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Diplodon shells from Northwest Patagonia as continental proxy archives: Oxygen isotopic results and sclerochronological analyses

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Freshwater mussels of the genus *Diplodon* (Bivalvia, Hyriidae) are the most abundant bivalve (today and in the past) in freshwater bodies at both sides of the South-Andean Cordillera. There are about 25 different *Diplodon* genera in Argentina and Chile that could be assigned almost completely to the species *Diplodon chilensis* (Gray, 1828) and two subspecies: *D. ch. chilensis* and *D. ch. patagonicus*; this latter species is found in Argentina between Mendoza (32˚ 52' S; 68˚ 51' W) and Chubut (45˚ 51' S; 67˚ 28' W), including the lakes and rivers of the target area, the Nahuel Huapi National Park (Castellanos, 1960).

Despite their wide geographic distribution, *Diplodon* species have only rarely been used as climate archives in the southern hemisphere. Kaandorp et al. (2005) demonstrated for *Diplodon longulus* (Conrad 1874) collected from the Peruvian Amazonas that oxygen isotopic patterns in the shells could be used in order to reconstruct the precipitation regime and dry/wet seasonal of the monsoonal system in Amazonia. Although this study demonstrated the potential of *Diplodon* in climatological and ecological reconstructions in the southern hemisphere, as of yet, no systematic study of *Diplodon* as a multi-proxy archive has been undertaken for the Patagonian region.

In this work we present sclerochronological analyses supported by $\delta^{18}O_{shell}$ in recent mussel of *Diplodon chilensis patagonicus* (D'Orbigny, 1835) collected at Laguna El Trébol (42ºS-71ºW, Patagonia Argentina), one of the best studied water bodies in the region for paleoclimate analysis. Water temperature was measured every six hours for one year using a temperature sensor (Starmon mini®) placed at 5m depth in the lake, close to a mussel bank. Additionally, $\delta^{18}O_{water}$ was measured monthly for the same time range.g$\delta^{18}O_{shell}$ values obtained by micro-milling at high spatial resolution in the growth increments of three *Diplodon* shells were compared to these records, and to air temperature and precipitation records in the region (from the NOAA database, station: airport of S.C. de Bariloche: 41ºS-71ºW).

D. ch. patagonicus exhibit very well developed annual growth lines, which allow calibrating a precise temporal scale with calendar years in the shell (Soldati et al., 2008). Extremely wide increments (e.g. years 2000-2001 and 1978-1979), related to distinct periods (so-called benchmark increments) are present in all specimens and can be used to anchor the growth curves in order to create a master curve for the lake. $\delta^{18}O_{shell}$ varies seasonally, presenting minima during the warm season (November/March) and maxima in the austral autumn/winter (April/October), reproducing the temperature fluctuations in the region. The resolution of the $\delta^{18}O_{shell}$ measurement varies for each year: samples obtained from larger annual increments ($>$1 mm, generally mussels younger than 10 years old) allow a resolution of ca. 2 months (5-7 samples per year), and sometimes even give a 5 weeks resolution, while thinner annual increments (between 1 and 0.1 mm, generally older than 10 years) allow only a 4-6 month resolution (2-3 points per sampled year). Because of their long live span of ca. 100 years, *Diplodon* shells are useful to construct an accurate climatological archive for Patagonia with time windows of around a century, resolving the environmental signal annually and even seasonally.

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