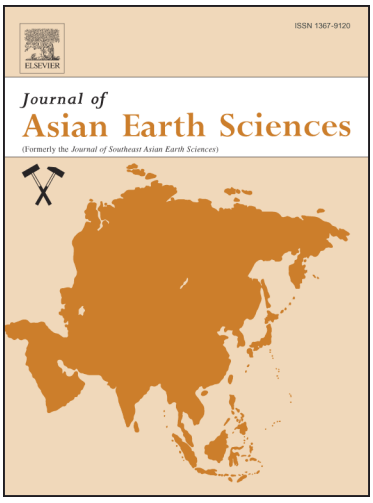

Full length article

Mechanism of crustal deformation in the Sichuan-Yunnan region, southeastern Tibetan Plateau: Insights from numerical modeling

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Mechanism of crustal deformation in the Sichuan-Yunnan region, southeastern Tibetan Plateau: Insights from numerical modeling

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Abstract The characteristics of crustal deformation and its dynamical mechanisms in the Sichuan-Yunnan region are of interest to many researchers because they can help explain the deformation pattern of the eastern Tibetan Plateau. In this paper, we employ a precise three-dimensional viscoelastic finite element model to simulate the crustal deformation in the Sichuan-Yunnan region, southeastern Tibetan Plateau. We investigate the influence of lower crustal flow and rheological variations by comparing the modeled results with GPS observations. The results demonstrate that lower crustal flow plays an important role in crustal deformation in the Sichuan-Yunnan region. The best fitting is achieved when the flow velocity of the lower crust is approximately 10-11 mm/a faster than that of the upper crust. Additionally, crustal rheological properties affect regional crustal deformation. When the viscosity of the middle and lower crust in the South China block reaches 10^{22} and 10^{23} Pa.s, respectively, the modeled results match observations well, especially for the magnitude of crustal motion within the South China block. Finally, our dynamic model shows that the maximum principal stress field of the Sichuan-Yunnan region exhibits clear zoning, gradually shifting from an approximately east-west orientation in the northern Bayan Har block to southeast in the South China block, southwest in the western Yunnan