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Assessing the salinity effect on planktonic foraminiferal Mg/Ca: Evidence from Aegean Sea core-top samples (Eastern Mediterranean).

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Recent work across the Mediterranean Sea has illustrated a salinity (S) effect on planktonic foraminiferal Mg/Ca, which potentially confounds the use of this as a temperature (T) proxy for paleoceanographic reconstructions. As a likely illustration of this, recent downcore work revealed Mg/Ca values that were unreasonably high to be explained by T variations alone over the last deglaciation and throughout the Holocene. Modern biochemical and oceanographic studies highlight the Aegean Sea as an especially sensitive part of the Mediterranean that is closely connected to global climatic variability. Especially focused on T and S variations in the upper hundred meters of the water column, where energy storage and heat transport occur, we analyse planktonic foraminiferal Mg/Ca from a series of Aegean core tops, spanning a strong S gradient and little T range along a N-S transect. The aim is to isolate and quantify the S influence on the Mg/Ca tracer as well as possible in a field study from the region.

We have specifically targeted the tropical spinose species Globigerinoides ruber, since it is the most ubiquitous species in the eastern Mediterranean and generally occurs in a wide range of T and S conditions.

From our initially high core-top Mg/Ca measurements, we estimated how much of this was “excess”, defined by amount of Mg/Ca exceeding that predicted using modern observed average summer T and a G. ruber calibration equation from the Western Equatorial Pacific (WEP). We then determined excess S values by subtracting WEP salinity values from those observed in our core-top locations. We observed that our results were in close agreement with those previously found for the Mediterranean as a whole, such that excess Mg/Ca is positively correlated with excess S. In the present study we expand on previous core-top results for the Aegean Sea in order to confirm and better quantify the S effect on G. ruber Mg/Ca signatures, such that paleo-records from this region will be interpreted with greater accuracy.

However, it is difficult to exactly distinguish the effects of each of individual variable, but it seems clear that temperature remains an overriding control on Aegean foraminiferal Mg/Ca with an additional secondary dependence on salinity.