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TÜRKAN BAYER ALTIN [1*], BEKIR NECATI ALTIN [1] & MUHAMMED ZEYNEL ÖZTÜRK [1]

CLIMATIC AND TECTONIC EFFECTS ON TERRACE FORMATION DURING THE LATE QUATERNARY IN THE UPPER YEŞILIRMAK VALLEY, NORTHERN TURKEY

ABSTRACT: ALTIN T.B., ALTIN B.N. & ÖZTÜRK M.Z., *Climatic and tectonic effects on terrace formation during the late quaternary in the Upper Yeşilirmak Valley, northern Turkey. (IT ISSN 0391-9838, 2017).*

This study was carried out in the upper course of the Yeşilırmak River, which is one of the biggest rivers reaching the Black Sea, northern Turkey. We distinguished two fluvial terraces and dated them using OSL technique. T2 is the young terrace and situated at ~11 m above the actual river (at 620 m asl). T1 is the youngest and situated at ~5-6 m above the actual river (at 605 m asl). From the lower dated terrace (T1) was dated 6735 ka, 5277 ka and 4226 ka, respectively. From the higher dated terrace (T2) was dated 24,139 ka, 22,008 ka, 12,694 ka and 11,307 ka, respectively. While the higher terrace aggraded during three important cold periods (Heinrich 2 event (H2), the Last Glacial Maximum (LGM) and the Younger Dries (YD), the lower terrace (the present floodplain) aggraded during the Holocene Climatic Optimum (HCO). The river incised during transition from the LGM to Holocene transition and after the HCO. the Yeşilırmak has incised its valley ~11 m during the last 24 ka. These results indicate an average incision rate of 1.25 mm/yr (1.25 m/ka).

KEY WORDS: Climate Change; Terrace; Incision; Late Quaternary; Yeşilırmak River.

INTRODUCTION

Sediment yields of the Yeşilırmak River, located in northern Anatolia, are driven by tectonic movement of the North Anatolian Fault (NAF) and by climate (Hubert-Ferrari & *alii*, 2002; Kazancı & *alii*, 2015). Recent works tend to emphasize climate change superimposed on tectonically driving terrace development (Bridgland, 2008, 2014; Demir & *alii*, 2012). Fluvial terraces are the abandoned floodplains of streams and rivers, and consist of unconsolidated deposits with basal unconformities known as straths and bench-like tops known as treads (Ritter & alii, 2002). Fill terraces are formed by valley aggradation and subsequent entrenchment into alluvial fills and reflect the adjustment of rivers to climatic perturbations or the lowering of base-level, the ultimate level of fluvial erosion (Jochems, 2013). In general, depositional terraces have been thought to reflect aggradation events controlled by climate or base-level change, whereas erosional terraces have been considered tectonically-controlled features (Bull, 1990). Staircase chronologies enabled the development of conceptual terrace development models, which uncover a close link between distinct fluvial processes and specific environmental (climatic) conditions (Stange, 2014). There are only a limited number of Holocene studies of fluvial development of the Yeşilırmak valley, especially its upper course (e.g., Gürbüz & *alii*, 2015; Huber-Ferrari & *alii*, 2002; Gürbüz & *alii*, 2013) and no studies on the fluvial terraces. However, there are studies of terrace formation and fluvial geomorphology related to the Kızılırmak River, which is located to the south of the Yeşilırmak and is the longest river within the borders of Turkey (Doğan & *alii*, 2009; Doğan, 2011; Görendağlı, 2011; Çiner & *alii*, 2015). Furthermore, Hubert-Ferrari & *alii* (2002) have addressed the question of determining slip rates of the NAF over various time periods using offset geological and geomorphological markers in the central section of the Yeşilırmak Basin. Erturaç & Tüysüz (2012) established the architecture of the Neogene-Quaternary basins developed along the Ezinepazar-Sungurlu Fault, which is a major offshoot of the dextral NAF zone, in the middle part of the Yeşilırmak Basin. Bozkurt & Koçyiğit (1996) documented the detailed stratigraphy and neotectonic structures of the Kazova basin, located in the upper section of the Yeşilırmak Basin,

[1] *Ömer Halisdemir University, Faculty of Science and Letter, Department of Geography, 51240, Nigde, Turkey*

** Corresponding author: T. Bayer Altin, turkanaltin@yahoo.com*

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