WE PROG
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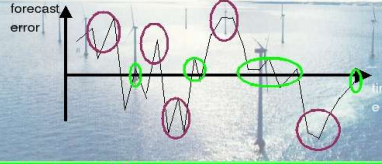www.weprog.com

WEPROG's Multi-Scheme Ensemble Prediction System

The Background

A typical daily error of a 24 hour 00UTC forecast during 1 month

"Varying Forecast Quality"

forecast error

time

At green times, all Ensemble members *agree with each other —> there is little uncertainty and little prediction error*

At red times, the ensemble members do not agree with each other —> there is large uncertainty and large errors
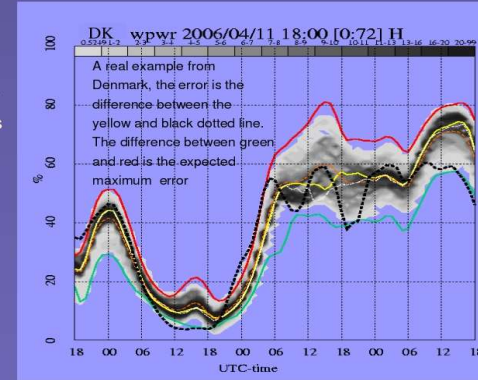
The background
- the weather changes fast between predictable and non-predictable
- subjective methods are not sufficient to estimate predictability
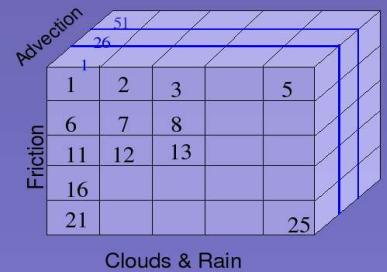- the commercial world suffers from various prediction mistakes

The method
- run a large number of different model configurations
- evaluate the uncertainty directly on the final product

The Ensemble Prediction approach is a step forward
- saves labour
- increases safety
- reduces the economic loss
- allows the expert end-user to take the right decision

DK wpwr 2006/04/11 18:00 [0:72] H

A real example from Denmark, the error is the difference between the yellow and black dotted line. The difference between green and red is the expected maximum error
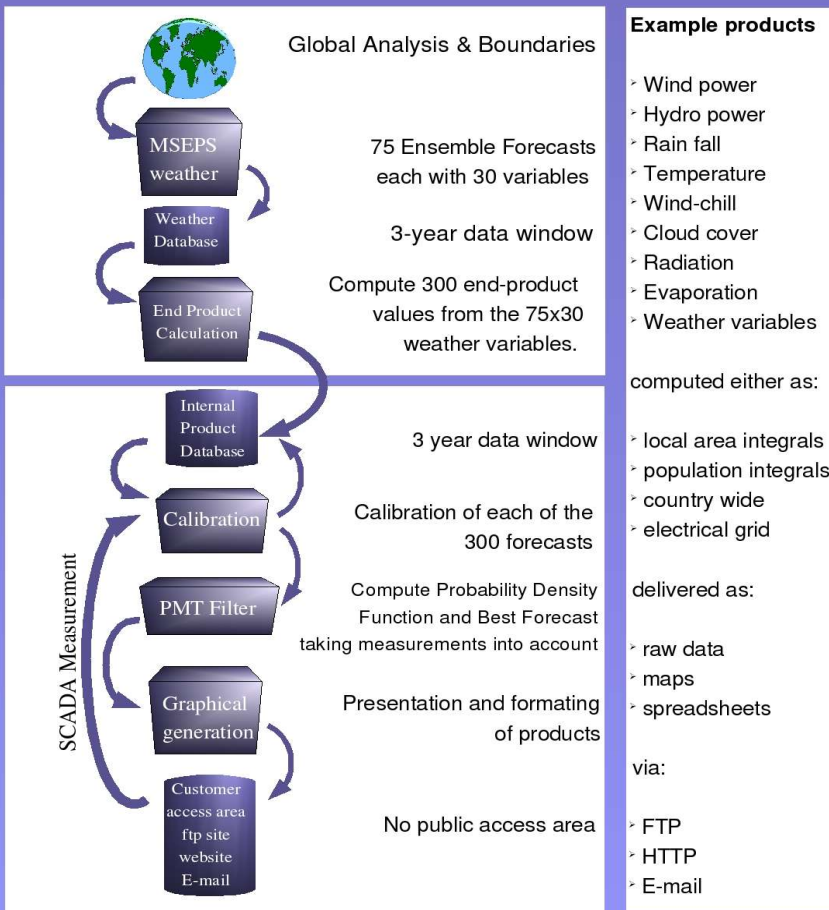
The 75 MSEPS model configurations

Description of the Multi-Scheme Ensemble Predictions System

The MSEPS comprises 75 individual weather forecasts referred to as "Ensemble Members". They are generated with a multi-scheme approach. This means that each ensemble member comprises a different set of approximation levels for the atmospheric processes resulting in different equations and boundary conditions. The equations define the forcing and therefore the evolution of the weather. Because all the equations used are describing the same processes with varying assumptions and approximation levels, the difference in fact describe the physical uncertainty of the weather forecast and therefore also part of the uncertainty in the initial state.
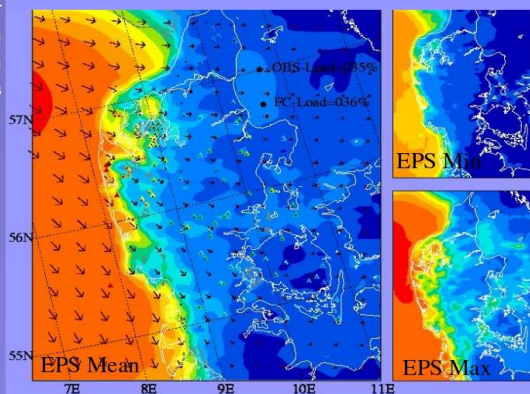

Advection

Friction

1	2	3		5
6	7	8		
11	12	13		
16				
21				25

Clouds & Rain

MSEPS Generation Chain

Weather driven part with 6 hourly update

Global Analysis & Boundaries

MSEPS weather

75 Ensemble Forecasts each with 30 variables

Weather Database

3-year data window

End Product Calculation

Compute 300 end-product values from the 75x30 weather variables.

On-line Part with frequent forecast update

SCADA Measurement

Internal Product Database

3 year data window

Calibration

Calibration of each of the 300 forecasts

PMT Filter

Compute Probability Density Function and Best Forecast taking measurements into account

Graphical generation

Presentation and formating of products

Customer access area ftp site website E-mail

No public access area

Example products
- Wind power
- Hydro power
- Rain fall
- Temperature
- Wind-chill
- Cloud cover
- Radiation
- Evaporation
- Weather variables

computed either as:
- local area integrals
- population integrals
- country wide
- electrical grid

delivered as:
- raw data
- maps
- spreadsheets

via:
- FTP
- HTTP
- E-mail

Wind Power Prediction example with measurements

57N
56N
55N
7E 8E 9E 10E 11E

OBS Load=035%
FC Load=036%

EPS Mean

EPS Min

EPS Max

Wind Speed Prediction

	Global Analysis	weather forecasts	End Product	Evaluation	Selection
No of states	1	75	300	900	1(3)
Elapsed time	-	2 hours [3day fc]	2 min	1 min	1min