



SALTGIANT ETN – Early Stage Researcher in Modelling Chemistry and Circulation of the Messinian Sea – ESR 7

Title	Modelling the (bio-)geochemical evolution and circulation of Messinian brine
Duration	48 months
Expected start date	October 2018
Host Institution	Department of Earth Sciences, Utrecht University, Utrecht (Netherlands) - https://www.uu.nl/en/research/department-of-earth-sciences
Primary Supervisor(s)	Paul Meijer, Wout Krijgsman
Objectives	<p>To investigate the evolution of brine hydrology and biogeochemistry in the Mediterranean basin during the formation of the MSG via numerical modelling. This project is rooted in our earlier box modelling work that simulated the average salinity on the (sub-)basin scale as a function of connectivity to the open ocean or atmospheric forcing. This ESR project will achieve more refinement, both in terms of the water properties being modelled and their spatial distribution within the Messinian basins. Applying these refined models of the Mediterranean during the formation of the MSG, ESR7 will address the following fundamental questions that keep causing problems in the interpretation of observations from the sedimentary record of the MSG: (a) how was salt distributed within the water column and between deep and shallow parts of the basin?; (b) was the water column density stratified and did it experience overturning (like the modern-day Dead Sea does)?; (c) did sulphate reduction inhibit gypsum formation in the deep part of a stratified Mediterranean during times of gypsum accumulation in the marginal basins?; (d) are marginal basins expected to be intrinsically different from the deeper parts?</p>
Expected results	<p>This project will offer physics- and chemistry-based insight in two different ways: (1) in the form of sensitivity analyses that shed light on the (relative) importance of the various factors that play a role in a given aspect of the basin evolution, and (2) by means of testing hypotheses as to the acting mechanisms, i.e., is a certain interpretation of the observational evidence consistent with the laws of physics.</p>
Specific requirements	adequate background in physics and chemistry affinity with programming and numerical modelling
Planned secondments	First: (months 10-11): Institut de Physique du Globe de Paris (Paris, France) (G. Aloisi, for the construction of the (bio-)geochemical model); Second: (months 28-29): Geological Survey of Israel (Jerusalem, Israel) (N. Lensky and Z. Gvirtzman, for testing the model against both the currently observed processes in the Dead Sea and the Messinian record of the Levantine basin. Testing the model against the Western Mediterranean sedimentary record will be done in shorter term visits to CNRS (J. Lofi).
Provided by SALTGIANT partners to ESRs; duration 1-3 month each	
Keywords	numerical modelling, ocean (bio-)chemistry, ocean circulation, marine geology,

paleoceanography

Application

Send application via : www.ipgp.fr/saltgiant

**For further
information**

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