



Seasonal Sr/Ca, and $^{44}\text{Ca}/^{40}\text{Ca}$ co-variation in *Arctica islandica*

Th. F. Nagler (1), S. R. Hart (2) and D. Hippler (1,3)

(1) Institut für Geologie, Universität Bern, Switzerland, (2) Department of Geology and Geophysics, Woods Hole Oceanographic Institution, USA, (3) Faculty of Earth and Life Sciences, Vrije Universiteit Amsterdam, The Netherlands (naegler@geo.unibe.ch)

We have studied the Ca isotopic variations and Sr/Ca ratios within an *A. islandica* shell in relation to temperature fluctuations of the ambient seawater with sub-seasonal resolution. The long-lived bivalve *A. islandica* dwells at 10-200m depth throughout much of the North Atlantic continental shelf. Its shells represent a promising SST archive for boreal marine settings. The *A. islandica* shell used for this study was collected at 60-m depth near the former position of the Nantucket Shoals Lightship (Weidman et al. 1994).

The years 1956-1958 were analyzed for both, Sr/Ca ratios and $\delta^{44/40}\text{Ca}$, with 1957 being the best resolved. The $\delta^{44/40}\text{Ca}$ are highly correlated with Sr/Ca ratios ($r=0.92$ for 1957). The positive correlation of Sr/Ca ratios and temperature in *A. islandica* is in accord with published data on other bivalves, but contrary to thermodynamic expectations and e.g. coral data. The same inversion is found for Ca isotope fractionation: the $\delta^{44/40}\text{Ca}$ correlation with temperature of *A. islandica* is negative, while all $\delta^{44/40}\text{Ca}$ temperature gradients published so far (inorganic precipitates and foraminifer data) show varying degrees of positive correlation. Thus, as for Sr/Ca, the temperature correlation of $\delta^{44/40}\text{Ca}$ in *A. islandica* is not under thermodynamic control. It appears inevitable to conclude that biological effects dominate both, Sr incorporation and Ca isotope fractionation in *A. islandica*. Growth rates and food supply are parameters that might relate Sr/Ca ratios as well as Ca isotopic compositions to vital activity and thus indirectly to temperature. In any case the high correlation of Sr/Ca ratios and Ca isotope fractionation indicates a common metabolic process for the observed variations.