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TITLE: Annual phytoplankton blooming using satellite-derived chlorophyll-a data around the Vitória-Trindade Chain, Southeastern Brazil

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ABSTRACT:

The present study aimed to investigate the influence that four seamounts of the Vitória-Trindade Chain (VTC): the Vitória (VB), Jaseur (JB), Davis (DB) and Dogaressa (DoB) Banks, located on the western South Atlantic Ocean, potentially exert on the annual variability of the chlorophyll-a concentration [Chla] over their summits and surrounding regions. Nine years (January 2003 to December 2011) of monthly and weekly (8-days composite) satellite derived chlorophyll-a concentration, with 4 km spatial resolution were obtained for the study area using the Moderate Resolution Imaging Spectroradiometer (MODIS) aboard NASA's Aqua satellite. For comparison purposes, different time-series were analyzed for both the region over the seamounts and the surrounding waters. A Gaussian model was adjusted to each of the time series of monthly mean chlorophyll-a concentration, and the curve parameters were used in order to objectively characterize the blooms. The results showed that the entire study area (both above and beyond the seamounts) underwent seasonal blooms, with peak of chlorophyll-a occurring around the austral winter (June, July and August), when due to surface cooling the deepening of the surface mixed layer is observed, enriching the photic zone with nutrients. Nevertheless, the peak chlorophyll-a concentration over the shallow seamounts was twice higher than that over deep seamounts or in the adjacent deep ocean. Our results suggest that the presence of these seamounts and their morphological characteristics can significantly impact the primary productivity observed in this region. Thus, the VTC can be divided into areas of diffuse [Chla] (VB and JB), with lower zonal scattering and higher phytoplankton concentrations (DB), and areas distant from the continental shelf and the mesoscale processes that develop there, hence with lower [Chla] (DoB). The profound impact that these seamounts have on the oceanic ecosystem may turn them into becoming true oasis in the oligotrophic deep ocean, supporting higher trophic levels, as well as important fisheries in this region.

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