Slope Failures and MTDs along a Cretaceous Escarpment in Western Sicily (Italy)

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In the last decades, many contributions have examined the Mass Transport Deposits (MTDs) in both modern and ancient examples for the comprehension of the sedimentary dynamics along the carbonate escarpments. Such sedimentary bodies have a great economic significance, since they are widely considered prone to the development of petroleum systems. In particular, MTDs from Cretaceous escarpments are well known from many regions of the world, since they are typically rich in rudists aragonite fragments determining high percentages of porosity. In these respect the deep knowledge on the facies architecture of these depositional systems is of broad interest as can offer examples for the prediction of the geometry and distribution of the facies types. Subsurface studies based on seismic data require comparisons with analogues from outcrops that allow the observation of structure and sedimentary characters of the MTDs.

On this topic, we carried out a sedimentological study in northwestern Sicily on a well-exposed Cretaceous escarpment, (Custonaci Cretaceous Escarpment, CCE). At present the original escarpment is dismembered in several tectonic units in the Maghrebian Chain. The biostratigraphic data allow to constrain the beginning of the slope sedimentation at the lowermost Cretaceous. Along the succession, the MTDs formed by huge bodies of megabreccias, alternate to finer grained skeletal rudstone and floatstone emplaced by turbidity currents and grain flows. The presence of pillow basalt intercalations suggests a major role of the tectonics as trigger for the MTDs emplacement. Furthermore, synsedimentary listric faults, slump scars and channel filling megabreccias allow to reconstruct the present day polarity of the slope.

The emplacement of coarse megabreccia beds at Custonaci can be documented until the Santonian. However, upward alternances of Scaglia-type pelagic calcilutites and skeletal turbidites and debrite beds lasted up to the Maastrichtian.

Nevertheless the Tertiary deformations have obscured the relationships of the CCE with the original source areas, there is a tight correlation between the evolution of the Cretaceous Panormide Platform and the studied slope.