

**ZIRCON GEOCHRONOLOGY AND REE GEOCHEMISTRY,
NORTH QAIDAM UHP TERRANE, NORTHWEST CHINA**

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Amphibolite-facies felsic gneisses near Dulan, at the southeast end of the North Qaidam Mountains, enclose minor (<10 vol%) eclogite, peridotite and pyroxenite (\pm garnet) which record ultra-high pressure (UHP) metamorphism. Field relations and the presence of coesite inclusions in zircons from paragneiss suggest felsic, mafic, and ultramafic rocks all experienced UHP metamorphism and a common amphibolite-facies retrogression. Cathodoluminescence (CL) and SHRIMP-RG U/Pb and REE analyses of zircons from two granitic orthogneisses indicate magmatic crystallization at 932 ± 9 and 919 ± 7 Ma (all ages are $^{238}\text{U}/^{206}\text{Pb}$, ^{207}Pb corrected for common Pb, except as noted). Zircon cores from two paragneisses yield discordant Early Proterozoic $^{207}\text{Pb}/^{206}\text{Pb}$ ages (up to 2.5 Ga), and are probably of detrital origin; zircon rims contain Grt, Rt, and Phe inclusions, very low Th/U, high U, low REE abundances, and Eu anomalies are small or absent, suggesting eclogite-facies growth at 418 ± 3 and 411 ± 3 Ma. Two fresh eclogites contain zircon with inclusion-rich CL dark cores, and rounded, inclusion-poor, medium CL rims. Analyses of cores (partial overlap on rims) yield moderate to high Th/U and U, and ages up to 475 Ma, which places a minimum age constraint on eclogite protolith crystallization; Ab and Th + REE-rich Ep inclusions suggest greenschist- or epidote-amphibolite-facies growth. The rims contain Grt, Omp, Rt, and Phe, yield low Th/U, moderate to high U, and weighted mean ages of 449 ± 3 and 440 ± 4 Ma, reflecting eclogite-facies growth. Two retrogressed eclogites contain inclusion-poor zircon with CL bright, mottled cores (\pm faint oscillatory zoning; Grt, Omp and Rt inclusions) surrounded by irregular, CL dark rims characterized by low Th/U, and very low U, which yield weighted mean ages of 421 ± 5 and 415 ± 12 Ma. Amp and Pl inclusions in the rims suggest the measured ages may reflect retrogression. Two garnet amphibolites contain zircon with medium CL, oscillatory zoned, moderate Th, U cores surrounded by bright CL, low Th, U rims. Discordant ages from both cores and rims define ~ 440 Ma lower intercepts, and 1.9 – 2.4 Ga upper intercepts. Variable REE patterns suggest decoupling of the Pb and REE systems, and indicate the importance of both zircon recrystallization and new growth in these samples. The spread in metamorphic ages (449 - 411 Ma) is probably too large to be explained by a single metamorphic event, and suggests that mafic enclaves record polymetamorphic / tectonic histories prior to their incorporation in the surrounding gneisses. The association near Dulan of metamorphosed Middle Proterozoic granites with paragneisses containing Early to Middle Proterozoic detrital zircon cores is very similar to rock associations in HP/UHP localities 400 km NE, near Da Qaidam, and on the NE side of the Altyn Tagh fault, in the south Altyn Mountains near Bashiwake, supporting the proposed correlation of these localities in a HP/UHP belt.