



Structural setting of the Romagna-Marche Apennine in the Adriatic foreland

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The Adriatic Sea constitutes the foreland of the Northern Apennines orogen where a deep Plio-Pleistocene fore-deep is located. The chain is the result of NE verging foreland fold-and-thrust system that migrates progressively in space and time since the Oligocene from the innermost Tuscany domains reaching the Adriatic area in the Pliocene. This geodynamics evolution created a complex structure composed by northwest-southeast-trending anticlines parallel to the coastline, stepped by lateral ramps and strike-slip faults. There is a general agreement about the presence of few main detachment levels located at several depths in the Meso-Cenozoic stratigraphic succession in the Romagna-Marche sector. Geophysical data state that the basal detachment is located in the Triassic anhydrites, an intermediate corresponds to Upper Cretaceous Marne a Fucoidi and Paleogene Scaglia Cinerea formations, while the shallower in the Messinian evaporites. The deepest detachment, located at 6-10km of depth, is the main control factor of the formation of the largest anticlines, separated by wide synclines. The shallower detachment is one of the control factors of the development of minor structures in the foredeep, affecting the thickness distribution of the Plio-Pleistocene sediments.

The main objective was to clarify the structural and geological setting of the Romagna-Marche Apennine between Rimini and Ancona, in the Adriatic off-shore.

The geophysical data were used to extrapolate in depth the main structures, define their deformation style and verify spatial and temporal relationships between them. The geological data have been integrated with subsurface data coming from reinterpreted seismic profiles (ViDEPI project), to create some on-offshore seriate geological cross-section integrating geometries, deformation styles and calibrated with thicknesses derived from wells data.

These cross-sections were balanced and restored with an average shortening that can reach 30%. In the area exists a combination of thick and thin-skinned deformation style, including anticlines with a large thickness of Plio-Pleistocene sediments in the footwall-synclinal of the thrust. In few structures, the presence of important back-thrusts can be noticed. They interest especially the Neogene layers, associated with the main thrusts.

Well highlighted is the progressive migration of the structures to the east/northeast from northernmost sections to those further South.

Reconstruction of the geodynamic evolution of this portion of the Northern Apennines chain is useful to better define the seismotectonics of the area. It can be easily integrated with data concerning the location of the seismicity to better constrain the seismologically active structures.