Glacial-Interglacial Gradients in Biogenic Export Fluxes along a Meridional Transect in the Southern Indian Ocean

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For the earth's climate during glacial-interglacial cycles, the partitioning of CO_2 between the ocean and atmosphere is crucial. The Southern Ocean, in particular, proves to play a major role, as variations in both physical and biogeochemical processes have the potential to regulate the uptake and release of CO_2: First, vertical mixing intensities close to the Antarctic continent bring CO_2-and nutrient-rich waters to the surface ocean contributing to release CO_2 to the atmosphere; on the other hand, export production transports CO_2 to the ocean interior, where it can be sequestered for centuries. Combined, these processes can partially explain pCO_2 trends recorded in Antarctic ice cores. However, different zones in the Atlantic sector of the Southern Ocean show different trends of export production for glacial/interglacial periods demanding for separate investigations.

To further test these hypothesis, we present new sediment records from the Southern Indian Ocean, a region that has yet been largely undersampled, adding up to existing records for a more complete picture of past Southern ocean dynamics. We report ^{230}Th-corrected biogenic opal, carbonate and alkenone fluxes on two highly resolved sediment cores in the polar and subantarctic zone, respectively, to reconstruct changes in export production since the penultimate glacial period. Additionally, redox-senstive trace metals that reflect the oxygenation state of deep waters provide additional evidence allowing to reconstruct changes in deep ocean ventilation. This combined approach will give important new constraints to further document changes in the efficiency of the biological pump accompanying changes in the dynamics in the Southern Indian Ocean and allow for comparisons with previously published records from the South Atlantic.