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Deformation history of the Qianlishan Complex: Implications for the tectonic evolution of the Khondalite Belt in the North China Craton



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The Khondalite Belt is an EW-trending Paleoproterozoic continent-continent collisional belt, which is considered to be a result of the amalgamation of the Yinshan Block in the north and the Ordos Block in the south to form the Western Block of the North China Craton [1]. In the past decades, researchers have carried out extensive metamorphic, geochemical and geochronological investigations of the Khondalite Belt. However, there has been no detailed structural work, which hinders better understanding of the tectonic evolution of this crucial area. In this study, we report structural data for the Qianlishan Complex, a key area located in westernmost part of the Khondalite Belt, where high-pressure pelitic granulites have been discovered [2]. Three distinct episodes of deformation (D_1 - D_3) have been identified in the Qianlishan Complex. The D_1 deformation is marked by small-scale, rootless intrafolial isoclinal fold (F_1), pervasive foliation (S_1), and minor mineral lineation (L_1). In some cases, the S_1 foliation is parallel to the original compositional layering (S_0). Generally, the F_1 and S_1 are hard to restore their original orientations due to later deformational events, especially the superimposition of the D_2 deformation (Fig. 1a). The D_2 deformation is the major stage of deformation that is characterized by tight to open fold (F_2) of variable scales, penetrative foliation (S_2), and mineral lineation (L_2). Most of the F_2 fold axes plunge to NWW-SEE, indicating a NNE-SSW-oriented shortening. The S_2 foliation shows moderate to steep dipping angles and displays a NWW-SEE orientation. The L_2 lineation displays a preferred NNE-SSW orientation with a moderate plunging angle, probably revealing the direction of collision. Both D_1 and D_2 are interpreted to occur during the crustal thickening under a compressive environment. The D_3 deformation mainly formed regional-scale open folds which have reworked the earlier D_1 and D_2 (Fig. 1b), probably being related to subsequent exhumation of the Qianlishan Complex.

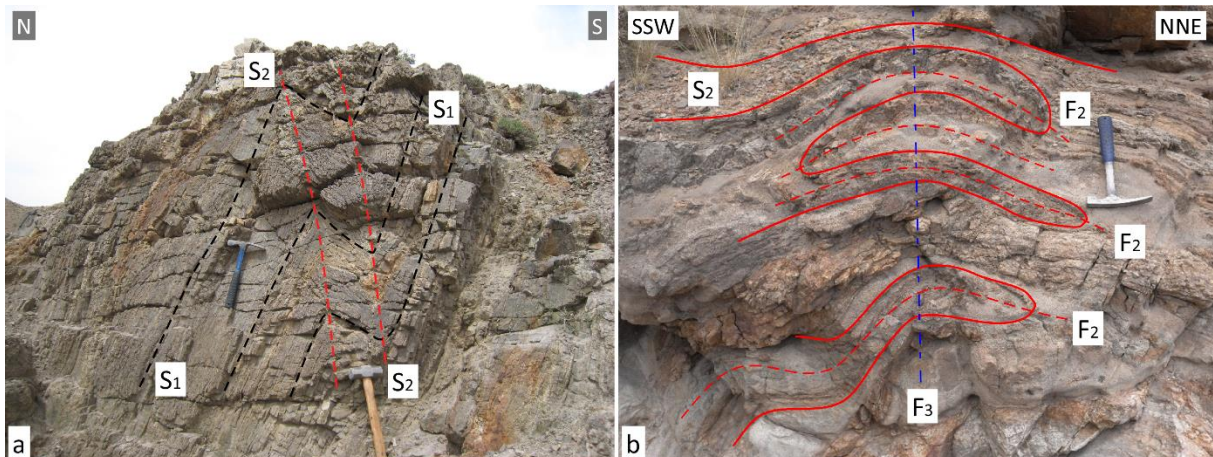


Figure 1: Field photographs showing typical superimposed deformational fabrics in studied area.

References:

- [1] Zhao G.C. et al. (2005) Precambrian Res. 136: 177-202
- [2] Yin C.Q. et al. (2014) Precambrian Res. 242: 172-186

