



The Mercedario ice core – an excellent archive for ENSO reconstruction

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South America is a key region for the understanding of climate dynamics in the Southern Hemisphere such as the El Niño-Southern Oscillation (ENSO). A direct ENSO signal can be expected to be preserved in glaciers located between 28 and 35°S, as the amount of winter precipitation in Central Chile is significantly correlated to the Southern Oscillation Index.

We will present new results from a 104 m long ice core drilled in 2005 at La Ollada glacier on Cerro Mercedario located in the Central Argentinean Andes (31°58'S, 70°07'W, 6100 m asl.). Measured borehole temperatures, ranging from -16.7 °C at 104 m depth to -18.5 °C at 10 m below surface, are the lowest englacial temperatures that have been measured in Andean glaciers to date which is reflected in the complete absence of melt features in the core. Another rather unique characteristic of this core is the fact that the oxygen isotopic ratios of water ($\delta^{18}\text{O}$) do not show seasonal variation. The core was dated using a combination of independent tools such as (1) annual layer counting mainly based on dust related chemical impurities, (2) nuclear dating with ^{210}Pb , ^{14}C of particulate carbon (i.e. OC fraction) and tritium, (3) measurements of trace gases (i.e. CH_4 , N_2O and CFCs) trapped in the ice enclosed air bubbles and (4) 2D glacier flow modelling. This allowed obtaining an accurate chronology for the last 350 years. The mean annual accumulation rate of the site was determined with 0.27 ± 0.03 m w.eq., principally allowing seasonal to sub-seasonal resolution. We will discuss transport and sources of chemical impurities and the relation between them, $\delta^{18}\text{O}$ and tropical eastern Pacific sea surface temperatures (SST). As expected for the site, we find $\delta^{18}\text{O}$ and most chemical impurities to be strongly modulated by the ENSO allowing presentation of a new proxy based ENSO reconstruction back to ~1700 AD.