

A Scatterometer Geophysical Model Function for Climate-Quality Winds: QuikSCAT Ku-2011

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Abstract

Space-based observations of ocean surface winds have been available for more than 25 years. To combine the observations from multiple sensors into one record with the accuracy required for climate studies requires a consistent methodology and calibration standard for the various instruments. Here we describe a new Geophysical Model Function (GMF) specifically developed for preparing the QuikSCAT winds to serve as a backbone of an ocean vector wind Climate Data Record. This paper describes the methodology used and presents the quality of the reprocessed winds. The new Ku-2011 model function was developed using WindSat winds as a calibration truth. We performed an extensive validation of the Ku-2011 winds, which focused on: 1) Proving the consistency of satellite winds from different sensors at all wind speed regimes; 2) Exploring and understanding possible sources of bias in the QuikSCAT retrievals; 3) Validating QuikSCAT wind speeds versus in situ observations, and comparing observed wind directions versus those from numerical models; 4) Comparing satellite observations of high wind speeds with measurements obtained from aircraft flying into storms; 5) Analyzing case studies of satellite-based observations of winds in tropical storms; and 6) Illustrating how rain impacts QuikSCAT wind speed retrievals. The results show that the reprocessed QuikSCAT data are greatly improved in both speed and direction at high winds. Finally, we discuss how these QuikSCAT results fit into a long-term effort towards creating a Climate Data Record of ocean vector winds.