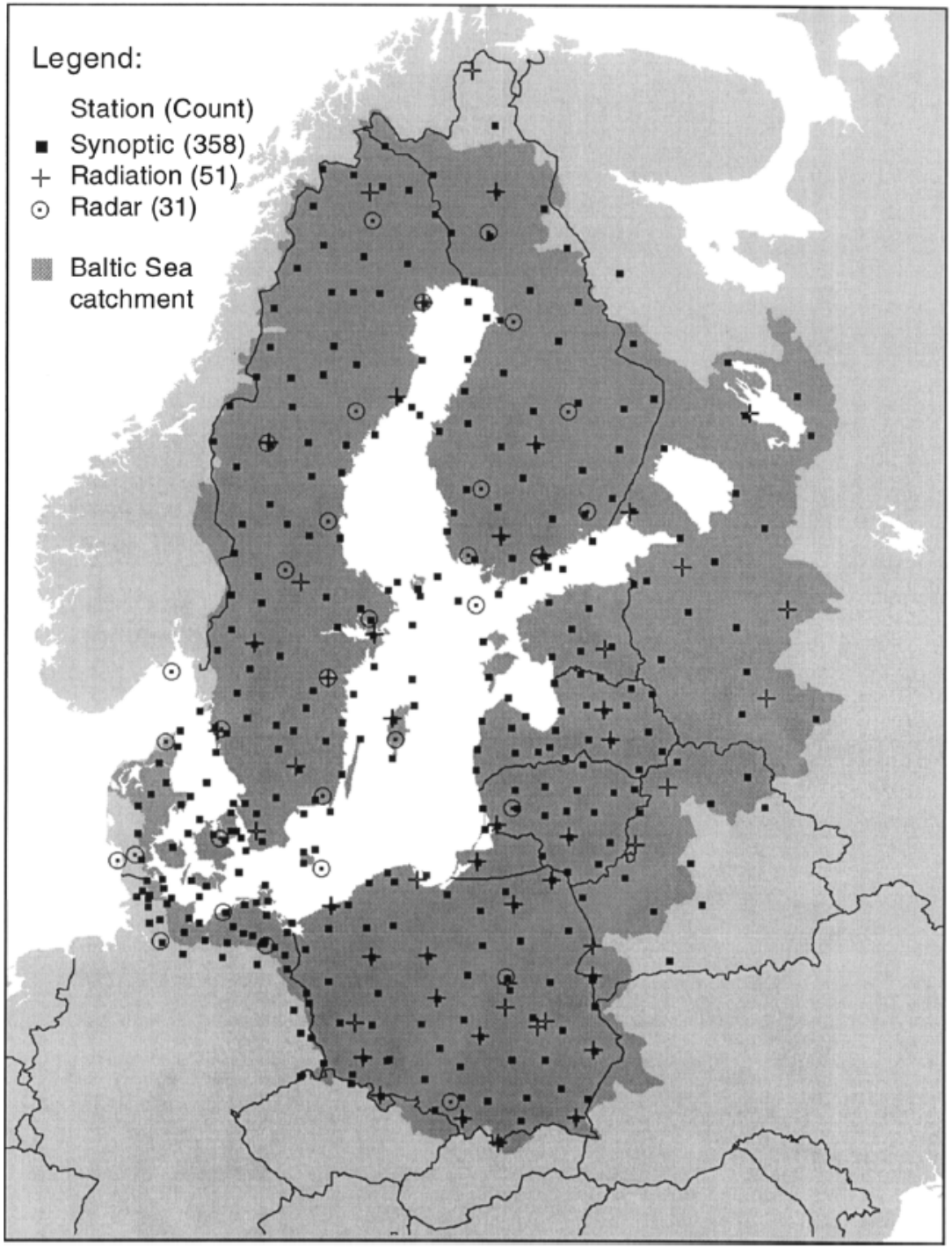


BALTEX water catchment basin with sub-basins of the Baltic Sea

~ 2.1 Mill. km^2

~ 80 Mill. inhabitants

Monthly averages (in m^3 s^{-1}) of freshwater flow into the major sub-basins of the Baltic Sea, calculated with the HBV model using meteorological input data.



Synoptic, radiation and radar stations of the BALTEX area