Glacial-interglacial and precession-controlled climate and environmental variability on early Pliocene deposits from the lower Guadalquivir Basin (SW Spain)

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Pliocene climate variability has impacted marine and terrestrial environments at different timescales in the past. Here we present an early Pliocene (4.5-3.7 Ma) marine multiproxy record of paleoclimatic and paleoenvironmental changes from the La Matilla core drilled in the lower Guadalquivir Basin (SW Spain). The lithology of these sediments includes clays, silts, and sands. In order to reconstruct paleoenviromental changes related to glacial-interglacial and precession-controlled variability, micropaleontological (benthic foraminifera) and geochemical (XRF data, TOC) proxies were analysed. Our multiproxy record was also compared with the global benthic O isotope record and precession curve. The estimated sedimentation rates show a distinct interval with very low sedimentation rates precluding the interpretation of data from 4.187 to 3.890 Ma. Below this interval, benthic foraminifera suggest an outer shelf or deeper setting with high variable fluctuations in organic matter flux to the sea floor and related oxygen depletion. Marine and continental inputs are the main possible sources of organic matter, which are controlled by both orbital precession and glacial-interglacial conditions. Strong influence of upwelling and/or phytoplankton blooms along with cold/arid conditions occur at times of precession maxima (low insolation) and glacial periods as showed by the high abundance of *Uvigerina peregrina* s.l. On the contrary, high terrestrial organic matter supply derived from river runoff and related oxygen decrease take place during precession minima (high insolation) coinciding with interglacial periods. Under these humid and warm conditions, *Bulimina aculeata*, species feeding from degraded organic matter, TOC and Mo/Al ratio increase significantly. Finally, above the low sedimentation rate interval, a clear trend towards more continental organic matter and higher riverine discharge is recorded by benthic foraminifera (higher *Nonion fabum* abundances) and geochemical proxies (higher Zr/Al and Ti/Al ratios). This is consistent with a gradual sea-level fall trend and grain size increase.