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Thermochronological evidence for Mio-Pliocene late orogenic extension in the eastern Albanides

B. Muceku (1,2), M. Bernet (1), P. Van der Beek (1), G. Mascle (1) and A. Tashko (2)

(1) Laboratoire de Géodynamique des Chaînes Alpines, Université Joseph Fourier, Grenoble, France, (2) Polytechnic University of Tirana, Tirana, Albania (bmuceku@ujf-grenoble.fr).

Albania occupies a central position within the Dinaro-Hellenic alpine mountain belt. This orogen is characterized by three fundamental components: a Western Fold-and-Thrust Belt (External Albanides), a Central Belt characterized by the occurrence of ophiolitic nappes, and an Eastern Complex (Internal Albanides). The internal Albanides were affected by pre-Tertiary tectonics, and in the external Albanides the deformation started during the Eocene. This deformation is related to subduction of the Apulian plate beneath the Eurasian plate.

We used fission-track (FT) and (U-Th)/He analysis on apatite and zircon to better constrain the thermal history of this mountain belt. Apatite (U-Th)/He ages in the western and northern Internal Albanides range from 55 Ma to 24-35 Ma, being in strong contrast with younger apatite (U-Th)/He ages of 4.5 to 9.3 Ma obtained for the eastern Internal Albanides. All of these results are in good agreement with AFT ages from the same areas. The observed east-west trend, with older cooling ages in the west, and younger cooling ages in the east across the Albanides is also reflected in zircon (U-Th)/He ages. These ages range between 80-100 Ma in the north-western Internal Albanides, and 20-50 Ma in the eastern Internal Albanides. Only the higher-temperature zircon FT ages do not show any significant differences on both sides of this area. Thermal modeling based on the available low-temperature thermochronologic data, in particular the apatite (U-Th)/He ages, provide clear evidence for a phase of rapid exhumation of the eastern Internal Albanides around 3-6 Ma, reaching a rate of about 1.2 km/m.y., while the western Internal Albanides record much slower exhumation since the Eocene ($<$ 0.1 km/m.y.). We propose that the asymmetric exhumation pattern is in connection with significant late Cenozoic extension and normal-fault movement

within the Internal Albanides, an interpretation that is in good agreement with the present-day tectonic structure of this region.

This study demonstrates that the combination of (U-Th)/He and FT thermochronology is a powerful tool to better constrain the exhumation history of an orogenic wedge in the front and back of a continental subduction regime.