

New Data on the Age and Geochemical Features of Granites in the Southern Prince Charles Mountains and Prydz Bay Coast

E.V. MIKHALSKY^{1*} & N.W. ROLAND²

¹VNII Okeangeologia, St Petersburg - Russia

²Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover - Germany

*Corresponding author (emikhalsky@mail.ru)

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Abstract - In the southern Prince Charles Mountains (SPCM) apparently undeformed post-tectonic granites are dated by zircon U–Pb (SHRIMP) study at c. 525–515 Ma. Early Palaeozoic granites in the SPCM may be correlated with peraluminous leucogranite type. Origination of these rocks as a result of voluminous mafic underplate at the base of the crust during the course of an intraplate orogeny is possible. Granites in some parts of the Ruker Terrane (Mts Dummett, Stinear, and Newton) contain inherited zircon populations with Palaeoproterozoic or Mesoproterozoic ages, which are not known from the Ruker Terrane. Granites in the Prydz Bay coast form two magmatic phases, the earlier one was pre- or syn-tectonic and is dated at c. 505 Ma. The later phase has A-type granite features (high HFSE, Ga/Al, biotite with high Fe, and F) and originated in within-plate tectonic setting.

INTRODUCTION

The southern Prince Charles Mountains (SPCM) are mainly underlain by the Archaean to Neoproterozoic Ruker Province (Phillips et al., 2006), termed Ruker Terrane by other authors (Mikhalsky et al., 2006a and references therein; Fig. 1). The northern Prince Charles Mountains (NPCM) are a part of extensive Meso- to Neoproterozoic mobile belt and comprises the Beaver Terrane (1150–940 Ma; Boger et al., 2000, Carson et al., 2000, Mikhalsky et al., 2001), and the Fisher Terrane (1300–1000 Ma; Mikhalsky et al., 2001, and references therein). The Fisher Terrane may represent a specific compositional zone within the Beaver Terrane (Mikhalsky et al., 2006b). Fitzsimons (2000) considered the NPCM as a part of the Rayner Province extending from western Enderby Land to the Lambert Glacier area. An area in the central and northern Mawson Escarpment was distinguished as a separate Palaeoproterozoic Lambert Terrane by Kamenev et al. (1990), Mikhalsky et al. (2006a). The Ruker Terrane comprises Meso- to Neoproterozoic felsic orthogneisses, variously deformed granites, and metasediments (collectively termed the Ruker Complex by Kamenev et al. (1993) or Tingey Complex by Phillips et al. (2006)) which form the basement overlain by Proterozoic metamorphosed and deformed cover sequences (Phillips et al., 2005, 2006). Most of the Ruker Terrane, and the Lambert Terrane experienced Cambrian (c. 500 Ma, hereafter Early Palaeozoic) granite intrusion. Boger et al. (2001) considered the Lambert Terrane a Cambrian collisional suture and correlated it with a high-grade belt exposed in the Prydz Bay area, while Fitzsimons (2003) supported

this model, but noted that c. 550–500 Ma tectonism was reported only from the southern part of Mawson Escarpment. However, Phillips et al. (2006) based on a U–Pb detrital zircon study concluded the collisional model “needs a revision”.

Previous granite datings in the SPCM mostly yielded Palaeoproterozoic and Archaean ages: 2589 Ma, 2100 Ma, 1995 Ma, and 1708 Ma (muscovite-bearing pegmatites cutting the metasediments in the Ruker Terrane; Tingey, 1982); c. 2650 (pegmatite crystallization and minimum age of deformation; Boger et al., 2001). Early Palaeozoic ages were obtained for granitic rocks or pegmatites in the SPCM by Halpern & Grikurov (1975): 495 Ma (Rb–Sr muscovite age, Mt McCauley), and Tingey (1991): 551±74 Ma (Rb–Sr whole rock, Harbour Bluff).

The compositional and structural diversity of granites in the SPCM was described by Roland & Mikhalsky (submitted). In this paper we present new geochemical and zircon U–Pb isotopic data (SHRIMP) for essentially post-kinematic (*i.e.* apparently postdated major tectonic and metamorphic events in the area) granitic rocks from both the Lambert and the Ruker Terranes. Mostly the granitoids occur as relatively thin vein and dykes or irregular shaped masses, but in a few localities they form larger bodies (up to some hundred meter wide). In some localities late granitic veins may exhibit some shearing attributive of tectonic activities, but the applied strain was not regional scale and did not produce metamorphic foliation in the host rocks apart from relatively narrow zones. However, in other localities (*e.g.*, Mt Dummett), similar rocks preserve a tectonic foliation (Phillips et al., 2005).