



Early Mesozoic intracontinental Xuefengshan Belt, South China: insights from structural analysis of polyphase deformation

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Intracontinental orogens remain less understood than accretionary or collisional orogens that are related to plate margin interactions. The mechanisms of intracontinental orogeny have long been discussed, since intraplate mountain belts cannot be ascribed to the plate margin interaction paradigm that assumes that the interiors of a continent are rigid and hard to deform. It is now well accepted that the deformation of continental crust can be a far-field consequence of collision, as exemplified by the Miocene tectonics of Asia, but still controversial.

In the center of the South China block, in Hunan Province, the Xuefengshan Belt provides a well-exposed and unique example of an intracontinental orogen, but its structural style and evolution are still on debate. Recent studies proposed that this intracontinental belt was formed by large scale over-thrust in the Late Mesozoic or by Triassic transpressional tectonics. An Early Mesozoic flat slab subduction to the NW is also suggested.

Detail field observations indicate that the Xuefengshan Belt can be divided into a Western Outer Zone (Wuling Mountain) characterized by km-scale box-fold structures, and an Eastern Zone, separated from the Western Outer Zone by the Main Xuefengshan Thrust, also corresponding to the cleavage front. In the Eastern Zone, NW verging folds coeval with a pervasive slaty cleavage and a NW-SE trending lineation are the dominant structure. From west to east, the dip of the cleavage surface exhibits a fan-like pattern. Basement rocks are sparsely located around some Triassic plutons. The rocks of the Xuefengshan Belt are generally ductilely deformed but weakly metamorphosed, however, below these upper crustal level, a high strain decollement accommodates the difference of deformation between the sedimentary and the basement rocks.

The bulk architecture of the Xuefengshan Belt results from polyphase deformation: the first one (D1), characterized by a top-to-the-NW shearing, controls the bulk architecture of the Xuefengshan, and is responsible for the crustal thickening of the Lower Unit of the Eastern Zone. The second one (D2) corresponds to the back-folding and back-thrusting stage with preferential cleavages or foliations that dip to the NW. The last phase (D3) is a NW-SE or W-E shortening event associated with upright folds with vertical axial plane cleavages. The high strain zone, corresponding to the ductile decollement, accommodated at depth the folding and shearing of the Neoproterozoic to Early Triassic sedimentary series. Combined with geochronological data, the Xuefengshan Belt is interpreted as an Early Mesozoic intracontinental orogen, which possibly originated from the continental underthrusting or continental subduction to the SE of a piece of the South China Block in response to northwest directed subduction of the Pacific plate.