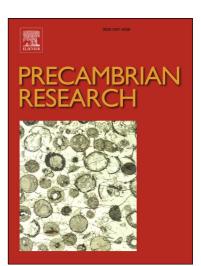
Accepted Manuscript

Linking the Windmill Islands, east Antarctica and the Albany–Fraser Orogen: insights from U–Pb zircon geochronology and Hf isotopes

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ACCEPTED MANUSCRIPT

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- 2 Pb zircon geochronology and Hf isotopes
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11 ABSTRACT

- 12 U–Pb and Hf isotopic data from metasedimentary and magmatic rocks from the Windmill
- 13 Islands in Wilkes Land, East Antarctica, confirm age and crustal evolution links between the
- 14 Albany–Fraser Orogen and this part of East Antarctica. Detrital zircon age data indicate that the
- 15 protoliths to the metasedimentary rocks of the Windmill Islands have maximum depositional
- 16 ages of c. 1350 Ma. Metamorphic zircon growth at c. 1300 Ma and a crystallisation age of c. 1315
- 17 Ma for the protoliths to an orthogneiss that intrudes the metasedimentary rocks provide a
- 18 minimum depositional age. Significant detrital zircon age components are identified at 1790 Ma,
- 19 1595 Ma and 1390 Ma. The 1350–1300 Ma depositional interval and the detrital age components
- 20 suggest that the Windmill Islands metasedimentary rocks can be linked to metasedimentary rocks
- 21 of the Arid Basin in the Albany–Fraser Orogen. The sediment sources were likely to be the West
- 22 Australian Craton as well as a significant component from the c. 1410 Ma Loongana Arc in the
- 23 Madura Province. This combination of sources suggests a back-arc setting for the Arid Basin,
- 24 consistent with the short interval between deposition and high thermal gradient metamorphism.
- 25 The magmatic rocks in the Windmill Islands have intrusive ages of c. 1315 Ma, 1250–1210 Ma
- and 1200–1160 Ma. The first phase of magmatism was likely to be derived from melting of Arid
- 27 Basin metasedimentary rocks, based on abundant inherited zircon with similar ages to the
- 28 surrounding metasedimentary rocks. The final two phases of magmatism have juvenile $\epsilon_{Hf}(t)$
- 29 values consistent with a greater proportion of mantle melt sources.
- 30

31 KEYWORDS: Wilkes Land; Antarctica; Detrital zircon; Provenance; Lu–Hf

32

33 1. INTRODUCTION

34 Wilkes Land, in East Antarctica (Fig. 1), was a central component in the formation of the Nuna,

35 Rodinia and Gondwana supercontinents (e.g. Boger, 2011; Fitzsimons, 2000, 2003; Payne et al.,

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