ULTRAHIGH PRESSURE OPHIOLITIC CHROMITE WITH UHP INCLUSIONS INDICATES DEEP SUBDUCTION IN THE ARCHAEAN: EVIDENCE FROM THE 2.55 GA ZUNHUA OPHIOLITIC MÉLANGE, CHINA

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ABSTRACT

The style of plate tectonics on early Earthis controversial, partly because modern style tectonics indicators are rare.We reportthe first terrestrial occurrence ofultrahighpressure (UHP) chromite(chenmingite) that contains a multiphase mineral inclusion of UHP TiO_2 (II)withrutile, apatite and tremolite, from the Archaean Central orogenic belt of the North China Craton. Chenmingite, which is stable at pressures above 14 GPa, corresponding to depths near the mantle transition zone (MTZ) at 410 km, has previously only been documented from meteoritesor synthesised in high-pressure experiments. Our discovery of chenmingite, with inclusions of UHP and crustal minerals, indicates that crustal materials including chromite were deeply subducted to the MTZ prior to 2.52Gyr, transformed into UHP chromite with UHP inclusions,and subsequently returned by convection to be incorporated in the shallow podiform chromitites of the uppermost late Archaean ocean mantle. These observations represent direct geological evidence for deep subduction of oceanic slabs and entrained crustal sedimentsin the Archaean.

Keywords: *Podiform chromite, Archean, ophiolitic mélange, CF chromite, TiO_2 (II)*