

Geodynamic evolution of the northern Shackleton Range, East Antarctica: constraints from combined U-Pb and Lu-Hf zircon isotope analyses

Will, Thomas¹ Zeh, Armin² Gerdes, Axel³ Frimmel, Hartwig⁴ Schmädicke, Esther⁵

¹Lehrstuhl für Geodynamik und Geomaterialforschung, Universität Würzburg, Am Hubland, D-97074 Würzburg, Germany ²Lehrstuhl für Geodynamik und Geomaterialforschung, Universität Würzburg, Am Hubland, D-97074 Würzburg, Germany ³Institut für Geowissenschaften, Universität Frankfurt, Altenhöferallee 1, D-60438 Frankfurt, Germany ⁴Lehrstuhl für Geodynamik und Geomaterialforschung, Universität Würzburg, Am Hubland, D-97074 Würzburg, Germany ⁵Institut für Geologie und Mineralogie, Universität Erlangen-Nürnberg, Schlossgarten 5a, D-91054 Erlangen, Germany

U-Pb and Lu-Hf isotope investigation reveal that the Shackleton Range represents a composite terrane that was affected to various extents by the Palaeoproterozoic Kimban Orogeny, the Mesoproterozoic Grenvillian Orogeny and the late Neoproterozoic/Cambrian Pan-African Orogeny. Separate crustal terranes with specific tectonothermal histories, isotope signatures and crustal evolutions could be delineated.

Based on U-Pb zircon isotope data a series of magmatic and metamorphic events could be identified. Magmatism occurred at approximately 1850 Ma, 1050 Ma and 530 Ma. High-temperature metamorphism took place at 1700 Ma, 600 Ma and 510 ± 10 Ma. Four different crustal domains, each of which is characterized by tectonism at different times, could be distinguished. For most of the dated single zircon grains, the Lu-Hf isotopic composition was determined as well. As indicated by $\epsilon_{\text{Hf}}(t)$ initials that are close to that of the depleted mantle, the Palaeo- and Mesoproterozoic events were associated with the formation of juvenile melts from a depleted mantle source, but minor to moderate recycling of older crust occurred as well. The youngest Pan-African events recycled the Palaeoproterozoic crust, without the addition of juvenile mantle material.

The geologic features of the Kimban-age Palaeoproterozoic tectonism in the Shackleton Range is very similar to that of the Australo-Antarctic Mawson Craton. This may indicate that the Mawson Craton extends across the East Antarctic Shield to the Shackleton Range. The documented 1060 Ma and 600 Ma events are correlated with Grenvillian and Pan-African tectonism in Dronning Maud Land and, by implication, indicate the continuation of the Pan-African Mozambique/Maud Belt into the Shackleton Range. The associated suture is located in the easternmost Shackleton Range and is related to the amalgamation of the Indo-Antarctic plate with West Gondwana. This continental collision was followed by the further collision of the combined Indo-Antarctic/West Gondwanan block with East Gondwana during the Pan-African Orogeny at approximately 510 Ma. A suture related to this latter collision can be traced in the northern Shackleton Range and may continue to Lützow Holm and Prydz Bay. Our data support the model that East Antarctica finally assembled during the Pan-African Orogeny and not already during the Mesoproterozoic.

Abs. No. **467**
Meeting: **DMG 2008**
submitted by: **Will, Thomas Will**
email: **thomas.will@uni-**
wuerzburg.de
date: **2008-06-02**
Req. presentation: **Poster**
Req. session: **S07**