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Modelling the Wilson Cycle: how structural inheritance affects geodynamics processes.

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The Wilson Cycle is a fundamental principle in plate tectonics. It entails that oceans close and reopen, inferring continuity from divergence to convergence. This idea questions the role of inherited structures at each stage of the Wilson Cycle.
Until recently the importance of continuity from divergence to convergence has been undervalued and the effects of inheritance of former structural complexity in the Wilson Cycle have only been studied with relatively simple 2D models. Yet, due to the intrinsically 3D character of plate movements through geological times, such effects requires to be studied using self-consistent 3D models.
Using the 3D thermo-mechanical code, I3ELVIS (Gerya and Yuen, 2007) we present the first internally consistent model of the complete Wilson Cycle from continental rifting to oceanic spreading to oceanic closure and subduction at the passive margin and ultimately collision. In this model, all lateral and longitudinal structures of the lithospheres are generated self-consistently from the initial continental structure, tectono-magmatic inheritance and material rheology. The model allows to examine how inheritance strongly affects stress and strain distribution in the lithosphere and thereby affects patterns of subduction initiation and ocean closure. Models show how thermal inheritance from rifting, in the lithosphere mantle, can be a key component of the conversion of passive to active margin and the onset of collision.
Bibliography:
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