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

Sascha Brune, Anton A. Popov, and Stephan V. Sobolev
GFZ German Research Centre for Geosciences, Potsdam, Germany (brune@gfz-potsdam.de)

Initial stages of continental break-up often involve large strike-slip components (e.g. during separation of South America and Africa, ∼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.