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Evolution of a Non-Tropical Oligocene-Miocene Carbonate System in the Ragusa Platform (Central Mediterranean) Closely Reflects Global Climatic Events

The Oligocene and Miocene are key time intervals in the climatic evolution of the Cenozoic. Systematic, global patterns of variability in oxygen isotopes allow to trace the onset and progressive intensification of ice-sheets in the southern Hemisphere and associated glacio-eustatic changes, and can be used for correlation. This study integrates chemostratigraphy with analysis of facies and stratal patterns to investigate to which degree the development of an isolated carbonate system records and respond to such global changes. The Hyblean Plateau of Sicily (Italy) and the Maltese Islands, jointly referred to as the Ragusa Platform, provide the most extensive and undeformed outcrops of Oligocene-Miocene carbonate sedimentary rocks in the Central Mediterranean. The Ragusa Platform records carbonate deposition at varying water depths on a shelf expanding from Sicily to Malta, in the eastern Pelagian Block. The Ragusa platform exhibits major spatial and temporal changes in carbonate facies reflecting a distinct three-step evolution: 1) a temperate to cool-water ramp consisting of laterally extensive (km-scale) aggradational and retrogradational bioclastic units. This ramp drowns in the earliest Miocene and is capped by a hardground and condensed strata; 2) a pelagic wedge, becoming progressively richer upsection in clays, records an overall temporary decrease of benthic carbonate production and export; 3) an aggradational and progradational temperate-to-warm-water carbonate ramp. Both the long-term evolution of this platform and shorter-term (Milankovitch-scale) stratigraphic events can be closely tied to changing paleoceanographic conditions and global climatic events recorded in many deep sea locations around the world. The Ragusa Platform provides a very clear record of the interplay of changes in relative sea-level, climate, weathering rates and paleoceanography in determining the overall architecture and facies distribution of a carbonate system.