

Tracing the Origin of an Iceberg Alley Dropstone and its Implications about Antarctica's Glacial History

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The sources of dropstone erratics in marine sediment cores can provide powerful constraints on ice sheet history. Site U1536 during IODP Expedition 382 in “Iceberg Alley” in the Scotia Sea shows well-defined intervals of glacial and interglacial periods, measured by variation in detrital material vs. biosiliceous ooze. Core U1536E (18R 1W) contained a large chloritic sandstone dropstone from 88 – 115cm with a distinct appearance. Visual comparison between archives from the Polar Rock Repository showed similarity to the Wyatt Earp Formation of the Crashite Group in the Ellsworth Mountain region. U-Pb ages by ICPMS from zircons extracted from the sandstone (n= 37) provided the age populations of sources that contributed to the sandstone dropstone. The zircon grains within the U1536 dropstone yielded U-Pb ages between 500 and 1700 Ma with a strong peak at 500-600 Ma, and the detrital ages are similar to published detrital ages from the Wyatt Earp Formation. U-Th-He ages were measured on some of the zircons and yielded 170-242 Ma (n=4), consistent with relatively little heating since deposition in the sandstone formation. The implication of the sample's glacial provenance as a dropstone requires there be no Weddell Sea ice shelf circa 7 Ma) when the sandstone was deposited on the Scotia Sea floor.