Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07543, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07543
EGU General Assembly 2008

Coccolith Sr/Ca ratios in the Eastern Mediterranean: production versus export processes

L. Auliaherliaty (1), H.M. Stoll (2,3), P. Ziveri (1,4), E. Malinverno (5), M. Triantaphyllou (6), S. Stavrakakis (7), and V. Lykousis (7)

(1) Department of Paleoclimatology and Geomorphology, Faculty of Earth and Life Sciences, Vrije Universiteit Amsterdam, De Boelelaan 1085 1081HV Amsterdam, The Netherlands, (2) Department of Geoscience, Williams College, Williamstown, MA 01267, USA, (3) Department of Geology, University of Oviedo, Arias de Velasco, s/n 30005, Oviedo, Asturias, Spain, (4) ICTA, Autonomous University of Barcelona (UAB), Edifici Cn-Campus UAB, 08193 Bellaterra, Spain, (5) Department Geolgical Science and Geotechnology, Università degli Studi di Milano-Bicocca, Milan, Italy, (6) Department of Historical Geology-Paleontology, Faculty of Geology, Panepistimiopolis, University of Athens, 15784, Athens, Greece, (7) Hellenic Centre fo Marine Research, PO. Box 2214, 71003 Heraklion Crete, Greece. (lia.auliaherliaty@falw.vu.nl / Phone: +31-20-5987325)

Coccolithophores, marine calcifying algae, have been known as major phytoplankton in the oligotrophic Mediterranean Sea. In general the oligotrophic conditions tend to be more extreme with increasing distance from the Atlantic Ocean, the major source of nutrients, and with increasing distance from the land-enclosed Aegean and Adriatic Seas. The phytoplankton population of the modern Eastern Mediterranean is dominated by picoplankton and nannoflagellates, including coccolithophores.

The aim of this study is to assess the relationship between surface production and export processes to the sea floor in the Eastern Mediterranean by examining time-series sediment trap samples which exhibit strong seasonality in trap fluxes of coccoliths and organic carbon. Here we describe a comparison between an indicator of nutrient stimulated coccolithophorid productivity set in the surface photic zone, the Sr/Ca ratio of coccoliths, and the export fluxes to sediment traps.

Samples collected by three sediment traps located off southwest Crete (48A [1950

m] and 48B [1014 m]) and in the Ionian Sea, (UN01 ST1 [500 m]) from June 2005 to August 2006 have been used for elemental chemistry of single-species individually picked coccoliths by secondary ion mass spectrometry. We focused on the surface dwellers *Calcidiscus leptoporus* and *Helicosphaera carteri*, and the cosmopolitan *Emiliania huxleyi*. *E. huxleyi* largely dominates the coccosphere species assemblage in the sediment trap samples.

We conducted profiles through individual coccoliths of *H. carteri* from the sediment traps which exhibited differing coccolith thickness and weight. The average Sr/Ca ratios of thick coccoliths are not significantly different from those of normal or thin coccoliths. This confirms that coccolith thickness variations result from primary biomineralization processes and not variable overgrowth by (low Sr) abiogenic calcite in the water column or sediments.

As observed in sediment traps elsewhere, highest absolute Sr/Ca ratios occur in *H. carteri* and *C. leptoporus* and lowest ratios in *E. huxleyi*. Sr/Ca ratios in *C. leptoporus* range from 2.6 to 3.1 mmol/mol, lower than found in previous studies in sediment traps of Sargasso Sea (3 to 4 mmol/mol) or Bay of Bengal (2.5 to 3.75 mmol/mol). Sr/Ca ratios of *E. huxleyi* are also lower in the Mediterranean than in the Sargasso Sea. In a given species, the amplitude of seasonal variation in Sr/Ca ratio is small. Peak Sr/Ca ratios in *E. huxleyi* occur in spring and early summer and broadly parallel trap fluxes of coccospheres and in spring 2006 also the increase in SeaWiFS-derived chlorophyll-a concentration. We will compare Sr/Ca ratios in all species with fluxes of coccoliths and coccospheres to the sediment traps and with other indicators of surface water environment.

Moreover, the relationship of surface productivity and export processes allows us to further comprehend its significant in carbon sequestration to the deep sea. This work is part of the EUROCORES-EUROCLIMATE Project ‘Quaternary Marine Ecosystem Response to Fertilization’ (MERF).

Keywords: Mediterranean Sea, coccoliths, sediment trap, productivity, export processes.