Journal of Geosciences, Osaka City University
Vol. 33, Art. 3, p. 69-107
March, 1990

Sequence of Deformation and Metamorphism of Granulites of Sri Lanka*

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(with 1 Table and 13 Figures)

Abstract

Various L-S and folding structures of mostly granulite facies rocks from central to southwestern-southern Sri Lanka, mainly in the areas around Kandy and Horana were studied from field evidence and geometrical analysis. Metamorphism during the deformations were preliminarily analysed based on microstructures of rocks under the microscope, published geochronological data were discussed, and the following conclusions are obtained.

The earliest D_1-D_2 deformations include more than two deformations, although their differentiation was difficult, such as rootless, isoclinal and close to tight overturned foldings with their hinges plunging generally northwest or southeast but sometimes in various directions. The earlier microstructures during D_1-D_2, formed possibly during ca 1800–2200 Ma, include xenocrystic minerals such as biotite, ilmenite, and sillimanite showing a preferred orientation in helicitic garnet porphyroblasts, and xenocrystic kyanite, staurolite and corundum showing no preferred orientation in the same porphyroblast in the garnet-sillimanite gneiss and in some sillimanite-bearing garnet-biotite gneisses. These microstructures predate the banding and were formed partly under the high shearing tectonics and partly, the high pressure conditions of the kyanite field. The later microstructures during D_1-D_2, formed possibly during ca 1100 Ma, are minerals which parallel the major banding structures of the rock. The breaking down of garnet into orthopyroxene plus plagioclase is the typomorphic change under the lower pressure conditions of the granulite facies. D_3 is the major upright folding generally in the NW-SE direction. Microstructures during D_3, formed possibly during ca 700 Ma, are the recrystallization of biotite and quartz in the area around Kandy, and biotite, quartz, orthopyroxene, or cordierite in the area around Horana along the younger foliation either paralleling the banding or the axial surface of the major upright folds, under the amphibolite to the granulite facies conditions. D_4 is gentle foldings and ductile faultings of various directions often associated with granitic veins. Microstructures associated with D_4, formed possibly during ca 450–600 Ma, are the alteration of garnet or orthopyroxene into biotite plus quartz along the faint schistosity inclined from the pre-existent s-planes belonging the D_1-D_2 or D_3, under the amphibolite facies conditions. The charnockite in the making, found sporadically throughout the survey areas as a result of some local conditions, is considered to belong the D_4 events. The microfractures filled with calii materials and the scanty development of chlorite, sericite, zoisitic