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Quaternary drainage evolution on the eastern piedmont of Central Apennines (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 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 focused on the Pleistocene drainage evolution of the piedmont area and on the comprehension of the role of tectonics, that is an intriguing issue, being this area a key area for the Apennines orogen geodynamics, at the transition between compressional active tectonics areas, towards east (Adriatic), and extensional active tectonic areas, towards west (Apennines chain).
Regional morphostructural analysis (based on DEM analysis and remote sensing) shows a general arrangement of the drainage network topography with mostly NE striking rivers, plan abrupt bends (>60°-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 (Early Pleistocene) of the present piedmont. They are arranged in four to six different order of terraces (from Middle Pleistocene to Holocene), being the first order terrace (Middle Pleistocene) located at the present drainage divides between adjacent basins, recording the onset of the drainage system after the early emersion. Long profile analysis shows a convergent geometry of the terraces, indicating the role of uplift on the drainage development.
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) mostly NW-striking and SW- or WSW-striking. The correlation with fluvial terraces suggests the age of the landforms, outlining the timing of tectonics acting within the piedmont areas (late Middle Pleistocene –early Late Pleistocene).
In this view, 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 a paleodrainage longitudinal to the chain (developed in the first emension moments, Middle Pleistocene), a main NE-stiking conseguent 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).