

MODULATION OF THE WESTLAND FOREDEEP THROUGH ONGOING COMPRESSIONAL INVERSION

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West of the Alpine Fault, Neogene shortening within the Australian plate has been largely accommodated by compressional reactivation of inherited normal faults, coupled with the propagation of new compressional structures. The tectonic signature of this *Compressional Inversion Orogen* includes: (i) a predominance of steep reverse faults; (ii) no regional vergence of folds and faults; (iii) an irregular time-space propagation of shortening; (iv) a complex sequence of distribution, infill and uplift of syntectonic basins; (v) lack of evidence for a deformation front migrating systematically away from the transform boundary with time.

This tectonic style is in distinct contrast to a ‘typical’ foreland fold-and-thrust belt, but independent geophysical data (e.g. the SIGHT seismic survey) are consistent with flexure of the Australian lithosphere ahead of the load imposed by the Southern Alps, and with the regional interpretation of a Miocene-Pleistocene retroarc foreland basin system west of the Alpine Fault.

We analyse migration and deformation of the Westland basins (from the Nelson offshore to Hokitika) using a series of 19 chrono-stratigraphic transects that extend from the Waimea-Alpine Fault margin to the offshore, sub-orthogonal to the NNE-SSW tectonic trends. For each transect, we use available bio-stratigraphic data from exposed sections and exploration wells to define differential mobility (in terms of subsidence, uplift and erosion) and time evolution of sedimentary basins in the last 16 Ma. Analysis of these transects, coupled to the interpretation of offshore seismic lines and to the structural setting onshore, help define the location, time shift, and progressive deformation of domains with distinct sedimentary infilling.

Our analysis shows a strong control of inherited paleogeography and basement discontinuities on the initial (16-12.5 Ma) configuration of segmented subsiding basins, followed by irregular westward and southward migration of subsiding basins and of deformed “piggy-back” basins from 12.5 to 2 Ma. Segmentation of the foredeep is characterised by re-entrants and salients of depocentral zones, controlled by compressional reactivation of discontinuous fault segments in different positions.

The tectono-stratigraphic evolution and progressive disruption of the Westland foreland basin system records the tectonic interference between progressive westward migration of shortening in the retro-wedge and localised, selective reactivation of inherited basement discontinuities that modulate the diachronous and irregular distribution of uplift and subsidence in the flexed Australian lithosphere.