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Partial Melting of Deeply-Subducted Eclogite: Field and Petrographic Evidence from the Sulu UHP orogen, China

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We report textural and geochronological data from melts derived from deeply-subducted eclogite in the Sulu orogen, China, which are similar in composition and age to melts thought to be responsible for the thermo-chemical erosion of the root of the North China craton. Successive stages of partial melting are preserved from initial grain boundary melting to small pockets of melt accumulation in pressure shadow areas, which then aggregate to form melt channels and dykes that transported large volumes of magma from the melting region to higher in the lithosphere. Zircons from the melt and the restite both show consistent metamorphic ages, associated with partial melting, of 210-230 Ma and protolith ages of 769-783 Ma, which correspond to the early retrogression age and protolith age of UHP rocks throughout the Dabie-Sulu orogen. This has important implications to interpret seismic signals and the rheological structure and mechanical behavior of the deep crust, the interaction between deformation and magmatic processes, and melt transportation processes in deeply subducted lithosphere. Partial melting of eclogite from deeply subducted oceanic or lower continental crust may be an important process in determining the mechanical behavior of subducted lithosphere and its rapid exhumation, for controlling the flow of deep crustal material, and for destruction of cratonic roots.