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Magnetic fabric and Petrofabric of Amphibolites in Eastern Himalaya Syntaxis

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The Himalaya orogenic belt was formed by the collision of the Eurasian plate and the Indian plate. There are two syntaxies along the orogenic belt, where the lower crust are extruded because of the strong stress and deep melting. Our samples are from the eastern Himalaya syntaxis, which is near the Namchabarwa Mount.

The sample TO-38 is composed of hornblende, garnet, plagioclase, quartz, ilmenite, magnetite and rutile. The hornblendes are strongly deformed and have clear lineation. While the garnets are relative strong and undeformed, they have a white rim of retrograded minerals with S-C fabric. The ilmenites are distributed extensively and are also deformed, with a slight SPO parallel to lineation. The magnetite are almost cubic with no SPO.

We obtained the magnetic fabric of sample TO-38 from anisotropy of magnetic susceptibility (AMS) measurements, and crystallographic fabrics from EBSD analysis. The hornblende shows that [001] forms a well defined point maximum parallel to lineation; poles to {110}{010} plot as a girdle normal to the foliation. The ilmenite fabric shows less pronounced distribution of [0001] axis normal to foliation and weak subparallel distribution of [11-20] axis to lineation. The magnetite is very little, and shows no LPO. The AMS measurement shows that the maximum susceptibility direction correspond to the lineation, also parallel to the [11-20] axis of ilmenite and [001] axis of hornblende. The minimum susceptibility direction is parallel to the [0001] axis of ilmenite. The thermomagnetic curves and values of bulk susceptibility reveal a magnetic mineralogy dominated by a mixed contribution of paramagnetic minerals and magnetite. The mean susceptibility are from 7.06×10^{-3}SI to 33.1×10^{-3}SI.

We also calculated the seismic anisotropy of amphibolites, and it shows the fast P wave propagate in lineation direction and has a 11.5% anisotropy. Meanwhile, the shear wave splitting polarization is also along the lineation, and has a 6% anisotropy. According to recent geophysical observations, the Tibet mid-lower crust have strong anisotropy, which favors an amphibolite facies mid-lower crust beneath the Tibet. Therefore, the correlation between petrofabric and magnetic fabric of amphibolites can be applied to interpret the deformation and evolution history of Tibetan Plateau.