Metamorphic evolution of the pre-Pan-African Epupa Complex, Namibia

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Within the Pan-African Damara Orogen of Namibia several pre-Pan-African basement complexes occur. One of the largest is the Epupa Complex straddling the border to Angola. The Epupa Complex consists of high-grade metamorphic gneisses which are intruded by the Kunene Anorthosite Complex. In the area south of the Kunene Anorthosite Complex the Epupa Complex can be subdivided in granulite facies and upper amphibolite facies rocks separated by late cataclastic shear zones. In the western part of the granulite area an interlayering of felsic, metapelitic and mafic granulites occurs, whereas the eastern part consists of mafic granulites.

Metapelites display the peak metamorphic mineral-assemblage garnet - sillimanite - perthitic K-feldspar - quartz - rutile ± plagioclase. Garnet is surrounded by spectacular symplectites of cordierite + orthopyroxene indicating the reaction garnet + quartz = cordierite + orthopyroxene. The symplectite in turn is rimmed by granular orthopyroxene. Another product of the breakdown of garnet are rims of cordierite pointing to the reaction garnet + sillimanite + quartz = cordierite. Both reactions are characteristic of an isothermal decompression. This process is followed by the growth of new euhedral garnet indicating late-stage cooling. Decompression textures were also recorded in felsic granulites: between peak metamorphic garnet and orthopyroxene plagioclase rims were formed or garnet is surrounded by symplectitic plagioclase + orthopyroxene.

Conventional geothermobarometry leads to a temperature of ≈ 800°C and a pressure of ≈ 10 kbar for the peak metamorphic granulite facies event. The P-T-evolution is modelled using P-T diagrams and P-T pseudosections in the KFMMnASH-system.