INTRODUCTION

The Mesoproterozoic Wilton package is a widespread basin system throughout a large area of the northern Australia. The Beetaloo Sub-basin is a key part of the Mesoproterozoic Wilton package and a major play area for the gas industry. This study focuses on the Beetaloo Sub-basin in northern Australia to understand the sedimentary provenance and tectonic evolution of the Mesoproterozoic Wilton package.

RESULTS

Detrital muscovite and zircon chronology

The compiled detrital muscovite and zircon ages from the Beetaloo Sub-basin range from 1092 ± 16 Ma to 135 ± 0.01 Ma. The youngest age of 1092 ± 16 Ma is from the upper Roper Group and the oldest age of 135 ± 0.01 Ma is from the Lower Roper Group. The detrital muscovite and zircon ages show a significant change in provenance between the Lower and Upper Roper Groups.

Sedimentary provenance

- The Lower Roper Group has a different sedimentary provenance compared to the Upper Roper Group. The Lower Roper Group is dominated by ca. 1.15 Ga muscovite analyses, while the Upper Roper Group is dominated by ca. 1.48 Ga muscovite analyses.
- The Lower Roper Group is characterized by deposition in a passive margin setting, while the Upper Roper Group is characterized by deposition in a more active margin setting.
- The detrital zircon ages in the Lower Roper Group are dominated by ca. 1.15 Ga muscovite analyses, indicating a sedimentary provenance from the Beetaloo Sub-basin.

CONCLUSIONS

The combined apatite and whole-rock Rb–Sr geochronology of the Derim Derim Dolerite provides important constraints on the age of the Mesoproterozoic Wilton package. The results support the hypothesis that the Wilton package was deposited in a passive margin setting over a long time period.

ACKNOWLEDGMENTS

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Late Palaeoproterozoic to early Mesoproterozoic redox conditions—proxies from the Tawallah and Lower McArthur groups

McArthur Linkage Team

INTRODUCTION
The McArthur Basin is a regionally extensive Palaeoproterozoic basin that has served as a key area in studies involving the development of redox conditions within ancient sedimentary basins, including modern analogues. The McArthur Basin is located in the Northern Territory, Australia, and is one of the largest sedimentary basins in the world. The basin has a complex tectonic history and is characterized by a series of depositional events, including deposition of sediments through deposition of sulphides.

Basin redox conditions are assessed through a number of trace elements with low detrital components. Uranium (U) similarly shares the characteristics with the trace elements previously discussed. In oxic environments, U is oxidized to U(VI) and is mobilized in the aqueous phase, whereas in anoxic environments, U is reduced to U(IV) and precipitates as uraninite (UO2). In euxinic environments, U(VI) is reduced to U(IV) and forms uraninite, which is insoluble in water.

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Age Constraints and Provenance of the Tomkinson Province—The Southernmost Greater McArthur Basin

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