

Establishing an Ocean Observing and Prediction Network for the Red Sea

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IOP Research Investigations – Initial Questions



- Role of eddies in north-central Red Sea and their variability, effect on pelagic biology & reef systems;
- Convective processes in the North Red Sea, and fluxes between the surface and deep Red Sea;
- Resolve the annual cycle of the Red Sea from a physical and biogeochemical perspective;
- What nutrients limit and control productivity of the Red Sea? What processes affect nutrients cycling?
- Is there an oceanographic connection between the annual aggregation of whale sharks near Shib Habil off Al Lith?

Seasonal Forcing – Monsoonally Driven (from Sofianos and Johns, JGR, 2003)



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Characteristics of the Circulation





- Strong Thermohaline Circulation
- Significant role of eddies in the circulation

Surface Current Mapping What is possible?





October 20, 2013, 0900 GMT

Surface Current Mapping Phase 1





First Radial Patterns – 8/27/2015





- APMs excellent
- Range
 - Expected 70-80 km
 - Realized 100-120



First Vector Map on August 27, 2015



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25,111

Figure 10. Suffice velocity for J.D. 242, 1994. Same as Figure 9 (MCSST, XBT, and CTD assimilation) except that orographically modified winds were used as forcing.

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Ocean Sensing and Observing









Modeling and Forecasting Collaborators: I. Hoteit





Progress



- Permanent Installation of KAUST-Rabigh sites by mid-October
- Permanent Installation of Duba sites by early November
- Permanent Installation of Jizan sites in early 2016.

Summary



- Initiation of the Red Sea Observing System with CODARs, Gliders, and profiling floats
- First CODAR systems using 16 MHz
- Good range and performance (beyond expectations)
 - Perhaps explainable by higher salinity of Red Sea
- Leading towards operational real-time modeling and prediction system for currents and surface waves
 - Oil spill response (drilling, shipping, coastal terminals)
 - Products for ports and shipping
 - Interaction with biological systems
 - Reef connectivity
 - Basin exchange
 - Etc