



Polyphase deformation recorded from Mesozoic granitoids in the North China Block. Example from the Yunmengshan granodiorite

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The Yunmengshan granodioritic pluton occupies the core of a NE-SW trending antiform located in the Yanshan Belt, about 100 km northeast of Beijing. This pluton yields zircon U-Pb ages of 143 Ma. It is accompanied by a widespread network of dykes and sills emplaced within a 155 Ma metadiorite and in well foliated but weakly metamorphosed sedimentary country rocks.

In order to decipher the tectonic events of this Mesozoic orogeny, we combined field structural analysis, petro-textural observation and Anisotropy of Magnetic Susceptibility (AMS) investigation.

The Yunmengshan granodioritic pluton exhibits a well developed planar and linear preferred mineral orientation along its northern and eastern margins but weakly developed in its central, western, and southern parts.

Magnetic mineralogical investigations show that magnetite of the pseudo-single domain is the main carrier of the magnetic fabric. Microscopic observation of quartz, feldspar and mica indicates various textures formed under magmatic to post-solidus rheological conditions. Along the southeastern and eastern margins of the pluton, a mylonitic fabric progressively develops from protomylonite to ultramylonite, from west to east, respectively.

The AMS results show planar or linear magnetic fabrics, with contrasted characteristics. The P parameter values are generally low, except along the SE pluton margin where post-solidus fabrics are conspicuous.

Structural, textural and AMS analyses allow us to separate two structural events, namely D1, and D2. The D1 event is characterized by a N-S striking mineral and magnetic lineation developed under magmatic to subsolidus rheological conditions during the Yunmengshan pluton emplacement at 142 Ma. Kinematic indicators observed both in the pluton, dyke swarm, and country rocks show a top-to-the-south sense of shear. We argue that the Sihetang recumbent anticline does not exist, but a 5 km thick ductile shear zone is coeval with pluton and dykes emplacement. The D1 event corresponds to a Late Jurassic-Early Cretaceous N-S compression.

The D2 event is characterized by a SE-dipping foliation, and NW-SE striking, down-dip lineation. The D2 kinematics indicates a top-to-the SE shearing developed in a post-solidus state complying with the country rocks ductile shearing. Previous Ar/Ar dating shows that the D2 deformation occurred at 126 Ma (Late Early Cretaceous) along the already defined Shuiyu shear zone. The Yunmengshan granodiorite is a syntectonic pluton emplaced at 142 Ma in a compressional setting, and was reworked at 126 Ma during the extensional tectonics recorded in the entire North China Craton.