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PRELIMINARY INTERPRETATION OF THE CROP 11 SEISMIC LINE FROM THE MAIELLA AREA TO THE ADRIATIC COAST

The CROP 11 seismic line crosses through the Central Apennines from the Tyrrhenian coast (Tarquinia) to the Adriatic one (Vasto). This preliminary report focuses on the easternmost portion of the line, from the Maiella Mountain to the Adriatic shoreline.

The identification of the principal reflectors recognized between 0 and 5 seconds TWT is based on the integration of the seismic data with the surface geology and the subsurface information derived from several wells drilled in the region for petroleum exploration. In addition, commercial lines not to public domain have contributed to improve the reconstruction of the overall structural architecture. The interpreted time section has been depth-converted by means of GeoSec software, using velocity values obtained from well calibrations on the line, as well as from subsurface regional information.

Between the Maiella Mountain and the Adriatic shoreline, the CROP 11 line cuts across the outer margin of the Apennine thrust belt and the inner margin of the Apulia foreland.

The portion of Apulia foreland explored by commercial boreholes consists of a thick pile (more than 6000 metres) of Mesozoic-Tertiary shallow-water carbonates (plus Triassic evaporites) conformably overlying Permian-Triassic siliciclastic deposits (see Puglia 1 and Gargano 1 wells) and disconformably overlain by Pliocene-Pleistocene clays, sands and subordinate conglomerates. Messinian evaporites commonly occur on top of the Mesozoic-Tertiary carbonates. Due to the acoustic-impedance contrast, a continuous strong reflector generally marks the top of the Apulia carbonates (including the Messinian evaporites). Between 4 and 5 seconds TWT, a sudden change of the seismic facies occurs. A layered unit characterized by a package of well-defined continuous reflectors underlies the massive unit of the platform carbonates that shows only discontinuous irregular reflectors. This change marks the contact between the middle-upper Triassic dolomites and anhydrites and the Permian-lower Triassic Verrucano-like siliciclastic deposits.

In the Furci-Scerni area, the Pliocene-Pleistocene autochthonous deposits disconformably covering the Apulia carbonates plus evaporites are tectonically overlain by rootless nappes (Molise units). The allochthonous sheets basically consist of middle Cretaceous-upper Miocene basinal carbonates followed by uppermost Tortonian-lower Messinian siliciclastic flysch deposits. In the study region, the Molise nappes are unconformably overlain by upper Messinian to lower Pleistocene thrust-sheet-top deposits.

From the Adriatic coast to the eastern margin of the Frentani Mountains, the top of the foreland Apulia carbonates depicts for about 25 kilometres a regular homocline

gently dipping towards the west. The top of the carbonates lies at about 1.8 seconds TWT in the east and 2 seconds in the west. Moving westwards from the eastern foot of the Frentani mountains, the structural architecture of the Apulia carbonates provides evidence for a severe compressional deformation. The top of the platform climbs from 2 seconds east of Pennadomo 1 to about 1 seconds (that is less than 1000 metres below sea level) in correspondence to the Bomba area. West of the Bomba structure, the top of the platform rapidly deepens to about 2.5 seconds TWT. In this area, the Torricella Peligna 2 well stopped at 2472 metres (1697 metres below sea level) without reaching the Apulia platform. Further west, the top of the Apulia platform rapidly shallows and finally reaches the surface in correspondence to the eastern flank of the Maiella Mountain.

The deepening of the Apulia carbonates from the Maiella Mountain to the Torricella Peligna structural depression has been interpreted as the expression of a thrust-fold cascade, that is of a stack of partly overlapping ramp anticlines, derived from at least three imbricates the highest of which is represented by the Maiella anticline. The subsequent rise of the Apulia carbonates from the Torricella Peligna depression to the Bomba ridge has been interpreted as a first order back-thrust feature related to a triangle zone at the base of the platform that in late Pliocene-early Pleistocene times allowed the transfer of the tectonic transport from an hinterland-dipping thrust-flat surface (sole thrust of the Apenninic system) to a foreland-dipping ramp. It is worthwhile to recall that other authors have recently interpreted the western flank of the Bomba ridge as the footwall of a normal-fault system responsible for the deepening of the Apulia carbonates in the Torricella Peligna area.

The deep crustal structures in the area crossed by the CROP 11 are well imaged in correspondence of the Apulian foreland. A reflector is recognised at around 7 s TWT gently dipping towards west. It can be easily followed until the Bomba ridge area where complex structurations and velocity changes near the surface and at depth are present. Other deeper and subparallel reflective intervals are imaged at 10 s and at 12 s TWT. These can be assigned to a layered lower crust thick about 2.5 s (about 9 km). The Moho can be indicated at the base of the lowermost interval at 12.5 s reflection time (around 32 km depth). This discontinuity deepens towards west and reaches 13 to 14 s TWT beneath the Maiella Mountain area.