Geophysical Research Abstracts
Vol. 19, EGU2017-8086, 2017
EGU General Assembly 2017

Fresh Water River discharges as observed by SMOS in the Arabian Sea and the Bay of Bengal

Estrella Olmedo, Joaquim Ballabrera-Poy, and Antonio Turiel
Institute of Marine Sciences, Physics Oceanography, Barcelona, Spain (olmedo@icm.csic.es)

The Bay of Bengal (BoB) and the Arabian Sea (AS) are two peculiar regions in the Indian Ocean exhibiting a wide range of Sea Surface Salinity (SSS) values. In the BoB, the strong summer monsoon rainfall and the continental run-offs into these semi-enclosed basins result in an intense dilution of the surface seawater in the northern part of the Bay, thereby inducing some of the lowest SSS water masses found in the tropical belt. In the AS, because of the intense variability associated with the monsoon cycle, water mass structure in the upper layers of the AS shows enormous variability in the space and time. As such, the role of the salinity in these regions is crucial in the ocean dynamics of these regions.

After more than 7 years in orbit, the Soil Moisture and Ocean Salinity (SMOS) mission [1] continues to provide a series of salinity data that could be used to monitor the SSS variations in these climatically relevant regions, provided that systematic errors due to land contamination are reduced. Recently-developed algorithms for SSS retrieval [2] have improved the filtering criteria and the mitigation of the systematic bias, providing coherent SSS retrievals close to the land masses.

In this work we have analyzed the SSS in 2-degree boxes located at the mouth of the main rivers in the BoB: Ganges-Brahmaputra, Irrawady, Mahanadi, Godovari; and in the AS: Indus. We have first tried to validate the SMOS salinity retrievals with in situ measurements. Since there is few available in situ data, we have also compared the climatological SSS behavior derived from SMOS with the ones provided by the World Ocean Atlas [3]. We have also compared the SMOS SSS data with historical data of discharges [4] and [5], ocean currents from the Ocean Surface Current Analyses Real-time (OSCAR) [6], Sea Surface Temperature from Operational Sea Surface Temperature and Sea Ice Analysis (OSTIA) [7],[8] and [9] and Chlorophyll data [10].

The conclusion of this work is that, when the proper filtering criteria is implemented, SMOS provides coherent SSS measurements close to the coast, and especially in these regions of the Indian Ocean, providing near real-time information suitable for validation and ocean data assimilation.

References:
[1] Font, J., Camps, A., Borges, A., Martin-Neira, M., Boutin, J., Reul, N., Kerr, Y., Hahne, A., and Mechlenburg, S. (2010). SMOS: the challenging sea surface salinity measurement from space. Proceedings of the IEEE, 98:649.

[2] Olmedo, E., Martínez, J., Turiel, A., Ballabrera-Poy, J., and Portabella, M., (2017), "Debiased Non-Bayesian retrieval: a novel approach to SMOS Sea Surface Salinity, Remote Sensing of Environment, under review.
[3] Zweng, M.M, J.R. Reagan, J.I. Antonov, R.A. Locarnini, A.V. Mishonov, T.P. Boyer, H.E. Garcia, O.K. Baranova, D.R. Johnson, D.Seidov, M.M. Biddle, 2013. World Ocean Atlas 2013, Volume 2: Salinity. S. Levitus, Ed., A. Mishonov Technical Ed.; NOAA Atlas NESDIS 74, 39 pp
[4] Dai, A., and K. E. Trenberth, (2002): Estimates of freshwater discharge from continents: Latitudinal and seasonal variations. J. Hydrometeorol., 3, 660-687
[5] Dai, A., T. Qian, K. E. Trenberth, and J. D Milliman, (2009): Changes in continental freshwater discharge from 1949-2004. J. Climate, 22, 10, 2773-2792
[6] Bonjean F. and G.S.E. Lagerloef, (2002): Diagnostic model and analysis of the surface currents in the tropical Pacific ocean, J. Phys. Oceanogr., 32, 2,938-2,954
[7] Donlon, C. J., M. Martin, J. D. Stark, J. Roberts-Jones, E. Fiedler and W. Wimmer, (2011). The perational Sea Surface Temperature and Sea Ice analysis (OSTIA). Remote Sensing of the Environment. doi: 10.1016/j.rse.2010.10.017 2011.

[8] Martin, M.J., A. Hines and M.J. Bell, (2007). Data assimilation in the FOAM operational short-range ocean forecasting system: a description of the scheme and its impact. Q.J.R. Meteorol. Soc., 133:981-995.
[9] John D. Stark, Craig J. Donlon, Matthew J. Martin and Michael E. McCulloch, (2007), OSTIA : An operational, high resolution, real time, global sea surface temperature analysis system., Oceans '07 IEEE Aberdeen, conference proceedings. Marine challenges: coastline to deep sea. Aberdeen, Scotland.IEEE.
[10] NASA Goddard Space Flight Center, Ocean Biology Processing Group; (2014): Sea-viewing Wide Field-of-view Sensor (SeaWiFS) Ocean Color Data, NASA OB.DAAC, Greenbelt, MD, USA. http://doi.org/10.5067/ORBVIEW-2/SEAWIFS_OC.2014.0. Accessed 2016/12/31. Maintained by NASA Ocean Biology Distibuted Active Archive Center (OB.DAAC), Goddard Space Flight Center, Greenbelt MD.