Geophysical Research Abstracts
Vol. 12, EGU2010-10087, 2010
EGU General Assembly 2010

Stable isotope and trace element proxy data from aragonite cements of stressed reef environments (early Messinian, Mediterranean Region)

Thomas Brachert (1), Francesca R. Bosellini (2), Markus Reuter (3), Regina Mertz-Kraus (4), and Alessandro Vescogni (2)

(1) Universität Leipzig, Institut für Geophysik und Geologie, Geologie, Leipzig, Germany (brachert@uni-leipzig.de), (2) Dipartimento di Scienze della Terra, Università di Modena e Reggio Emilia, Largo S. Eufemia 19, 41100 Modena, Italy, (3) Institut für Erdwissenschaften, Karl-Franzens-Universität Graz, Heinrichstr. 26, 8010 Graz, Austria, (4) Max-Planck- Institut für Chemie, Postfach 3060, 55020 Mainz, Germany

Early Messinian coral reefs of the Mediterranean area are among the classical examples of Neogene reefs in the world and, according to the ecology of their biota, do not exhibit compelling evidence for significant salinity stress prior to the Messinian Salinity Crisis (MSC). Because of excellent outcrop conditions and preservation, these reefs have become prototypes of Neogene reefs worldwide. Here we present stable oxygen isotope (IRMS) and trace element data (LA-ICP-MS) from marine aragonite cement in biogenic frameworks of some Mediterranean reefs. The reworking of the cements by intraformational breccias clearly supports petrographic evidence of "syndepositional" precipitation. Reported values of 18O/16O translate into peak sea surface salinity of 50 to 60 permil, which is a lethal value for most members of the reef community. Therefore, additional proxies have been evaluated to constrain the environment in which the cements formed. 13C/12C signatures are fully within the range of marine cement, however, systematic excursions exist on outcrop-scaple over the geological sections which may suggest episodic influx of terrestrial organic matter brought in by rivers or episodic upwelling of deep water masses with CO_2 enriched in 12C. Intra-cement 13C/12C, Sr/Ca and Mg/Ca measured along transects exhibits co-variant changes which are incompatible with temperature effects and more plausibly document the mixing of different fluids, or the evolution of the pore fluids upon continuing precipitation. Although the final cause underlying the discrepant aspect of biological and various inorganic proxy data remains not yet fully understood, this study shows that evaluation of one single proxy may lead to more misleading than helpful concepts of palaeoenvironments and environment change.