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Catastrophic remobilization of shelf sediments into deep-marine settings: high-resolution stratigraphic studies of Miocene megabeds in the Cilento Group, Southern Apennines, Italy

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Mass transport deposits (MTDs) play a crucial role in source-to-sink systems. They document the rapid, en-masse transport and burial of large volumes of sediments and organic matter from shallow-marine to deep-marine environments. Understanding the distribution, composition, and formation of MTDs is essential, as it forms the basis for elucidating their role in sedimentary basin evolution and biogeochemical cycles.

The wedge-top siliciclastic successions of the Miocene Cilento Group, Southern Apennines (Italy), record multiple episodic, large-scale mass transport events within a fragmented foreland basin system. This study focuses on two megaturbidites, integrating high-resolution stratigraphic logging and petrographic analysis to characterize their sedimentary architecture and assess the transport and depositional processes that shaped them.

These megabeds have consistent lateral extents spanning tens of kilometers, with an average total thickness of 55 meters. A westward thinning trend likely reflects the influence of basin physiography and flow direction. Distinctive coarser-grained turbiditic beds in the uppermost sections exhibit lateral, localized, and channelized features, suggesting coeval gravity flows superimposed on the main depositional event. Petrographic analysis shows that the megaturbidites are predominantly composed of quartz-rich siliciclastic sediments in a calcite-rich matrix, with grain sizes ranging from fine sand to silt. The megaturbidites also contain benthic and planktonic foraminifera reworked from various water depths, along with terrigenous organic matter. These findings indicate complex sediment sources and transport pathways extending from the continental shelf (i.e., a foramol-type platform) to the basin plain.

This study provides information about the source of organic matters, preservation mechanisms, and basin morphology. These insights will contribute to a better understanding of the tectonic-climatic dynamics of the central Mediterranean during the middle to late Miocene and the implications of spatial and temporal variability in sediment transfer in source-to-sink systems.

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