Benthic foraminiferal distribution and tectonic significance of the early Late Miocene tectonostratigraphic deposits of the Pre-Apulian zone, western Greece

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A total of 26 marine sediment samples were collected from the northern margin of the Agios Petros Basin (Early Tortonian, Levkas Island, W. Greece) for micropaleontological analysis. The section, located in the Pre-Apulian Foreland Basin, is proximal to the thrust fault which separates the Pre-Apulian from the Ionian zone. It is composed of hemipelagic silty clays interrupted by thin turbidite sandstones, reflecting sedimentation as a result of thrust activity and is marked by a general palaeogeographic change: the pre-existing shallow platform, on which bioclastic calcareous sedimentation took place, rapidly subsided and marls and clays were deposited until the Pliocene.

The purpose of this study is to establish the magnitude of palaeoenvironmental and palaeobathymetric changes through the Early Tortonian part of the Pre-Apulian zone. For this reason, we undertake benthic foraminiferal analysis of a closely packed suite of samples to establish palaeobathymetry changes through the succession, in order to (1) estimate the water depth (palaeobathymetry) in which the sediments were deposited, (2) assess the benthic foraminiferal setting in which deposition took place and (3) establish the magnitude of downslope transport of sediments by noting the sources and abundance of redeposited species.

The samples were processed for benthic foraminifera using standard techniques. Statistical analyses of the benthic foraminiferal data were used to identify biofacies and species assemblages. The distribution patterns of the dominant and associated species (*Siphonina reticulata* and *Cibicidoides kullenbergi*), together with the decreased Benthic Foraminiferal Number (BFN) values, elevated diversities and higher planktic-to-benthic ratios, suggest deposition at bathyal water depths with moderate organic matter fluxes and elevated oxygen contents of the bottom water, typical for this water depth interval (e.g. Schmiedl et al., 1997).

The palaeobathymetry curve is based on quantitative benthic foraminiferal census data. The palaeobathymetric evolution of the studied sediments together with the faunal pattern, provide the key to unlocking the broader question as to whether the depositional pattern within this part of the Agios Petros Basin was driven by tectonic or eustatic change. The palaeobathymatric estimations show that the development of depositional depth in the studied section was primarily determined by tectonics. That is the general sea level rise trend in the Agios Petros Basin has been caused by tectonically induced subsidence.

In the lower part of the record minor amplitude, short duration uplift may be due to local reorientation of stress field followed by a rapid, high rate subsidence. The following stratigraphic interval is characterized by a relative long period of tectonic quiescence followed by significant uplift which took place due to regional compression. This points to a radical change in early Tortonian basin evolution. However, the strange looking drop and jump of the basin and seafloor maybe an artifact, probably caused by an overestimation of palaeowater depth.

Benthic foraminifera have proven to be a powerful tool for the study of the palaeodepth history of this complex site, where tectonic and eustatic signals combine.

Keywords: Early Pre-Apulian zone, benthic foraminifera, paleobathymetry, eustacy, tectonics

References:

Schmiedl G., Mackensen A., Müller P.J., 1997, Recent benthic foraminifera from the eastern South Atlantic Ocean: dependence on food supply and water masses, *Mar. Micropaleontol.* 32: 249–288.