

Phytoplankton composition in the Indian Ocean sector of the Southern Ocean during austral summer of 2013 and 2015: In-situ and Remote sensing approach

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Phytoplankton biomass (chlorophyll a) and community in the water column were analyzed in various frontal regions (Subtropical front (STF), Sub Antarctic front (SAF), Polar Front 1 (PF1) and Polar Front 2 (PF2)) in the Indian Ocean sector of the Southern Ocean (SO) during the austral summer (January-February) 2013 and 2015. The surface chlorophyll a (Chl-*a*) was maximum at PF1 (0.77 mg m^{-3}) followed by SAF (0.5 mg m^{-3}), STF (0.26 mg m^{-3}) and PF2 (0.21 mg m^{-3}) in 2013, while it was maximum in the SAF (0.56 mg m^{-3}) followed by PF1 (0.32 mg m^{-3}), PF2 (0.28 mg m^{-3}) and STF (0.20 mg m^{-3}) during 2015. This suggests that the average surface phytoplankton biomass along the track was more in 2013 compared to that in 2015. Among the fronts, the average surface phytoplankton biomass was elevated in PF (PF1 and PF2) in 2013 than 2015. The deep chlorophyll maximum (DCM) was 50m in STF and SAF in both the study periods, whereas it was 75m in PF1 and 100m in PF2 during 2013. Consequent to biomass variation, the diagnostic pigment (DP) index also varied in the surface for both the periods, however the community Diatom DP (Diat_{DP}) in the surface and water column increased from STF to PF. Similar to Diat_{DP} the community Prokaryotic DP (Prok_{DP}) has increased from STF to PF. Contrary to this, Flagellate DP (Flag_{DP}) was highest in the STF and decreased towards PF. Result indicates the biomass and community variation in the frontal regions due to the influence of biological and physical process at environmental settings. Analysis of Aqua-MODIS (Moderate Resolution Imaging Spectroradiometer) and NOBM (NASA Ocean Biogeochemical Model) data found well correlated with the *in situ* trend of phytoplankton biomass and community, whereas the Chl-*a* values observed in Aqua-MODIS were low as compared to the *in situ* values. Combined analysis of *in situ*, remote sensing and model data can be used as a tool for mapping the larger scale estimates of surface phytoplankton biomass from the Indian sector of SO.

