A B S T R A C T

The thesis embodies the results of detailed investigations of Precambrian granitic rocks and associated metamorphites occurring around Channapatna-Maddur (between Lat $12^{o}30'30''$ to $12^{o}45'$ N and Long $77^{o}3'8''$ to $77^{o}15'$ E included in the Survey of India, toposheet No. 57 H/2) in Bangalore and Mandya districts, Karnataka, India.

An attempt has been made in the present work to outline the evolution of the granitic rocks and associated metamorphites with imprints of deformation and metasomatic replacement leading to in situ granitization.

The polymetamorphic sequence includes magnetite quartzites, schistose quartzites, pyroxene granulites, calc granulites, cordierite gneisses, amphibolites, migmatites and gneisses with pegmatites, aplites and quartz veins. A geological environment that consists of Peninsular gneisses, migmatites and the later formed Closepet granites together with the relict exposures of rocks equivalent to Dharwar group, is studied in detail.

Nondiastrophic structures in the area include the occurrence of poorly preserved and modified relict stratification. Diastrophic structures comprise different types of planar structures, folds of diverging plunge and different types of linear structure. The structures on macroscopic, mesoscopic and microscopic scales reveal the convincing evidences of superposed deformation. The Precambrian complex has imprints of at least two generations of large scale folding F_1 and F_2. The NW-SE trending tight isoclinal folds (F_1) with variable axial surfaces (S_2) have been involved in the development of open disharmonic folds (F_2) by superposition. The F_2 deformational episode has been followed by tectonic movements (probably of restricted distribution) that formed the conjugate folds (F_3).

Evidences of retrogressive metamorphism are furnished by reversion of sillimanite to muscovite, diopside or augite to amphibole, biotite and garnet to chlorite. The regional granitization of the complex might have been primarily responsible for effecting this mineralogical regression in migmatites and granite gneisses.

The detailed petrographic study of the various rock types suggests a large scale modification of the pattern of regional metamorphism by migration and fixation of elements leading to in situ granitization of pyroxene granulites, magnetite quartzites and amphibolites. The migmatites represent an intermediate stage of granitization of preexisting metamorphites with relicts of unabsorbed paleosome.

The study of geochemical variations of granitic rocks based on the modal and detailed chemical analyses of representative samples reveals that granitization is chiefly due to alkali metasomatism (soda followed by potash).

Trace element (partial) study of the transition series of rocks (ortho-amphibolites, migmatites, pyroxene granulites and granitic rocks) points to at least two episodes of metamorphism followed by granitization. The enrichment and the depletion of some of the trace elements have been observed during granitization.

Pegmatites and quartz veins show that they are mostly replacement types and are indicators of granitization in phases. The quartz veins of nondilational nature occurring within the metamorphites and gneisses have originated due to metasomatic metamorphism towards the closing stage of granitization of the preexisting rocks.

It is thus, concluded that the different types of gneisses (Peninsular gneisses) have been formed due to in situ granitization of the preexisting metamorphites and are syn-to late-kinematic with reference to F_1 folds. The younger granites (Closepet granites) formed due to later metasomatic activity (mainly potash metasomatism) and anatexis and are syn-to late-kinematic with reference to F_2 folds.