Estelle
Obligis
CLS
Jacques Stum, CLS
Amandine Guillot,
philippe sicard, CLS
Oral
Permanent gases in the atmosphere induce propagation delay to pulses emitted by satellite-borne radar altimeters to the ocean surface : the range measurement has to be corrected for this effect. The path delay due to water vapour (PD) varies from 1 cm in dry, cold air, to 40 cm in wet, hot air, and is highly variable in space and time. It has long been recognized that the most accurate way to measure it is to fly a microwave radiometer together with the radar altimeter, sensing theatmosphere at frequencies near the 22.235-GHz water vapor absorption line, along the altimeter path (i.e., nadir viewing). A second possibility is to compute the PD from meteorological models, but with poorer accuracy because such models often cannot map the atmospheric humidity short space and timescales. An alternate approach has recently been proposed by Stum et al. (IEEE Trans. Geosci. Remote Sens., 2011): it combines, through an objective analysis (OA) method, all existing scanning radiometer columnar water vapor observations, to derive the PD for any altimeter mission. This approach is motivated by the need to offer an improved PD correction for altimeter missions that do not embark a microwave radiometer, but also by the potential benefit to sea level rise studies using altimeter missions for which the long term stability of both the aboard radiometer PD and the meteorological model PD are uncertain. Improvements of the method will be presented, taking into account more sensors, refinements of the calculation of the statistical properties of the field of (sensor – ECMWF) PD anomalies to be analyzed, and of the sensor errors. More extensive validation results will also be shown, including statistical crossover analysis and spectral analysis. Its applicability to near real time altimeter processing (including Jason-2 and Cryosat-2) will be assessed. The potential of this type of products for large swath mission or for climate applications will be also discussed.

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