Stability Monitoring of the Advanced Microwave Radiometer onboard Jason-3

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Jason 3 was successfully launched from the Vandenberg Air Force Base on January 17, 2016 aboard a SpaceX Falcon 9 rocket into a low inclination earth orbit with a nominal altitude of 1336 km. The altimeter onboard Jason 3 is the latest in a series that measure the surface height of the global ocean, monitor the rate of sea-level rise and help more accurate weather prediction. To ensure the consistency of measurements between Jason 3 and previous satellites, the instruments were tested for about eight months in a follow-on orbit 80 seconds after Jason 2, which provides nearly simultaneous measurements of the earth by both satellites. Calibration accuracy is critical for the sea surface height measurements since the sea level rise is on the order of 3 mm per year. Previous studies have shown that the Advanced Microwave Radiometer (AMR) on Jason 2 and 3, which provides water vapor measurements for calculating path delays in the altimeter, are critical for ensuring the accuracy and stability of the sea surface height measurements. Therefore, monitoring the stability of AMR on Jason 3 is critical to the mission. This study leverages our previous work on Jason 2 and expanded to Jason 3 to monitor the AMR stability at calibration/validation sites, including the Amazon rainforest, desert, coldest part of the ocean, and inter-comparisons with AMR on Jason 2, as well as similar channels on ATMS on Suomi NPP. Preliminary results show that while overall the AMRs on Jason 2 and 3 are providing consistent measurements, some differences are also found during the eight months period. A strong temperature dependent bias was found in the 23.8GHz channel which suggests that the AMR measurement on Jason 3 (as in Interim GDR datasets) was colder than that of Jason 2. This bias was effectively removed after calibration correction in cycle 17. In addition, the Jason-3 AMR at 23.8 GHz are compared with the SARAL/DFMR and SNPP/ATMS since launch to present, the inter-satellite bias and trend can be well captured. This study demonstrates that the methodology for monitoring the AMR stability is capable in detecting small biases, and is especially useful for longterm monitoring after the orbital separation between Jason 2 and Jason 3 on Oct. 3 2016.