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Climate variability of Southern Chile since the Last Glacial Maximum: a continuous sedimentological record from Lago Puyehue (40°S)

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A key region to study high resolution climate changes of the Southern Hemisphere is undoubtedly the southern part of Chile because it has the advantage to be far removed from the Northern Hemisphere ice sheets and thermohaline circulation influences. In order to reconstruct the regional climate evolution since the Last Glacial Maximum, we investigated the sedimentary infilling of Lago Puyehue (40° S, 164 km^2, elevation 185 m) by a multi-proxy analyse of a 11 m long core. Sediments from this core are transported by interflow currents and are made of finely laminated silts, with only small disturbances due to volcanic and seismic activities. Several proxies were measured: grain-size, mineralogy, magnetic susceptibility, major elements geochemistry and biogenic silica concentration. These are used to reconstruct paleo-precipitation and paleo-productivity changes around 40°S. Results evidence that sediment grain-size is highly correlated with the biogenic sediment content and can be used as a proxy for lake paleoproductivity. On the other hand, the magnetic susceptibility signal is highly correlated with the aluminium and titanium concentrations and can be used as a proxy for the terrigenous supply. Temporal variations of sediment composition demonstrate that, since the Last Glacial Maximum, the Chilean Lake District was characterized by 3 abrupt climate changes superimposed on a long term climate evolution. These rapid climate changes are: (1) the end of the Last Glacial Maximum at 17,300 cal. yr. BP; (2) a 13,100-12,300 cal. yr. BP cold event, ending rapidly and interpreted as the local counter part of the European Younger Dryas event, and (3) a 3400-2900 cal. yr. BP climatic instability related to low solar activity. The timing of the 13,100-12,300 cold event is compared with similar records in both hemispheres and

demonstrates that this Southern Hemisphere climate change lags behind the Northern Hemisphere Younger Dryas cold period by 500 to 1000 years.