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Size changes in the diatom *Fragilariopsis kerguelensis* and their implications for Southern Ocean paleoreconstructions

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Diatoms play a central role in the ecosystem of the Southern Ocean, as they are the main producers and carriers of organic carbon and dissolved silicon towards the deep ocean. Variability in space and time of the size of the most abundant species (*Fragilariopsis kerguelensis*) may directly impact the way this ecosystem functions, and also affect the nutrient balance of the global ocean, as important water masses (e.g. the Antarctic Intermediate Water) get their nutrient signature in this area. We analyzed the size variability of *Fragilariopsis kerguelensis* valves in sixty-four surface sediment samples from the Southern Ocean, in sediment trap at the Antarctic Polar Front (APF), and along several piston cores from different Southern Ocean provinces.

The average valve area of *F. kerguelensis* displayed a maximum in the proximity of the APF, and lower values to the north and south of it, and also changed markedly over seasonal cycles, as diatom blooms and nutrient availability waxe and wane. The last glacial to interglacial transition also witnesses important changes in the valve size of *F. kerguelensis*, with specimens from glacial intervals being ca. 30 to 50% larger than their interglacial counterparts. The highest average sizes during glacial intervals are higher than what found anywhere in the Southern Ocean today. The newly proposed proxy (valve area of *Fragilariopsis kerguelensis*) may thus prove useful for the reconstruction of the past position and nutrient characteristics of the APF and „opal belt“, a region characterized by high production and export of biogenic silica, in a particularly sensitive and dynamic area such as the Southern Ocean.