G.P. Cavinato [1], E. Di Luzio [1], R. Nicolich [2], M. Parotto [3], E. Patacca [4], P. Scandone [4]
Other CROP 11 Working Group contributors: S. Bigi [5], L. Cernobori [6], A.Mazzotti [7], E. Miccadei [8], S. Persoglia [6], D. Scrocca [1], M. Tozzi [1]

[1] CNR-IGAG Istituto di Geologia Ambientale e Geoingegneria, sez "La Sapienza" c/o Dipartimento di Scienze della Terra, Università "La Sapienza", Roma
[2] Dipartimento di Ingegneria Civile, Università degli Studi di Trieste
[3] Dipartimento di Scienze Geologiche, Università di Roma Tre
[4] Dipartimento di Scienze della Terra, Università di Pisa
[5] Dipartimento di Scienze della Terra, Università "La Sapienza", Roma
[6] Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS, Trieste
[7] Università di Milano
[8] Dipartimento di Scienze della Terra, Università G. D'Annunzio, Chieti

INTERPRETATION OF THE CROP 11 SEISMIC PROFILE: STATE-OF-THE-ART AND FUTURE PLANNING

The CROP 11 line is a deep reflection seismic line running across Central Italy from the Tyrrhenian coast near Tarquinia to the Adriatic coast near Vasto following approximately a W-E direction for about 270 kilometers. The CROP 11 Working Group has completed the interpretation of the eastern half portion of the profile, from the adriatic coast to Fucino Plain, i.e. from the foreland areas to the orographic divide of the mountain chain. Major results were obtained with regard to the reconstruction of the Apennine thrust-belt structural architecture and the definition of the foreland crustal structure.

Along the Adriatic coast the Apulia/Adria crust is seismically imaged at shallow depths by an almost reflection-free interval exceeding 2 sec TWT in thickness (about 7 kilometres) that corresponds to the Mesozoic-Tertiary carbonate sequence of the Apulia platform of the geological literature. Within the platform, few key-reflectors are imaged in correspondence to some lithostratigraphic levels as the middle Cretaceous bauxite horizons, the lower Cretaceous *Marne ad Orbitolina* horizon and the Triassic dolomites and evaporites.

The Apulian platform shallow-water carbonates and evaporites stratigraphicaly overlies Permo-Triassic continental to shallow-marine clastic deposits and subordinate limestones reached by commercial wells (Puglia 1, Gargano 1, Alessandra 1 and Assunta 1) in the adriatic foreland. These are supposed to represent the upper part of a sedimentary sequence that overlies a Baikalian-Panafrican adriatic crystalline basement belonging to the southern foreland of the Hercynian chain. Such a clastic sequence is seismically expressed by discontinuous packages of parallel reflectors with variable amplitude and frequency extended between 4.2 and 5.7 sec. TWT, beneath a relatively thin interval of discontinuous, weak and disorganised reflectors corresponding to the bulk of the Triassic evaporites.

At much greater depths, between 9.7 and 12 sec. TWT, the profile shows a thick unit with a quite sharp upper boundary characterised by evident subhorizontal strong reflectors. This interval, interpreted as representative of a layered lower crust underlies a less coherently organized unit, likely representative of a heterogeneous upper crust, showing at the base a tabular very low-reflectivity zone probably representative of a massive crystalline basement. The base of the lower crust at 11.5-12 sec. TWT is in agreement with previous results of deep-seismic-sounding

refraction experiments in the area that fix the Moho discontinuity at a depth of about 32 kilometres.

In the analysed portion of the Apennine mountain chain, a series of major low-angle thrusts have been responsible for the eastward and northeastward tectonic transport of the Majella, Queglia, Morrone-Porrara, Gran Sasso-Genzana and Western Marsica units during the lower-Pleistocene-Messinian time interval. Another major thrust was responsible for the northward transport of the Molise nappes above the aforementioned units and above the lower-middle Pliocene deposits of the Apulia foreland. In addition, a quite complex array of high-angle inverted faults and backthrusts in the brittle carbonates of the Apulia Platform accounts for the remarkable structural elevation of the Casoli-Bomba structure, generated at the end of the early Pleistocene.

Along the CROP 11 line, maximum elevation (2793 m) is reached in correspondence to the Majella Mountain, a N-S trending ramp anticline about 35 km long and 10-12 km wide developed in the Mesozoic-Tertiary carbonates of the Adriatic-Apulia domain. The Majella fold, created during the middle and late Pliocene, was re-deformed and uplifted during Pleistocene times because of the growth of an antiformal stack beneath its original base thrust. The stack growth was also responsible for an extensional reactivation of the original ramp, with consequent development of collapse faults in the backlimb of the anticline (as the Caramanico Fault). Interpretation of some commercial seismic lines crossing the anticline and tied to wells drilled within the massif has evidenced the sole thrust of the anticline is deeper than Triassic levels and enters the Permo-Triassic clastic sequence that results to be severely involved in thrusting deformation.

Interpretation of the CROP 11 profile provided a reconstruction of the overall structural architecture of the Central Apennines according to a style of thin-skin tectonics. The Permo-Triassic deposits underlying the Apulia Platform have been surely incorporated in the Apennine wedge and appear to have undergone remarkable deformation and forward transport, whereas no portion of the crystalline basement, on the contrary, seems to have been involved in the tectonic shortening.

Future planned job includes interpretation of the western half of the CROP 11 line; attention will be focussed on the Apennine sector straddling the Adriatic and the Tyrrhenian crustal domains. At a first analysis, an abrupt change in seismic facies witnessing the transition to the Tyrrhenian thinned crustal sector occurs below the Tiber Valley.