



Coupling and feedback between tectonics and surface processes during rifted margin formation

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Whereas significant efforts have been made to understand the relationship between mountain building and surface processes, little research has been done on the relationship between surface processes and extensional tectonics. Here we present coupled tectonic-surface processes modeling of extensional basin formation. The main aim is to find out how erosion and deposition affect the deformation in extensional systems. We test sensitivity of the rift mode to the combined effects of crustal rheology and varying surface process efficiency. The results show that both erosion of rift flank areas and basin deposition enhance localization of crustal deformation. Frictional-plastic shear zones accumulate more deformation during a longer period of time, and time of lithospheric rupture is delayed when fluvial erosion, transport and deposition are efficient. We show that removal of mass from rift flanks and sedimentary loading in the basin area are the main cause of the feedbacks providing a first order control on the style of extensional basin formation.