

P-T paths in Pan-African metapelites of the Kaoko belt, Namibia

GRUNER, BIRGIT B., OKRUSCH, MARTIN and WILL, THOMAS M.
Mineralogisches Institut, Universität Würzburg, Germany

The Kaoko belt of northwestern Namibia, part of the late Neoproterozoic mobile belt system of western Gondwana, consists of a Pan-African volcano-sedimentary sequence and underlying basement rocks of Archean to Mesoproterozoic age. During the Pan-African orogeny basement and cover experienced polyphase deformation and metamorphic overprint, increasing in grade from greenschist to granulite-facies conditions. From east to west, the following metamorphic zones can be distinguished, based on mineral assemblages in metapelites: (i) garnet, (ii) staurolite, (iii) kyanite-staurolite, (iv) kyanite-sillimanite, (v) sillimanite-muscovite, (vi) sillimanite-K-feldspar, and (vii) garnet-cordierite-sillimanite-K-feldspar zone.

The metamorphic evolution in each of these zones were reconstructed using conventional geothermobarometers, petrogenetic PT grids in the system KFMASH and KMnFMASH as well as PT pseudosections for the bulk chemistry of typical metapelites. These pseudosections, in combination with prograde growth zoning of garnet, observed peak mineral assemblages, and retrograde mineral formation enables a detailed reconstruction of clockwise PT path segments experienced by these rocks. The following peak metamorphic PT conditions were determined: 8-10 kbar/500-550°C for the eastern, 7-9 kbar/550-650°C for the central, and 4-6 kbar/650-750°C for the western Kaoko belt.

Consequently, two different types of metamorphic evolution can be distinguished in the Kaoko belt: a medium to high-T/medium-P, Barrovian-type evolution in the eastern and central Kaoko belt, and a high-T/ low -P, Buchan-type evolution in the western Kaoko belt. The boundary between these two metamorphic types coincides with the Puros lineament, a NNW-SSE striking structure ranging over a few km in the central Kaoko belt. The geodynamic significance of these results is discussed.