
Dating the Quaternary evolution of NW Anatolia, insights from and comparison between luminescence, radiocarbon, U/Th and apatite (U-Th)/He methods

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Abstract

NW Anatolia to the east of the Marmara Sea comprise the western part of the Pontide Mountain Range and bounded by the North Anatolian Fault Zone to the north and Central Anatolian Plateau to the south. The region is drained by the Sakarya River where the river's main course and its tributaries respond to the tectonic uplift, climate changes and the Black Sea level.

Within this framework we have first detailed the timing and rate of mountain building and relatively dating the emplacement of the North Anatolian Fault within the region (apatite (U-Th)/He). The formation of the fluvial terrace staircases of the Sakarya River main course and major tributaries are also studied by luminescence protocols (OSL, pulsed IRSL, Post-IR-IRSL) to date the incision rate(s) also providing insights on the differential tectonic uplift since the last 200 ka. The terrestrial deposits through the Holocene starts with the fluvial response to the abrupt rise of the Black Sea (luminescence, radiocarbon and U/Th) and also reveal information on climate changes. The isolated sedimentary units reflect the timing of significant mass movements and furthermore quantify the long term horizontal slip-rate of the North Anatolian Fault.

Considering the differences in the sedimentary units, target minerals and focus geological time, we were able to model our dating results in order to isolate the rate(s) and timing(s)

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of the forces of the earth processes forming the region. Evaluation of the dates was possible by comparing the dating methods within the same stratigraphic unit and also by its compatibility with the Quaternary geological history of the region.