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Towards long-term (2002-present) reconstruction of northern Indian Ocean Sea Surface Salinity based on AMSR-E and L-band Radiometer data

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The Bay of Bengal is under the influence of the monsoon and has a highly contrasted and variable Sea Surface Salinity (SSS). In situ salinity data is however too sparse to reconstruct interannual SSS variability of the Bay of Bengal prior to synoptic SSS mapping of SMOS launched in 2009.

Previous studies have demonstrated the ability of X minus C-band measurements, such as those of AMSR-E (May 2002-Oct 2011), to track SSS changes in high-contrast regions and at high Sea Surface Temperature (SST). Here, we apply this approach to reconstruct the Bay of Bengal SSS before 2010. We remove the effects of other geophysical variables such as SST, surface wind, and atmospheric water content using an empirical approach. SSS is then retrieved based on another empirical fit, trained on the ESA Climate Change Initiative (CCI) SSS dataset, over the AMSR-E and CCI common period (Jan 2010 to Oct 2011). Our first results are encouraging: spatial contrast between the low post-monsoon SSS values close to estuaries and along the west coast of India are reproduced. Our algorithm, however, tends to overestimate low SSS and underestimate high SSS values, possibly due to data contamination near the coast and/or a suboptimal removal of the signals from other geophysical variables. Nevertheless, the first results show a correct representation of the recognizable Indian Ocean Dipole (IOD) phenomena. Furthermore, we are currently creating and studying the use of a neuronal network with the intention to include more parameters in the algorithm.

The long-term goal of this work is to merge the C-, X-, and L-band data with in-situ measurements thus providing a long-term reconstruction of monthly SSS in the Bay of Bengal with a ~50 km resolution. This dataset will be used to explore the physical processes that drive interannual SSS variability in regions where it is strong, such as near major river estuaries or along the west coast of India.