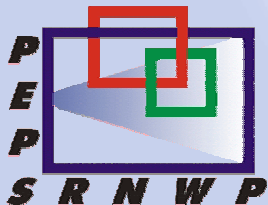# Verification of the SRNWP-PEPS:

- **System**

- **Case Studies**

- **Verification of Precipitation**

- **Verification Toolbox**

The work was done by
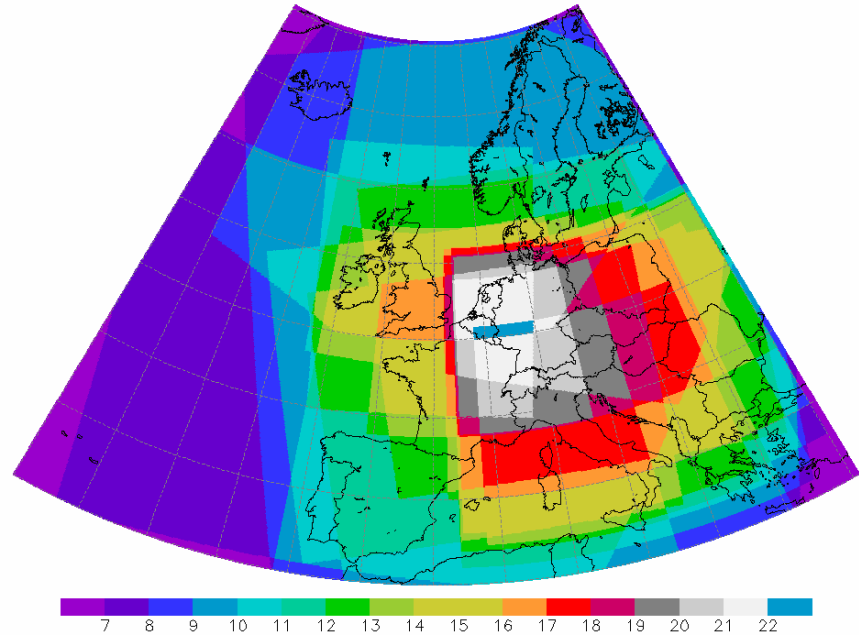
Sebastian Trepte
Martin Göber
Bernhard Anger
Michael Denhard

EUMETNET
The Network of European Meteorological Services

Short-Range
Numerical Weather Prediction
Programme

www.dwd.de/PEPS

contributing models

Meteorological Service	Regional Model	Coupling Model	Resolution (km)	Forecast Period (h)	Time interval (h)	Main Runs (UTC)
Belgium	ALADIN-BE	ARPEGE	15	+60	1	0, 12
France	ALADIN	ARPEGE	11	+48	3	0, 12
Portugal	ALADIN-PT	ARPEGE	12.7	+48	1	0, 12
Austria	ALADIN-AT	ARPEGE	9.6	+48	1	0, 12
Croatia	ALADIN-LACE	ARPEGE	9	+72	3	0, 12
Czech. Repub.	ALADIN-LACE	ARPEGE	11	+48	1	0, 6, 12, 18
Hungary	ALADIN-LACE	ARPEGE	11	+48	1	0, 12
Slovakia	ALADIN-LACE	ARPEGE	11	+48	3	0, 12
Slovenia	ALADIN-LACE	ARPEGE	9.4	+48	3	0, 12
Denmark	HIRLAM	ECMWF	16	+60	1	0, 6, 12, 18
Finland	HIRLAM	ECMWF	22	+54	1	0, 6, 12, 18
Spain	HIRLAM	ECMWF	18	+48	1	0, 6, 12, 18
Netherlands	HIRLAM	ECMWF	22	+48	1	0, 6, 12, 18
Ireland	HIRLAM	ECMWF	16	+48	3	0, 6, 12, 18
Norway I	HIRLAM	ECMWF	11	+30	1	0, 12
Norway II	HIRLAM	ECMWF	22	+30	1	0, 12
Sweden I	HIRLAM	ECMWF	11	+48	3	0, 6, 12, 18
Sweden II	HIRLAM	ECMWF	22	+48	3	0, 6, 12, 18
Germany	LME	GME	7	+78	1	0, 6, 12, 18
Switzerland	aLMo	ECMWF	7	+72	1	0, 12
Poland	LM	GME	14	+72	3	0, 12
Italy	EuroLM	EuroHRM	7	+48	3	0, 12
United Kingdom	UM-EU	UM global	12	+48	3	0, 6, 12, 18

PEPS-Grid
with a grid spacing of
0.0625° (~7 km)
covering Europe

Probabilities
(Nearest Neighbour)

$$P_i(x > T) = \frac{Number \ of \ forecasts \ x \ exceeding \ T \ at \ i}{N_i}$$

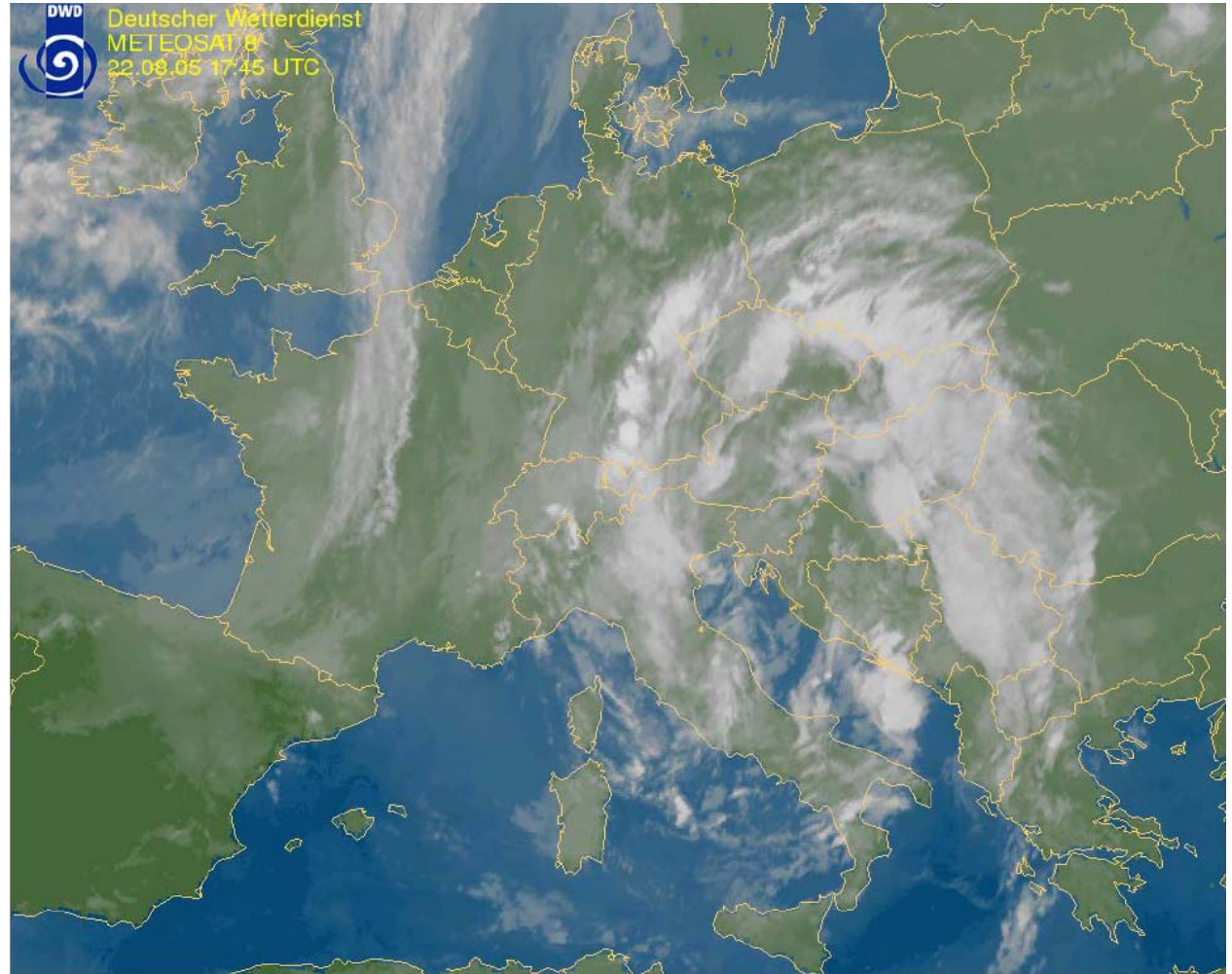where N_i is the total number of forecasts at PEPS grid point i and T is a threshold

➡ **the precision of the estimated probabilities depend on location**

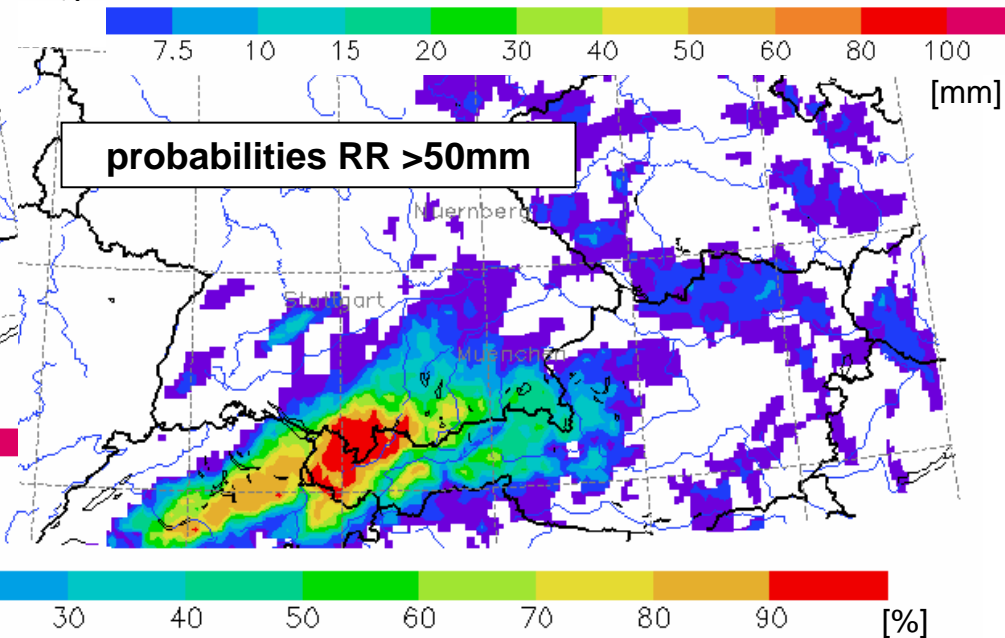Operational forecast center & Working group „evaluation of nwp" at DWD (many thanks to **Bernhard Anger)**
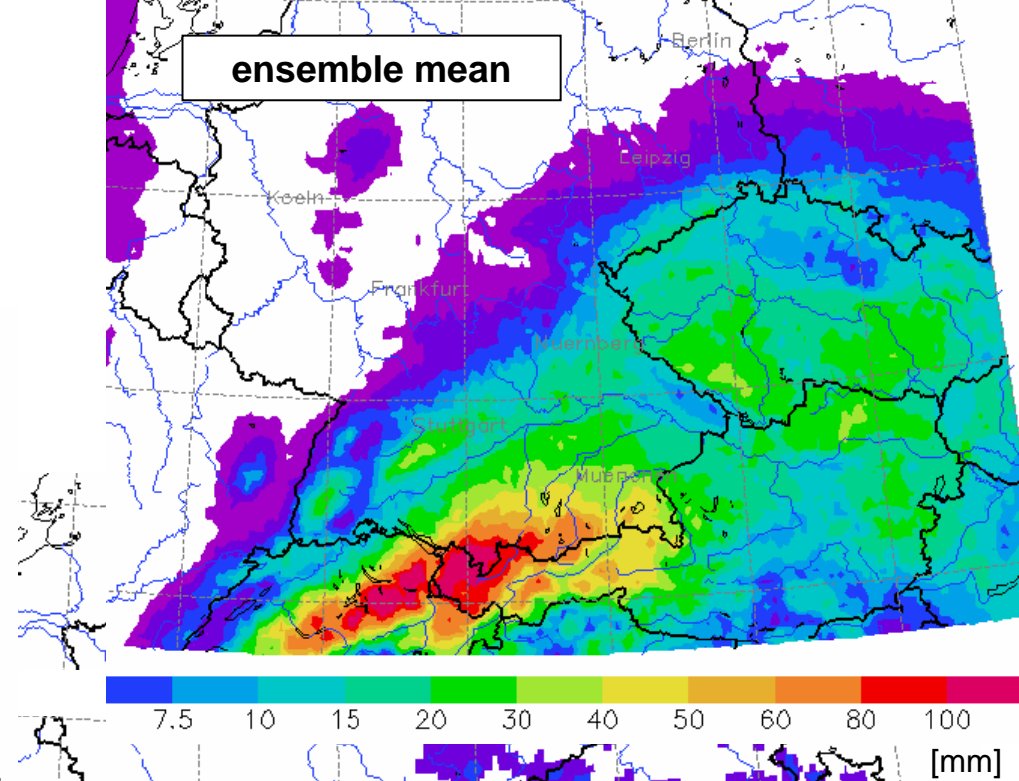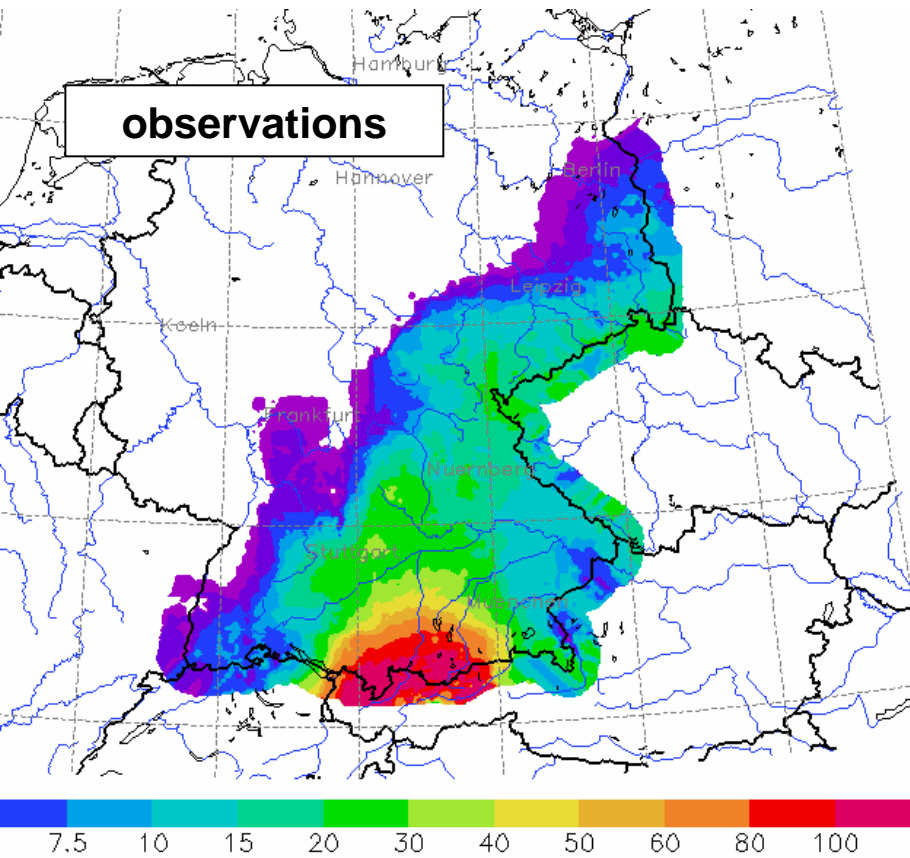
Event	negative	positive
maximum temperature end of Mai		- significant probabilities - good spacial resolution
heavy precipitation Thunderstorms Mai 3 2005	- missed some extremes - bad localisation of extremes	- significant probabilities - more consistent forecasts compared to single models

wind gusts
 Thunderstorms
 March 11 & June 3
	- underestimation in
	   convective cases
	 - overestimation in non
	   convective cases
		- good spacial resolution

snow Coldfront alpine foehn situation March 10 & 12	passage of cold front was to fast	good estimation of orographic effects on snowfall
snow November 25/26	underestimation of snow amount	- good spacial resolution - good signals for gusts

**Flooding
in
Bavaria
August 2005**

24h precipitation
run: 22.08.05 0 UTC,
available: 22.08.05 6:05 UTC
valid: 22. 8. - 23. 8., 6 UTC

ensemble mean

observations

probabilities RR >50mm

Element: 24h total precipitation (RR24) 06...06 UTC
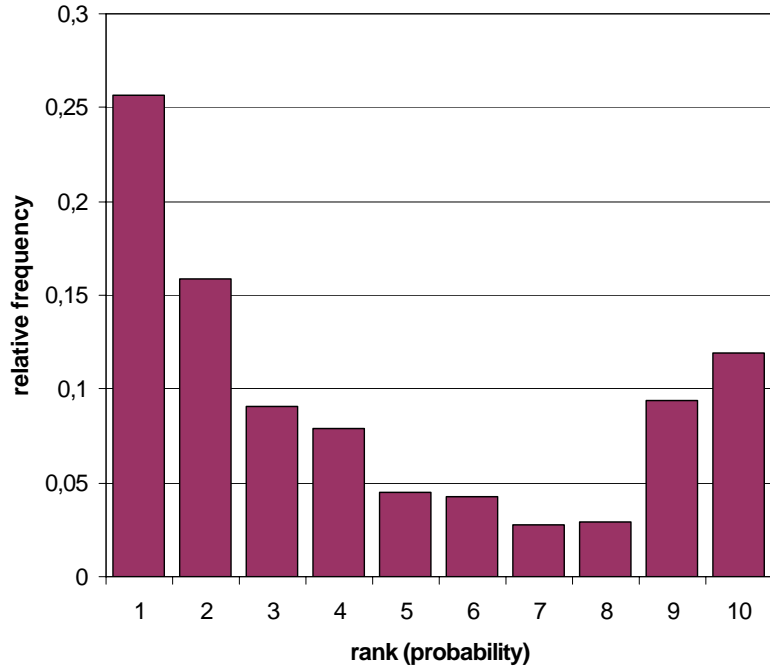
Area: Germany
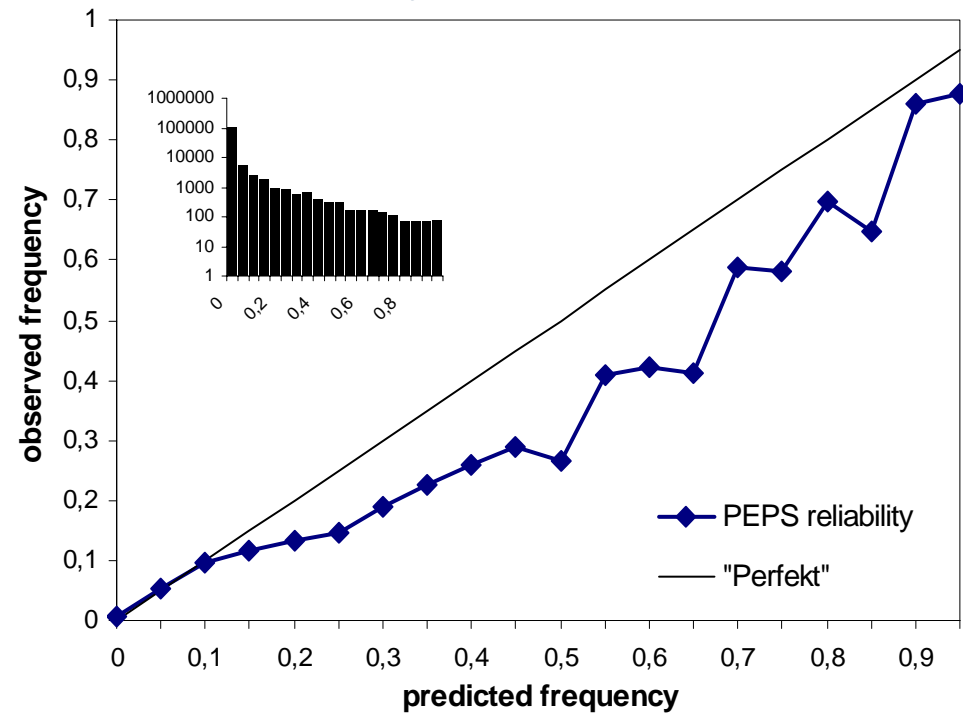
Observations:
synop (214)
AMDAIII precipitation (650)

Event: RR24 > 20 mm

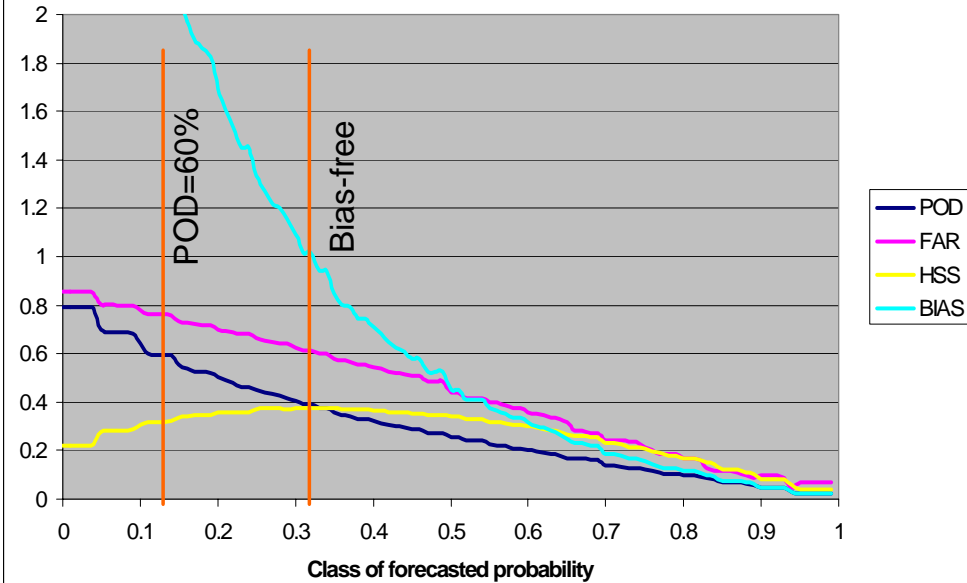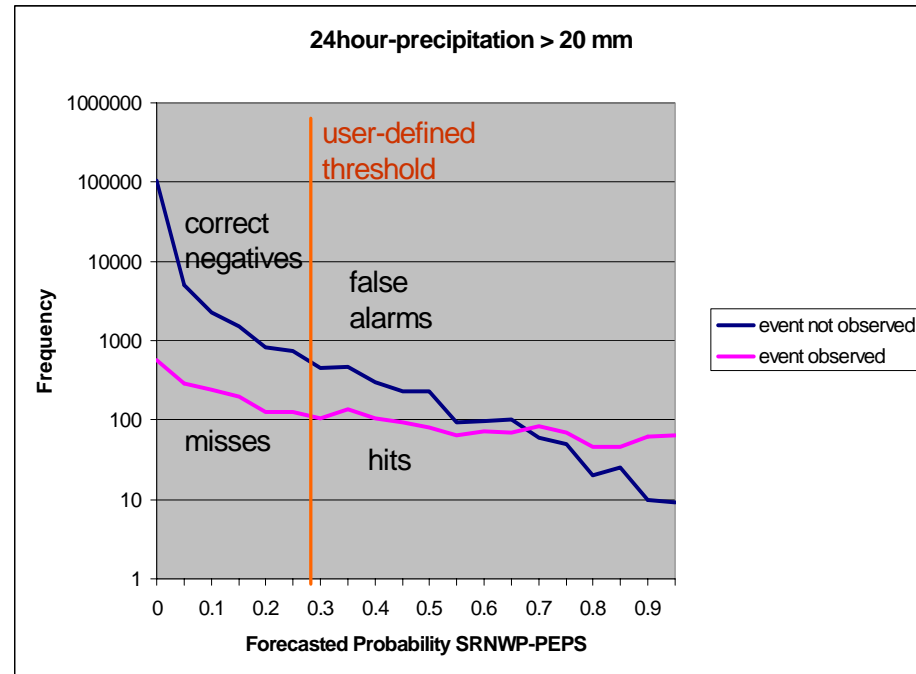**Time Period:** April to September 2005

Pit-Histogram RR24 March 2006

Reliability RR24h > 20mm

24-hour precipitation > 20 mm
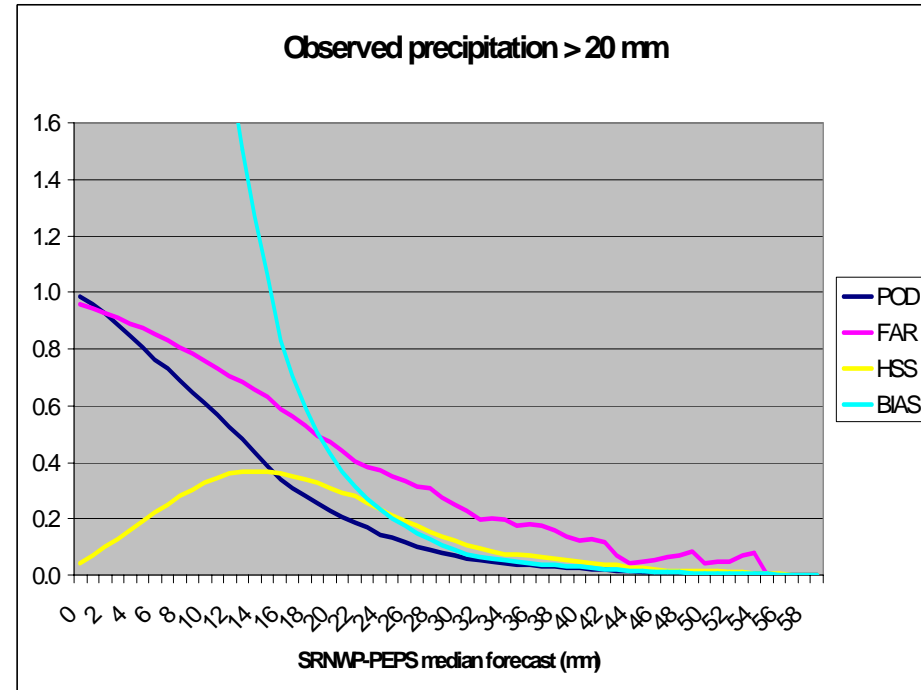

24hour-precipitation > 20 mm

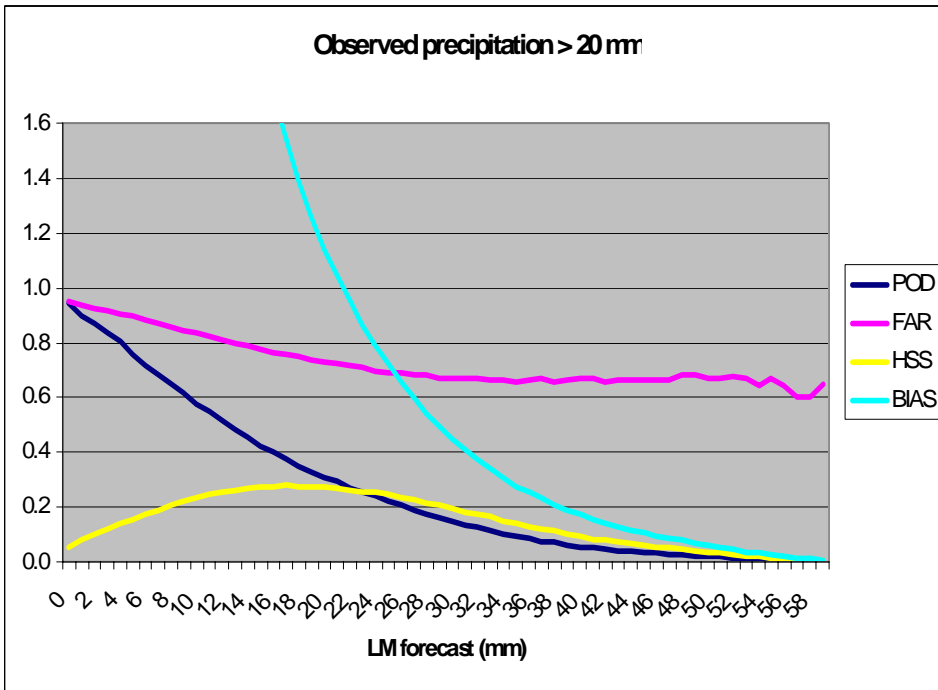| Measured			PEPS-
value		LM	median
Bias-free at	22 mm		15 mm
POD	29		39
FAR	72		63
HSS	27		37

Measured			PEPS-
value		LM	median
POD=60% at	9 mm		10 mm
BIAS	4		2.5
FAR	85		76
HSS	22		33

LM

SRNWP-PEPS

Observed precipitation > 20 mm

LM forecast (mm)

Observed precipitation > 20 mm
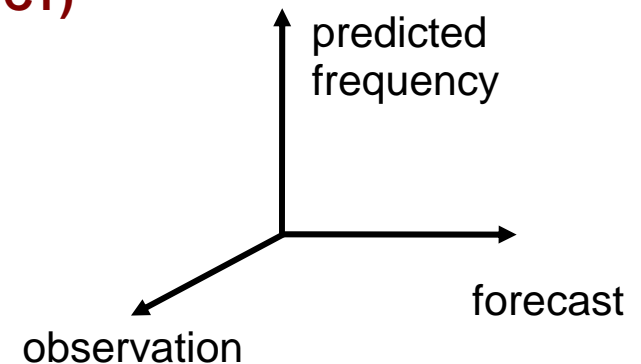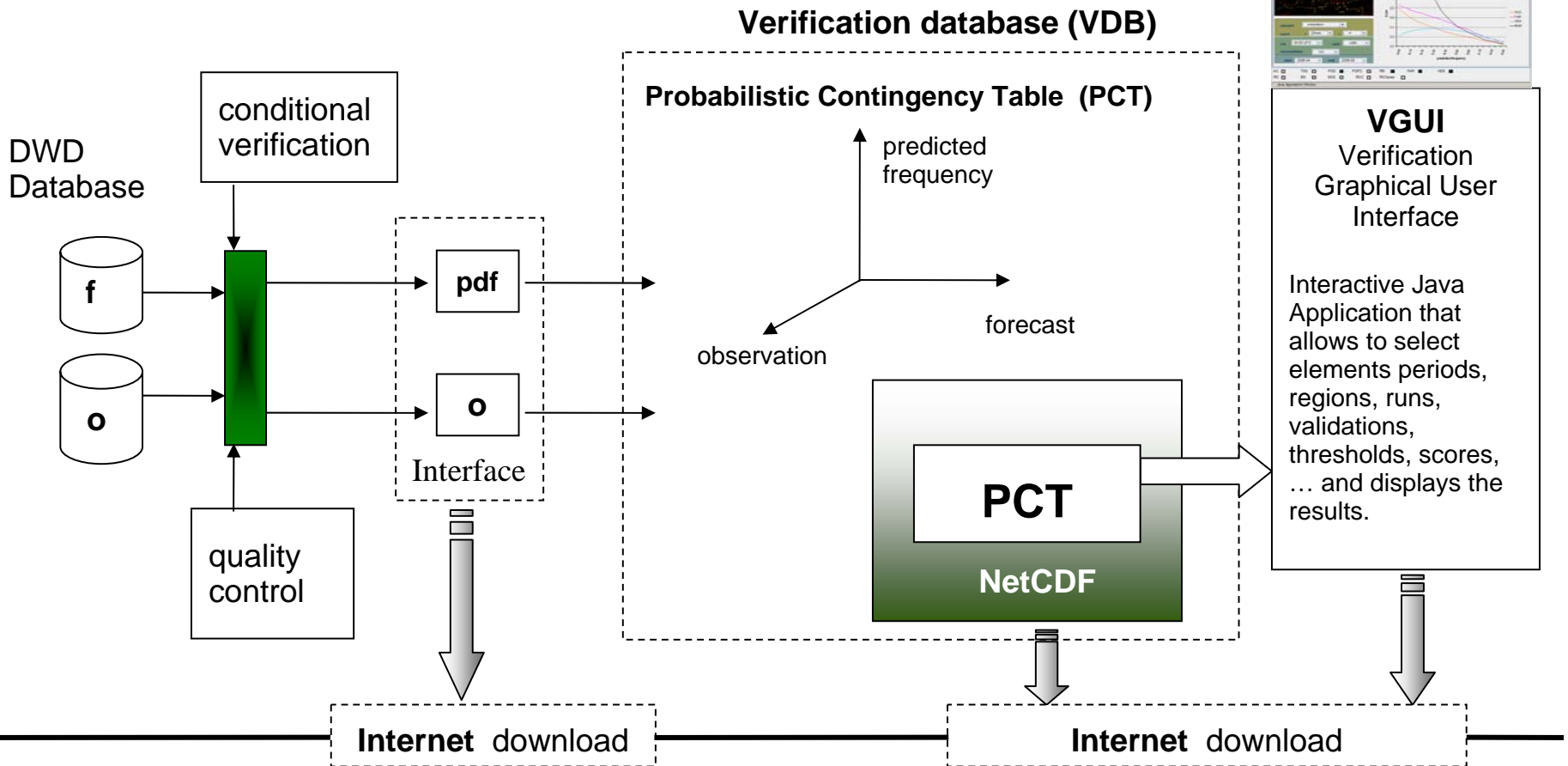

SRNWP-PEPS median forecast (mm)

- **User oriented Verification**

- **standard Verification Tool**

- **Graphical User Interface** (Java Swing)

- **easy to use** (download via „Java Web Start")

- **comparing Ensemble Systems**

Probabilistic Multi-Category Contingency Table (PCT)

- based on categories

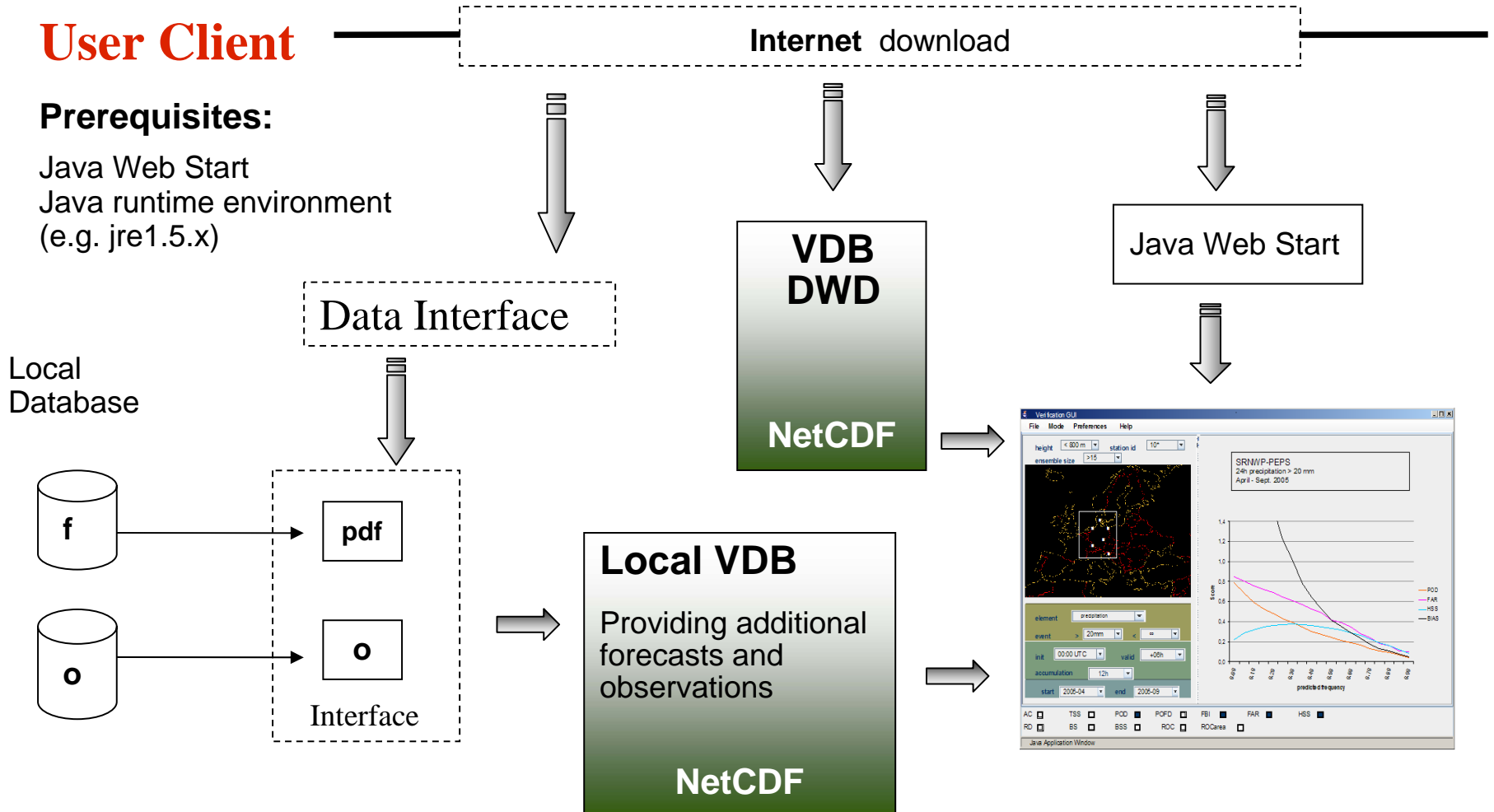- smallest bin width defined by measurement error

- monthly accumulation

predicted frequency

forecast

observation

Verification Server DWD

Verification database (VDB)

Probabilistic Contingency Table (PCT)

DWD
Database

conditional
verification

f

o

quality
control

pdf

o

Interface

predicted
frequency

observation

forecast

PCT

NetCDF

VGUI
Verification
Graphical User
Interface

Interactive Java
Application that
allows to select
elements periods,
regions, runs,
validations,
thresholds, scores,
… and displays the
results.

Internet download

Internet download

User Client

Internet download

Prerequisites:

Java Web Start
Java runtime environment
(e.g. jre1.5.x)

Data Interface

VDB
DWD

NetCDF

Java Web Start

Local
Database

pdf

o

Interface

f

o

Local VDB

Providing additional
forecasts and
observations

NetCDF

SRNWP-PEPS
24h precipitation > 20 mm
April - Sept. 2005

Verification Graphical User Interface

- area/station id
- height
- init/valid
- element
- event
- accumulation
- time period
- score

- **First version of Verification Tool Box ready end of May**

- **Report on basic PEPS verification at SRNWP Ensemble meeting in November**

- **Calibration with modified Bayesian Model Averaging (BMA)**

- **Operational distribution of calibrated PEPS products in Spring**

**Thank you
to the
contributing
Weather Services !**