GEODYNAMIC AND SURFACE PROCESS EVOLUTION OF NEW GUINEA SINCE THE JURASSIC

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Regional scale flooding of New Guinea has occurred episodically since the Jurassic. The most recent flooding event during the Miocene occurred despite falling long-term eustatic sea levels. Recent work has suggested dynamic topography, the long-wavelength low-amplitude topographic response to mantle flow, as a factor in the emergence and flooding of this region, and therefore influencing the depositional history of New Guinea basins. The link between deep Earth and surface processes has not yet been explored for this region. We use forward numerical models coupling plate kinematics, mantle convection, paleogeography and eustasty to investigate the time-dependent topographic response of the New Guinea margin. Dynamic topography estimates derived from mantle convection models are then coupled with surface process modelling code *Badlands* to study the landscape evolution of New Guinea and the adjacent Australian continent. Reproducing the inundation history of New Guinea, our models show that continental scale dynamic topography plays a significant role in the development of drainage systems, and erosion-deposition regimes. Our work demonstrates the necessity in linking geological processes that operate across wide spatial and temporal scales to better understand how the interplay between deep Earth and surface processes control the source to sink evolution of basins.