Zircon U-Pb and Hf isotopic data from granitic rocks of Taiwan

C.Y. LAN[1]*, T. USUKI[1], K.L. WANG[1], T.F. YUI[1], J.H. YANG[2], W. LIN[3] AND P.S. HSIEH[3]

[1]Institute of Earth Sciences, Academia Sinica, Nankang, Taipei, Taiwan, ROC (*correspondence: kyanite@earth.sinica.edu.tw)

[2]State Key Laboratory of Lithospheric Evolution, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing,, PROC (jinhui@mail.igcas.ac.cn)

[3]Energy and Environment Research Laboratories, Industrial Technology Research Institute, Hsinchu, Taiwan, ROC (waynelin@itri.org.tw)

South China is famous for its widespread, voluminous Mesozoic Yanshanian igneous activity. Taiwan is situated at the eastern margin of South China. The timing and genesis of granitic rocks of Taiwan are curcial to understand the crustal evolution of Taiwan and thair relationship with South China.

In this study, six granitic rocks were collected from the Tailuko metamorphic basement of Taiwan for *in situ* zircon U-Pb dating and Hf isotopic measurement. They include four metagranites and one paragneiss from northern Taiwan and one metagranite from southern Taiwan. The metagranites present two magmatic age groups, 191±10 Ma [1]. and 84-90 Ma. Their relict zircon cores present Early Cretaceous to Early Permian ages with minor Paleoproterozic age. However, no unique magmatic age is found from the paragneiss. Its relict ages vary from Cretaceous to Late Carboniferous with minor Paleoproterozic ages and the youngest age being 88 Ma. The Early Jurassic metagranite outcropped in southern Taiwan gives positive zircon epsilon Hf (t) values, ranging from +8.6 to +11.8. Their T_{DM}^{C} Hf model ages of zircon range from 0.5 to 0.7 Ga. The Late Cretaceous metagranites outcropped in northern Taiwan yield positive to negative epsilon Hf (t) values, ranging from -3.8 to +6.5 and vary among different localities. Their T_{DM}^{C} Hf model ages of zircon range from 0.8 to 1.4 Ga and vary among different localities. Similar geochemical properties can be observed among the metagranites, such as initial Nd isotopic values, amount of normative corundum and peraluminosity [2]. Trace elements analyses on zircons are carried out for two Late Cretaceous metagranites. They exhibit REE patterns similar to magmatic zircons.

Our studies identified Middle Neoproterozoic and Middle Neoproterozic to Middle Mesoproterozoic Hf model age for the Early Jurassic metagranite from southern Taiwan and Late Cretaceous metagranites from northern Taiwan, respectively. These findings are consistent with the occurrences of Neo-proterozoic magmatism in the Yangtze and Cathaysia blocks.

Eoarchaean crustal evolution of the North Atlantic craton

PENELOPE J. LANCASTER*, CRAIG D. STOREY AND CHRIS J. HAWKESWORTH

University of Bristol, Dept. of Earth Sciences, Wills Memorial Building, Queen's Rd., Bristol BS8 1RJ, UK (*correspondence: penelope.lancaster@ucd.ie)

Recent studies suggest extraction of juvenile crust from the mantle has been globally continuous throughout Earth's history, but the crustal record is biased by preservation, particularly from supercontinents [e.g. 1, 2]. As a result, crust older than the first supercontinent at *c*. 2.7 Ga is now rare and frequently strongly reworked. However, younger sedimentary rocks may preserve fragments of Archaean basement by sampling wide areas, including those which have since been buried or destroyed, thereby providing a more complete record of the ancient crust. Of these sedimentary rocks, coarse basal units are most likely to preserve local basement, constraining the likely geographical distribution of those source areas and providing greater context for any detrital material.

Detrital zircons have been analyzed from basal units of the Meso/Neoproterozoic to Cambrian Stoer, Sleat, Ardvreck and Morar groups in NW Scotland to evaluate basement source ages and isotopic signatures. Widespread crustal extraction is recorded in Hf model ages between 4160–1410 Ma, peaking at c. 3350 Ma, with significant crystallisation and/or reworking between 3670–1070 Ma, peaking at c. 2700 Ma. Similar crystallisation and model ages have been identified around the North Atlantic Craton, suggesting a shared, but not consanguineous, origin. All four units contain Hf model ages that imply partial reworking of Eoarchaean crust, and model ages as old as 4200 Ma from the basal Ardvreck Gp. indicate the existence of much older crust in Scotland and the greater North Atlantic Craton. Such consistency around the craton reinforces the conclusion that crustal extraction and crystallisation are continuous, large-scale processes, and have been since the very earliest Earth.

[1] Lancaster *et al*. (2011) *Earth Planet. Sci. Lett*. In press.
[2] Hawkesworth *et al*. (2009) *Science* **323**, 49–50.