#### MeteoGroup

# MeteoGroup Operational System:

Automated Forecasts, meteorologist intervention and final products

12 NOVEMBER 2007
ERIC TERPSTRA

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i. Automated Forecasts
MODELS
MOS development
Operational system

ii. Meteorologist Intervention

iii. Final products

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#### Models

ECMWF 00, 12 UTC EPS 00, 12 UTC

- direct line with ECMWF

GFS 00, 06, 12, 18 UTC

- through NCEP
- Verifications have shown ECMWF is best model for MOS purposes
- Major MOS update based on availability ECMWF at 07/19.15 UTC

#### **MOS Development**

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#### MOS - MODEL OUTPUT STATISTICS

Forecast for a specific site (x,y) and time (t) for predictand Y with predictors X

$$Y(x,y,t)=X(x_i,y_i,t_i)+c$$

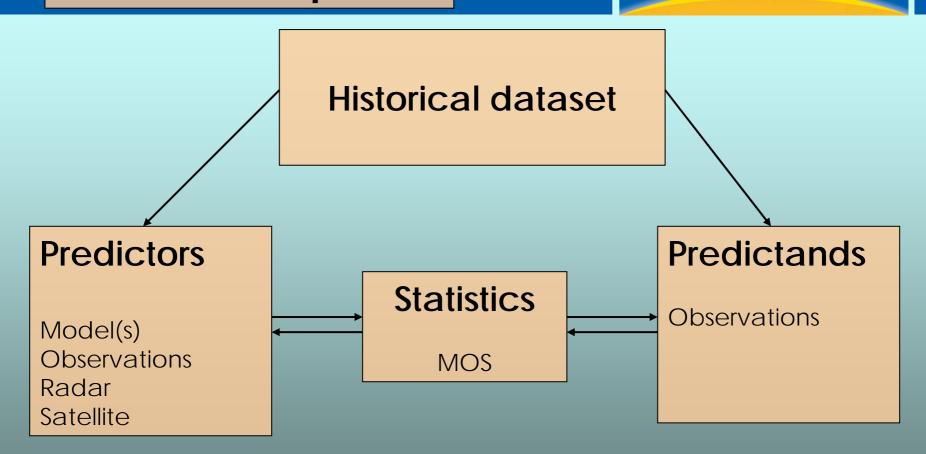
#### **MOS Development**

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#### MOS - MODEL OUTPUT STATISTICS

- Outperforms DMO on average 20%
- Bias free
- Predictands not in the model (visibility, propability freezing rain)

#### **MOS Development**



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#### Model

ECMWF, GFS, EPS, VarEPS

#### **Observations**

Metar, Synop, Other sources

#### Radar

Expected intensity precipitation

#### Satellite

Expected pixel value

# Statistical Model Mos

 $Y_s(t) = f(M_i(t_k), O_i(t_m), R(t), S(t), F(t)) + C$ 

#### Downscaling

[MISSING MOS]

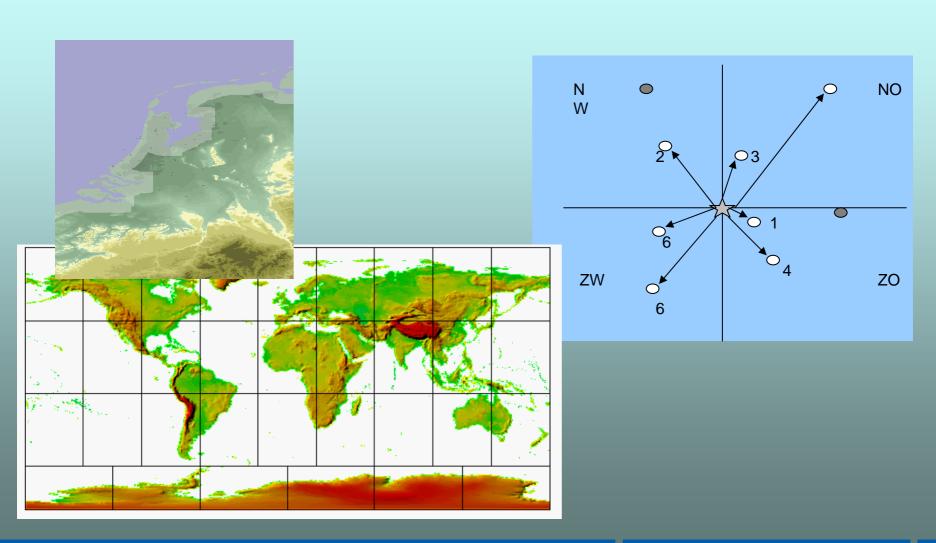
$$Y_s(t)=f(Y(t_k))$$
  
 $Y_s(t)=f(Y_t)$ 

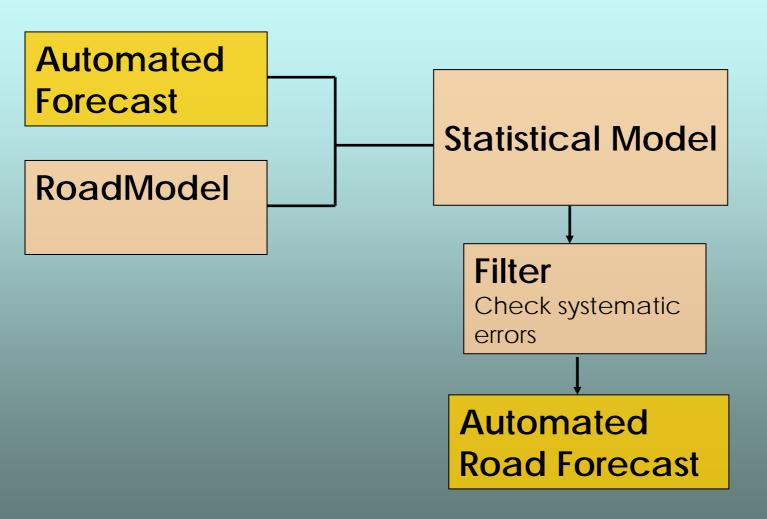
Automated Forecast

#### **Filter**

Check systematic errors

# Downscaling



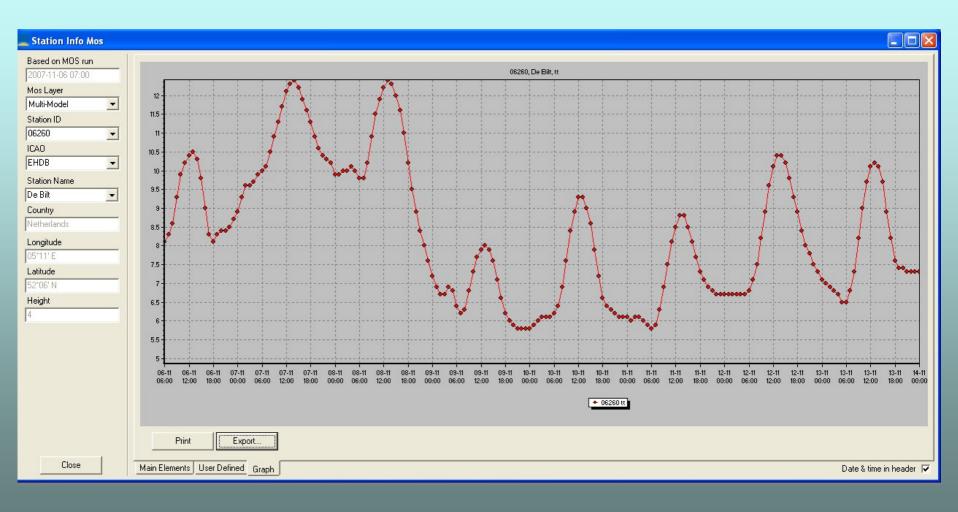


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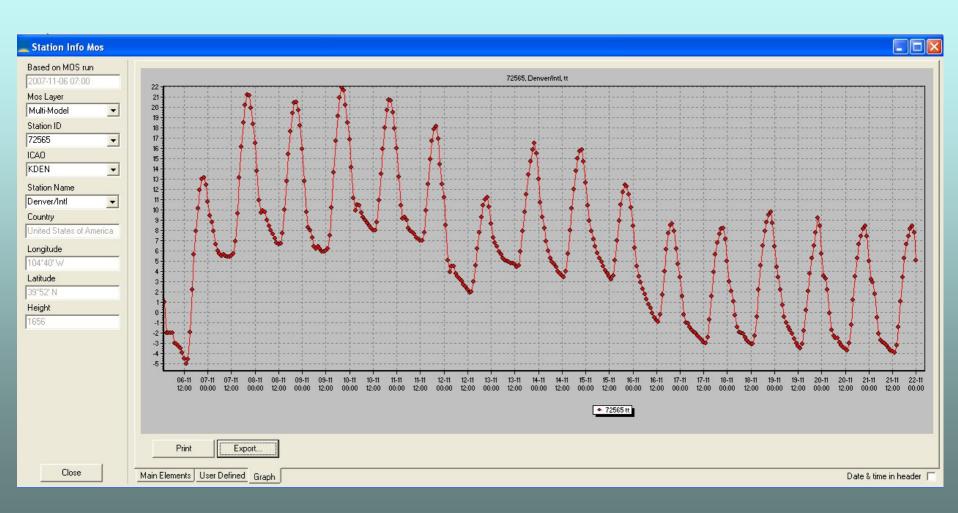
### System properties

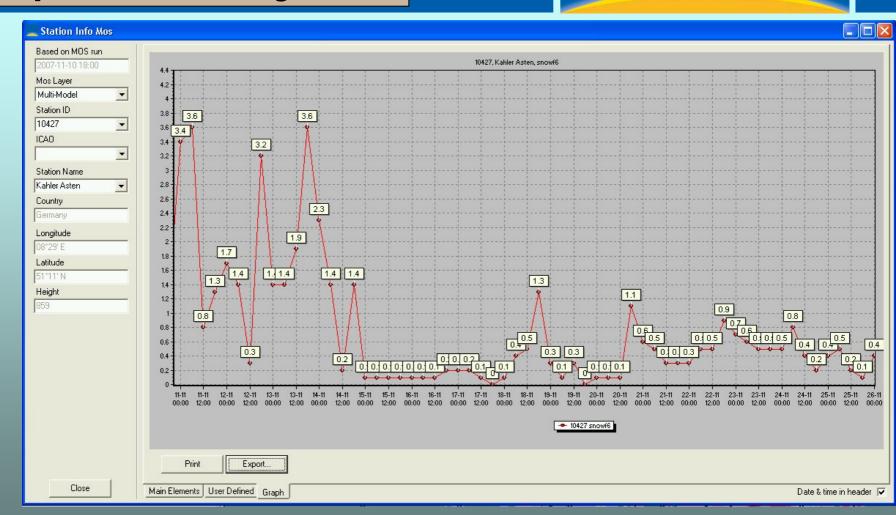
- \*\* all locations complete information \*\*
- 1- A specific location
- 2 Based on MOS
- 3 1-hourly up to 15 days
- 4 All weather stations in the world (~15.000)
- 5 85 forecast elements
- 6 updated every hour [2 days ahead]
- 7 updated twice a day [15 days ahead]

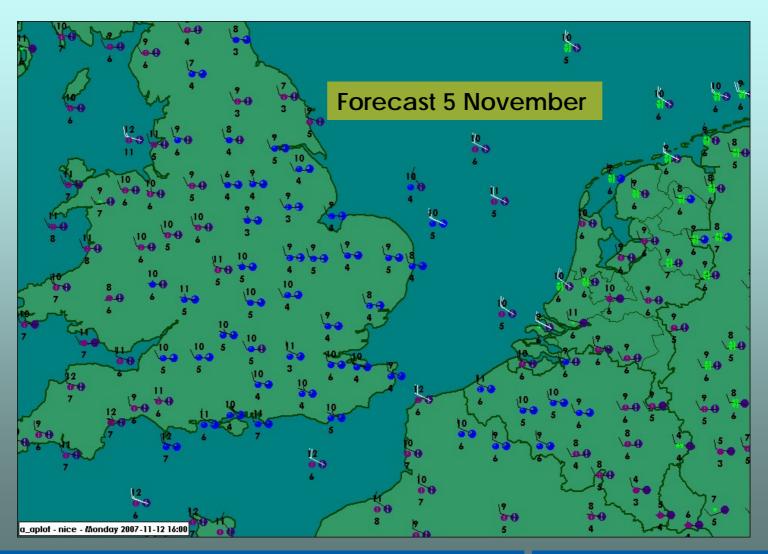
Matrix of 85 columns x 5.4 million rows

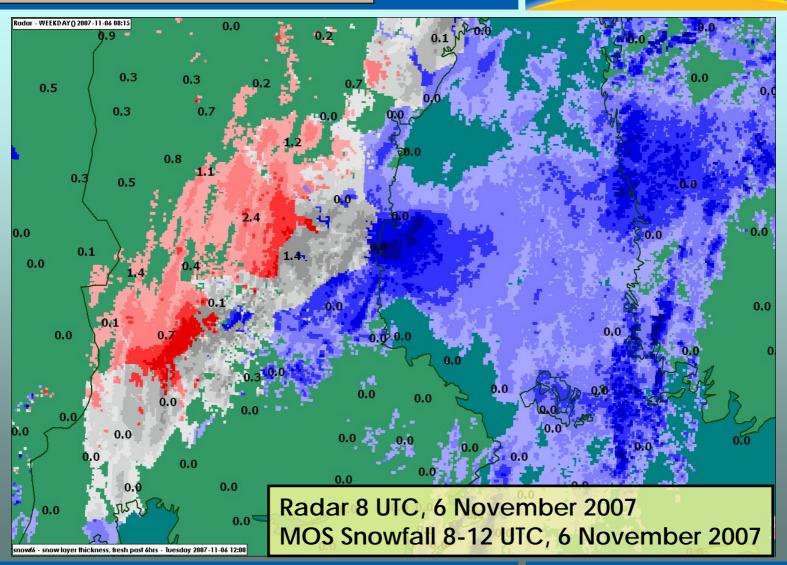


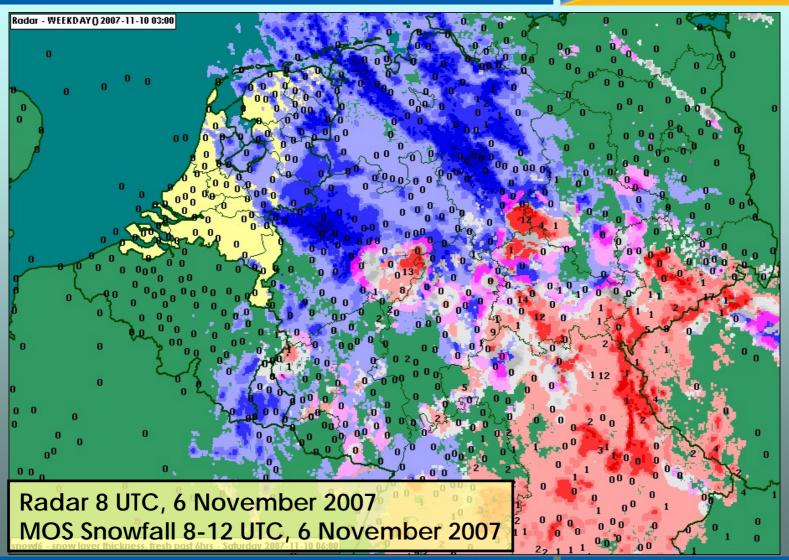


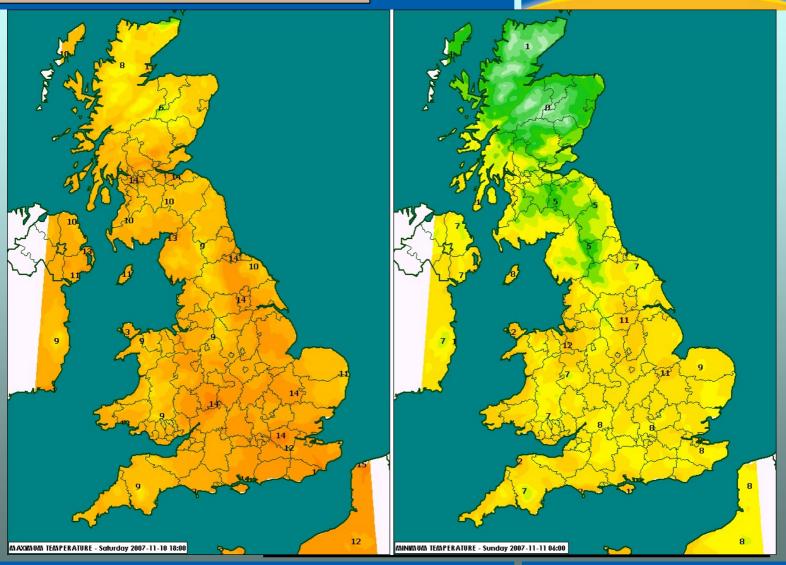




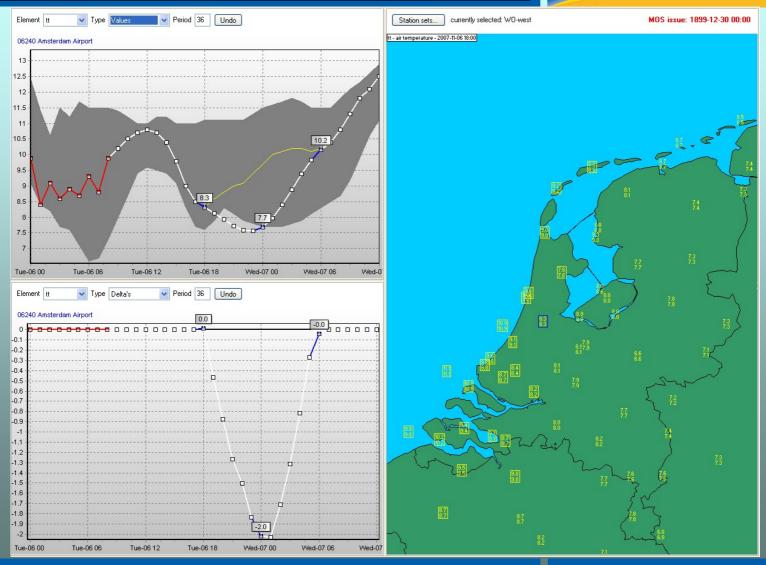




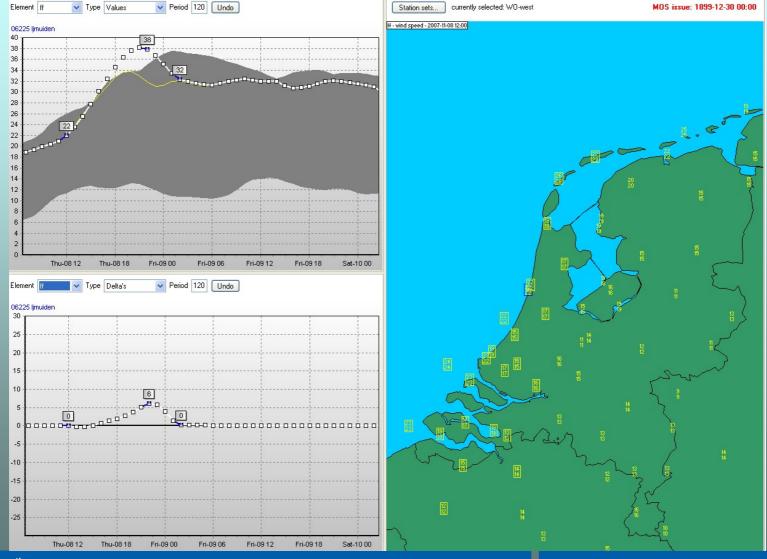






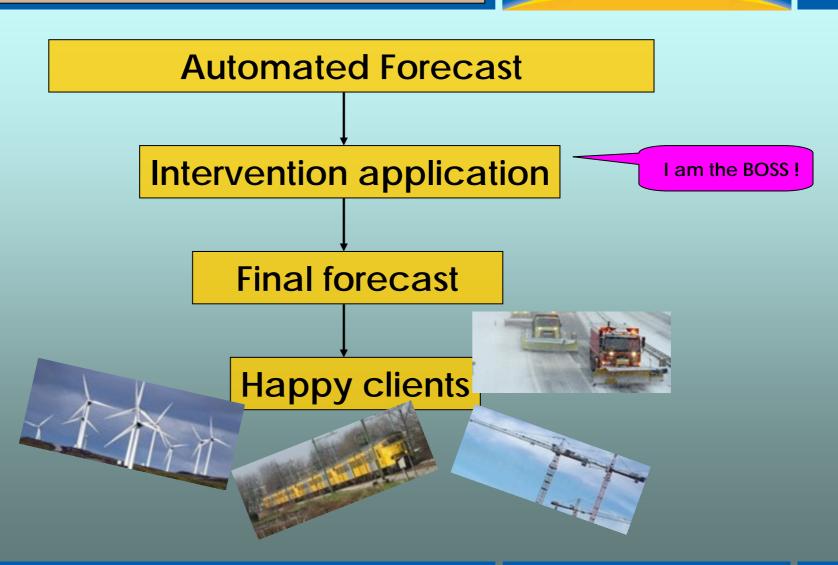


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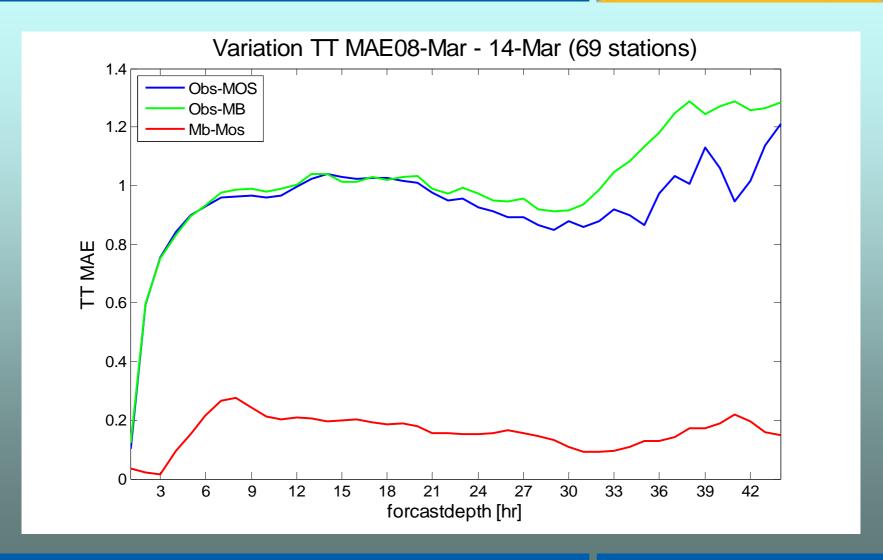


ECMWF 11<sup>th</sup> Workshop on Meteorological Operational Systems – 12/11/2007

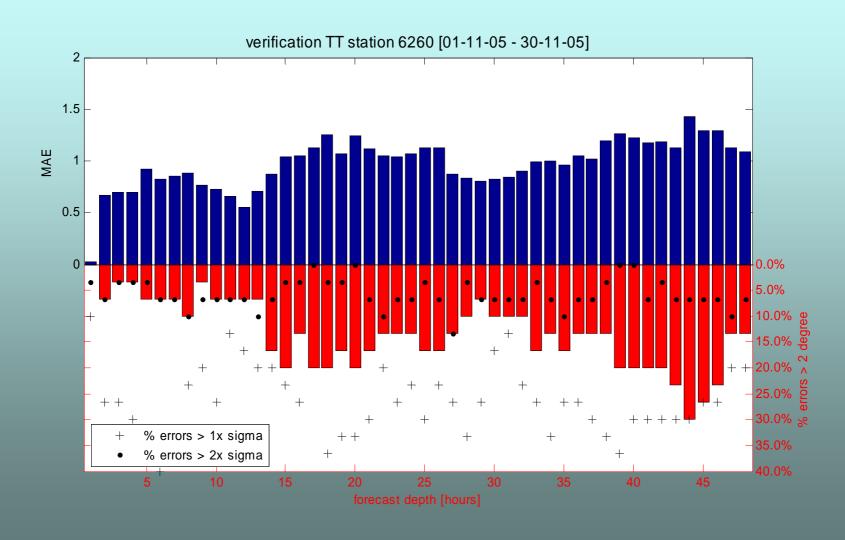
Meteo Consult - Wageningen



#### Verification



#### Verification



#### **Future developments**

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#### **Future developments**

#### **Extension MultiModelMOS**

- more global models
- mesoscale models
- mesoscale ensembles

Extension to more than 15 days

**Automated verification**