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SHRIMP U-Pb zircon dating of gabbro and granulite from the peridotite massif of Lanzo (Italy).

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The Lanzo peridotite in the Western Alps is one of the largest plagioclase peridotite massifs. Its oceanic and Alpine metamorphic evolution have been matter of debate. The massif is subdivided into 3 parts, the southern, central and northern body, which are separated by shear zones. The numerous gabbroic dikes in the Lanzo massif can be separated into 2 groups ...().()(Boudier and Nicolas 1972; Boudier 1978)): (I) an oldest 'indigenous' group of troctolite to olivine gabbro, frequently occurring 'en echelon' with fuzzy contacts to the surrounding lherzolites and interpreted as genetically related to the plagioclase lherzolites. (II) An intrusive group of troctolite, olivine gabbros, gabbronorites to Fe-Ti gabbros, with usually sharp contacts towards the peridotite. We sampled zircon-bearing Fe-Ti gabbros from the second group in the central and southern part of the massif. In addition, one granulite sample situated in the serpentinized NW part of the massif was studied.

Fe-Ti gabbros contain a magmatic paragenesis composed of brown amphibole, ilmenite, pyroxene, apatite and zircon and a metamorphic paragenesis with garnet, chlorite, chloritoid, talk, and retrograde green amphibole. Zircons were studied by cathodoluminescence (CL) and analysed with SHRIMP II for U-Pb dating and LA-ICP-MS for trace element determination. CL imaging of zircon reveals magmatic zoning cross cut by a unzoned recrystallized domains. U-Pb dating of three samples indicates an age of magmatism of 160 to 163 Ma, similar to other Western Alps ophiolitic gabbros. In one sample, some zircon domains are as young as (150-151 Ma). Trace

element chemistry of zircon by LA-ICP_MS indicates a positive Ce anomaly and a variable Eu negative anomaly. The Eu anomaly suggest plagioclase fractionation in the magma and is in line with the magmatic origin of the zircon. The recrystallized domains show some degree of trace element perturbation.

The granulitic sample is mainly composed of quartz, garnet, albite, white mica, rutile, titanite, ilmenite and chlorite. CL images of the numerous zircon crystals reveal metamorphic rims surrounding detrital cores. The cores yield ages from $\sim$ 400 to $\sim$ 1670 Ma as expected for a detrital population. CL imaging indicates two different domains in the metamorphic rims. A dark inner rim surrounding the detrital core, which was dated at $\sim$ 304 Ma, and an outer rim dated at around 293 Ma. Such metamorphic ages are well known in the Austroalpine basement such as Ivrea or Sesia Zones. Zircon REE patterns from the granulitic sample show a positive slope from Gd to Lu for the core and a near flat pattern for the external rim. Analyses also indicate lower content of U for the core (132 to 1267ppm) than the rim (most around 2000 ppm). The internal and external rims can be distinguished on the basis of different U contents and trace element composition (higher U and lower HREE in the internal rim). This indicated that the two rims formed in different conditions, and thus their age reflects different metamorphic stages. The presence of a granulite body zone within the Lanzo serpentinite, testify for a complicated history of the Lanzo massif. This body is probably derived from the nearby Sesia Zone and was incorporated in the serpentinite during Jurassic tectonics or, more likely, in Alpine times.

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