

## **The Evolution of Global Source-to-Sink Relationships During the Cretaceous and Tertiary Using Stage Level Palaeogeographies and PaleoDEMs**

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This study examines the stage-level palaeogeographic evolution of the Earth during the Cretaceous and Tertiary and how observed changes in the landscape directly influences sediment source to sink relationships at regional and basin scales. This is part of an on-going programme to map the global Phanerozoic and Late Precambrian landscape at stage level.

The landscape is dynamic and changes at all temporal and spatial scales. These changes are a direct consequence of active and past (inherited) tectonic processes and the effects of contemporary climate (weathering, erosion, transport (via wind, water and ice) and vegetation). Despite its significance for understanding downstream depositional systems in areas of active or potential exploration, there have been few studies that have attempted to reconstruct the palaeolandscape in a systematic way, and certainly none, of which we are aware, on the spatial and temporal scales presented here.

The mapping comprises three main components: a structural and tectonic basemap, which provides the reconstructed positions of plates and structures (the plate model used is that of GETECH, v.1 2009); a reconstruction of contemporary depositional and erosional (tectonophysiographic) areas with the dominant lithologies present (the aim is to represent regional and local base-level for each stage; fluctuations are summarised as a polygon showing the variation of the shoreline through the stage); elevational and bathymetric maps (as palaeoDEMs), complete with interpreted major palaeoriver systems. All of this work is completed in ArcGIS and the maps are underpinned by a comprehensive geological database and bibliographic reference library. In addition, each area has a systematic data sheet that records pertinent stratigraphic and tectonic information.

The resulting maps provide a unique insight into the global, regional and basin scale changes in source-to -sink relationships through time. The underlying methodologies we have used are rigorous, and the results testable, which is essential if palaeogeography is to be used as a tool in exploration.