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# Linking continental erosion to marine transport and sedimentation

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Limited attention has been given to linking continental erosion to marine transport and sedimentation in large-scale landscape evolution models. Although either of the two environments has been thoroughly investigated, the details of how erosional events are recorded in the sedimentary and stratigraphic records have not been studied in a consistent quantitative manner. Here we present results obtained from a new numerical model for marine sediment transport and deposition that is directly coupled to FastScape, a landscape evolution model that solves the continental stream power law and hillslope diffusion equation using fully implicit and O(n) algorithms. The model of marine transport and sedimentation is simulated by a nonlinear 2D diffusion model where a source term represents mass flux arising from continental river erosion. It is based on the simplest representation of marine transport that assumes that flux is proportional to slope, which leads to a diffusion-type equation that we solve using an alternating direction implicit scheme. Multiple lithologies are implemented that vary by their transport coefficients. This method is also highly efficient (O(n) and implicit), which allows us to perform a large number of simulations to undertake a Bayesian inversion of stratigraphic data. Using our model we not only show the manner in which the stratigraphic record responds to tectonic and climate events but also how it is controlled by the coefficients for river erosion, hillslope diffusion, the transport coefficients in the ocean environment, and variations in sea level. The model is used to better constrain the nature and timing of erosional events on adjacent continents through an inversion of the stratigraphic record. In the longer term, we are looking at ways to improve the equations governing marine sediment transport especially, to better represent the deep part of that transport, i.e. in the abyssal plains or past the shelf and slope.