



Detrital zircon U-Pb and Hf isotopic data for meta-sedimentary rocks from the Heilongjiang Complex, northeastern China and tectonic implications

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The Heilongjiang Complex is a blueschist facies metamorphic belt located in the Zhangguangcailing orogen between the Jiamusi and Songliao blocks in Northeast China. This complex has been regarded as an accretionary belt related to the subduction of an intervening oceanic domain between the two blocks. However, the timing of ocean closure and final amalgamation has not been well constrained, with different models arguing for a period of 210-180 Ma or sometime after ~ 140 Ma. This work reports in-situ detrital zircon U-Pb and Hf isotopic analyses of meta-sedimentary rocks from the Heilongjiang Complex. Detrital zircons from seven meta-sedimentary rocks samples yield U-Pb ages spanning from 1690 to 167 Ma, with main populations matching those of multi-phase magmatism in the Jiamusi and Songliao blocks. Several Precambrian age groups (600 Ma, 700 Ma, 900Ma, 960 Ma, 1200Ma, and 1300Ma) are consistent with the inherited zircons from the mafic rocks in the Heilongjiang Complex. A comparison with compiled data of magmatic rocks suggests that the two blocks may have been connected to each other during Paleozoic time. Detrital zircon dating of all siliciclastic rocks yielded the youngest age component of ~ 170 Ma, suggesting that the latest deposition of the mica schists happened at some time after ~ 170 Ma. In addition, the mafic-ultramafic rocks in the Heilongjiang Complex record rifting and ocean development from ~ 275 to 140 Ma. We propose that the Jiamusi and Songliao blocks were once existed as a single block in the Paleozoic, which underwent a rifting event in the Permian to form a rifting basin that was subsequently evolved into an oceanic domain. The closure of the oceanic domain most likely occurred at some time after 140 Ma.