

Paper Number: 3203

## Age and source of the Hanson Formation—unlocking the Early Jurassic history of the paleo-Pacific margin of Gondwana

Nelson, D.A.<sup>1</sup>, and Cottle, J.M.<sup>1</sup>

<sup>1</sup>Department of Earth Science, University of California, Santa Barbara, California 93106-9630, USA, demian@umail.ucsb.edu

---

The Early Jurassic stratigraphy throughout the Transantarctic Mountains is dominated by a thick section of silicic tuffs and reworked volcanoclastic sediments, the Hanson Formation, of unknown age and origin [1]. During this time period initial rifting of supercontinent Gondwana is thought to have been coincident with the emplacement of three large igneous provinces (LIP; Ferrar-Karoo, ~183 Ma, and Chon Aike V1, ~188-178 Ma) and a mass extinction event at the Toarcian-Pliensbachian boundary [2, 3]. The earliest discovered volcanic rocks of the Chon Aike silicic LIP (~188 Ma) from the Antarctic Peninsula are believed to provide the timing of initial supercontinent breakup. However, it remains unclear whether the Hanson Formation represents a distal and, perhaps, more thorough record of silicic volcanism during initial rifting, arc-related volcanism along the active paleo-Pacific margin of Gondwana, or some combination of both processes.

Whole rock geochemistry data from Hanson Formation rocks is difficult to uniquely interpret because of variable alteration, and the potential presence of detritus from multiple isotopically and temporally distinct sources [4]. We therefore focus on zircon U-Pb, Hf isotope and trace element data from Hanson Formation tuffs and volcanoclastic sediments from throughout the Central Transantarctic Mountains to determine the timing, duration and source(s) of volcanism. U-Pb dates for >20 tuffs yield a detailed and continuous record of volcanism between ~200-183 Ma. Relatively constant zircon trace element ratios and consistently positive  $\epsilon_{\text{Hf}_i}$  isotopic compositions throughout the Hanson Formation suggest derivation from a uniform juvenile source. To further elucidate the Early Jurassic tectonic and magmatic history of southern Gondwana, we compare and contrast our data from the Hanson Formation with new and existing data for potential magmatic sources and related volcanic rocks along the paleo-Pacific margin of Gondwana.

### References:

- [1] Elliot, D. H. (1996). *Antarctic Science*, 8(04), 389-394.
- [2] Pankhurst, R. J., et al. (2000). *Journal of Petrology*, 41(5), 605-625.
- [3] Encarnación, J., et al. (1996). *Geology*, 24(6), 535-538.
- [4] Elliot, D. H., et al. (2007). *10th ISAES, USGS Open-File Report*, 1047.

