

U-Pb dating in the Superior and Churchill provinces, 2010-2011

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Abstract

This report presents the results of U-Pb geochronology on zircons, analyzed in 2010, from 13 samples collected in the Superior and Churchill geological provinces. The Superior samples were taken from in the Lac Kinglet area (three samples), the La Grande 3 Reservoir area (three samples), and the Abitibi area (four samples). Another three samples were taken from the Lac Zeni area in the southeastern part of the Churchill Province. The analyses were performed using two methods, isotopic dilution (ID-TIMS) or laser ablation (LA-MC-ICPMS).

Superior Province, La Grande and Minto subprovinces, Lac Kinglet area

Sample 2010-MS-0182 (NTS map sheet 33J03) is a biotite tonalite of the Coates Suite. This tonalite unit from the northeastern part of the La Grande Subprovince is associated with a magmatic tonalite event that occurred between 2710 and 2720 Ma. The age obtained of 2709.5 ± 5.6 Ma confirms this tonalite belongs to the Coates Suite.

The two other samples from the Lac Kinglet area belong to the Bienville Domain of the Minto Subprovince. Sample 2010-MS-0215 (NTS 33J15) is a diatexite of the Kinglet Suite that yielded an age of 2705.2 ± 2.1 Ma. These diatexites were derived from the melting of ancient volcano-sedimentary rock units and were related to the emplacement of large potassic and charnockitic intrusions. Sample 2010-MP-1228 (NTS 33J08) is a quartz monzodiorite with a porphyroid texture. This sample, interpreted as belonging to the Salleneuve Suite, yielded an age of $2696.8 +3.5/-2.8$ Ma, suggesting instead that it belongs to a younger unit, probably the Maurel Suite. Field relationships suggest the Salleneuve Suite is older than 2710 Ma.

Superior Province, La Grande Subprovince, La Grande 3 Reservoir area

Sample 2010-DB-1083 (NTS map sheet 33G09) is a felsic tuff from the Guyer Group. The analysis of this tuff indicates a crystallization age of 2815.9 ± 3.1 Ma, comparable to other volcanic units in the Guyer Group (2820 to 2806 Ma).

The Magin Formation represents a new sedimentary unit found north of the Guyer Group. Laser ablation analysis of detrital zircons from a sample of polygenic conglomerate (sample 2010-DB-1017, NTS 33G09) yielded $^{207}\text{Pb}/^{206}\text{Pb}$ ages varying from 2688 Ma to 2840 Ma. The principal mode at 2720.5 ± 2.7 Ma corresponds to the maximum age of sedimentation for this formation.

Sample 2010-SB-6182 (NTS 33G15) was taken from a lobed rhyolite of the Mintisch Formation. The sampled outcrop exposes the Ouf showing, the most significant deposit of volcanogenic massive sulphides in the La Grande 3 area. The collected zircons display a wide range of shapes and a complex age distribution, suggesting disturbances to the isotopic system. Rhyolite emplacement is estimated at 2846.5 ± 6.5 Ma. This age is comparable to some volcano-sedimentary assemblages in the northeastern part of the La Grande Subprovince, including the Laforge Complex (2840.7 ± 0.9 Ma).

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Churchill Province, Lac Zeni area

In the Lac Zeni area, three Mesoproterozoic intrusions were sampled to compare their ages with those of known similar intrusions in the region (1469 Ma and 1459 Ma), associated with the Nain Plutonic Suite (1350 to 1290 Ma) and the Lac Brisson peralkaline granite (1240 ±2 Ma). The ages obtained demonstrate that the Juillet Syenite (NTS 23I16, 1479.9 +12.6/-5.4 Ma) and the Ramusio Granite (NTS 13L13, 1481.7 ±4.3 Ma) represent the oldest Mesoproterozoic intrusions in the southeastern part of the Churchill Province. The age of the Misery Syenite Intrusion (NTS 13M05, 1409.7 ±1.2 Ma), which carries rare earth mineralization, defines a minimum age for the Mistastin Batholith.

Superior Province, Abitibi Subprovince, Matagami area

Two samples of rhyolite from the North Flank of the Matagami mining camp – a rhyolite breccia of the Lac Watson Group from the Radiore mine (2010-PP-0020, NTS 32F13) and a massive rhyolite of the Rivière Allard Formation from the Lac Garon mine (2010-PP-0038, NTS 32F13) – were collected to better determine their respective stratigraphic positions and compare them to equivalent units on the South Flank. Inconsistent analytical results and the poor quality of the zircons prevented us from obtaining reliable ages for these samples.

Superior Province, Abitibi Subprovince, Chapais area

A sample of lapilli and block tuff (2010-JP-0007, NTS 32G15), from volcaniclastic units interbedded with basalts to the southwest of the Chibougamau Pluton, yielded a crystallization age of 2729.0 ±1.1 Ma. This is similar to the age of the volcaniclastic rocks and rhyolites of the Andy and Queylus members of the Waconichi Formation (2729 to 2726 Ma).

A sample of lapilli tuff (2010-PH-2197, NTS 32G14) was dated at 2716.4 ±1.0 Ma, which corresponds to the age of the Blondeau Formation as determined by dating a contemporaneous intrusion of quartz ferrodiorite belonging to the Bourbeau Sill (2716.7 +1.0/-0.4 Ma).