SENCKENBERG Iuliana Vasiliev^{1,*}, Daniela Boehn², Darja Volkovskaya², Clemens Schmitt², Konstantina Agiadi³, Emilija Krsnik^{1,2}, Federico Andreetto⁴, Andreas Mulch^{1,2}



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Rationale

The contemporary changes in continental and marine circum-Mediterranean temperature associated to the The Messinian Salinity Crisis (5.97-5.33 Ma; MSC) are still poorly constrained.

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Methods

We reconstruct continental mean annual temperatures (MAT') and sea surface temperatures (SSTs) using branched (br) and isoprenoidal (iso) glycerol dialkyl glycerol tetraether (GDGT) biomarkers for the time period corresponding to stage 3 (5.55-5.33 Ma).

Circum Mediterranean Climate parameters targets

Pliocene

Miocene

340-

350-

360-

370-

380-

390-

400-

410-





2

24

earic 13

Bal

an

Mediterran

2

+5.33 Ma∖−

Results

The biomarkers were extracted from outcrops and DSDP cores spread over a large part of the on-land and offshore Mediterranean domain. We could calculate TEX_{se} derived SSTs (averaging at 28 °C). Where available we compared the TEX_{ac} derived SSTs with alkenone based, U^k_{ac} derived SST estimates (averaging at 26 °C). The brGDGT MAT' values vary around 13 -14 °C. At Cyprus location the brGDGT MAT' are backed by MAT values from Δ_{47} performed on carbonate soil nodules (22 °C), with comparable MAT results for the interval where MAT' brGDGT MAT' reached 25 °C.

Conclusions

Independent of pitfalls that may arise in using biomarkers as proxies, both SST estimates independently hint towards much warmer Mediterranean Sea water during the latest, Stage 3 of the MSC. The temperatures on continent were however lower in this way exceeding the present day contrast between Mediterranean sea and land of 5 to 7 °C. We therefore conclude that the sea temperature between 5.55 to 5.33 Ma was warmer than the present-day Mediterranean Sea; the land was similarly warm. However the sea-land contrast was higher.

E Mediterranean Cyprus land section



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Circum-Mediterranean Sea & Land Temperatures into Pliocene

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Cyprus, Pissouri section, Miocene-Pliocene transition

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Balearic 124 hole, Miocene-Pliocene transition

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Biomarkers of 124 hole