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Towards a climate rata Record of vcean Vector winds: The newly reprocessed QuikSCAT

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At Remote Sensing Systems we recently reprocessed the ocean vector winds observed with the QuikSCAT scatterometer, for the whole mission (1999-2009). One of the main reasons behind the reprocessing is to prepare QuikSCAT to serve as a backbone for a long-term climate-quality dataset for ocean winds. When the algorithm for the original QuikSCAT was developed (Wentz and Smith, 1999), there was limited knowledge about what ground truth to use for calibrating high wind speeds above 20 m/s. Satellite retrievals of high winds are challenging for two reasons. First, they are often contaminated by the presence of rain, and it is difficult to separate the wind and rain signals in the retrievals. Second, validation data of winds greater than 20 m/s are scarce and therefore limit our understanding of the accuracy of the satellite-retrieved high winds. Traditionally, observed winds from buoys or winds from Numerical Weather Prediction models are used as calibration ground truth when developing the scatterometer Geophysical Model Function (GMF), which relates the radar backscatter ratio to observed wind speed and direction. However, both buoys and NWP winds are not reliable at high winds. Therefore extrapolations were made to develop the GMF at high winds, based on feedback from the hurricane research community. Recent analyses showed that the original winds were significantly overestimated in the 20-30 m/s wind regime. We derived a new GMF using the complete 10 years of scatterometer observed backscatter ratio by using as calibration target wind retrievals from the WindSat radiometer. WindSat wind speeds and directions are part of the WindSat geophysical products recently released at Remote Sensing Systems. They were developed using a new algorithm which is capable of making wind retrievals even in the presence of rain and storm conditions (Meissner and Wentz, 2009). The WindSat retrievals are believed to be accurate for winds up to at least 30 m/s. Additionally, WindSat is able to accurately detecting rain and is used to discard QuikSCAT observed backscatter ratio in the proximity of rain when developing the scatterometer GMF. After developing the new GMF with special attention devoted to high winds, we reprocessed the complete QuikSCAT data set. Our next step is to apply the same methodology and calibration target to the ocean vector winds from the European scatterometer ASCAT, which started in 2007 and is planned to continue for several years. Using a consistent methodology in wind retrievals is ideal when merging different datasets to produce a Climate Data Record. Additionally, the Data Record can be extended back in time previous to QuikSCAT by adding two additional European scatterometers to the timeseries, ERS-1 (started in 1991) and the following ERS-2, which have several similarities with ASCAT. This intercalibrated data set would then provide two decades of global ocean vector winds, suitable for climate research. This is a challenging task, because of the differences in the observing methods with each satellite, but we are moving towards it. The scatterometer data record is particularly valuable because the scatterometer is inherently a stable sensor in that it measures a ratio (backscattered radiation versus transmitted radiation) as compared to measuring an absolute quantity.