

# Discovery and Significance of Early Paleozoic Mafic-Ultramafic Blocks in the Eastern Yidun Terrane, Qinghai-Tibet Plateau

DR. WENXIAO ZHOU, PHD<sup>1,2</sup>, JIALI XU<sup>1</sup>, HANG ZHOU<sup>1</sup>,  
 BO HUANG<sup>1</sup>, YADONG XU<sup>1</sup> AND HAIQUAN LI, PHD<sup>1</sup>

<sup>1</sup>China University of Geosciences (wuhan)

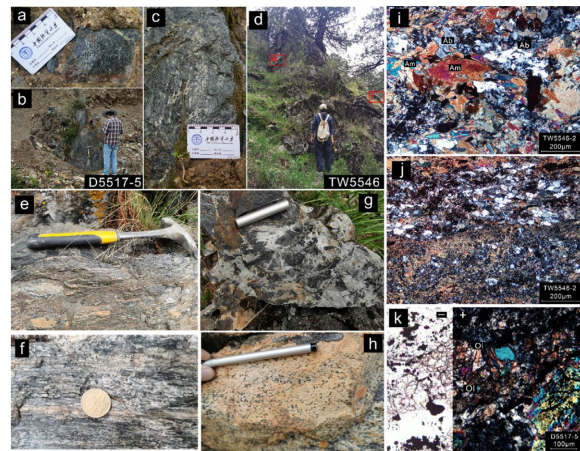
<sup>2</sup>Cardiff University

Presenting Author: [zhouwenxiao@cug.edu.cn](mailto:zhouwenxiao@cug.edu.cn)

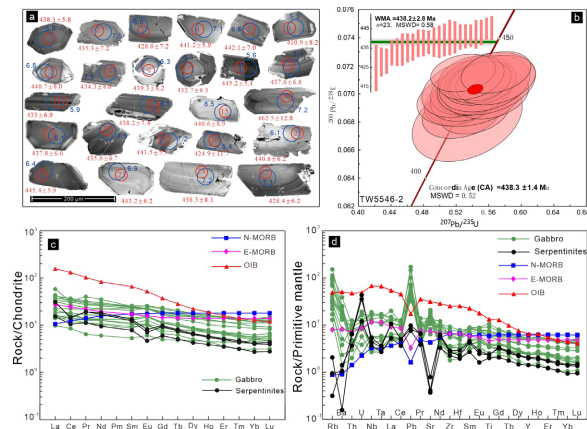
Mafic to ultramafic rocks that form along convergent plate margins play an important role in reconstructing the tectonic evolution of ancient orogenic belts and associated geodynamic settings. However, such rocks have remained largely unstudied in the Garzê-Litang subducted accretionary complex belts and in the Yidun terrane (Tibet). Yet understanding these significant magmatic rocks is likely key in resolving controversy regarding the geodynamic setting of the southern margin and the subduction polarity of the Proto Tethys Ocean. To help answer these geodynamic questions we present an integrated study using petrography, geochemistry, and zircon U-Pb-Lu-Hf isotope analyses on newly recognized mafic-ultramafic rock blocks that contain gabbro and serpentinite in the eastern Yidun terrane, Qinghai-Tibet Plateau. Zircon U-Pb dating of the gabbro yields a weighted average age of  $438.2 \pm 2.8$  Ma, indicating that these mafic-ultramafic blocks formed in the Early Silurian. The zircon  $\varepsilon_{\text{Hf}}(t)$  values are between 5.4 and 8.5, and produced a single-stage model age ( $T_{\text{DM1}}$ ) range from 729 to 858 Ma, which is best interpreted to indicate that enriched mantle was the magma source. The gabbro and serpentinites exhibit low total rare earth element abundances ( $\sigma_{\text{REE}}$ , ranges from  $23.08 \times 10^{-6}$  to  $69.52 \times 10^{-6}$ ), moderately enriched LREEs ( $\text{LREE}/\text{HREE} = 2.75$  to  $5.30$ ,  $\text{La}/\text{Yb}_N = 2.42$  to  $6.78$ ) and LILEs (e.g., Rb, Ba, Sr), and negative HFSEs (e.g., Nb, Ta, Zr, Hf, and Ti) anomalies, suggesting their derivation was from a sub-arc mantle wedge metasomatized by slab-derived fluids/melts. The mafic-ultramafic components likely represent fragments of an Early Silurian supra-subduction zone (SSZ) arc/forearc complex. Collectively, the complex may record an intra-oceanic subduction-accretion event at  $438.2 \pm 2.8$  Ma. When this information is combined with existing interpretations on recently discovered Early Palaeozoic sequences in the eastern Yidun terrane (Xu et al, 2021), the accretionary-to-collisional orogenic events in the western Yangtze Craton could be a response to eastward subduction of the Proto-Tethys Ocean and initial extension of the Jinshajiang back-arc Ocean.

Reference:

1. Xu, X., Xia, Y., Chen, J., Liang, C., Xu, Y., 2021. Late Triassic foreland basin and Early Palaeozoic basement in the eastern Yidun Micro-block and its tectonic implications for the eastern Palaeo-Tethys. Geological Journal.



**Figure 1.** Field outcrop of mafic-ultramafic rock blocks in Heni town, Litang County. (a-c) Serpentinite and fine-grained peridotite outcrop; (d-g) meta - gabbro (amphibolite) lenses/blocks in the metasedimentary matrix; (h) undeformed gabbro, hornblende retains the illusion of pyroxene; (i, j) microscopic features of metamorphic gabbro (strong deformation to mylonitization); (k) microscopic features of dunite characteristics.



**Figure 2.** (a) Representative zircon CL images for the Heni gabbros. Red circles and numbers mark analytical spots and corresponding apparent  $^{207}\text{Pb}/^{238}\text{U}$  ages; blue circles and numbers mark Hafnium isotope analytical spots and  $\varepsilon_{\text{Hf}}(t)$  values, respectively; (b) Zircon U-Pb concordia diagrams with concordia ages (CA) and weighted mean ages (WMA); (c) Chondrite-normalized REE diagrams and (d) primitive mantle-normalized multi-element diagrams for the Heni gabbros and serpentinites.