



Long-term subsidence, cooling, and exhumation history along the South Atlantic passive continental margin in NW-Namibia

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In northwest Namibia the Kaoko Belt is one of the most important Precambrian crustal segments that have stored the subsidence, cooling, and exhumation history of Namibia since the Neoproterozoic. ZFT-ages are processed to give new insights on this early evolution. Paleozoic to Mesozoic sedimentary rocks of the Karoo Supergroup and the Lower Cretaceous volcanic rocks of the Etendeka sequence overlay the Proterozoic metamorphic and intrusive rocks (1). New apatite fission-track (AFT) ages range from 390.9 (17.9) Ma to 80.8 (6.0) Ma. Along the coast apatites of Proterozoic rock samples reveal the youngest ages. Further inland the ages increase significantly. In addition, rapid change of AFT-ages occurs on both sides of major thrust and shear zones.

Using the oldest thermochronological data the revealed t-T paths indicate a long era of exhumation, starting at the end of the Pan-African Orogeny in the Neoproterozoic and continuing into the Permo-Carboniferous. The subsequent sedimentation of the Karoo Supergroup initiates a new era of subsidence until the end of Triassic (2). The subsequent period of denudation ends abruptly with the rapid deposition of the Etendeka basalts in the Early Cretaceous (3). The maximum thickness of the Etendeka volcanic suite has been estimated, using the apatite fission-track data, to about 3.2 (1.2) km. With the ongoing opening of the South Atlantic and the formation of the continental margin the Kaoko Belt went through a rapid cooling event starting ~ 130 Ma and ending ~ 80 Ma, at a mean rate of 0.034 km/Ma for the western, and 0.018 km/Ma for the northern and eastern Kaoko Belt. This cooling event was accompanied by a reactivation of major fault zones, like the Purros Mylonite Zone (4). Thereafter, stable conditions were established, with denudation rates generally lower than 0.010 km/Ma, until the Neogene, where a second cooling event led to increased exhumation rates around 0.042 km/Ma. The total amount of denudation in the last 130 Ma has been estimated to ~ 2.7 km in the northeastern and ~ 4 km in the western Kaoko Belt.

References

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