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TITLE: Phytoplankton and nutrient dynamics of six South West Indian Ocean seamounts

AUTHOR: ['Martinus J. Sonnekus', 'Thomas G. Bornman', 'Eileen E. Campbell']

ABSTRACT:

A survey of six seamounts and two transects through the subtropical convergence zone (SCZ) in the South Indian Ocean in November and December 2009 showed a strong latitudinal gradient from the subtropics to the Sub-Antarctic Front. Concentrations of oxygen, nitrate, nitrite, soluble reactive phosphorous as well as phytoplankton biomass (measured as chlorophyll a) increased while salinity and temperature decreased with an increase in latitude. These differences resulted in significant differences between seamounts. The chlorophyll a maximum became shallower at higher latitudes, changing from a depth of ~85 m in the subtropics to ~35 m over the seamounts and in the SCZ. The mixed layer depth also increased from ~50 m in the subtropics to ~100 m at higher latitude stations. The N:P and N:Si ratio indicated that NO₃⁻ was limiting at all the seamounts except one, at which SiO₄ was the limiting nutrient. The phytoplankton community also showed a latitudinal gradient with decreasing diversity and a change in dominance from dinoflagellates in the tropics to diatoms towards the SCZ. The dominant diatom genus of the survey (>50% of the cell counts) was *Pseudo-nitzschia*. Nutrients exhibited an inverse linear relationship with temperature and salinity. The oligotrophic subtropical areas differed from the mesotrophic seamounts in temperature while waters over seamounts north and south of the Agulhas Return Current (ARC) differed in salinity. The phytoplankton (148 taxa) responded to these differences, showing three communities: subtropical seamount phytoplankton (Atlantis Seamount, Walters Seamount and off-mount samples), phytoplankton of the waters north of the ARC (Melville Bank, Sapmer Bank, Middle of What Seamount) and phytoplankton south of the ARC (Coral Seamount, SCZ1) characterised by a bloom of *Phaeocystis antarctica*. The environmental drivers most strongly linked to these observed differences were nitrate, temperature and oxygen. These environmental drivers displayed a clear latitudinal gradient unaffected by mesoscale variability of the ARC eddy field and allowing the three phytoplankton communities to persist. Phytoplankton biomass was enhanced in the shallow (< 200 m) seamount waters, although the speed of the currents indicates an allochthonous origin.

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