



Morphotectonic mapping and Quaternary landscape evolution on the eastern Central Apennines and adriatic area (Italy)

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The Apennines chain is divided into main morphostructural domains: from west to east chain, piedmont, coastal and Adriatic area. The landscape features have been developed in a complex geomorphological and geological setting, from Neogene to Quaternary, driven by active tectonics (thrust-related crustal shortening and high-angle normal faulting related crustal extension), regional rock uplift, and surface processes.

The Apennines chain shows a high-relief landscape dominated by several morphostructures including high-standing, resistant Mesozoic and early Tertiary carbonates ridges (i.e. thrust ridges, faulted homocline ridges), intervening erodible Tertiary siliciclastics valleys (i.e. fault line valleys), and Quaternary continental deposits filled basins (i.e. tectonic valleys, tectonic basins). The piedmont of Central Apennines is characterized by a low relief hill landscape (i.e. cuesta, mesa, plateau reliefs) on Mio-Plio-Quaternary terrigenous deposits, related to sin-, late-orogenic phases of the Apennines, and by post-orogenic Quaternary marine regressive deposits and fluvial continental deposit.

This work is based on morphotectonic mapping focused on the landscape and drainage evolution of the chain and piedmont area.

Local morphostructural analysis (based on field mapping and aerial photo interpretation) shows geomorphological evidence of tectonics (i.e. river bends, straight valleys, hanging and beheaded valleys, counterflow confluences) and allowed the realization of several morphotectonic maps at scales from 1:15,000 to 1:50,000 (Marsica peligna region in the chain area; Osento river basin and Aventino – Sangro river basin in the piedmont area; Tremiti islands in the Adriatic area).

Regional morphostructural analysis (based on DEM analysis and remote sensing) shows a general arrangement of the drainage network topography with mostly SW striking rivers (in the chain area) and mostly NE striking rivers (in the piedmont area), with plan abrupt bends ($>60^\circ$ - 90°) at the transition between chain and piedmont (i.e. W-E to SW-NE, NW-SE to S-N) and within the piedmont (i.e. S-N to SW-NE, SW-NE to E-W). Major long gradient variation (i.e. knick points, ks high) are located at the transition between chain and piedmont. Secondary long gradient variation are located within the piedmont area in connection with plan bends and are, in many cases, NW-aligned.

Quaternary fluvial deposits (basing on field mapping) records drainage evolution since the emersion (from Late Miocene to Early Pleistocene) of chain and piedmont. They are arranged in four to six different order of terraces (from Middle Pleistocene to Holocene). Long profile analysis shows a convergent geometry of the terraces, indicating the role of uplift on the drainage development.

On the base of morphotectonic mapping correlating landforms and Quaternary continental deposits, the drainage network of Adriatic piedmont of Central Apennines is the result of the link between streams developed in different morphostructural setting and in different time: remnants of karst and glacial paleolandscape in the chain area, tectonic valleys and basin formation, remnants of a paleodrainage longitudinal to the chain (developed in the first emersion moments of the piedmont, Middle Pleistocene), a main NE-striking consequent drainage connected to the regional rock uplift processes (Middle – Upper Pleistocene) and a secondary, mainly NW-striking, drainage coming from local, low displacement, extensional tectonics (late Middle Pleistocene –early Late Pleistocene).