

ALPINE EXHUMATION DETERMINED BY FISSION-TRACKS ANALYSIS AND PETROGRAPHY OF TERTIARY SANDSTONES OF THE VENETO FORELAND ALONG THE TRANSALP PROFILE

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Orogenic sediments provide much information about uplift and erosion of the adjacent mountainous belts. As necessary requirement, burial temperatures reached by the investigated sedimentary successions have to be significantly lower than the total annealing temperatures (about 120° C for apatite and more than 250° C for zircon). In this study, the arenite petrography has been integrated with detrital fission-track geochronology, which utilizes the fission-track ages of single detrital grains (mainly apatite and zircon) to identify the source region and to quantify its thermochronological evolution.

The southern end of the TRANSALP profile crosses the Oligo-Miocene succession of the venetian foreland basin. According to MASSARI et al. (1986), the basin fill history can be divided into two stages: from Chattian to Langhian, the basin represents the foreland of the NW-SE-trending Dinaric chain; from Serravallian to Recent, it was incorporated into the south-vergent South-Alpine chain. The first stage is characterized by the presence of a wide terrigenous shelf and the unconformities recognized have been regarded as dominantly eustatic (MELLERE et al., 2000). In the second stage, as a response of the South-Alpine uplift, there is an abrupt increase in subsidence rate and the shallowing upward of the stratigraphic succession attests the rapid filling of the foredeep. Whereas the Chattian-Langhian succession is up to 800 m thick, the uppermost stage is represented by 3000 m of sediments. These estimates have been confirmed by analysis of organic matter (FANTONI et

al., this volume) and by apatite fission-track data, which show a low degree of annealing for the oldest investigated sample (Langhian).

Petrographic and fission-track data confirm the two-phase evolution of the Venetian foreland basin. The Chattian to Langhian samples are predominantly quartzolitic, with some minerals typical of medium-grade and low-grade metamorphic rocks. Apatite fission-track data show distinct sources but most of the ages range in the Paleogene. These data suggest that main source rocks were represented by Penninic and Austroalpine nappes. Minor input comes from the South-Alpine chain which was probably submerged. From the Serravallian onwards, active thrusting, uplift and erosion of the South-Alpine chain are marked by a change of the arenite composition, with an abrupt increase of dolostone grains. Apatite fission-track data again suggest the presence of more sources but most of the ages are Mesozoic, indicating a source region not affected by Alpine metamorphism. A similar age pattern has been revealed by zircon fission-track analysis from modern sediments collected in the Brenta and Piave rivers. These data demonstrate that no major paleographic variations occurred from the Late Miocene onwards in this sector of the South-Alpine chain.

References

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