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Inter-individual and inter-site reproducibility of δ^{18}O profiles across *Protothaca thaca* (Bivalvia, Veneridae) shells from Peru and Chile

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Oxygen stable isotope changes in bivalve shells ($\delta^{18}O_s$) are used for sea surface temperature (SST) reconstructions. Among the paleotemperature equations linking $\delta^{18}O_s$ and SST, in the case of aragonitic species, those of Grossman and Ku (1986) and Böhm et al. (2000) are the most commonly used. However, specific isotopic fractionation related to taxonomy occurs and can bring erroneous paleo-SST if calibration is not assessed on modern specimens of the considered mollusk species. Here, we investigate the potential of a relatively common, upper subtidal, South American bivalve, *Protothaca thaca*, as a SST recorder. This species which grows in the cold water that bathes the Peruvian and Chilean coasts are more resistant than other mollusk species to short-lived positive temperature anomalies which characterize El Niño events. This peculiarity opens interesting perspectives for reconstructions of past El Niño occurrences through geochemical studies on fossil shells of *P. thaca*.

The modern shells studied come from Antofagasta (Chile, 23˚S, collected in 2000) and Pocoma-Ilo (Peru, 17˚S, collected in 2003). High-resolution (3 to 4 samples per month) δ^{18}O profiles were obtained on five shells and cover at least three years of growth. A previous sclerochronological study (Lazareth et al., 2006), useful to provide the chronological framework for the stable isotope samples, had shown that major growth breaks coincide with periods during which SST stay above 18˚C for several weeks (at least in the Pocoma area).

The δ^{18}O isotopic profiles recorded in the Pocoma shells are quite similar and depict

seasonal signals, at least from Dec. 1999 to Dec. 2001. After Dec. 2001 and until 2003, the δ^{18}O profiles show a regular decrease with no seasonal pattern. In the Pocoma shells, the local SST changes are not clearly reflected in the δ^{18}O variations. On the contrary, the δ^{18}O profiles of the Antofagasta shells grossly correspond to the SST changes recorded in the latter area.

Several "paleotemperature equations" were used but generally provided calculated values that are significantly higher than those recorded in each locality.

The study shows that δ^{18}O variability measured in *P. thaca* shells is generally reproducible between individuals from each locality. However, δ^{18}O values cannot readily be translated into SST with a single equation in both localities. The difference between calculated and measured temperatures is systematically more important for the Pocoma shells than for the material from Antofagasta. These results tend to indicate that even for a given species, much caution should be taken for paleo-SST reconstructions. Local environmental factors may also play a role in the isotopic composition of the biogenic carbonates and in the relationship between δ^{18}O and SST.

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