

“A strategy for restoring inversion basins; thermochronological and dip analyses in SE Australia”

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Constructing balanced sections across inverted basins is difficult because of the different directions of tectonic transport during extension and compression and the imprecise estimates of the magnitude and timing of inversion events. Sections oriented within 25 degrees of all transport directions can be used to predict the detachment depth and result in (10%) error in the amount of extension/compression. Extensional faults are commonly oblique to the transport direction, so the extension direction is best determined by dip analysis of the pre-rift section, in an uninverted area. As subsequent compression commonly reactivates extensional faults, the compression direction is best determined from the orientation and magnitude of large, curved inversion anticlines, the morphology of which can be estimated from thermochronological analysis. Palaeotemperature gradients are determined from borehole vitrinite reflectance profiles and integrated with vitrinite reflectance maps of inversion unconformities to estimate the amount of denudation. In addition, the timing, amount and duration of cooling, due to inversion and erosion, can be determined by apatite fission track analysis. Thus the eroded strata can be replaced onto the section at the correct time and the inversion restored to reveal the amounts of extension and compression. For the Otway Ranges in SE Australia 45% Early Cretaceous extension followed by 10% mid-Cretaceous compression is inferred.



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