Tracing dust sources in the Atlantic Southern Ocean during the last 160 ka

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The Southern Ocean is a "high-nutrient low-chlorophyll" area where iron availability is a key component to primary productivity, which in turn influences the carbon cycle. The main supply of iron to the Atlantic Southern Ocean is dust, originating mostly from South America. During ice ages the increased dust supply to the Southern Ocean enhanced the primary productivity, which then influenced the CO_2 leakage.

Both iron concentration and bioavailability in dust depend on the type of material the dust derives from. Thus identifying potential source areas would allow a better characterization of the iron supplied to the ocean.

Lead, Sr, and Nd isotopic signatures of the detrital fraction in marine sediments are powerful tools to trace dust sources. Here, we have studied core ODP 1090, a well-documented core located in the east Atlantic sector of the Southern Ocean. In particular a tight connection between the dust inputs and the atmospheric CO_2 variations has been identified in this core. We will measure Pb, Sr, and Nd isotopic compositions over the last 160 ka with an average resolution of 5 ka. Preliminary results show large variations in the $^{87}Sr/^{86}Sr$ ratios: 0.711 to 0.719. These values mostly fall in the field of South American sources; however contributions from Australia or South Africa cannot be excluded. We will measure Pb and Nd isotopic compositions to further precise the origins of dust.