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Miocene-Pliocene paleoenvironmental reconstruction using siliceous microfossils in the Weddell Sea sediments

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The latest Oligocene-Pliocene (ca. 25-3 Ma) microfossil assemblages of diatoms as well as *Chaetoceros* resting spores and chrysophyte cysts from the sediments drilled by the Ocean Drilling Program (ODP) Leg 113 Hole 689B are investigated to reveal the paleoceanographic changes around the Weddell Sea, Antarctic Ocean. As a result of the biochronological analysis, forty-one diatom bioevents including twenty-five biohorizons are recognized.

In the paleoceanographic analysis, a distinct peak of *Thalassionema nitzschioides* var. *parva* are observed at 18 Ma (million years ago before present), which may indicate a migration of the Antarctic Circumpolar Current. The increases in the abundance of sea-ice related diatom taxa from 13 Ma and at 9.5-5 Ma are also observed, which seem to be related to the growth of seasonal and multi-year sea-ice distributions around the late Miocene period. High abundances of subantarctic species and chrysophyte cysts from ca. 4.8-3 Ma are may appear to be associated with the Pliocene warmth event. In addition, the diversification of diatoms at 9.5 Ma might be caused by strengthening of seasonal variations in sea-ice distribution. Moreover, the diversification of diatoms and abrupt increase in *Chaetoceros* resting spores and chrysophyte cysts at ca. 4.8 Ma may be associated with eutrophication by strong nutrient supply.

Furthermore, this study has a potential to contribute the prediction of the global climate change in the future because the studied ages of this study include the Miocene and Pliocene known as high pCO_2 periods, as well as the reconstructions of the past Antarctic sea-ice and ice-sheet distributions.

Keywords: the Weddell Sea, diatom, chrysophyte cyst, resting spore, sea-ice