Geophysical Research Abstracts
Vol. 19, EGU2017-11212-4, 2017
EGU General Assembly 2017

Petrology and zircon geochronology of felsic gneiss from the Tromsø Nappe, the Scandinavian Caledonides

Yasuhiro Monta (1), Takao Hirajima (1), Ryosuke Kato (2), Yasuhito Osanai (2), Nobuhiko Nakano (2), Tatsuro Adachi (2), Shuhei Sakata (3), Jaroslaw Majka (4), and Marian Janak (5)

(1) Kyoto University. Kyoto, Japan (montay@kueps.kyoto-u.ac.jp), (2) Kyushu University, Fukuoka, Japan, (3) Gakushuin University, Tokyo. Japan, (4) Uppsala University, Uppsala, Sweden, (5) Slovak Academy, Bratislava, Slovak

The spatial extent/distribution of ultrahigh pressure metamorphic (UHPM) rocks gives a critical condition to consider the exhumation process of the relevant area. Main lithotype hosting UHPM rocks in the world is commonly orthogneiss, and most of orthogneiss mainly consists of amphibolite facies minerals that harm to determine the exact distribution of the UHPM terranes. However, zircon grains have a potential to retain UHPM minerals, such as coesite and jadeite, from the later stage overprint (e.g., Tabata et al., 1998). Therefore, the comprehensive study on zirconology is a potential tool to determine the exact spatial distribution and the formation timing of UHPM belt. The Tromsø Nappe, belonging to the Uppermost Allochthon of the Scandinavian Caledonides, is one of the UHP terranes, and evidence of UHPM comes from eclogites (e.g., Ravna & Roux, 2006; Janák et al. 2012) and diamond-bearing gneiss (Janák et al., 2013). The studied sample is garnet-muscovite gneiss from the Tromsø Nappe. It shows an augen structure characterized by cm-size plagioclase porphyroclasts in the gneissose matrix mainly composed of micas, mm-size garnet and quartz. Si-content and XMg of muscovite are homogeneous in each grain (6.20 - 6.40 for O = 22 basis and 0.60 – 0.74, respectively). X-ray mapping of garnet suggests that some garnet grains show a zoning structure, such as Ca-poor (XGrs = 0.09 – 0.15) and inclusion-rich inner-core (including kyanite), Ca- and inclusion-poor outer-core and Ca (XGrs = 0.16 – 0.26)-rich rim (ca. 50 μm), although most of garnet grains are free from Ca-rich rim. Outline of inner-core shows an irregular shape, suggesting that some garnet was partially resorbed during its formation stage. Most plagioclase grains shows a zoning of Ca-rich (XAn = 0.25-0.31) core and Ca-poor (XAn = 0.15-0.22) rim. Zr-in-Rt thermometry and GASP barometry give 640 – 700 C and 1.5 – 1.7 GPa for the garnet and plagioclase cores. The same thermometry and Grt-Hbl-Pl-Qtz barometry give 550 – 590 C and 1.1 – 1.3 GPa for the rim pairs. The PT conditions of the garnet core stage are similar to those of D1 stage in metapelite in the Tromsø Nappe (Krogh et al., 1990). Zircon grains also show zoning structures, oscillatory zoned core, thin dark mantle and bright rim in cathodoluminescence image. The LA-ICP-MS U-Pb dating of zircon gives the concordant ages of 2800 – 950 Ma for the core and 490 – 430 Ma for the rim. The zircon core shows high Th/U ratio (> 0.10), the HREE over LREE and Ce positive and Eu negative anomaly, suggesting the magmatic origin (e.g., Hoskin & Ireland, 2000). The zircon rim shows low Th/U ratio (< 0.10), depleted HREE and Eu negative anomaly, suggesting the metamorphic origin in the plagioclase stability field. The zircon rim ages overlap U-Pb zircon ages of 452.1 +/- 1.7 Ma from eclogites (metamorphic age) and U-Pb titanite and rutile ages of 451 – 448 Ma (cooling age) obtained by Corfu et al. (2003) using ID-TIMS. Our older rim ages overlap with the igneous age by Corfu et al. (2003). This discrepancy remains as a future problem.