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Tectonic geomorphology of the 21 May 2003 Zemmouri earthquake area (Mw 6.8, Tell Atlas, Algeria) : An analysis of the long-term coastal uplift

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Geomorphological, geological and structural markers attest for successive uplift during the late Quaternary along the Algerian coastal region, a section of the Africa-Eurasia plate boundary. Large and moderate shallow earthquakes with Mw $\geq$ 6 occurred on E-W to NE-SW active thrust-related-fold structures an among them the 21 May 2003 Zemmouri earthquake (Mw 6.8) that caused $\sim$0.5 m uplift on 55 km coastal. In this work, we study the correlation between the 2003 coseismic uplift with the long-term active deformation using the distribution of Quaternary marine and alluvial terraces where indicators show three pre-2003 main notch levels formed in the last 21.9 ka along with five alluvial terrace levels formed in Pleistocene. The analysis of drainage system and related tectonic geomorphology along the coastal area show over 500 small and large rivers that document the trend of present-day and past stream channels, their longitudinal profiles, the arrangement of Quaternary deposits and the response of river mouths to the successive past and recent uplift. The analysis of remote sensing images combined with high-resolution Digital Elevation Model and field observations reveal concave downward shape of most river profiles and river mouth deflections near the coastline. Data previously obtained on the coseismic deformation using coastal tectonics, seismology and geodetic (InSAR and GPS) investigations are combined to our analysis of coastal deformation. The results confirm the impact of the offshore thrust fault responsible of the coastal deformation through successive coseismic uplift with an estimated average 0.9 to 2.1 mm/year during the late Pleistocene - Holocene (Maouche et al.,2011). The short-term and long-term deformation and related surface slip distribution controls the drainage system and related distribution of Quaternary deposits. Our results indicate how the tectonic geomorphology can be a decisive marker for the identification of coastal active faults and related seismic hazard.