

Spatial variability of the primary production and structure of the phytoplankton community in the South Indian Ocean.

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The exchanges of carbon dioxide (CO₂) at the air-sea interface are critical processes involved in the marine carbon cycle and of importance for the Earth climate. The biological carbon pump (BCP), *i.e.* the transfer of organic carbon biologically fixed by primary production (PP) from the euphotic zone to the deep ocean, constitutes one of the major processes to remove CO₂ from the atmosphere and sequester it for long time periods. One of the main factors controlling the BCP is the intensity of the PP and the structure of the phytoplanktonic community, which in turn depend on the physico-chemical conditions of the ocean.

Despite the importance of the BCP for the functioning of marine ecosystems (*e.g.* food sources for mesopelagic communities), and for the Earth climate, its role within the marine carbon cycle remains misunderstood, and the magnitude of this process poorly quantified. Furthermore, large oceanographic provinces remain severely undersampled, such as the South Indian Ocean (SIO). The latter hosts contrasted biogeochemical provinces, from low productive systems with Low Nutrient Low Chlorophyll and High Nutrient Low Chlorophyll areas, to high productive regimes in the vicinity of the Southern Islands, as a consequence of natural iron fertilization.

Within the SOCARB (South Indian Ocean CARBOn fluxes from the surface to the mesopelagic twilight zone) program, we conducted an oceanographic cruise during late austral summer (23rd Jan. – 28th Feb.) to understand the role of the PP and the phytoplanktonic community structure in the BCP. At 12 stations located in the different biogeochemical provinces, 6 depths were sampled in the euphotic zone. We present preliminary results of (i) PP determined using the ¹³C tracer method and on-deck incubations, (ii) pigments data determined from High Performance Liquid Chromatography (HPLC) and (iii) onboard cytometry flux analyses. PP and pigments samples were size-fractionated (< 3 μm; 3-20 μm; > 20 μm) to quantify the impact of these different size groups on CO₂ uptake and organic carbon production, and assess the structure of the phytoplankton community. We will discuss the intensity level of the PP and the phytoplankton abundance and diversity, to describe their roles within the BCP.