Spatial-temporal architecture of the Archean crust in the Eastern North China craton

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The Archean domains are composed of tonalite-trondhjemite-granodiorite (TTG) gneisses, diorites and granites, and supracrustal successions (commonly greenstone belts) of greenschist facies (upper crust) to granulite facies (lower crust). The majority of the Archean domains in the Eastern North China craton was built at 2600–2500 Ma, and generally suffered high-amphibolite to granulite facies metamorphism with anti-clockwise *P-T*-paths at ~2480 Ma. Although the >2600 Ma rocks (even ~3800 Ma rocks in Anshan area) distribute mostly as minor relic bodies/lens in the 2600-2500 Ma-dominated crust, there are several regions with significant ~2700 Ma crust. And the marginal regions of this craton were overprinted by a ~1950–1800 Ma metamorphism up to high-pressure granulite facies with clockwise *P-T*-paths. The supracrustal rocks occur as relic bodies with varied scales up to kilometers intruded by the TTG gneisses-dominated plutons, which cover 70-80 % of the Archean domains. This typical structural architecture of the lower continental crust is distinctly different from the typical dome-and-keel structure in some other cratons, which likely formed under significant vertical tectonism. Based on the spatial-temporal architecture of the Archean domains of the Eastern North China craton, we propose that the craton can be divided into four blocks, i.e., the Lushan-Jiaobei, Zhongtiao-Taishan, Liaonan-Qingyuan and Wutai-Zunhua blocks. The chemistry of these Neoarchean blocks approves a horizontal growth of crust; however, the presence of mafic rocks from primitive mantle and the strong anatexis producing voluminous plutonic rocks in the high-grade domains may indicate the co-existing of vertical growth of the crust. The four blocks may be the crust of arc-like terrains produced by the Archean-style subduction, i.e., a mantle-wedge-weak ‘hot’ flat subduction with significant mantle upwelling under the arc crust, and the exhumation of the Archean domains from varied crustal levels may be resulted from their amalgamation at ~2480 Ma.