Geophysical Research Abstracts, Vol. 8, 03695, 2006
SRef-ID:

Li/Ca ratios in the Mediterranean non-tropical coral *Cladocora caespitosa* as a potential paleothermometer

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Long-time series of key climatic parameters, such as sea surface temperature and salinity, are limited in the Mediterranean Sea with the available instrumental records generally being too short in duration or non-continuous. Such data are needed to better understand the mechanisms governing climate changes in the Mediterranean Basin. Shallow water scleractinian corals secrete calcareous skeletons with minor and trace elements being incorporated as a function of the physical and/or chemical parameters in the ambient seawater in which it grew as well as being modulated by biological or 'vital' effects. Trace element systematics in corals is therefore potentially capable of providing reliable marine environmental records at high temporal resolution. Sr/Ca, Mg/Ca, B/Ca and, to some extents U/Ca, are undoubtedly the most common elements in tropical corals suggested to be controlled dominantly by temperature and some of these relationships, namely B/Ca and Sr/Ca vs. SST, have been already described for the aragonite skeleton of the non-tropical coral *Cladocora caespitosa*, collected in the Mediterranean Sea (Montagna *et al*., 2004).

Here we investigate the possibility of using Li/Ca ratios as a temperature proxy in two specimens of *C. caespitosa*, collected from different locations in the Mediterranean Sea (Miramare in the Northern Adriatic Sea and Portofino in the Ligurian Sea). Measurements of Li/Ca, B/Ca and Sr/Ca ratios were obtained on the external coralline portion (wall region), using the high-efficiency laser ablation ICP-MS system at the Research School of Earth Sciences (ANU). Li/Ca ratios are significantly correlated to B/Ca and Sr/Ca ratios, showing a seasonal pattern similar to the sea surface temperature. In particular, Li/Ca ratios increase as temperature decrease with a % change per

$^{\circ}$C ($\sim$ 4 %) very similar to the only published value by Marriott *et al*. (2004) for a *Porites* coral.

Our study confirms the temperature dependence of Li/Ca ratios into coralline aragonite and demonstrates the possibility of using high-resolution Li/Ca records in *C. caespitosa* for temperature reconstructions in the Mediterranean Sea.

References

Montagna P., McCulloch M., Mazzoli C., Silenzi S. (2004). B/Ca, Sr/Ca, U/Ca and Mg/Ca ratios of a non-tropical coral (*Cladocora caespitosa*) from the Northern Adriatic Sea (Mediterranean Sea) and their relationship to sea surface temperature. 10th International Coral Reef Symposium, Okinawa, Abstract book 269.

Marriott, C.S., Henderson, G.M., Belshaw, N.S., Tudhope, A.W. (2004). Temperature dependence of δ^7Li, δ^{44}Ca and Li/Ca during growth of calcium carbonate. *Earth and Planetary Science Letters* 222, 615-624.