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Variability in the Late Permian landscape of the upper Balfour Formation (Beaufort Group Strata, Karoo Basin, South Africa).

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The End-Permian mass extinction, ca. 251.9 Ma, is considered to represent the most severe ecological upheaval in the history of life, with an estimated species diversity loss in excess of 90% in the oceans. Compared to the well-studied marine record, the terrestrial expression of this extinction is poorly understood. Traditionally, it has been equated with the contact between the *Daptocephalus* (previously *Dicynodon*) and overlying *Lystosaurus* Assemblage Zones (AZs) in the Karoo Basin of South Africa. Recently published research demonstrated that this faunal turnover, which occurs in the Elandsberg and Palingkloof Members, uppermost units of the Balfour Formation (Beaufort Group, Karoo Supergroup), predates the marine extinction; nevertheless, many workers still consider this biozone transition to record three separate episodes of extinction, based on published biostratigraphic data.

An accurate lithostratigraphic framework is essential for constructing a detailed, regional biostratigraphic database that can be used to reconstruct palaeobiological diversity models. This is a difficult undertaking in a terrestrial setting, such as the upper Balfour Formation, that records a long-term transition from high sinuosity fluvial systems (forming the Balfour Formation) to the lower sinuosity fluvial systems responsible for the deposition of the Katberg Formation. To date, correlation between the isolated and widely distributed Changhsingian boundary sections in the Karoo Basin have been based on the purported presence of unique boundary facies or facies sequences, ostensibly present at each section. Yet, the correlative utility of such “golden spike” horizons also has been called into question by recent assessments of lateral facies relationships in the upper Balfour Formation. These studies demonstrate significant lateral lithofacies variation, indicating that it is impossible to accurately correlate between outcrops within a single locality, without tracing boundary surfaces in the field.

To determine whether similar lateral variation occurs on larger spatial scales, we have expanded an established lithostratigraphic framework for a single locality, to an area spanning several kilometres and including a number of widely spaced measured sections. Provisional results show that current models underestimate the nature of the transitional Late Permian landscape, resulting in the conclusion that the uppermost Balfour Formation represents a laterally heterogenous landscape that preserves a variety of depositional sub-environments. This lateral variability necessitates a review of existing stratigraphic models and, by inference, also palaeobiological models for this interval.