**Remotely-sensed phytoplankton size structure around Southern Africa.**

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The three-component model of Brewin et al. (2010) computes fractional contributions of three phytoplankton size classes (micro-, nano-, picophytoplankton) to the overall chlorophyll *a* concentration. Using in situ HPLC data, model coefficients were fine-tuned for application to the southern African marine region. The refined model was applied to seasonal climatologies of MODIS Aqua chlorophyll *a* around Southern Africa during summer and winter. During summer, high chlorophyll *a* was limited to shelf regions along the coasts of Southern Africa and Madagascar, while values < 0.1 mg m-3 occurred over most of the open ocean between the equator and 40°S. Between 40°S and 45°S, elevated concentrations (up to 0.5 mg m-3) were associated with the Subtropical Convergence zone. During winter, chlorophyll *a* values up to 0.5 mg m-3 extended over a much larger area of the open ocean, with low values (< 0.1 mg m-3) restricted to subtropical gyres and the Mozambique Channel. During both seasons, micro-phytoplankton comprised more than 50 % of the total chlorophyll *a* in shelf regions, and less than 10 % in the open ocean, while the converse was true for pico-phytoplankton. During summer, nano-phytoplankton tended to dominate in smaller zones along the edges of the continental shelves and in the Subtropical Convergence zone, while in winter, they were distributed over a larger area and contributed more to the total chlorophyll *a*. Characterizing spatial and temporal variations in phytoplankton size structure will enable the influence of climate change and variability in different ecosystems to be evaluated.

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