

Changes in Magnetic susceptibility and grain size in the Southern Ocean off the northern Antarctic Peninsula since the last glacial period and its implication for ice calving activity

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ABSTRACT

Magnetic susceptibility (MS) values in Scotia Sea sediments showed strong correlations to ice core dust input, which emphasizes the role of atmospheric circulation in the Southern Ocean. Thus, the correlation between them was suggested as a powerful tool for age construction of marine sediments in the Southern Ocean. However, controls for MS variation in Scotia Sea sediments are not clear. In this study, we document grain size analysis and MS record of sediment cores from the Southern Ocean off the northern Antarctic Peninsula (the south Scotia Sea and the northern Powell Basin) to reveal which size fraction is responsible for MS variation and how the size fraction is transported to the Southern Ocean deep-sea since the last glacial period. MS values of all cores GC02-SS02, GC03-C2, GC03-C4, and GC04-G03 are strongly related to sand sized and coarse silt sized fractions. Sand sized and coarse silt sized fractions have high MS values compared to other size fraction, which indicates that they are the size fraction which is responsible to increased MS values during the glacial period. They are most likely transported by ice rafting from the Antarctic Peninsula and the Weddell Sea. Thus, strong correlation between MS and ice core dust record indicates a strong linkage between circulations of cryosphere (iceberg calving activity) and atmosphere (dust input) in the Southern Ocean off the northern Antarctic Peninsula.