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Tectonic Features and Evolution of the Lower Pliocene Foredeep Cellino Basin (Abruzzo - Central Italy)

The hydrocarbon-bearing Cellino Basin lies in the Abruzzo sector of the Periadriatic foredeep, generated by underthrusting of the Adria Plate below the Apennine chain during the Neogene. The basin is filled with Plio-Pleistocene siliciclastic turbidites, and its substratum consists of a carbonate succession, ranging from Triassic dolostones to Messinian evaporites.

The strong influence of the basin morphology on the sedimentation and the subsequent tectonic evolution has been revealed.

The substratum dips NNW, alongside the depocentral axis; this plunge is superimposed to the general dip towards the Apennines (W). It is divided in four blocks having different depth, from 7000-7600 m in the NW sector up to 4000-4500 m in the SE sector. The southernmost block caused the sudden restriction of the lower part of the Cellino Basin, in which coarse-grained turbidites were deposited.

The substratum is also affected by an array of Messinian extensional faults, striking N170°-175°, which do not involve the Pliocene sequence.

The Plio-Pleistocene compressional deformation of the foredeep produced an inner complex structure (Internal Structure), in which the foredeep substratum is involved, and an outer imbricate thrust system (Coastal Structure), detached over the Messinian evaporites. The imbricate fan is parallel to the extensional faults and lies above it, suggesting that the thrusts and associated anticlines are related to the substratum morphology. The overall structural setting has been validated with a balanced cross-section. Out-of-sequence thrusting and non-coeval deformation within each thrust sheet characterize the deformational history of the tectonic units.