

# SHRIMP U-Pb zircon geochronology of southern Madagascar: New evidence of Mesoarchaean crust and its implications on Madagascar tectonothermal history

Nirihaja O.T. RAKOTONANDRASANA<sup>1</sup>, Makoto ARIMA<sup>1</sup>, D.J. DUNKLEY<sup>2</sup>, Raymond RAKOTONDRAZAFY<sup>3</sup>, Roger A. RAMBELOSON<sup>3</sup>

<sup>1</sup>Graduate School of Environment and Information Sciences, Yokohama National University, 79-7 Tokiwadai, Hodogaya-ku, Yokohama 240-8501, Japan

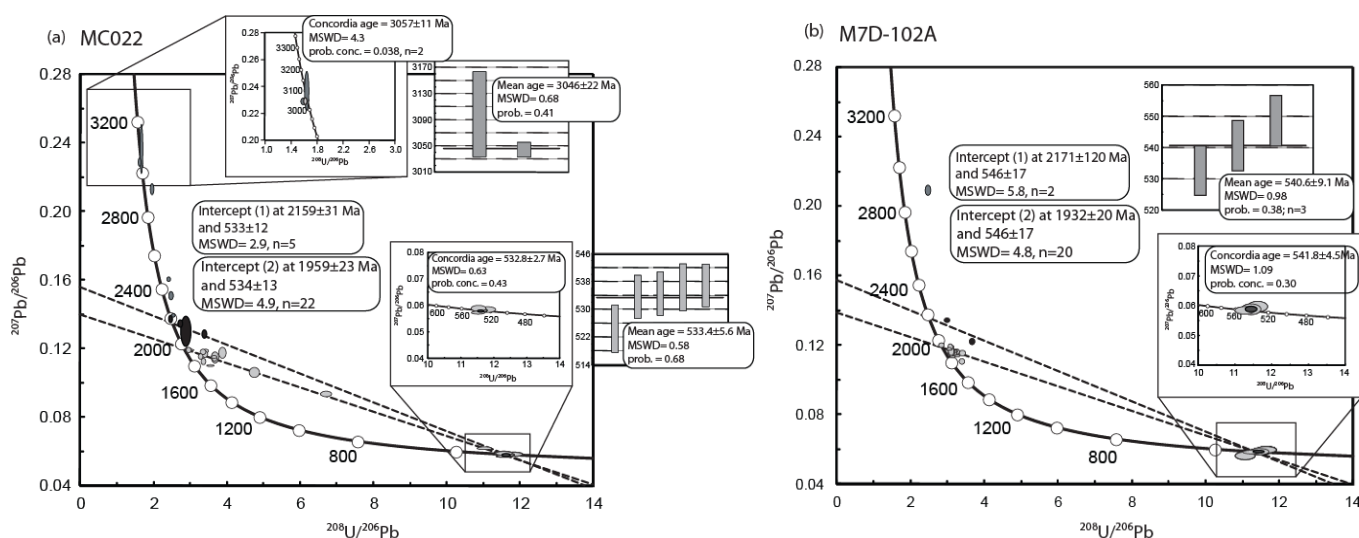
<sup>2</sup> Department of Applied Geology Curtin University, Kent Street, Bentley, WA 6102, Australia

<sup>3</sup>Département des Sciences de la Terre, Faculté des Sciences, Université d'Antananarivo, BP 906, Antananarivo 101, Madagascar

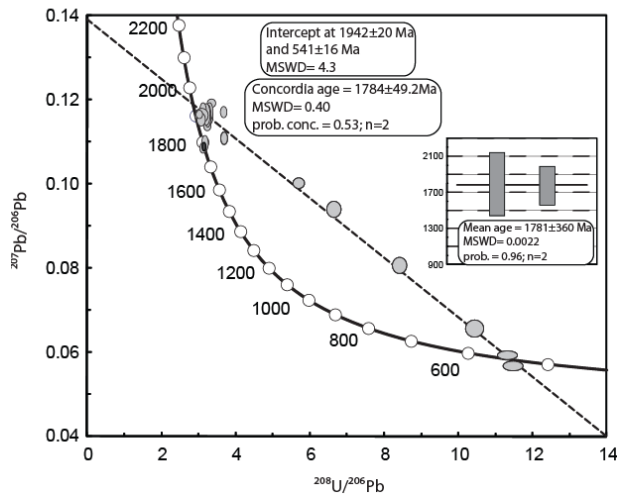
## Abstract

We have studied zircon CL imaging and SHRIMP U-Pb data from pelitic gneiss, psammitic gneiss, migmatite mesosome, leucosome, and granitic gneisses collected from the northern part of the Anosyan Domain, southern Madagascar. The present zircon data indicate that Mesoarchaean basement of 3098 – 2905 Ma is the source rock of this vast metamorphic terrain. Our data reveal that this terrain was affected at least three major metamorphic events at 1959-1932 Ma, 548-533 Ma and 522-482 Ma. Ultrahigh temperature metamorphism (UHTM) occurred at 548 - 533 Ma. The younger ages indicate a final stage of metamorphic event and attributed to the hydrothermal process. Other ages between 1775-1795 Ma probably indicate thermal events within the Anosyen and Androyen Domains. Provenance ages between 2902-1959 Ma were derived from heterogeneous sources. The intervening emplacement of the alkaline granitic body took place at  $838 \pm 12$  Ma in the south and  $786 \pm 12$  Ma in the north of the Ranotsara shear zone, respectively. The lack of Archaean evidence in migmatite composed of mesosome (MC038) and leucosome (MG2301) layers implies the strong Pb loss effect of zircon resetting during zircon-melt interaction. The presence of correlative Archaean age in central Madagascar suggests that both south and central Madagascar terrains were either one exotic craton, or derived from the African or Indian craton. Later, this craton was reworked during Paleoproterozoic, Neo-proterozoic, and Paleozoic periods.

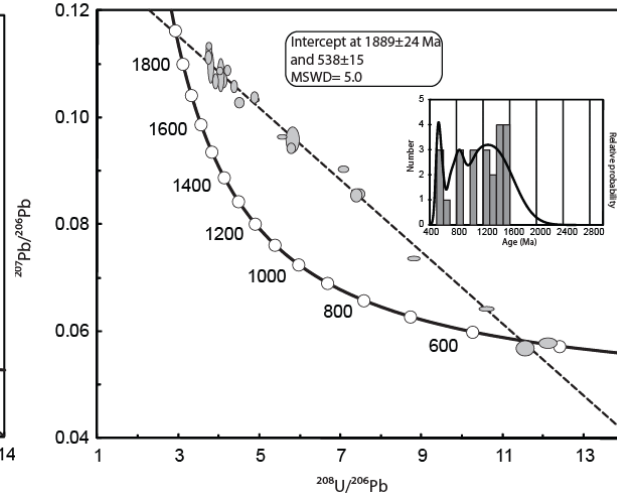
Keywords: Zircon SHRIMP Geochronology, Archaean, Craton, South Madagascar



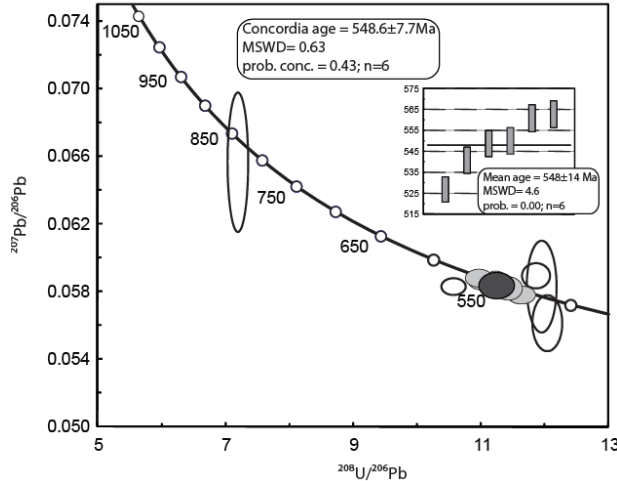
(c) MC038



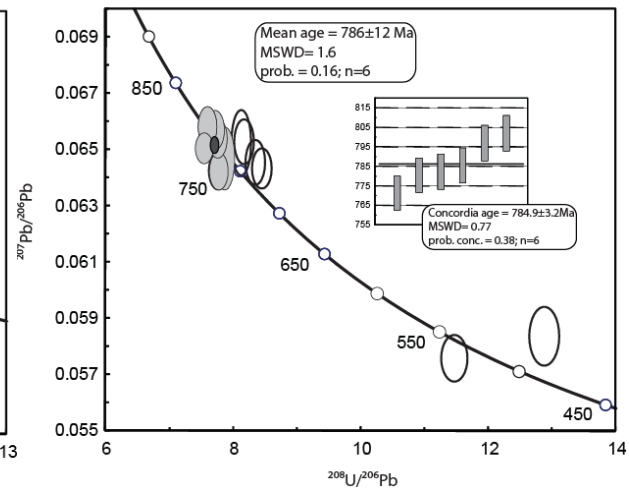
(d) MG2301



(e) M7D-52A



(f) M7D-27C



## References

- Jöns, N., Schenk, V., 2008. Relics of the Mozambique Ocean in the central East African Orogen: evidence from the Vohibory Block of southern Madagascar. *Journal of Metamorphic Geology* 26, 17–28.
- Paquette, J.L., Nedelec, A., Moine, B. & Rakotondrzafy, M., 1994. U-Pb, single zircon Pb-evaporation, and Sm-Nd isotopic study of a granulite domain in SE Madagascar. *Journal of Geology* 102, 523–538.
- Rambeloson, R.A., Yoshida, M., Ramasiarino, V., Le Duc L. & Ralison, B., 2003. The Central Granites-Gneiss-Migmatite Belt (CGMB) of Madagascar: the Eastern Neoproterozoic Suture of the East African Orogen. *Gondwana Research* 6, 641–651.
- Tucker, R.D., Kusky, T.M., Buchwaldt, R., Handke, M.J., 2007. Neoproterozoic nappes and superposed folding of the Itremo Group, west-central Madagascar. *Gondwana Research* 12, 356–379.
- Tucker, R.D., Roig, J.Y., Macey, P.H., Delor, C., Amelin, Y., Armstrong, R.A., Rabarimanana, M.H., Ralison, A.V., 2011. A new geological framework for south-central Madagascar, and its relevance to the “out-of-Africa” hypothesis. *Precambrian Research*, 185, 3–4, 109-130.