

Late Neoproterozoic to Cambrian metamorphic events in the Princess Elizabeth Land, East Antarctica and its implications to the assembly of East Gondwana

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The coastal belt of Prydz Bay in the Ingrid Christensen Coast of Princess Elizabeth Land (PEL), East Antarctica exposes an ensemble of highly deformed orthogneissic and paragneissic rocks which record late Mesoproterozoic to early Neoproterozoic (*ca.* 1000–900 Ma) and late Neoproterozoic to Cambrian (*ca.* 550–500 Ma) tectonothermal histories.

In this study, pelitic granulites from the Storness Peninsula have been investigated to constrain the tectonothermal evolution of PEL. We use field and textural relations in conjunction with phase equilibria modelling and petrochronology to demonstrate the P-T-t evolution of the terrane. The paragenetic evolution is marked by the sequential development of the assemblages biotite + quartz + sillimanite to garnet + K-feldspar to spinel + biotite + cordierite along a clockwise P-T path. The peak stage was achieved by a segment of decompressional heating up to a temperature of ~900°C. This heating caused partial melting and produced cordierite-bearing leucosomes surrounding the quartz-deficient melanosome consisting of garnet - spinel - cordierite - sillimanite - biotite - K-feldspar with monazite, zircon and apatite as accessory phases. LA-ICPMS U-Pb zircon ages yield a range of *ca.* 1764 – 594 Ma with a dominance of *ca.* 1000 – 800 Ma detrital core ages suggesting Paleoproterozoic to Mesoproterozoic inheritance. Limited overgrowth on zircon from the melanosomes makes it difficult to estimate the precise age of metamorphic imprint. On the contrary, chemical ages of texturally constrained monazite suggest the time frame of *ca.* 560–485 Ma for this tectonometamorphic cycle in the PEL. While the peak stage was reached at *ca.* 530 Ma, the youngest population of matrix monazite age of *ca.* 485 Ma suggests post-peak cooling during the late Cambrian time. Evidence of this metamorphic cycle has also been traced in the Eastern Ghats Province (EGP) of India. This study confirms that the Prydz Bay region of East Antarctica was juxtaposed to the EGP during the assembly of East Gondwana at *ca.* 550–500 Ma. The Cambrian tectonothermal events are better preserved in the East Antarctica compared to its erstwhile neighbor in India presumably due to the proximity of the former to the Kuunga orogenic belt.