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Fluctuations in alkenone-derived sea surface temperature, productivity, and ventilation in the Magellan Strait, Chilean continental margin, over the past 12 kyr

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In 2003, Leg 3 of the R/V MIRAI MRO3-KO4 cruise, which was part of the BEAGLE (Blue Earth Global Ocean Experiment) program, took place along the Chilean marginal area (36-54˚S) and the Magellan Strait. The main goal of this leg was to study changes in the biological pump, sea surface water temperature and ventilation speed of the intermediate water during the recent past (last 12,000 years) geological era, and to clarify the bio-optical dynamics in the surface water at present times.

The eastern South Pacific Ocean is one of the least explored and most productive regions of the global ocean. Circulation along the Chilean coastline is controlled by the West Wind Drift (WWD) which approaches the coast at 45˚S, where it splits into the Peru-Chile Current (PCC) and the Cape Horn Current (CHC). The PCC flows equatorward to ca. 4˚S where it turns westward. The CHC flows poleward along the southernmost coast of Chile. The area north of ca. 40˚S is characterized by very high productivity due to coastal upwelling of nutrient-rich equatorial subsurface waters (ESSW) and a sub-surface oxygen minimum zone. South of this latitude, productivity is also high due to the interplay of nutrients from the south and runoff from the Chilean fjord system. Antarctic Intermediate Water, which has high oxygen, low nutrients and

salinity, is present at the depths 400–900m. Thus, the Chilean marginal area has been recognized as a key area for biogeochemical cycle of carbon in the global oceans not only during modern times but also over the past geological period. Studies over the past decade have focused on the area north of ca. 43˚S but little is known of the paleoceanographic history in the southern region.

Based on the above-mentioned purpose, Leg 3 of cruise of R/V MIRAI MR03-K04 retrieved four piston, two gravity and four multiple cores in the Chilean marginal sea and the Magellan Strait. Piston core PC-03 collected at the mouth of Magellan Strait (52˚52'S, 74˚05'W, water depth 560m) was used in this study. In this presentation, alkenone-derived sea surface temperature (SST) with decadal to centennial time resolution over the past 12ka are shown. Alkenone-SST range between 10 and 12˚C in the early Holocene, and show a marked decline from 12˚C to 9˚C since 6 kyr BP. Changes in SST are accompanied by changes in primary productivity proxies such as biogenic opal, total organic carbon, total nitrogen, and isotopes of organic matter $d^{13}C$ and $d^{15}N$, as well as changes in ventilation based on carbon isotope data of planktic and benthic foraminifers.