



Collaborative Observations of Currents to Mixing and Monsoon Response in the Southern Bay of Bengal

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Upper ocean circulation, mixing, air-sea interactions and monsoon oscillations have been studied in the Bay of Bengal as part of US (ONR/NRL) sponsored programs in collaboration with India and Sri Lanka. The project, Air-Sea Interactions in the Northern Indian Ocean (ASIRI), conducted between 2013 and 2017 aimed at understanding and quantifying upper ocean processes and coupled atmosphere-ocean dynamics of the Bay of Bengal with relevance to Indian Ocean monsoons. The second project, Monsoon Intra Seasonal Oscillations in the Bay of Bengal (MISOBOB) is an ongoing study to examine the ocean role on the regional atmospheric phenomena monsoon intra seasonal oscillations. In the following we describe shipboard observations of sharp frontal features observed during July 2017, and internal tides and high-frequency variability observed from six deep-water moorings in the southern Bay of Bengal in the upper 500 m for 20 months between December 2013 and August 2015. Mooring observations indicate that incoherent internal tides accounted for at least 60% of the total semidiurnal tide energy. Solitons were generated at multiple source regions along the Andaman Islands and contribute significantly to the high frequency energy. Soliton and internal-tide amplitudes show a fortnightly modulation, consistent with the spring-neap cycle of the semidiurnal tide. The interaction of tides and the associated high-frequency waves with mesoscale eddies produced regions of enhanced shear and strain in the thermocline. High-strain regions were found within cyclonic eddies and high-shear regions were found within anticyclonic eddies. Shear-strain-based dissipation models indicate that mixing can be enhanced by a factor of 3-5 by tidal and higher frequencies during interactions with eddies.