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The interaction between the Apula plate and the Calabrian Accretionary Wedge in the Northern Ionian Sea: tectonic-stratigraphic evolution and implications for subduction processes.

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In the collisional setting of the Northern Ionian Sea, the Calabrian Accretionary Wedge, which represents the Southeastward prolongation of the Southern Apennines, is facing directly the subducting Apula plate, which is mainly made of Mesozoic to Tertiary Carbonate Platform. The aim of this contribution is to illuminate the structures and stratigraphic relationships between the frontal part of the orogenic belt, the foredeep and adjacent Apulian foreland. Because of the lack of exploration wells in these deep offshore basins, a detailed seismic facies analysis of six multichannel seismic profiles has been carried out to define the tectonic-sedimentary evolution of the study area.

Seismic interpretation allows to identify four main structural domains. The highly tectonized accretionary wedge is characterized by compressive tectonics. A narrow foredeep basin is filled by a thick (1,5–0,9 s TWT) Pliocene-Holocene subhorizontal succession and lies above buried normal faults. A massive carbonate succession of the Apulian Platform, shows reef and carbonate platform margin facies. A layered carbonate succession of the Apulian Platform is characterized by “intra-platform” facies and located in the easternmost portion of the area. Seismic stratigraphic analysis allows to define two main regional unconformities with characteristic relationships with structural trends: i) the Messinian unconformity, related to a regional and significant erosion associated to paleokarst processes on the exposed Mesozoic Apulian Platform, is cut by an array of normal faults affecting the entire Apulian foreland and by reverse faults in the accretionary wedge; ii) the middle Pliocene Unconformity, an angular and erosive unconformity truncating the Lower Pliocene reflectors, is affected by normal faults in the foreland and by compressive tectonics in the Calabrian wedge that is progressively advancing.

Seismic data analyses shows that the compressive tectonics is currently active in the Calabrian Accretionary Wedge and concentrated in the innermost domains where thrust faults deform the sea floor. The Mesozoic Apulian Platform is affected by normal faulting driven by flexural bending since Lower Pliocene. The new structural map shows that transpressive and positive inversion tectonics is a common deformational style in the foreland that can be associated with the Dinaric-Hellenic subduction, which is synchronous with respect to Calabrian subduction. According to these observations, the compressive tectonics affecting the Apulia plate can be interpreted as

related to both the Calabrian and Dinaric-Hellenic shortening processes. The interference of these two orogenic wedges with the Apulia Plate plays an important role in defining the tectonic evolution of the Northern Ionian Sea.