Survey for assessment of proper verification of phenomena

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Contents

Introduction

Every weather has its impact!

1. Inconvenience of wearing sunglasses 
2. Flooded basement,

   ...

n. The damage caused by a white squall (NOT by the movie of Ridley Scott!).

Categories of impact ‘s intensity

- High-impact – damage, risks to health, economic impacts…
- Extreme-impact – dramatic losses, deaths, injuries, major disruption

Since every weather has its impact, each weather element can be treated as an impact source. It's just a question of scale.

1. ”regular” elements – temperature, precipitation, windspeed…
2. ”specific elements” – visibility limitations, thunderstorms, tornadoes, …

The verification method should be adapted (and specific) for each element.

Introduction (2)

What actually should be done in this task:

- Brief researches (case studies) to assess applicability of particular method(s) (in progress/partially done);

- Comparison and judgment whether continuous or discrete methods may/should be applied (in progress…)

- Overall final recommendations (2-b done…)

In this presentation – focus on lightning forecast (in)direct verification

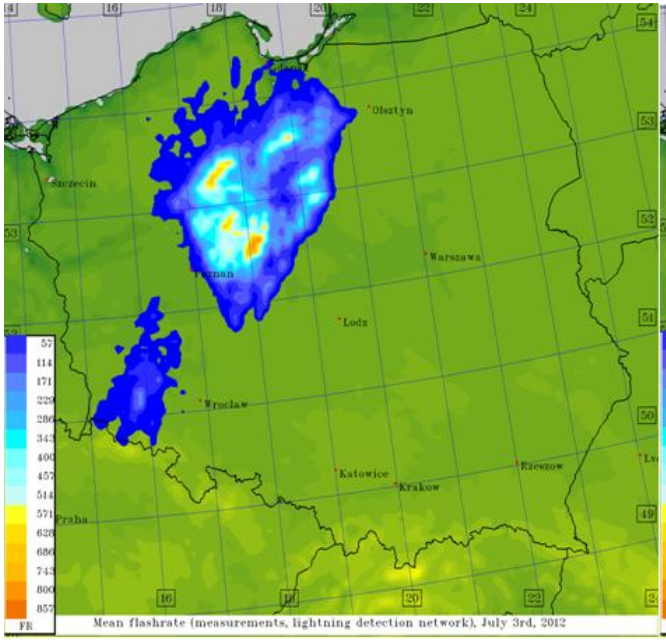
Survey on (basic) methods applicable to the problem:

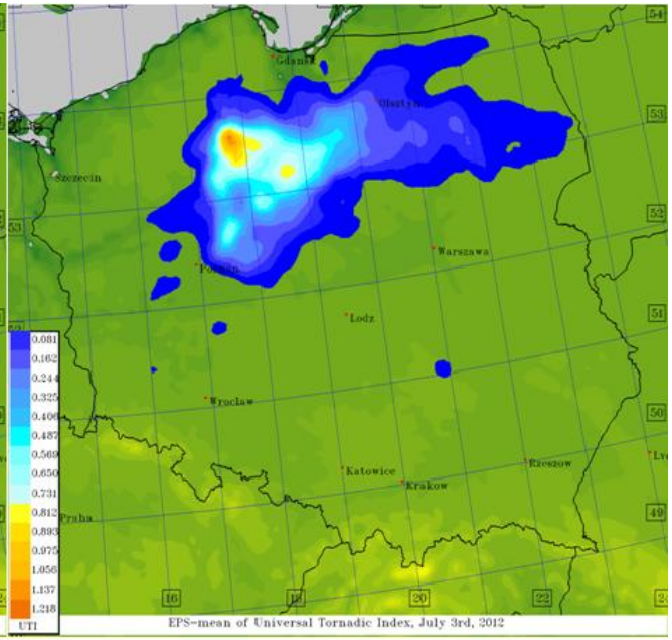
1. Neighborhood-based approaches *)
2. Coverage–Distance–Intensity (CDI) verification*)
3. FSS verification**)
4. Standard evaluation at the grid scale
5. **Cross-correlation (space-lag correlation) verification**

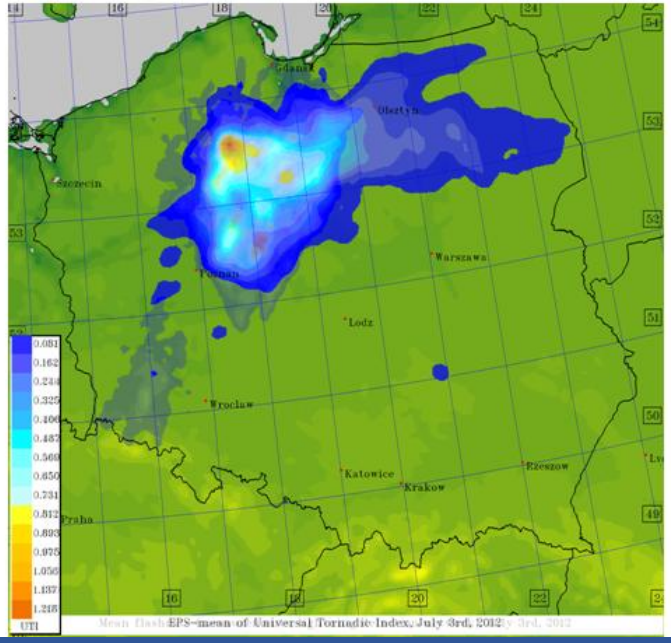
*) Wilkinson, 2017: A technique for verification of convection-permitting NWP model deterministic forecasts of lightning activity. Wea. Forecasting, 32, 97–115

**) Blaylock and Horel, 2020: Comparison of Lightning Forecasts from the High-Resolution Rapid Refresh Model to Geostationary Lightning Mapper Observations, Wea. Forecasting 35, 402-416

Space lag (cross-) correlation (reminder from WG7)

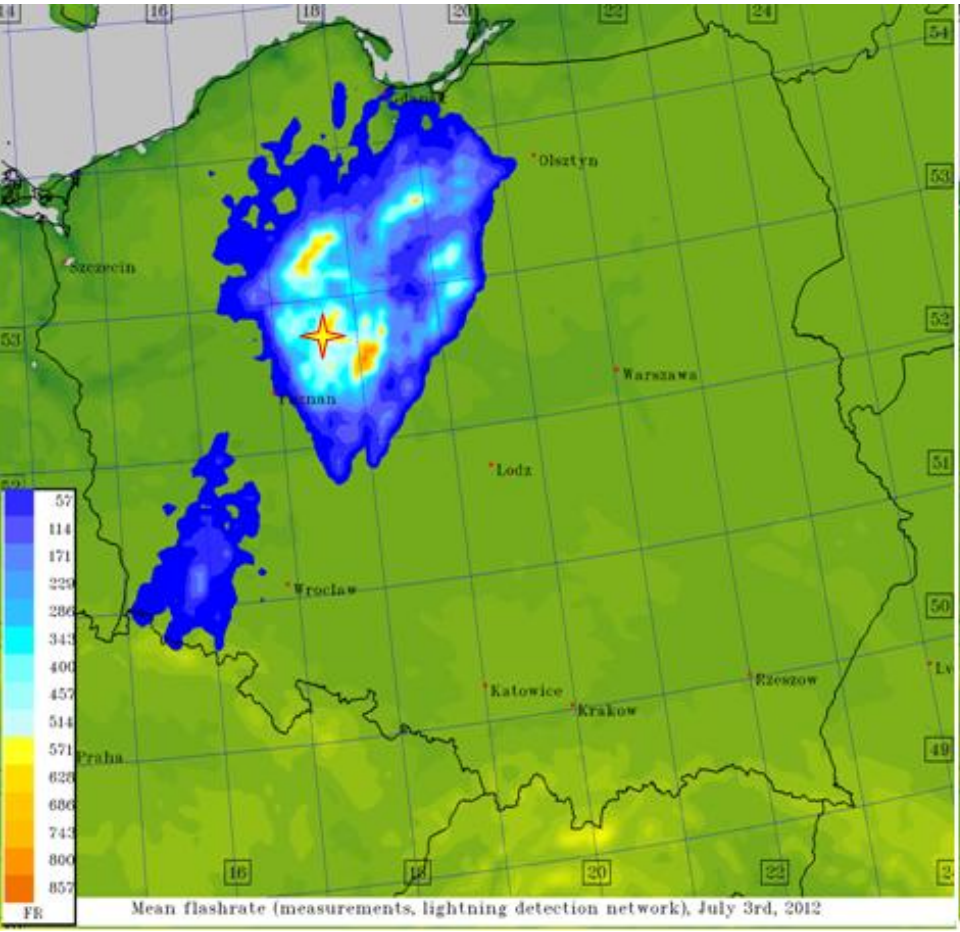


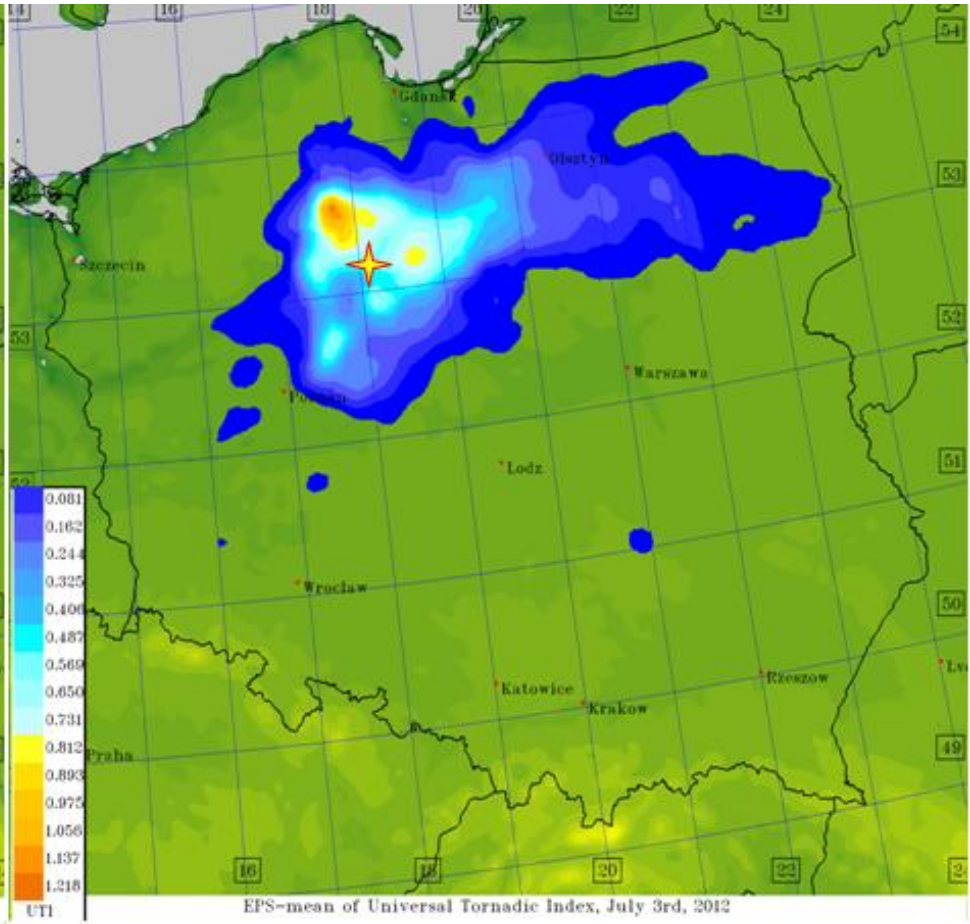




Space lag (cross-) correlation (reminder from WG7)

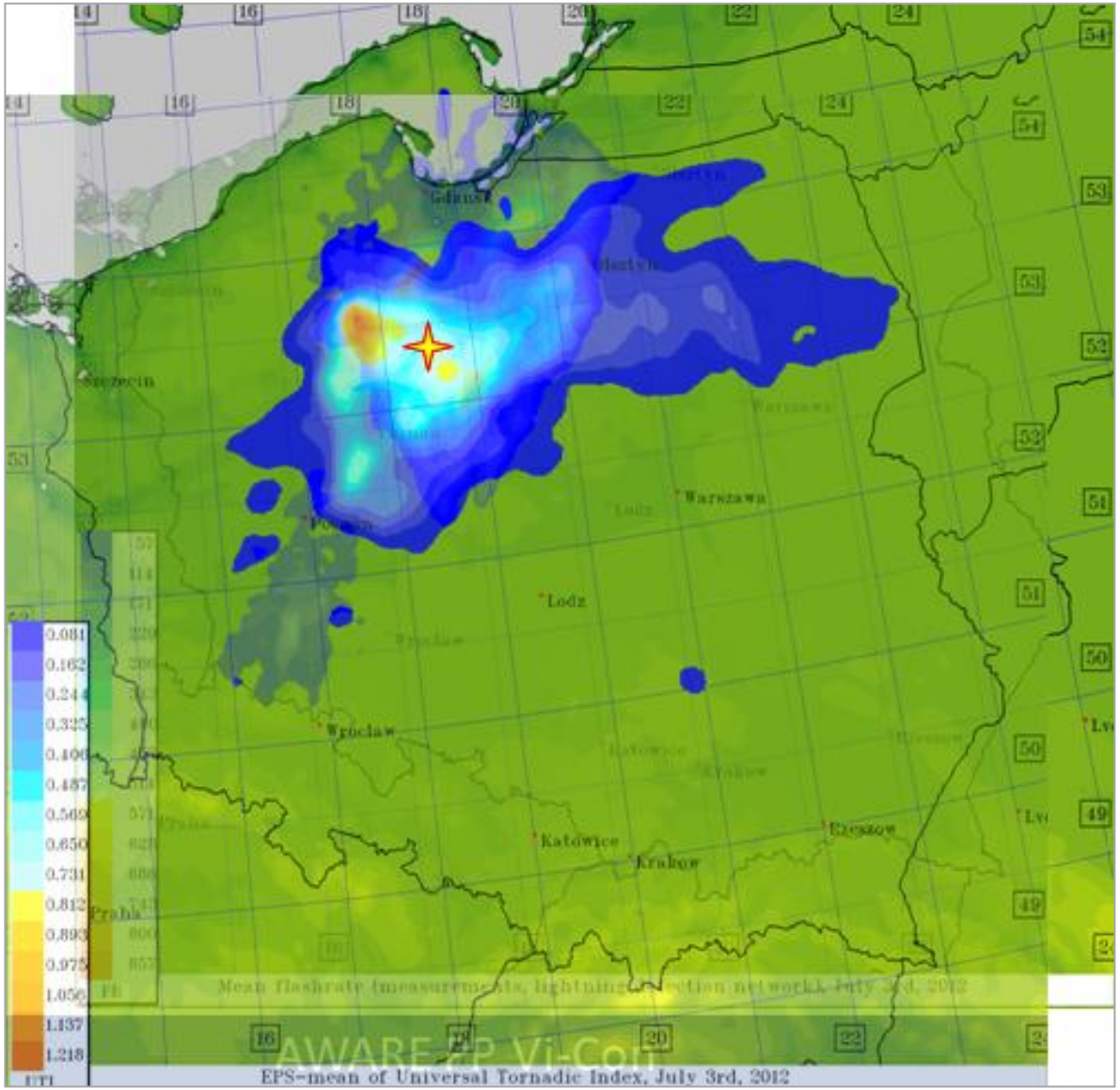
1. Calculate coordinates of ”centres of mass” for both distribution patterns (obs. vs. fcst)





2. Compute vector of displacement of fcst to obs. as a difference of the two above

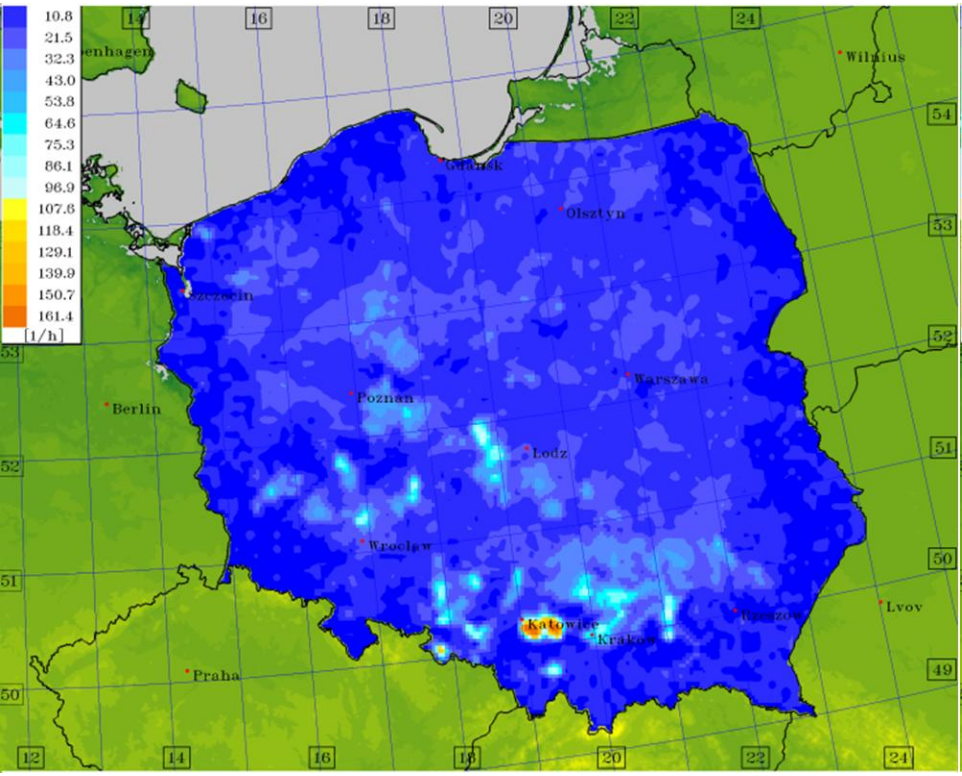
Space lag (cross-) correlation (reminder from WG7)



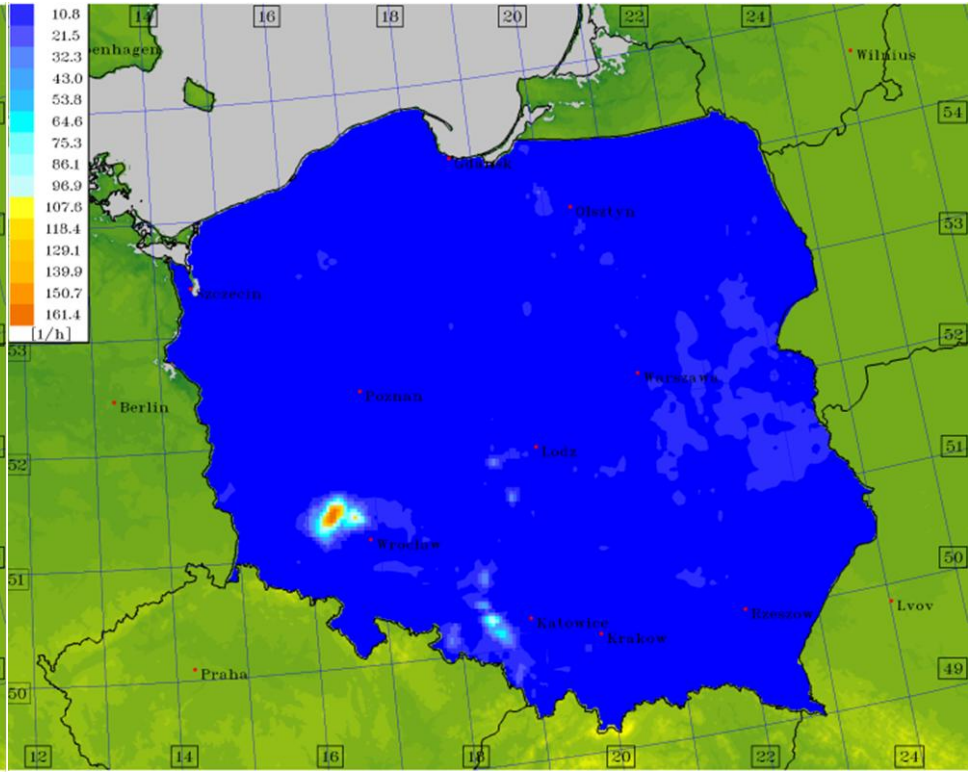
3. …Displace linearly every value of fcst by the vector of displacement

Space lag (cross-) correlation

Forecast – observation; lightning frequency

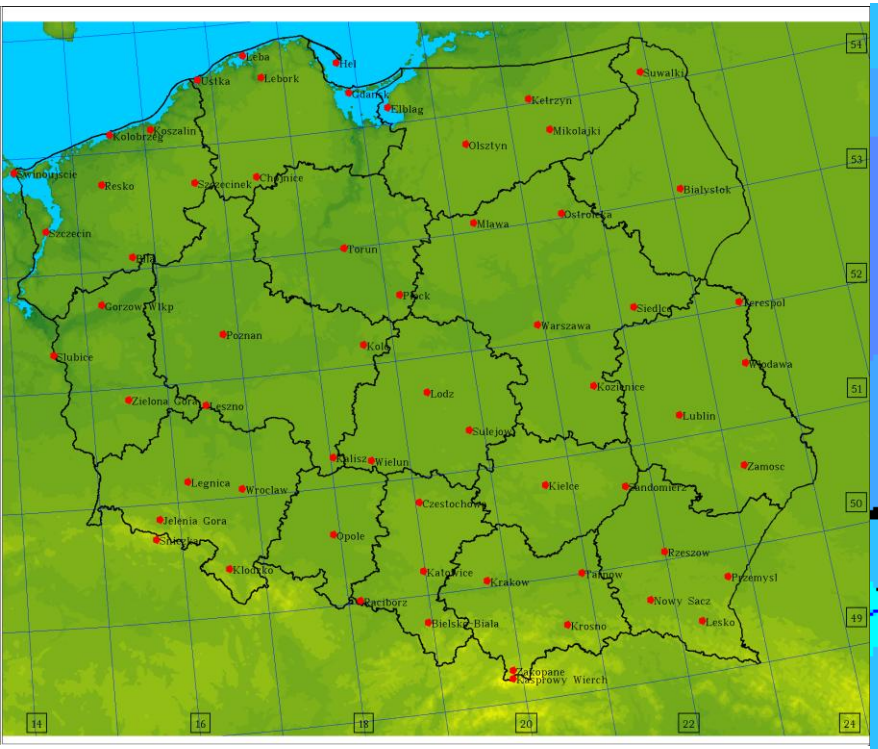


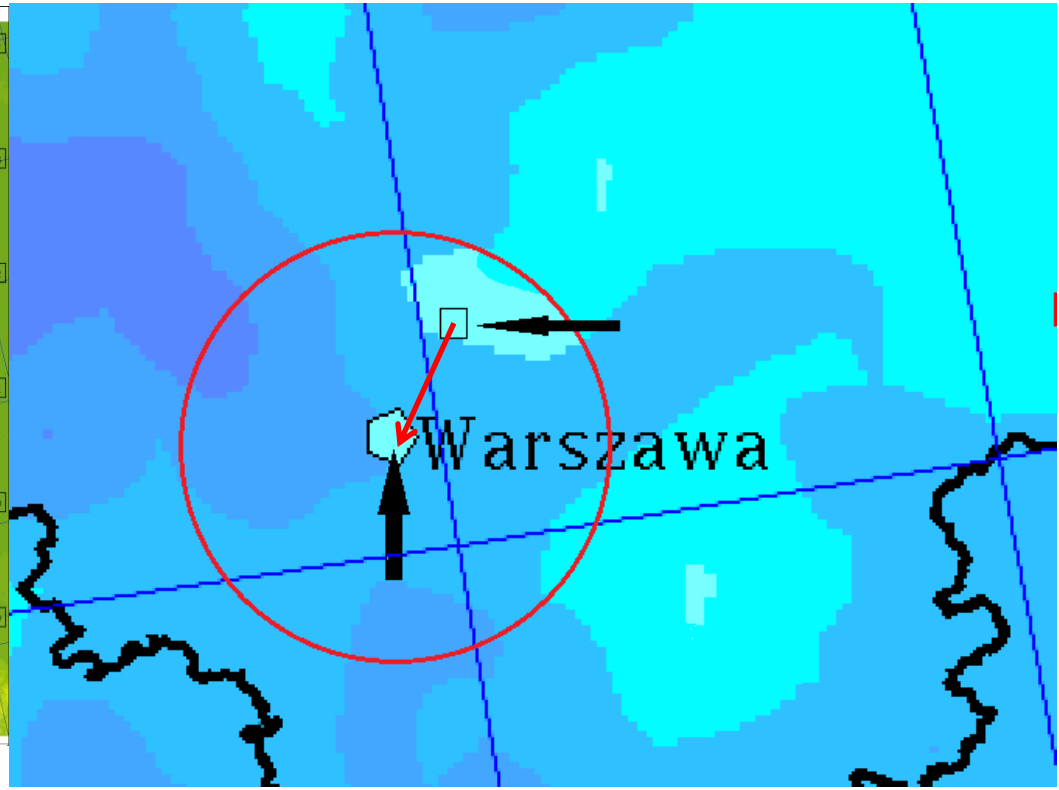
Raw FLR



VOD FLR

Vector Of Displacement for ‘regular’ fields

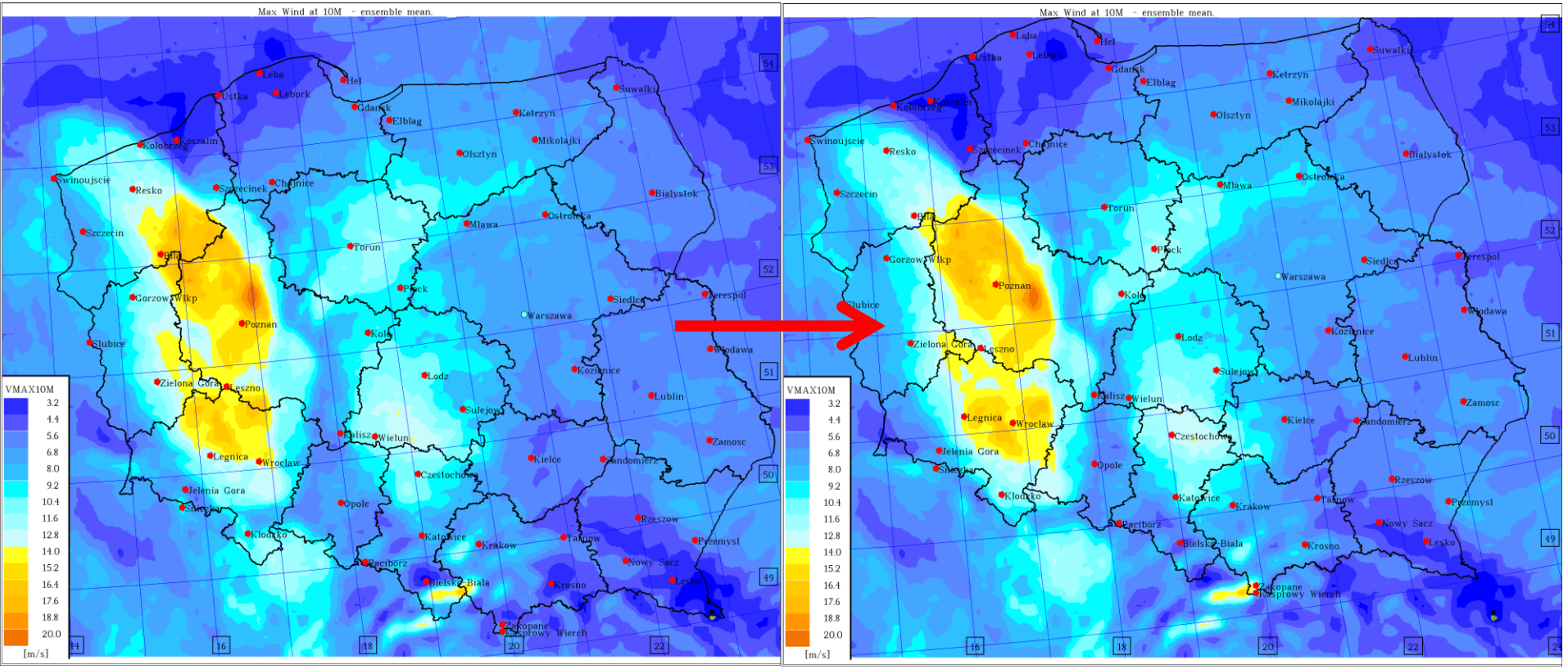




Some 60+ SYNOP stations… not enough…

1. At all SYNOP stations: in defined vicinity (red circle), find the grid *(x,y*, horiz. arrow*)* with the forecast’ value closest to the one measured at station *(x_s,y_s*, vert. arrow*)*.
2. Calculate the displacement vector for single station as *(x-x_s,y-y_s*, red arrow*)*.
3. Calculate an overall VOD as mean for all the stations…

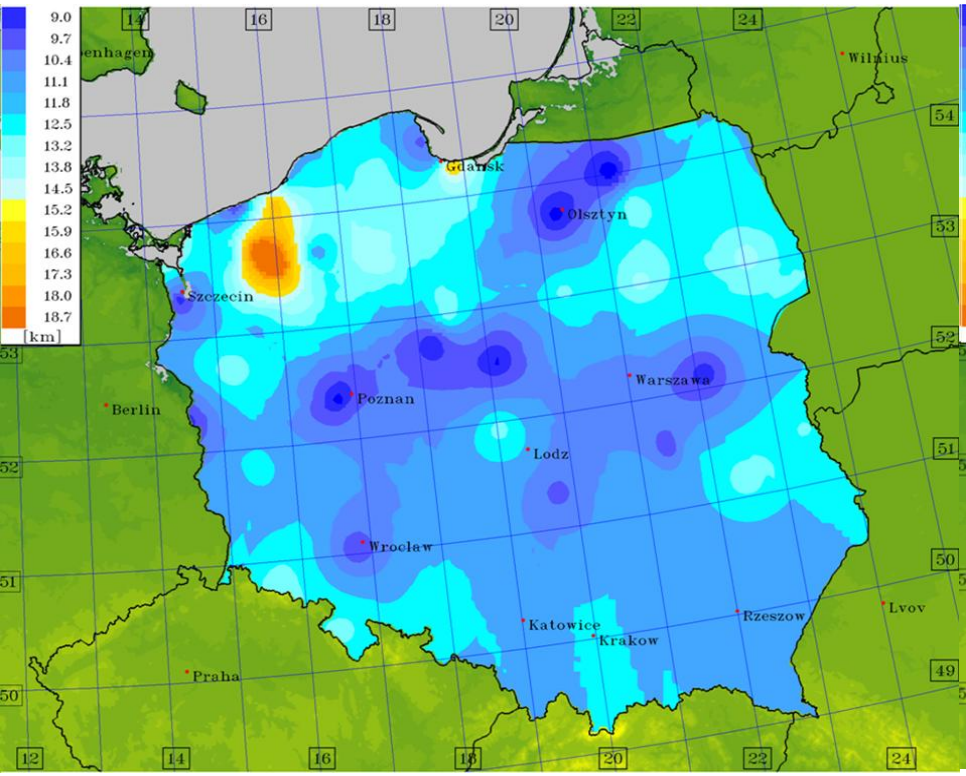
Vector Of Displacement for ‘regular’ fields



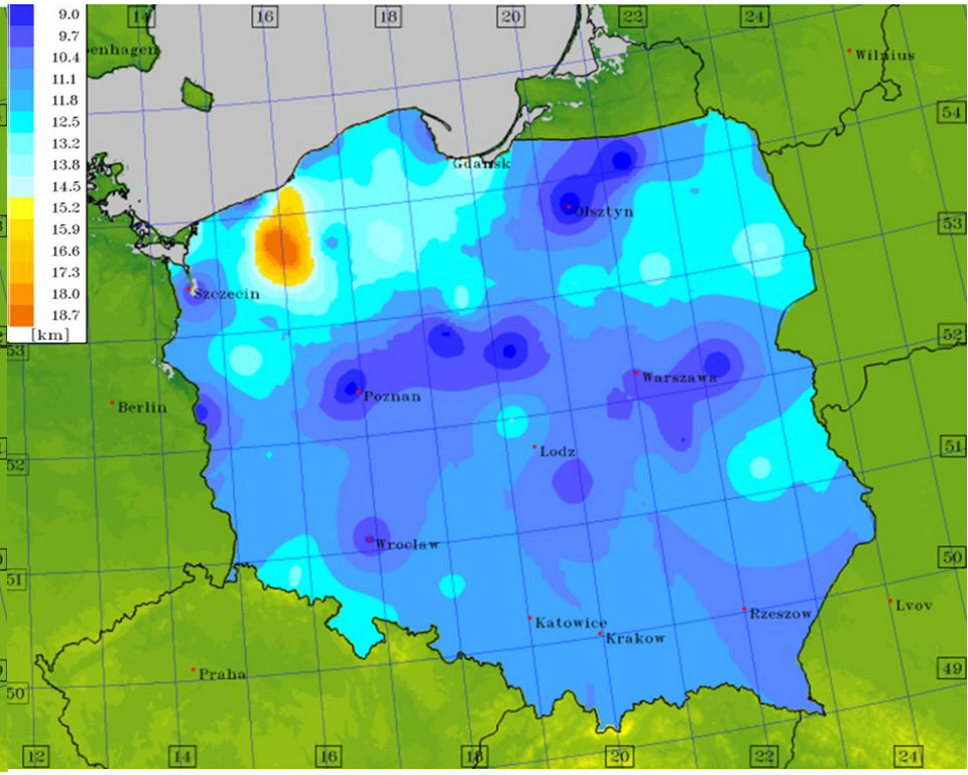
4. …finally, displace every value of fcst by the vector of displacement

Space lag (cross-) correlation

Forecast – observation; Visibility Range



Raw VIS



VOD VIS

To-dos

1. Find more cases for simple- and VOD-verification for the last period
2. Use e.g. SAL and/or FSS verification for the above cases
3. Compare results for continuous and discrete verification
4. Connect the results appropriately to subtasks 3.1 and 4.2

Conclusions to be drawn afterwards…