Uplift and active tectonics of southern Albania inferred from dating of incised alluvial terraces

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The west part of the Balkans is formed by the Albanides convergence zone that produces permanent microseismicity and frequent earthquakes reaching intensities of IX. In Albania, the Osum and Vjoje rivers cross the active graben and frontal thrust systems of the Albanides.

The effects of climatic and geodynamic forcing on their development were investigated by the means of field mapping, topographic surveying and compilation of absolute dating of alluvial terraces. We established the chronology of terraces abandonment from new (^{14}C and *in situ* produced ^{10}Be) and previously published dating (TL, ESR, U-series [1, 2, 3]).

We identified nine incised terraces units developed since the "Marine Isotopic Stage 6" (MIS 6), up to historic times. Once the climatic effect was identified, the vertical uplift has been quantified on a time scale shorter than the glacial climatic cycle. Regional bulging produces an overall increase of the incision rate from the west to the east that reaches a maximum value of 2.8 m/ka in the hinterland. Local pulses of incision are generated by activation of normal faults. The most active faults have a SW-NE trend and a vertical slip rate ranging from 1.8 to 2.2 m/ka. This study outlines the geodynamic control of the development of rivers flowing through the Albanides and mid-term neotectonic features are in agreement with the present-day NW-SE extension deduced from the GPS network [4].

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The isotopic composition of atmospheric zinc

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Zinc is emitted to the atmosphere by natural (soil erosion, volcanoes, vegetation) and anthropogenic (metallurgy, waste incineration, fuel combustion, fertilizers) sources, with both similar Zn fluxes on a global scale (~50±10 KTons/yr.). Metal concentrations in aerosols, rain, snow or epiphytic lichens are often well correlated and reflect that of atmospheric fall out fluxes. In some samples, Zn concentration is decoupled from that of other metals, suggesting independent sources or a different behaviour during transport or deposition. Trying to document the various origins of atmospheric Zn, we have analysed the Zn isotopic composition of different bio-geological samples having various Zn concentrations.

Samples were collected in an urban area of NE France (aerosols, lichens) and in Eastern Canada (rain/snow from single precipitation events, snow packs from two winter seasons, lichens). Samples yielded few ppb to hundreds ppm Zn with Al/Zn wt. ratios from near 0 to 40. As the average upper silicate crust has a mean Al/Zn > 1000, Zn originated from anthropogenic and/or other natural sources such as vegetation or volcanic material. The overall range in $\delta^{66}Zn$ values (relative to Zn JMC-Lyon) varies from 0.6‰ to -0.25‰. Lichens and aerosols from the urban area display the same $\delta^{66}Zn$ values (0.1±0.1‰), very similar to the mean composition of ore Zn (0.16±0.2‰; [1]). Lichens from remote area in Canada yielded heavier Zn with $\delta^{66}Zn$ from 0.25 to 0.6‰, towards values reported for Russian lichens (1±0.2‰) sampled near a mining/process plant [2]. Zinc retrieved from snow packs (from ca. 40000 km^2 in the St. Lawrence valley) have very homogeneous $\delta^{66}Zn$ (-0.02±0.04‰, n=9), whereas single precipitation samples have statistically lighter Zn (-0.18±0.10‰; n=7). This suggests that dissolved (light) and solid (heavy) atmospheric Zn species may have an overall different isotopic composition. Low $\delta^{66}Zn$ may originate from th192 input of refined Zn and/or automotive circulation whereas high $\delta^{66}Zn$ might come from industrial process residual Zn or the contribution of organic aerosols from vegetation.

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