
254-37 - Booth No. 143: U-Pb ZIRCON DATING OF NEOARCHEAN ROCKS IN THE LITTLE ELK TERRANE, BLACK HILLS, SOUTH DAKOTA



Wednesday, September 25, 2024



8:00 AM - 5:30 PM



Hall D (Anaheim Convention Center)

Booth No. 143

Abstract

Proterozoic metasedimentary rocks exposed in the core of the Black Hills, South Dakota, are generally interpreted to represent an ocean basin that closed during suturing of the Wyoming and Superior cratons. However, two Archean terranes are exposed at the western (Bear Mountain terrane) and eastern (Little Elk terrane) margins of the Black Hills Precambrian core and have an unclear relationship with the Proterozoic rocks. This study focuses on the Little Elk terrane, which has been mapped as two individual units: the Little Elk Granite and Biotite-Feldspar Gneiss. Previous work on the Little Elk terrane has argued either that these units are distinct entities based on structural features, or that they are variably deformed versions of the same granite body based on whole rock geochemical data. We present U-Pb zircon data from each of the two units with the goal of determining whether the units are separate entities or have some genetic relationship. After LA-ICP-MS analyses on 315 zircons from each sample, the zircon U-Pb data were filtered for concordance (75-110%) and compared using concordia plots, kernel density estimate plots, weighted mean plots, and associated statistics. Both samples display significant discordance with a lower intercept at 0 Ma, suggesting simple Pb loss. The data that passed the filtering criteria display a normal unimodal distribution for each sample. The granite sample yielded a weighted mean age of 2545 ± 2.3 Ma (MSWD= 0.86, n=139), and the gneiss sample yielded a weighted mean age of 2555 ± 2.3 Ma (MSWD= 0.7, n=149). Each sample contains few analyses older than ca. 2600 Ma. Given the normal distribution of the data, the underdispersion of the analyses, and similarity between the mean ages, we interpret that the two units share an origin, and the Biotite-Feldspar Gneiss is a portion of the Little Elk Granite that experienced higher strain. Synthesizing our data with other recent work on the Little Elk Terrane reveals that a greenschist facies shear zone juxtaposes the western margin of the Little Elk Granite against Paleoproterozoic quartzites to the west. We interpret that the Biotite-Feldspar Gneiss represents the portion of that shear zone with Little Elk Granite protolith.

Author



Alexandra Robinson
Pomona College

Authors



Trevor Waldien
South Dakota School of Mines and Technology



Nicole Moore
Pomona College

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