

Composition of the Neoproterozoic granitic rocks from the Bienville and La Grande domains, Superior Province, Canada

LUKÁŠ ACKERMAN¹, JIŘÍ ŽÁK², MARTIN SVOJTKA¹,
FILIP TOMEK^{1,2}, JIŘÍ SLÁMA²

¹Institute of Geology of the Czech Academy of Sciences,
Prague, Czech Republic; ackerman@gli.cas.cz

²Faculty of Science, Charles University, Prague, Czech
Republic

The Bienville and La Grande domains are Meso- to Neoproterozoic lithotectonic units of the north-eastern Superior Province [1]. The Bienville domain belongs to the Hudson Bay Terrane and it is predominantly composed of granitic (tonalite–trondhjemite–granite; TTG) and gneissic rocks with an age of ~2.7 Ga. By contrast, the La Grande domain is traditionally divided into the ~2.7 Ga southern part (Eastmain) with a high proportion of volcano-sedimentary rocks and the ~3.4–2.7 Ga old northern part (La Grande) with similar characteristics as Bienville [1,2].

Here, we present new U–Pb LA–ICP–MS zircon ages, major/trace element geochemistry and Sm–Nd isotopic compositions for the granitic/gneissic rocks (TTG, granite) from the (1) southernmost part of the Bienville domain and (2) a N–S transect through both parts of the La Grande domain. New U–Pb ages (~2710 Ma) for the granitic rocks from the Eastmain part are indistinguishable within the given error from those determined in the Bienville domain (~2700–2720 Ma). The sampled Bienville rocks exhibit wide range in composition from monzogabbro to granite with variable LREE-enrichment ($La_N/Yb_N = 20–57$), but very narrow range of $\epsilon_{Nd(i)}$ (+0.3 to +0.6) and T_{DM} model ages (2.79–2.82 Ga) indicating derivation from homogeneous, mildly evolved source. These signatures are different from those reported from the northern parts of the Bienville domain [2]. By contrast, the La Grande domain is characterized by rocks with tonalitic (low-K) composition dominating in the northern part accompanied by granodiorite–granite common in the Eastmain part. Collectively, rocks from both parts of the La Grande domain yield overlapping, highly variable La_N/Yb_N (3–74) paralleled by wide range of $\epsilon_{Nd(i)}$ (–0.9 to +2.1) and T_{DM} model ages (2.07–3.74 Ga) suggesting derivation mostly from juvenile sources.

Funded by the Czech Science Foundation project 19-08066S.

[1] Percival et al. (2012) Geol Assoc Canada Spec Pap 49, 321-378. [2] Boily et al. (2009) Prec Res 168, 23-44.