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TITLE: The spatial distribution of particulate organic carbon and microorganisms on seamounts of the South West Indian Ridge

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ABSTRACT:

The ecology and biogeochemistry of oceanic seamounts is not very well understood and explored. Pelagic ecosystems above the summits and flanks of seamounts have been observed to show different biological or biogeochemical properties to off-seamount areas, such as enhanced chlorophyll concentrations, a phenomenon referred to as the 'seamount effect'. In addition, seamount biogeography has been hypothesised to be similar to islands where community structure differences in multiple organisms have been shown to change between seamounts and across frontal systems. We used elemental analysis, to measure particulate organic carbon (POC), and flow cytometry, to estimate abundance of microorganisms from above four seamounts (Coral, Melville, Middle of What and Atlantis) along the Southwest Indian Ridge (SWIR) from latitude 32.6°S to 41.3°S, longitude 57.1°E to 42.7°E. Samples were collected from the surface to the bottom using a CTD fitted with optical sensors. POC was predicted from models created from in-situ transmission (optical) data (cp). The high resolution predicted POC in the euphotic zone showed a heterogeneous distribution both above individual and between seamounts. The shallow penetration of two of the seamounts displayed an effect on the POC concentration in the euphotic zone depleting the layer around the summit. The transmission data showed higher concentrations of particles towards the surface, caused by primary production, and near to the seabed, probably resulting from re-suspension of sediments. The POC concentrations and microbial abundance were positively correlated to cp and fluctuated with particle abundance, with microorganisms accounting for ~50% of the observed POC. Based on non-metric multidimensional scaling it is clear that the microbial clusters strongly indicate three separate biological regimes associated with northeastern, central and southwestern zones of the section of the SWIR that was sampled. This biological zonation is associated with physical oceanographic boundaries represented by the Subtropical and Subantarctic Fronts, forming three distinct 'biogeographical' regions.

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