

Quantitative Precipitation Estimation from CERAD, BALTRAD and Gauges

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Motivation

Within the framework of **ELDAS** the **BALTEX/PIDCAP** initiative on the collection and analysis of precipitation observations has been continued and extended to the entire region of Europe. Goal is to provide precipitation fields on a regular 0.2-degree latitude/longitude grid; temporal resolution 24 and 3 hours. These fields serve as ground truth for NWP model verification and as forcing data for the ELDAS soil moisture assimilation.

NWP centres involved

KNMI, DWD, ECMWF, INM, SMHI and Meteo France

ELDAS ... FP5 project, Development of a European Land Data Assimilation System to predict floods and droughts

Data - operational weather radar networks

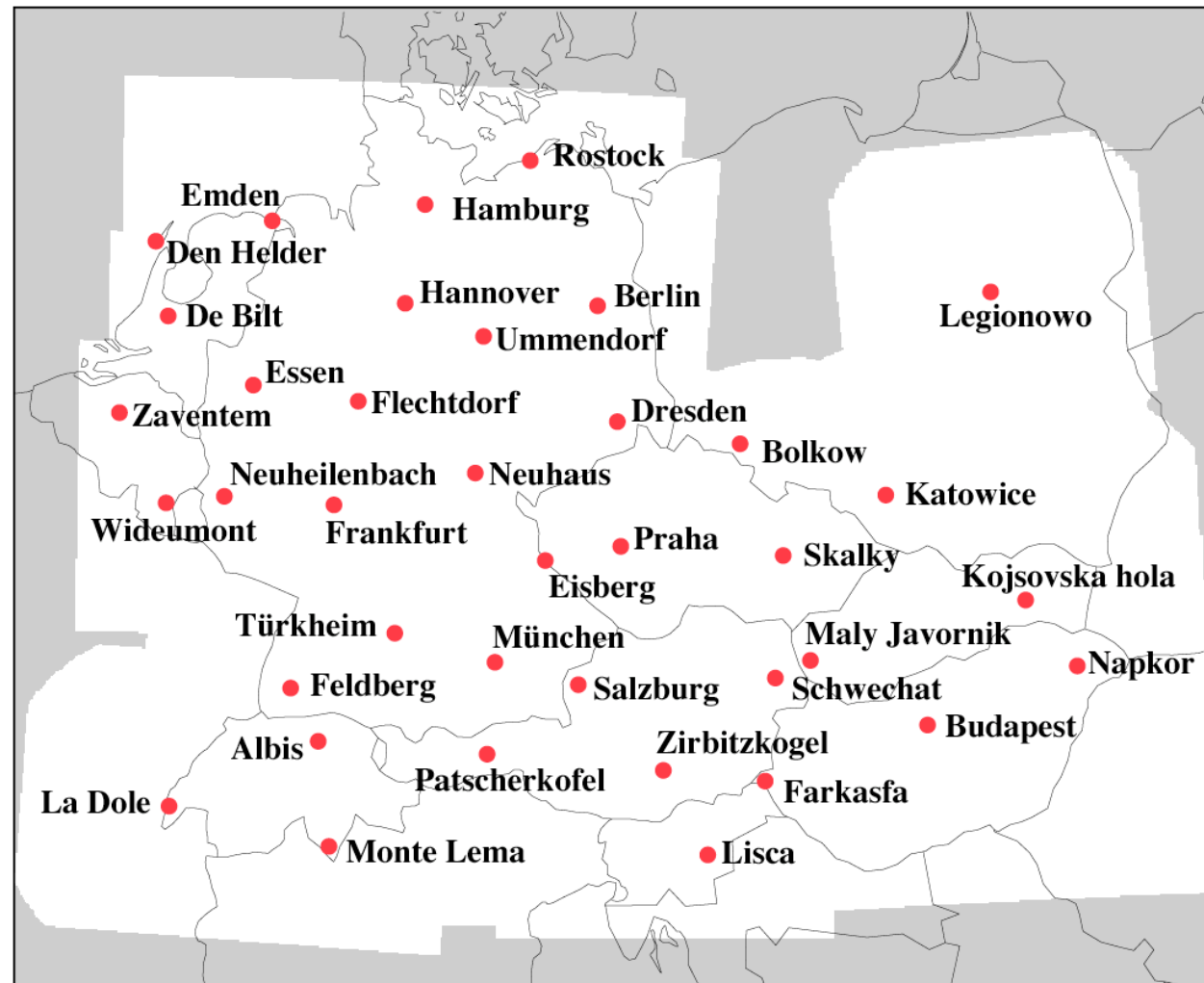
CERAD, the Central European Radar Network

Resolution 30 min
4 km

Maximum intensity
product with 8 rain
classes

Provider

Technical University
Graz, Austria
Konrad Köck



BALTRAD

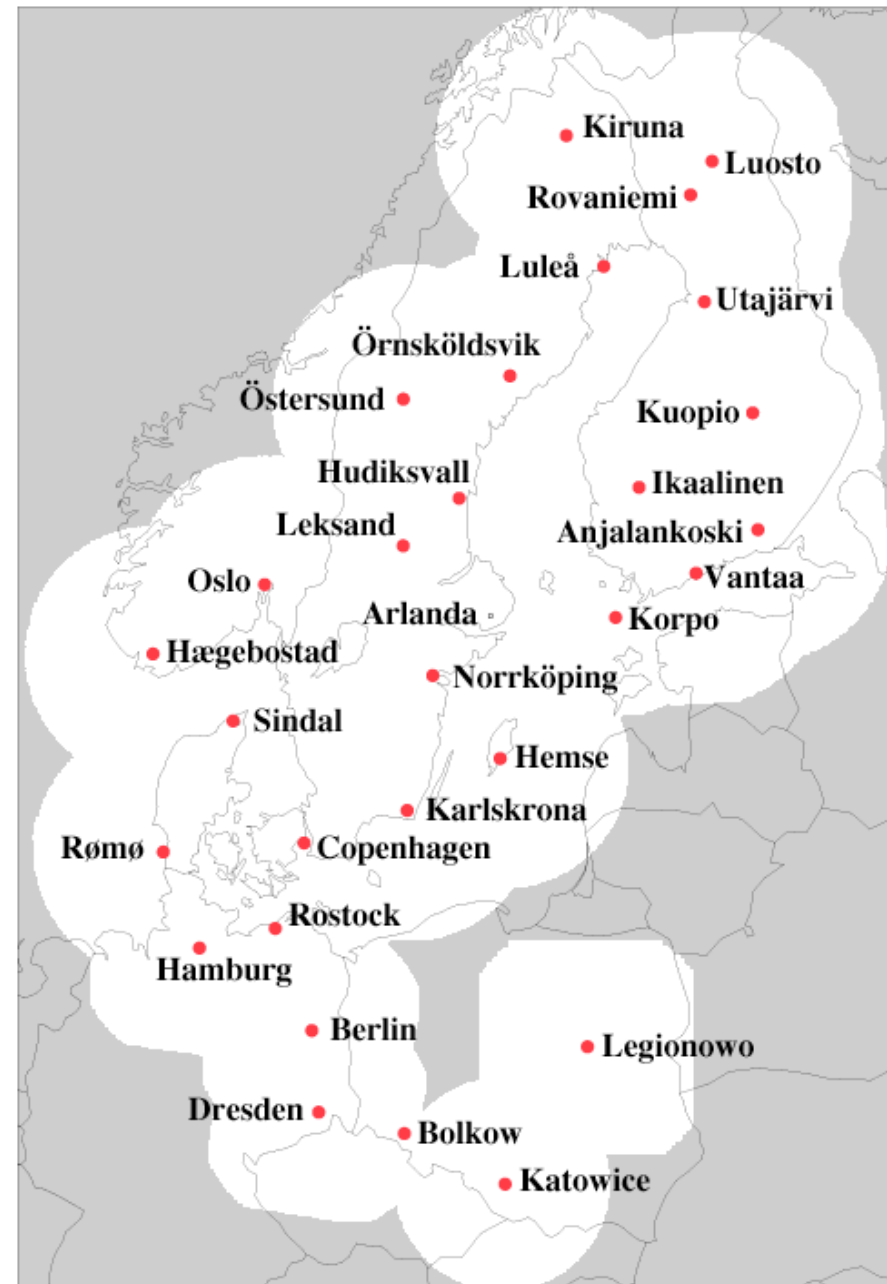
The Baltic Radar Network

Resolution 15 min
2 km

Provider

SMHI, Sweden

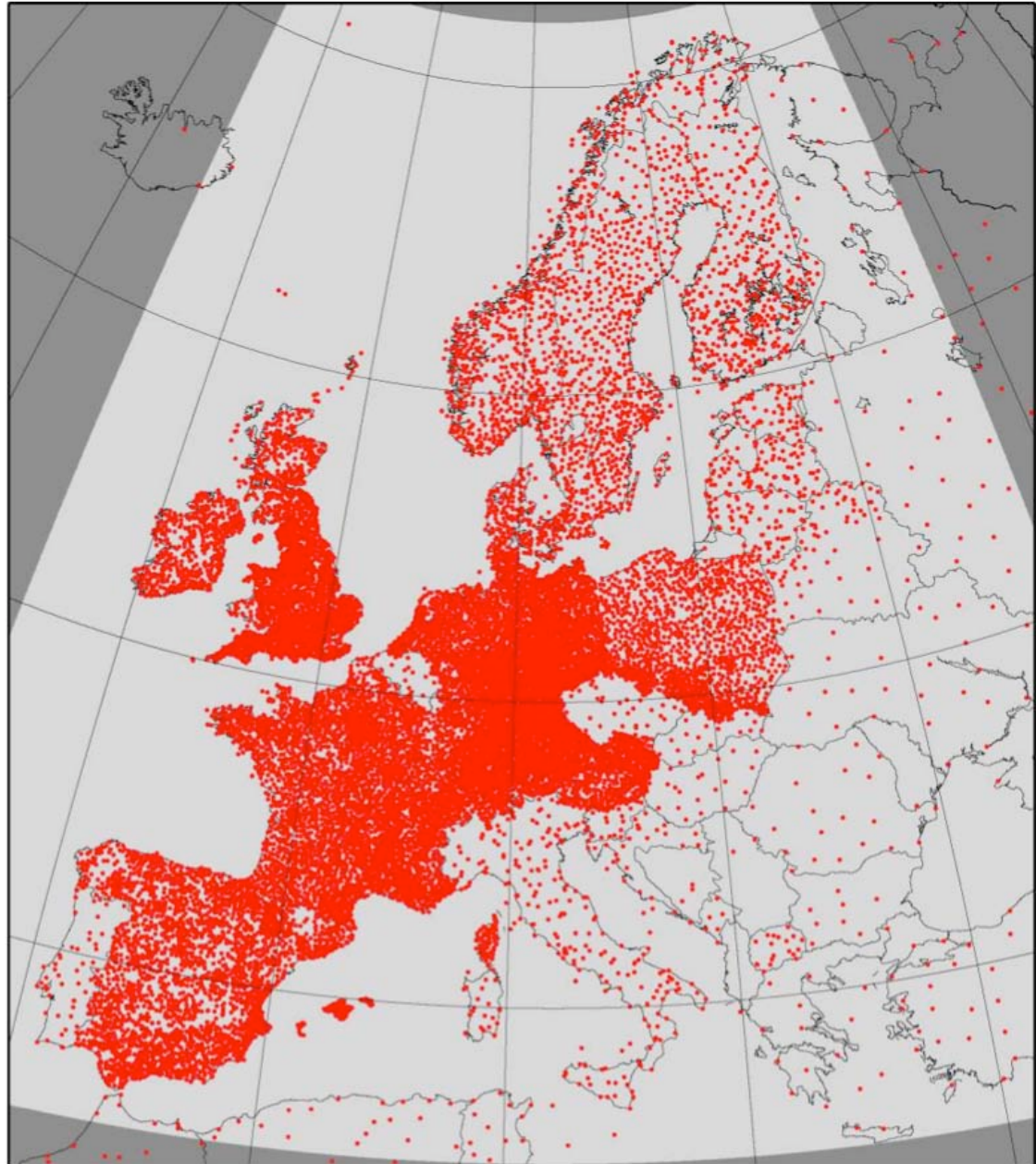
Daniel Michelson



Data - rain gauges

Total 21,000

Denmark	210
Sweden	740
Norway	670
Finland	400
Poland	1,190
Great Britain	2,900
Ireland	400
Netherlands	320
Germany	4,000
France	4,250
Spain	3,350
Austria	490
Switzerland	350

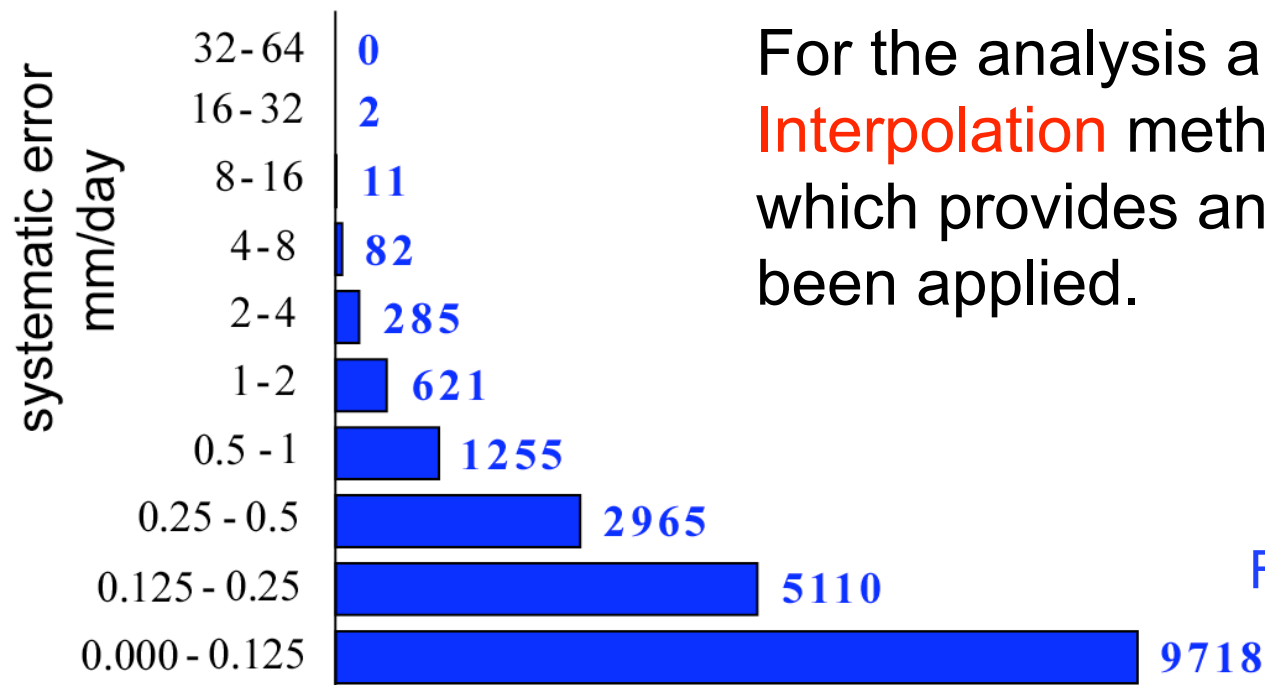


Method - Precipitation Correction and Analysis

PCA-Model developed during FP4 projects

NEWBALTIC I, II

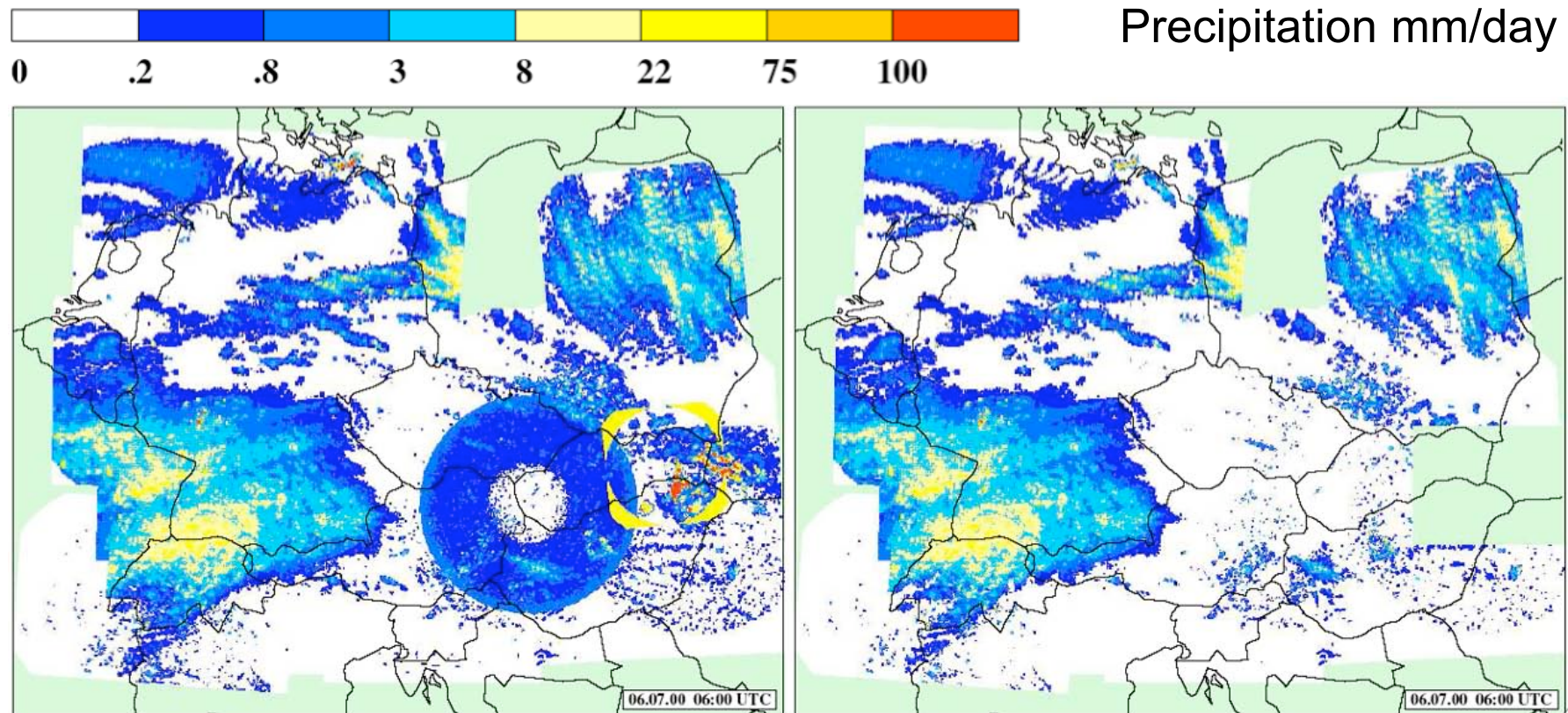
Daily gauge measurements have been corrected for systematic errors (**wind induced errors, wetting and evaporation losses**).



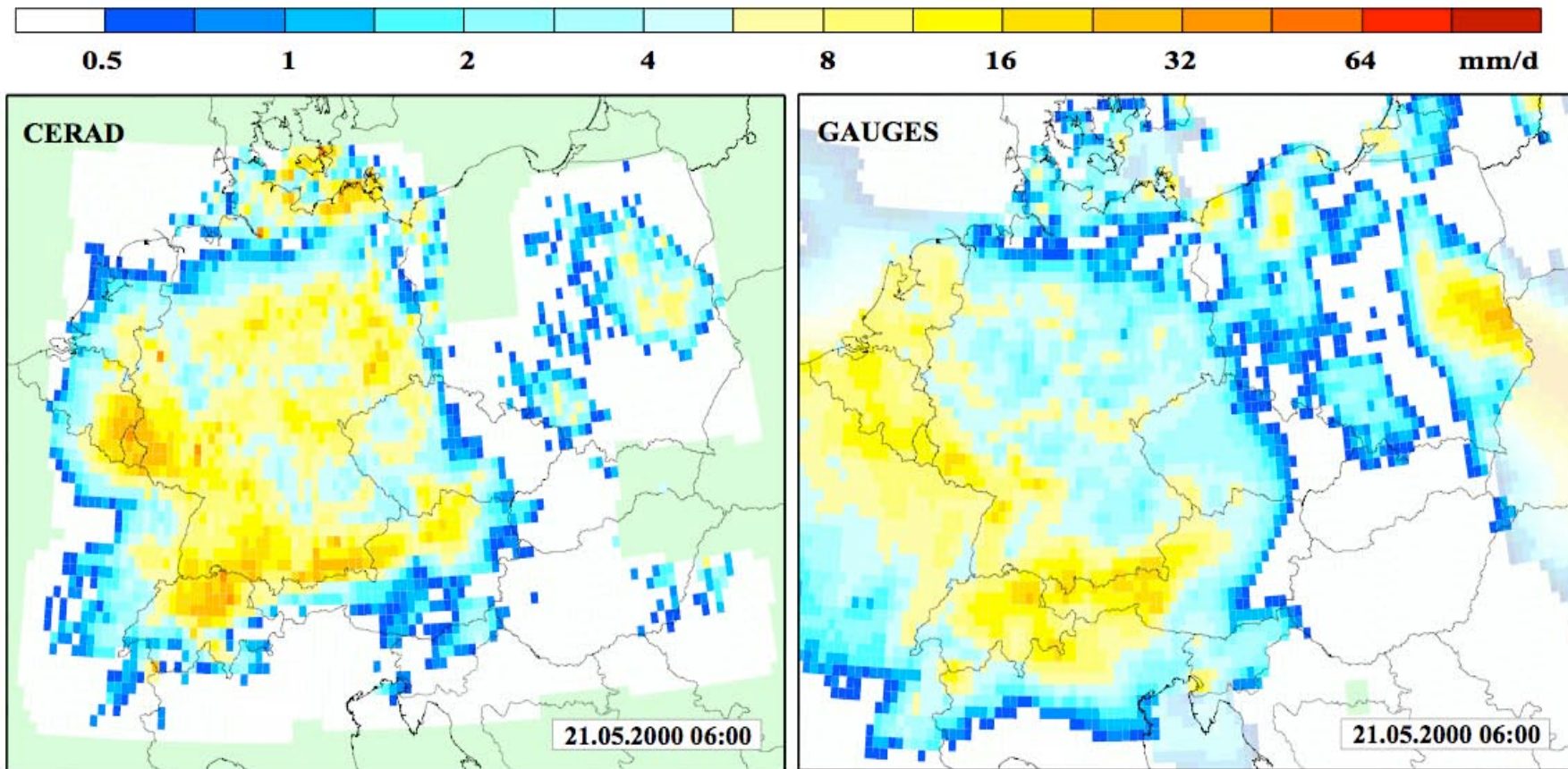
For the analysis an **Optimum Interpolation** method (Block-Kriging), which provides an error estimate has been applied.

Frequency distribution
1 Jan. 2000

Method - Error reduction of CERAD



Accumulated radar precipitation in mm/day, original (left) and corrected (right). Radar specific uncertainties are for example artefacts, ground and sea clutter, missing pictures, etc.



Results for 21 Mai 2000

Gauges 3.79 mm/d

Radar precipitation

RMS error

Rank-order correlation

uncorr.

corr.

5.81

3.61

10.71

4.92

0.48

0.62

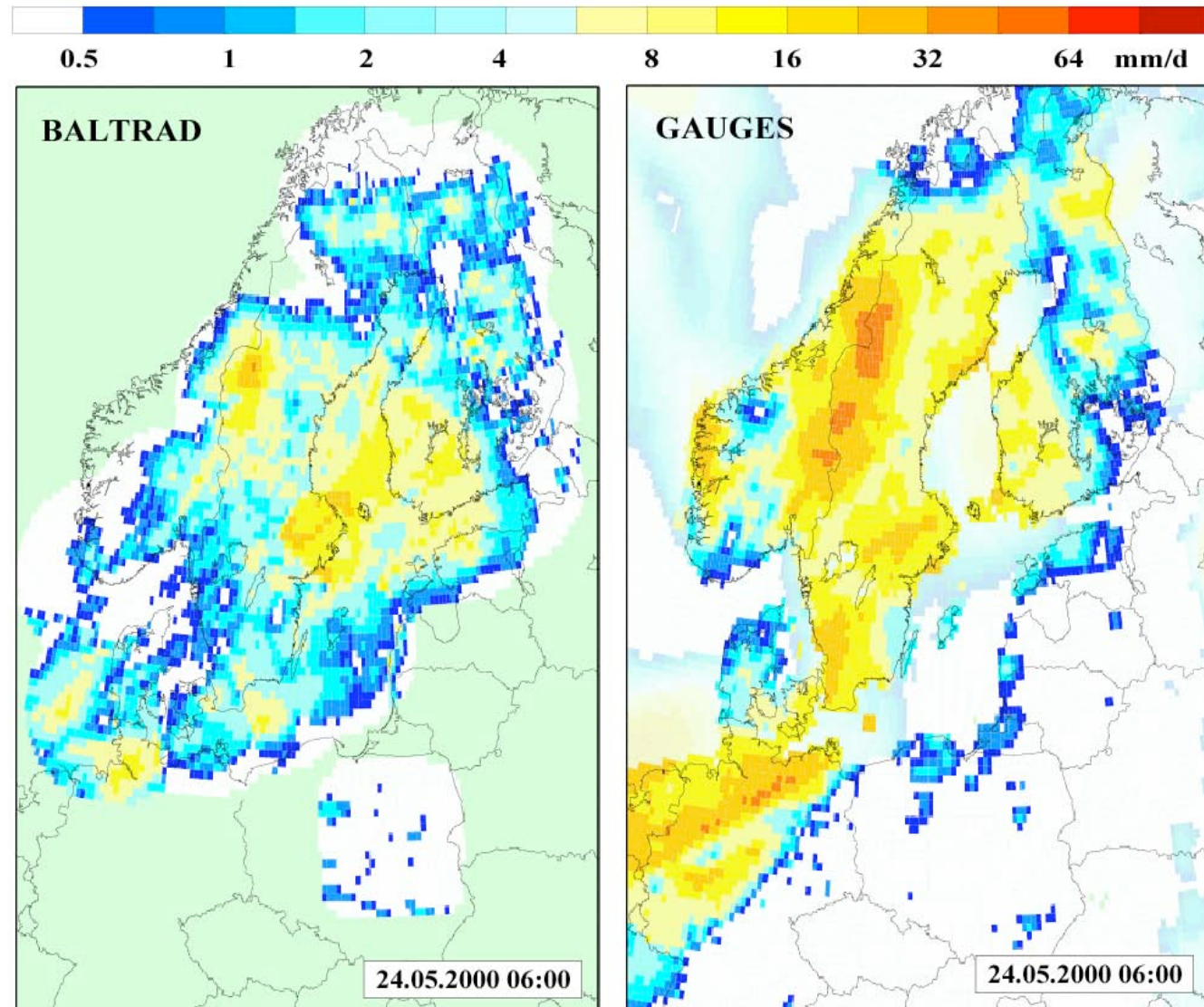
Comparison - daily precipitation BALTRAD vs gauges in mm/day

Gauges 3.18
BALTRAD 1.15
RMSE 3.85
Correlation 0.56

Results for 2000

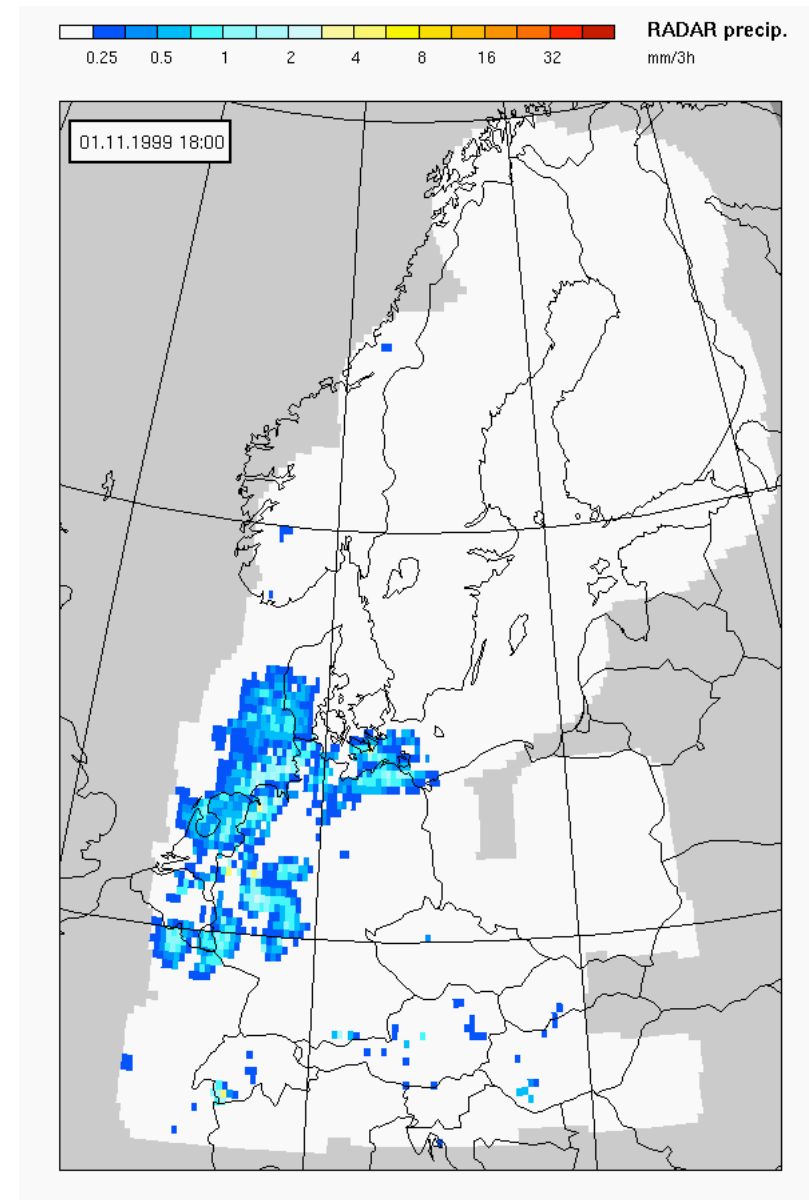
BALTRAD under-
estimates surface
precipitation

Gauges 2.40
BALTRAD 0.76



Merged CERAD / BALTRAD fields on 0.2° grid

Operational BALTRAD and CERAD data have been accumulated to 3-hourly precipitation sums and interpolated to the 0.2° ELDAS grid. For overlapping grid areas the maximum value has been applied.



Results - merged CERAD/BALTRAD data, adjusted with daily precipitation gauge analyses

Quantitative 3-hourly precipitation estimates derived from two international weather radar networks, CERAD and BALTRAD, have been merged and interpolated to the same 0.2 degree grid. Radar specific errors in CERAD have been reduced by a semi-automatic procedure.

A total number of 21,000 daily precipitation observations have been corrected for systematic measurement errors and analysed on a 0.2 degree grid.

The simplest possible method, linear temporal interpolation was used to adjust the 3hourly radar fields with daily gauge analyses.

Results

ELDAS precipitation product

Period: Oct. 1999 - Dec. 2000

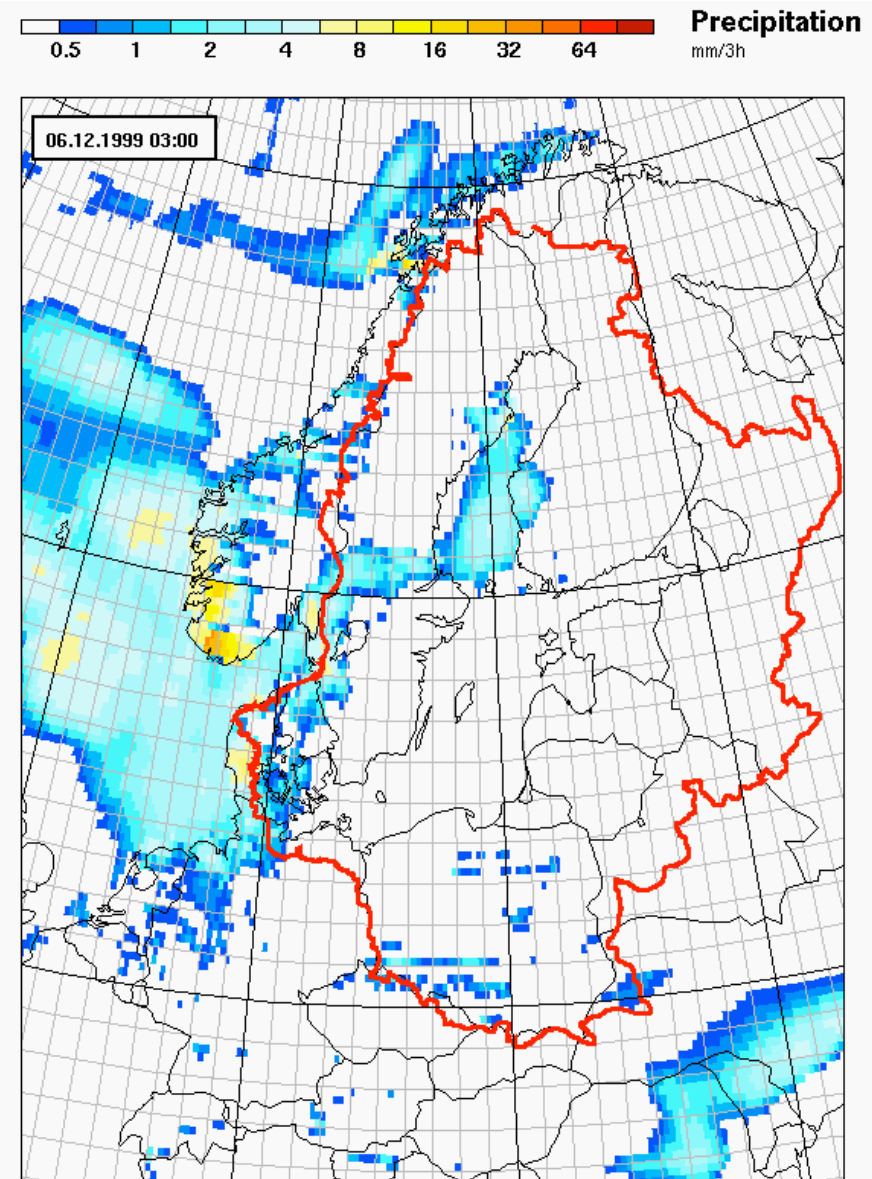
Input Data: BALTRAD, 2km 15min
CERAD, 4km 30min
Gauges, 21,000 daily

Background: ECMWF T511 exp. run

Addition: Error fields and flags

Resolution: 3-hourly / 0.2 degree

Region: Central & Northern
Europe



Outlook

The experimental versions of the ELDAS precipitation fields in both resolutions, daily and 3-hourly, have been stored in **GRIB format in the ECMWF MARS** archive.

Daily precipitation fields in **ASCII file format** will be archived and distributed by the **Global Precipitation Climatology Centre (GPCC)**.

Acknowledgements

Daniel Michelson - provided the BALTRAD data

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Uta Gjertsen - provided the Norwegian precipitation gauge data

BALTEX MDC