Fault interaction and strain partitioning in southeastern Tibetan Plateau: from kinematics to geodynamics

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In southeastern Tibetan Plateau, the Xianshuihe-Xiaojiang fault system (XXFS) and its neighboring fault systems collectively accommodates the material extrusion of the Tibetan Plateau. However we do not mechanically understand how these faults interact with each other and how the fault interaction impacts strain partitioning, fault slip rates, and seismicity in this region. We develop and use a three-dimensional viscoelastoplastic finite element model to simulate regional deformation, fault slip rates, and fault interaction in the fault system of southeastern Tibetan Plateau. We investigate the effects of inception and activity of faults, fault strength, lithospheric rheology, and topography on partitioning of strain and fault slip rates. Model results show that fault strength, lithospheric rheology, and topography all significantly influence the strain partitioning and slip rates on faults. The initiation of the Daliangshan fault results mainly from the non-smooth fault geometry of the main trace of the XXFS. Our model results support the hypothesis of codependent slip rate between fault systems. For the present fault configuration, our model predicts localized strain in the Daliangshan faults, Yingjing-Mabian faults, and Lianfeng-Zhaotong faults, where numerous earthquakes occurred in recent years.