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The last millenium sedimentary record in Chilean Patagonian lakes

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We evaluate the climate and environmental variability of Northern Chilean Patagonia during the Last Millennium, using a multi-proxy analysis of lake sediment cores. Among several investigated sites during the last years, the sedimentary records of lakes Thompson (45°S, 71°W) and Bertrand (46.5°S 72.5°W) are particularly promising. Radiocarbon ages measured on bulk sediment and macro-remains and/or ^{210}Pb profile give a mean sedimentation rate of 1 (Lake Thompson) or 2 mm/yr (Lake Bertrand), allowing a decennial sampling resolution. To reconstruct past climate changes, we conducted a multiproxy study combining sedimentology, mineralogy and geochemistry.

The sediments of Lake Thompson are composed of light brown organic-rich clayey silts. X-ray radiographies show that the sediment record is undisturbed, and that our 1m long core contains two fine tephra layers. The inorganic content of the sediment is very low (a few %). Some clay minerals, quartz and feldspars were identified by X-ray diffraction. The high organic matter content (mean 15%) and its low C/N ratio (8) throughout the core, evidence that the lake productivity remained high over the last 900 years. The biogenic silica content of the sediment is high (40 to 80%), in relation to the small catchment to lake surface ratio, which limits the supply of terrestrial particles to the lake. We note higher concentrations in biogenic silica and organic matter between 1550 and 1800 AD.

Lake Bertrand is adjacent to a pro-glacial lake, Lake Plomo. The connection between both lakes is limited by a morainic barrier. The sediments of Lake Bertrand are composed of homogeneous silts with some clays (< 20%) and 5 to 10% of sand. Lake Bertrand sediments are characterized by low C/N ratio (10) supporting an important aquatic productivity. In contrast with Lake Thompson, the inorganic component represents 90-95% of the bulk sediment with a few percent of organic matter (5%). Diatoms are ubiquitous but their abundance varies highly through the core. The biogenic silica profile evidences two peaks (Si bio>30%) above the 5% background level. According to the age model, the changes in aquatic productivity occur between 1700 and 1850 AD.

Although the two lakes are located in different environments and are relatively distant from each other, they both record a significant sedimentological change during an interval equivalent to (part of) the Little Ice Age. The biogenic silica-rich intervals probably represent a major climate shift in the Andes of North Patagonia. Further biological analyses are in progress in order to better constrain the terrestrial and aquatic environmental conditions during this event.

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