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Response of normal faults to mass redistribution on Earth's surface due to erosion and sedimentation

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Mass redistribution on Earth's surface creates loads that can influence the rate of crustal deformation. Here we combine landscape-evolution modelling with three-dimensional geomechanical models to investigate how erosion and sediment deposition affect faulting in extensional tectonic regimes. The surface processes are implemented by using the CASQUS Software (Kurfeß & Heidbach, submitted to *Computers & Geosciences*, 2007), which integrates the landscape-evolution model CASCADE (Braun & Sambridge, *Basin Research*, 1997) into the commercial finite-element software ABAQUS. Basic models - consisting of an elastic upper crust with a single normal fault - show that the slip rate of the fault is significantly modified by erosion and sedimentation. To analyse the effect of the surface processes on the fault in more detail, fault geometry, extension rate and the parameters controlling erosion and sedimentation are varied in a series of experiments. More complex setups including fault arrays are used to model structures like growing horsts. Preliminary results show that the topography resulting from the slipping faults influences the courses of rivers in the model but also that erosion and sediment deposition affect the slip behaviour of the faults.