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Holocene and late Glacial Climate Variability in the Chilean Fjord Region

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The southern Chilean continental margin (including the Chilean fjord region) offers unique opportunities to study Southern Hemisphere paleoenvironmental changes during the Holocene and the late glacial on short, decadal to centennial time-scales. During the IMAGES R/V Marion Dufresne cruise Pachiderme (February 2007), long CALYPSO piston cores were recovered from a latitudinal transect between ca. 42 and ca. 53°S. The coring sites are located both in the inner fjord region and offshore on the continental slope. Major scientific goals include the reconstruction of Holocene and deglacial changes in the extent of the Patagonian ice-sheet and the derivation of high resolution records of continental climate changes (particularly rainfall variability controlled by the southern westerly wind belt). Furthermore, we focus on the reconstruction of paleoceanographic changes in the fjords and on the slope and compare those to each other and to previously published records from the Chilean margin further north, the Southern Ocean, and Antarctica. Based on preliminary shipboard data and first radiocarbon dates, sedimentation-rates seem to be high enough to record cen-

tennial and sub-centennial scale variations.

Here, we present the first high resolution records of bulk chemistry changes based on XRF scanning as well as alkenone sea surface temperatures (SST). In general, the fjord sites provide very high resolution records covering mostly the complete Holocene and parts of the late glacial. In the northern fjord region (Aysen Fjord, ca. 45°S), a 55-m-thick sediment cover was cored. The XRF iron content record suggests decreasing terrigenous sediment input over the late glacial, most likely reflecting the retreat of the Patagonian ice-sheet. In the Holocene, pronounced iron content fluctuations on m to dm-scale imply significant terrigenous input changes on centennial to decadal time-scales either induced by Holocene glacier extent variations or rainfall-related fluvial input changes. Further south, a 24m-long core from the relatively open marine Concepción Fjord (ca. 50°S) covers the past ca. 12 kyr. A pronounced long-term increase in calcium contents from the base to ca. 6 kyr BP. likely reflects increasing marine influence related to the postglacial sea-level rise and/or the final retreat of glaciers in the hinterland. Shorter-term variability in calcium and iron contents, particularly obvious over the past ca. 4 kyr, may be related to terrigenous input and/or marine productivity changes. First alkenone SST data show relatively high amplitude SST changes of up to ca. 3.5°C throughout the Holocene.

First results from continental slope sites suggest a very condensed and carbonate-rich Holocene sequence underlain by an extended glacial unit with high terrigenous input. XRF element scans illustrate a pronounced m-scale variability which most likely reflects millennial-scale climate fluctuations over Marine Isotope stages 2 to 4. Initial alkenone SST results suggest a very strong warming of ca. 8°C over the last termination.