



Southern Ocean circulation changes across the last deglaciation: contribution from Marion-Dufresne cruises

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The last deglaciation is marked by rapid climatic events linked to large reorganizations of the deep ocean circulation. To decipher the role of the Southern Ocean in these deep circulation changes requires reconstructing the evolution of its stratification and its zonal behavior during the last deglaciation from high resolution, well dated records. Furthermore, nowadays the connection between atmosphere and the deep ocean occurs through the Southern Ocean, and it might had a leading role in the evolution of atmospheric CO₂ concentrations across the deglaciation. However, establishing a precise chronology for marine sediment records in high latitudes is a difficult task, as it requires the determination of radiocarbon surface water age changes.

It has been possible to retrieve high sedimentation rate cores during Indian and Pacific oceanographic cruises, particularly PACHIDERME and INDIEN SUD expeditions. We pre. We aim at tying these marine records to terrestrial records, using tephra deposited in marine and terrestrial region in the different sector of the Southern Ocean when it is possible. This work is in progress within a French-Swedish project. We will present results at different depth from South West Pacific sector of the Southern Ocean and from the Indian sector. A precise chronology in the Indian sector requires to first establish the tephrochronology of Kerguelen Islands that is under progress.

We compare these new records with previously published records of the Atlantic and Pacific sectors. It indicates that upwelling events drive radiocarbon changes in waters above 2500 m depth and increases in atmospheric CO₂. Oceanic circulation changes are not synchronous at deeper depth between 2500 and 4000 m depth. Southern Ocean temperature and vertical mixing increases occurs synchronously with temperature increase above the Antarctic and atmospheric CO₂ increases within error of marine and Ice chronologies, while the ACC current intensity decrease (or northward migration) occurred later within the Indian Ocean