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Mélanges and broken formations in the outer accretionary wedge of the central Apennines (Abruzzi region, Italy)

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The outer accretionary wedge of the central Apennines of Italy (east of Majella mountain, Abruzzi region) is marked by a 10-15 kilometers wide belt of chaotic units (Mts. Frentani mélange) that thrust over the undeformed late Pliocene-early Pleistocene foredeep succession. The Mts. Frentani mélange incorporates the outermost and deepest thrust sheets of the Molise Units and is tectonically imbricated with blocks of Messinian evaporites and early-middle Pliocene top-thrust deposits ranging in size from decimeters-to-hundreds of meters.
Two different types of chaotic units are defined on the basis of their geometric and stratigraphic position, internal organization, and nature of the bounding surfaces.
(1) Tectono-sedimentary mélange corresponding to the late Cretaceous-middle Miocene Argille Scagliose (Varicoloured Scaly Clays). It consists of a block-in-matrix arrangement with blocks of Mesozoic and Cenozoic limestones, calcarenites, greenish-grey calcilutites, cherty limestones, quartzarenites, and manganisiferous black limestones, ranging in size from decimeters-to-hundreds of meters. The blocks are randomly distributed within a varicoloured matrix mainly consisting of a brecciated matrix, locally overprinted by a pervasive scaly cleavage. The chaotic arrangement of this mélange indicates that its emplacement and deformation are consistent with (i) slope and debris avalanches at the external frontal thrusts that produced mass-gravity deposits during tectonic deformation, and (ii) folding and thrusting that overprinted the previously formed sedimentary mélange.
(2) Broken formations corresponding to the late Oligocene-early Miocene Red Beds of the Molise Units. They consist of alternating red marly claystones and grey-green-red marls characterized by a structurally ordered block-in-matrix fabric. In the matrix a pervasive scaly fabric is present and often associated to mesoscale S-C shear zones. In spite of an intense stratal disruption that led locally to a block-in-matrix fabric, the original stratigraphy can still be recognized. Tectonic shearing acting at the base of the thrust sheets was probably the main factor in disrupting the originally coherent succession.
We present a comparative analysis of these two types of chaotic units developed in different geometric and stratigraphic positions with respect to the wedge front. They are characterized by different block-in-matrix arrangements that are consistent with their tectonic setting of formation.