

UPDATE ON THE NWP SAF INTEGRATED SATELLITE WINDS MONITORING REPORT

The NWP SAF Integrated Satellite Wind Monitoring Report (ISWMR) displays differences between satellite wind observations and short-range NWP model forecasts. Both the satellite wind observation and the model forecast contribute to these differences; neither can be assumed to be "true", and therefore the differences are model dependent. This report compiles differences found from two NWP models in order to try to separate the contributions from satellite winds and the models.

The paper has been prepared by Pauline Butterworth from the UK Met Office.

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by Pauline Butterworth, Met Office, UK

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WEB SITES

- The ISWMR is available at http://www.metoffice.com/sec5/NWP/NWPSAF/satwind_report
- The First ISWMR Analysis Report is available at http://www.metoffice.com/sec5/NWP/NWPSAF/satwind_report/SAF_2000.html
- The NWP SAF home page is at <http://www.metoffice.com/sec5/NWP/NWPSAF/>

STATUS

- The ISWMR now displays over one year of satwind quality information from the two participating centres (Met Office and ECMWF). Data continue to be added on a monthly basis.
- The First ISWMR Analysis Report has been written, published on the web site, and advertised to members of the CGMS wind list server.
- Extra items have recently been made available: a link to the EUMETSAT page outlining current satellite wind use and the observation errors assigned to them at major NWP centres; the CGMS document that was prepared subsequently to account for the differences seen in assigned observation errors.

EXAMPLES OF MONITORING

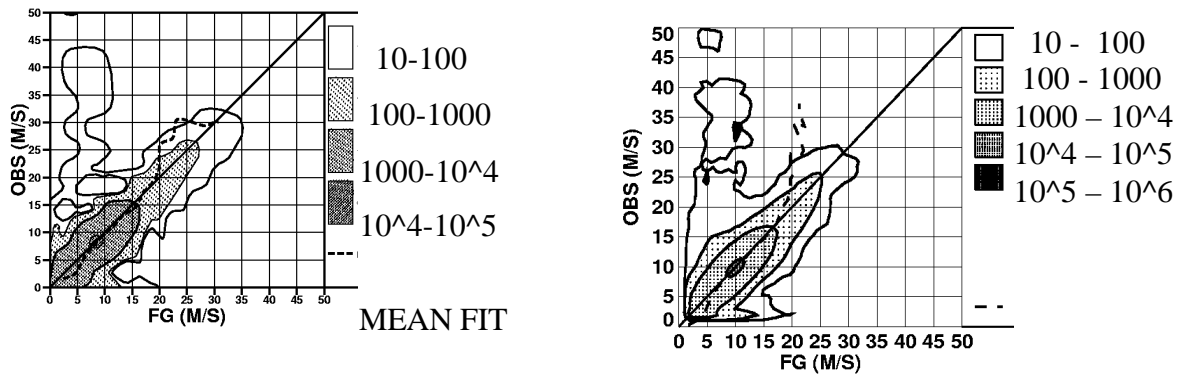
There are currently two basic types of graphical display for observation/model differences.

- Contour density wind speed plot

This type of plot illustrates the difference in wind speed between the observed value ('OBS', the satellite wind) and the model's 6-h forecast value ('FG', the first guess). The data are mapped in terms of density of winds, so that the significance of the differences can be estimated.

Figure 1 shows data for Meteosat-7 low-level infrared satellite winds in the northern hemisphere. Due to processing differences, the numbers of observations displayed by the two centres will never be exactly equal. Points to note are that the wind speed bias is very low for both centres, showing good agreement between the satellite winds and the model forecast. The bias for ECMWF is slightly more negative, implying a

faster model than that of the Met Office. It can be seen in both plots that there is a tendency for some data points to be produced at a much higher OBS speed than FG speed. It is probable that this is mostly due to a height assignment problem with the satellite wind observation. However, the density of this contour shows that the number of these observations is very small.



(a) No. of obs = 36491, Bias = -0.3 m/s,
Standard deviation = 3.7 m/s

(b) No. of obs = 35718, Bias = -0.2 m/s,
Standard deviation = 3.8 m/s

Figure 1. Observation – first guess wind speed comparisons for Meteosat-7 low-level IR satellite winds in the northern hemisphere. The satellite winds are compared with the global NWP models of (a) ECMWF and (b) the Met Office.

- Global maps of wind speed bias and standard deviation

By viewing wind speed statistics on a global map, geographical problem areas can be more readily identified.

Figure 2 displays global maps of observation - background wind speed bias, at high levels for infrared winds averaged for April 2001. Regions of similarity and differences can readily be seen. Note the large negative values in high wind speed regions, implying that the satellite winds are under-reporting some values. The ECMWF plot shows more structure, for example in the eastern tropical Pacific Ocean, something which will be investigated at the Met Office.

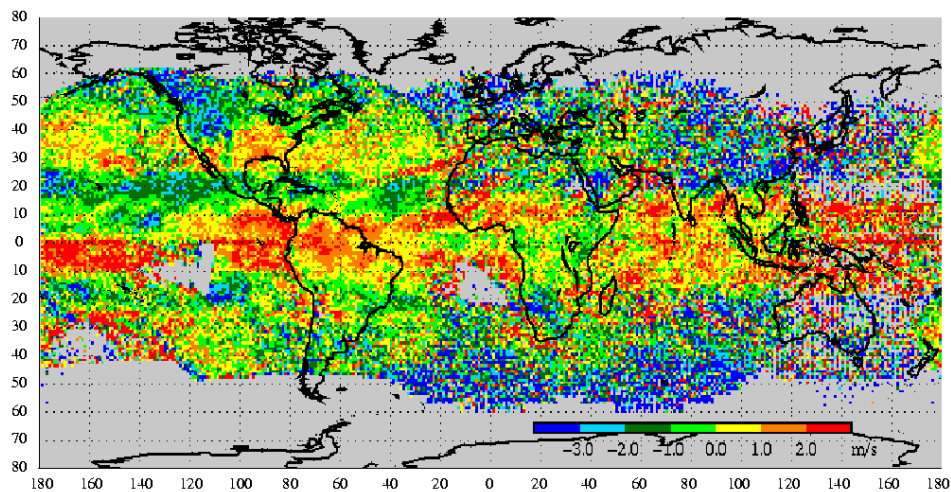
UTILITY SO FAR

The First ISWMR Analysis Report outlines some of the features that have become apparent during the lifetime of the ISWMR to date. Attempts have been made to provide an explanation for these features. However, it is not expected that ready solutions exist for all the problems revealed. The Analysis Report summarises a list of actions that we believe will lead to improvements both in the NWP models and in the satellite winds. In the coming year, these will begin to be addressed at the Met Office and, we hope, at other centres, to deal with these actions.

BRIEF OUTLOOK

- The Analysis Report contains a list of suggested improvements to the ISWMR, and some of these will be implemented this year.
- Data will continue to be collected during the lifetime of the NWP SAF.
- The US Naval Research Laboratory, Monterey, has an internal milestone to join the ISWMR by summer 2002.
- We hope that positive changes will occur at NWP centres and wind production centres after publication of the Analysis Report.

Met Office: O-B speed bias, IR HL, April 2001



ECMWF: O-B speed bias, IR HL, April 2001

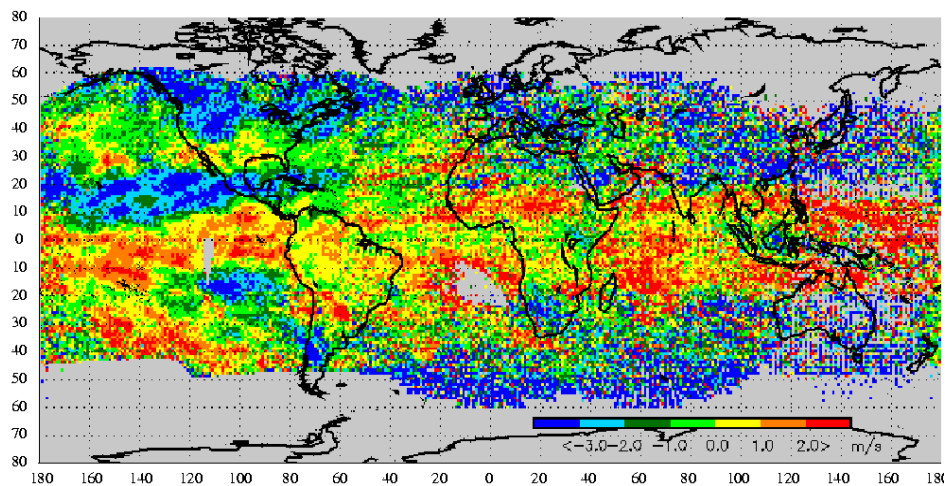


Figure 2. Observation (O) - Background (B, a 6-h NWP model forecast) wind speed bias map, valid for infrared winds at high levels, averaged for April 2001. Top: Met Office, bottom: ECMWF.