



Last glacial to Holocene productivity in the Southern Ocean (Antarctic Zone) - Assessment of stable isotope records from diatoms

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Changes in Southern Ocean productivity have been identified to be critical for regulating the glacial-interglacial fluctuations in atmospheric $p\text{CO}_2$ observed in ice core records. However, yet there is no consensus on the significance of proxies used for the estimation of past productivity change because none of the available proxies is controlled by biological productivity alone. In the Southern Ocean, diatoms represent the major primary producer and their siliceous hardparts preserve well in the sediment record. Hence diatoms are potential indicators of past changes in productivity, productivity regimes and environmental conditions. Here we combine data derived from isotope geochemical ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) and chemical (% C and % N) investigations of the resilient organic matter of diatoms, bulk total organic carbon and biogenic silica accumulation records and diatom based paleoenvironmental reconstructions ($\delta^{18}\text{O}$, sea surface temperature, sea ice distribution) to better assess the relation of stable isotope based proxies to past productivity. We study the glacial/interglacial changes of the proxies in three high resolution records documenting the past 30 ka. The investigated sediment cores have been recovered at locations south of the Polar Front at ca. 40°E (Core PS2606-6, western Indian sector), 30°W (Core PS1786-1, western Atlantic sector) and at ca. 120°W (Core PS58/271-1, eastern Pacific sector) and originate in areas governed by different environmental and hydrographic conditions. Age models are based on a combination of AMS ^{14}C dating, oxygen isotope stratigraphy and diatom biofluctuation records.