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New $^{87}Sr/^{86}Sr$ constraints on the marine Miocene of the Lower Tagus Basin and the Alentejo Coastal Plain (Portugal)

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Resumo

Sedimentation in the Lower Tagus Basin was strongly controlled by eustatic oscillations, with several marine incursions during the Miocene. Previous studies, based on biostratigraphic and isotopic data, identified ten depositional sequences in the southwestern sector of the basin that correlate with third-order eustatic cycles. Some of these transgressions reached considerable amplitudes, with marine influence extending up to ~80 km inland under the present-day configuration of the territory. Preliminary results of $^{87}Sr/^{86}Sr$ isotopic dating from oyster shells collected in the Lower Tagus Basin (LTB) and the Alentejo Coastal Plain (ACP) are presented (figure 1). At Vila Nova da Rainha, a 15.69 Ma age (correlating with Langhian, V-b unit at Lisbon) anchors the marine-influenced base of the local succession, exposing a ~5 Ma hiatus between these levels and the overlying sands with Hipparion (Vallesian, MN 9). This age corroborates previous bio-chronostratigraphic assignments. Marine and marginal-marine sediments crop out along the eastern margin of the LTB and in the ACP. In the Alcácer do Sal region and along the Melides–Sines coast, these deposits are assigned to the Alcácer do Sal Formation (upper Serravallian–lower Tortonian). However, further north, as far as Lavre (Montemor-o-Novo), geological mapping attributes them to a broader interval corresponding to the Vindobonian (Langhian–Tortonian). Oyster shells collected at two sites along the Marateca stream (Monte da Moinhola and Monte Novo) and at Melides yielded ages of 11.13 Ma, 11.03–7.32 Ma and 8.58 Ma. These values indicate Tortonian deposition and are consistent with the Alcácer do Sal Formation, suggesting that marine Miocene deposits cropping out as far north as Lavre may belong to this unit, representing one of the most landward-penetrating Miocene transgressions. At the base of the sea cliff at Galé beach (Melides), calcareous sandstones and sands with marine fauna have been mapped as part of the Alcácer do Sal Formation. However, $^{87}Sr/^{86}Sr$ dating of oyster shells yielded ages between 6.79 and 5.80 Ma, indicating Messinian deposition. These sediments can therefore be correlated with the Esbarrondadoiro Formation, a Messinian marine unit of the Alvalade Basin whose connection with the coastal area had not previously been unequivocally identified. This study contributes to the understanding of the marine Miocene of southwestern Portugal and has implications for paleogeographic reconstruction and geological mapping.

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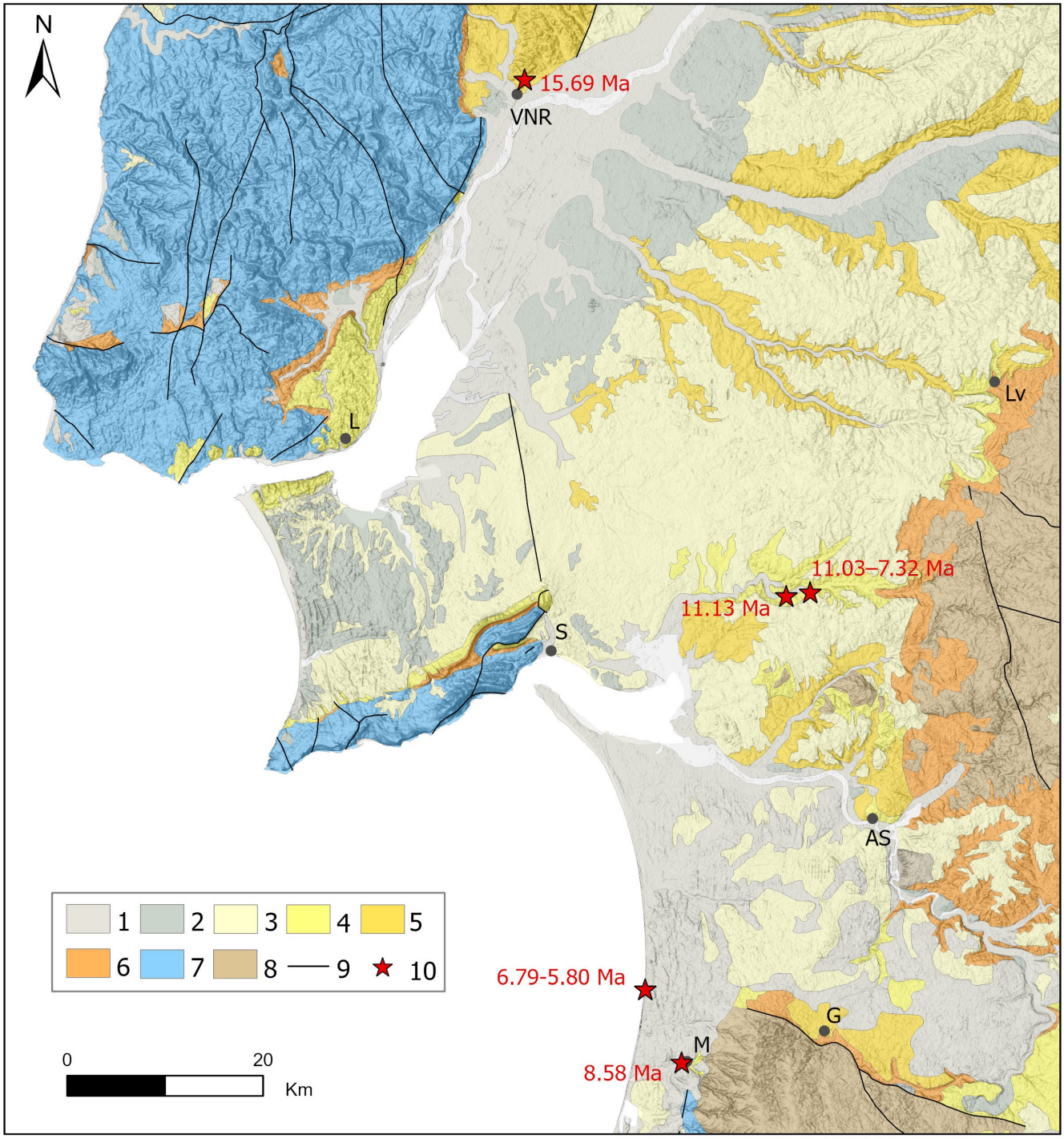

Fig. 1 – Geological map showing the sample locations for 87Sr/86Sr dating. 1, Holocene; 2, Pleistocene; 3, Plio-Pleistocene; 4, Miocene (mostly marine facies); 5, Miocene (mostly continental facies); 6, Paleogene; 7, Mesozoic; 8, Paleozoic; 9, Fault; 10, Sample locations; L, Lisbon; VNR, Vila Nova da Rainha; S, Setúbal; Lv, Lavre; AS, Alcácer do Sal; G, Grândola; M, Melides. Adapted from the Geological Map of Portugal (1:1.000.000 scale), LNEG.