Significance of high-elevated planation surfaces in interpreting thermotectonic evolution of the mountains.

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Low-temperature thermochronometers, such as apatite fission track (AFT) and (U-Th)/He dating, are commonly used to reconstruct the mode of landscape evolution and mountain building. Correct interpretation of thermochronological data still remains critically dependent on other geological constraints, for instance presence of sedimentary records. Difficulties arise when appropriate constraints are only sparsely preserved, as it is often the case in many geological settings, such as old cratons or exposed crystalline areas. In these cases, it is essential to use another kind of constraints, for instance geomorphic markers.

The target of this study is Corsica, which consists of well exposed Variscan crystalline basement. Despite of numerous low-temperature thermochronological studies, the issue of its low-temperature evolution is still unsatisfactorily constrained due to scarcity or lack of stratigraphic constraints. There are, however, occurrences of high-elevated remnants of planation surfaces preserved at elevation of more than 2000 m a.s.l., which are used as reference horizons, since it is accepted these quasi-planar landforms represent the end-product of long-term planation near former base-level.

By combining the AFT and apatite (U-Th)/He data from the planation surfaces with interpretations from landform analysis and stratigraphy, we attempt to reconstruct the geodynamic and morphotectonic evolution of the island, the issues that cannot be solved by single disciplines alone.

By using our integrated model we show that that the high-elevated planation surfaces represent the relics of an erosion surface, which formed on the Variscan crystalline basement during the period of tectonic quiescence lasting from the mid-Cretaceous to the Early Paleocene. In the Eocene during the Alpine collision, the erosion surface was partly destroyed in the subduction zone and partly "conserved" beneath the foreland sediments. The present-day topographic relief was created from Oligocene to Miocene times, when the surface was segmented by faults into numerous blocks that were individually exhumed, uplifted, and re-exposed to erosion. The uplift was accompanied by valley incision at the expense of the erosional surface remnants.