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Thin viscous sheet models for deformation of Indo-Australian oceanic lithosphere

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An outstanding problem regarding the deformation of equatorial Indian Ocean lithosphere is why the deformation zone is as wide as it is, and not narrower or wider. To improve our understanding of what controls this width, we apply thin viscous sheet models, which have previously been successfully applied to deformation in several continental deforming zones, to investigate the deformation of oceanic lithosphere in the deforming zones between the Indian, Capricorn, and Australian plates. We apply boundary conditions based on the results of investigations of the current motion between these plates. We neglect any buoyancy forces due to plate thinning or thickening. We consider a series of models with power-law exponents of 1, 3, 10, and 30. For simplicity, we only consider models for which the strength of the lithosphere does not vary laterally. We use various observations, including the observed width of the diffuse plate boundaries, to determine which models are acceptable and which are not. Preliminary results indicate that the best fit is for a power-law exponent of about 30. Implications for the rheology of oceanic lithosphere will be discussed.