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Superficial and deep-seated gravity-driven deformation horizons within basinal succession: the case study of Maiolica Formation, Gargano Promontory, Southern Italy

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Gravitational phenomena on the paleoslope of continental margins play a significant role both in redistribution of sediment and formation of new structural features within sedimentary basins worldwide. Mass-transport deposits (MTDs) represent important heterogeneities within the succession and occur on various scales (tens of centimetres to hundreds of metres). Small- to medium-scale MTDs (up to tens of meters) act as layers of different petrophysical properties, whereas large-scale MTDs (tens to hundreds of meters) form both stratigraphic and structural discontinuities (faults, thrusts, erosional surfaces, dykes or injections) within the succession.
The Maiolica Formation, Early Cretaceous deep basinal succession cropping out in Gargano Promontory of Southeast Italy is represented by undisturbed intervals of flat-lying thin-bedded, cherty micritic limestone interstratified with intervals of lithologically similar, but structurally distorted beds. For this reason, the studied outcrops provide a good opportunity to characterize the geometry and the internal deformation of small- and medium-scale carbonate MTDs. At the outcrop scale, small- to medium-sized MTDs can be simply identified as sheets of deformed strata alternated with packages of undeformed beds. However, several observed features such as folded stylolites with radially oriented peaks within some of these deformed packages and the presence of large vertical clastic-dyke-like bodies in the succession suggest that some of these deformed packages represent deep-seated basal gliding horizons of large-scale MTDs.
In this study, we present MTDs on two different scales that have a crucial influence on the evolution of slope to basinal successions. Moreover, we define the features that distinguish superficial MTDs from the deep-seated gravity-driven deformation horizons within basinal carbonates.