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Does strike-slip motion facilitate rifting and continental break-up?

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Initial stages of continental break-up often involve large strike-slip components (e.g. during separation of South America and Africa, $\sim$140 Ma) however there is no clear understanding of how oblique motions effect the break-up development. We use the three-dimensional, thermomechanical FEM code SLIM3D to model rifting of continental lithosphere composed of upper crust, lower crust, and mantle lithosphere. Results show that the force needed to initiate break-up strongly decreases for increased oblique plate motion. Our numerical models allow to quantify the relative importance of the three main weakening mechanisms: (i) friction softening in the brittle domain due to a strain-dependent effective angle of internal friction, as well as (ii) strain rate softening and (iii) shear heating which both reduce viscosity in the ductile domain.