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Constrain multistage deformation using FIAs, Garnet Lu-Hf and Monazite U-Pb dating- A case study of north Qilian, China

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Constrain the absolute age of multiple deformation and metamorphic events is one of the hotspots in geochronology study. This study using FIAs (foliation intersection axes preserved within porphyroblasts) measurement technology, combined with garnet Lu-Hf and in situ monazite U-Pb dating to determine the two stages deformation recorded in garnet and plagioclase porphyroblast, in Tuolemuchang, North Qilian, China. The early deformation events recorded in garnet porphyroblast is 512.3 ± 2.7 Ma and the younger one recorded in plagioclase porphyroblast no early than 481.0 ± 2.3 Ma, with NE-SW horizontal bulk shortening. Combined with the results of previous studies on Hf and U-Pb isotopic analysis, 512.3 ± 2.7 Ma garnet Lu-Hf age is considered as the growth time of garnet during the subduction process of Qilian ocean. The garnet Lu-Hf isotope system weren't affected by Younger metamorphism and deformation obviously. Combine with microstructure analysis, garnet Lu-Hf age can provide useful constrain for early stage deformation.

