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EVIDENCE OF HOLOCENE TECTONIC ACTIVITY AFFECTING ALLUVIAL FILL EVOLUTION IN THE VEGA MEDIA OF THE SEGURA RIVER, SOUTHEASTERN SPAIN (WESTERN MEDITERRANEAN REGION)

Abstract: Rodríguez-Estrella T., Conesa-García C., Navarro-Hervás F., Pérez-Cutillas P. & García Mariana F., Evidence of *Holocene tectonic activity affecting alluvial fill evolution in the Vega Media of the Segura River, southeastern Spain (Western Mediterranean region).* (IT ISSN 0391-9838, 2018).

A compressive stress pattern, associated with active faults, controlling Holocene alluvial deposits was analyzed here by adopting an integrated approach focused on direct and indirect research methods, and taking the Vega Media of the Segura River (VMSR) (SE Spain) as a case study. In particular, geological reconnaissance to determine the morphology of valley edges was carried out, and geophysical methods, boreholes, hydrochemical analysis, piezometry, seismic records, and ^{14}C dating with the AMS technique were also used. This neotectonic activity responds to a compressive regime, maximum in a N-S orientation, which is manifested by dextral strike-slip faults (N125°-140°E direction), with horizontal displacements of up to 5 km, and normal faults, trending N50°-70°E with throws in the upper silt unit of up to 8 m in less than 200 m. Within the meander-belt zone of the VMSR, the age of clayey silts, at 14-15 m depth, was estimated to be between 2,754 and 7,561 cal yr BP, representing slip rates for these faults of between 0.26 and 0.53 mm/yr since the middle Holocene. Considering the whole Holocene alluvial fill in this area, the complete set of possible net slip rates comprises values from 0.12 to 0.57 mm/yr. In addition, age differences of up to 4,350 cal yr BP were found at 9 m depth in boreholes spaced less than 100 m apart. Such Holocene tectonic activity has determined the displacement of the Segura River towards the southern valley margin and the formation of sharp meander bends.

Key words: Neotectonics, Alluvial fill, Holocene, Silts, Vega Media of the Segura River, Spain.

INTRODUCTION

Rivers and alluvial plains are extremely sensitive to tectonic tilting and faulting, resulting in morphological and sedimentary adjustments (Mackey & Bridge, 1995; Hofmann & *alii*, 2011). Such variations arise because rivers change position by gradual channel-belt migration or by abrupt avulsion in response to the deformation of the land surface (Alexander & *alii*, 1994; Schumm, Dumont & Holbrook, 2000; Mack & *alii*, 2011; Hajek & Wolinsky, 2012). Such channel-belt movements have the potential to increase the proportion and connectedness of channel-belt deposits within a basin fill (e.g., Besley & Collinson, 1991; Hajek & *alii*, 2010). However, few studies on alluvial fill evolution and channel planform changes in areas tectonically active during the Holocene are available to test these observations (Holbrook & Schumm, 1999). At best, the most recent case studies are focused on the tectonic factors controlling drainage networks and channel patterns (e.g. Sagri & *alii*, 2008). More typically, in areas subjected to active normal faulting or compressional folding (e.g. the northeastern Mediterranean area and the Betics), active structures produce local or regional anticlines or uplifted blocks, separated by depressions – cut across by rivers – that alternate between incision of uplifted structures and aggradation in the subsiding areas (Macklin & *alii*, 1995). Previous studies have highlighted the influence of recent compressive tectonics on the alluvial fills in western Mediterranean valleys, associated with large NE-SW left-lateral,

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