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Dependence of SMOS/MIRAS brightness temperatures on wind speed: sea surface effect and latitudinal biases

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SMOS (Soil Moisture and Ocean Salinity) has been successfully launched in November 2009 and its only payload, Microwave Imaging Radiometer using Aperture Synthesis (MIRAS) instrument, is the first interferometric radiometer at L band (1.4GHz) in orbit. MIRAS employs aperture synthesis in 2D with a Y-shaped antenna structure to create an image of emissions from the Earth surface at L-band over a range of incidence angles (0° to 65°) with a spatial resolution of 35 to 110 km. More than two years after launch the level 1C (L1C) brightness temperatures (TBs) reprocessed with the up-to-date ESA level 1 processing version (the Level 1 processor V5.04 and V5.05), have been released. It has been shown during the commissioning phase that the receivers onboard of MIRAS are affected by a short-term drift during each orbit, and a seasonal variation due to the thermal drifts of the antenna patch. Although a new antenna model is incorporated in the ESA L1 V5 processing to account for these variations, latitudinal and seasonal drifts in L1C TBs are still observed. In this presentation, we first investigate the impact of the TB drifts on the sea surface emissivity roughness model we derived in Yin et al. (TGRS 2012) from multi-latitude level 1 V3.17 TBs. We then study dependencies of TBs at multi-incidence angles with wind speed separately for various latitudinal bands and different seasons in order to separate artificial effects of TB drifts from sea surface effects. We then propose a new roughness/foam forward model. We estimate the quality of SMOS retrieved SSS by comparing it with ARGO measurements, and discuss SSS quality given the imprecision of the forward model and of the wind speed used as prior value in the level 2 ocean salinity processor.