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Multi-proxy record of orbital-scale changes in climate and sedimentation during the Weissert Event in the Valanginian Bersek Marl Formation (Gerecse Mts., Hungary)

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A multiproxy (δ^{18}O, δ^{13}C, magnetic susceptibility, gamma-ray spectroscopy) stratigraphy was developed from a 31.2-m-thick Upper Valanginian to lowermost Hauterivian section of the Bersek Marl Formation in Gerecse Mountains, Hungary, comprising alternating marlstone layers of varying clay and carbonate content. The aims of the study were to understand the mode of sedimentation in the Gerecse subbasin and establish a reliable correlation with other Cretaceous sections using the isotopic signature of the Weissert Event.
In the studied section, the bulk carbonate δ^{13}C signal shows sustained, elevated values (up to 2.7‰ up to 19.2 m, followed by a decreasing trend upsection. Together with biostratigraphic data, this suggests that the lower part of the section was deposited during the plateau phase of the Valanginian Weissert Event. Spectral analyses of the multiproxy dataset, including magnetic susceptibility measurements and gamma-ray spectroscopy on the lower part of the section, led to the identification of precession, obliquity, long and short eccentricity signals. A mean sedimentation rate of 14 m/Myr was calculated based on astronomical tuning. The cyclicity in the proxy signals reflects dilution cycles by detrital inputs in the basin, which supports a hypothesis that orbitally-forced humid-arid cycles controlled the pelagic alternating sedimentation during the Early Cretaceous throughout the Tethyan area.