

**Earthsciences** Geosciences https://www.uu.nl/staff/RMEbner r.m.ebner@uu.nl



## **Slowing down the overturning** - Insights from conceptual modelling on a stably stratified Mediterranean Sea during the Messinian Salinity Crisis

Ronja Ebner, Paul Meijer

Vening Meineszgebouw A, Princetonlaan 8a

# Concurrent Gypsum and Halite precipitation in the Mediterranean Sea possible at reduced overturning and high average Salinity



**^** Distribution of Messinian evaporites (M. Roveri et al., 2014)

> Conceptual scheme of the deep stratified water model for the MSC evaporites

At the end of the Miocene, salinity of the Mediterranean Sea exceeded gypsum and halite saturation, leading to the youngest known salt giant to form in a relatively short time span. This event is called the **Messinian Salinity Crisis**.

Insight into the exact circumstances leading to this extreme situation would increase our understanding of today's system and how this would react to climatic changes.



Deep saline deposits in deep basins (offshore)

Some of the theories rely on a drastic change in circulation, leading to a stably stratified water column at high salinities. It is yet to be determined how realistic these ideas are. Amongst others the question

#### (J. García-Veigas et al., 2018)

### of the possibility of concurrence still to be answered.

The results show what happens, when

- a) the strait of Gibraltar closes?
- b) the net-evaporation changes?
- c) the margins become more restricted?

Conditions met with normal mixing



For specific configurations the model reaches a state with

- the open basin at or above gypsum saturation and below halite saturation
- while the deep basin reached or succeeded halite saturation.

In order to reach that situation the a high average salinity and a weak overturning is needed.



### The tool is a conceptual box model



[1] Roveri et al., 2014, The Messinian Salinity Crisis: Past and future of a great challenge for marine sciences, Marine Geology [2] García-Veigas et al., 2018, Geochemical indicators in Western Mediterranean Messinian evaporites: Implications for the salinity crisis, Marine Geology



SALTGIANT is a European project funded by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-