Phytoplankton diversity in the Southern Ocean derived by merging hyperspectral satellite information

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Phytoplankton account for about half of the global primary production and are the very basis of the marine food web. The global chlorophyll-a concentration of phytoplankton has been monitored with ocean color satellite sensors since the late 1970s. Different phytoplankton have different functions in the biogeochemical cycles and so interest has grown in distinguishing these so called phytoplankton functional types (PFT) from space to improve our understanding of marine phytoplankton's role in the global marine ecosystem and biogeochemical cycles.

The Southern Ocean takes up about half of the anthropogenic carbon dioxide amount taken up by the ocean globally and is, therefore, a major carbon sink strongly influencing the global carbon cycle. Due to iron limitation, phytoplankton abundance is generally low in these waters but blooms occur that are linked to physical processes such as e.g. sea ice retreat, upwelling, vertical mixing by eddies. It remains an open question how observed temporal and spatial climate changes in the Southern Ocean affect the biogeochemical cycles and the food web, especially via the primary production of phytoplankton.

The DFG-funded project “Antarctic phytoplankton in response to environmental change studied by a synergistic approach using multi- and hyper-spectral satellite data” addresses the question of phytoplankton community composition and its changes due to global warming in a potential typing point region regarding earth's climate, the Southern Ocean. Focusing on the hyperspectral satellite data, the objectives and methods to derive PFTs in the Southern Ocean will be presented.