Chronological study of the anatexis of the Grt biotie gneiss from the south Altyn HP-UHPM terrane

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According to the previous studies, the type, the time and the distribution of the HP–UHP rocks, and the period of the magmatism in the South Altyn Tagh have been identified (Liu et al., 2013), which play significant roles on understanding the formation and evolution of the orogen. However, the anatexis and the fluid activity caused by the continental subduction and exhumation are not in-depth studied. In this study, the authors focus on the chronological studies on the felsic veins and the host Grt biotite gneiss from the Jianggalesayi area in the South Altyn HP-UHP terrane, in order to ristrict the time of the anatexis of the gneiss.

CL images show that the zircons of the Grt biotite gneiss from Jianggalesayi area have the multilayered structure of core – rim I – rim II – rim III. The zircon U–Pb dating obtained four groups of ages for the different zones: the 586Ma of the core is interpreted as the top limit protolith age of the rock, 503 ± 5Ma of rim I and 459 ± 4 Ma of rim II are identical to the peak UHP and granulite–facies retrograded metamorphic ages of the eclogite and UHP Grt bearing pelitic gneiss from the Jianggalesayi area (Liu et al., 2012; Cao, 2013), respectively, 415 ± 3 Ma of rim III should represent the age of the anatexis of the rock. The zircons from the felsic vein exhibit the structure of core-rim. The zircon cores of the felsic vein have consistent ages of 604–1702 Ma with the cores of the host gneiss, indicating the identical source of the zircon cores of the two rocks, which suggest that the zircon cores of the felsic vein may be derived from the host gneiss; The age of the rims (417 ± 2 Ma) is also consistent with the rim III of the host gneiss, which represent the anatexis time of the host gneiss. The ages (415 ± 3 Ma and 417 ± 2 Ma) are correspond to the fouth period of the early Paleozoic granitic magmatism (426-385Ma) (Kang et al., 2015) in the south Altyn Tagh. Combining with previous studies, the authors infer that the anatexis of the gneiss was caused by the upwelling of hot mantle materials, due to the exhumation of the subducted continent in the environment from compressive to extensive after slab break-off at ~415Ma.