

## Permian pyroxenite dykes in a harzburgite associated with eclogites (Austroalpine Unit, Eastern Alps): origin and and tectono-metamorphic evolution constrained by zircon U–Pb ages

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The Upper Austroalpine Siegraben structural complex (SSC) represents a Variscan basement fragment that underwent a Cretaceous eclogite-facies metamorphism (Putiš *et al.*, 2002 and references therein) and is composed of mafic eclogites, ortho- and paragneisses, marbles and rare peridotites. This fragment contains Permian (256±3 Ma, sample GS-8; zircon SIMS U–Pb age) granite veins. The Cretaceous subduction was dated at 90±4 Ma (s. SW-1) on zircon from an Ordovician gabbro-eclogite (469±5 Ma, s. S-202-3) exposed between Siegraben and Schwarzenbach, ca. 80 km south of Vienna.

Websterite and garnet ortho- and clinopyroxenite dykes crosscutting a km-size fragment of harzburgite occur in the hanging wall of the SSC between Steinbach and Gschorrholtz villages in southeastern Austria. The dyke textures reflect P–T conditions changes in the mantle, subduction channel and accretionary wedge environments, which the studied mantle fragment passed through. A clinopyroxenite dyke was dated at 252±2 Ma on zircon by U–Pb SIMS. The depleted mantle source of the dyke is constrained by εHf(t) values of 16–8, and the dykes' petrogenesis is most likely related to sub-crustal cumulate-type melts. Magmatic melts of highly evolved ortho- and clinopyroxenites could be products of a partial melting of a hydrated (ancient Variscan, SSZ?) peridotite.

The porphyroclastic Cpx1 (10–13 mol.% Ca-Ts), Opx1, Spl1 and Amp1 (Mhb or Prg) are inferred remnants after magmatic phases. They contain Ti-Spl and Ilm exsolutions due to a cooling of the dykes in the mantle Spl stability field (D0-1 stage). Garnet exsolutions in Cpx1, Opx1 and Amp1, and Cpx exsolutions in Amp1, demonstrate a continuous cooling and/or pressure increase (D0-2 stage). The Grt coronas around Spl1, Opx1, Cpx1 and Amp1, and the granoblastic matrix of Grt (or Cr-Spl in websterites), low-Al Cpx, low-Al Opx, Fe-enriched Ol, Zo, Ky, Rt, Prg, ± Mgs and Dol, record a subduction (D1) stage. The Cpx–Grt or Amp–Grt symplectites replacing the Cpx1 and Amp1 rims suggest a HP–HT exhumation (D2-1) stage. The Grt (or Cr-Spl) replacement by Spl, and Opx1, Cpx1 and Prg replacement by Ol–Spl, Opx–Spl or Prg–Spl symplectites indicate continuous exhumation (D2-2) stage. The MP/MT conditions of an accretionary wedge were estimated from Tr, Grs-rich Grt, Sr-Ep, Czo, Cl-Ap, Ttn, Chl, Srp and Tlc assemblage (D3 stage). Anticlockwise P–T path was reconstructed for the D0 to D1 stages, followed by almost an isothermal exhumation (D2) and emplacement in the Cretaceous accretionary wedge (D3). The Perpele\_X pseudosection P–T calculation from a clinopyroxenite dyke yielded 850–825 °C and 25–28 kbar (D1).

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### REFERENCES

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