

ASIRI
Air-Sea Interaction Regional Initiative
in the Northern Indian Ocean

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The South Asian summer Monsoon brings rain to the Indian subcontinent and affects the livelihood of 1.5 billion people. Yet, the predictability of the Monsoon, its onset, and spatio-temporal variability, is poor in climate models. The phenomenon invokes strong coupling between the ocean and atmosphere, but relatively little attention has been devoted to understanding the role of the ocean, from which the atmosphere derives all of its moisture fluxes. ASIRI is an ONR research initiative involving multiple institutions and scientists, which, in partnership with India and Sri Lanka, aims to improve our understanding of the upper ocean and its atmospheric interactions.

Observational and modeling process studies are being carried out in the Bay of Bengal to: (1) relate air-sea fluxes of heat, moisture and momentum to bulk parameters, (2) understand upper-ocean/mixed-layer dynamics and its relation to air-sea fluxes, (3) infer the effect of submesoscale and mesoscale processes on the lateral dispersal of freshwater, and (4) examine biophysical variability and its feedbacks on sea surface temperature.

The Bay of Bengal is one of the freshest oceans, influenced by a strongly seasonal terrestrial runoff and seasonally reversing winds, which drive a seasonal reversal in circulation. The field component of ASIRI uses ship-based and autonomous observations made within international waters, along with satellite data, to capture variability ranging from meso- to submeso- to micro-scale. Modeling is being used to explore processes that maintain or destroy stratification, transport, disperse and mix freshwater, affect sea surface temperature and air-sea fluxes of heat and moisture. Cruises have been conducted in Nov-Dec 2013 and June 2014 on both US and Indian research vessels and further activities are planned for 2014-15. A long term mooring is being established to obtain high resolution time series of in-water and atmospheric properties, to measure air-sea fluxes and infer interactions between the ocean and atmosphere.

ASIRI collaborates with India's Ministry of Earth Sciences through the Monsoon Mission for improving medium range forecasts of the monsoon and its intra-seasonal variability. Satellite derived data of the sea surface topography and temperature are invaluable for assessing the setting and scales, but since the surface layer density is controlled largely by salinity, satellite-derived salinity is also proving helpful.

This study enhances our understanding of the Monsoons, which are of strong societal relevance and pose a challenge for intra-seasonal prediction and ocean-atmosphere coupled models.