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Mediterranean climate evolution during MIS 11: evidence from an integrated and high-resolution marine record

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The Ionian flank of the Calabria region (Southern Italy) hosts a very thick succession of Pleistocene marine shelfal sediments that have been recently uplifted, as testified by a flight of marine terraces that are late Middle Pleistocene in age. This setting represent an unique record that is presently being exploited for reconstructing the history of climate during the Middle Pleistocene in an especially sensitive area, such is the central Mediterranean borderland.

Here we present the preliminary results of a highly resolved land-sea correlation across an almost complete glacial-interglacial cycle, which we interpret as correlative to the late MIS 12 – MIS 11 interval (ca. 450 to 380 ka) based on calcareous plankton biostratigraphy, direct comparison with deep-sea δ^{18}O Mediterranean (ODP) records, and direct tuning to the astronomical target curve of Laskar (2004). According to our age model, the study record was investigated with a ca. 400-yr resolution. Documentation of terrestrial climates was provided by the rich pollen content, while foraminiferal assemblages and stable isotopes records (δ^{18}O and δ^{13}C) from different foraminiferal species (both planktic and benthic) have been employed in order to reconstruct the ocean dynamics.

A decoupling is observed between the isotopic records from benthic and planktic foraminiferal species. Indeed, our record reveals an excellent long-term correlation between the δ^{18}O record of the benthic species *Uvigerina peregrina* and the temperate tree pollen group, thus suggesting that both respond promptly to the 100-kyr (eccentricity) orbital forcing. In contrast, the δ^{18}O record of the surface-dwelling foraminifer *Globigerinoides ruber* is modulated at higher frequencies, which are straightforwardly interpreted as the response to the 40-kyr (obliquity) orbital forcing.

A prominent isotopic event occurs in late part of the studied interglacial, when a short interval of very light δ^{18}O values of *G. ruber* is observed. As also confirmed by the peculiar foraminiferal assemblages, this event reflects an increased stratification of the water column, and might be interpreted as the geochemical signature of sapropel S11 in the shelfal setting. Concomitantly, a massive expansion occurs of the *Picea-Abies* pollen group, which indicates increased rainfall rates with respect to the temperate tree pollen group that is largely dominant above and below.

Our data provide a sound evidence that deposition of sapropel layers in the Mediterranean was not triggered only by massive runoff from the eastern Mediterranean borderlands, but it was also enhanced by increased freshwater yield in the highlands of the central Mediterranean area.

Our results also suggest that during interglacial periods a short-term climatic instability took place, albeit its amplitude was apparently subdued to that documented across full glacial intervals.