Geophysical Research Abstracts
Vol. 19, EGU2017-15918, 2017
EGU General Assembly 2017

Sr/Ca and Mg/Ca in *Glycymeris glycymeris* (Bivalvia) shells from the Iberian upwelling system: Ontogeny and environmental control

Pedro Freitas (1), Christopher Richardson (2), Simon Chenery (3), Carlos Monteiro (1), Paul Butler (2,4), David Reynolds (5), James Scourse (2,4), and Miguel Gaspar (6)

(1) Instituto Português do Mar e da Atmosfera - IPMA, Divisão de Geologia Marinha e Georecursos Marinhos, Lisboa, Portugal (pedro.freitas@ipma.pt), (2) School of Ocean Sciences, Bangor University, Menai Bridge, United Kingdom (c.a.richardson@bangor.ac.uk), (3) Environmental Science Centre, British Geological Survey, Keyworth, United Kingdom (srch@bgs.ac.uk), (4) College of Life and Environmental Sciences, University of Exeter, Penryn, United Kingdom (p.g.butler@bangor.ac.uk and j.scourse@bangor.ac.uk) , (5) School of Earth and Ocean Sciences, University of Cardiff, Cardiff , United Kingdom (ReynoldsD3@cardiff.ac.uk), (6) Divisão de Modelação e Gestão de Recursos da Pesca, Instituto Português do Mar e da Atmosfera, Olhão, Portugal (mbgaspar@ipma.pt)

Bivalve shells have a great potential as high-resolution geochemical proxy archives of marine environmental conditions. In addition, sclerochronology of long-lived bivalve species (e.g. *Arctica islandica*) provides a timeline of absolutely dated shell material for geochemical analysis that can extend into the past beyond the lifetime of single individuals through the use of replicated crossmatched centennial to millennial chronologies. However, the interpretation of such records remains extremely challenging and complex, with multiple environmental and biological processes affecting element incorporation in the shell (e.g. crystal fabrics, organic matrix, biomineralization mechanisms and physiological processes). As a result, the effective use of bivalve shell elemental/Ca ratios as palaeoenvironmental proxies has been limited, often to species-specific applications or applications restricted to particular environmental settings. The dog-cockle, *Glycymeris glycymeris*, is a relatively long-lived bivalve (up to 200 years) that occurs in coarse-grained subtidal sediments of coastal shelf seas of Europe and North West Africa. *Glycymeris glycymeris* shells provide a valuable, albeit not fully explored, archive to reconstruct past environmental variability in an area lacking sclerochronological studies due to the rarity of long-lived bivalves and lack of coral reefs.

In this study, we evaluate the potential of Sr/Ca and Mg/Ca ratios in *G. glycymeris* shells as geochemical proxies of upwelling conditions in the Iberian Upwelling System, the northern section of the Canary Current Eastern Boundary Upwelling System. Sr/Ca and Mg/Ca generally co-varied significantly and a clear ontogenetic, non-environmental related change in Sr/Ca and Ba/Ca variability was observed. High Sr/Ca and Mg/Ca ratios in older shells ($>$ 10 years old) were found to be associated with the occurrence of growth lines deposited during the winter reduction in shell growth. Nevertheless, Sr/Ca and Mg/Ca variation in older shells was synchronous with contemporary environmental conditions, i.e. upwelling intensity and salinity. The use of Sr or Mg in *G. glycymeris* shells as valid geochemical environmental proxies in the Iberian Upwelling System remains complex and requires further research to unravel environmental and physiological/biomineralization controls.

This study was financed by the Portuguese Fundação para a Ciência e Tecnologia (FCT) GLYCY Project (contract PTDC/AAC-CLI/118003/2010) and a sabbatical grant to PSF (Ref: SFRH/BSAB/127786/2016), co-supported by POCH and the European Social Fund. Funding for consumable costs was provided by Bangor University.