



New evidence for a late Neoproterozoic (ca. 650 Ma) metamorphic event in the Caledonian basement of Wedel Jarlsberg Land, West Spitsbergen

Majka J. (1), Czerny J. (1), Manecki M. (1), Mazur S. (2)

(1) AGH – University of Science and Technology, Department of Mineralogy, Petrography and Geochemistry; al. Mickiewicza 30, 30-059 Krakow, Poland, (2) Wrocław University, Institute of Geological Sciences; pl. Maksa Born'a 9 50-204 Wrocław, Poland

The SW part of Wedel Jarlsberg Land constitutes one of the most important sections of the Caledonian basement exposed on the western Spitsbergen. The area between Hornsund and Torellbreen consists of two Proterozoic terranes (Czerny et al. 1993) with different lithological composition and metamorphic grade, separated by the Vimsodden-Kosibapasset fault zone (VKFZ). The latter one represents a ductile strike-slip to oblique-slip shear zone of regional extent and dextral kinematics developed under greenschist facies conditions. In the southern terrane, paragneisses, shists and marbles of the Isbjørnhamna Group are overlain by quartzites, metatuffs, amphibolites, metagabbros, and metagranites of the mostly metavolcanic Eimfjellet Group, probably 1200-1100 Ma in age (Balashov et al, 1995, 1996). These rocks were metamorphosed under amphibolite facies conditions later overprinted by greenschist facies retrogressive event. The northern tectonic block displays only greenschist facies metamorphism and consists of the metasedimentary Deilegga Group separated by an angular unconformity (i.e. the Torellian unconformity, Birkenmajer 1975) from less deformed rocks of the Sofiebogen Group (Slyngfjellet and Elvefya Formations).

This study presents the first U-Th-total Pb monazite ages obtained from SW Wedel Jarlsberg Land. Previously reported Grenvillian Rb/Sr age of ca. 936 Ma (Gavrilenko et al.1993) as well as 919-933 Ma zircon lower intercept ages (Balashov et al. 1995) suggested that the amphibolite grade metamorphism in the southern terrane is Grenvillian in age. However, late Neoproterozoic ages of metamorphism were also reported from the southern terrane based on K/Ar method (565 and 595 Ma, Gayer et al. 1966),

and most recently Ar/Ar method (hornblende: 616 ± 17 Ma, muscovite: 584 ± 14 and 575 ± 15 Ma; Manecki et al. 1998). Caledonian Ar/Ar ages of 459 ± 9 and 432 ± 7 Ma (Maneckci et al. 1998) were obtained from both Proterozoic terranes juxtaposed across the VKFZ.

Monazites from the Isbjørnhamna, Deilegga and Sofiebogen Groups were analysed with the use of electron microprobe Cameca SX 100 in EMPA facility at the Dionyz Stur Geological Survey in Bratislava, Slovak Republic. The monazite age was calculated on the basis of Montel et al. (1996) calibration. The monazites from the Isbjørnhamna Group yielded uniform Neoproterozoic age of 643 ± 9 Ma. Detrital monazites from the Deilegga Group and the Slyngfiellet Formation represent a wide age spectrum: 2760-2360 Ma, 1880-1800 Ma, 1680-1360 Ma, 1180-900 Ma. However, metamorphic ages in all the analysed rocks from the northern terrane are similar and show two metamorphic events: Neoproterozoic 700-560 Ma and Caledonian 540-420 Ma. Monazite dates from rocks belonging to the Elveflya formation of the Deilegga Group, adjacent from the north to the VKFZ, yielded four distinct age maxima: 653 ± 39 Ma, 524 ± 27 Ma, 443 ± 16 Ma, 356 ± 33 Ma. The oldest metamorphic age of ca. 650 Ma, consistent with previous K/Ar and Ar/Ar estimates, appears consistently in all the analysed samples.

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