

# Le magmatisme basique dans la formation du Métailler, Alpes valaisannes: geochronology, géochimie et implications géodynamiques.

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## Abstract

The Métailler formation belongs to the Mt Fort nappe basement, in the Middle Penninic domain of the Alps. Previously, little was known about the age or geodynamical setting of this formation. A detailed mapping was performed in the area of the Vallon de Louvie which has not previously been mapped. At the same time, samples were taken from the surrounding area in order to compare to the previous studies and mappings. Mapping of the Vallon de Louvie revealed a heterogeneous volcano-detritic sequence. This sequence contains pillow-lavas and is intruded by complex gabbro bodies.

The Vallon de Louvie gabbros have composition of continental tholeiites and show a slightly enriched signature similar to E-MORB. They followed a tholeiitic trend of differentiation marked by progressive enrichment in Fe and Ti, leading to emplacement of Ti-Gabbros and finally segregation of small volumes of Si-enriched liquids. The gabbro bodies are formed of multiple sills that are likely to have successively emplaced in a warm environment and over a short time interval to allow *in situ* differentiation. The age of an albitic dikelet and an albitic segregation at the top of a sill were obtained by the U/Pb on zircon method : 456.7 +/- 5Ma and 462 +/- 4-7 Ma respectively.

The mafic volcanic component in the sediments seems to be linked to the magmatic event that produced the gabbros. The time interval defined for the deposit of the volcano-detritic sequence is constrained by a detrital zircon study where the youngest zircon is 456 +/- 9 Ma old (an important group has an approximate age of 475 Ma) and the age of the gabbros : 460 Ma.

The Métailler formation should thus have a place in the N-Gondwanian margin at the Ordovician. It is a basin with a strong continental influence (receiving Archean detritic zircons), close to a mafic volcanic center possibly linked to the extensional faults forming the basin itself. Based on the geodynamic reconstitutions of Stampfli et al. (2011), the Métailler basin could represent the eastern part of the Rheic ocean rift, a very subsident basin created at the back-arc of the active margin of the N Gondwana.

The Membre de Cleuson (stratigraphic formation overlaying the Métailler formation) shows rhyolitic volcanics emplaced at the surface intercalated by polygenic conglomerates. These typical facies form the Cleuson area and can be found in the Métailler formation itself around the Grande Dixence dam. The Pte d'Allèves rhyolitic facies were dated by U-Pb on zircons: 267Ma. This date confirms that they cannot belong to the Métailler formation, but are inserted in it by a fold or a thrust slice of the Membre de Cleuson. This hypothesis had already been proposed by

Schaer (1959). If the contact between these two formations is a stratigraphic one, it thus shows a 200Ma gap in the sedimentation.

The study of zircon recrystallisation features in the albitic dikelets of the Métailler showed a metamorphic dissolution-recrystallisation process. We observed poikilitic recrystallised zones and microzircon agglomerates either around magmatic cores or forming pseudomorphs of Zr-rich minerals. Zirconium seems to be mobile at small scales at temperatures around 500°C.

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