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# Pressure-temperature-time evolution of strictly foliated, whitish metagranites in the Bulgarian Rhodope

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Orthogneisses are common in the denuded crust of a collisional orogen. However, they are rarely investigated in detail to derive metamorphic pressure (P) - temperature (T) conditions probably because of the lack of diagnostic mineral assemblages. Nevertheless, this rock type can contain valuable P-T information. In addition, zircon omnipresent in orthogneiss can be used for the reconstruction of the timing of corresponding orogenic events.
We have investigated a specific type of orthogneiss in the Rhodope Massif in Bulgaria. This type is characterized by abundant, well-oriented white mica and very little biotite, chlorite, and epidote resulting in strictly foliated, whitish rocks. For the derivation of the P-T evolution two samples with accessory garnet were selected occurring near the western and eastern extension of the Rhodope Massif. White mica in the sample from the western extension is phengite, with a maximum Si content of 3.36 per formula unit, partially replaced by muscovite. On the contrary, only paragonite occurs as white mica in the sample from the eastern extension as a result of Na-metasomatism prior to metamorphism. Garnet in both samples is significantly zoned, but this mineral from the sample of the western extension of the Rhodope Massif usually contains around 80 mol% of grossular + spessartine components whereas garnet from the eastern extension is composed of about 60 mol% almandine component. In spite of the different mineral compositions, P-T estimations on the basis of P-T pseudosection modelling with PERPLE_X yielded similar results for the studied metagranites. Peak pressure conditions were 10.5 kbar at 585°C for the sample from the western extension. These conditions were followed by a pressure decrease to 5.5 kbar at slightly rising temperatures up to 615°C. P-T conditions derived for the metagranite from the eastern extension cluster around 8 kbar and 600-625°C. Zircon separated from 38 samples of such rocks was dated using laser-ablation ICP mass-spectrometry to determine the contents of U and Pb isotopes in this mineral. We obtained two age clusters at about 150 Ma (9 samples) and 300 Ma (29 samples).
The obtained data were interpreted as follows: Granites, intruded in late Variscan times, were metamorphosed during the late Cimmerian orogeny in late Jurassic times as a result of continent-continent collision whereupon one plate was thrust below the other one. The location of the studied metagranites was close to the contact of both continental plates at depths of 30-38 km in these times. The close spatial relation of these orthogneisses to a zone with rootless bodies of ultrabasic and basic rocks supports our view that this zone can be interpreted as the contact zone of the plates during the overriding event.