

Mid-Cretaceous granulites and the age of the Alpine Fault “Big Bend”

M. W. SAGAR^{1*}, J. M. PALIN¹, D. SEWARD²
AND M. T. HEIZLER³

¹Department of Geology, University of Otago, Dunedin, NZ

(*correspondance: matthew.sagar@otago.ac.nz)

²School of Geography, Environment and Earth Sciences,

Victoria University of Wellington, NZ

(diane.seward@vuw.ac.nz)

³New Mexico Bureau of Geology & Mineral Resources,

NMMT, Socorro, NM, USA (matt@nmt.edu)

The Alpine Fault is the main Australian-Pacific plate boundary structure in the South Island of New Zealand. At a regional scale the Alpine Fault has a remarkably linear trace [1], except in the northern South Island, where a lazy-S-shaped bend has developed.

Mid-Cretaceous (126.6 ± 1.3 Ma) adakitic hornblende granulites of the Glenroy Complex outcrop west of the Big Bend. Peak metamorphic conditions were 815 ± 40 °C/ ~ 6 kbar. U-Pb, $^{40}\text{Ar}/^{39}\text{Ar}$ and fission-track thermochronology define a multipart thermal history that elucidates the age of the Big Bend. Following metamorphism, the Glenroy Complex was relatively rapidly exhumed to the upper crust during two periods of continental extension (104.5 ± 2.5 Ma & ~ 80 – 45 Ma) separated by a period of tectonic quiescence in the Late Cretaceous (~ 100 – 80 Ma). Development of the Alpine Fault at ~ 23 Ma [2] had no influence on Glenroy Complex exhumation. Initial surface exposure occurred in the late Middle Miocene. Development of the Big Bend at ~ 15 Ma led to formation of a foreland basin on the Australian Plate and reburial of the Glenroy Complex to ~ 3 km. Increased convergence across the plate boundary in the Late Miocene [3] resulted in final exhumation at ~ 4 Ma.

[1] Norris *et al* (1995) *GSA Bulletin* **107**, 231-240 [2] Cooper *et al* (1987) *Geology* **15**, 941–944 [3] Cande *et al* (2004) *Geophysical Journal International* **157**, 399-414