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He Grenville Orogenesis Recorded by Monazite from the Paragneiss of North Qaidam UHP Metamorphic Belt, Western China

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The poly-phase orogeny information included in one orogenic belt is the key for studying the regional tectonic evolution at different time period. It also has important significance of understanding the rock association and geochemical evolution of different orogeny. However, the later orogenesis always fully or partially erases the information about the early orogenesis, making it much harder to investigate the metamorphism and

geochronology information of the poly-phase orogenesis. Monazite, as a common accessory mineral in paragneiss, has high closure temperature of the U-Th-Pb isotopic system and essential to the fluid and metamorphic P-T conditions, making it much easier to record the abundant geochronological information about the poly-phase orogenesis (Williams et al., 2007). In-situ electron microprobe monazite dating method make it possible to

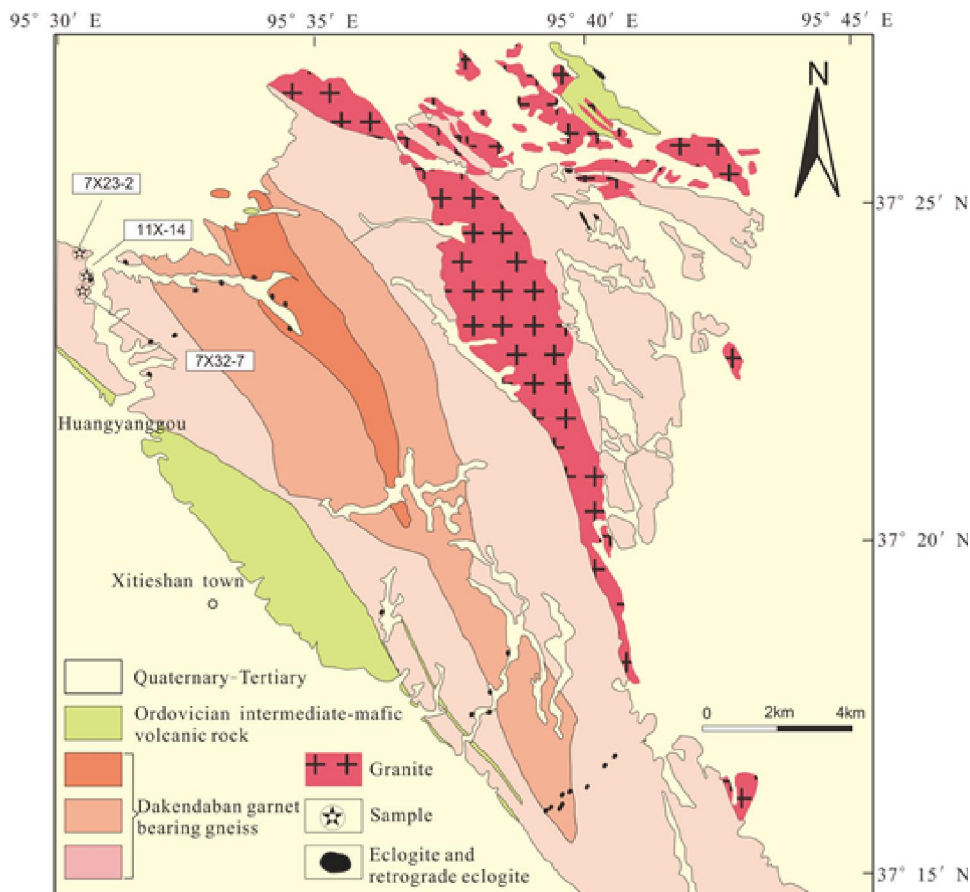


Fig.1 Geological sketch map of the Xitieshan terrane, North Qaidam UHP metamorphic belt, including studied eclogites and showing sample localities.

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connect the geochronological information and the mineralogical characteristics and metamorphic reactions in order to get the *P-T-t* path of the mineral assemblage with different ages.

We have combined in-situ electron microprobe monazite dating method with petrological investigations on the garnet-bearing kyanite/sillimanitebiotite gneiss from the Xitieshan terrane of North Qaidam Caledonia ultrahigh pressure metamorphic belt (Fig.1) and yielded 886 ± 18 Ma Grenville ages (Fig. 2,3). The rare earth element distribution pattern is similar with the ones in the literature. By means of traditional mineral geothermobarometry, the high amphibolite facies 607-727°C, 6.5-10.0 kbar conditions has been conducted, which is slightly higher than the *P-T* condition recorded by the Paleozoic paragneiss. Compare with the trace element geochemistry with the Paleozoic paragneiss, the Grenville paragneiss are characterized by high total rare

earth element and obvious Eu negative anomaly ($Eu/Eu^* = 0.50$) with correspondingly be depleted in Ba and Sr element, which shows the active continental margin sediment characters. By reviewing the Grenville orogenesis and the formation and decomposition of the super-continent Rodinia globally, we consider that the North Qaidam UHP belt is related to the active continental margin region during the formation of super-continent Rodinia at Grenville age (Song et al., 2012, 2014; Zhang et al., 2016).

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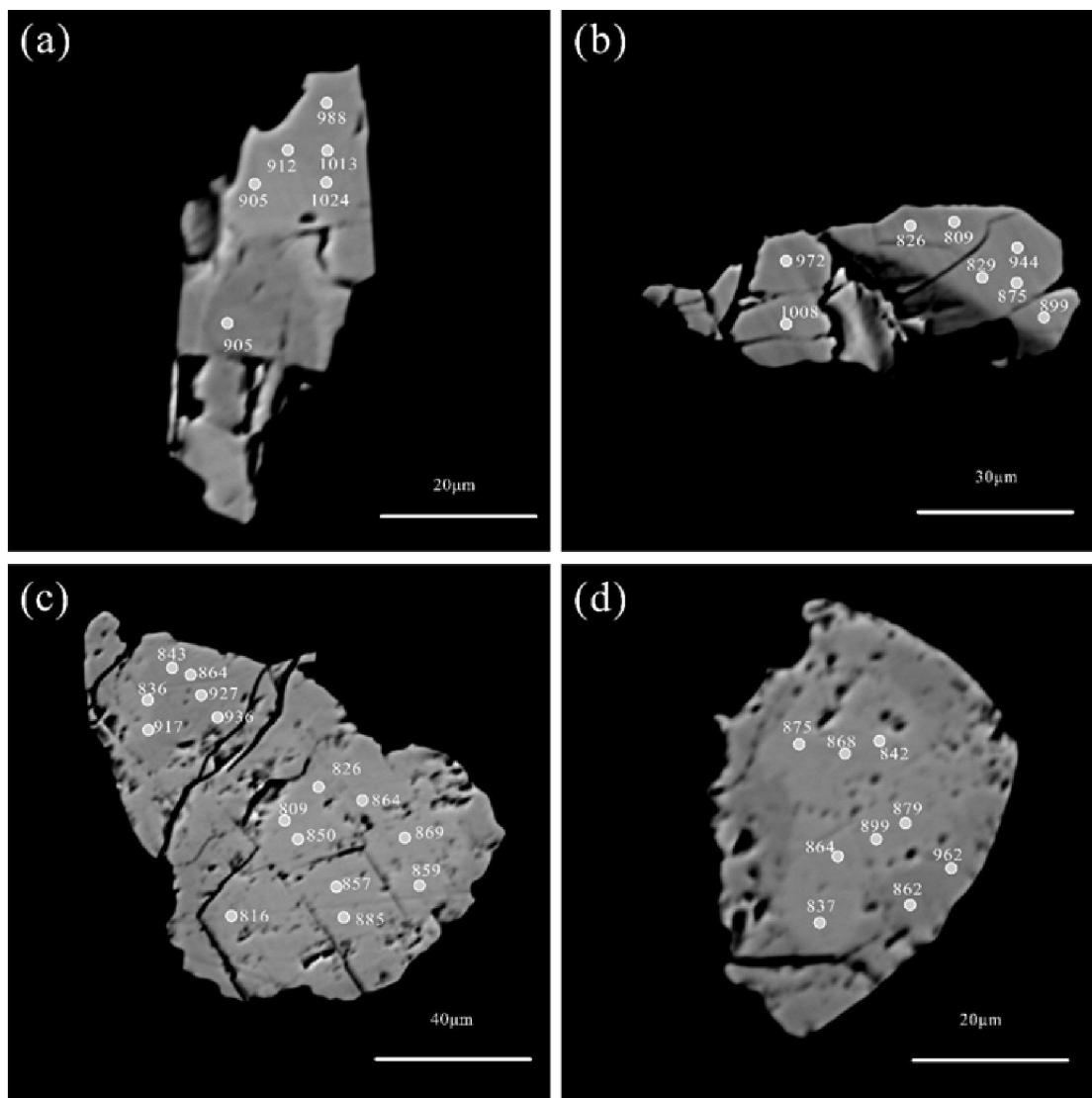


Fig.2 The monazite grain shape of the paragneiss and the position of the electronic microprobe apparent age analysis

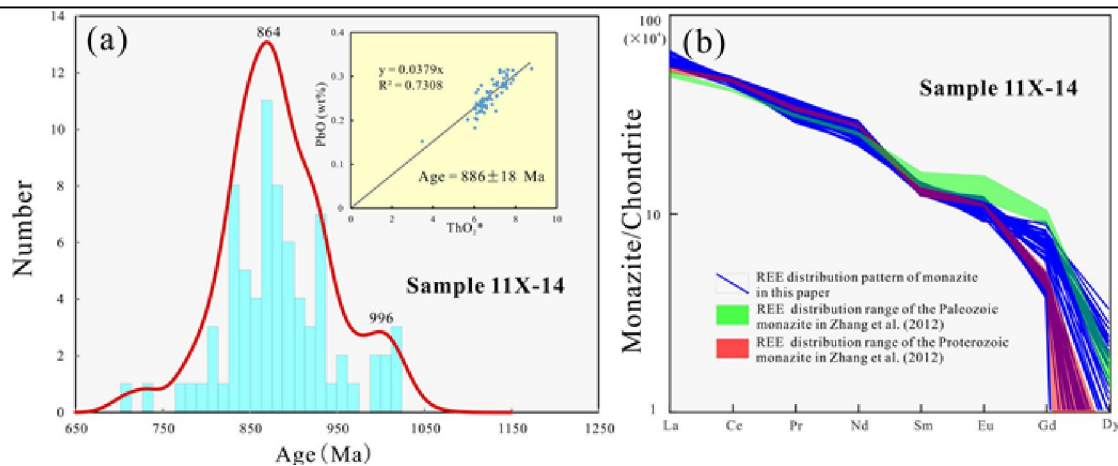


Fig.3 The apparent ages and REE patterns of the monazite from paragneiss sample 11X-14

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