Geophysical Research Abstracts
Vol. 18, EGU2016-14840, 2016
EGU General Assembly 2016

Towards a model-based understanding of the Mediterranean circulation during the Messinian Salinity Crisis

Dirk Simon and Paul Meijer
Utrecht University, Geosciences, Utrecht, Netherlands (d.simon@uu.nl)

Today, the Atlantic-Mediterranean gateway (the Strait of Gibraltar) and the strong evaporative loss in the east let the Mediterranean Sea attain a salinity of 2-3 g/l higher than the Atlantic Ocean. During the winter months, strong cooling of surface waters in the north forms deep water, which mixes the Mediterranean, while during summer the water column is stratified.

During the Messinian Salinity Crisis (MSC, 5.97-5.33Ma) the salt concentration was high enough to reach the saturation of gypsum (∼130-160 g/l) and halite (∼350 g/l). This caused large deposits of these evaporites all over the basin, capturing 6% of the World Ocean salt within the Mediterranean at the time.

Although several mechanisms have been proposed as to how the Mediterranean circulation might have functioned, these mechanisms have yet to be rooted in physics and tested quantitatively.

Understanding circulation during the MSC becomes particularly important when comparing Mediterranean marginal to deep basins. On the one hand, many of the marginal basins in the Mediterranean are well studied, like the Sorbas basin (Spain) or the Vena del Gesso basin (Italy). On the other hand, the deep Mediterranean is less well studied, as no full record of the whole deep sequence exists. This makes it very complicated to correlate marginal and deep basin records.

Here we are presenting the first steps in working towards a physics-based understanding of the mixing and stratification bahaviour of the Mediterranean Sea during the MSC. The final goal is to identify the physical mechanism needed to form such a salt brine and to understand how it differs from today's situation. We are hoping to compare our results to, and learn from, the much smaller but best available analog to the MSC, the Dead Sea, where recent overturning has been documented.