Tectonics of the Qinling (Central China): tectonostratigraphy, geochronology, and deformation history

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Abstract

The Qinling orogen preserves a record of late mid-Proterozoic to Cenozoic tectonism in central China. High-pressure metamorphism and ophiolite emplacement (Songshugou ophiolite) assembled the Yangtze craton, including the lower Qinling unit, into Rodinia during the \(\sim 1.0\) Ga Grenvillian orogeny. The lower Qinling unit then rifted from the Yangtze craton at \(\sim 0.7\) Ga. Subsequent intra-oceanic arc formation at \(\sim 470–490\) Ma was followed by accretion of the lower Qinling unit first to the intra-oceanic arc and then to the Sino–Korea craton. Subduction then imprinted a \(\sim 400\) Ma Andean-type magmatic arc onto all units north of the northern Liuliang unit. Oblique subduction created Silurian–Devonian WNW-trending, sinistral transpressive wrench zones (e.g., Lo-Nan, Shang-Dan), and Late Permian–Early Triassic subduction reactivated them in dextral transpression (Lo-Nan, Shang-Xiang, Shang-Dan) and subducted the northern edge of the Yangtze craton. Exhumation of the cratonic edge formed the Wudang metamorphic core complex during dominantly pure shear crustal extension at \(\sim 230–235\) Ma. Post-collisional south-directed shortening continued through the Early Jurassic. Cretaceous reactivation of the Qinling orogen started with NW–SE sinistral transtension, coeval with large-scale Early Cretaceous crustal extension and sinistral transtension in the northern Dabie Shan; it presumably resulted from the combined effects of the Siberia–Mongolia — Sino-Korean and Lhasa — West Burma — Qiangtang–Indochina collisions and Pacific subduction. Regional dextral wrenching was active within a NE–SW extensional regime between \(\sim 60\) and 100 Ma. An Early Cretaceous Andean-type continental magmatic arc, with widespread Early Cretaceous magmatism and back-arc extension, was overprinted by shortening related to the collision of Yangtze–Indochina Block with the West Philippines Block. Strike–slip and normal faults associated with Eocene half-graben basins record Paleogene NNE–SSW contraction and WNW–ESE extension. The Neogene(?) is characterized by normal faults and NNE-trending sub-horizontal extension. Pleistocene(?)–Quaternary NW–SE extension and