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Evaluation and Validation of Operational RapidScat Ocean Surface Vector Winds

Paul Chang (1), Zorana Jelenak (1), Seubson Soisuvarn (1), Faozi Said (2), Joseph Sienkiewicz (3), and Michael Brennan (4)

(1) NOAA/NESDIS/STAR, College Park, United States (zorana.jelenak@noaa.gov), (2) Global Science and Technology, Inc, (3) NOAA/NWS/NCEP/Ocean Prediction Center, (4) NOAA/NWS/NCEP/National Hurricane Center paul.s.chang@noaa.gov

NASA launched RapidScat to the International Space Station (ISS) on September 21, 2014 on a two-year mission to support global monitoring of ocean winds for improved weather forecasting and climate studies. The JPL-developed space-based scatterometer is conically scanning and operates at ku-band (13.4 GHz) similar to QuikSCAT. The ISS-RapidScat's measurement swath is approximately 900 kilometers and covers the majority of the ocean between 51.6 degrees north and south latitude (approximately from north of Vancouver, Canada, to the southern tip of Patagonia) in 48 hours. RapidScat data are currently being posted at a spacing of 25 kilometers, but a version to be released in the near future will improve the postings to 12.5 kilometers. RapidScat ocean surface wind vector data are being provided in near real-time to NOAA, and other operational users such as the U.S. Navy, the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the Indian Space Research Organisation (ISRO) and the Royal Netherlands Meteorological Institute (KNMI).

The quality of the RapidScat OSVW data are assessed by collocating the data in space and time with "truth" data. Typically "truth" data will include, but are not limited to, the NWS global forecast model analysis (GDAS) fields, buoys, ASCAT, WindSat, AMSR-2, and aircraft measurements during hurricane and winter storm experiment flights. The standard statistical analysis used for satellite microwave wind sensors will be utilized to characterize the RapidScat wind vector retrievals. The global numerical weather prediction (NWP) models are a convenient source of "truth" data because they are available 4 times/day globally which results in the accumulation of a large number of collocations over a relatively short amount of time. The NWP model fields are not "truth" in the same way an actual observation would be, however, as long as there are no systematic errors in the NWP model output the collocations will converge in the mean for winds between approximately 3-20 m/s. The NWP models typically do not properly resolve the very low and high wind speeds in part due to limitations of the spatial scales they can account for. Buoy measurements, aircraft-based measurements and other satellite retrievals can be more directly compared on a point-by-point basis. The RapidScat OSVW validation results will be presented and discussed. Utilization examples of these data in support of NOAA's marine weather forecasting and warning mission will also be presented and discussed.