

Joining COSMO-LEPS, SRNWP-PEPS, and LMK-LAF-ensemble
to generate calibrated precipitation forecast scenarios

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Project:

”Ensemble forecasts in operational flood risk management of the Mulde river basin”

BMBF-funding programme "Research for the environment" with the theme "Risk management of extreme flood events".

Aim:

Provision of scenarios of precipitation evolution for hydrological flood forecast models in operational mode.

Analysis of meteorological forecasts in terms of the potential of the incidence rate of severe precipitation events.

Joining different ensemble systems available at DWD

COSMO-LEPS (+120 h)

SRNWP-PEPS (+48 h)

LMK-LAF (+18 h)

COSMO-LEPS

Probabilistic forecasts of COSMO-LEPS

Limited-area Ensemble Prediction System (LEPS),
based on LokalModell (LM) of DWD and developed within COSMO
(Consortium for Small-scale Modelling).

Number of ensemble members: 16

Horizontal resolution: 10 km

Lead time: 120 hours

SRNWP-PEPS



Multi-model Ensemble Prediction System (Poor Man's Ensemble) based on routine forecast models of European Meteorological Services and developed at DWD within the SRNWP programme (Short-Range Numerical Weather Prediction) of EUMETNET.

- 23 ensemble members
- ALADIN, HIRLAM, COSMO, UKMO consortia
- Short-range ensemble forecasts on a 7 km grid
- Ensemble mean (median) and probabilistic forecasts
- Domain size: 35°–70°N, 30°W–30°E
- 4 runs per day
- Running at German Weather Service (DWD)
in an experimental mode (quasi-operational) since 1.5 years
- Distribution of the results to the Meteorological Services

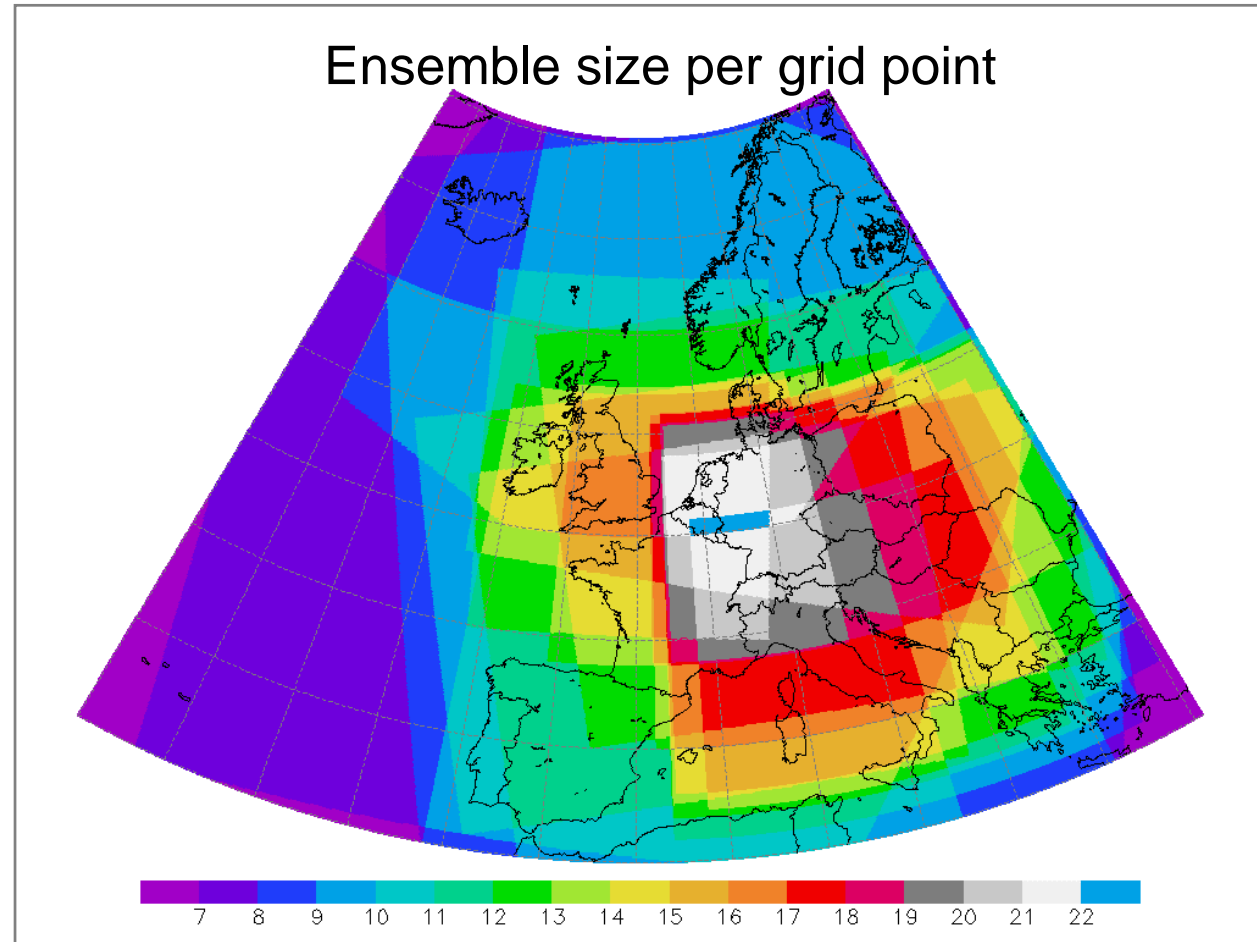
- Meteorological parameters:
 - Accumulated total precipitation**
 - Accumulated total snow**
 - Maximum 10 m wind speed**
 - Maximum 10 m wind gust speed**
 - Maximum/Minimum 2 m temperature**

Work flow

Transformation to an unique ensemble grid with a grid spacing of 0.0625° (~ 7 km) covering Europe and the North Atlantic Ocean
 961×561 grid points

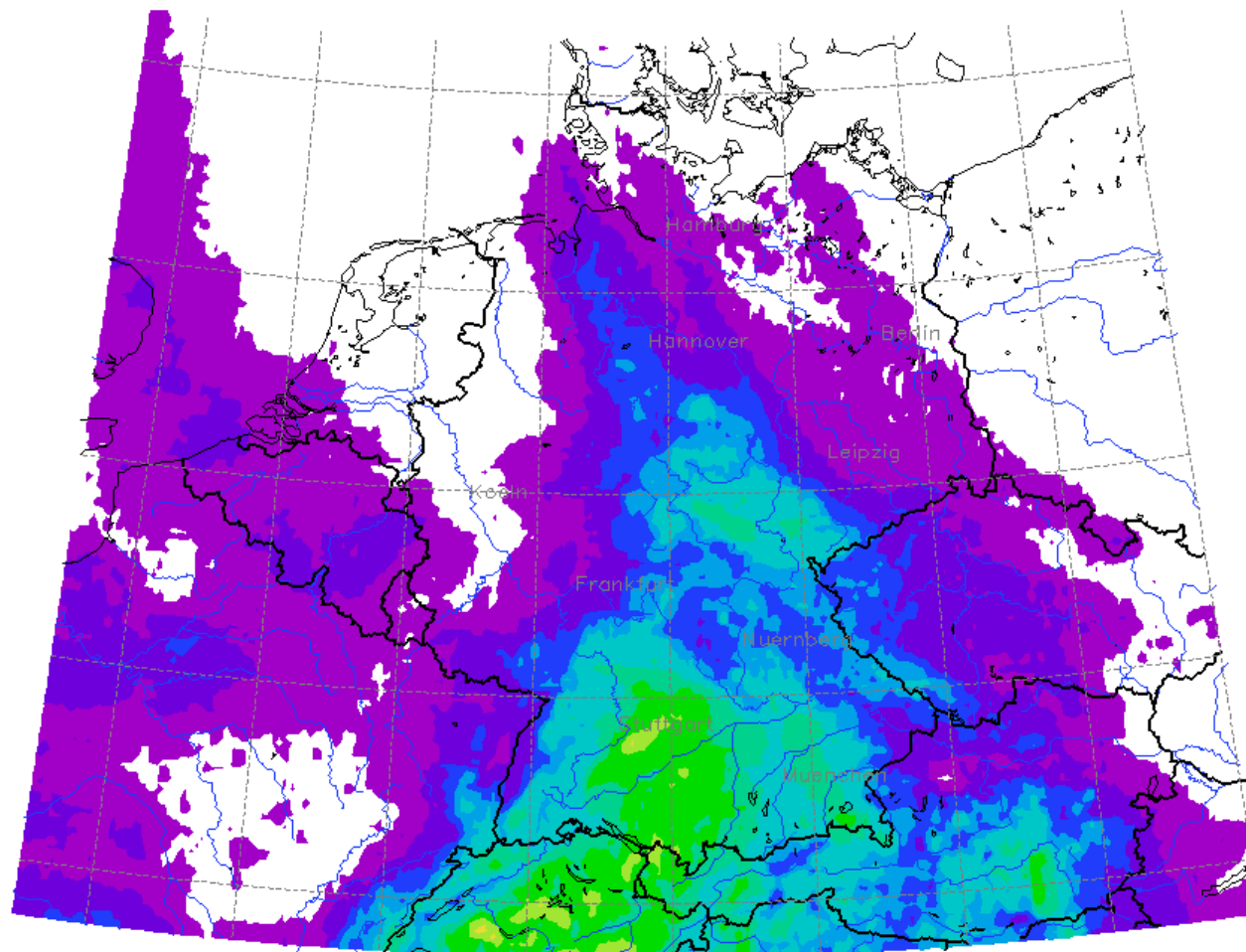
Calculation separately for each ensemble grid point:
 the nearest model grid points from all contributing models are used

→ **Ensemble size depends on location**



20050820 00 UTC +06...30

24 h surface total precipitation [mm]

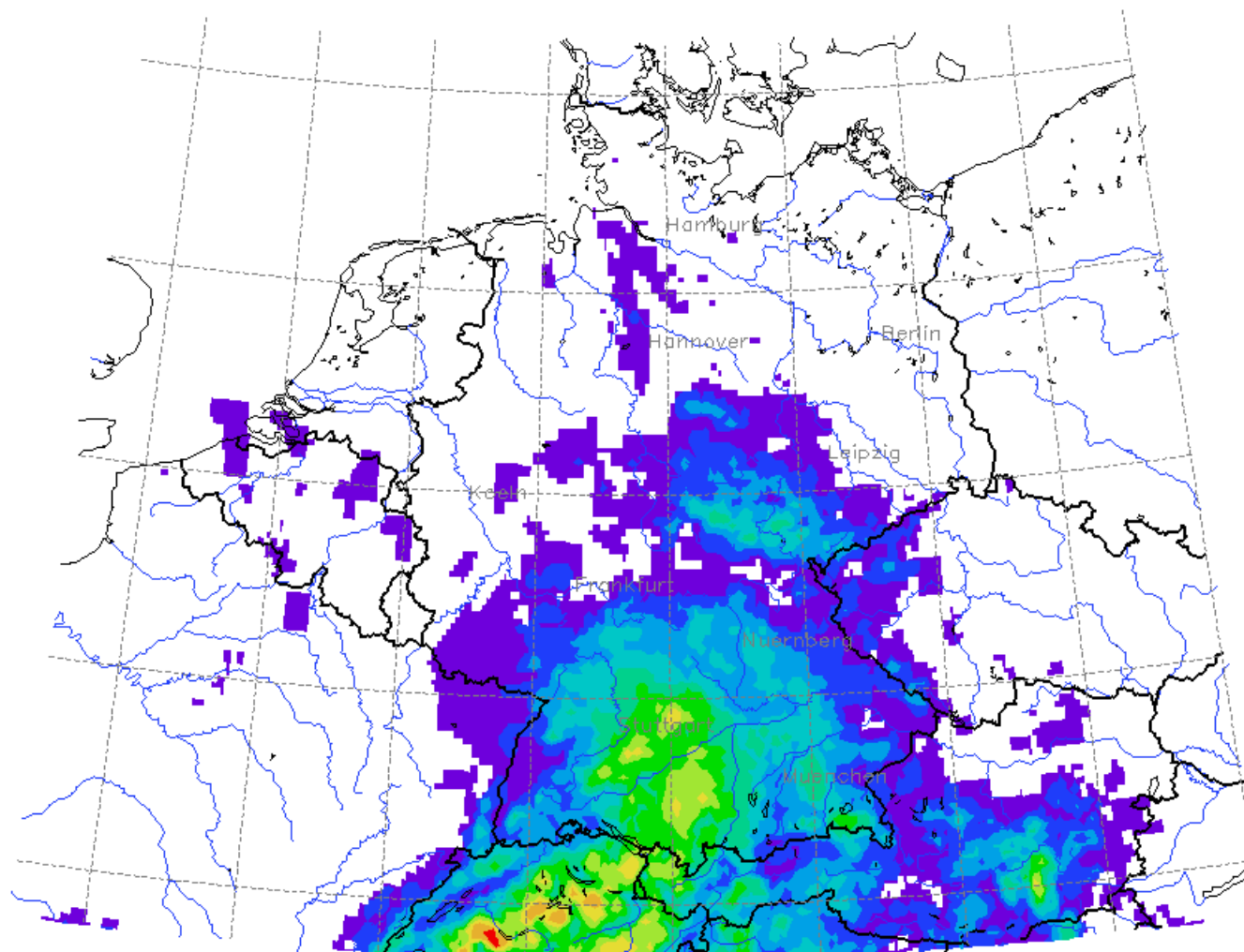


DWD
SRNWP-PEPS

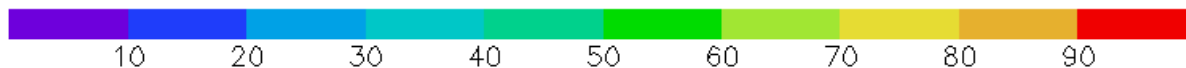


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probability of 24 h total precipitation > 20mm [%]



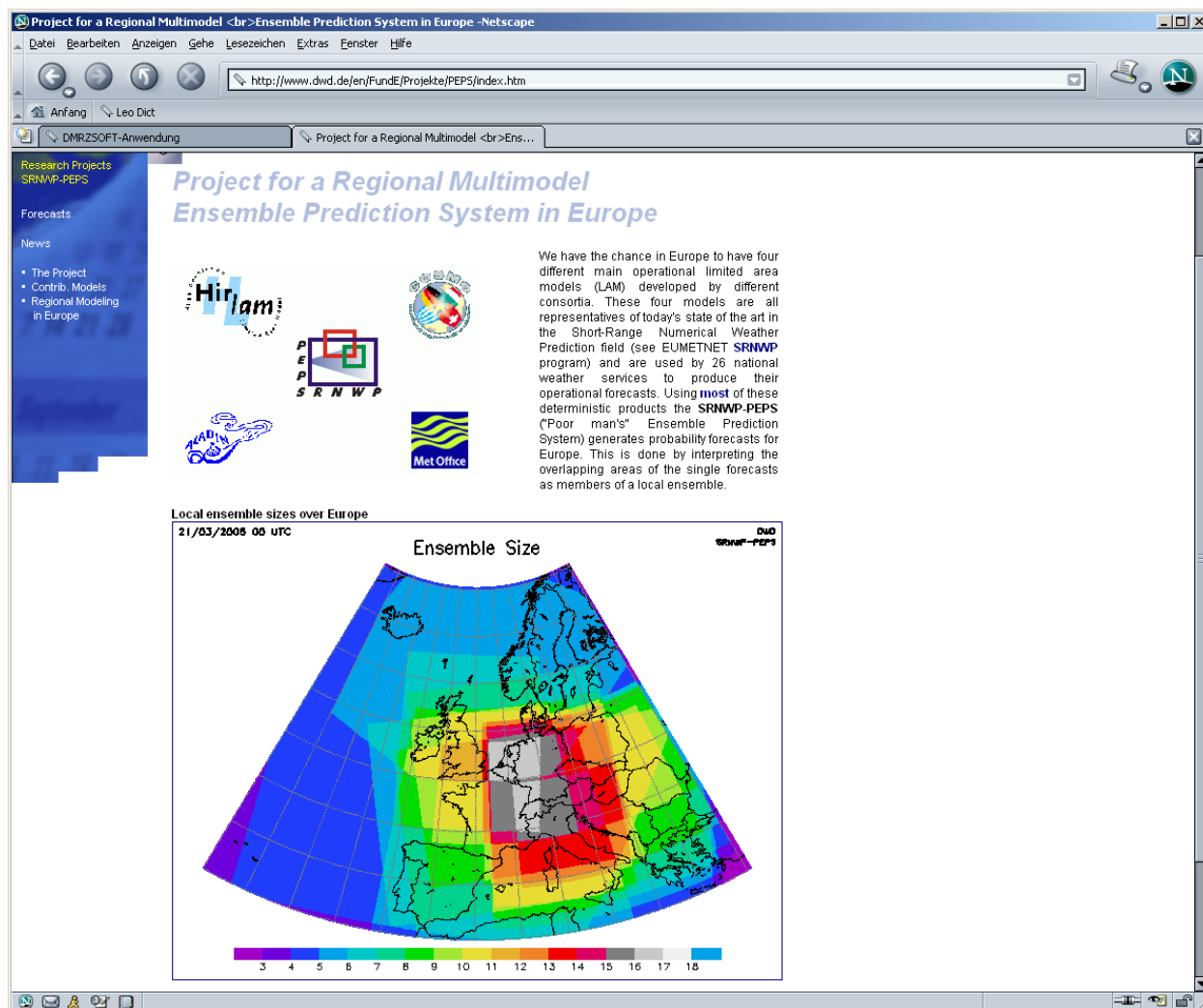
DWD
SRNWP-PEPS



SRNWP-PEPS Internet site

www.dwd.de/PEPS

open for all users

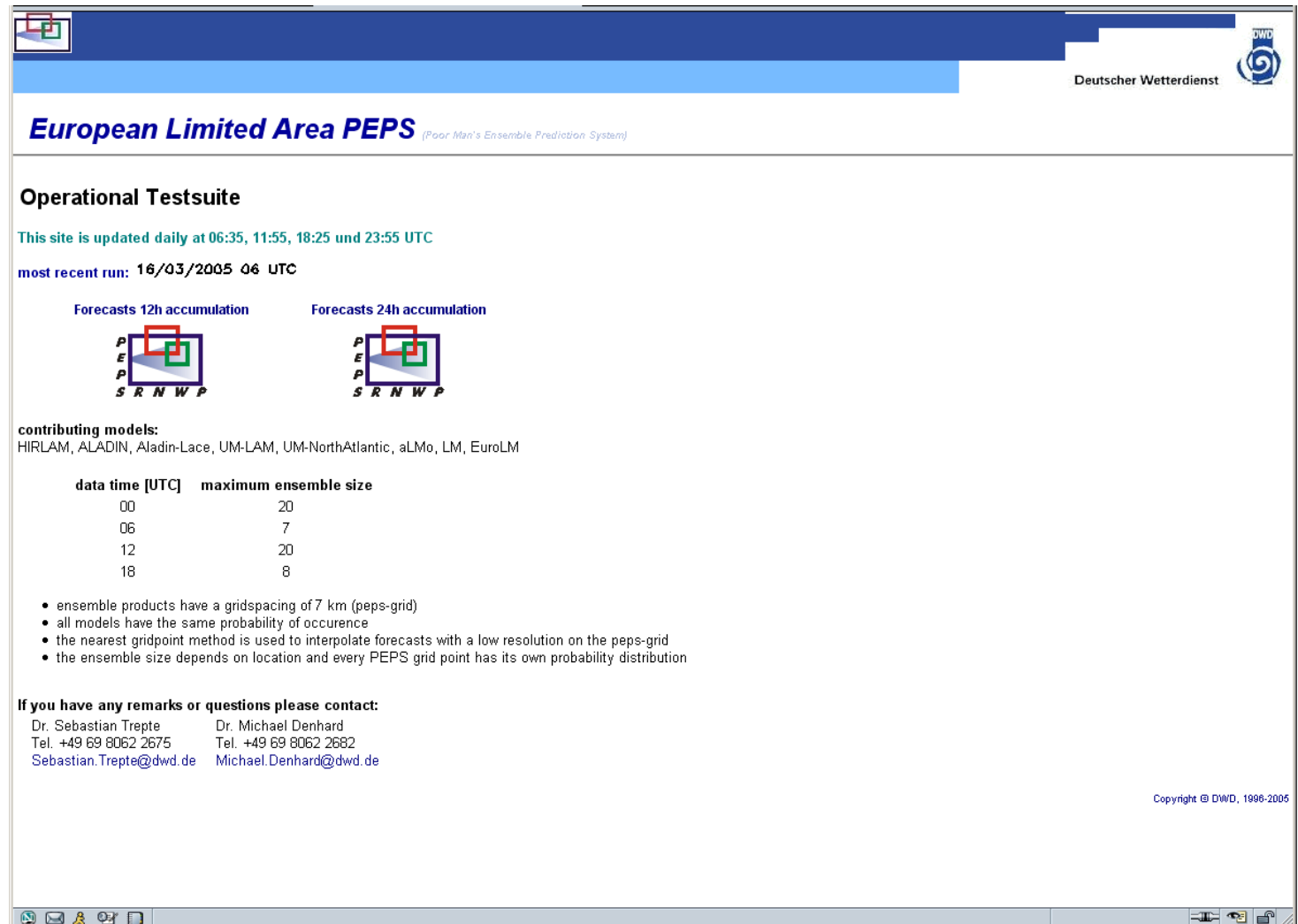
A screenshot of a Netscape browser window displaying the SRNWP-PEPS website. The browser title is "Project for a Regional Multimodel
Ensemble Prediction System in Europe - Netscape". The address bar shows the URL "http://www.dwd.de/en/Funde/Projekte/PEPS/index.htm". The website content includes a navigation menu on the left with "Research Projects SRNWP-PEPS", "Forecasts", and "News". The main content area features the title "Project for a Regional Multimodel Ensemble Prediction System in Europe" and a paragraph of text explaining the project's goal: "We have the chance in Europe to have four different main operational limited area models (LAM) developed by different consortia. These four models are all representatives of today's state of the art in the Short-Range Numerical Weather Prediction field (see EUMETNET SRNWP program) and are used by 26 national weather services to produce their operational forecasts. Using most of these deterministic products the SRNWP-PEPS ('Poor man's' Ensemble Prediction System) generates probability forecasts for Europe. This is done by interpreting the overlapping areas of the single forecasts as members of a local ensemble." Below the text are logos for HIRLAM, ARPEGE, and the Met Office. At the bottom, there is a map titled "Local ensemble sizes over Europe" for "21/03/2008 00 UTC". The map shows a color-coded distribution of ensemble sizes across Europe, with a legend at the bottom ranging from 3 to 18. The map shows higher ensemble sizes (red and orange) in the central and eastern parts of Europe, and lower sizes (blue and green) in the western and northern parts.

SRNWP-PEPS Internet site



link to
<forecasts>

closed user group





The screenshot shows the website for the European Limited Area PEPS (Poor Man's Ensemble Prediction System). The page has a blue header with the DWD logo and the text "Deutscher Wetterdienst". The main content area is white and contains the following information:

European Limited Area PEPS (Poor Man's Ensemble Prediction System)

Operational Testsuite

This site is updated daily at 06:35, 11:55, 18:25 und 23:55 UTC
most recent run: 16/03/2005 06 UTC

Forecasts 12h accumulation Forecasts 24h accumulation



contributing models:
HIRLAM, ALADIN, Aladin-Lace, UM-LAM, UM-NorthAtlantic, aLMo, LM, EuroLM

data time [UTC]	maximum ensemble size
00	20
06	7
12	20
18	8

- ensemble products have a gridspacing of 7 km (peps-grid)
- all models have the same probability of occurrence
- the nearest gridpoint method is used to interpolate forecasts with a low resolution on the peps-grid
- the ensemble size depends on location and every PEPS grid point has its own probability distribution

If you have any remarks or questions please contact:

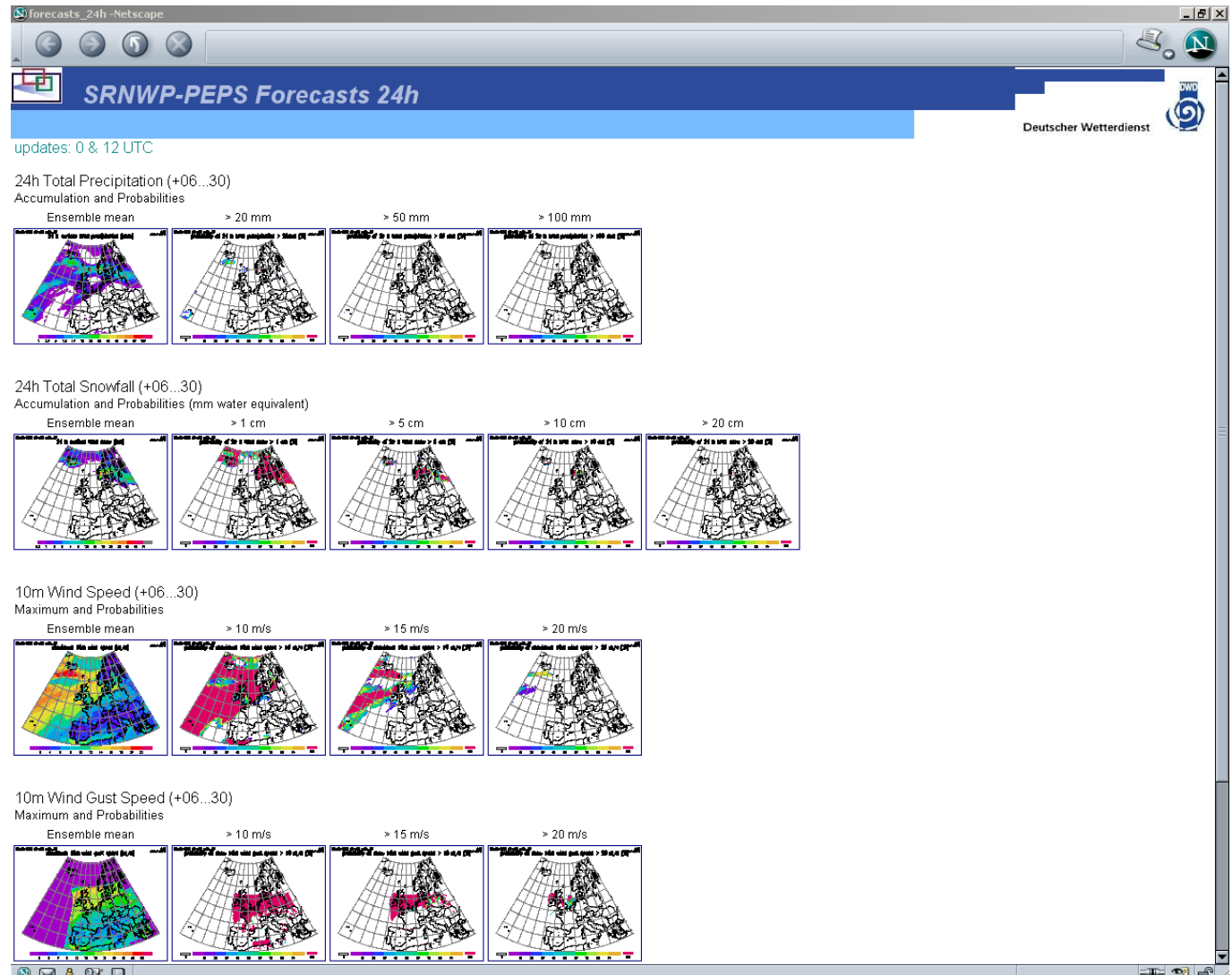
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SRNWP-PEPS Internet site



link to
<Forecasts 24h>



LMK (LM-Kürzestfrist)

Categorical and probabilistic forecasts of LMK

High-resolution model based on LM for the very short-range forecast.

Features: explicit simulation of deep convection, new microphysics scheme of precipitation particles, assimilation of radar reflectivities every 3 hours in addition to synoptic data.

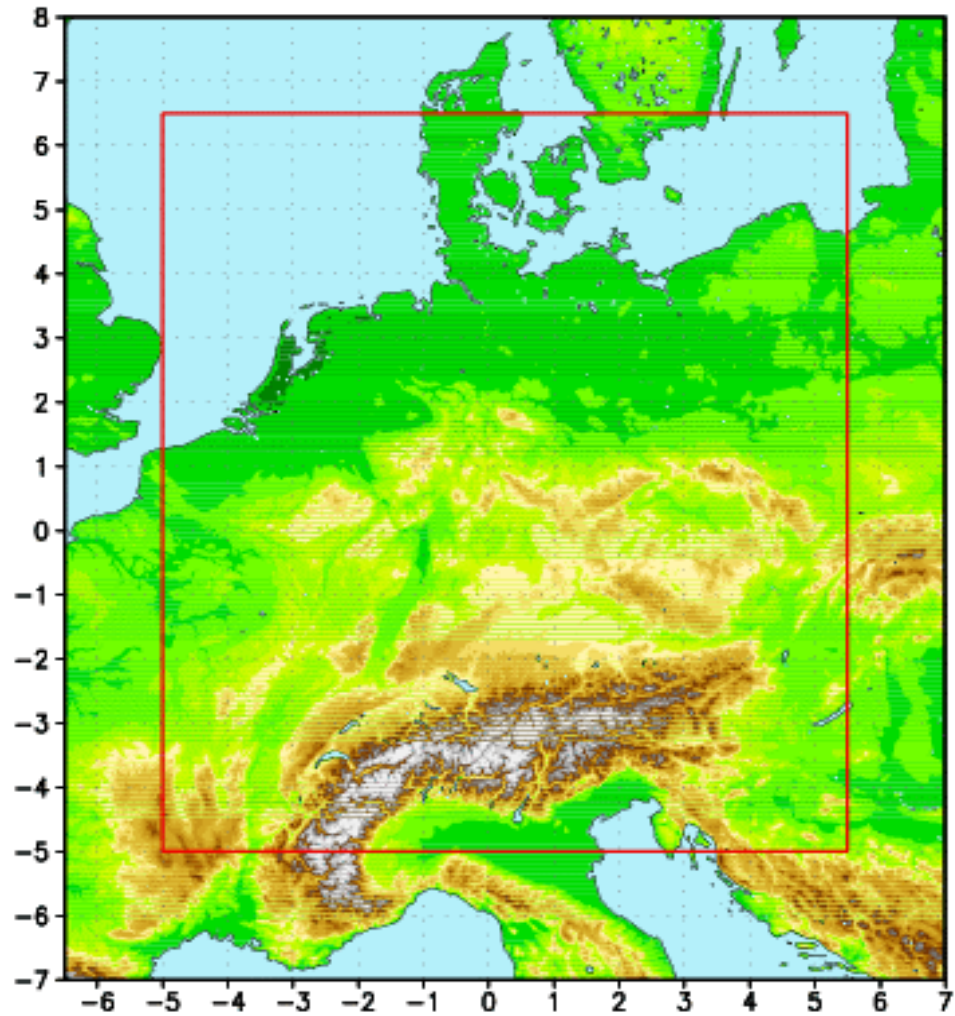
A so-called *lagged average forecast ensemble (LAF)* will be available by using new categorical LMK forecast every 3 hours up to 18 hours.

Number of ensemble members of LAF: 6

Horizontal resolution: 2.8 km

Lead time: 18 hours

Model domain of LMK



Joining the ensemble systems

Ensemble calibration

Models' bias corrections

Evaluation of ensemble members concerning the forecasting performance

→ Poster

Results

Ensemble precipitation forecasts (scenarios) for flood forecasting models

- Cluster analysis using uncalibrated forecasts
- Ensemble mean, extremes
- Quantiles of calibrated probability density function