Detection of sea-surface temperature anomaly in the equatorial region of Bay of Bengal using indigenous Lagrangian drifter

Sea-surface temperature (SST) is one of the important parameters related to the global ocean–atmosphere system, which plays a major role in studies of air–sea heat exchange, upper ocean processes, weather forecast, circulation pattern, etc. SST is also used as an ancillary parameter to quantify the productivity of the world ocean. The distribution of SST provides significant information for monitoring the relevant key ocean structures, e.g. fronts, eddies and upwellings[1–6]. SST data are measured from ships, buoys and offshore platforms. But, the measurement of SST together with water movement will provide useful information on ocean currents.

In this study, an indigenous drifter (Pradyu) developed by the National Institute of Ocean Technology, Chennai with INSAT communication was deployed in the equatorial region of the Bay of Bengal and data collected for a period of two months (21 April 2012 to 21 June 2012). The Pradyu drifter consists of an SST sensor which is about 10 cm from the sea surface, has a 6 m long drogue at 15 m below the surface and is designed to drift with deep ocean currents. This was an indigenous attempt to develop a system with INSAT communication and with improved measurement scheme over the imported system using ARGO satellites, where only 4–5 passes per day are possible in the equatorial region and may not record eddy circulations like the one as shown in Figure 1. The Pradyu samples SST at 1 min interval which is averaged for 15 min making a total of 96 observations per day and transmits data every hour with positional information using MSS payload on INSAT satellite.

Three days track (6–8 May 2012) of the drifter movement is superimposed with *Google Earth*. The drifter data were

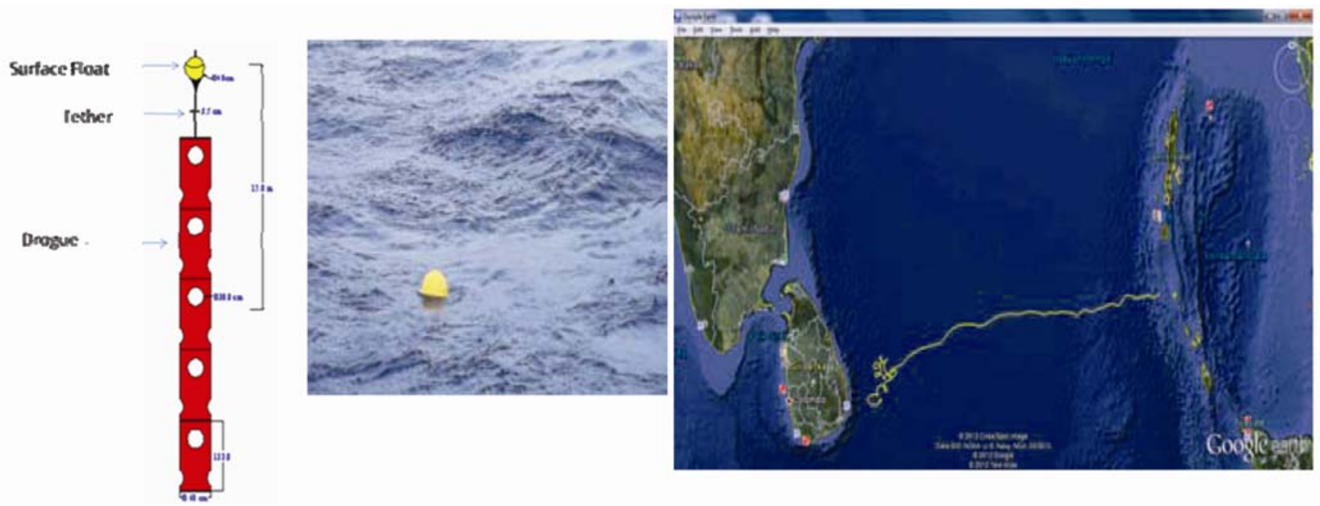

Figure 1. Drifter and the track during data collection.

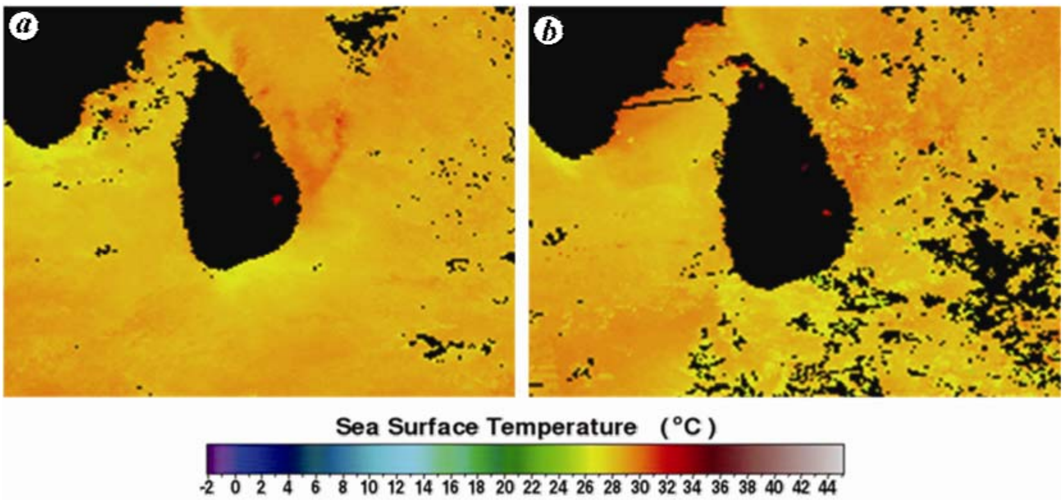

Figure 2. Three-days composite of daily SST derived from MODIS-Aqua (***a***, 6–8 May 2012; ***b***, 12–14 May 2012).

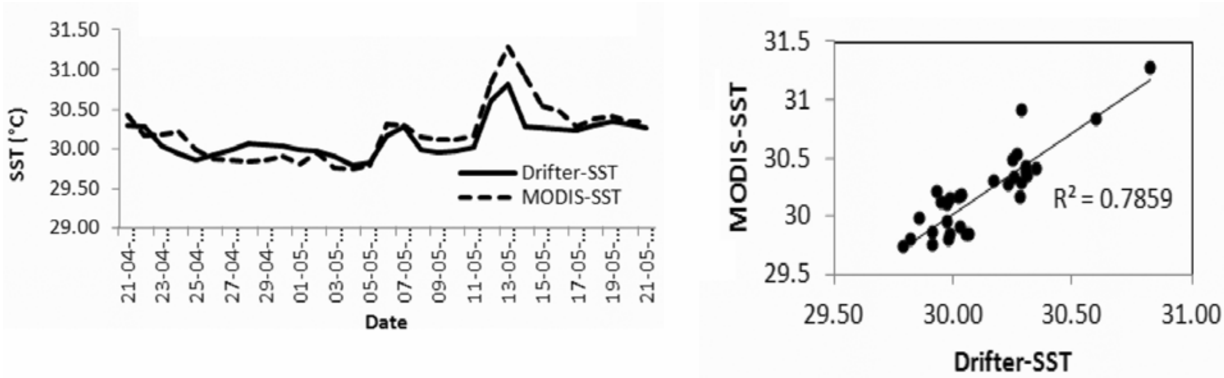

Figure 3. Comparison of daily averaged absolute SST between MODIS-Aqua and Pradyu.

captured every 15 min and it was found that for a period of one month (21 April 2012 to 25 May 2012) the drifter whirled in a steady location (7°N, 83°E) may be due to reversal of wind speed and surface current which cause the stratification. To know its scientific evidence, the SST was compared with MODIS-Aqua 3-days composite SST with a spatial resolution of 4 km, as shown in Figures 2 and 3.

A V-shaped thermal front was observed from MODIS-Aqua images (Figure 2 *a*). Later due to strong stratification, the average temperature in this area has been increased within an anomaly of 3°C (Figure 2 *b*). During this one month observation, two peaks were observed in Pradyu SST which compares well with MODIS-Aqua SST. The absolute value of satellite-derived SST (as appeared in the areas of thermal front in Figure 2) is the skin temperature of water at sea surface overestimates about 0.5°C with Pradyu SST which is spatially distributed due to the action of ocean current and surface wind speed. The first peak indicates the stratification caused by the surface wind and ocean current, which leads to an eddy which persists for one week, i.e. 6–8 May 2012. Whereas the secondary peak indicates that the mean temperature is about 31.5°C due to strong stratification induced by strong current and wind speed. The straight comparison between Pradyu SST and MODIS SST is significant and R^2 is 0.78. However, the vertical profile of SST is unknown.

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Do endophytic fungi possess pathway genes for plant secondary metabolites?

Endophytic fungi which live inside plant tissues as asymptomatic mutualists have been recognized as an important and novel source of bioactive compounds[1]. They produce a number of important secondary metabolites, including anti-cancer, anti-fungal, anti-diabetic and immunosuppressant compounds[2]. Some of these compounds are those produced by their respective host plants as well. For example, Stierle *et al.*[3] showed that an endophytic fungus, *Taxomyces andreanae* isolated from the yew plant, *Taxus brevifolia* produced paclitaxol, the multi-billion dollar anti-cancer compound, just as it is produced by the yew plant. Following this report, a number of endophytic fungal sources of important plant secondary metabolites including camptothecin (CPT), podophyllotoxin, vinblastine, hypericin, diosgenin, azadirachtin and rohitukine have been reported (Table 1). These findings have triggered the expectation that endophytic fungi can be a source of important plant metabolites, thus relieving our dependence on plants for these metabolites.