Title: Spatio-temporal variability of chlorophyll-α off the coasts of Tanzania, Mozambique and Comoros Island

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Background
Lack of continuous physical, biological and chemical data is the major challenge that hinders understanding of the spatial and temporal variability of plankton in the Western Indian Ocean region. To address this challenge the Second International Indian Ocean Expedition (IIOE 2) was initiated. One of the projects under IIOE2 was the SA Agulhas II research and training cruises specifically designed to address country gaps within the Indian Ocean African Rim.

Methodology
Data were collected during the October 2017 cruise (Mozambique and Tanzania) and July 2018 cruise (Tanzania and Comoros). Downcast measurements of the CTD was used to obtain profiles of temperature, oxygen, light and fluorescence along the sampling transects. Profiles were aligned to standard depths with intervals of 0.5 meters from the surface to the maximum depth of each profile. Profiles were stitched along transect to create hydrographic section. 250ml of water from the CTD along the profile was analyzed onboard, using the fluorometric method, to determine chlorophyll-α concentrations.

Results
Preliminary results from Tanzania shows that chlorophyll-α concentrations were highest (maximum fluorescence) in the depth ranging between 60 - 70m with relatively highest concentrations found in the southern Tanzania, coinciding with river Ruvuma discharge (the Largest coastal River in Southern Tanzania), a dominant factor that may increase nutrients and support the higher Chlorophyll-α concentrations. In Mozambique the data analysis shows that the
surface chlorophyll $a$ was generally very low, with values ranging from 0.04 mg.m$^{-3}$ in the offshore regions to 1.80 mg.m$^{-3}$ in the near-shore region, just south of the Zambezi River mouth. The higher values of chlorophyll $a$ were also observed off Beira and south of Angoche. The high concentrations of chlorophyll $a$ observed off Beira and south of Angoche are mainly derived from the high nutrient loads injected by the various rivers running to the Bank. Conversely, chlorophyll $a$ concentration in the coast water of Comoros revealed maximum fluorescence ranged from the surface to maximum depths of ~80m. The benthic topography of the Comoros Islands may be a large influence on the chlorophyll production and will need to be explored. Other factors that may contribute to observed variability in chlorophyll $a$, for both regions, include temperature-induced stratification of water masses, oxygen-limitations, and light-intensity and nutrient availability.

**Conclusion**

The study suggest that the variation of chlorophyll-$a$ concentration is influenced by physicochemical parameters and possibly due to nutrient loading from freshwater discharge into the coastal waters. Understanding of *in-situ* distribution and variation of chlorophyll-$a$ concentration allows the ground-truthing of remotely sensed data that is used as a proxy for primary production and therefore is very useful information to fisheries managers and monitoring water quality control.

**Keywords:** Chlorophyll-$a$ concentration; CTD; Comoros; Tanzania; Mozambique