Petrotectonic comparison of the Kokchetav and the Sulu-Dabie UHP terranes

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The Kokchetav Massif of northern Kazakhstan (540 to 530 Ma) and the Dabie-Sulu terrane of east central China (240-210 Ma) are characterized by their large areal distribution, common occurrence of microdiamond and coesite, and most P-T estimates within a field of extremely low geothermal gradient. These terranes extend several hundred km, and the exhumed UHP/HP units occur as thin subhorizontal slabs, bounded by normal faults on the top, and reverse faults on the bottom. For the Kokchetav Massif microdiamond and coesite are best preserved in supracrustal rocks (pelitic-psammitic gneiss, dolomitic marble and whiteschist); minor inclusions of coesite and its pseudomorphs occur in eclogites. Rare Ti-clinohumite-bearing garnet peridotite appears to be crustal-derived Fe-Ti ultramafics. P-T estimates for diamond-grade eclogite and garnet peridotite based on the K_2O-in-Cpx geobarometer yield maximum P-T condition at 7 GPa, 1000°C. On the other hand, UHP records for the Sulu-Dabie belt are mainly from eclogite and garnet peridotite within felsic gneissic unit. Only trace diamonds were reported in eclogite and garnet peridotite whereas gneissic rocks contain minor coesite inclusion in zircon. Hydrous phases and magnesite are common in various UHP rocks. Mantle-derived and crustal-hosted garnet peridotites yield very high-P estimates (4.0-6.5 ± 0.2 GPa at 750-950 °C). Supracrustal rocks together with their enclosing mafic-ultramafic rocks of these terranes have experienced subduction zone UHP metamorphism at very low geothermal gradients probably less than 5°C/km.