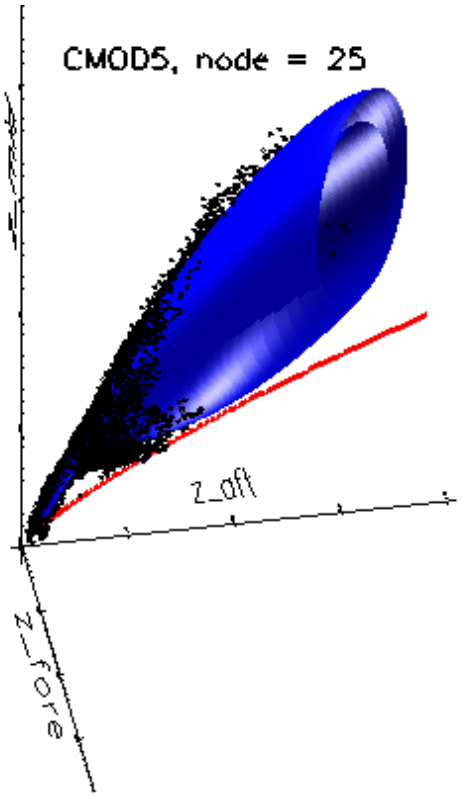
ASCAT scatterometer quality control

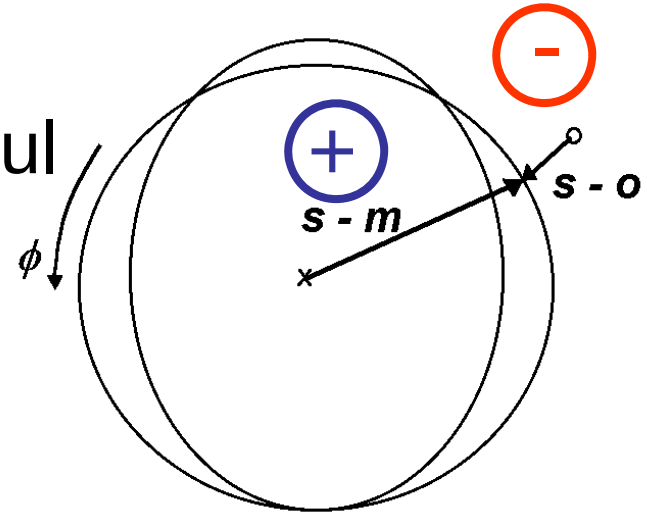
Marcos Portabella, CSIC
Ad Stoffelen, KNMI
Anton Verhoef, KNMI
Jeroen Verspeek, KNMI

Introduction

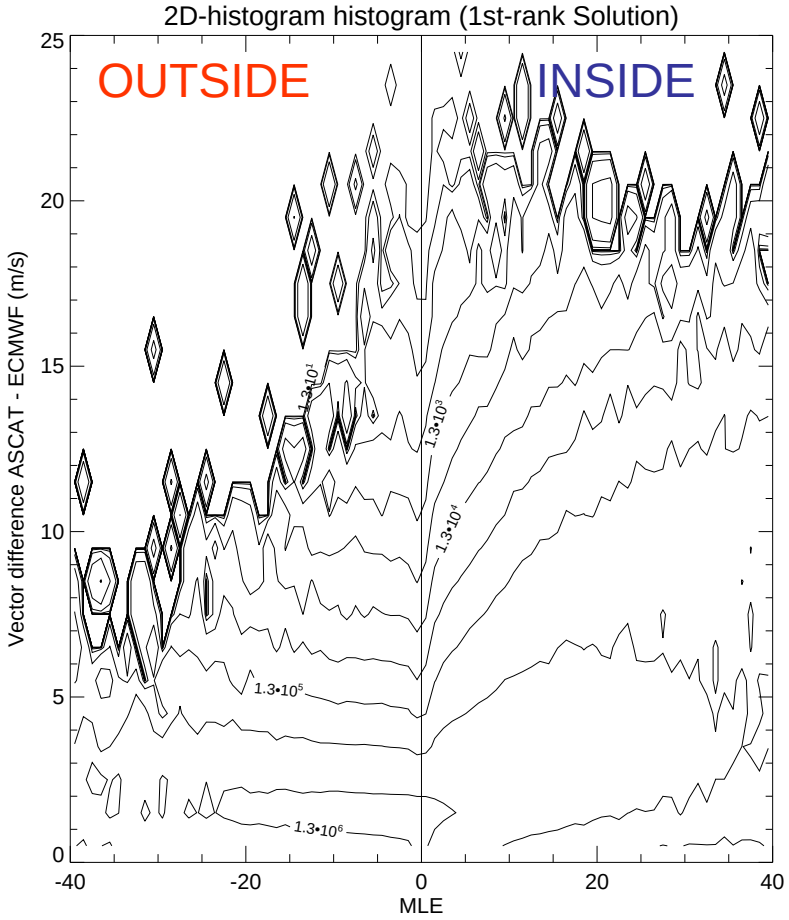
$$\sigma^o = GMF(v, \phi, \theta, p, f)$$

- CMOD-5 GMF in 3D measurement space: conical shape
- Inversion residual (MLE) can be interpreted as the minimum (squared) distance between measurement triplet and cone surface
- MLE “sign” analysis can be useful in identifying
  - GMF errors
  - QC issues
  - Geophysical patterns

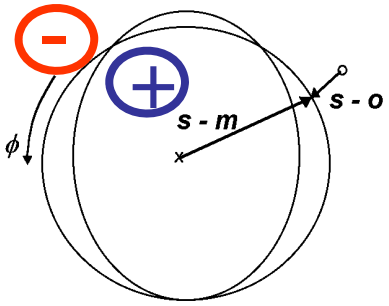




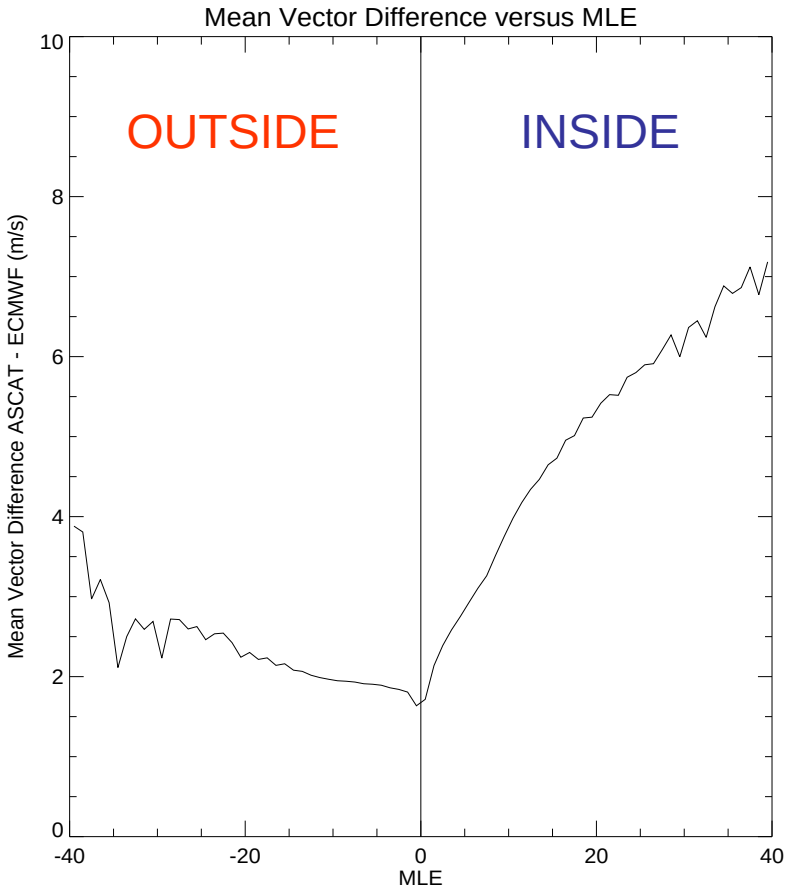
QC issues



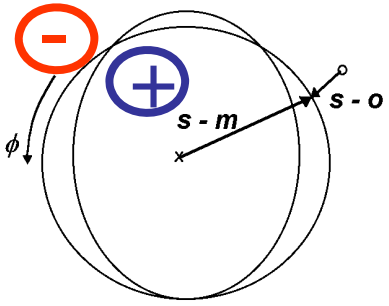
- MLE as a QC indicator: different behaviour depending on sign
- MLE more sensitive to wind quality inside the cone
- Triplets outside the cone result in better quality winds
- Different QC threshold depending on MLE sign?



ASCAT 25km QC

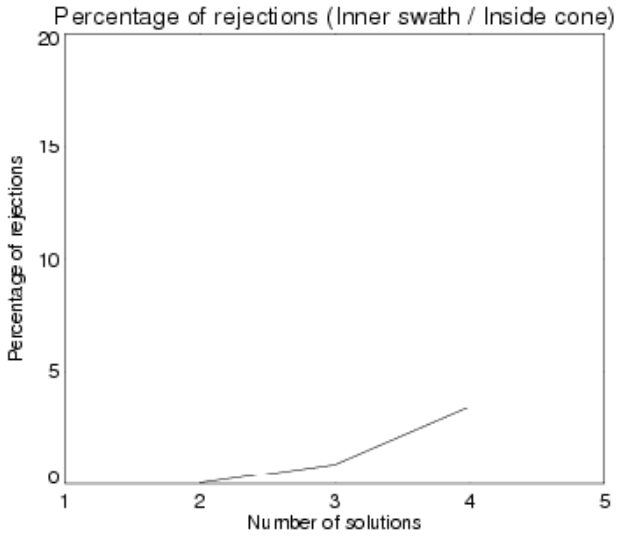


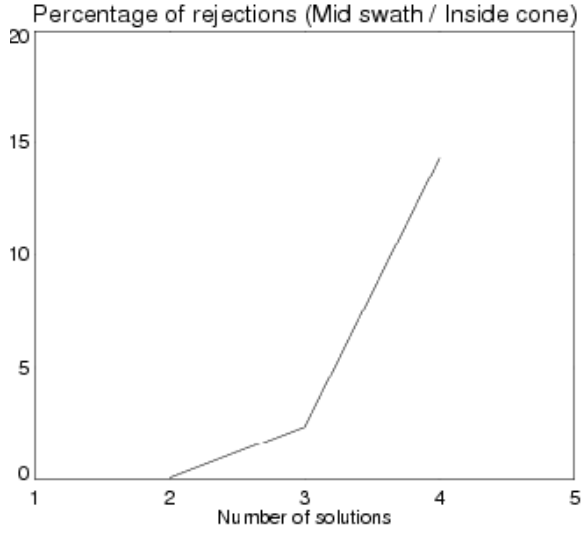
- No rejections “outside” the cone
- MLE is normalized per WVC and the threshold is set to a fixed value of 19
- QC is most effective above 4 m/s

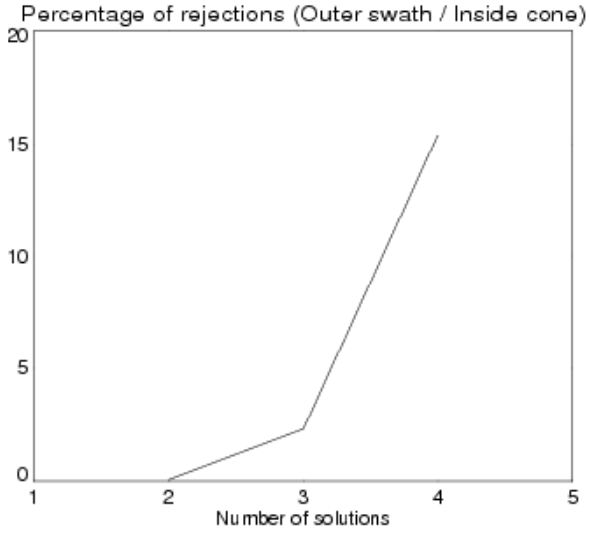


ASCAT 25 km QC

QC	Nr. of data (%)	Mean VRMS (m/s)
Accepted	99.6%	1.72
Rejected	0.4%	4.25

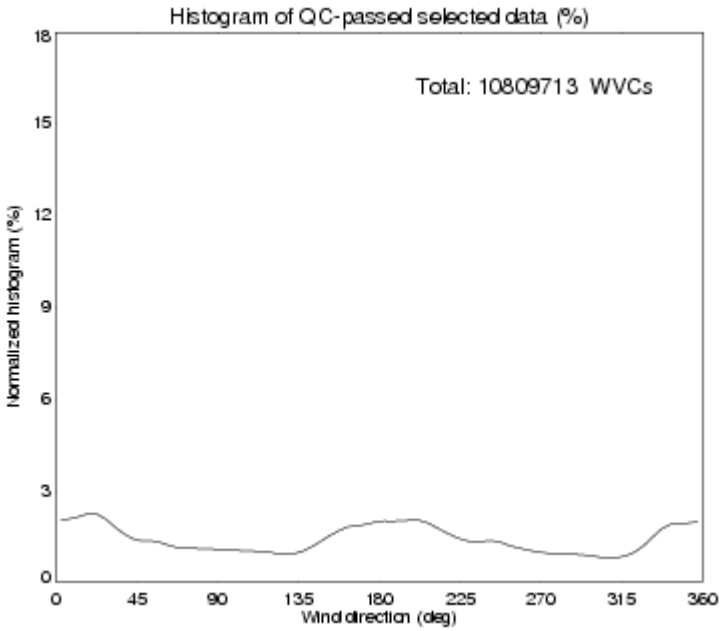


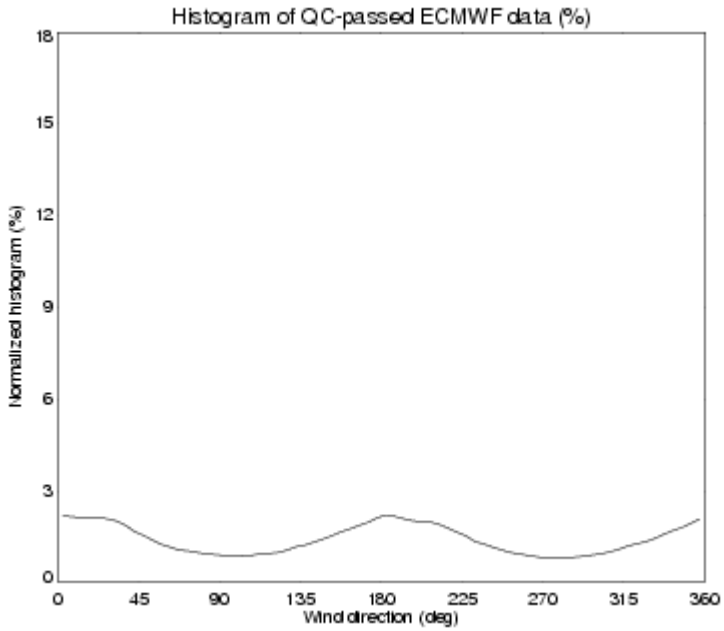


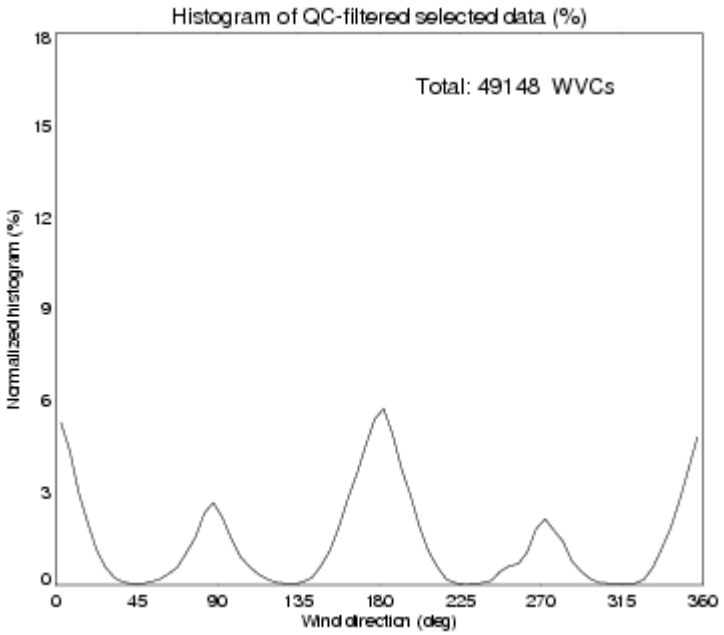


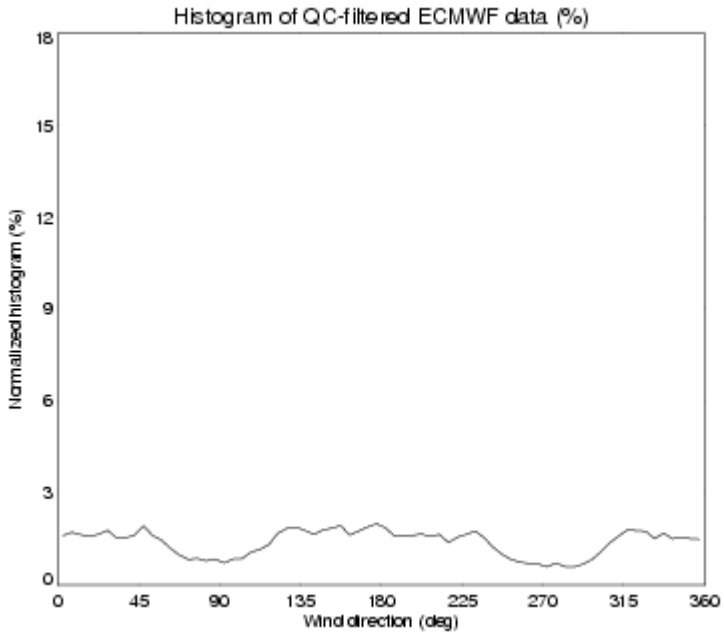
ASCAT QC: wind direction

ASCAT winds > 4 m/s



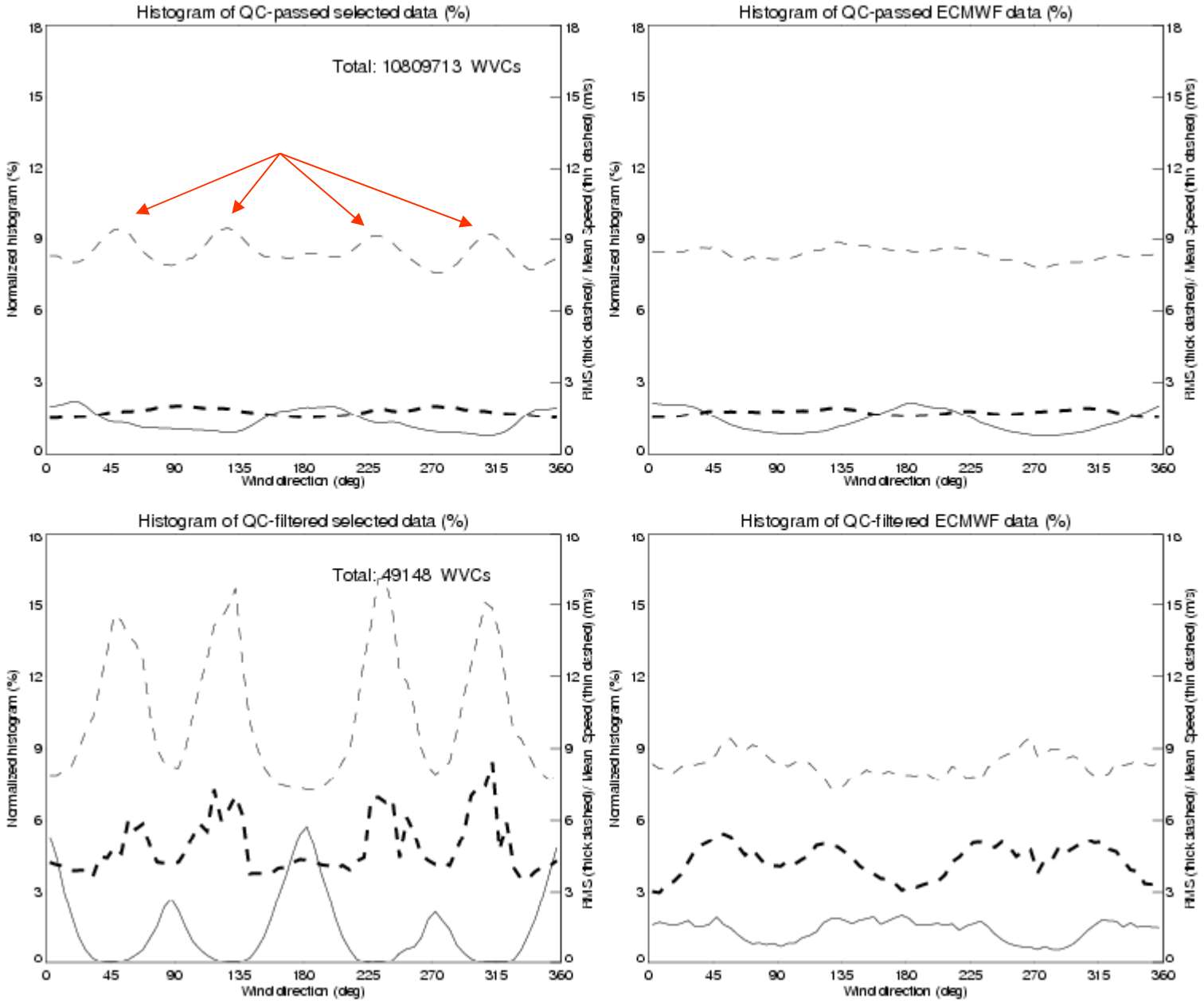




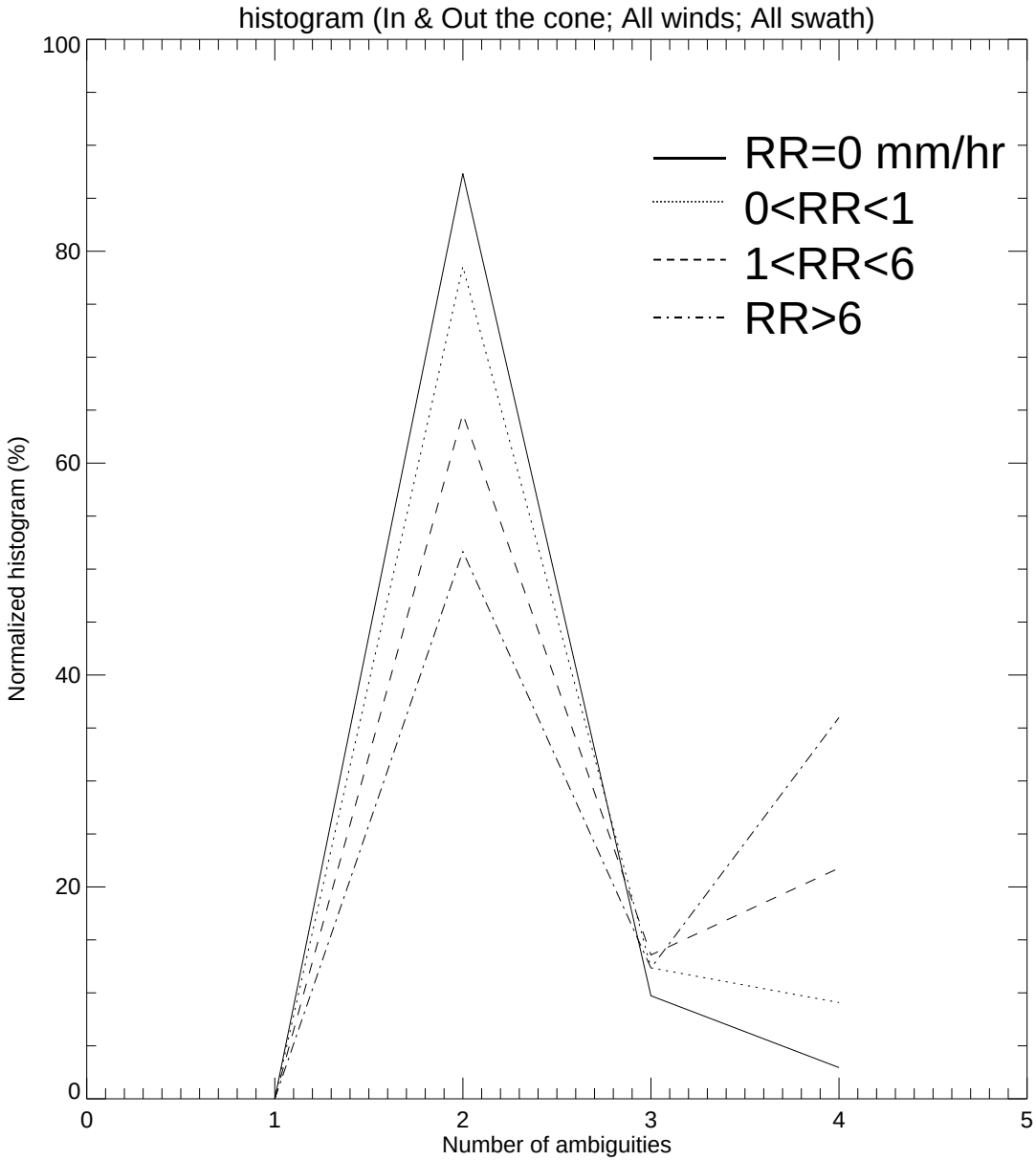


ASCAT QC: wind speed

ASCAT winds > 4 m/s

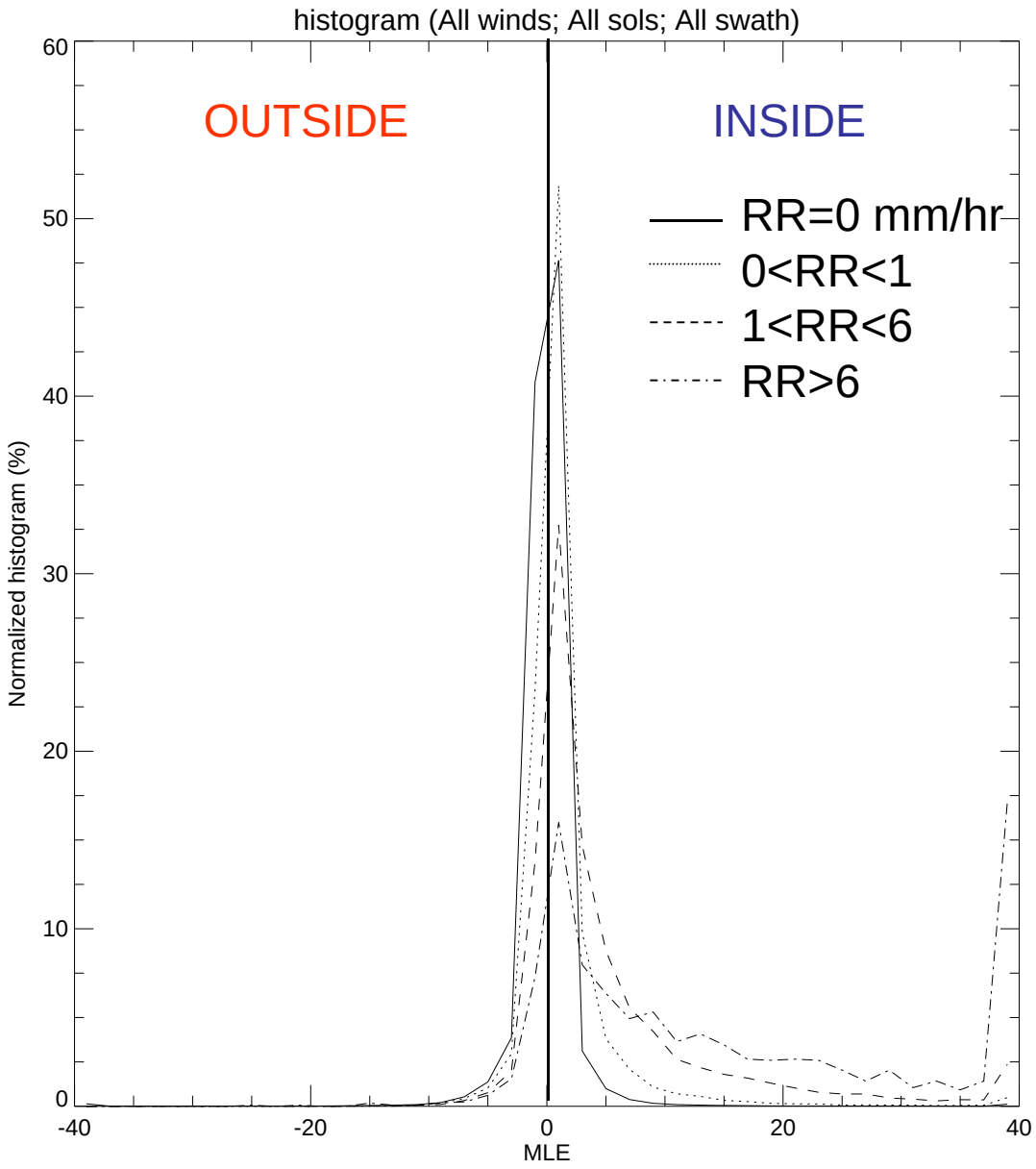


Rain effects

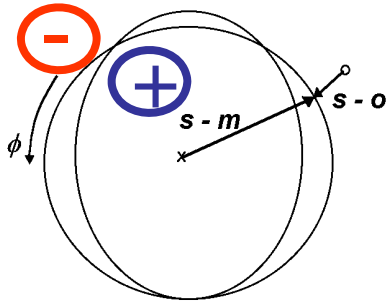


- At C-band, attenuation and scattering mechanisms are thought to be small compared to splashing effect
- 1 month of ASCAT-TMI collocations
- Ambiguity increases with rain rate (QC indicator)

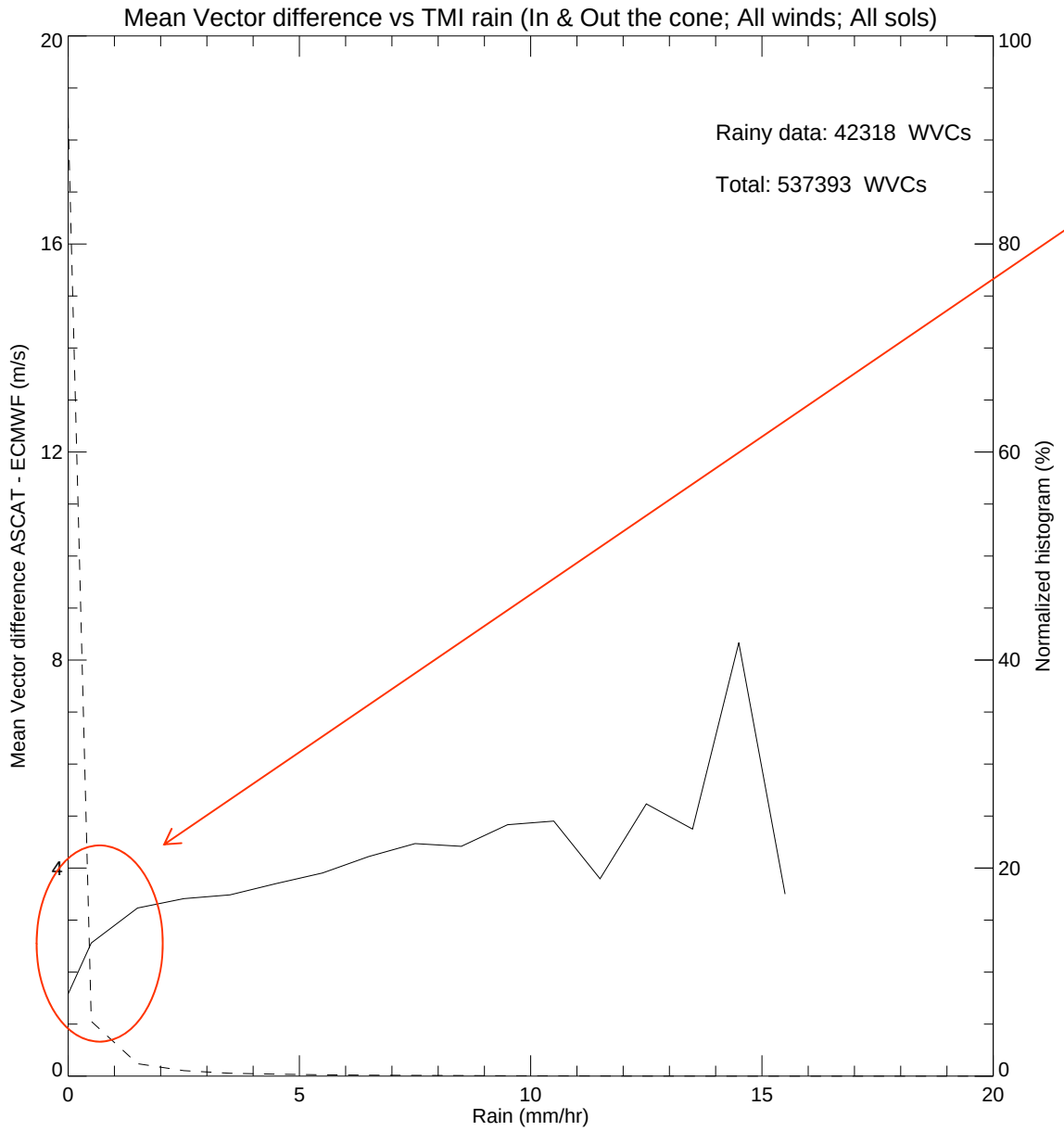
Rain effects



- Rainy measurements mostly inside the cone due to loss of anisotropy
- Shift inside the cone increases with increasing RR
- Consistent with current QC



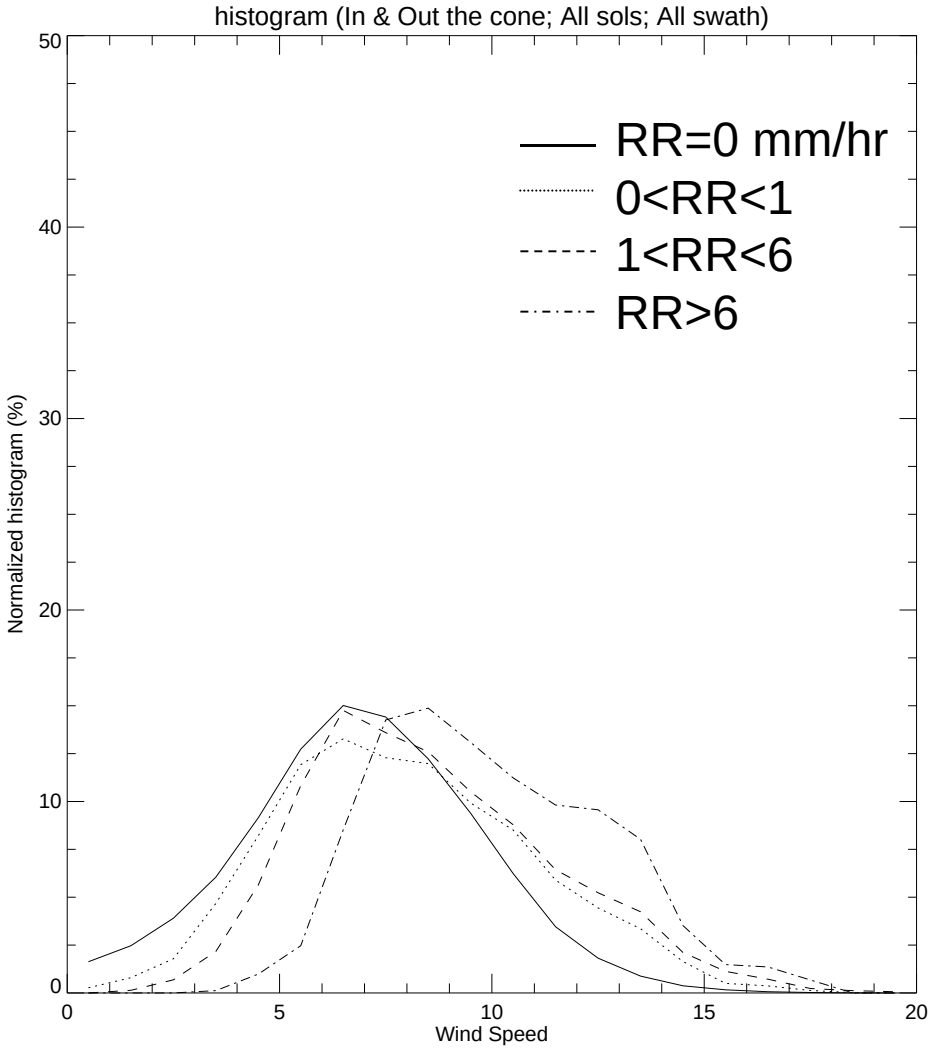
Rain effects



Rain effects on ASCAT or ECMWF wind quality degradation?

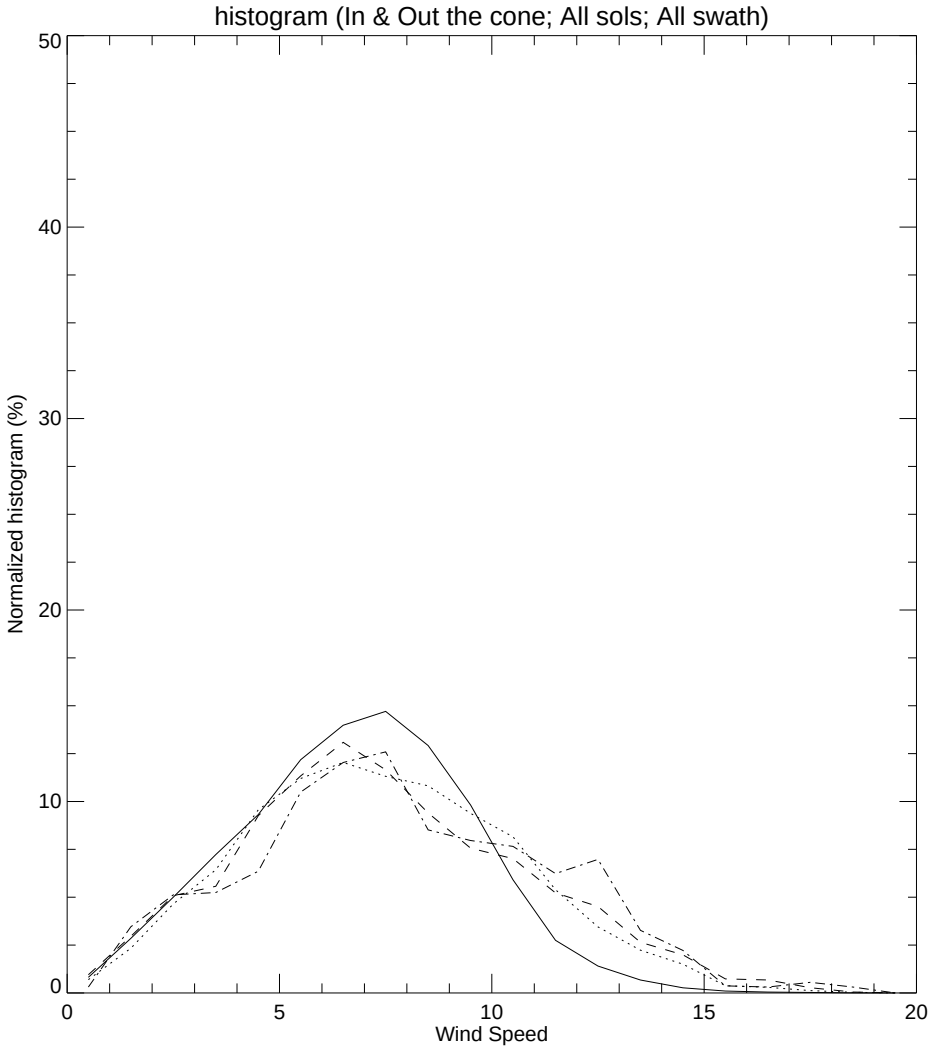
Rain effects

ASCAT



ASCAT rain effects for RR>6 mm/hr

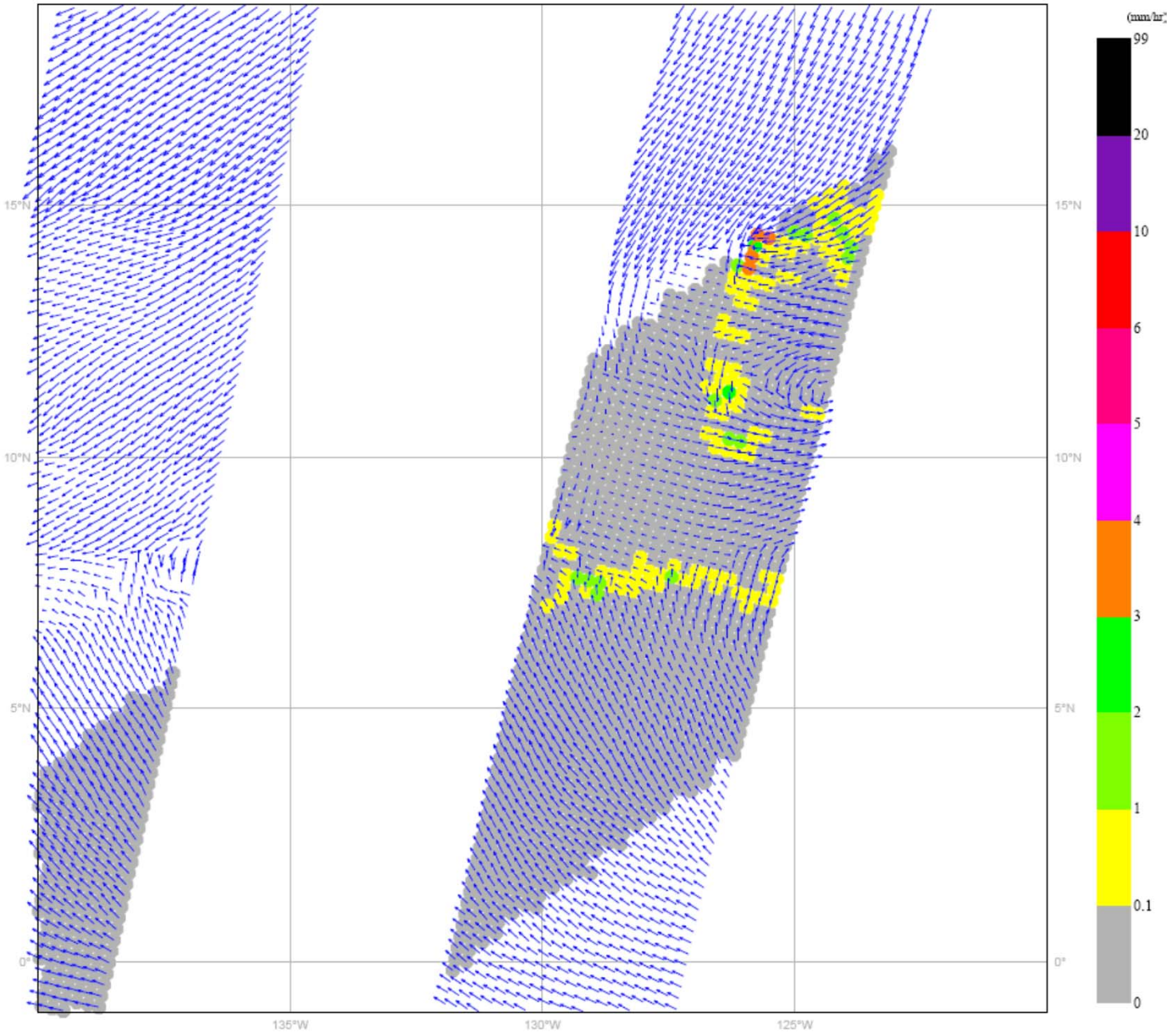
ECMWF



Is EMWF depicting equatorial rain-related effects (downbursts, convergence)?

ASCAT winds + TMI rain rates

17:42 UTC 14/10/2008



ECMWF winds

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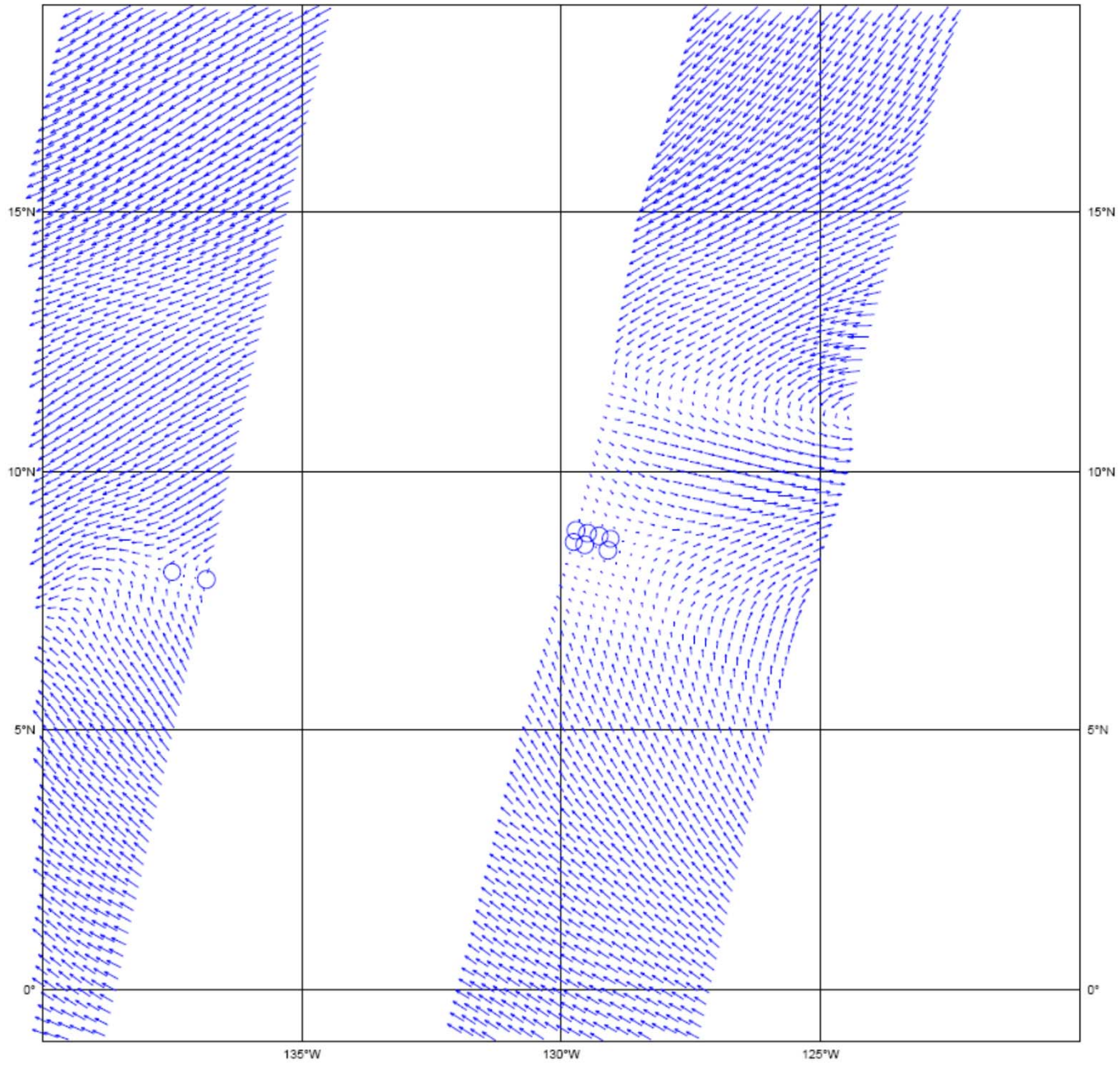

ASCAT Wind Speed

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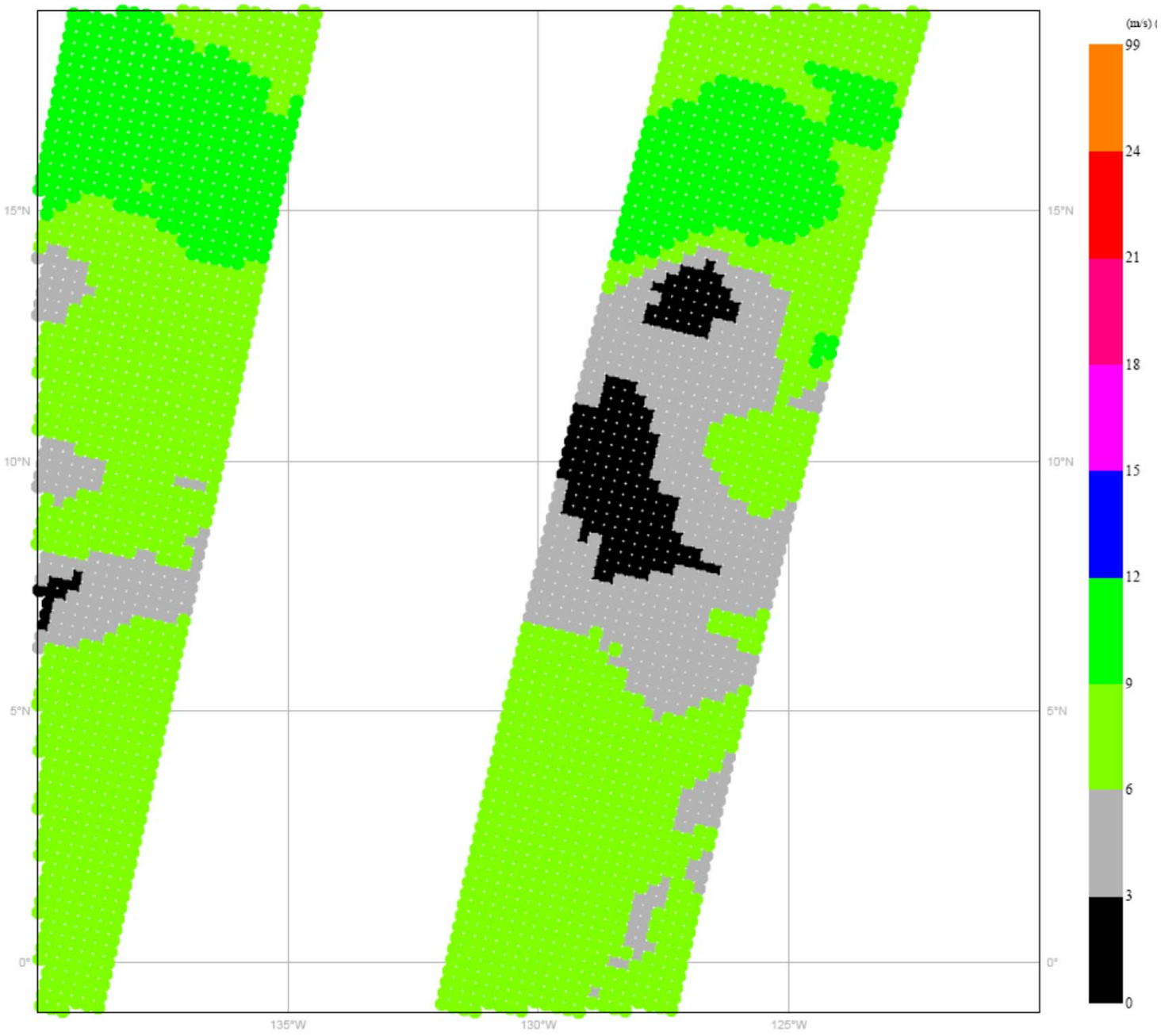

ECMWF Wind Speed

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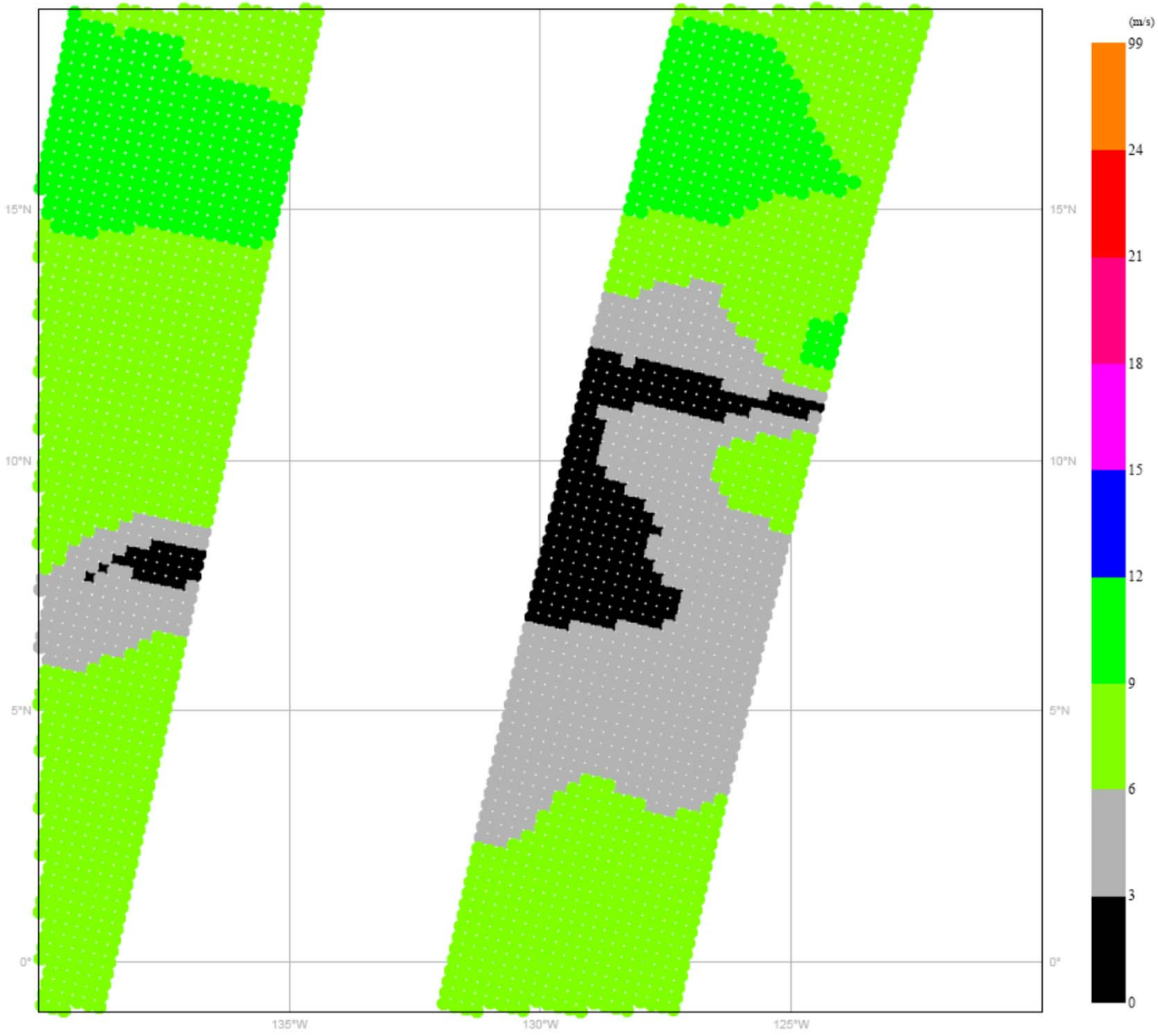
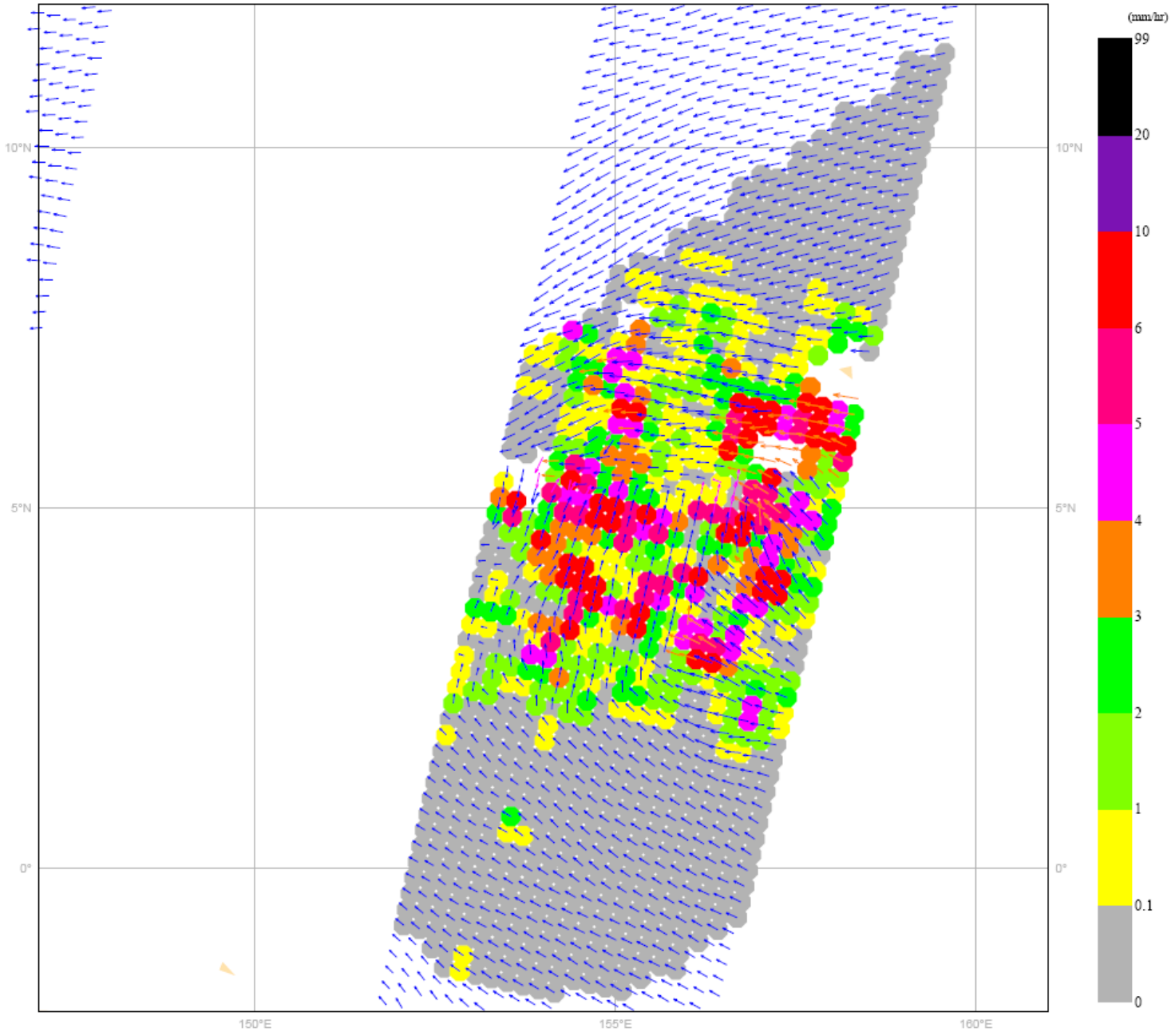


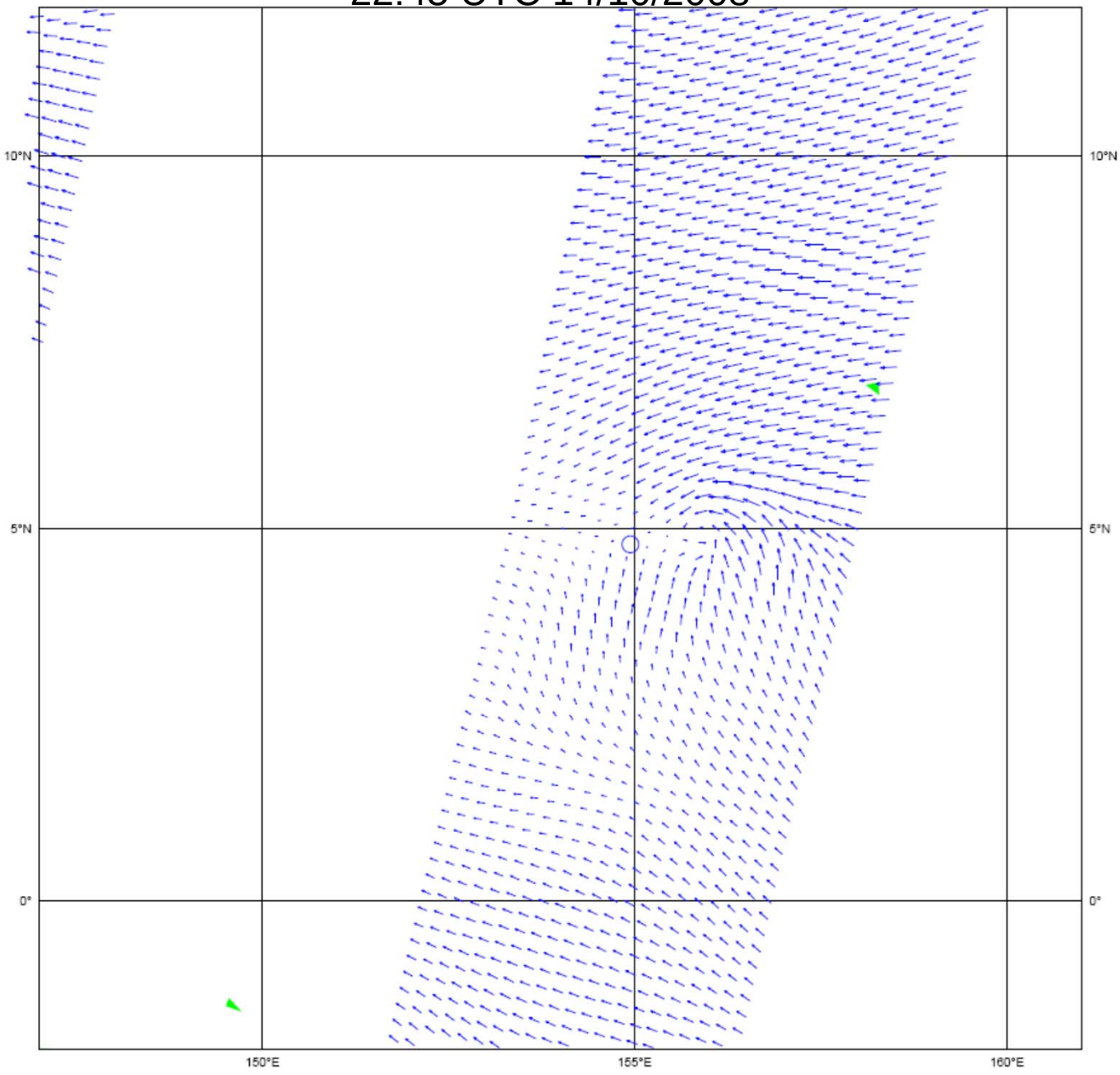
ASCAT winds + TMI rain rates

22:45 UTC 14/10/2008



ECMWF winds

22:45 UTC 14/10/2008



ASCAT Wind Speed

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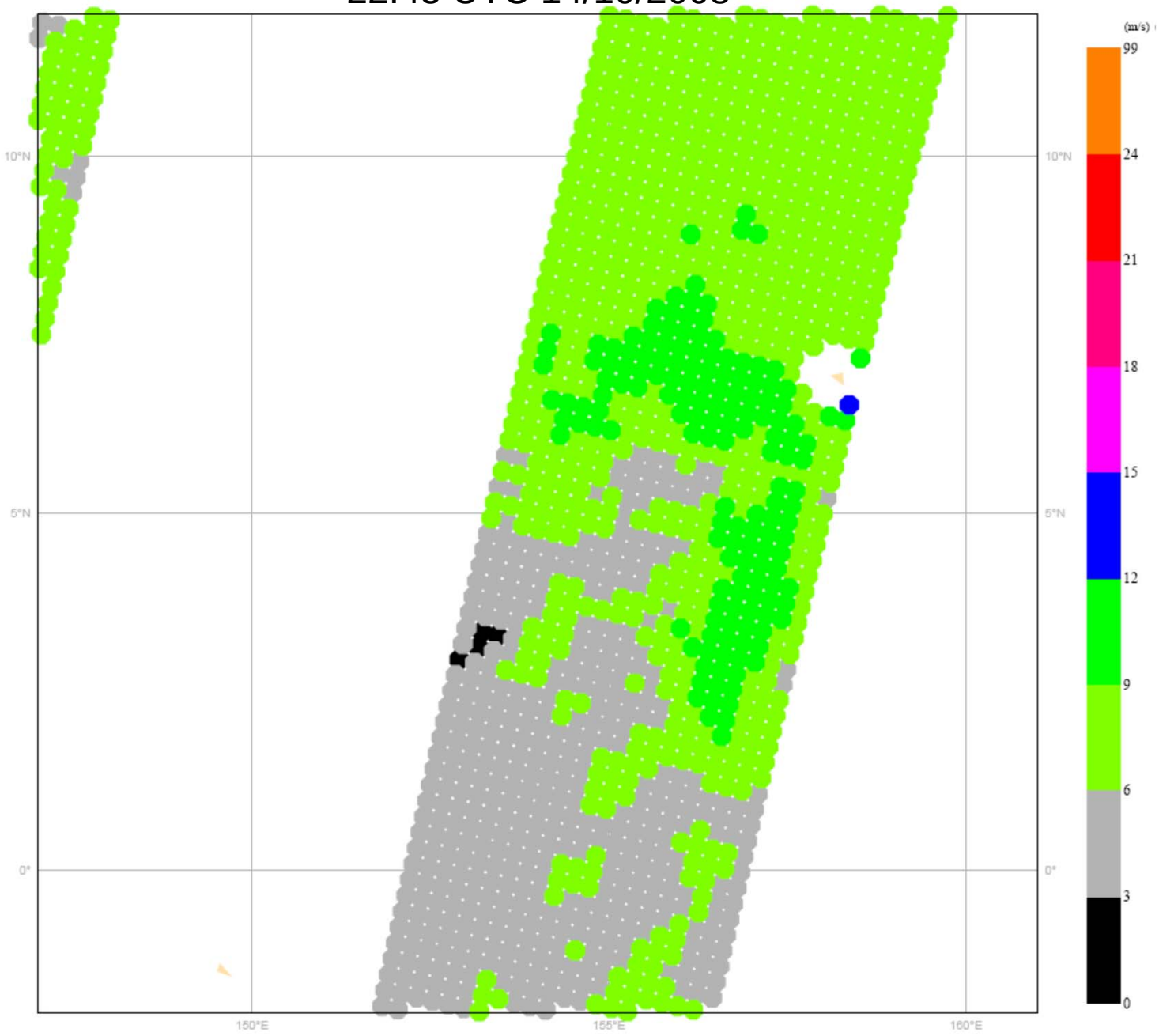

ECMWF Wind Speed

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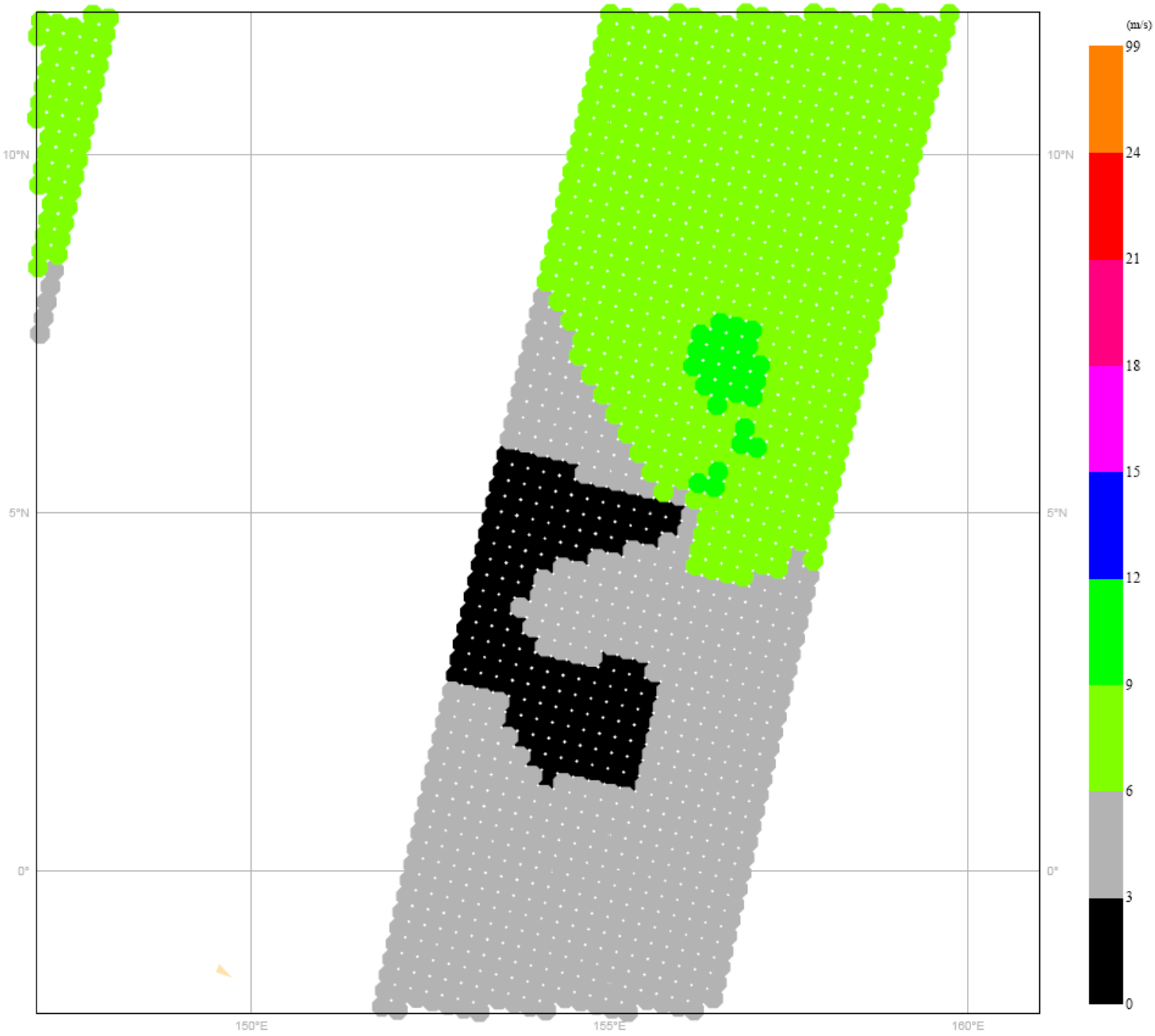

Remarks

- ASCAT L2 QC is generally effective
- Rain effects need more careful examination
  - More ASCAT-TMI collocations at high RR
  - Assess effectiveness of a more constrained QC (lower MLE threshold)
  - Examine rain effects wrt swath region, number of amiguities, and others.
  - Verification with buoy data
- Inversion improvements
  - Evaluate wind speed & direction artifacts