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High Resolution SST record from the Southeast Pacific provides new insights in interhemispheric climate pattern during Termination 1

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There is a general consensus that the deglacial warming in the Southern Hemisphere mid- and high latitudes started earlier than in the north. In addition, the warming trend was interrupted by a millennial-scale cooling event (Antarctic Cold Reversal, ACR) that began at or around the time of the Bölling/Alleröd (B/A) warming and ended close to the beginning of the Younger Dryas cold phase observed in the Northern Hemisphere. In Antarctic ice-core records, the timing of the ACR is relatively well constrained as large swings in methane records allow a relatively close synchronisation to the Greenland records though the partly large gas age/ice age offsets may introduce significant uncertainties. However, before ca. 15 kyr B.P and back to ca. 28 kyr BP (gas ages), methane fluctuations are much smaller making the exact timing of the beginning of deglacial warming and short-term events before more ambiguous.

Here, we present a new, well-dated (14C-AMS), and high resolution sea-surface temperature (SST) record from Ocean Drilling Project Site 1233 located within the northernmost Antarctic Circumpolar Current off southern Chile (41°S). In previous works, we showed that the complete ca. 70 kyr-long SST record closely follows millennial-scale temperature fluctuations as observed in Antarctic ice cores. We now substantially increased the time resolution during the deglaciation in order to resolve centennial-scale events. Deglacial warming starts at ca. 18.7 kyr BP. with an abrupt SST increase of nearly 5°C until 17.5 kyr BP. Therafter, temperatures remain nearly stable until the beginning of a second warming step of ca. 2°C between ca. 12.7 and 12 kyr BP. Superimposed on these general trends, minor SST variability with amplitudes in the

order of 1°C can be observed.

A comparison to the methane-synchronised temperature record of the Western Antarctic Byrd ice-core suggests a close correspondence in the timing of the beginning of the deglacial warming and the second warming step at the end of the ACR. These major trends are also observed in inland ice-cores such as Dome C (applying a methane synchronisation time-scale). In contrast to the ice-core records, our Pacific SST record shows a much faster initial warming that starts exactly at the time of the beginning of cooling in Greenland towards Heinrich Event 1. In addition, we do not observe a cooling at the beginning of the ACR but a warming at its end (during the Younger Dryas). These observations may suggest that the mid-latitude Pacific reacts more rapid to reductions of the North Atlantic Thermohaline Circulation (THC) than inland Antarctica. Conversely, a cooling during the resumption of the THC (as during the B/A) appears to be more prominent in Antarctica and only minor in the subpolar Pacific. Shorter-term temperature fluctuations during the deglaciation as observed in our record appear in a similar shape in the coastal ice-core sites (Byrd and Law Dome) but are basically absent in the more continental Dome C record. Finally, the close correspondence of our SST record in particular to the Byrd ice core records may help to improve the ice core stratigraphy during those time-intervals where methane records only show minor fluctuations.