COMPARISON OF QUIKSCAT GRIDDED WINDS OVER THE GULF OF MEXICO

Georgy V. Mostovoy and Patrick J. Fitzpatrick
GeoResources Institute, MSU, Stennis Space Center, Mississippi
E-mail: mostovoi@gri.msstate.edu

A comparison between different QuikSCAT gridded datasets similar to the study of Mostovoy et al. (2004) has been performed over the Gulf of Mexico. The same datasets (RSS, FSU and JPL) of QuikSCAT winds are used to demonstrate that results of comparison obtained over the Bay of Bengal (Mostovoy et al., 2004) are also observed in other oceanic regions. An analysis covers a span from May to August for the 3-year time period (from 2001 to 2003). Additionally the FSU, JPL and RSS datasets are compared against in situ wind speed measurements from U.S. National Data Buoy Center ocean buoys. Quality controlled observations from 11 moored buoys (3-m and 10-m discus) are used for comparison. They are located over the northern part of the Gulf of Mexico. The QuikSCAT data provide an estimate of the 10-m neutral equivalent wind (Verschell et al., 1999). Therefore wind speed observations from 5-m height (3-m discus buoys) have been adjusted to the 10-m height, using power-law profile with an exponent equal to 0.1, but the buoy wind speed have not been corrected for the effects of atmospheric stability. It has been shown that stability correction has a little impact on the results of comparison.

The scatterplot technique is used to reveal smoothing effects of the temporal interpolation on the gridded winds. For the comparison with buoy observations, data from grid point nearest to the buoy location are selected. As an example Figure 1 is for the buoy 42020. It shows a correlation between 00 UTC and 12 UTC wind speed for observations, RSS, FSU and JPL datasets. Relative to the observations (Figure 1a) QuikSCAT gridded winds (Figures 1b, 1c, and 1d) except for RSS dataset exhibit less scatter between 00 UTC and 12 UTC values.

The smoothing effect of temporal interpolation apparent as a reduction of the scatter in FSU and JPL datasets is quite clear (see Figures 1c and 1d) in comparison with observations and RSS winds (Figures 1a and 1b). A similar tendency for the excessive smoothing is also evident for other buoys. The Figure 2 is for the buoy 42001. Correlation coefficients between 00 UTC and 12 UTC winds have been calculated to quantify this reduction in the data points scatter. They are plotted in Figure 3 along with 95% confidence limits for all the buoys used in this study. Correlations coefficients for FSU and JPL datasets are significantly higher than that for observations and RSS winds.

Another way to describe the smoothing effect of temporal interpolation is shown in Figure 4 where histograms of QuikSCAT (RSS, FSU and JPL) minus buoy wind speed difference are plotted for 42020 buoy. Both FSU and JPL winds are in the mean biased relatively low compared to the RSS data for buoy wind speeds exceeding 4 m/s (Figures 4a and 4c). In contrast, high bias in QuikSCAT winds is typical for low speeds (Figures 4b and 4d). The example in Figure 5 for 42001 buoy is similar to Figure 4.

This study has shown that FSU and JPL gridded datasets reproduce crudely diurnal variability of winds providing a reduced difference between OO UTC and 12 UTC values in comparison with observations and RSS data. Rather, the FSU and JPL gridded products describe daily mean fields.

Acknowledgements. Encouragement by Dr. Roger King and the financial support from the GeoResources Institute is highly appreciated. Authors acknowledge consultations provided by Deborah Smith, Remote Sensing Systems (Santa Rosa, CA) on reading and understanding the QuikSCAT datasets. The JPL winds are obtained from the NASA/NOAA courtesy of W. Timothy Liu and Wenqing Tang. Authors highly appreciate the efforts of Mark A. Bourassa, Center for Ocean-Atmospheric Prediction Studies, FSU for maintaining the COAPS scatterometer web page.

References

Mostovoy G.V., P.J. Fitzpatrick, and Y. Li, Quality of QuikSCAT gridded winds over the Bay of Bengal, Research Activities in Atmospheric and Oceanic Modelling, 2004 (current report).

Verschell , M.A., Bourassa M.A., Weisman D.E., and O'Brien, J.J., Model validation of the NASA Scatterometer winds, *Journal of Geophys. Res., 104*, 11359-11374, 1999.

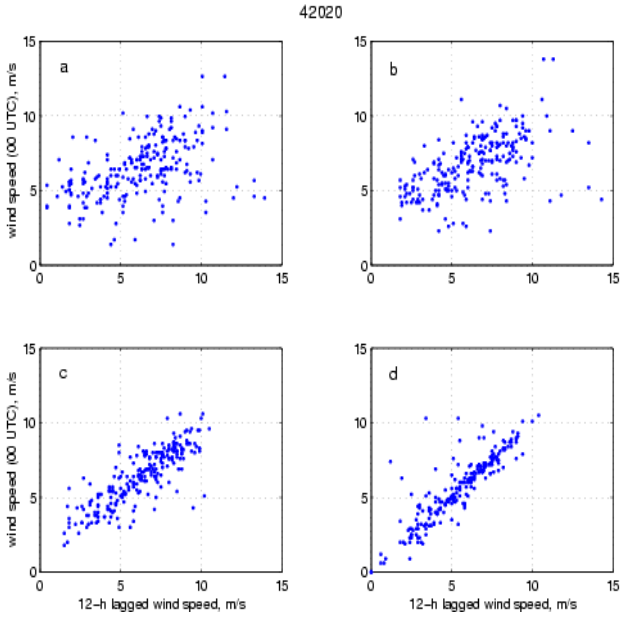


Figure 1. Scatterplots of the QuikSCAT wind speed for ±12-h time lags for 42020 buoy. The top frames are for buoy observations (a), and for RSS winds (b). The bottom frames are for FSU (c) and JPL (d) gridded winds. Note a substantial reduction of variance in FSU and JPL data as compare with observations and RSS values.

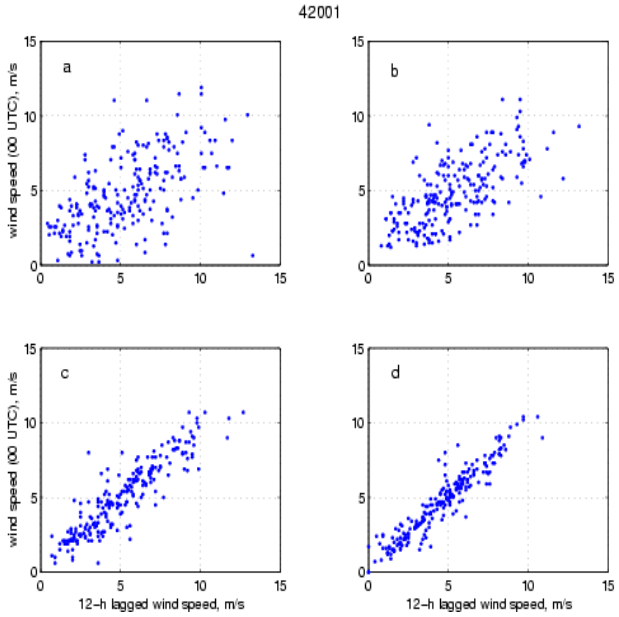
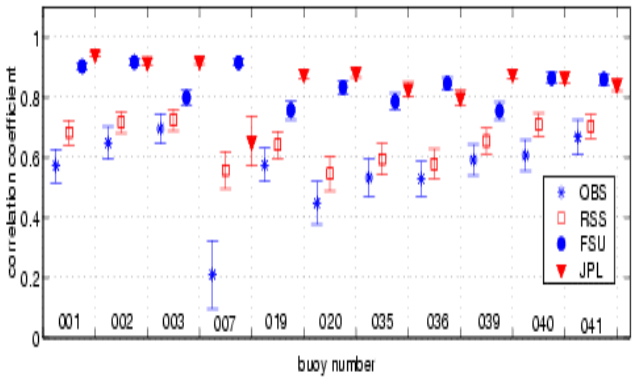


Figure 2. The same as in figure 1, but for 42001.buoy.

Figure 3. Correlation coefficients between 00 UTC and 12 UTC winds for different datasets. Abscissa corresponds to the buoy number (region prefix 42 is omitted). Error bars stand for 95% confidence limits.



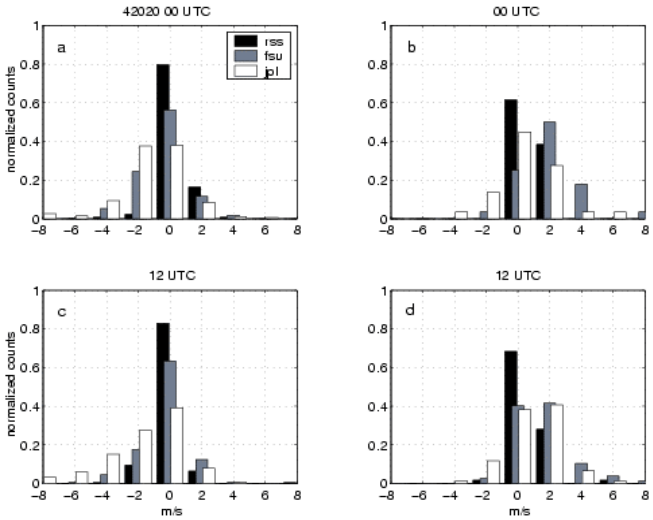


Figure 4. Histograms of QuikSCAT-buoy wind speed difference for 42020 buoy at 00 UTC (a,b) and 12 UTC (c,d). Plots (a,c) are for buoy wind speed > 4 m/s, and plots (b,d) are for wind speed ≤ 4 m/s.

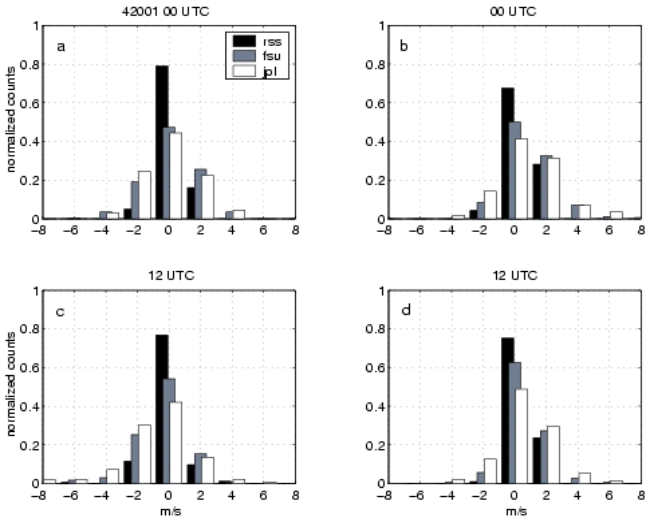


Figure 5. The same as in figure 4, but for 42001 buoy.