Geophysical Research Abstracts
Vol. 14, EGU2012-13979, 2012
EGU General Assembly 2012

Last millenium environmental changes in Lake Bertrand sediments, Chilean Patagonia

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Our study focuses on a multiproxy analysis of sedimentary records from Lago Bertrand (area 50 km2; 227 masl; 46°55'S 72°50'W). Three cores were retrieved during fieldtrips in 2009 and 2011 with an Uwitec gravity corer. One core was collected in the main lake (LBt09, 102 cm) and two others in a lateral extension (LBb11-A, 162 cm and LBb11-B, 156 cm). Data 210Pb and 137Cs give average sedimentation rates of 2 mm/yr for the upper core section from the main lake, allowing a decennial resolution. Our aim is to document the climatic variability during the last millennium in Northern Patagonia and its impact on the environment.

Lago Bertrand is separated from a pro-glacial lake (Lago Plomo) by a morainic barrier. The sediments of this lake are mainly composed of clayed silts and very few sandy silts. In the cores from the Eastern branch of Lago Bertrand, X-ray radiographies and magnetic susceptibility profiles evidence well-defined pluri-millimetric laminations with organic-rich layers, especially in the central core section. In the main lake, X-ray radiographies show diffuse pluri-millimetric laminations while magnetic susceptibility profiles do not confirm it. The sediments of the main lake appear more homogeneous with less organic-rich layers. They are characterized by low C/N ratio (10), supporting an important aquatic productivity; high inorganic content (90-95% of the bulk sediment); two peaks in the biological silica profile; and abundant diatoms (50-100 μm). According to the age model, the changes in aquatic productivity occurred between 1700 and 1850 AD. The cores from the Eastern branch of Lago Bertrand are under investigation to confirm the extension of the sedimentological changes observed in the main lake.

The main sedimentological change observed in Lago Bertrand occurs during an interval equivalent to a part of the Little Ice Age. A similar biogenic silica-rich layer was also recorded in another relatively distant lake (Lago Thompson at 45°30'S, 72°47'W). The identification of the diatom assemblages and its temporal variability in both lake sediments will help to identify the origin of those silica-rich layers. In addition, further sedimentological analyses are in progress to better characterize the sediment deposition models.

This research was funded by Chilean Fondecyt project number 1070508 and Belgian projects (FNRS proposal 1360 2007-2010, ULg CFRA 1060 2009-2010).