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GEOLOGICAL EVOLUTION OF THE DZIRULA MASSIF, GEORGIA

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The Dzirula massif is the largest pre-Alpine crystalline unit in the Transcaucasian segment of the Eastern Mediterranean Province. On its southern margin it is overlain by a sequence of Jurassic lavas and volcaniclastic sediments. Elsewhere, it is flanked by a thick succession of Miocene to Pliocene terrigenous rocks. There are three key lithologies within the Dzirula massif:

The first is a series of LP/HT metamorphic rocks that include cordierite-biotite-sillimanite-bearing migmatites with evidence for biotite vapour-absent melting at T>800oC, paragneisses and deformed granodioritic gneisses. The latter have an apparent Cadomian magmatic signature with U-Pb zircon ages of ca. 540 Ma. Previously published geochronological data suggest a prolonged geological history for the LP/HT series that spans the neo-Proterozoic to the middle Palaeozoic. New zircon and monazite ages reported here suggest that the LP/HT metamorphic event occurred at ca. 330 Ma. Some of the paragneisses contain relict monazites with an age of ca. 480 Ma implying that the LP/HT event overprinted a previous metamorphic event.

The second key lithology is a series of un-foliated calc-alkaline to high-K, I-type granodiorites, diorites and gabbros, which are intrusive into the migmatites and granodioritic gneisses. Our new zircon data show that they were intruded at ca. 330 Ma, contemporaneously with the LP/HT metamorphism. They may represent the heat source that drove the metamorphic event.

The third key lithology is represented by a series of pink, medium- to high-K microcline, peraluminous granites, which are intrusive into both the other lithological units. A wide spectrum of Ar ages with a statistical mean age of 321 ± 7 Ma indicate a Variscan age for these granites. They may represent late stage crustal melts related to the HT/LP metamorphic event.

There is no evidence for a post-Variscan (i.e. Alpine) metamorphic overprint in the Dzirula massif. On the southern margin of the massif some Variscan granitoids are conspicuously reddish coloured, possibly as a result of hydrothermal activity connected with the Jurassic volcanism.