

Protracted oceanic subduction prior to continental subduction: New Lu-Hf and Sm-Nd geochronology of oceanic-type high-pressure eclogite in the western Dabie orogen

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ABSTRACT

Oceanic-type high-pressure eclogite from the Huwan mélange in the western part of the Dabie orogen, north of the classic ultrahigh-pressure terrane, has been investigated with combined Lu-Hf and Sm-Nd geochronology. The eclogites are thought to have formed during the subduction of oceanic crust prior to the subduction of the Yangtze craton beneath the North China block. Garnet Lu-Hf and Sm-Nd garnet-whole rock dates yield similar ages of 257.4 ± 1.4 and 252.5 ± 2.7 Ma, the youngest ages reported thus far from this mélange. Despite the partially preserved prograde major- and trace-element zoning in garnets, the Lu-Hf and Sm-Nd ages mostly reflect the high-pressure eclogite-facies metamorphism instead of the early phase of garnet growth. The data define a new high-pressure age population for the Dabie orogen, which provides a more detailed insight into the subduction history of the Yangtze craton before continental collision. The new Lu-Hf and Sm-Nd dates for these oceanic-type eclogites, combined with existing geochronological information, range from 315 to 253 Ma. This broad interval suggests that the overall subduction of oceanic crust occurred over a period of ~60 Ma and that different slices with distinct pressure-temperature histories underwent HP metamorphism at distinct times. A model of a continuous evolution from oceanic to continental subduction is favored, and the onset of the deeply continental subduction occurred probably not before ca. 257 Ma.

Keywords: Dabie, eclogite, oceanic subduction, Lu-Hf, Sm-Nd