Migmatites resulting from mass and heat transfer by melt migration

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Migmatites, formed by anatexis in high-grade metamorphic terranes [1], are divided into two broad types [2], metatexite migmatites (metatexite) and diatexite migmatites (diatexite). Based on the petrological and geochemical (e.g. zircon Lu–Hf and whole-rock Nd–Sr isotope) data for migmatites from the Higo metamorphic terrane, central Kyushu, Japan, the metatexite is interpreted to have formed by *in situ* partial melting in which the melt did not migrate from the source, whereas the diatexite included an externally derived melt with a juvenile component [3, 4].

The Cretaceous high-temperature metamorphism of the Higo metamorphic terrane is interpreted to reflect emplacement of mantle-derived basalts under a volcanic arc along the eastern margin of the Eurasian continent, and mass transfer and advection of heat *via* hybrid silicic melts from the lower crust (Fig. 1). The hybrid silisic melt due to mixing of crustal and residual silicic melts at lower crustal depths, which dissolved apatite, zircon, and monazite, transferred the significant mass to mid-crustal depths through diatexite magma channels [4]. The effective heat transfer by melt migration within migmatites expanded a high-temperature region with a lower apparent thermal gradient [5, 6].

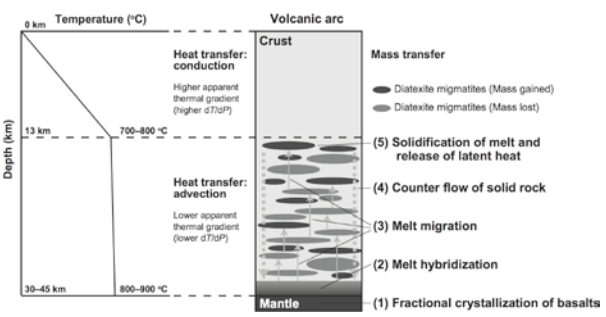

Figure 1: Genesis of migmatites and mass and heat transfer (modified from Suga *et al*. [4] and Miyazaki [6]).

[1] Sawyer *et al*. (2011) *Elements* **7**, 229–234. [2] Brown (1973) *Proc. Geol. Assoc* **84**, 371–382. [3] Maki *et al*. (2014) *J. metamorphic. Geol* **32**, 301–323. [4] Suga *et al*. (2016) *Int. Geol. Rev* **58**, 405–423. [5] Miyazaki (2004) *J. metamorphic. Geol* **22**, 793–809. [6] Miyazaki (2007) *The Island Arc* **16**, 69–82.