

# Evidence for Post-Metamorphic Metasomatism of High-Grade Orthogneisses from Sri Lanka

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## Abstract

Here we discuss the post-metamorphic metasomatism of high-grade orthogneisses by studying granite-looking, pink-coloured microcline-bearing rocks exposed around Ambagaspitiya, Sri Lanka. These rocks are medium- to coarse-grained and are more or less homogeneous and isotropic. Textural and petrographic analyses clearly show that these special rocks are neither deformed nor metamorphosed and that they are not any kind of intrusive rocks. The present study shows that these rocks have formed through K-metasomatism of once intensely deformed and metamorphosed granodiorite, tonalite, monzodiorite and quartz monzodiorite. The modal compositions of most of these metasomatic rocks of Ambagaspitiya are very similar to those of syenite, quartz syenite, monzonite, quartz monzonite and quartz monzodiorite.

All the original metamorphic rocks – namely granitic gneiss, metagranite, metagranodiorite, metatonalite, metamonzodiorite, metaquartz monzodiorite, metadiorite, basic dikes and metapelites – had undergone at least five ductile deformations,  $D_1$  to  $D_5$ , and had been metamorphosed under upper amphibolite to granulite facies conditions prior to the metasomatism. Almost all the parent metamorphic rocks had acquired a well-developed gneissic foliation ( $S_2$ ) and had suffered at least two intense folding events ( $F_3$  and  $F_4$ ) before the metasomatism occurred. All the metamorphic and deformational fabrics of affected metamorphic rocks have been completely or partially obliterated by the metasomatism. This indicates that the metasomatic process post-dates all ductile deformations ( $D_1$  –  $D_5$ ) and the regional metamorphism. Of the parent metamorphic rocks, metagranodiorite, metatonalite, metamonzodiorite and metaquartz monzodiorite have undergone intense metasomatism. It is shown that the metasomatism has nucleated along late-stage, post- $D_5$  shear zones, which may form an interconnected network. Potassium-bearing metasomatic fluids, derived from a deep-seated K-rich source, may have migrated along these shear zones. The fluids which entered the shear zones have pervaded the orthogneisses through foliation planes and along grain boundaries and microcracks in minerals, transforming the host gneisses to metasomatic rocks. The main metasomatic transformation has taken place through the replacement of metamorphic plagioclase and plagioclase-quartz by microcline and through formation of myrmekite. Further studies are necessary to unravel the nature, composition and the source of these late-stage K-rich fluids in the lower crust.

**Key words:** Orthogneisses, shear zones, post-metamorphic fluids, K-metasomatism, myrmekitization.

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