



*Norwegian  
Meteorological Institute  
met.no*

## **EurEPS**

# **The Realization of an Operational LAM-EPS in Europe**

**A SRNWP Project under EUMETNET  
Proposed to the EUMETNET Council at its  
30<sup>th</sup> meeting by Norwegian Meteorological**



# Redaction Team

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Leader
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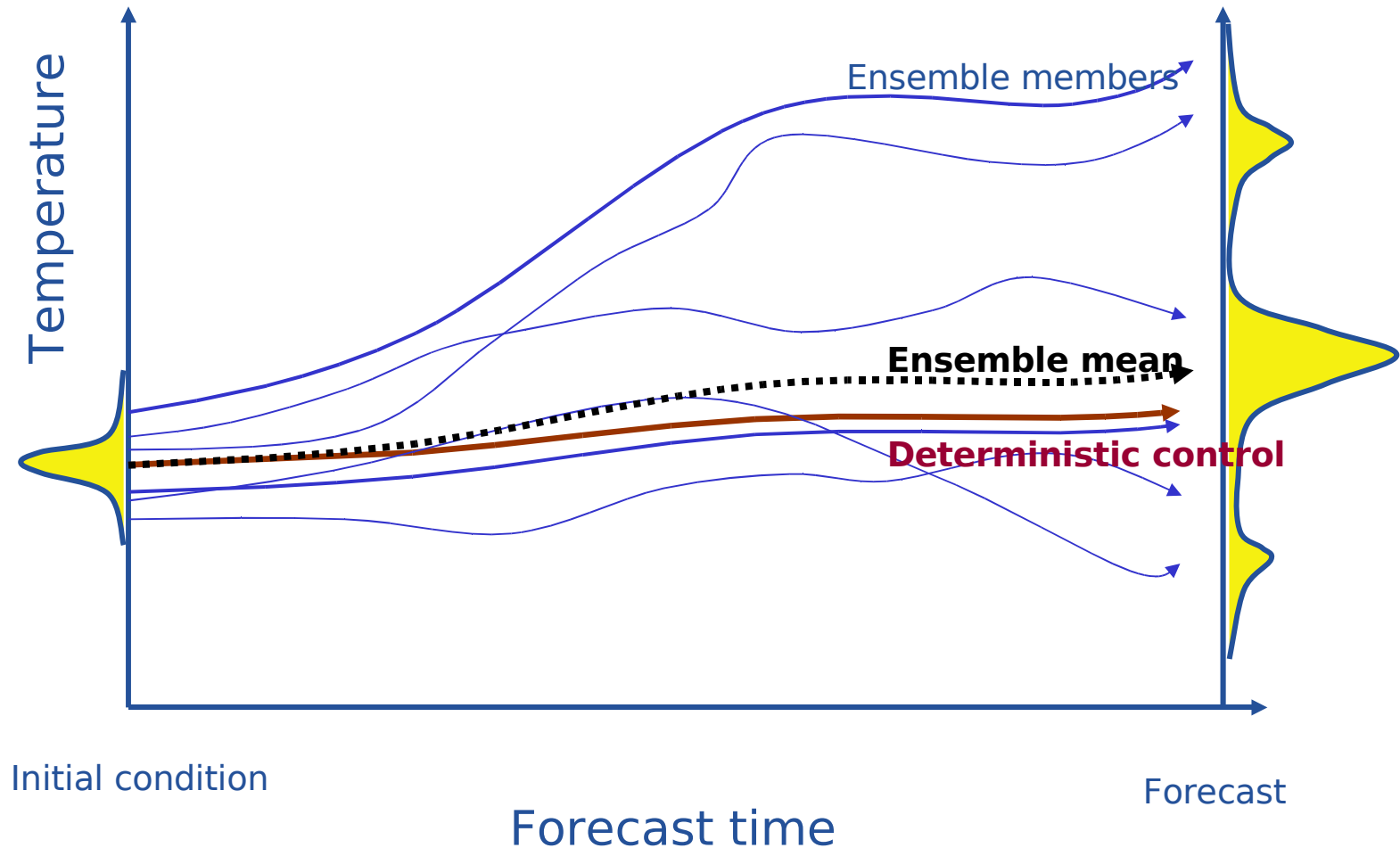


## ***The Overall Aim*** of EurEPS

- *is to understand and quantify the benefits of the combination of a multi-centre ensemble of ensemble systems (grand ensemble),*
- *and to investigate the practical and technological feasibilities for real-time combination of several decentralized ensemble forecast systems,*
- *for the purpose of guiding real-time operational short-range probabilistic weather forecasting over Europe.*

# Ensemble forecasts

Complete description of weather prediction in terms of a  
Probability Density Function (PDF)







# Why EPS and Probabilistic forecasting?

- Valuable information on weather components with rudimentary predictability – thus impossible to give deterministically – can be forecasted
- Smaller scales of free flows lose predictability first
- these scales are frequently associated with high-impact weather
- due to the associated potential loss, even small forecasted probabilities can be highly valueable.



## Hence EurEPS

is proposed to help met services

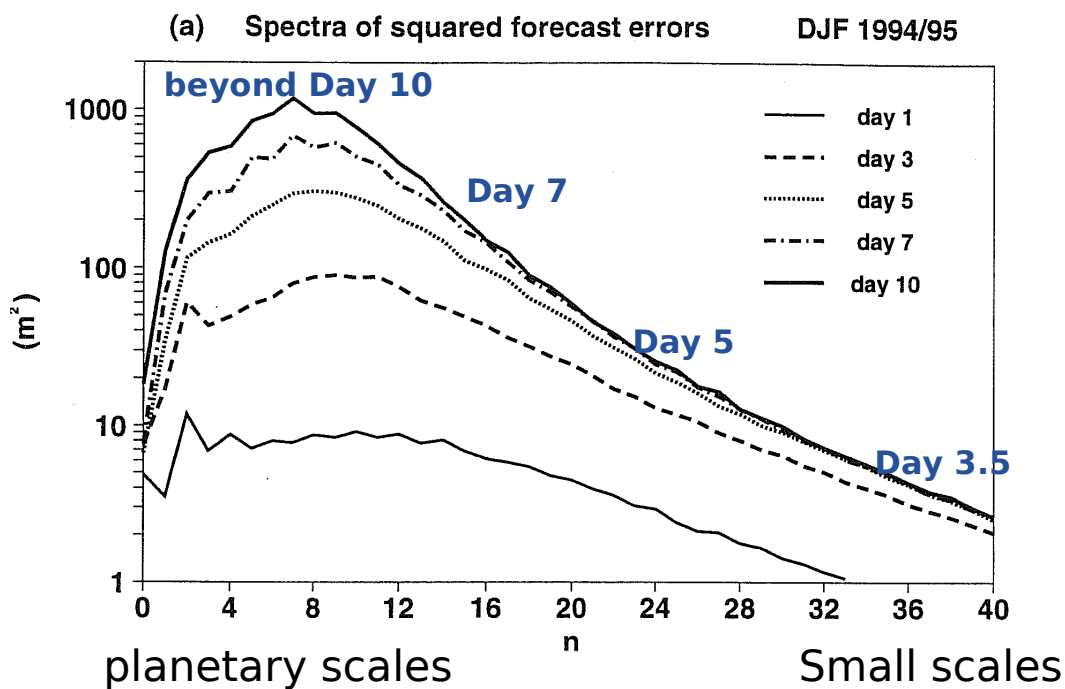
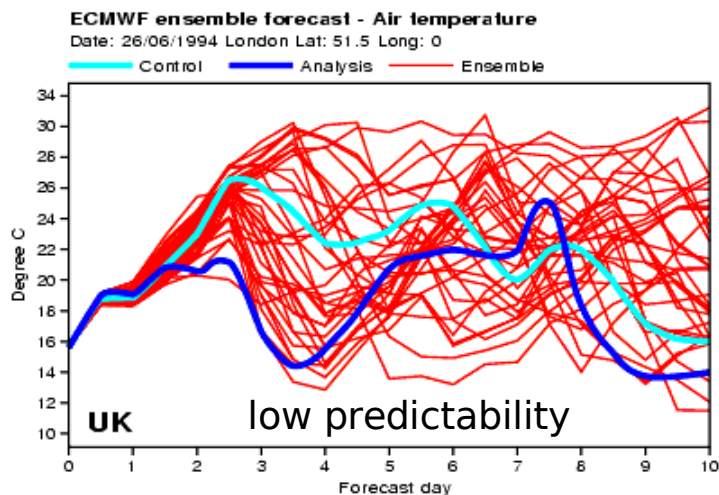
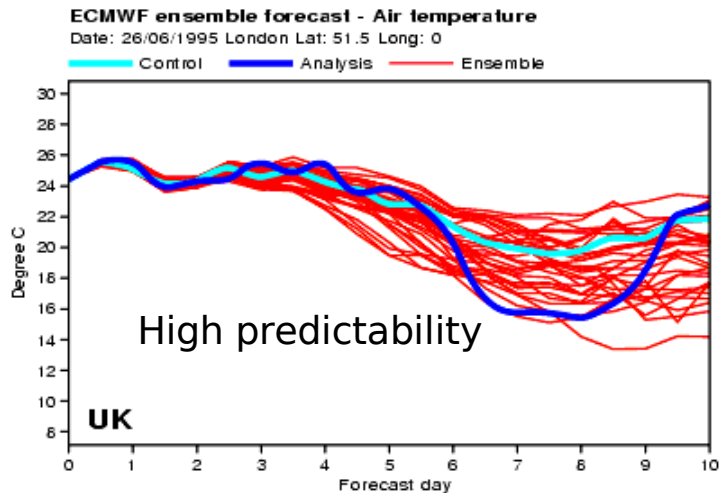
to protect life and property from weather-related hazards

by exploiting existing technology and established methods in a cost-efficient way.



# Forecast uncertainty - i.e. Predictability - varies from day to day

# Forecast uncertainty - i.e. Predictability - varies with spatial scale

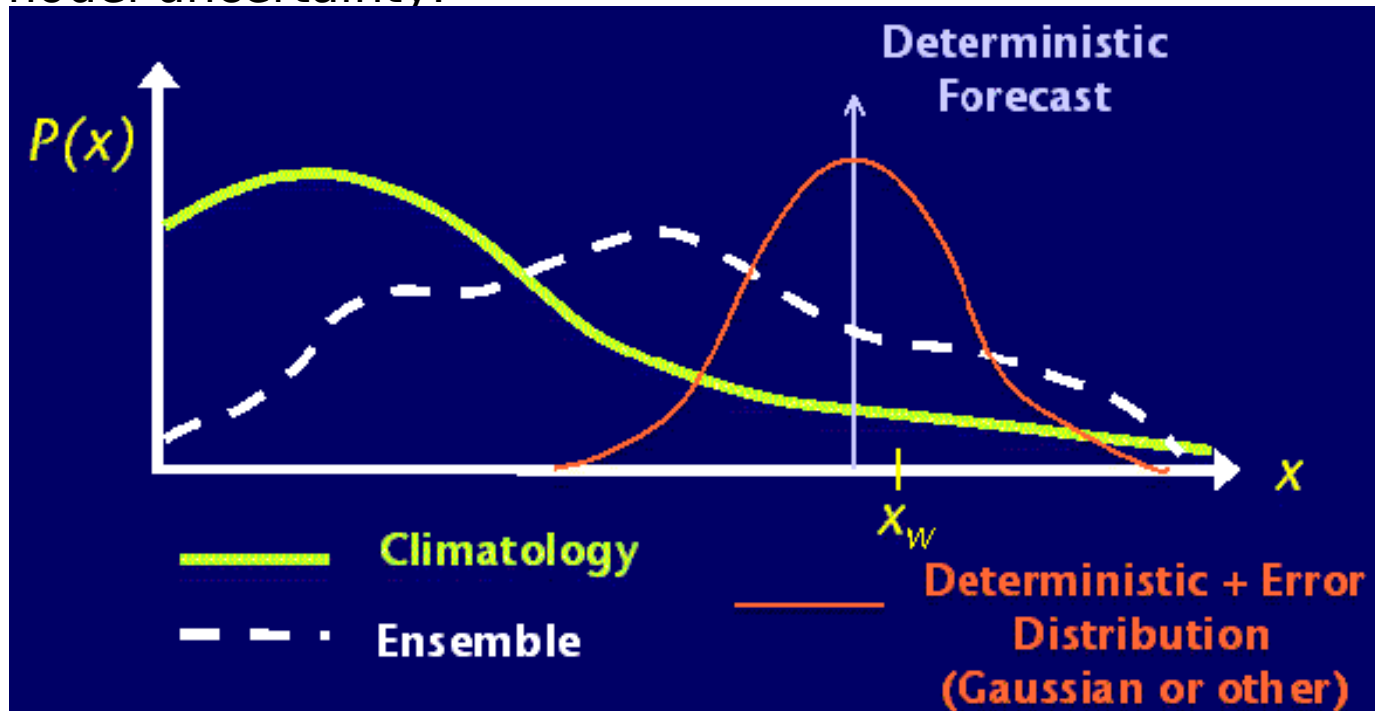


Source: ECMWF

**Deterministic forecasts** provides single solutions.

The simplest way to provide probability information is to add an error distribution to a deterministic forecast, e.g. gaussian or some observed distribution.

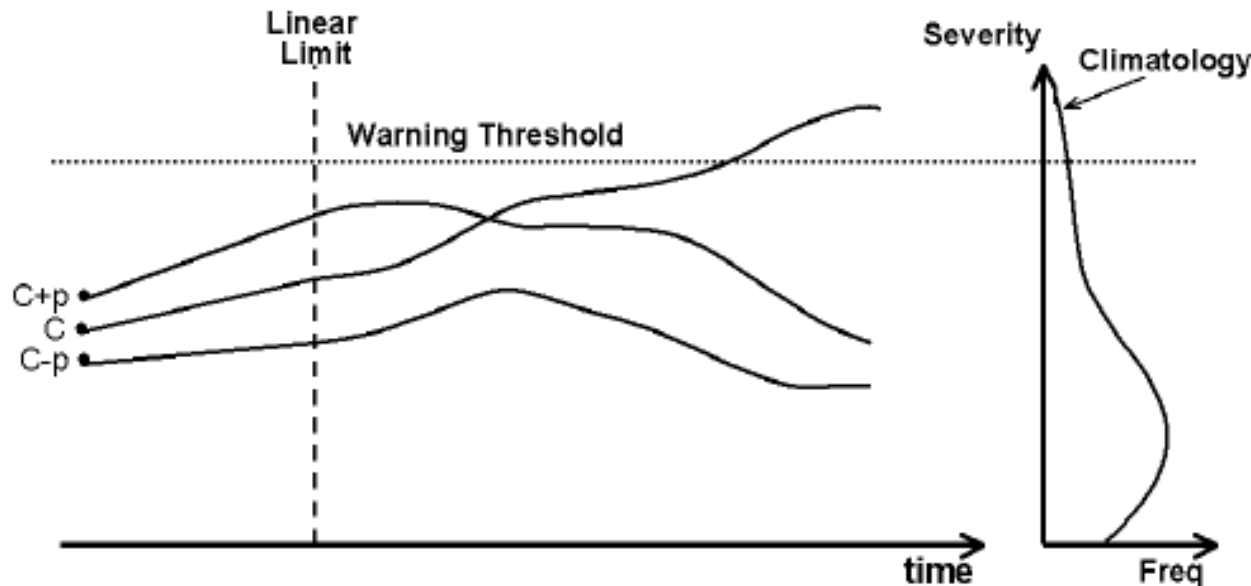
**Ensemble forecasts** provide case-dependent probability distributions accounting for the meteorological information available to the ensemble and model uncertainty.



## ***Schematic illustration of the effect of non-linearity on an ensemble forecast.***

In the early stage of a forecast, ensemble members diverge quasi-linearly.

In later stages, even when one member predicts severe weather, most members can be expected to be drawn towards model climatology.



Forecasting high-impact weather requires a probabilistic approach



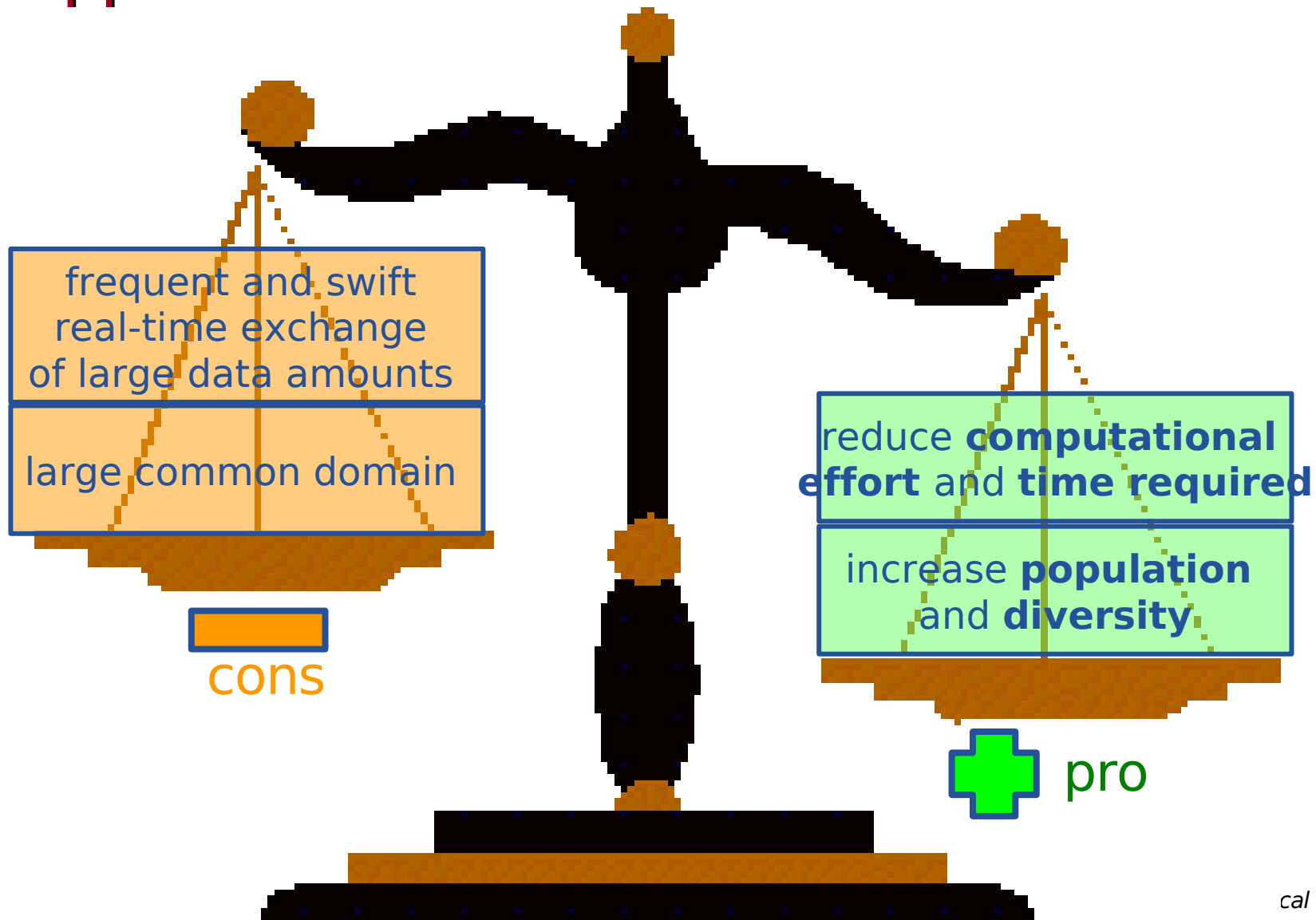


# The Purpose

- ❖ in a two-year perspective, is to **establish potentials and identify practical obstacles** for a pan-European grand short-range ensemble system,
- ❖ compared to the alternative of using several sub-European and less populated ensemble systems which single NMSs could run on their own.
- ❖ Before taking decisions for an operational pan-European grand ensemble system, **both the implied operational challenges and the benefits for operational probabilistic forecasting need to be investigated**



# Pro and cons of a Multi-centre approach





## EurEPS data centre

- ❖ The LAM-EPS planned in EurEPS basically combines existing systems in European NWP consortia and countries;
- ❖ A EurEPS data centre should be established.
  - ECMWF with one fully dedicated person is proposed
  - due to existing IT and communication systems, and EPS expertise, at ECMWF



# EurEPS Status

- ❖ Positive moral support from Eumetnet Council
- ❖ No financial support from Eumetnet

## Statements:

- ❖ Interoperability regarded so far as more urgent
- ❖ EurEPS may depend on progress in Interoperability



## EurEPS Status

Can we follow up, and how?

- ❖ The GLAMEPS work must continue as a HIRLAM-ALADIN co-operative effort
  - RT data-exchange in particular
- ❖ Co-operation with SRNWP and the Interoperability project to ensure that EurEPS needs are urgently considered







# The Multi-centre approach

- ❖ The distributed multi-centre approach permits to
  - increase the **population** of the ensemble
  - account for a larger **diversity of uncertainties**
  - reduce each centre's **computational effort** and the **time** required to produce a probabilistic forecasts.
- ❖ The intention is to enable increased benefits for similar total cost, since resources are used to produce complementary information in parallel.



# Objectives

- ❖ To **co-ordinate** LAM-EPS to avoid duplication of efforts
- ❖ To **develop** a prototype setup for a multi-centre European grand LAM-EPS based on existing developments in the consortia.
- ❖ To **establish** the practical feasibility of real-time collection of LAM-EPS data for combination into grand LAM-EPS forecasts to be disseminated to all EurEPS participants.
- ❖ To **demonstrate** the skill and value of the grand LAM-EPS for probabilistic prediction of high-impact events,

■ compared to smaller single-centre LAM-EPS