

Near-Surface Circulation and Fate of Upper Layer Fresh Water from Rivers Runoff and Rain in the Bay of Bengal near Sri Lanka

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LONG-TERM GOALS

Improve the knowledge of the near-surface circulation in the BoB and of the pathways through which the freshwater fluxes occur.

OBJECTIVES

We want to collect direct observations of the seasonally reversing currents of the southwest BoB to improve the knowledge of the near-surface circulation and for the validation of numerical ocean circulation models. The science questions we to address include the descriptive effort of identifying the routes through which the export of fresh water can potentially occur. More specifically:

- 1) is the Sri Lanka Dome, which shows up very clearly in the summer geostrophic surface current maps (Figure 1) effective in maintaining a nearly closed recirculation cell east off Sri Lanka or do particles (drifters) quickly disperse and get entrained in the northward flowing EICC and westward flowing SMC?
- 2) Does the southward wintertime EICC flows around Sri Lanka and exports fresh water into the Arabian Sea or does it retroreflects eastward along the east coast of Sri Lanka, as some authors suggest?

APPROACH

To address the two questions above, we are deploying 3 SVP drifters/month off the coast of Sri-Lanka. A large number of drifters was deployed 2015 when an additional fleet of 36 salinity drifters was used in conjunction of other IOP activities to map the SSS distribution and variability over the experiment area and to infer the surface freshwater export pathways from direct measurements. The salinity drifters were collecting SSS data every 5 minutes for 6 weeks.

The salinity drifters will also be important to provide a SSS mesoscale view in lieu of the defunct Aquarius SSS data.

WORK COMPLETED AND RESULTS

The deployment of the drifters began in September 2012. The first shipment of 15 drifters was delivered to Mr. Udaya Jinadasa of NARA in Colombo in July 2013. Mr. Jinadasa was trained on the SVP drifter deployment methodology and the first deployment of 3 drifters (2 Argos 3 and one Iridium) occurred on 9/27/2013 and was performed by the Sri Lanka Navy (Figure 1). To date, 113 drifters were deployed in support of ASIRI.

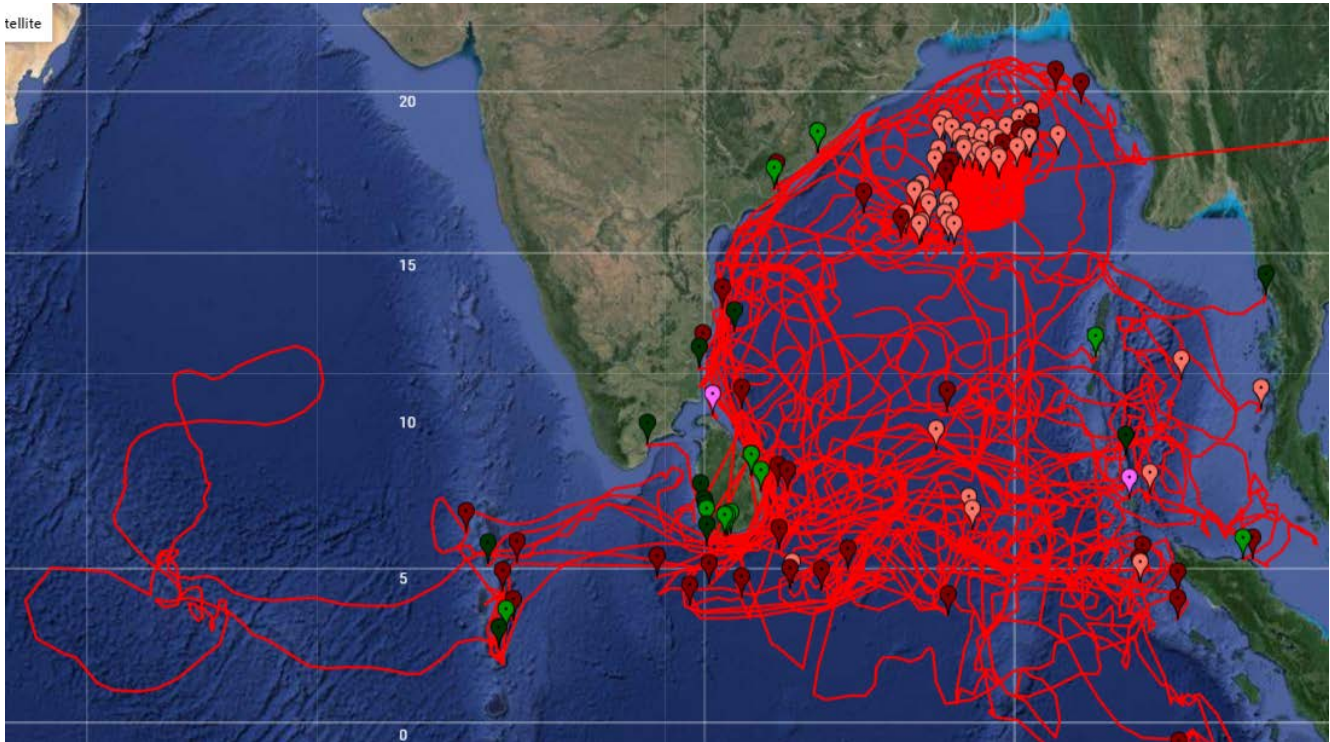


Figure 1: tracks of the drifter deployed since the beginning of the project, as of 11/13/2014.

Drifters were also provided in support of three ASIRI cruises in fall 2013, summer 2014 and summer 2015

RESULTS

A synthesis of drifter/altimetry/wind data was performed. The maps of near-surface currents show a well-developed EICC off Sri Lanka, and meandering currents and mesoscale features in the south-central BoB. The EICC moved around Sri Lanka, and turned westward as it passed south of the island. The width of the EICC off the eastern side Sri Lanka was about 100 km. The results of the synthesis were compared with observations collected during a December 2013 cruise and were found to be in very good agreement.

IMPACT/APPLICATIONS

- Capacity building in Sri Lanka
- The drifter data are posted in real-time to the GTS of the World Weather Watch

RELATED PROJECTS

The Global Drifter Program

PUBLICATIONS

- Lucas, A. J., E. L. Shroyer, H. W. Wijesekera, H. J. S. Fernando, E. D'Asaro, M. Ravichandran, S. U. P. Jinadasa, *et al.* "Mixing to Monsoons: Air-Sea Interactions in the Bay of Bengal." *Eos, Transactions American Geophysical Union* 95, no. 30 (2014): 269-70.
- H. W. Wijesekera, T. G. Jensen, E. Jarosz, W. J. Teague, E. J. Metzger, D. W. Wang, S. U. P. Jinadasa, K. Arulananthan, L. R. Centurioni, H. J. S. Fernando, 2015: Southern Bay of Bengal current and salinity intrusions during the northeast monsoon, *Journal of Geophysical Research: Oceans, In Press*
- Hormann, Verena, Luca R. Centurioni, and Gilles Reverdin. "Evaluation of Drifter Salinities in the Subtropical North Atlantic." *Journal of Atmospheric and Oceanic Technology* 32, no. 1 (2015/01/01 2014): 185-92.
- Hemantha W. Wijesekera, Emily Shroyer, Amit Tandon, M. Ravichandran, Debasis Sengupta, Priyantha Jinadasa, Harindra J.S. Fernando, Neeraj Agarwal, K. Arulananthan, Mark Baumgartner, Jared Buckley, Luca Centurioni, et al., 2015: Decrypting a mystery bay - the ASIRI ocean-atmosphere initiatives on Bay of Bengal, *BAMS, under revision*