

Presence of Tonian Cryogenian Orogeny in the interior of Princess Elizabeth Land: Evidence from detrital zircons isotopic ages

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The East Antarctic Shield (EAS) is a complex sutured terrane comprising excerpts of Indo-Antarctic, Australo-Antarctic, and Africo-Antarctic cratonic domains covered with thick icesheet. These sutures and cratonic boundaries are defined by a complex network of Pan-African-aged mobile belts. Geophysical surveys suggest the presence of an Indo-Australo-Antarctic Suture (IAAS) joining the Eastern Dronning Maud Land with Princess Elizabeth Land- Wilkes Land sector. However, the relation of IAAS with the hidden Gamburtsev Subglacial Mountains remains enigmatic. Also how the coastally exposed lithologies terminate in the interior of the PEL sector still remains unresolved.

Sediments deposited in the Prydz Bay preserve the signature of the sub-glacial geology of the PEL and the Gamburtsev Subglacial Mountains. The detrital zircons were separated from the marine sediments from sites 739, 742 and 740 which were drilled during ODP expedition 119 in the year 1989. These sites are located on the continental shelf of the Princess Elizabeth Land, in Prydz Bay.

Site 740 and 742 are the proximal sites and are dominantly the depocenter for the streams present in the coastal terrane while site 739 is the distal site and is mainly affected by the sediments deposited through the complex drainage system of Lambert Amery Ice streams. The zircons were separated as heavy media and LA_ICPMS isotopic dating was carried out at IUAC Facility, New Delhi, India. Zircons from proximal sites show the spread of ages varying from Paleoproterozoic to Pan-African. However, the distal site shows concordant ages of ~650-700Ma which suggest the presence of a Tonian-Cryogenian event in the interior of PEL sector. This data provides new insights into the speculated Gamburtsev Sub Glacial Mountains. The vast range of age from Paleoproterozoic to Pan-African confirms the supply from the complex terrane of coastal PEL while ~700 Ma concordant ages from interior integrated with metamorphic monazite ages confirms presence of a Tonian-Cryogenian orogenic belt in interior. This work contributes to our understanding of sub-ice geological framework of south of