



Using stable isotope ($\delta^{18}\text{O}$, $\delta^{13}\text{C}$) on lacustrine mollusks as palaeoclimate tools in Chilean Patagonian Lakes: A case study from Lago Cisnes (47°S)

Denisse Alvarez (1), Nathalie Fagel (2), Eddy Keppens (3), Alberto Arraneda (1), and Roberto Urrutia (1)

(1) Aquatic Systems Research Unit, EULA – Chile Environmental Sciences Centre, University of Concepción, Casilla 160-C, Concepción, Chile, (2) University of Liege, AGEs Geology, Liege, Belgium (nathalie.fagel@ulg.ac.be, +32.4.3662029), (3) Geology Department, Vrije Universiteit Brussel, B-1040 Brussels, Belgium

Understanding the past climatic changes in the Southern Hemisphere (SH), are important to know the global climatic system on natural conditions, before the anthropogenic forcing became significant. However the knowledge in this Hemisphere still is not well developed comparatively with the Northern Hemisphere (NH); due in part to the used of climatic indicators still is limited. The carbon and oxygen stable isotope composition of biogenic carbonates precipitated in a lake have been successfully applied in several investigations of past climate and environment in the NH contrary to SH, where just few studies have applied stable isotopes in lakes. In this study, stable isotopes ($\delta^{18}\text{O}$, $\delta^{13}\text{C}$) were analyzed on lacustrine mollusk shells present in a short sediment core (34 cm) from a small Patagonian lake in order to assess if the isotopic signal on biogenic carbonates reflects environmental and climatic changes in this area. The analyses were made in three mollusk species, one bivalve (*Musculium* sp.) and two gastropods (*Lymnaea* sp. and *Biomphalaria* sp.) using isotope ratio mass spectrometry (IRMS). Additionally sedimentological and geochemical analyses were conducted (LOI 550 and 950°C, TON, TOC, C/N ratio and bulk X-ray diffraction). The results indicated that both $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ showed significative fluctuations along the core, but with different trends, probably due to different physiological behavior between bivalves and gastropods. Gastropods are air-breathing pulmonates that discriminate against heavy isotopes of ^{18}O and ^{13}C , leading a significant fractionation between light and heavy isotopes of those elements. Only the isotopical signals of the *Musculium* sp. give similar trends with the sedimentological and geochemical records, suggesting this species could be a good indicator of climatic and environment changes in Cisnes lake. All sedimentological, geochemical and carbon and oxygen stable isotopes (from *Musculium* sp.) records indicated that during the last centuries the Cisnes lake have suffered strong evaporation process.

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