

**Cordierite granulites of Sri Lanka and southern India:
Evidence for decompression and CO₂ influx
into the deep crust**

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Cordierite is a common accessory in the granulite facies supracrustals in Sri Lanka and southern Kerala (south India). It occurs associated with orthopyroxene and garnet in anhydrous granulites (charnockites) and with sillimanite and graphite in aluminous metapelite (khondalites). The coarse cordierite-orthopyroxene association in charnockite is of particular interest, as it shows field characteristics similar to that of incipient charnockites, developed along structurally controlled fluid pathways. Cordierite is often a product phase and it is seen rimming garnet, or in symplectitic intergrowths with hypersthene or quartz. Microstructures, phase equilibria considerations, P-T computations, and tectonic evaluation suggest that the cordierite-forming reaction in these localities was triggered by decompression during isothermal uplift tectonics associated with crustal extension. Cordierite is known to trap volatiles and alkali ions in its crystallographic framework, and hence the channel fluid in cordierite has been a monitor for characterising metamorphic fluids. Here we report the occurrence of abundant CO₂-rich fluid inclusions in cordierites from both the terranes, and differentiate the channel and inclusion fluids based on stepped thermal analytical results of pure cordierite grains. We identify the cordierite crystallization in these granulites as being intimately linked with CO₂ influx into the lower crust.