PROBABILISTIC APPROACH IN COMPARATIVE VERIFICATION OF HIGH RESOLUTION MODELS

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(special thanks to Maurice Schmeits)

1. INTRODUCTION
2. WHY PROBABILITIES
3. THEORETICAL EXAMPLE
4. STATISTICAL POST-PROCESSING
5. DESIGN OF POSSIBLE EXPERIMENT
6. CONCLUDING REMARKS

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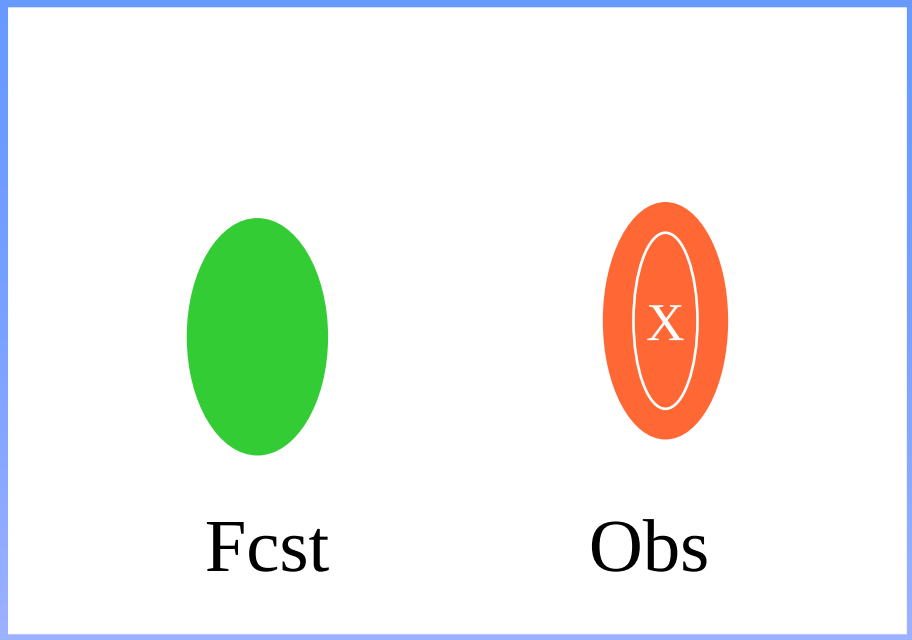
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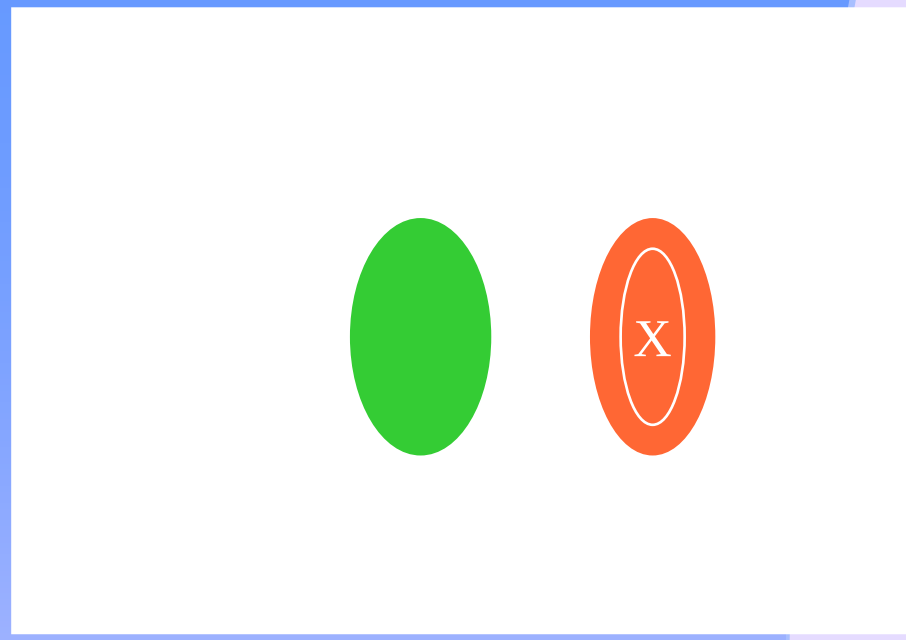
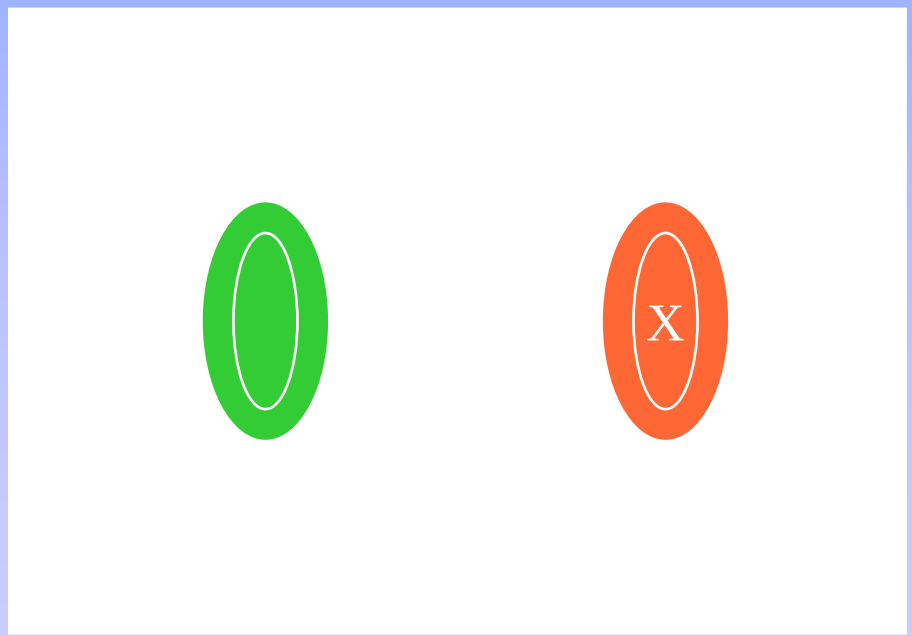
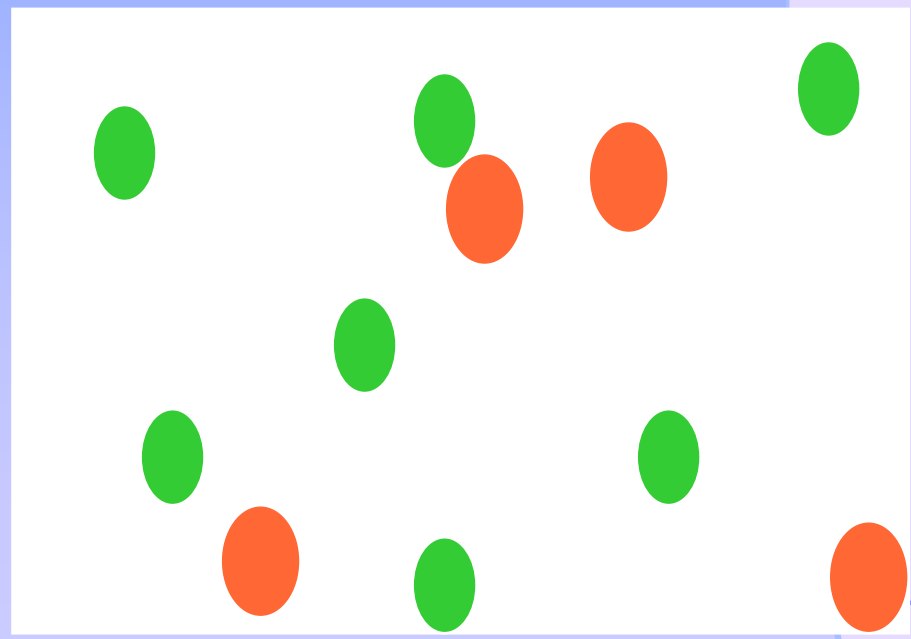






EVENT BASED METHODS

* Intensity and Phase error
* CRA
* Displacement, volume and pattern error

WHY PROBABILITIES?

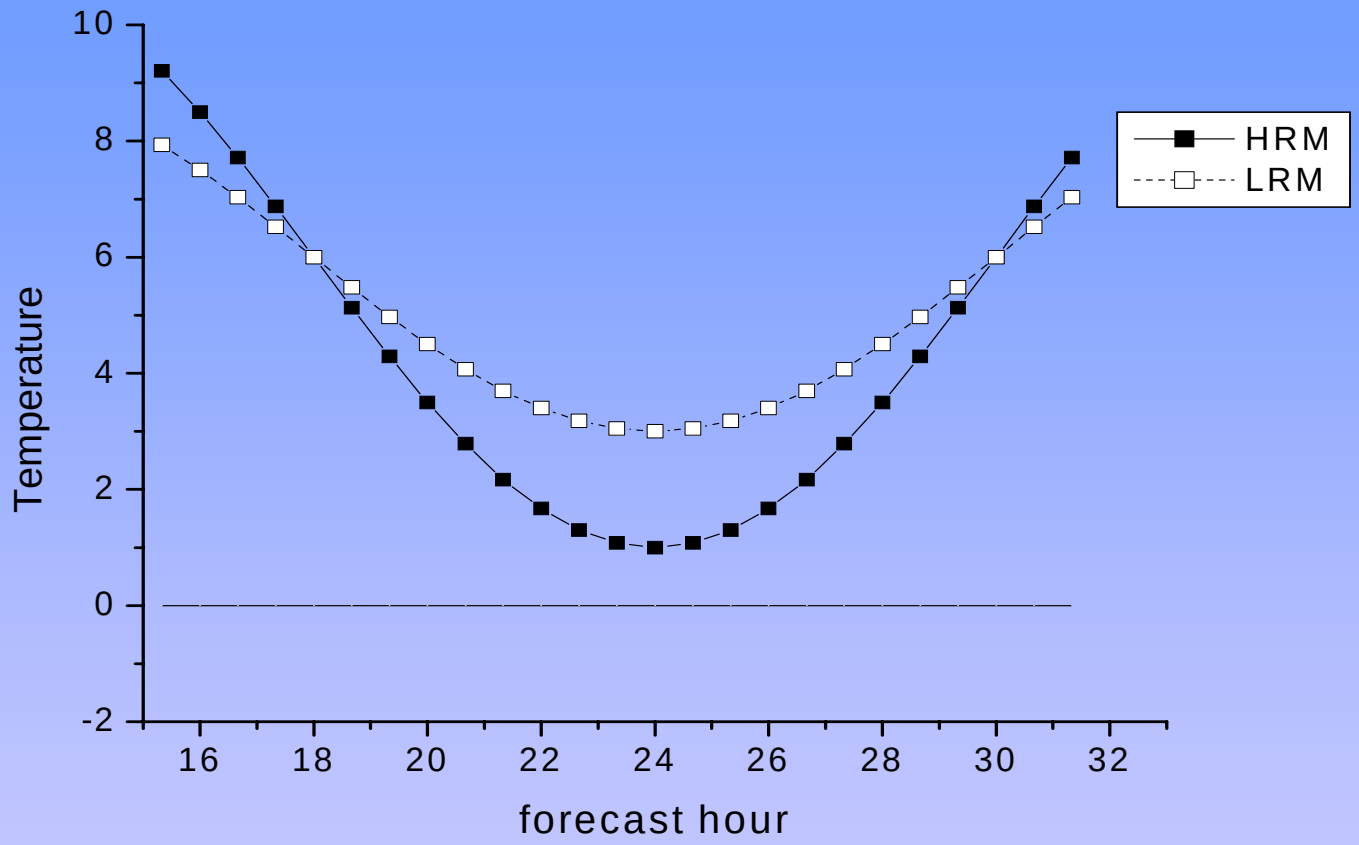
* They may be useful to estimate the “predictive potential”

* The uncertainty inherent in forecasts can be expressed in a quantitative and unambiguous manner

* Especially important for smaller time and/or length scales

* Economic value, C/L ratio

* They may provide a useful tool in comparative verification



THEORETICAL EXAMPLE

* Consider precipitation in x-direction

* LRM vs HRM
  - HRM equal to LRM but with one additional small scale cos-wave
  - Observations have the same resolution as HRM

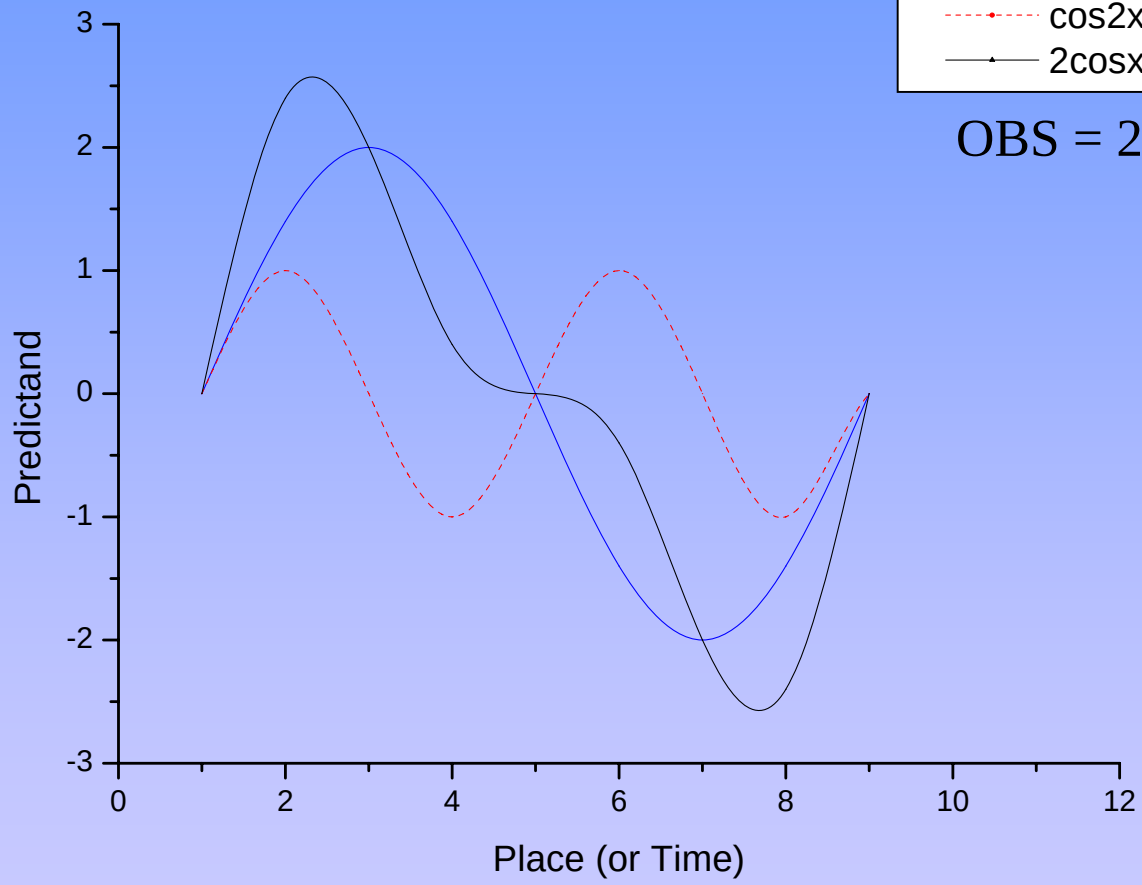
* Assume perfect predictability for the LRM-scales

* Look at consequences in the HRM of known uncertainty (equally probable within fixed range) of phase and amplitude of small scale wave

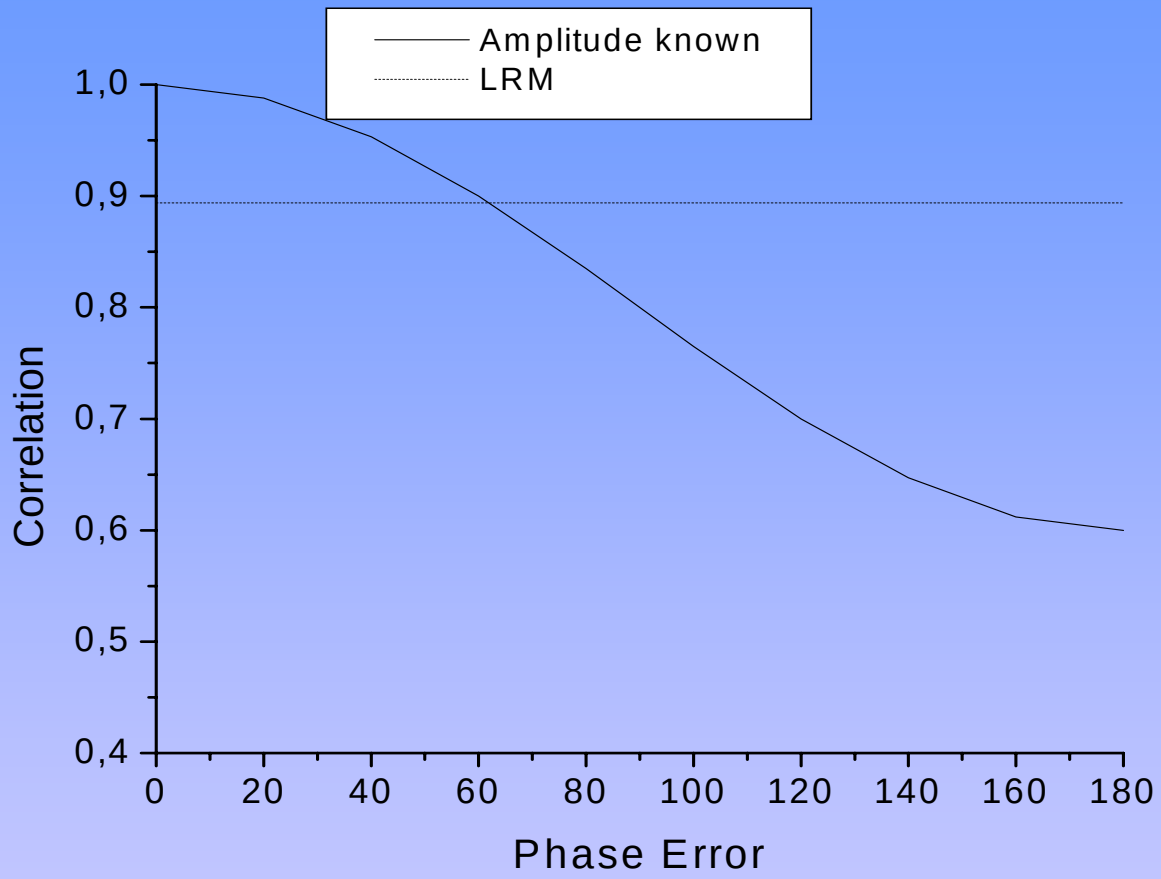
* Consider P(RR>RR0)
  and observed frequency = 1/3

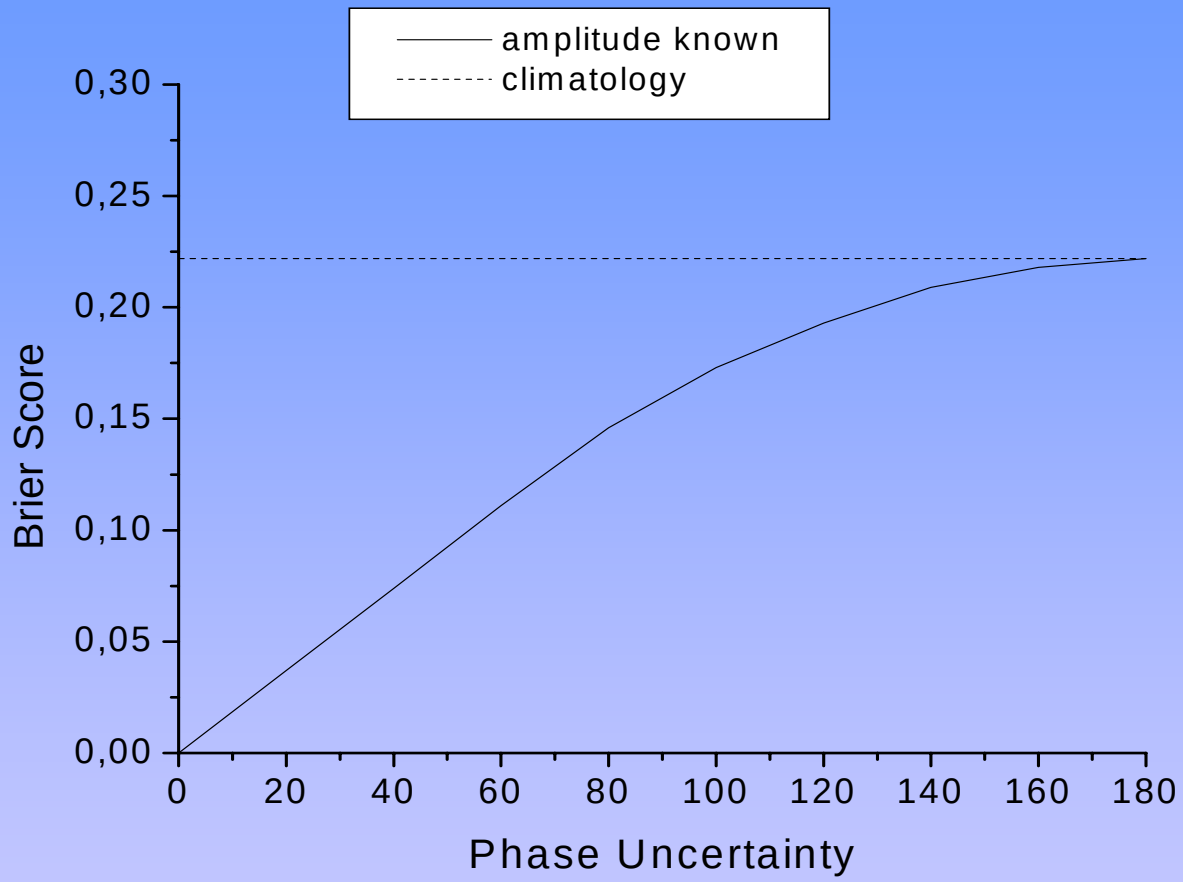
* Verify with Brier Score

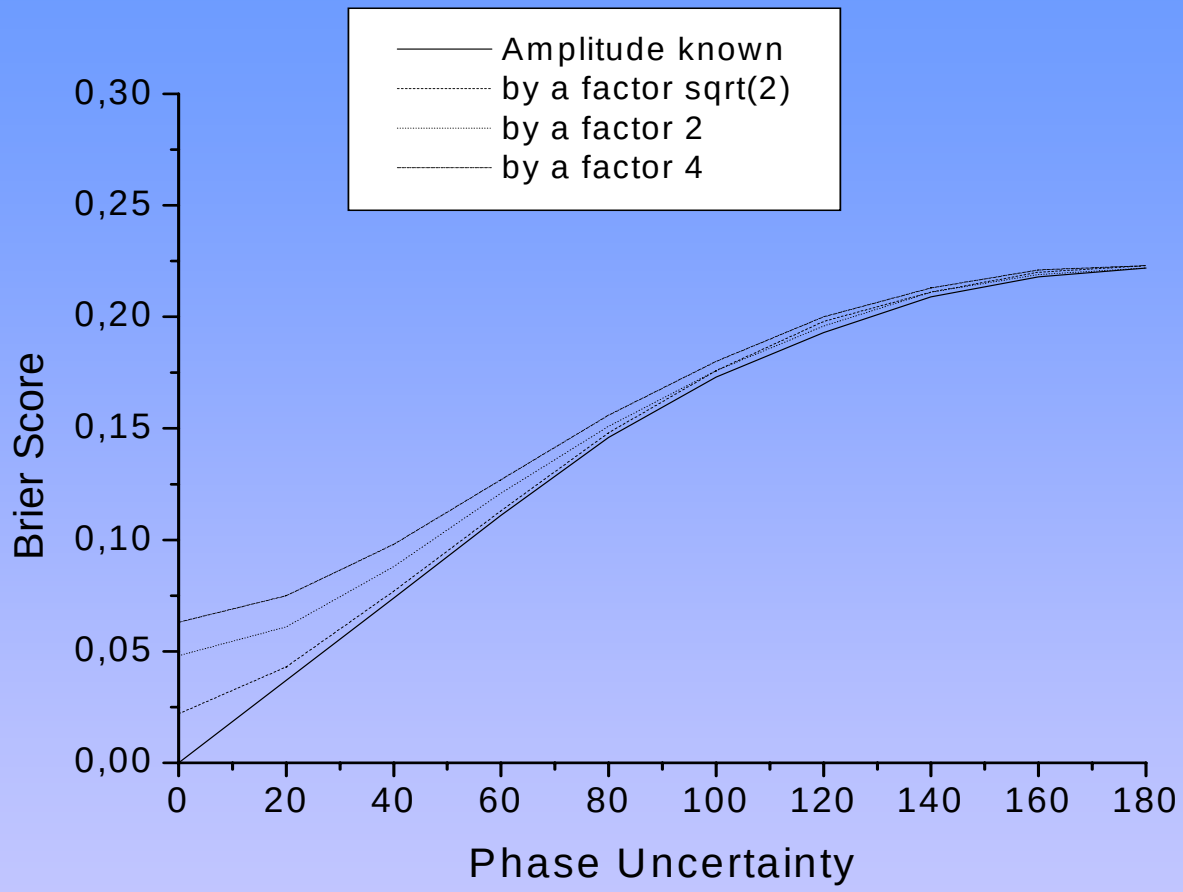
$$\frac{1}{N}\sum_{n=1}^{N}(p_n - o_n)^2$$



OBS = 2cosx + cos2x

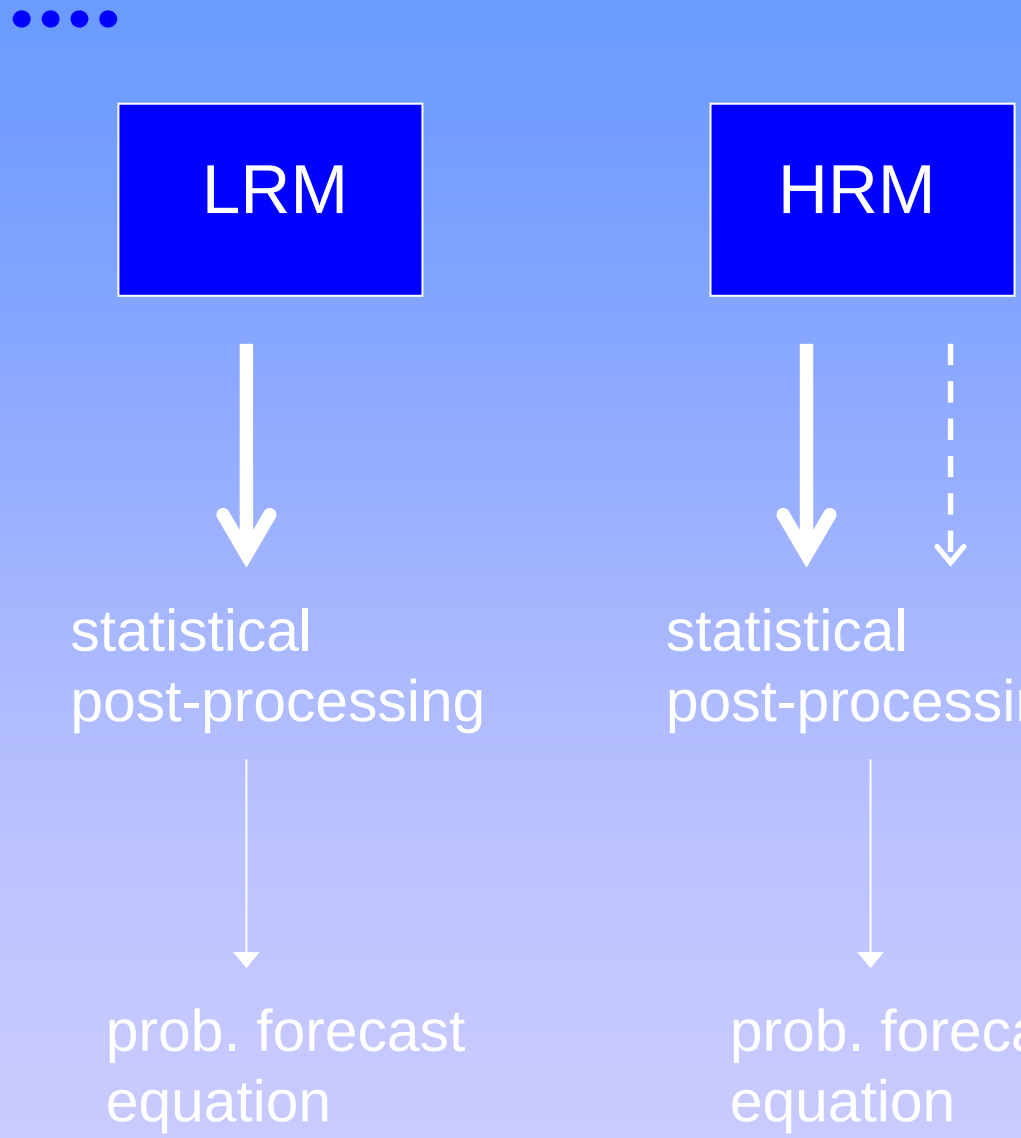






STATISTICAL POST-PROCESSING (PROB.)

* Large data sets
* Huge set of potential predictors
* Derive statistically significant predictors
* Test the resulting equations on independent data



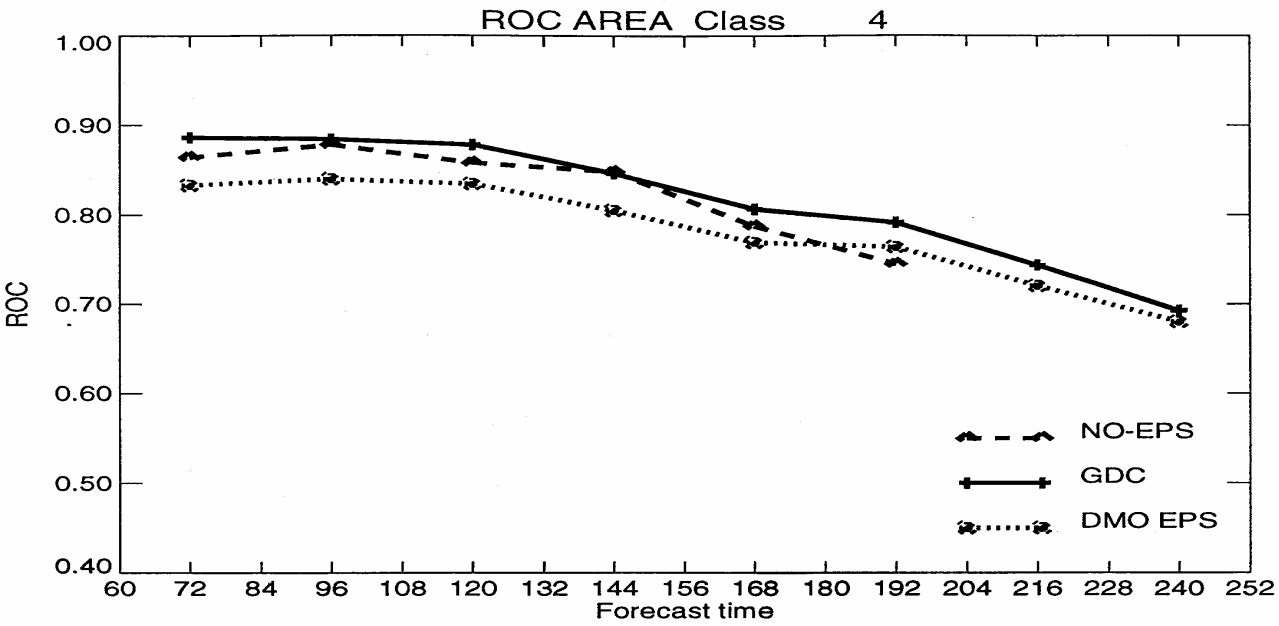
ADVANTAGES

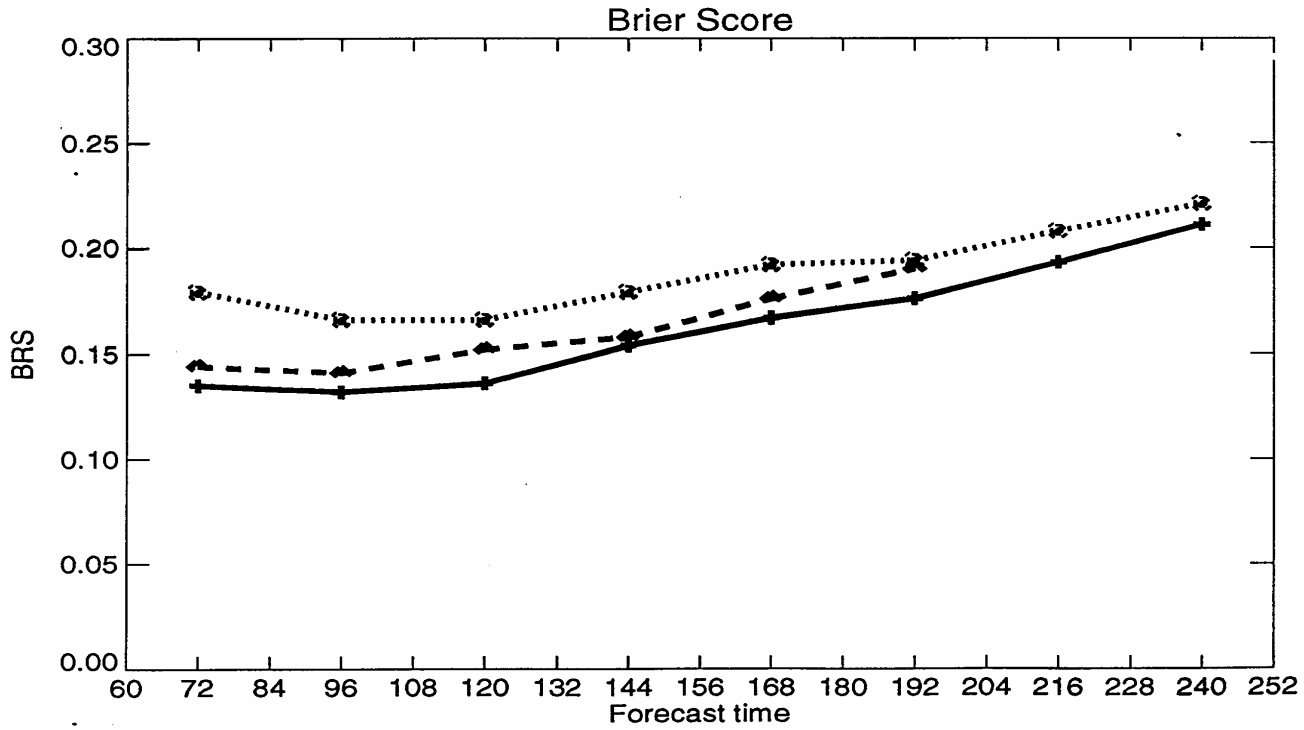
* Offers estimate of “predictive potential”
* The uncertainties inherent in forecasts can be taken into account
* Forecasts are reliable
* Objective

DISADVANTAGES

* Large data sets needed
* You never know that you can’t do better
* Difficulties with rare events

P{an.T>+2}





Regional probabilistic short range forecast system for (extreme) convective weather

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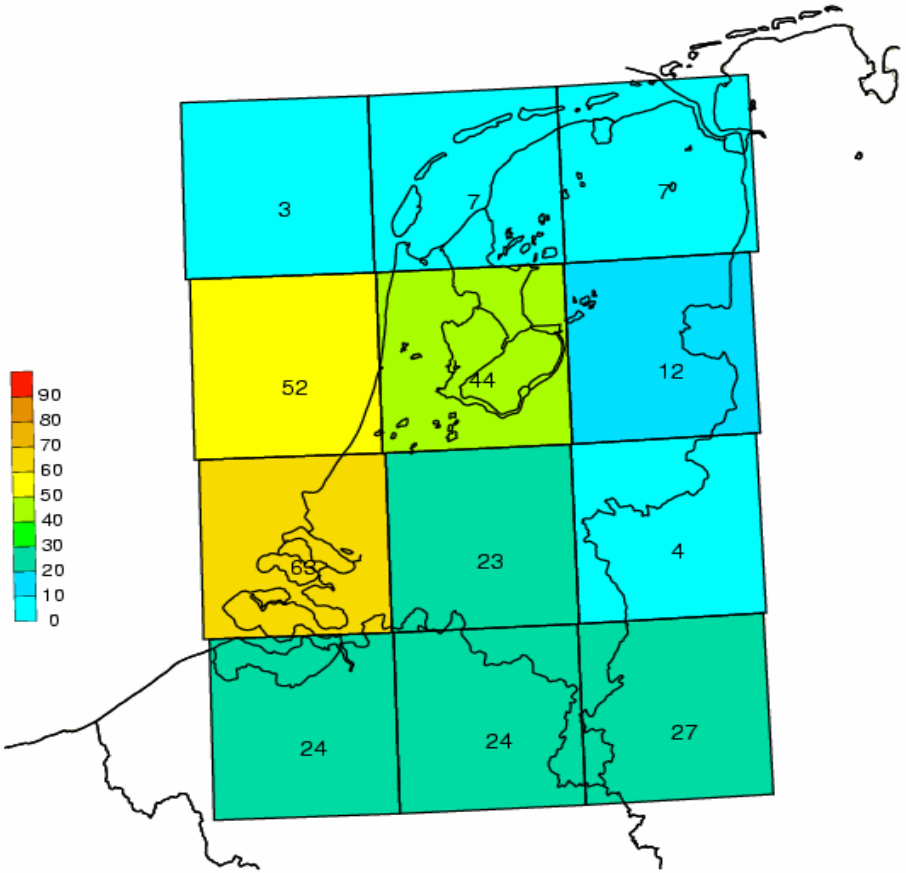
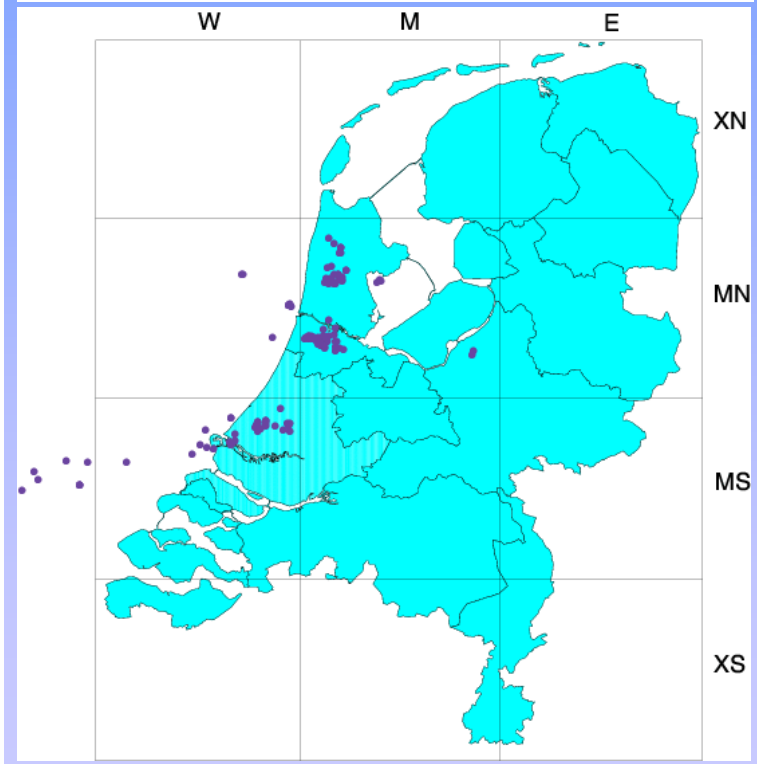
Probability of thunder (>= 2 discharges)
00UTC-run of 6 August 2003 (15-21UTC)



lightning discharges 6 August 2003
(15-21UTC)



CONCLUSIONS

* Not only DMO is important in verification but also the “predictive potential” of the model

* Assessing this predictive potential can best be done by means of probabilities

* A way to do that is by statistical post-processing

* (Comparative) verification should include statistically processed model output

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