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# Post-breakup burial and exhumation of passive continental margins: nine propositions to inform geodynamic models

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Despite many years of study, the processes involved in the post-breakup development of passive margins remain poorly understood. Integration of apatite fission track analysis (AFTA) and stratigraphic landscape analysis (SLA) at a number of margins has provided new insights into the development of elevated passive continental margins (EPCMs). In particular, these studies have highlighted the importance of integrating evidence from the preserved rock record with information on the deposition and erosional removal of rock units which are no longer present ("missing section"). From these studies we have formulated nine propositions regarding the formation of EPCMs and the nature of the controlling processes, viz:
1: EPCMs are not the inevitable consequence of rifting and breakup
2: Elevated topography at present-day EPCMs developed long after breakup
3: Similar EPCM landscapes at different margins suggest similar controlling processes
4: EPCMs undergo episodic burial and exhumation rather than slow monotonic denudation, both before rifting and after breakup
5: Post-breakup exhumation at continental margins is not restricted to elevated onshore regions
6: Post-breakup burial and exhumation have affected low lying margins as well as EPCMs
7: Episodic km-scale exhumation and re-burial also affects cratonic regions
8: Exhumation events show a broad level of synchroneity across continents and oceans and correlate with plate boundary events and changes in plate motions.
9: EPCMs are located where there is an abrupt, lateral change in crustal or lithospheric thickness
These propositions imply that positive and negative vertical motions at passive margins are controlled by plate-scale processes. Many of these key aspects are absent from current geodynamic models of passive margin development. Understanding the processes that control vertical movements at passive continental margins requires development of realistic geodynamic models that honour these propositions.