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210 - Using Permian glacials and Paleocene-Eocene Thermal Maximum regolith as time markers to constrain and understand the uplift history and landscape evolution of the Australian Alps

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Considering the diversity of landscapes across the width of the Victorian Great Dividing Range allows for a nuanced understanding of SE Australia landscape evolution. This includes establishing uplift timing, controls on uplift differentiation, and characterising complex erosion histories which show distinct differences between western and eastern Victoria.

We use the distribution and differential preservation of Permian glacial features and deep indiscriminate, tropical-style regolith profiles formed during the Palaeocene-Eocene Thermal Maximum (PETM) as time-markers to constrain Victoria's landscape evolution. We conclude that Permian landscapes are surprisingly intact in parts of west/central Victoria where Cretaceous uplift was limited, but have been denuded where Cretaceous uplift was substantial.

Uplifted Cretaceous landscapes deeply dissected prior to the Eocene feature in-situ PETM regolith remnants upon and below the high erosional escarpments that incise them. PETM valley incisions are deep, broad and occupied by significantly underfit modern rivers. Aggressive PETM erosion formed spaced inselberg mountain landscapes confined to west/central Victoria and south Gippsland.

Cretaceous-uplifted plateau landscapes that weren't deeply incised until after the PETM are ubiquitous across northeastern Victoria (Victorian Alps) and extend into the SE NSW Alps. The alps are characterised by incised erosional escarpments and valleys that, critically, lack PETM regolith. Post-PETM valley forms are typically V-shaped and sized consistent with their modern rivers.

All mountain uplift in Victoria was Cretaceous, but subsequent erosion histories show marked differences. We attribute aggressive pre-Eocene erosion of uplifted Cretaceous landscapes in west/central Victoria to a persistently southwesterly-derived PETM high rainfall regime, with Cretaceous alpine mountains in NE Victoria and SE NSW remaining uneroded in an orographic rain-shadow to prevailing PETM weather. Subsequent PETM decline combined with warm south-flowing East Australian Current growth switched the rainfall regime to easterly derived. This initiated deep Alpine erosion post-PETM, with Permian-Eocene landscapes of central/west Victoria swapped into a post-PETM orographic rain-shadow.