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Lacustrine record of last millenia environmental changes in south central Chile

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The lacustrine sediments are considered as an important natural archive that provide responses to environmental changes and reconstruct the past conditions of these ecosystems originated from the atmosphere, the surrounding catchment or the lake itself (Hatfield & Maher, 2009; Ahmad & Davies, 2017). Multiproxy analysis is used to the study of the lake sediments representing climatic and environmental changes, where the late Holocene is relatively well documented (Bianchi & McCave, 1999). However, high resolution studies have been less developed in the southern hemisphere, despite the role of these systems in understanding climate and environmental changes compared to most studies that focus on the northern hemisphere (Bertrand et al. 2008). The study area comprises Laguna Grande and Laguna Chica, which are located at south of the mouth of BioBio River at Concepción Province, Central Chile. Both systems are characterized by metamorphic rocks, deposits of marine terraces, and fluvial deposits of BioBio River. The climate in the late Holocene is influenced in this area by the Subtropical South Pacific Ocean high pressure system and the extratropical southern westerly winds (SWW) that allow the occurrence of El Niño-Southern-Oscillation (ENSO) and the Southern Annular Modes (SAM). Two sediment cores were collected in the deepest part of the lakes and different analyses were performed: organic matter, magnetic susceptibility, stable isotope carbon and nitrogen ratios (C/N), carbon and nitrogen isotopic composition (δ13C, δ15N), mineralogy, grain size and biogenic silica. The cores age was estimated using 210Pb, 137Cs and 14C. A main lithological and mineralogical change was observed in both lakes with greater contribution of sand, plagioclase, quartz and total clay between 2000 to 3000 years B.P. in Laguna Grande, meanwhile in Laguna Chica the contribution was observed between 1600 to 1800 years B.P. continuing beyond of 2500 years B.P. This condition was present during the Roman Warm Period. Changes in magnetic susceptibility, organic matter, carbonates, C/N ratio and carbon and nitrogen isotopic composition and biogenic silica are also observed in this period. A reduction in the percentage of organic matter was observed in the Dark age cold period and Little ice age in contrast with Laguna Chica that show slight fluctuations in both periods. In the last 150 years both lakes have been affected by periods of land use, urbanization processes and replacement of native plantations by forest plantations. Further analyses must be done to interpret the climatic and environmental conditions as well as explain possible impact of the climatic changes in the south central Chile.