Detrital zircon age patterns and provenance in late Paleozoic–early Mesozoic New Zealand terranes and development of the paleo-Pacific Gondwana margin

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ABSTRACT

Permian-Triassic strata from Parapara Peak in the Takaka terrane, western province, New Zealand, are dominated by detrital zircon peaks at ca. 240 Ma comparable to the Torlesse terrane of the eastern province. This contrasts with lower Paleozoic strata (Onekaka schist), which is comparable to other lower Paleozoic terranes (including adjacent Buller terrane) from the Gondwana margin that are characterized by detrital zircon patterns with characteristic peaks at ca. 500–650 Ma and ca. 1000–1150 Ma, a less distinct peak around 1400–1700 Ma, and scattered Archean ages. These data indicate the close proximity of the eastern and western provinces by Permian time and a probable source region of Parapara Peak strata and Torlesse terrane in the New England fold belt of southeast Australia.

INTRODUCTION

Geologic similarities among New Zealand, West Antarctica, and southeastern Australia have long been recognized, particularly in relation to their lower Paleozoic sequences (Cooper and Grindley, 1982). Not only are equivalents of the lower Paleozoic Delamerian and Lachlan fold belts represented in New Zealand and northern Victoria Land (Cooper, 1989; Gibson and Ireland, 1996), but detrital zircon age spectra indicate that the lower Paleozoic sediments in all three regions were derived from a common provenance (Ireland et al., 1995; Gibson and Ireland, 1996; Wysoczanski et al., 1997). In New Zealand (Fig. 1), sedimentary rocks of this age are restricted to the Buller and Takaka terranes (Cooper, 1989), which together make up the western province (Landis and Coombs, 1967).

The western province, which consists predominantly of lower Paleozoic sedimentary rocks intruded by Devonian-Carboniferous and Cretaceous granites, differs from the rest of New Zealand in that its sediments are almost exclusively of continental derivation. This is no less true of the lower Paleozoic successions in the Buller and Takaka terranes than it is for a small outcrop of Permian strata exposed at Parapara Peak (Fig. 1). The strata at Parapara Peak have long been considered anomalous in respect to both their composition and location, in that they comprise quartz-rich, locally fossiliferous, sedimentary rocks that bear no obvious relationship to the volcanogenic terranes (Brooke Street, Murihiku, and Torlesse) of equivalent age in New Zealand’s eastern province (Bishop et al., 1985).