

**THE "BOZENER QUARZPORPHYR" (SOUTHERN ALPS, ITALY):
SINGLE ZIRCON U/Pb AGE EVIDENCE FOR 10 MILLION YEARS OF MAGMATIC
ACTIVITY IN THE LOWER PERMIAN**

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During the Permian the Southern Alps were affected by a prominent igneous activity that produced voluminous basic to acidic volcanic and plutonic rocks. The magmatism originated during a period of post-orogenic extension and transtensional faulting controlling magma ascent and emplacement.

The "Bozener Quarzporphyr", well known for its usage in road and house construction, forms part of the Atesina Volcanic District (AVD). Together with the Monte Luco volcanics, and the Cima d' Asta, Bressanone, Ivigna, Monte Croce and Monte Sabion intrusives, it constitutes a major part of the Permian magmatism in the central-eastern Southern Alps. The rocks represent a continuum of lithologies ranging from basaltic andesites to rhyolites, and from gabbros to monzo-granites, respectively, and where acidic varieties are more common. The metaluminous to slightly peraluminous rocks exhibit mineralogical, petrographical, and geochemical characteristics of a high-K calc-alkaline suite. Isotopic and geochemical evidence support a hybrid nature of both volcanic and plutonic rocks being derived by complex interactions between mantle melts and crustal material [1].

Published radiometric age determinations of different volcanic and plutonic rocks range between 297 Ma and 270 Ma (Rb/Sr and K/Ar biotite ages, U/Pb zircon ages, Th/Pb allanite ages [2, 3, 4]). For the Collio Basin single zircon U/Pb ages for the magmatic activity range between 283 ± 1 Ma and 281 ± 2 Ma [5]. A somewhat younger volcanic activity is recorded in the Monte Luco sequence, as suggested by palynostratigraphic "ages" (260 Ma–255 Ma) determined on lacustrine sediments (Tregiovo Formation) intercalated with rhyolitic ignimbrites [6].

The volcanics of the AVD have not been dated directly previously. Therefore, a detailed single zircon U/Pb study was made in order to establish the absolute age and duration of the AVD igneous activity (reported errors are ± 2 sigma).

In concordance with field evidence the oldest volcanic activity of the AVD is recorded in the Formazione di Plazzoles: Ignimbritic rhyolites forming intercalations within the Ponte Gardena Conglomerate are dated at 284.9 ± 1.6 Ma. Rhyodacitic porphyries exhibit the same age (284.5 ± 1.7 Ma).

After a break of c. 5 Ma the volcanic activity continues with the extrusion of the Formazione di Monte Luco: a pyroclastic flow, interpreted as a surge product, is dated at 279.6 ± 1.5 Ma, whereas a rhyodacitic lava dome has an age of 278.4 ± 1.5 Ma. The overlying rhyodacitic ignimbrite, termed Ignimbrite di Gargazzone, shows at its base an age of 276.5 ± 1.1 Ma. A subvolcanic body found within these ignimbrites, the so called Subvulcanite di Terlano, is indistinguishable in age (276.1 ± 1.5 Ma). Rhyolitic ignimbrites of the Formazione di Nalles more to the SE of the Formazione di Gargazzone again show the same age as the latter two formations (276.7 ± 1.1 Ma). The next higher unit is called Ignimbrite di Gries. It is made up by rhyolitic ignimbrites which in some parts were deposited concordantly on the Formazione di Nalles but in other areas show an erosive contact to the Ignimbrite di Gargazzone. Its age is 276.9 ± 2.3 Ma. Also with an erosive contact to the Formazione di Nalles the rhyolitic lavas of the Lave di Andriano formation were extruded at 274.6 ± 2.1 Ma. This suggests that after the deposition of the Formazione di Nalles and Gargazzone and going hand in hand with erosional events there seems to be a hiatus in the volcanic activity of 1–2 Ma.

Somewhat problematic is the age of 277.0 ± 2.0 Ma found for the rhyolitic ignimbrites of the Ignimbrite di Vadena. According to the mapping results these deposits should be younger than the Ignimbrite di Gries. The volcanic activity terminates with the formation of the Ignimbrite di Predonico at 274.1 ± 1.4 Ma.

The following conclusions can be drawn from the age data: a) The very long volcanic activity suggested by the published age data [2, 3, 4] cannot be further substantiated. The new single zircon U/Pb age data suggest that the volcanism in the AVD lasted only c. 10 Ma. b) The activity was not continuous but was interrupted twice for some million years. c) Compared to the Collio Basin [5] the volcanism was more long lasting. d) The palynostratigraphic "ages" of the Tregiovo Basin [6] have to be corrected according to the age found for the Formazione di Monte Luco (c. 279 Ma). e) The determined ages fit well into the general age pattern found for the Permian magmatism in the Southern Alps.

References

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