

# ***Towards a simple and easy to interpret wind verification scheme***

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# Outline:

- Motivation
- Build-up of the method
- Preliminary results
- Build-up of the method cont'd
- Preliminary results cont'd
- Next steps and questions





# Motivation:

Verification of wind (2D, 10m) in complex terrain is one of MesoVICT goals

## Literature:

- ~90% are about wind speed only
- Wind direction only verified „indirectly“ via verification of  $u$  and  $v$  separately → difficult to interpret
- Using of curl and div of wind-field (scalars) to make use of object based verification methods, Bullock & Fowler, 23rd Conf. Wea. Ana. & Forecasting (2009) → interesting approach but also needs time for interpretation

→ need for a simple wind verification scheme



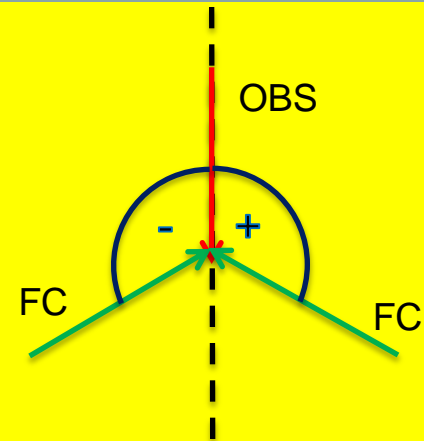
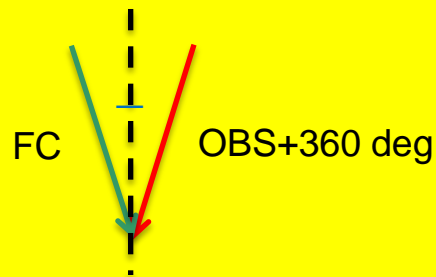
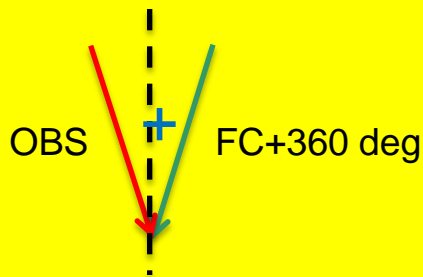
# Build-up of the method:

- Input data: wind data in terms of speed and direction (SYNOP report)
- Calculate differences of speed and direction → be careful with direction

$$\text{speed } \Delta ff = ff_{FC} - ff_{OBS}$$

$$\text{direction } \Delta dd = dd_{FC} - dd_{OBS}$$

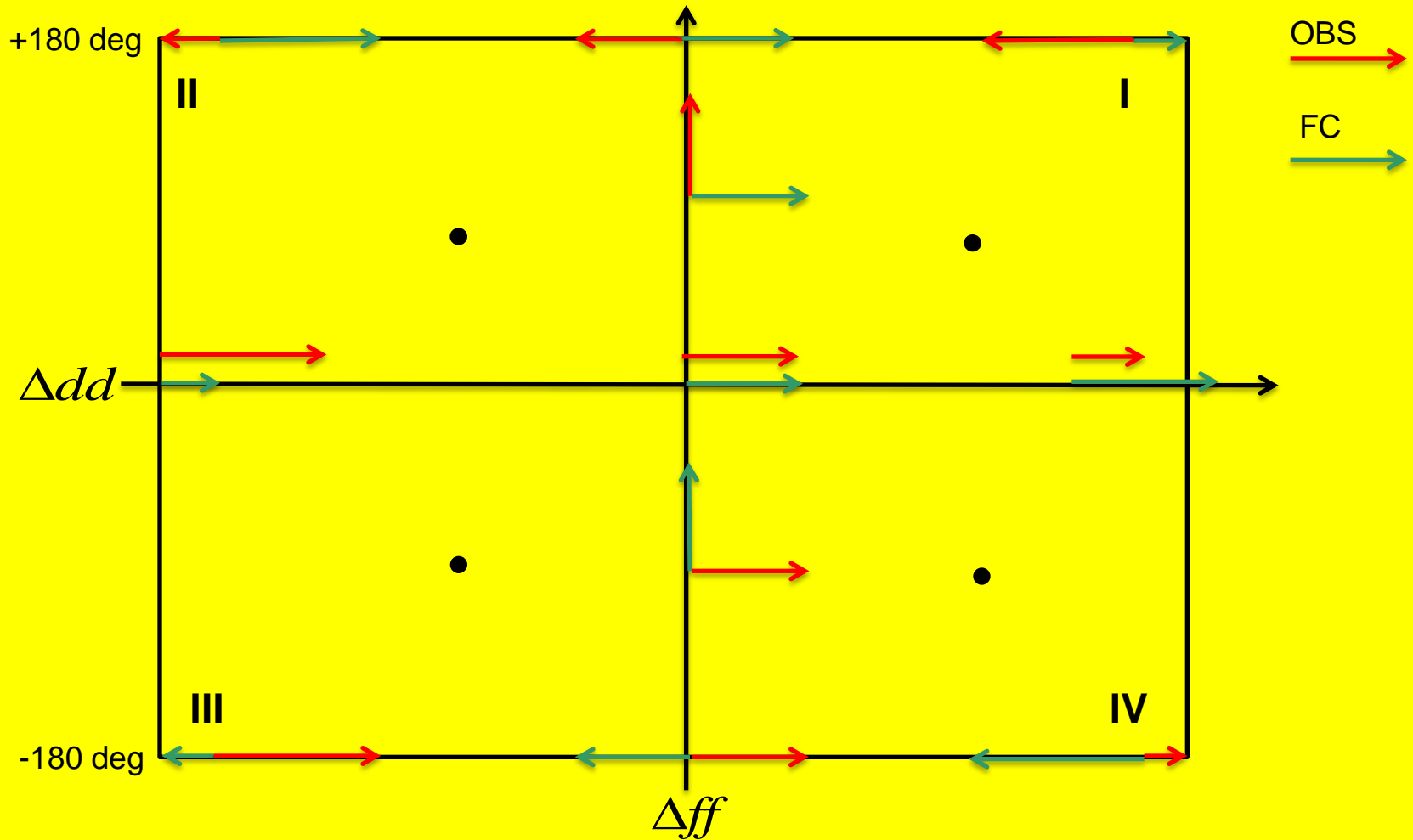
Maximum difference for direction:  $\pm 180$  degree





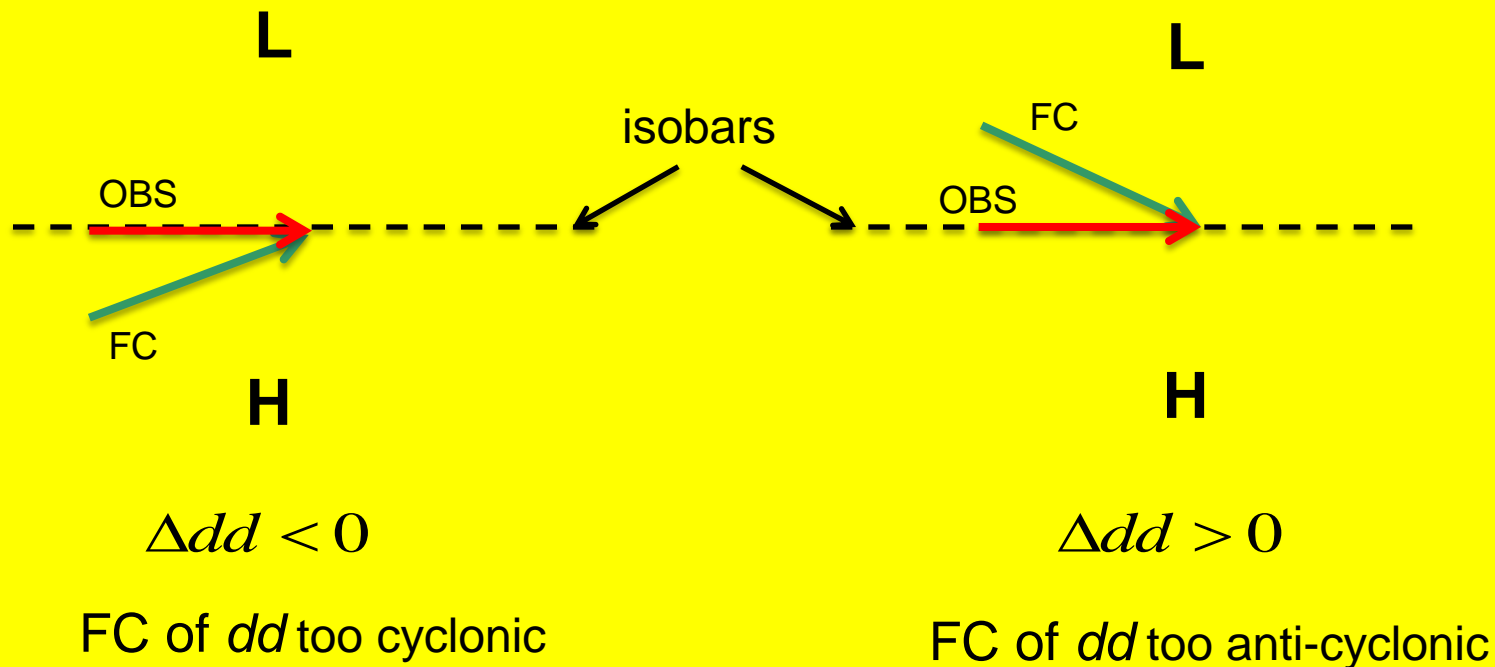
# Build-up of the method:

- Results in pairs of  $\Delta ff$  and  $\Delta dd$  → scatterplot



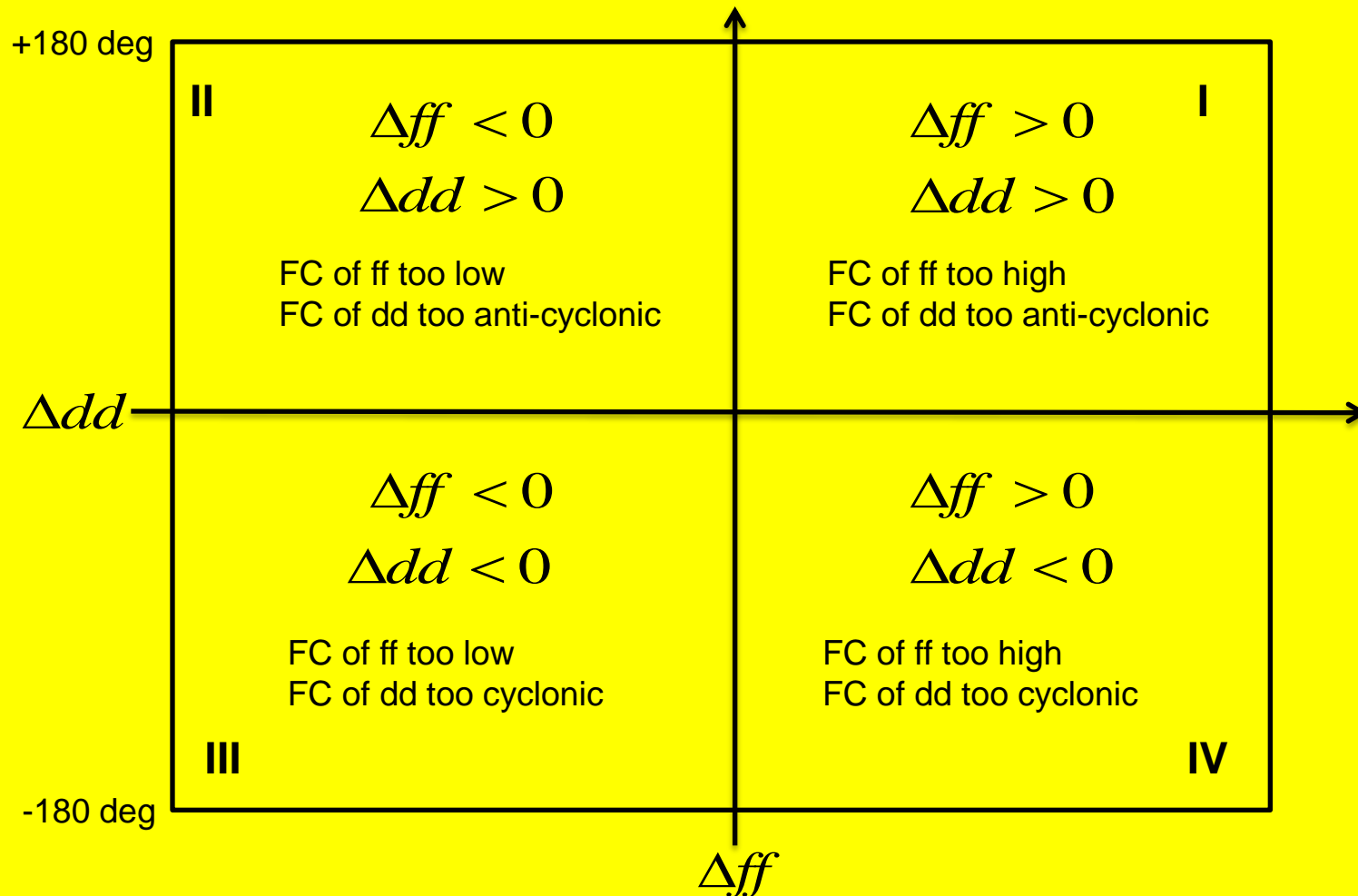
# Build-up of the method:

- Interpretation  
assume geostrophic flow for observations



# Build-up of the method:

- Possible Interpretation





# Preliminary results:

Data:

FC: time series of daily wind forecasts (00 UTC and 12 UTC)  
run from ECMWF for 06h and 36h FC for one year (7/2014-  
6/2015)

OBS: SYNOP 10m wind of Graz-Nord

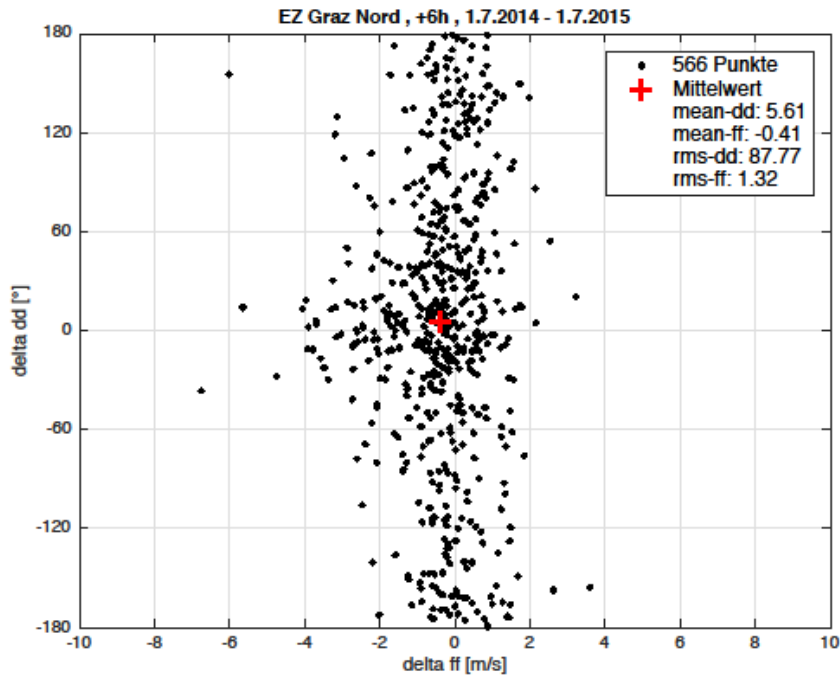


[http://www.diercke.at/diercke\\_karten.xtp](http://www.diercke.at/diercke_karten.xtp)

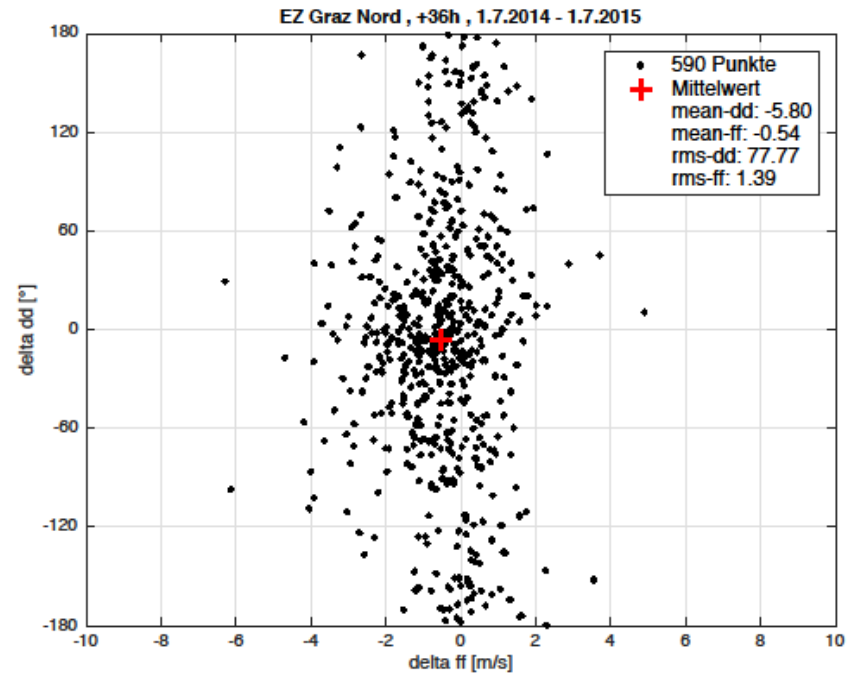


# Preliminary results:

- Data are excluded if SYNOP report misses *dd* and/or *ff*
- Data are excluded if circumventing wind is reported



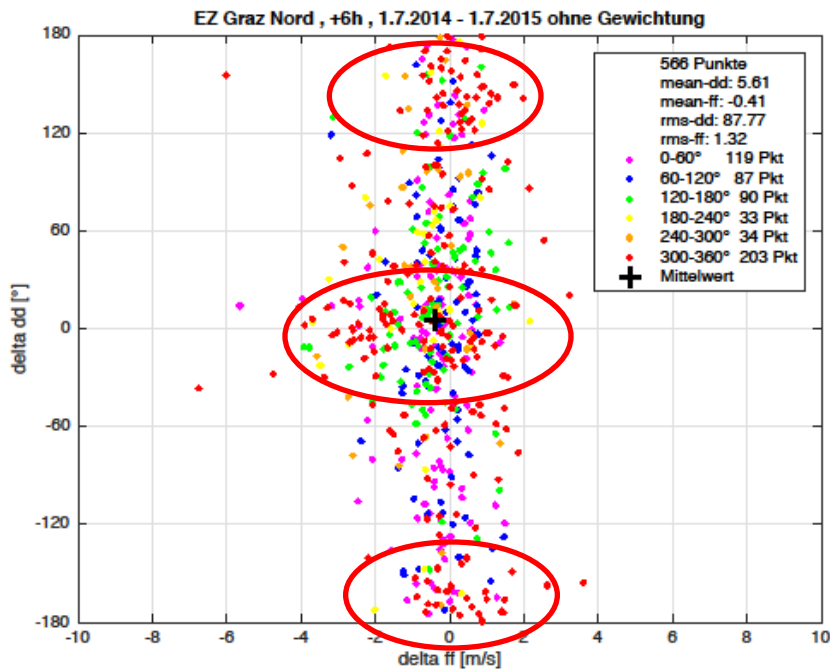
+06h: verifies for 06 and 18 UTC



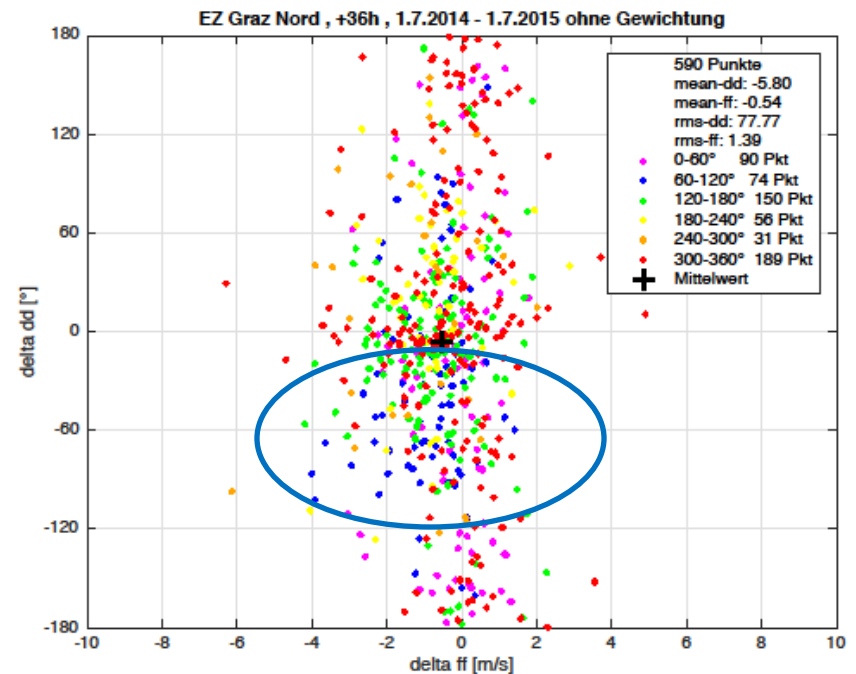
+36h: verifies for 12 and 00 UTC

# Preliminary results:

- Colour dots according to measured wind direction (or wind speed or certain threshold or ...)



+06h: verifies for 06 and 18 UTC



+36h: verifies for 00 and 12 UTC



# Build-up of the method

- Problem: same  $\Delta ff$  and same  $\Delta dd$  results from different wind speeds.

Example: case1:  
 $\Delta dd = +90 \text{ deg}$   
 $\Delta ff = 0 \text{ m/s}$   
 $ff_{FC} = ff_{OBS} = 1 \text{ m/s}$



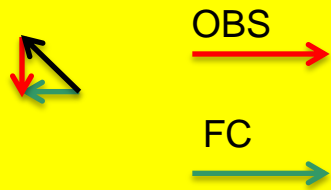
case2:  
 $\Delta dd = +90 \text{ deg}$   
 $\Delta ff = 0 \text{ m/s}$   
 $ff_{FC} = ff_{OBS} = 10 \text{ m/s}$



# Build-up of the method

- Solution: define a weight which is dependent from the length of the difference vector.

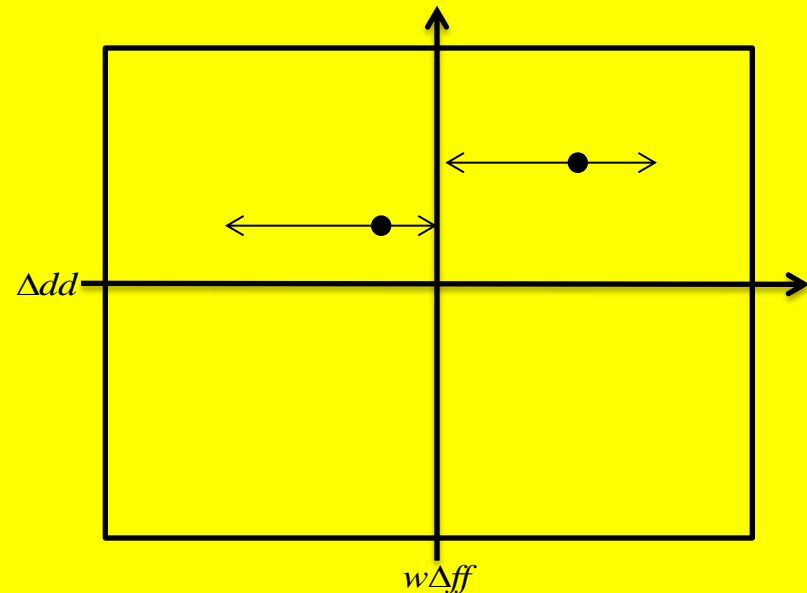
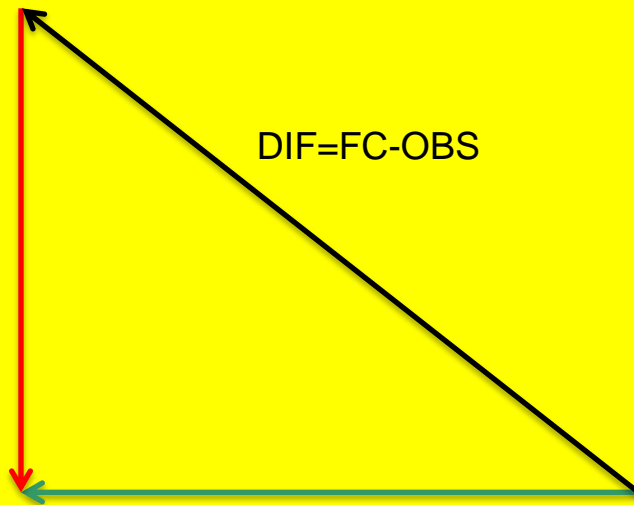
Example:



Weight:

$$w = \frac{\|\vec{V}_{FC_i} - \vec{V}_{OBS_i}\|}{\text{mean} \|\vec{V}_{FC} - \vec{V}_{OBS}\|}$$

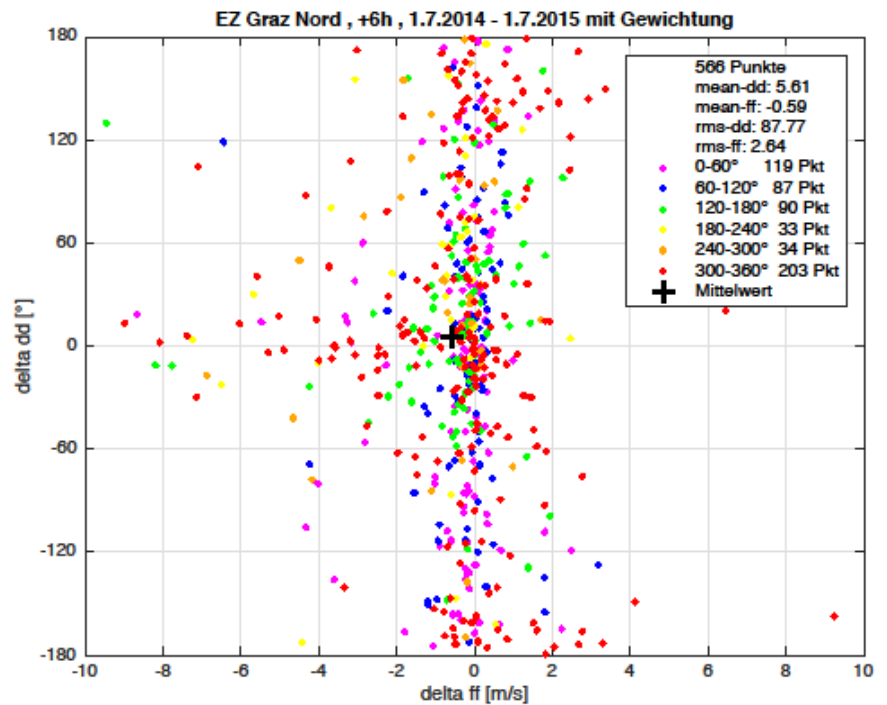
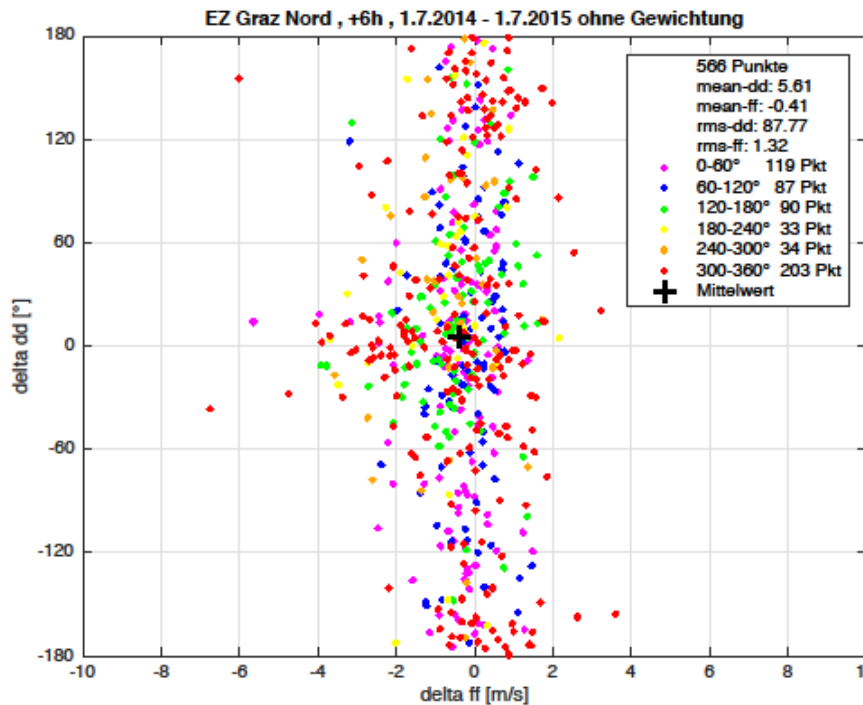
$$0 \leq w \leq w_{\max}$$





# Preliminary results:

- Same as previous results but with weight

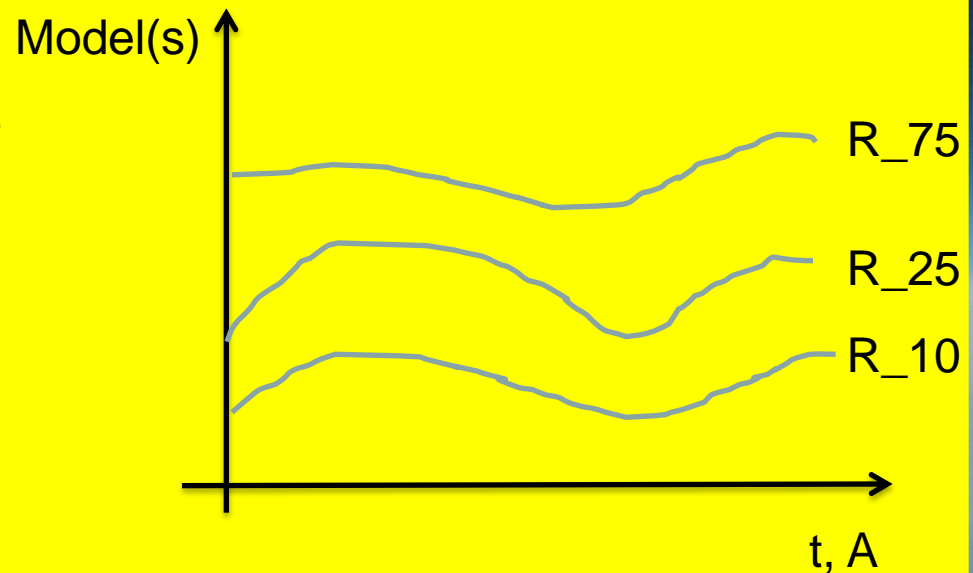
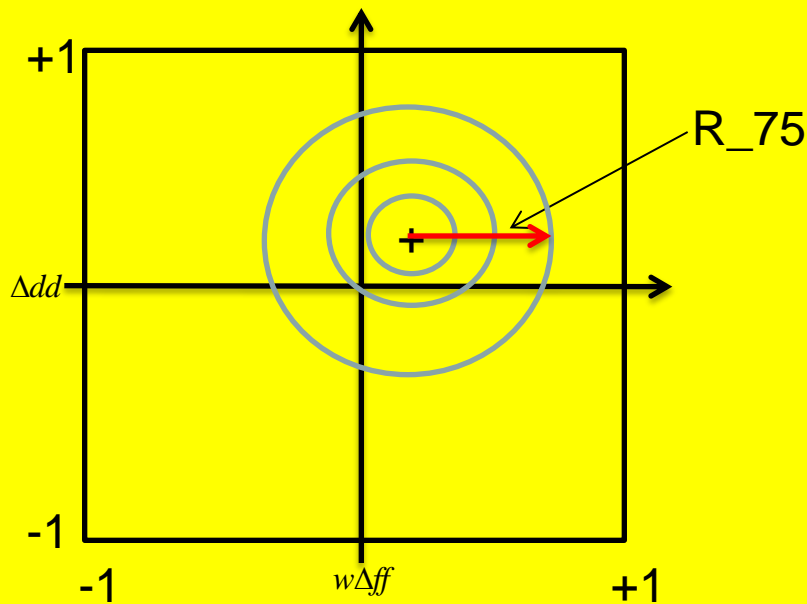


+06h: verifies for 06 and 18 UTC

As left but with weight w

# Outlook:

- Reduce the information to one number
  - Normalize x- and y-axis
  - Define a radius with contains 10% (25%, 50%, ...) of the data points with the mean value as origin
- Explore full range of possibilities





# Questions:

- Useful?
- Simple?
- Easy to interpret?



Thank you  
for your attention!

