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Oblique closure of the northeastern Paleo-Tethys in central China

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A branch of the Paleo-Tethys Ocean once separated the north China plate from the south China plate. However, the mode of closure of the northeastern Paleo-Tethys Ocean during the Late Paleozoic to Early Mesozoic has been debated. One reason for this debate is that the collisional suture zone was later buried by large-scale thrust faults in the southern Qinling-Dabieshan orogen, which made it difficult to reconstruct the amalgamation of the supercontinent in central China. New regional geologic mapping provides stratigraphic and structural constraints on the mechanism of this ocean closure. Our results indicate that dextral transpressional suturing in the southern Qinling-Dabieshan foreland fold-thrust belt resulted in the formation of the northern Yangtze foreland basin, where the stratigraphy precisely shows the time-transgressive closure of the ocean, and the orogenic sediments shed over 1000km westward from eastern China to the closing Paleo-Tethys. Therefore, we propose an oblique subduction model to describe the closure of the Paleo-Tethys Ocean. Investigation of basin subsidence as a function of subduction history in a time-dependent global geodynamic model demonstrated that long-wavelength topography superimposed on the thrust-load subsidence was dragged by the subducted and retreated sinking Paleo-Tethys slab. Our findings suggest that prolonged slab pull during the oblique subduction of the oceanic plate continued to drive deep continental subduction, thereby forming high- and ultrahigh-pressure metamorphic rocks and leading to sustained ocean closure and foreland basin formation.