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Control of trace element incorporation into planktonic foraminifera across a strong salinity and nutrient gradient in the Mediterranean Sea

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Trace metal ratios in foraminiferal calcite are seeing increasing use as palaeoproxies for ocean variables such as water temperature (e.g. Elderfield and Ganssen 2000). Relatively little has been done, however, to assess the extent to which other ocean variables, such as carbonate-ion concentration, nutrient concentration, or salinity, might affect trace metal incorporation into foraminiferal calcite. To examine the influence of these variables requires study of regions where strong observed gradients are accompanied by only small changes in temperature. The Mediterranean Sea provides an ideal environment to test the effect of ocean variables other than temperature on trace metal incorporation into planktonic foraminifera. For example, from the west to the east of the basin there is a sea surface temperature range of only 3^{o}C but a salinity range of 5 psu and a nitrate concentration ranging from 3.5 μmol to close to zero.

Eleven box core tops, observed to contain modern planktonic foraminifera, were sampled from sites ranging across the Mediterranean Sea. From these several species of common planktonic foraminifera, including *Orbulina universa* and *Globigerinoides ruber* (white), were picked and thoroughly cleaned using standard techniques for trace-metal work. Samples were analysed by ICP-MS for Mg/Ca, Cd/Ca, U/Ca and Sr/Ca.

Preliminary results, using *Globigerinoides ruber* (white), indicate that, in this basin, sea surface temperature appears not to be the major control on key trace metal proxies such as Mg/Ca and Cd/Ca. Mg/Ca, for instance, shows an increase by over a factor of two from west to east despite a sea surface temperature change of only 3^{o}C. Trace

metal data on this and other planktonic species allow empirical comparison of chemical variation with environmental variables. This work will help to assess the cause of scatter observed during calibration of common trace-metal proxies, and to assess the accuracy of such proxies when applied to times in the past.