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Mass transport and organic matter distribution in paleoceanographic reconstruction of the northern Arabian Platform during the Early Cretaceous

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The Barremian-Aptian sedimentary succession in the Western Levant is an important reservoir strata notably due to intercalation of carbonates and coarse siliciclastics. In much of the northern Levant this strata has been described as a transition from siliciclastic marginal marine deposits to carbonate shoals and lagoons – posing the possibility of similar configurations.
Results from high-resolution elemental, mineralogical, sedimentological and petrophysical analyses measured on a set of long cores from northern Israel offers a unique look at this transition, in terms of the paleoceanography, geometry and ventilation conditions in the lead-up to Oceanic Anoxic Events 1a and 1b. Two intervals of abundant mass-transport deposits (MTDs) emplacement were identified in this succession: a Late Barremian series and an Aptian series.
These MTDs are graded and/or chaotic, they significantly differ from the fine grained, fine laminated calcareous shale in-situ lithology. The background lithology was found to contain elevated organic matter, sulfur and iron content while bioturbation features are notably scarce or absent. At the contacts between the marine shales and the MTDs, there is a decrease in sulfur and iron, indicating more oxic conditions at the sediment-water interface of the emplaced units, compounded by a coeval oxygenation of the native deeper waters due to turbulence and mixing associated with mass transport.
Together, these observations indicate emplacement of coarse-grained, shallow water MTDs at the lower termination of a slope, with gradient sufficient to support mass transport above a basal shear plane. The lithologies within the MTDs indicate high energy downslope transport of calcareous and terrestrial material into a low-energy basinal environment during the Late Barremian and Aptian. These background sediments bear evidence suggestive of at least two intervals of diminished oxygen in the lower water column, one predating OAE 1.