Biodiversity hotspots were cold during the Eocene

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In the present oceans marine biodiversity is highest in the warmest parts of the ocean, in the western part of the Pacific Ocean. Many hypotheses have been formulated about the processes underpinning this pattern, but the potential of the fossil record to discriminate between these hypotheses is poorly utilized.

The congruent biogeographical patterns of large benthic foraminifera (LBF) with that of other tropical shallow marine organisms show that LBF can be used for measuring overall diversity in tropical marine environments. Here I use the correlation of genus and species richness in LBF with environmental parameters during the late Lutetian to evaluate several hypothesis, and especially the positive correlation between temperature and diversity.

The Eocene ocean was very different from the present day ocean, with the highest diversity at the northwest shores of the Tethys Ocean. This biodiversity hotspot was not associated with the warmest area of the Eocene ocean, but with a very similar temperature window as the current area of maximum diversity. These data hint at a temperature limitation to marine biodiversity.

Primary biogeographic breaks in large benthic foraminifera reflect the pattern of oligotrophic water masses delimited by and due to gyral current systems and attenuated by upwelling systems. An analysis of the distribution patterns of *Nummulites* is used to provide initial insights in the distribution of water masses in the Eocene oceans. This analysis provides evidence for the existence of a faunal break in the Tethys seaway between Africa and Eurasia long before final closure. It also brings to light a large, highly productive area of relatively low biodiversity along the northern shores of Africa.