

# U-Pb dating in the Superior and Churchill provinces in 2009-2010

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### Abstract

This report presents the results of U-Pb geochronology on zircons from 14 samples collected in the Superior and Churchill provinces. The zircons were analyzed in 2009. The samples from the Superior Province are from the Laforge 1 Reservoir area (three samples), the La Grande-3 Reservoir area (three samples), and the Abitibi Subprovince (five samples). Three samples were collected from the Lac Bonaventure area in the southeast part of the Churchill Province. The zircons were analyzed using two methods: isotopic dilution (ID-TIMS) and laser ablation (LA-MC-ICPMS).

#### La Grande Subprovince, Laforge 1 Reservoir area

Two samples of biotite ± hornblende tonalite were collected from the Coates Suite. Sample 2009-MS-0144 (NTS map sheet 33I01) yielded an age of 2742.9 ± 5.6/-3.8 Ma, and sample 2009-MP-1195 (NTS map sheet 33I08) yielded an age of 2716.0 ± 2.8/-1.9 Ma. These results reveal that the Coates Suite contains tonalites of different ages.

Sample 2009-LP-2260 (NTS map sheet 33I07) is a felsic volcanic rock from the southern part of the Laforge Complex. The crystallization age of 2840.7 ± 0.9 Ma indicates that this complex is an ancient volcano-sedimentary unit comparable in age to supracrustal units of the La Grande Subprovince.

#### La Grande Subprovince, La Grande-3 Reservoir area

Sample 2009-DB-1062 (NTS map sheet 33G07) is quartz-phyric rhyolite of the Guyer Group. The crystallization age of the rhyolite, estimated at 2806.1 ± 2.3 Ma, confirms that Guyer volcanic units (2820 – 2806 Ma) are much older than those of the Yasinski Group (2751-2732 Ma) further to the west.

The Brune Formation is the name given to a lens of polygenetic conglomerate in the core of the Guyer Group. The analysis of detrital zircons (2009-DB-1054, NTS map sheet 33G07) by laser ablation yielded  $^{207}\text{Pb}/^{206}\text{Pb}$  ages ranging from 2788 Ma to 2905 Ma, with a main modal age of 2891 ± 2 Ma. The maximum sedimentation age of the conglomerate is estimated at 2841 ± 3 Ma.

Sample 2009-PB-4024 (NTS map sheet 33G07) is a garnetiferous wacke of the Marbot Formation, a sedimentary sequence found at the transition between the La Grande and Opinaca subprovinces. Laser ablation dating of the detrital zircons yielded  $^{207}\text{Pb}/^{206}\text{Pb}$  ages ranging from 2669 Ma to 2840 Ma, with a main modal age of 2712 ± 2 Ma. The best interpretation of a maximum sedimentation age is 2702 ± 2 Ma. This suggests that the Brune and Marbot formations are probably not contemporaneous since their source materials have very different ages.

### **Churchill Province, Lac Bonaventure area**

Sample 2009-JG-1108 (NTS map sheet 23I14) is a mylonitized opdalite (hypersthene granodiorite) collected near the western border of the De Pas Batholith charnockite suite. The crystallization of  $1837.3 \pm 4.5$  Ma confirms this unit belongs to the De Pas Batholith and not to the Archean host gneisses to the west.

A sample of biotite tonalite gneiss (2009-CL-3269, NTS map sheet 23P03) was collected from the Griffis Gneiss. An age of  $2789 \pm 17/-5$  Ma indicates an Archean protolith for this unit, whereas a younger age of  $2633.7 \pm 2.0$  Ma corresponds to an episode of remobilization or metamorphism.

Sample 2009-JG-1026 (NTS map sheet 23P03) represents hornblende-clinopyroxene granite gneiss belonging to the Flat Point Gneiss. A crystallization age of  $2684 \pm 8$  Ma indicates an Archean protolith for this gneiss. A second age of  $1805 \pm 1.9/-1.4$  Ma is related to migmatization during the Hudsonian Orogeny.

### **Abitibi Subprovince, Preissac area**

A plagioclase-phyric rhyolite (sample 2009-PP-0025, NTS map sheet 32D08) of the Deguisier Formation of the Kinojévis Group yielded an age of  $2720.7 \pm 1.2$  Ma. This suggests that the unit, which is characterized by a direct spatial and temporal association between ultramafic lavas and rhyolite units, may correlate with the lower part of the Kidd-Munro Assemblage ( $2719-2711$  Ma).

### **Abitibi Subprovince, Matagami area**

A sample of rhyolite (2009-PR-9222) from a volcanic unit to the south of the McIvor and Cavalier plutons (NTS map sheet 32F12), west of the Matagami camp, was dated at  $2725.1 \pm 1.2$  Ma. This result is comparable to the age of the Lac Watson Group ( $2724.5 \pm 1.8$  Ma), and confirms the hypothesis that these felsic units are stratigraphic equivalents.

A crystallization age of  $2723.6 \pm 0.8$  Ma for tonalite sample 2009-PR-9050, collected from the McIvor Pluton (NTS map sheet 32F12), indicates it represents a synvolcanic intrusion.

### **Abitibi Subprovince, Chapais area**

Sample 2009-FL-9318 (NTS map sheet 32G15) is an andesite of the upper member of the Chrissie Formation. A crystallization age  $2791.4 \pm 3.7/-2.8$  Ma was determined based on zircon analysis. The Chrissie Formation thus represents one of the oldest volcanic units of the Abitibi Subprovince.

### **Abitibi Subprovince, Rouyn-Noranda area**

Sample ML-2005-1018 (NTS map sheet 32D04) is a slightly altered syenite belonging to the Baie Renault Syenite. Zircon analysis yielded a crystallization age of  $2682 \pm 1$  Ma, comparable to the ages of many alkaline intrusions in the southern Abitibi Subprovince.