Plenary Discussion 1

AMV quality information from the derivation

Why should we do this?

1. To help understand AMV errors through NWP SAF-type case studies (see Francis Warrick's poster)

2. To quality control the data e.g. filter out data above/below certain thresholds

3. To feed into the observation errors used in NWP

4. Potential also for height reassignment or layer representation dependent on further research

Individual observation error scheme

A good specification of the observation error is essential to assimilate in a near-optimal way

Two independent sources

Error in vector

- Linked to accuracy of tracking step

Error in height

- Linked to accuracy of height assignment
- More problematic if large vertical wind shear

Total u/v error = √ (u/v Error^2 + Error in u/v due to error in height^2)

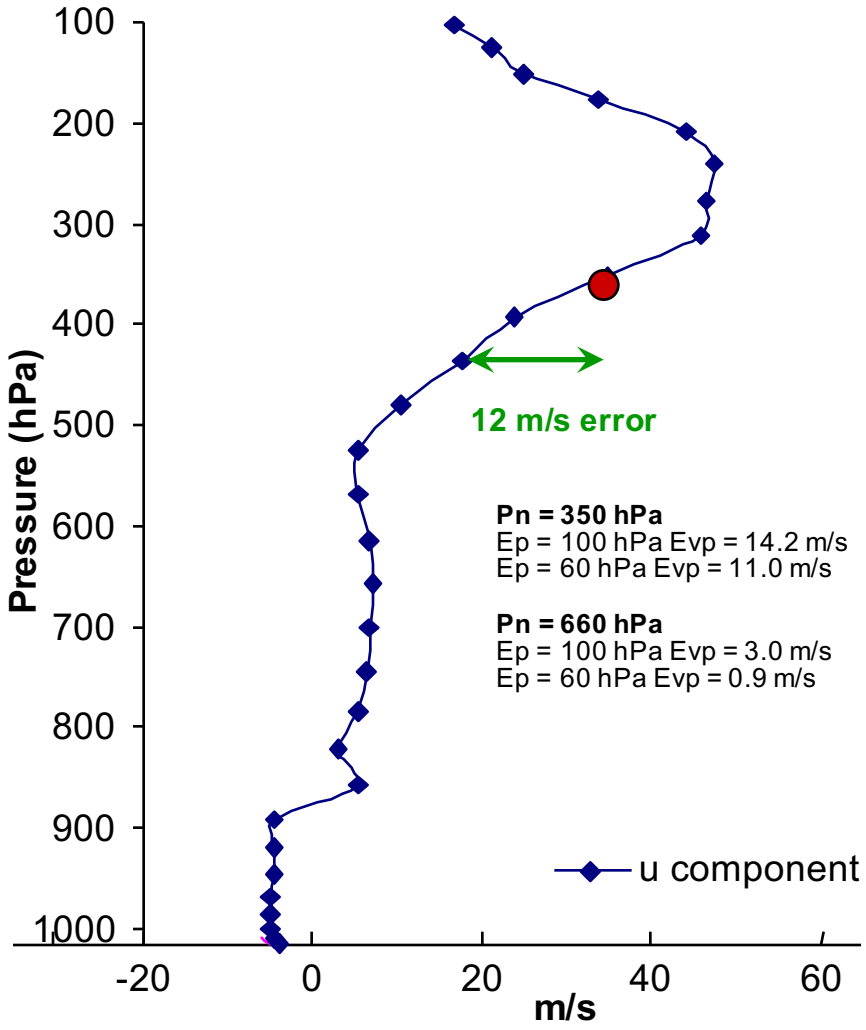
For this we need an estimate of:

1. u and v error (Eu and Ev)
2. height error (Ep)

Ideally from data producers

Until then estimate Ep using best-fit pressure stats as a guide.
See Forsythe & Saunders, IWW9, 2008; Salonen et al, 2014, submitted to JAMC

Currently assume uncorrelated errors



Some general considerations

1. Often get information from individual pixels – need to give representative value for target (is median best or something else, should we give any information on range)?

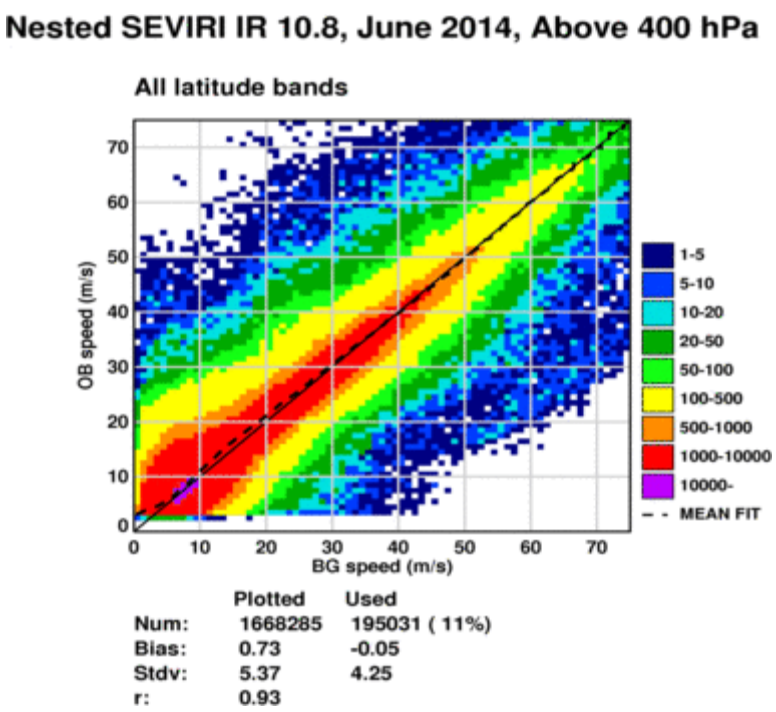
2. Some schemes use more than one image for height assignment – how do you combine to give representative value for final AMV? This is also true for tracking information.

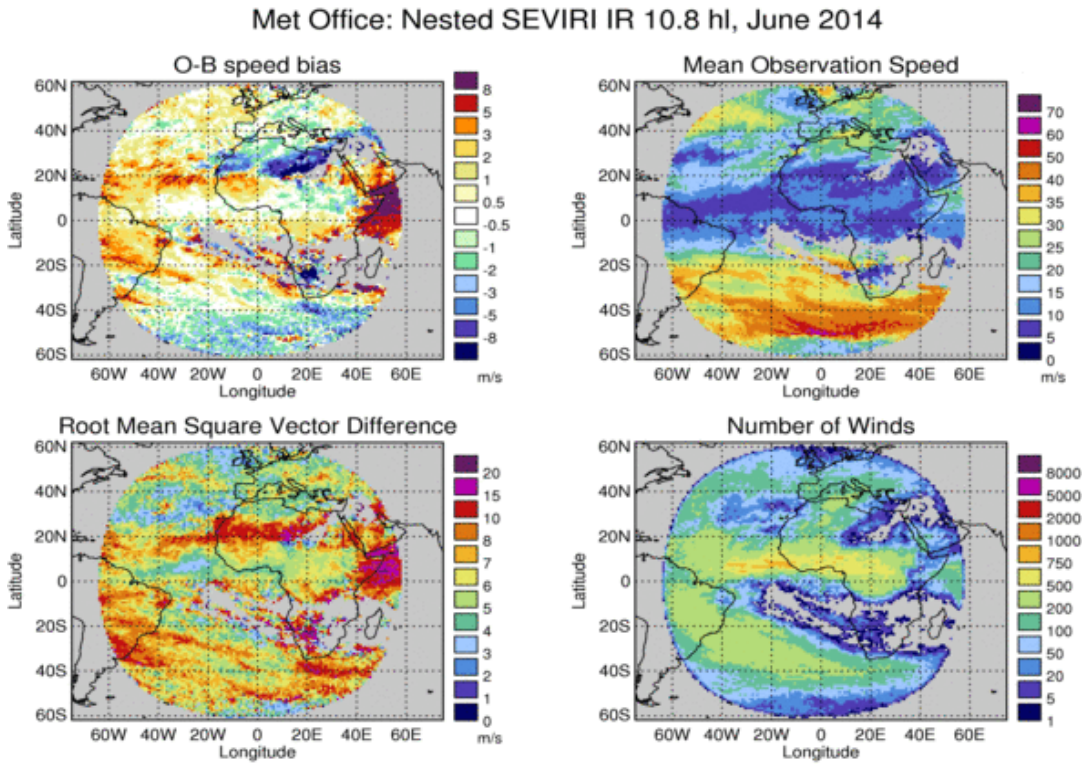
Quality of cloud top pressure

- ?space for a top level estimate of cloud top pressure error
- median cloud top pressure error from pixel-based cloud scheme
- cost from pixel-based cloud scheme
- standard deviation or range of cloud top pressure in cluster/ccc patch
- dominant height assignment method in cluster/ccc patch

Median cloud top pressure error

Many AMV producers moving to use of pixel-based cloud schemes developed by the cloud community, in some cases providing additional information e.g. estimates of height error, OE cost and cloud optical depth. Initial investigations show promise that these can help filter out poor quality data.





All data

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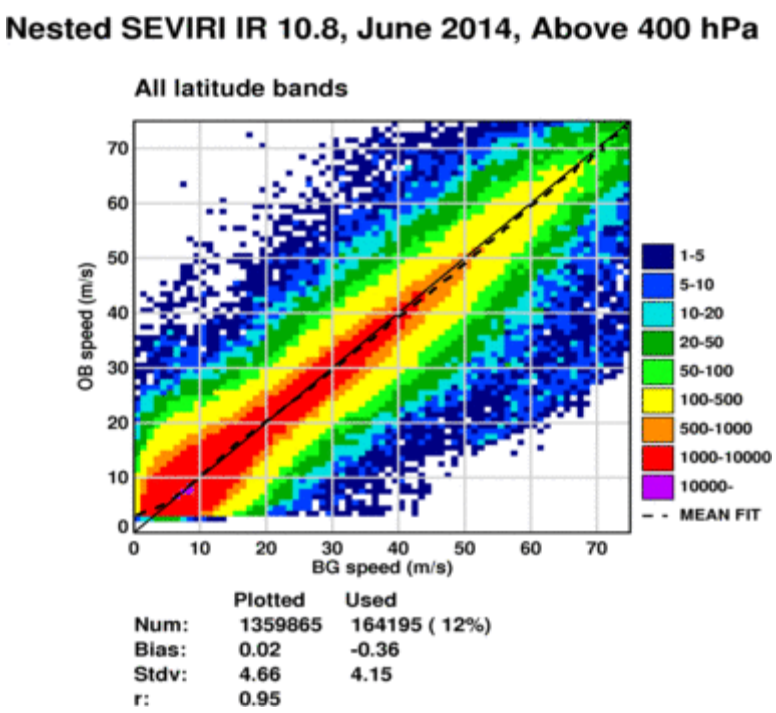
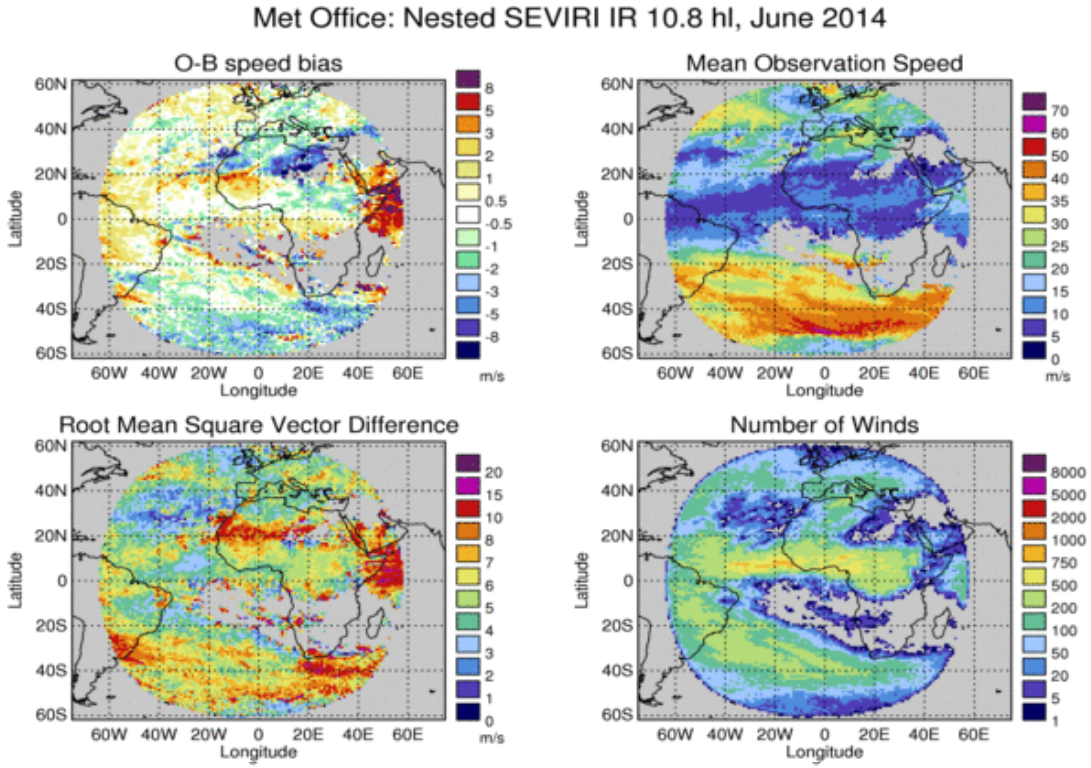


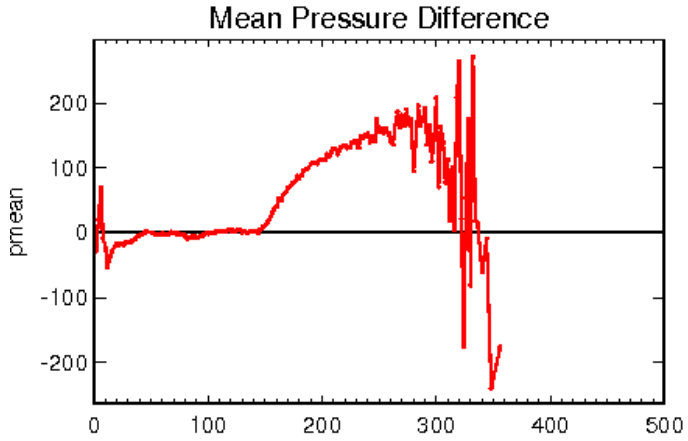


Pressure error < 140 hPa

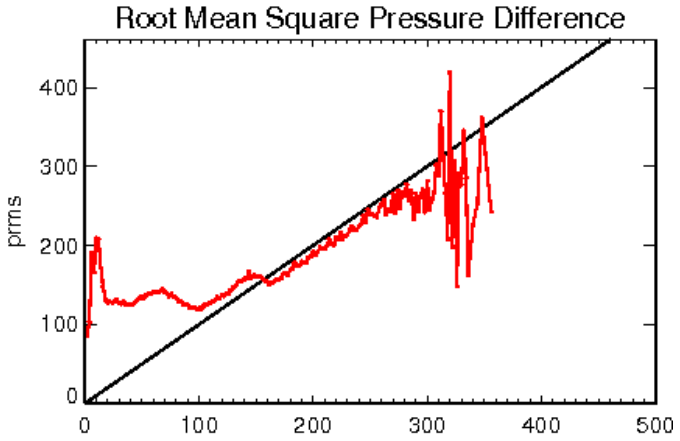
Median cloud top pressure error

Comparison to model best-fit pressure stats

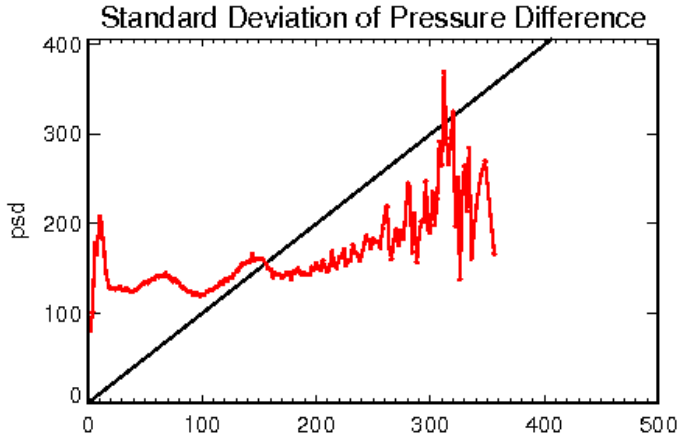
Nested SEVIRI IR 10.8
June 2014
All levels All latitude bands



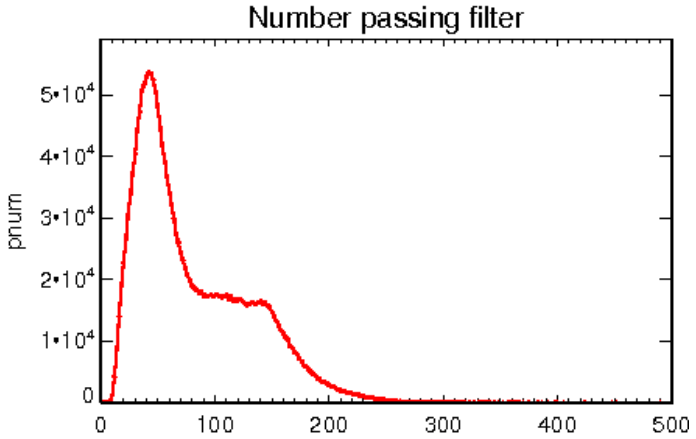
Median cloud top pressure error



Median cloud top pressure error



Median cloud top pressure error

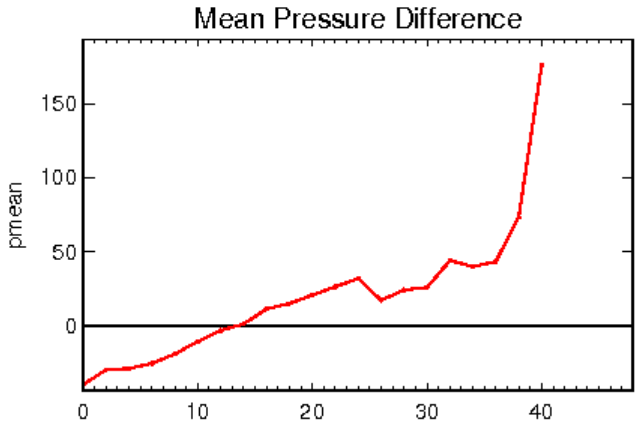


Median cloud top pressure error

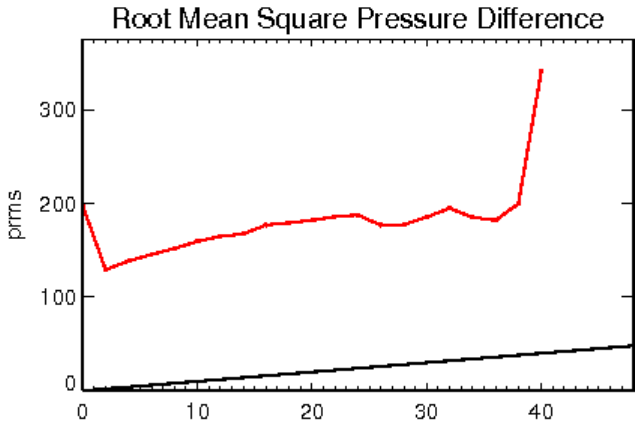
Standard deviation of OCA CTPs

Comparison to model best-fit pressure stats

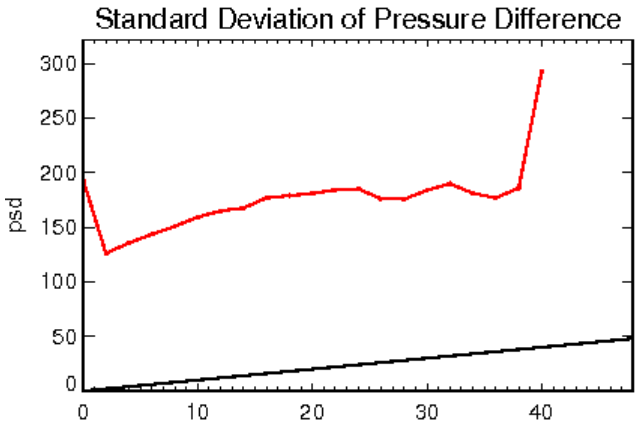
Meteosat-10 IR 10.8
May 2016
All levels All latitude bands



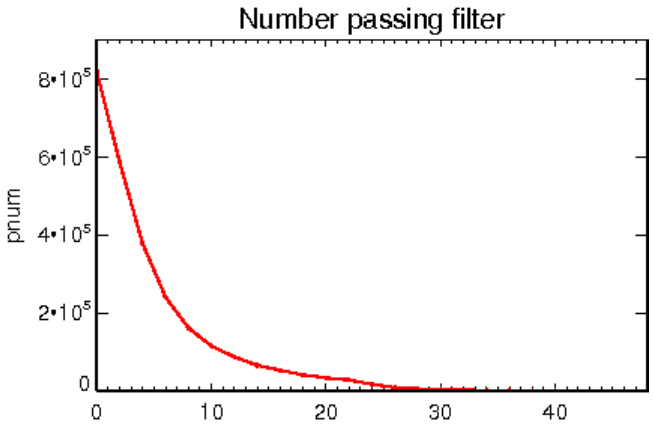
Standard deviation of OCA CTPs



Standard deviation of OCA CTPs



Standard deviation of OCA CTPs



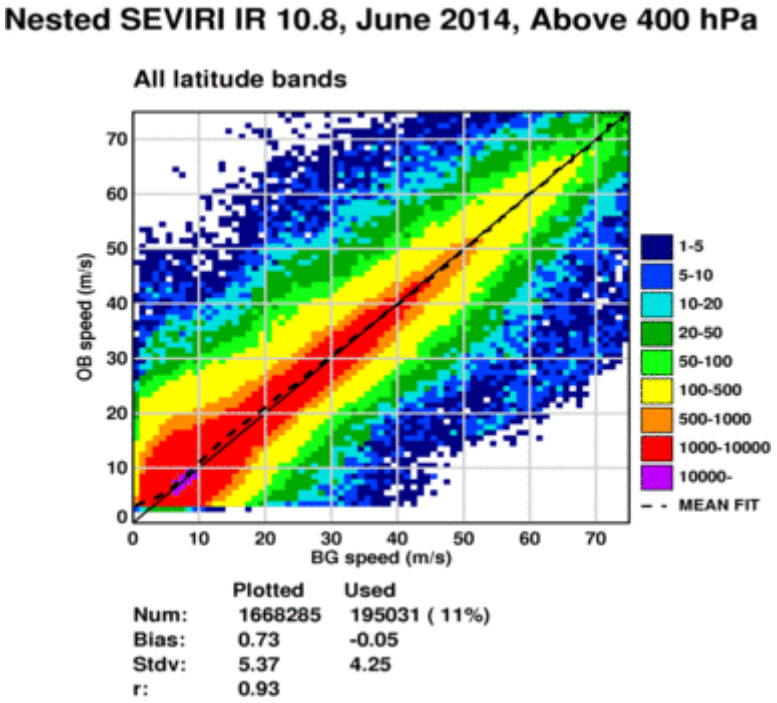
Standard deviation of OCA CTPs

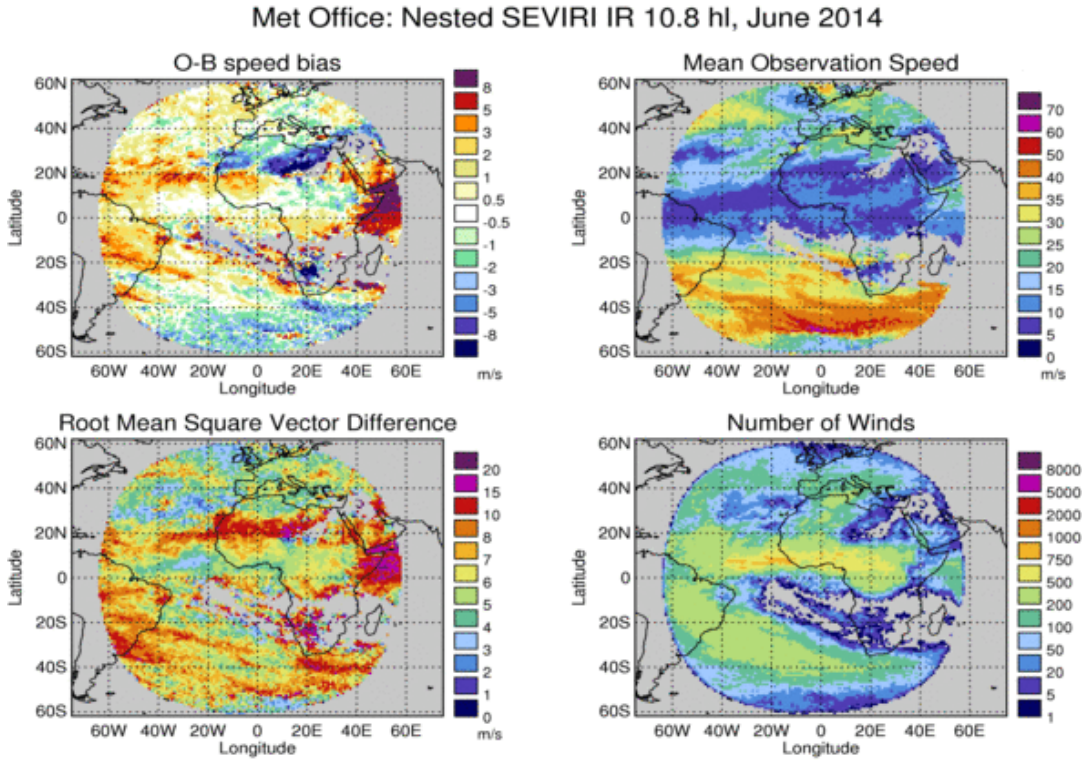
Cloud information

- ?space for a top level estimate of cloud top pressure adjustment (also flag to say if correction has been applied)
- ?space for a recommended layer depth
- median cloud optical thickness
- ice/liquid water path
- cloud phase (liquid/ice/mixed/undefined)
- cloud type (opaque/semi-transparent at one level / more than one level)
- cloud particle size (AMV cloud drop effective radius)
- cloud emissivity

Median cloud optical depth

Many AMV producers moving to use of pixel-based cloud schemes developed by the cloud community, in some cases providing additional information e.g. estimates of height error, OE cost and cloud optical depth. Initial investigations show promise that these can help filter out poor quality data.





All data

Median cloud optical depth

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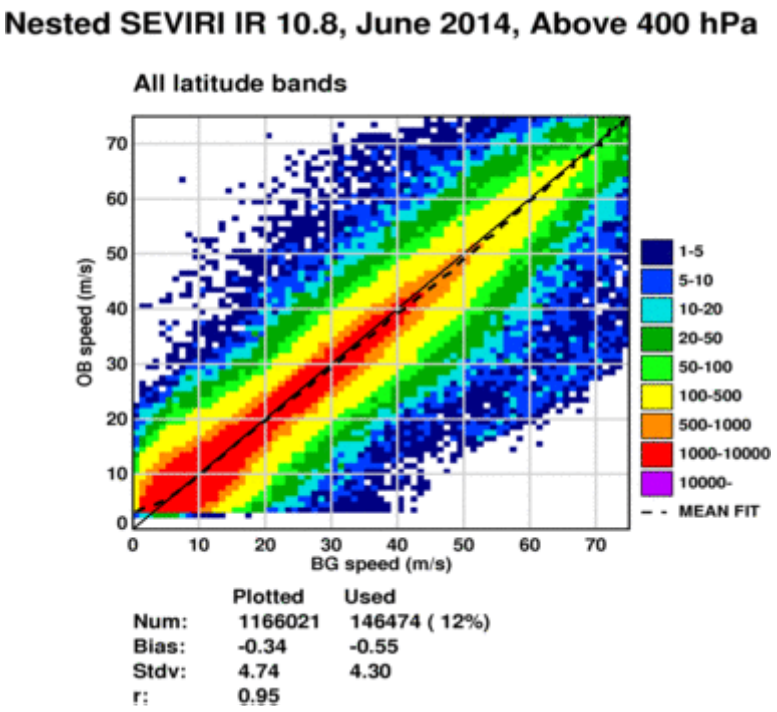
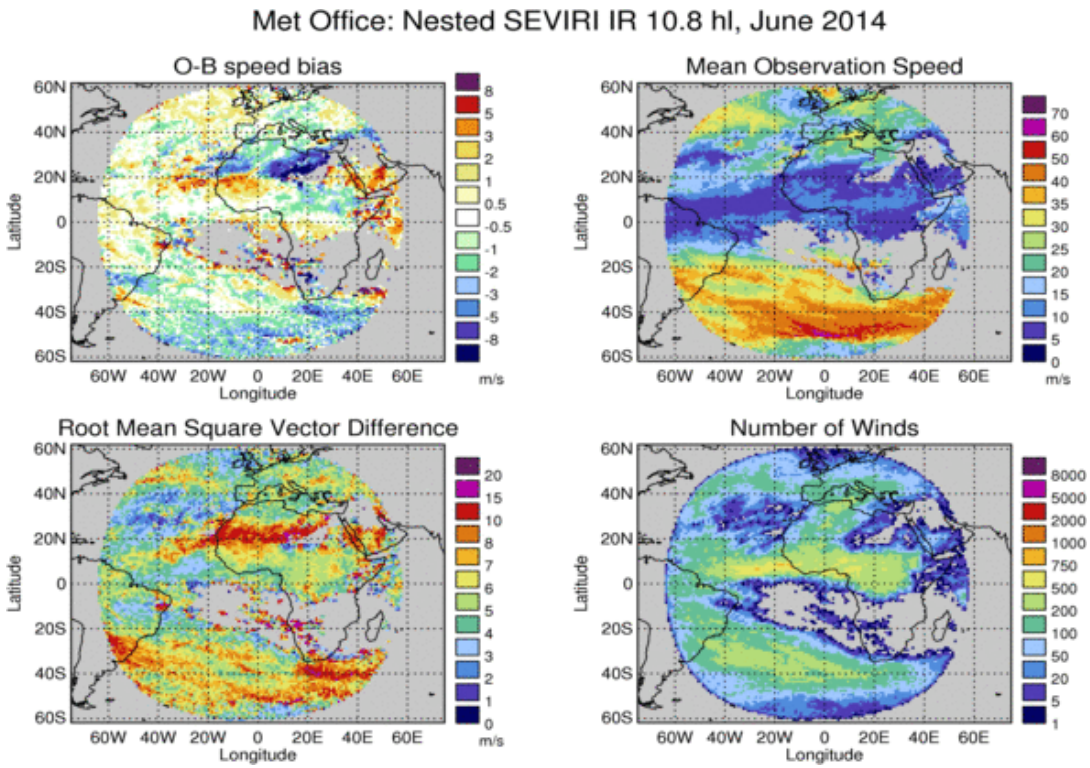


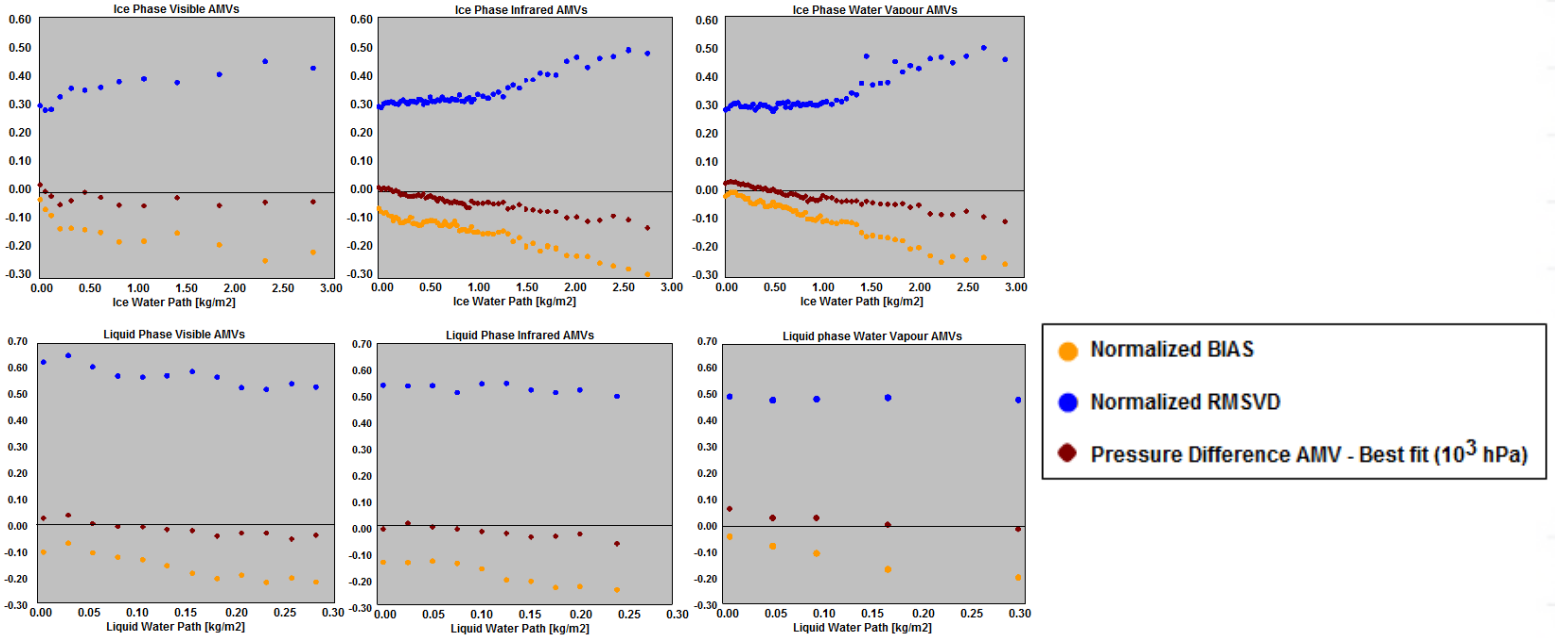


Optical depth > 0.75

NWC SAF/HRW v2016: Main improvements

➔ Displaying for "Ice phase AMVs" (up) / "Liquid phase AMVs" (down)

NBIAS NRMSVD Pressure difference with best fit level against IWP_{AMV}/LWP_{AMV}



NBIAS more negative for larger IWP_{AMV}/LWP_{AMV} values

NRMSVD larger for larger IWP_{AMV} values

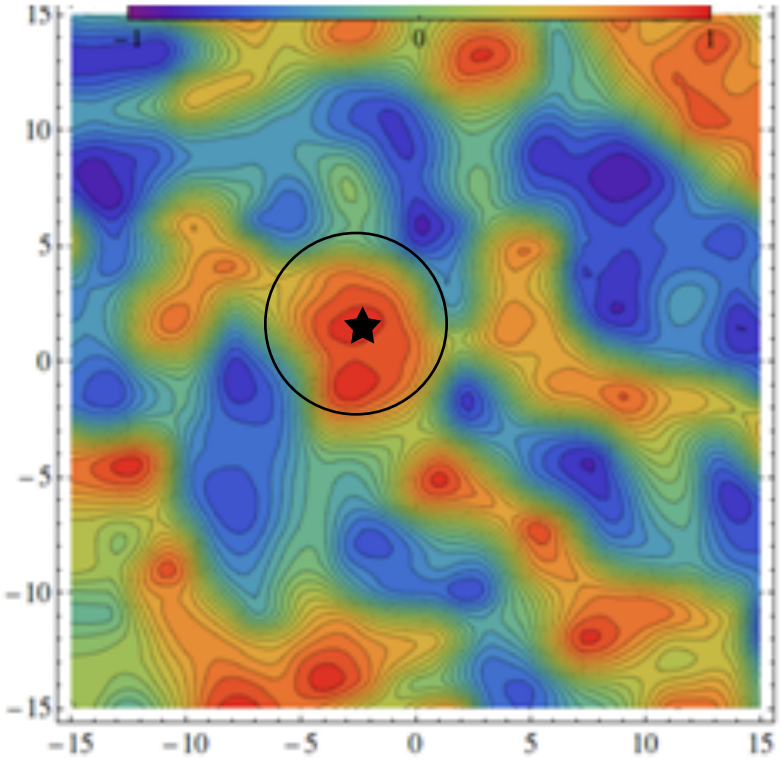
≈ Linear relationship of Press.Diff.with best fit level against IWP_{AMV}/LWP_{AMV}

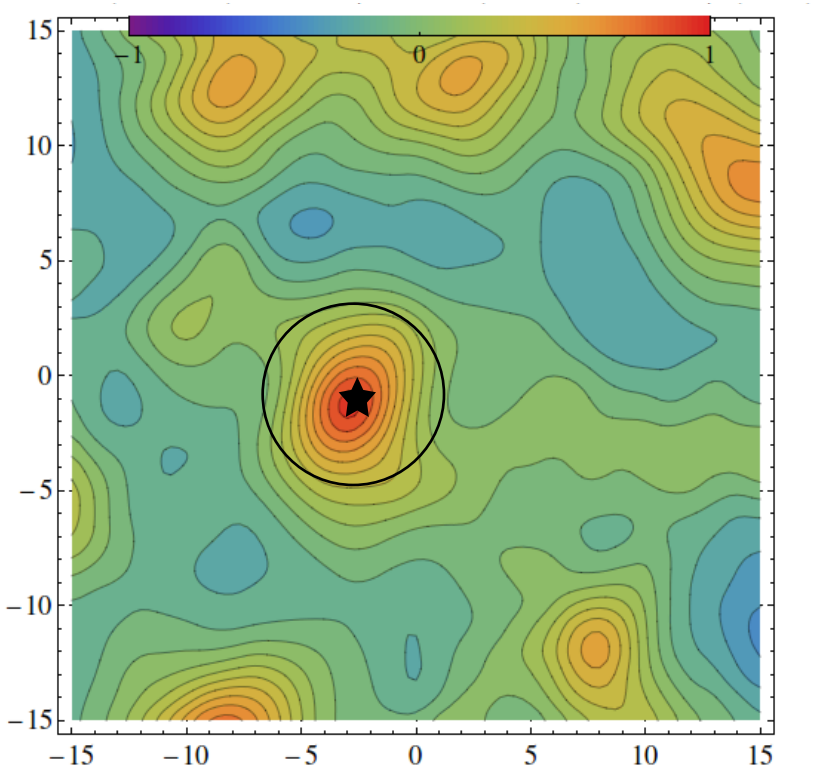
Best fit at lower levels of atmosphere except for small values of IWP_{AMV}/LWP_{AMV}

Quality of tracking

- ?space for a top level estimate of u error
- ?space for a top level estimate of v error
- correlation coefficient of target
- number of local vectors in target cluster
- number of pixels in target?
- some measure of how well constrained the correlation surface is
- some measure of size of tracked feature
- standard deviation of u/v in cluster
- anything extra?

Tracking – well constrained?





Where to go from here?

1. Pull together ideas from this discussion to identify the main extra information to work towards exchanging. Keen to standardise this between producers as far as possible.

2. Use this to set up a new AMV BUFR sequence (and an agreed NetCDF format?)

3. Further evaluation of test data to better understand how to use this information in NWP.

Plenary Discussion 1

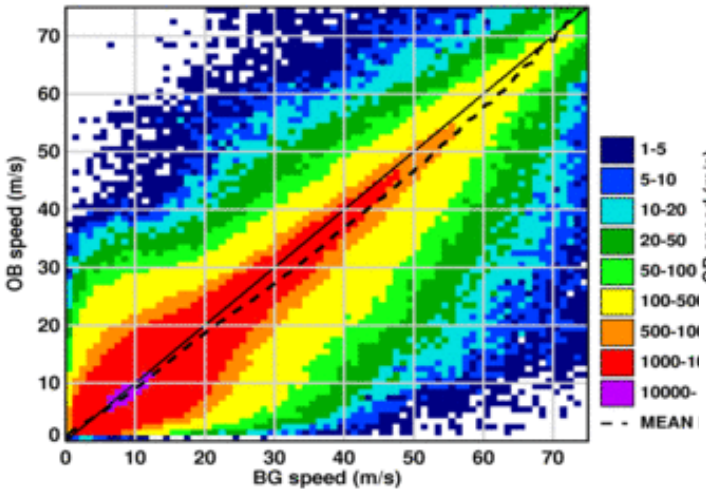
Extra slides

NWP quality control for AMVs

•Met-9 NH IR winds, above 400 hPa, August 2014

•All received (2,291,797)

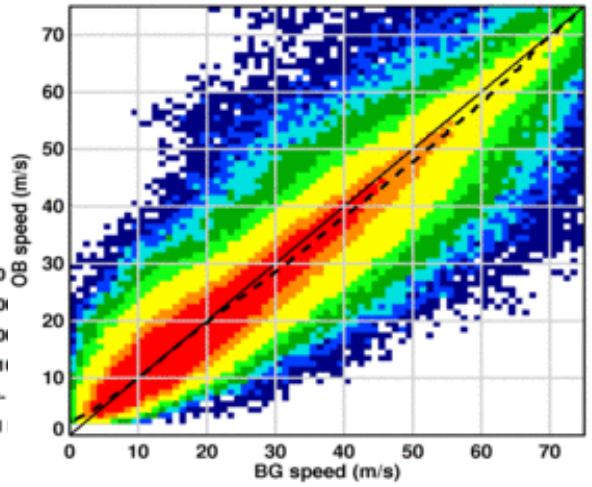
•stdv = 6.5 m/s



•100%

•QI1>80 (1,257,157)

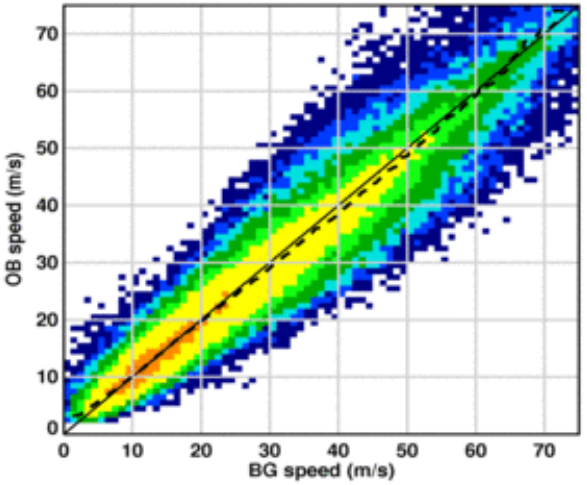
•stdv = 4.9 m/s



•55%

•Used (161,247)

•stdv = 4.2 m/s



•7%

•Assimilate only a small percentage of the data