

# Evidences of Multiple Middle Eocene Warming Events in the Lutetian-Bartonian Chemostratigraphic Record from the Southwest Pacific

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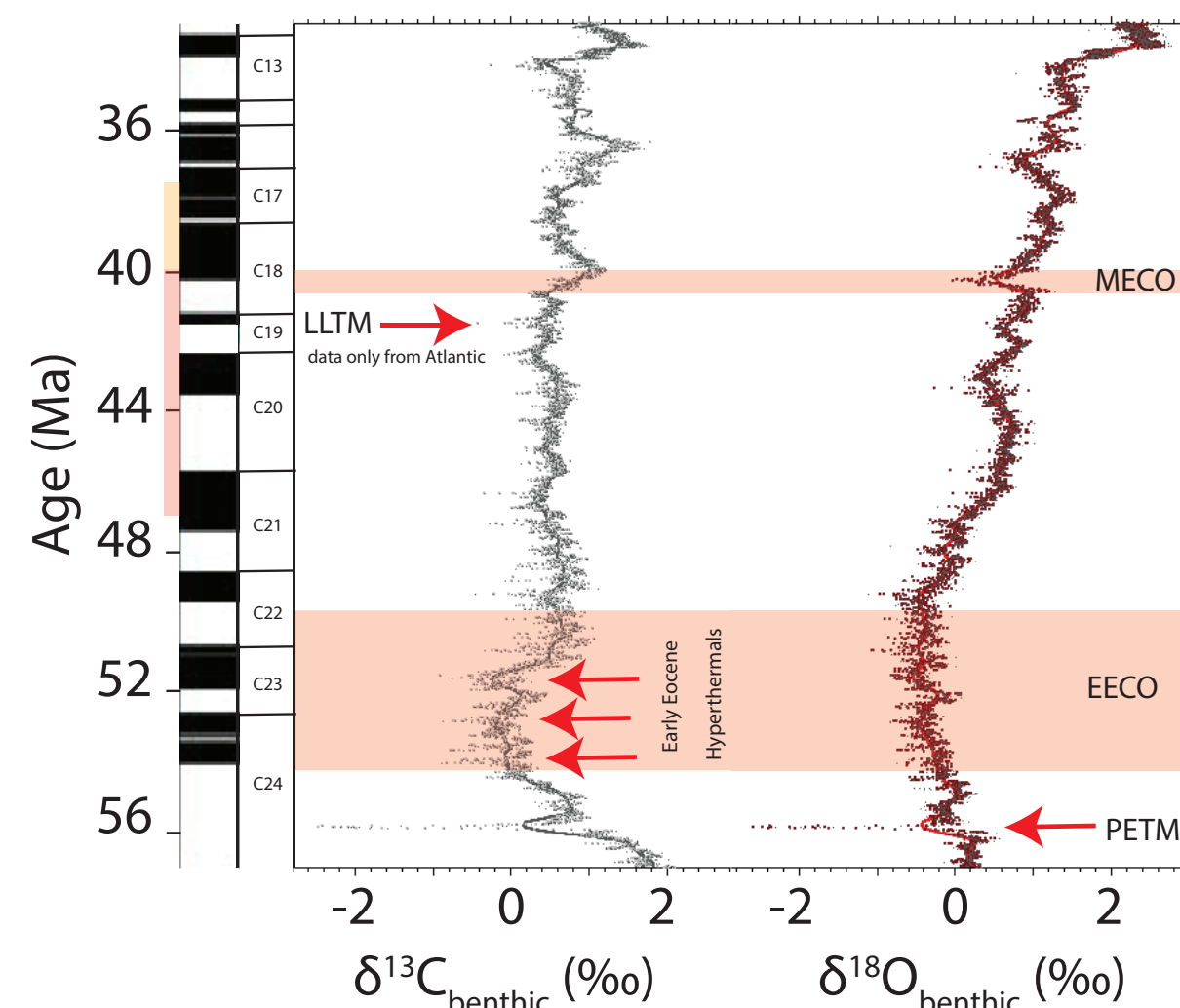
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## The relatively under-documented middle Eocene chemostratigraphy

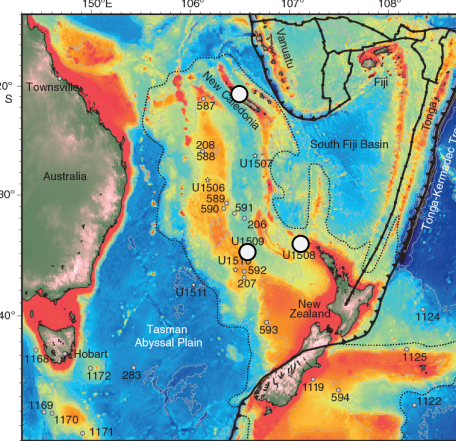
•Middle Eocene Climate Optimum (MECO), ca. ~40.5 Ma, is fundamentally different compared to early Eocene hyperthermals.

•Identification of another hyperthermal, 1 Myr prior to MECO, but discovered only in the Atlantic.

•The global relevance of Late Lutetian Thermal Maximum (LLTM) remains unconstrained.



## Study sites in Tasman area



•Two sites: U1508 and U1509 drilled during IODP Expedition 371 in Tasman Sea

•Outcrop samples from sites in New Caledonia

## Methods

•Shipboard core description and stratigraphy for Expedition 371 sediment cores

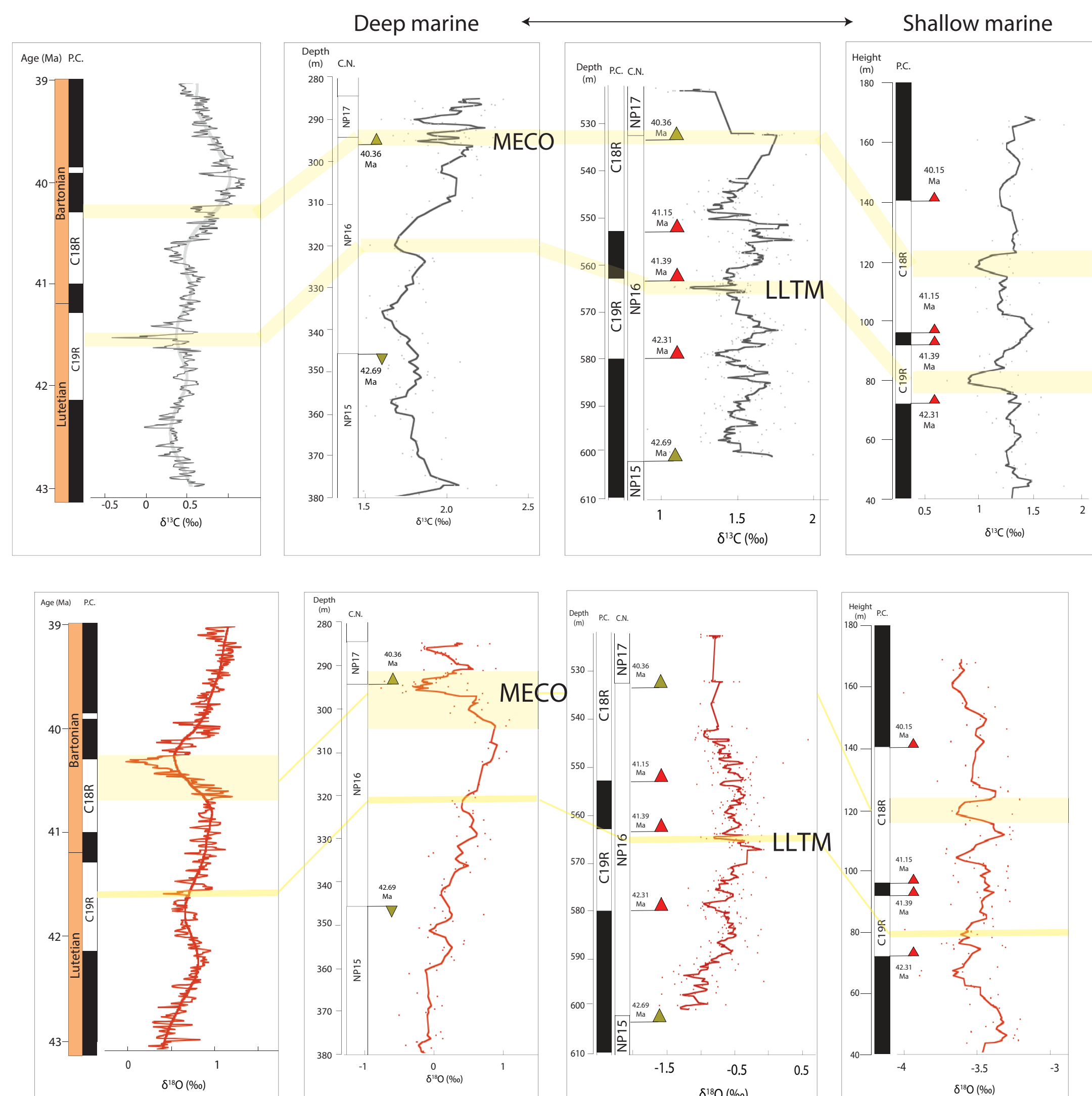
•Intervals between 43-39 Ma selected from Sites U1508, U1509 in Tasman Sea and Koumac section of New Caledonia

•Bulk sedimentary  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  analyses using an IRMS, connected to Gasbech II, at the Stable Isotope Laboratory of Rice University

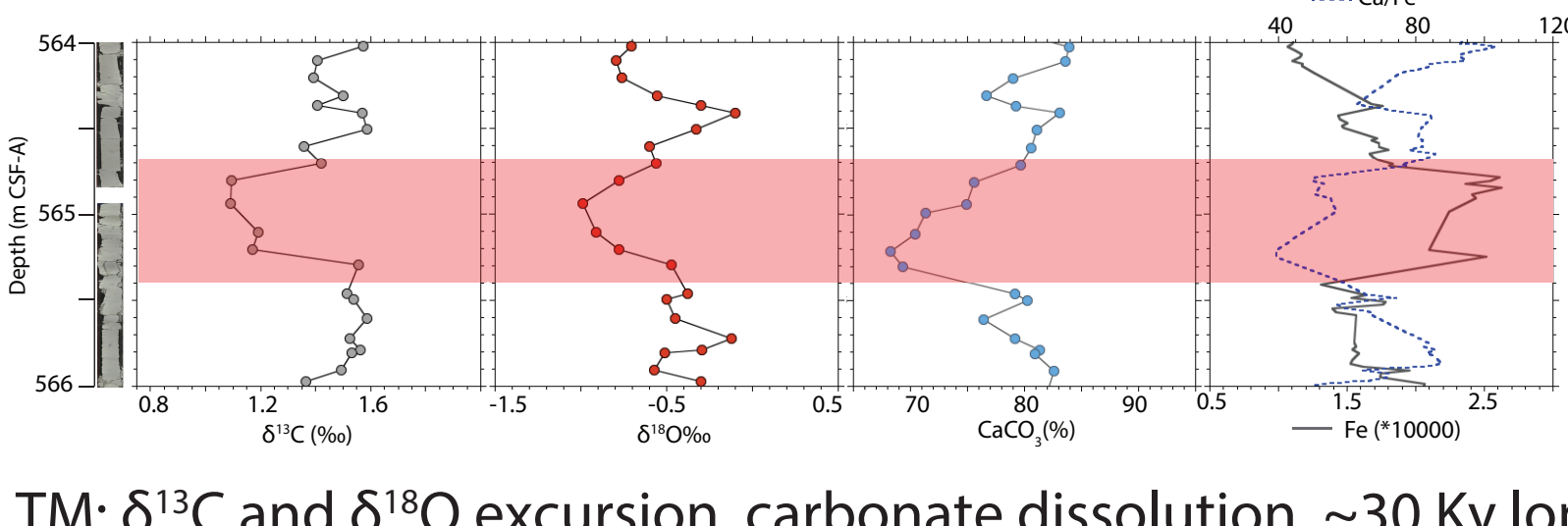
•Colorimetric carbonate content analyses of selected intervals at Florida State University.

•XRF measurements of selected intervals of IODP cores at the Gulf Coast Repository.

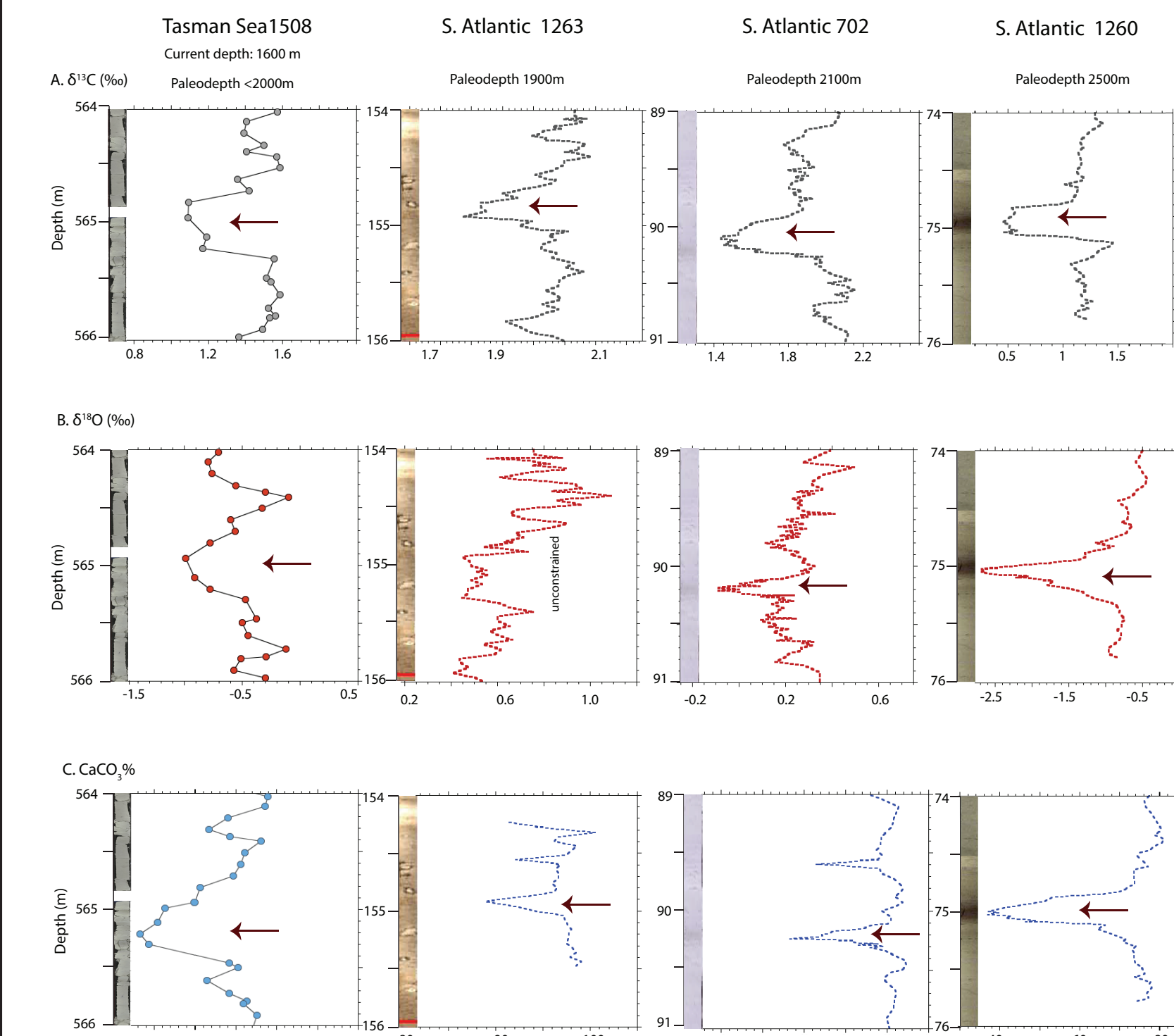
## Lutetian-Bartonian chemostratigraphic record from the southwest Pacific



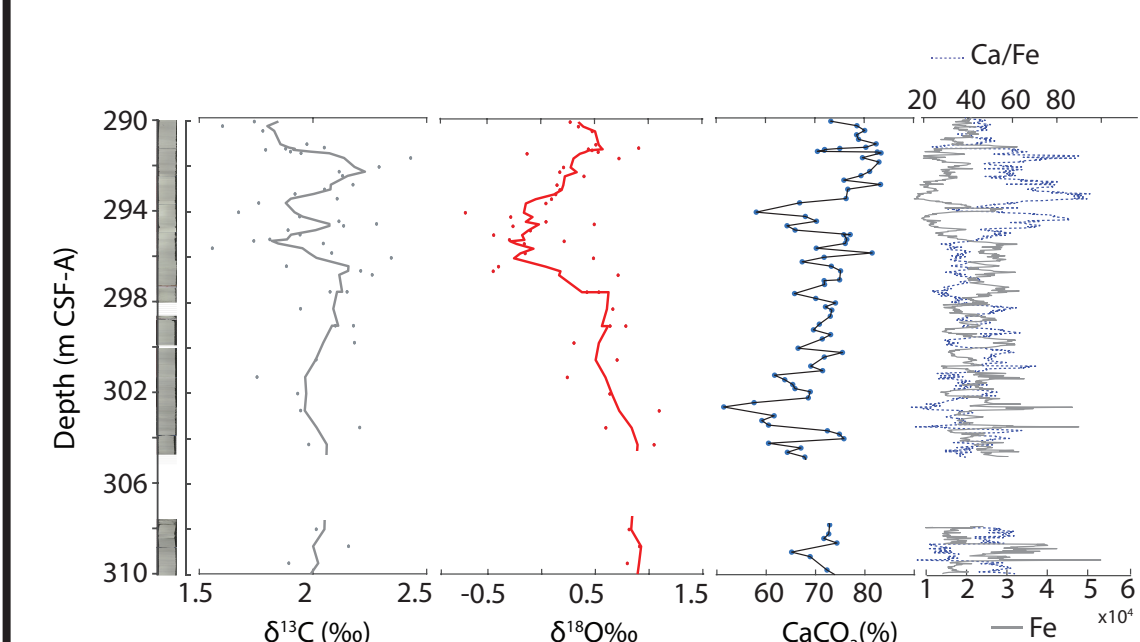
## The first evidence of a global occurrence of the LLTM hyperthermal



LLTM:  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  excursion, carbonate dissolution, ~30 Ky long



## Evidence of the MECO interval



Characteristic  $\delta^{18}\text{O}$  stratigraphic record of the MECO interval at Site U1509 in Tasman Sea.

## Implications

•Based on shipboard sedimentation rates, the chemostratigraphic record from Tasman Sea shows evidences of 405 Ky eccentricity cycles.

•Two warming event shave been identified from the chemostratigraphic record of the southwest Pacific.

•The LLTM or Chron 19R hyperthermal event is of ~30 Ky duration and coincides with an eccentricity maxima, similar to the Atlantic cores. This study presents the first global record of the LLTM hyperthermal.

•The interval of MECO is expressed at Site U1509 of Tasman Sea and the Koumac section in New Caledonia.

## References

1. Sutherland et al., 2020; 2. Bhattacharya and Dickens, 2020; 3. Dallanave and Chang, 2020; 4. Westerhold et al., 2020;
5. Sutherland et al., 2019; 6. Westerhold et al., 2018; 7. Westerhold and Rohl, 2013; 8. Agnini et al., 2014; 9. Bohaty and Zachos, 2003

## Acknowledgements

