SST Diurnal Variability from 6 years of Geostationary SST retrievals

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Abstract

The diurnal variability of SST, driven by the coincident occurrence of low enough wind and solar heating, is currently not properly understood. Atmospheric, oceanic and climate models are currently not adequately resolving the daily SST cycle, resulting in biases of the total heat budget estimates and therefore, demised model accuracies. Moreover, diurnal SST variability complicates the merging of SST fields from different satellite sensors and is a source of bias for the satellite wind retrieval algorithms. The ESA STSE funded project SSTDV:R.EX.-IM.A.M. aims at characterising the regional extend of diurnal SST variability and its impact in atmospheric modelling. The Spinning Enhanced Visible/Infra-red Imager (SEVIRI), on board the Meteosat Second Generation (MSG) platforms, is in geostationary orbit and thus provides hourly SST fields over a wide field of view and can thus resolve the diurnal cycle. Polar orbiting instruments, such as the very accurate Advanced Along Track Scanning Radiometer (AATSR) on ENVISAT, also provide accurate SST retrievals but depending on the mission characteristics, they sample at different times of the day. Satellite SSTs are representative of the upper centimetre of the water column but understanding of the vertical extent of diurnal signals is essential. Drifting buoys provide measurements close to the surface but are not always available. Moored buoys are generally not able to resolve the daily SST signal. The increased availability of observational evidence at different depths of the water column and at different times of the day, is fundamental for understanding the generation and destruction of the diurnal warm layer. Nonetheless, as datasets become larger the challenges in retrieving concurrent observational evidence from various observing systems are also increasing.

Keywords: SST, SEVIRI, diurnal variability, PIRATA buoys, AATSR

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