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A high wind GMF for QuikSCAT wind retrievals and application to typhoon IOKE

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Abstract. Geophysical Model Function (GMF) describes the relationship between backscattering and sea surface wind, enabling wind vector retrieval from backscattering measurement. So that GMF plays an important role in Ocean wind vector retrieval. The performance of the existing Ku band model function QSCAT1 is good at low and moderate wind speeds range. But at higher wind speeds, the existing algorithms diverge alarmingly. Because of the lack of in situ data for developing the GMF for high winds, the QSCAT1 appears to overestimate of the sigma0 thus the underestimate of wind speed in high wind conditions. In this paper, we analyze several mach up QuikSCAT and Special Sensor Microwave/Imager (SSM/I) wind speed measurements of typhoons occurred in the West Pacific Ocean, and a correction of QSCAT1 model function for wind speed above 16m/s is proposed, which use the collocated QuikSCAT and SSM/I measurement as the training set, and the neural network approach as a multiple nonlinear regression technique.

We apply the modified GMF to the QuikSCAT observations of Hurricane IOKE. The wind estimated by QuikSCAT for Typhoon IOKE in 2006 is improved with the maximum wind speed reaching above 55 m/s. An error analysis is performed using wind fields from the Holland model as surface truth. The result shows an improved agreement. But still large bias exists, indicating that the rain efforts need to be considered for further improvement.

Keywords: GMF, high wind, QuikSCAT, Neural Network