Geophysical Research Abstracts
Vol. 18, EGU2016-14286, 2016
EGU General Assembly 2016

Isotopic age constraints on provenance of exotic terranes, latest Permian collision and fast Late Triassic post-collisional cooling and tectonic exhumation of the Korean collision belt

Koenraad de Jong (1), Seokyoung Han (1), Gilles Ruffet (2), and Keewook Yi (3)

(1) Seoul National University, School of Earth and Environmental Sciences, Seoul, Republic of Korea (keuntie@yahoo.com), (2) Université de Rennes 1, Géosciences Rennes - UMR CNRS 6118, Rennes, France, (3) Korea Basic Science Institute, Division of Earth and Environmental Sciences, Chungbuk, Republic of Korea

The Korean peninsula is located in the eastern margin of the Eurasian continent where major late Palaeozoic to early Mesozoic continental collision zones, like the Central Asian Orogenic Belt and the Central China Orogen, merge with circum-Pacific subduction-accretion systems. We present an integrated view of the Korean collision belt using recent Ar/Ar laser-probe step-heating single grain ages from the uppermost Gyeonggi Massif, central Korea's Palaeoproterozoic high-grade granite-gneiss terrane affected by Permo-Triassic metamorphism, the bordering Hongseong zone and the overlying Imjingang belt and the correlative Taean Formation, as well as SHRIMP isotopic ages of detrital zircons from meta-sandstones from the latter metamorphic marine turbidite sequences. We show that early Paleozoic isolated exotic terranes form part of the collision belt and were reworked in Permo-Triassic time.

Age spectra of zircons from mature meta-sandstones in the Misan Formation (Imjingang Belt) and Taean Formation do not match the age distribution of the Gyeonggi Massif, to which both are usually assigned, as they show only subordinate 1.9–1.8 Ga and ∼2.5 Ga age modes but dominant 441–426 Ma and 978–919 Ma peaks. Much of the sediment appears to have been derived from distant, exotic middle Paleozoic and Early Neoproterozoic magmatic sources, not present in Gyeonggi or other Korean basement massifs. The youngest concordant zircon ages are: 394, 398 and 402 Ma, showing that both formations are at least of Early Devonian age. Terranes with a substratum with Early Neoproterozoic and Silurian-Devonian granitoids are present in the South Chinese Cathaysia Terrane and in the Qinling Terrane (Central China Orogen). Both formations may, hence, represent the submarine fan part of a routing system and a delta-shelf system originally situated in China. The Taean Formation and Imjingang Belt are thus exotic Paleozoic terranes tectonically emplaced in the Korean collision belt.

Muscovite, biotite and amphibole from different units of the Imjingang Belt yielded tightly clustered Ar/Ar plateau ages between 255±1 and 249±1 Ma, dating fast cooling after peak temperature conditions. Slightly younger 243±1 and 240±1 Ma muscovite plateau ages in strongly retrogressed mylonites in the top of the Gyeonggi Massif and 241–237 Ma age components (Taean Formation) point to collisional tectonism. Concordant 233–229 Ma isotopic ages of titanite, hornblende and mica in Hongseong zone and Taean Formation, and detrital muscovite in Jurassic Gimpo sandstones reveal a regional thermal event affecting large portions of the peninsula's crust, also manifested in widespread 237–226 Ma mantle-sourced Mg-rich potassic magmatism and associated mafic dykes truncating folds and tectonic foliations. The Late Triassic thermal pulse implies rapid advective-conductive asthenospheric heat transport promoted by extension and magmatic underplating during post- or late-collisional lower crust and uppermost mantle delamination and/or oceanic slab break-off. The efficiency of cooling is underlined by identical biotite (228±1 Ma) and hornblende (230±1 Ma) plateau ages in Hongseong amphibolites that are partly concordant with 243–229 Ma (average: ∼235 Ma) U–Pb zircon ages in the Gyeonggi Massif and the Hongseong zone, in the literature. This indicates that the Gyeonggi Massif is a Late Triassic core complex.