

A bridge to isolation: new evidence for the sea level drawdown in the western Mediterranean during the MSC

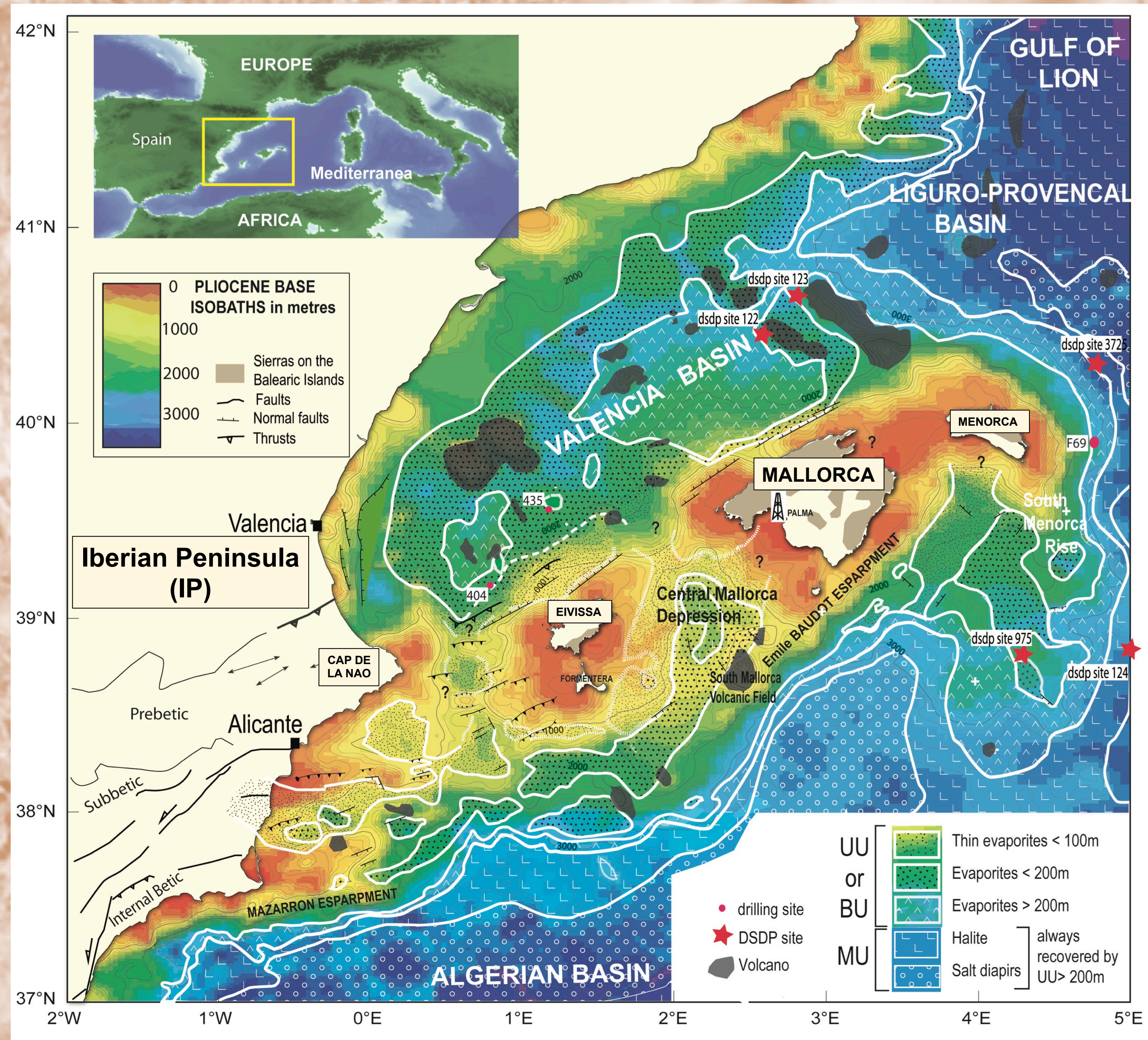
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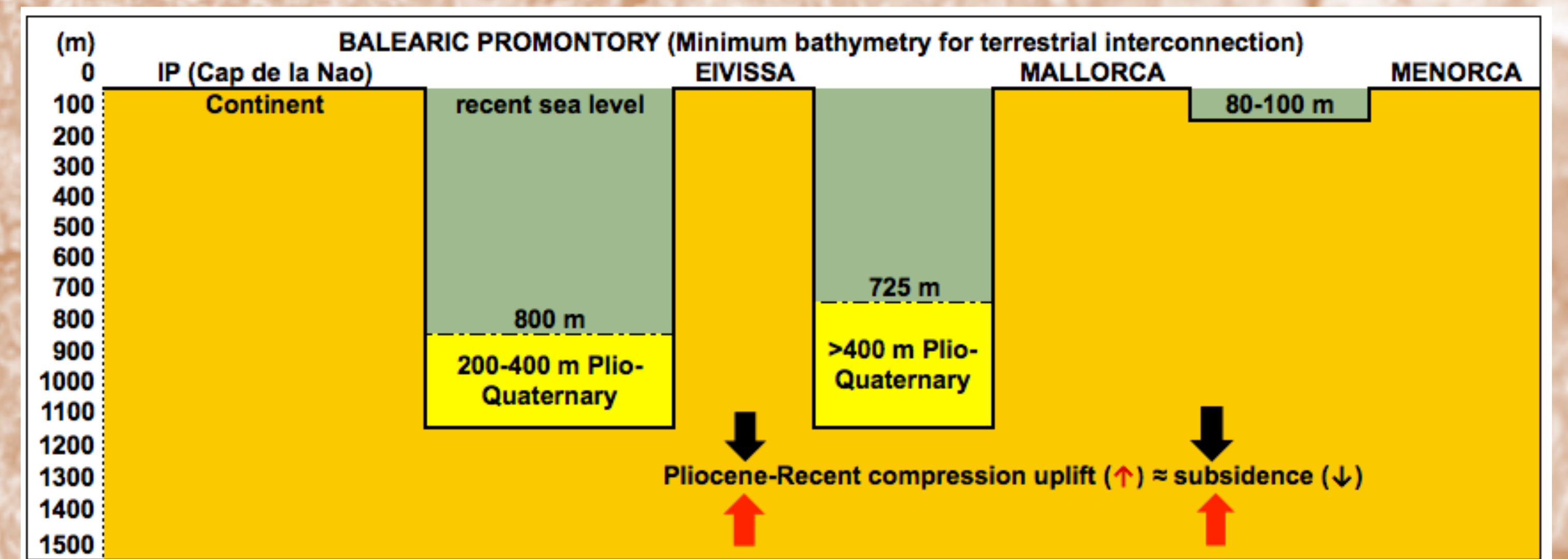
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A minimum of 1000-1200 m drawdown of the Mediterranean sea level should have been achieved to allow the faunal colonization of the Balearic Islands during the MSC peak

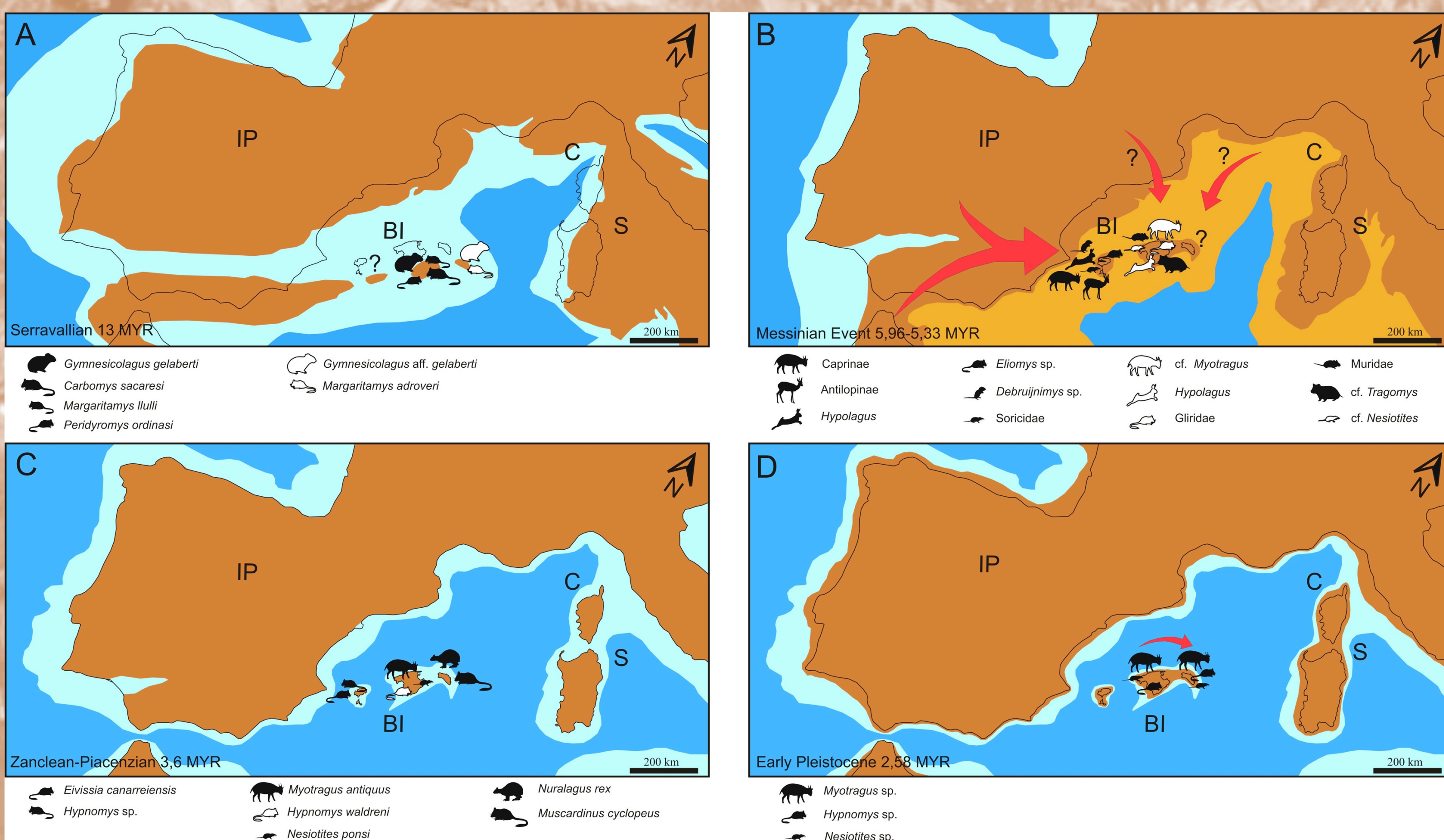
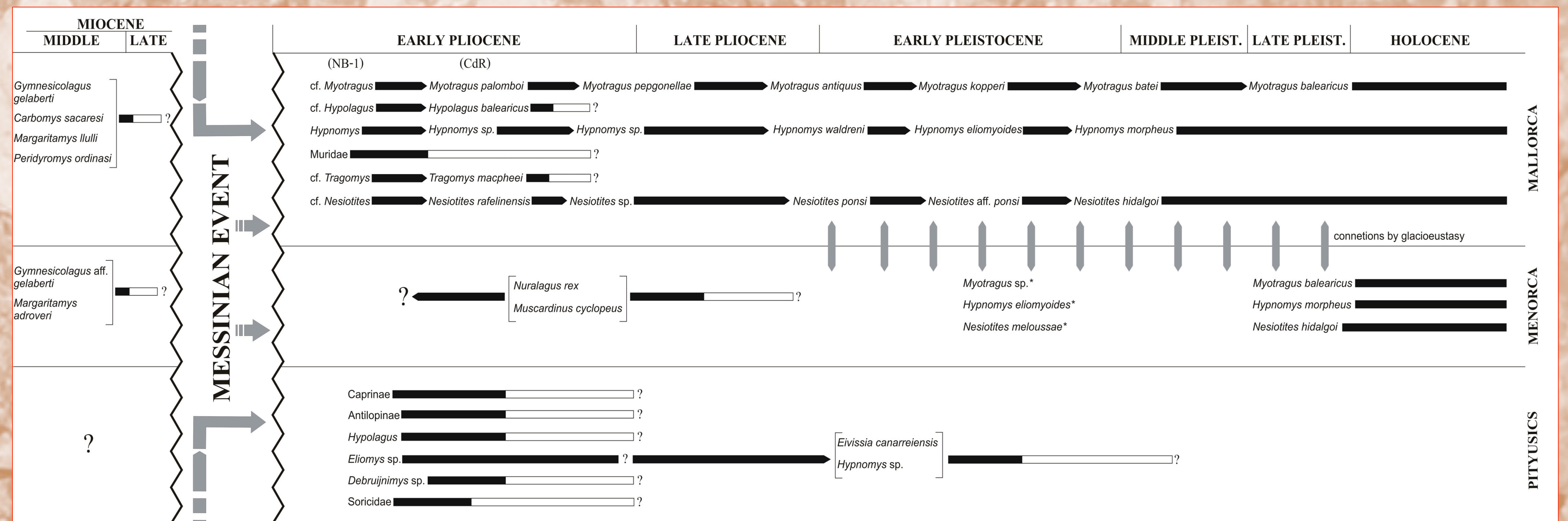
Geostructural setting

The Balearic Islands corresponds to the emerged segment of the Balearic Promontory, which in turn constitutes the north-eastern prolongation of the external zones of the Betic Range (south-eastern Spain) into the Mediterranean Sea. The Balearic Promontory is a 500 km-long, 120 km-wide continental rise including the Balearic Islands, which is surrounded by a narrow shelf with steep slopes toward the surrounding basins (Acosta *et al.*, 2002). The Neogene basins on the Balearic Promontory have been relatively stable in terms of vertical movements since the Miocene, and provide an adequate record, both onshore and offshore, to illustrate the sequence related to the Messinian Salinity Crisis events serving to test the debated scenarios (Mas and Fornós, 2011, 2013; Just *et al.*, 2011; Maillard *et al.*, 2014; Driussi *et al.*, 2014).



Biostratigraphy and colonization

Two different insular faunal episodes can be identified in the Miocene to Holocene fossil record of the Balearic Islands (e.g. Alcover *et al.*, 1981; Moyà-Solà *et al.*, 1999; Bover *et al.*, 2008). A first episode (the so-called *Gymnesicolagus* faunal assemblage) has been related to the Langhian-Serravalian regression (middle Miocene) and is represented in several Mallorcan and Menorcan sites. A second episode, started with the Messinian Salinity Crisis (MSC), spreads over all the Plio-Pleistocene. The discovery in the last twelve years of Messinian/Zanclean deposits in Mallorca and the reappraisal of the study of Pliocene sites of Menorca and Eivissa improve substantially the knowledge on the paleofauna of this episode (Bover *et al.*, 2007, 2014; Quintana *et al.*, 2011; Quintana and Moncunill-Solé, 2014). They shed new light on the fauna that arrived to the islands during MSC, and give a strong support to the chronology of the colonization event based on the phylogenetic relationships between the new discovered fossil mammals and their mainland relatives.



Paleobathymetry

The Eivissa Channel, located between eastern Spain and the Island of Eivissa, connects the Valencia Trough with the Algerian Basin, and it corresponds to the offshore eastern prolongation of the external zone of the Betic Ranges. This channel has currently a minimum depth of 800 m, including 200 to 400 m of Pliocene to Holocene layers. Post-MSC deformation has led to small folds and thrusts, which are well expressed in the bathymetry (Acosta *et al.*, 2001; Lastras *et al.*, 2004). It can be related to Pliocene to Present-day compression associated with moderate positive vertical uplift that could reach here a maximum of 200 m (Maillard & Mauffret, 2013). The MSC deposits, which actually lie at 1000-1200 m depth, could have been deeper during the Messinian, but not significantly if we take into account the Pliocene to Holocene subsidence. Additionally, there are partly truncated at the top suggesting sub-aerial erosion.

Conclusion and consequence

A minimum of 1000-1200 m drawdown of the Mediterranean sea level should have been achieved to allow the faunal colonization of the Balearic Islands during the MSC peak. The faunal findings in the Messinian/Zanclean site of Na Burguesa-1, containing some fossil directors, constitute new strong evidence supporting the deep-basin shallow-water paradigm.

Acknowledgements

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