



22-25 October
Seattle, Washington, USA

THE GEOLOGICAL SOCIETY
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Booth No. 467 ISOTOPES TO ICE: CONSTRAINING PROVENANCE OF GLACIAL DEPOSITS AND ICE CENTERS IN WEST-CENTRAL GONDWANA

Sunday, 22 October 2017

09:00 AM - 05:30 PM

📍 *Washington State Convention Center - Halls 4EF*

The timing and geographic distribution of glaciers in high-latitude southern Gondwana during the late Paleozoic Ice Age remain poorly constrained, ultimately precluding our ability to estimate ice volume and associated climate teleconnections and feedbacks during Earth's penultimate icehouse. Here, we report new U-Pb ages and Hf isotope compositions of detrital zircons recovered from diamictites in two key mid- to high-latitude Gondwanan basins (Paraná, Brazil and Tepuel, Argentine Patagonia). The results indicate regional sediment sources for both basins during the early period of late Paleozoic glaciation evolving into more distal sources during the final phase of deglaciation along southern and western Gondwana. Similar age sediment sourced from diamictites in the Congo Basin, that require an ice center in eastern Africa suggest the possibility of a large ice sheet in this area of Africa proximal to the Carboniferous-Permian boundary, which may have sourced sediments to the Paraná Basin. An inferred distal southern source of glacial sediment for the Tepuel Basin argues for the presence of an ice sheet(s) in the Ellsworth block of Antarctica towards the end of the glaciation history in Patagonia. These findings indicate an evolution during the late Paleozoic Ice Age from proximally to extrabasinally sourced sediment reflecting continental-scale glaciation and subsequent drainage from the Windhoek Highlands, Ellsworth Block and an East African source in west-central Gondwana. Coincidence with a long-term fall in atmospheric $p\text{CO}_2$ during the Pennsylvanian to a minimum across the Carboniferous-Permian boundary and a subsequent rise in the early Permian suggests a primary CO_2 -driver for deglaciation in the Paraná Basin. Additional boundary conditions including availability of moisture and paleogeography likely further contributed to the timing of nucleation, growth and demise of these Gondwanan glaciers.

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