SURFACE PROCESS MODELS OF THE LAKE EYRE BASIN USING BADLANDS SOFTWARE

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Surface process dynamics play an important role in sedimentary basin evolution. It affects hydrologic and carbon cycling, which are particularly difficult to simulate because of their complex interactions and the large range of spatial and temporal scales on which they operate. By considering uplift/subsidence, sea level change and climate change, surface process models are able to assimilate and represent several dynamic processes, including crustal deformation, mantle-convection-driven dynamic topography, erosion, sediment deposition, burial, and compaction. In order for these models to be useful for the industry they need to be able to reproduce depositional histories in sedimentary basins. Here we propose to use Badlands (BAsin anD LANdscape DynamicS), a landscape evolution modelling software, to evaluate the topographic and sedimentary evolution of the Lake Eyre Basin, a large, dominant feature in the Australian landscape with economic resources and good data coverage. Analyses of the long-term Lake Eyre sedimentation can provide valuable information about the connection between processes operating at the Earth's surface and the deeper mantle. From our calibrated models, we will be able to characterise reconstructions of the burial of stratigraphic layers in a sedimentary basin through space and time**.** Our approach will provide an integrated set of forward models and data assimilation framework which may help us better constrain source-to-sink basin models, and shed light on the contribution of mantle convection processes on the stratigraphic evolution of basins. Furthermore, data science and machine learning methods can be used in conjunction to develop surrogate-assisted models in order to assist existing model for large-scale implementation.