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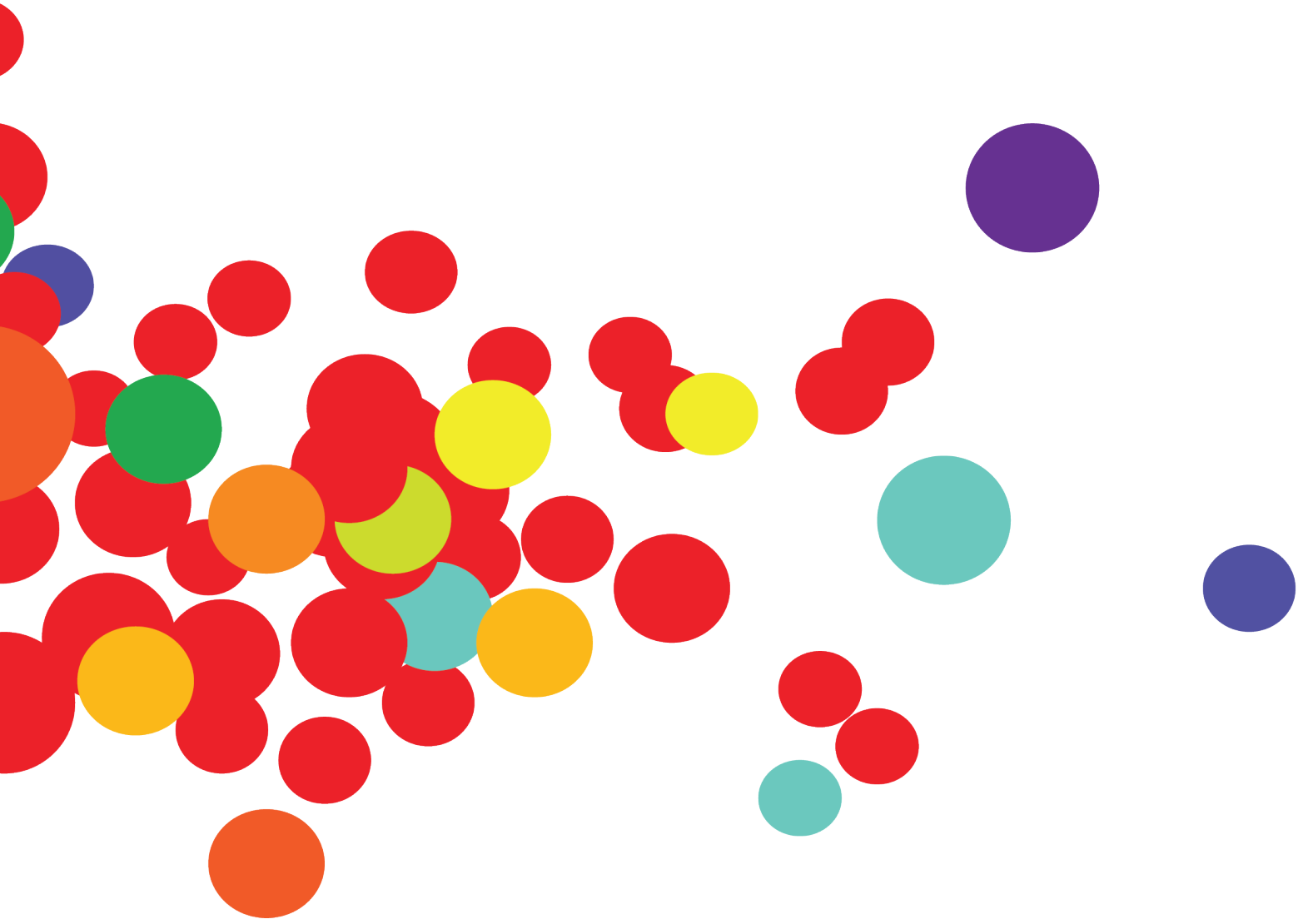

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Abstracts

3D RESTORATIONS OF THE MIOCENE-PLIOCENE SYNOROGENIC BASINS WEST OF THE ALPINE FAULT: STRUCTURAL CONTROL OF BASEMENT DEFORMATION AND COMPRESSIONAL INVERSION

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The tectono-stratigraphic setting of the Australian crust in the West Coast region of the South Island of New Zealand is imprinted by a long deformation history, involving: (i) Paleozoc collision along the Gondwana margin; (ii) mid-Late Cretaceous rifting culminating with separation of the Zealandia continental mass from eastern Gondwana (90-60 Ma); (iii) propagation since 25 Ma of the transpressive, right-lateral Alpine Fault, and development of the collisional orogen of the Southern Alps.

Neogene deformation of the Australian crust is not consistent with simple flexural models against the collisional margin, because of the double vergence of folding and faulting, the irregular time-space propagation of shortening and uplift from the inner to the outer zones, with complex evolution of syntectonic marine-terrestrial sedimentary basins separated by basement uplifts.

We present a regional study integrating surface and subsurface data to provide a 3D reconstruction of deformed Australian crust, recorded by the geometry of the top basement surface, chrono-stratigraphic transects, and restored and decompacted regional cross sections that constrain the vertical mobility within fault-bounded basins undergoing progressive shortening. Our reconstruction shows the role of inherited Late Cretaceous conjugate normal faults that were reactivated in compression, controlling several km of relief between antiformal basement pop-ups bounded by steep reverse faults and synformal depressions hosting syntectonic sequences up to 6-8 km thick. Some faults already breached the top basement during the extensional phases, whereas others propagated from deeper levels of the basement, controlling folding of the sedimentary cover. Currently active faults comprise sets of newly-forming blind reverse faults at the base of the seismogenic crust that propagate up-section exploiting the inherited extensional fault fabric.

The resulting geometry controls short-wavelength, irregular undulation of the top basement surface, disrupting the regional trends of uplift and progressive migration of “foreland basins” from the inner to the outer zones.