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Eustatic and Tectonic Control on Messinian Depositional Sequences in Irpinia-Daunia Apennines (Southern Italy)

The Mediterranean Messinian is subdivided into three main intervals: pre-evaporitic, evaporitic, and post-evaporitic or Lago-mare stages presenting different features in the various Italian regions. In southern Apennines (Irpinia-Daunia sector) various units characterize the three Messinian intervals. The 'Diatomiti' fm. (pre-evaporitic interval) is formed by thin-bedded euxinic gray marly clay with whitish diatomitic marl. The environmental conditions are referred to a pelagic starved basin. Limestone and crystalline gypsum of supra- to sub-tidal environment and reworked clastic gypsum form the Mt. Castello Evaporites (evaporitic stage). At the Mediterranean scale the control mechanism for the evaporite origin is eustatic. In terms of sequence stratigraphy, these deposits are related to a third-order sea-level lowstand. Fourth order facies successions are related to basin dynamics, connected to interplay of eustasy, local tectonics and rates of evaporation and sediment supply. The post-evaporitic units (Torrente Fiumarella unit and Anzano Molasse), characterized by varied clastic alluvial and lacustrine facies with freshwater Ostracoda assemblages, reflect a major palaeoclimatic change and represent a hypohaline interval. The post-evaporitic units are still a response to the 'salinity crisis', characterized by increasing fresh-water influx of Paratethyan realm. The evaporitic and post-evaporitic sequences are separated by an important erosive unconformity linked to the regional 'intra - Messinian tectonic phase'. The described units belong to the rank of depositional sequences. Their development appears controlled by relative base-level changes in a tectonically-driven regional subsidence. Local tectonics controls the development of additional unconformity surfaces. They are part of larger sequences (Villamaina and Altavilla units) related to foredeep evolution phases.