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Metamorphic P-T evolution of garnet-clinopyroxene rocks from the Gondwana collisional orogen in southern India

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The East African - Antarctic Orogenic Belt, which includes Madagascar - Southern India - Sri Lanka - East Antarctica regions, is regarded to have been formed by complex subduction-accretion-collision tectonic events related to the amalgamation of Gondwana Supercontinent during Neoproterozoic. The Palghat-Cauvery Suture Zone in southern India is known as a major suture zone that formed during the closure of Mozambique Ocean at ca. 530-550 Ma. The dominant lithologies of the suture zone are felsic to intermediate orthogneiss, metasediments, and mafic-ultramafic suites. Particularly, the occurrence of mafic-ultramafic suites (ophiolite or layered intrusion) is a unique character of the suture zone compared to surrounding granulite blocks and cratons. Here, we report new petrological data of metagabbroic garnet-clinopyroxene rocks from southern India and discuss its petrological implications. Mineral assemblages of the rocks are garnet + clinopyroxene + ilmenite + plagioclase + quartz with retrograde hornblende. Similar rocks and textures have been reported from the Palghat-Cauvery Suture Zone in South India (Nishimiya et al., 2008; Saitoh et al., 2011), Highland Complex in Sri Lanka (Osanai et al., 2006; Takamura et al., 2014), and Lutzow-Holm Complex in East Antarctica (Saitoh et al., 2012). However, temperature and pressure conditions inferred for the metagabbro based on geothermobarometry are 680-710C and ˜9 kbar, which is significantly lower than the results of previous studies (>12 kbar, >800C). The metagabbro could be an exotic block with discrete P-T evolution trapped during the formation of the Palghat-Cauvery Suture Zone.

Keywords: granulite, P-T path, Gondwana