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Metamorphic P-T-t paths of Neoarchaean Eulysites from Eastern Hebei, North China Craton

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Neoarchaean eulysites from eastern Hebei, China containing metamorphic reaction textures are used to reveal the tectonic evolution of the Jidong terrane. The eulysites are iron-rich and the bulk-rock compositions of samples LZ10 and LZ15-1 (in wt.%) are SiO_2 = 41.45, TiO_2 = 0.11, $Al2O_3$ = 0.28, $Fe2O_3$ = 53.94, FeO = 42.36, MnO = 0.12, MgO = 2.38, CaO = 1.57, Na2O < 0.01, and K2O < 0.01, and SiO_2 = 43.98, TiO_2 = 0.14, $Al2O_3$ = 2.55, $Fe2O_3$ = 48.04, FeO = 40.55, MnO = 0.21, MgO = 3.22, CaO = 1.65, Na2O < 0.01, and K2O < 0.01, respectively. The eulysites mainly consist of orthopyroxene, clinopyroxene, garnet and quartz, with minor olivine, amphibole, apatite and magnetite. P-T pseudosections are calculated in the NCFMASHO model system using Perple_X 6.68 [1], based on the internally consistent thermodynamic dataset of tcds 55 [2].The prograde sections of P-T paths are proposed based on the sedimentary precursors of eulysites [3]. Two samples record the clockwise P-T paths containing near isothermal decompression (ITD) and subsequent isobaric cooling (IBC) segments, with the peak metamorphic conditions of 13 kbar/800 °C reaching high-pressure granulite facies. High resolution SIMS U−Pb dating of the metamorphic zircons demonstrate that four eulysites record two groups of metamorphic ages, ca. 2.49-2.50 Ga and ca. 2.39-2.41 Ga. The age of first group is approximately coeval with the peak metamorphic age recorded by high-pressure metapelitic granulites from Jidong and Xiwulanbulang (XWLBL) area and high-pressure mafic granulites from Jiaodong area [4-6]. The second group ages are proposed to correspond to cooling processes. The clockwise P-T paths and the peak pressure of 13 kbar implies that the eulysites once were buried to a depth of ca. 45 km, and then experienced a quick exhumation. Combing this study with previous studies about the high-pressure mafic granulites from the Jiaodong terrane [4], high-pressure metapelitic granulites from XWLBL area and Jidong terrane [5-6], we conclude that a subduction-collision event is recorded during the late Neoarchaean, which is corresponding to the amalgamation of the NCC by some micro-blocks in the late Archean [7].

References:
[1] Connolly JAD (2005) Earth Planet. Sci. Lett. 236: 524-541
[2] Holland TJB and Powell R (2003) J. Metamorphic Geol. 145: 492-501
[3] Zhang RY et al. (1982) Acta Geol. Sin. 56: 70-80
[4] Liu SJ et al. (2015) Gondwana Res. 23: 493-508
[5] Wang D and Guo JH (2017) Precambrian Res. 303: 251-267
[6] Lu JS et al. (2017) Precambrian Res. 290: 1-15
[7] Zhai MG and Santosh M (2011) Gondwana Res. 20: 6-25