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# SHRIMP U-Pb zircon results from the Jeannin Lake area, Quebec

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## INTRODUCTION

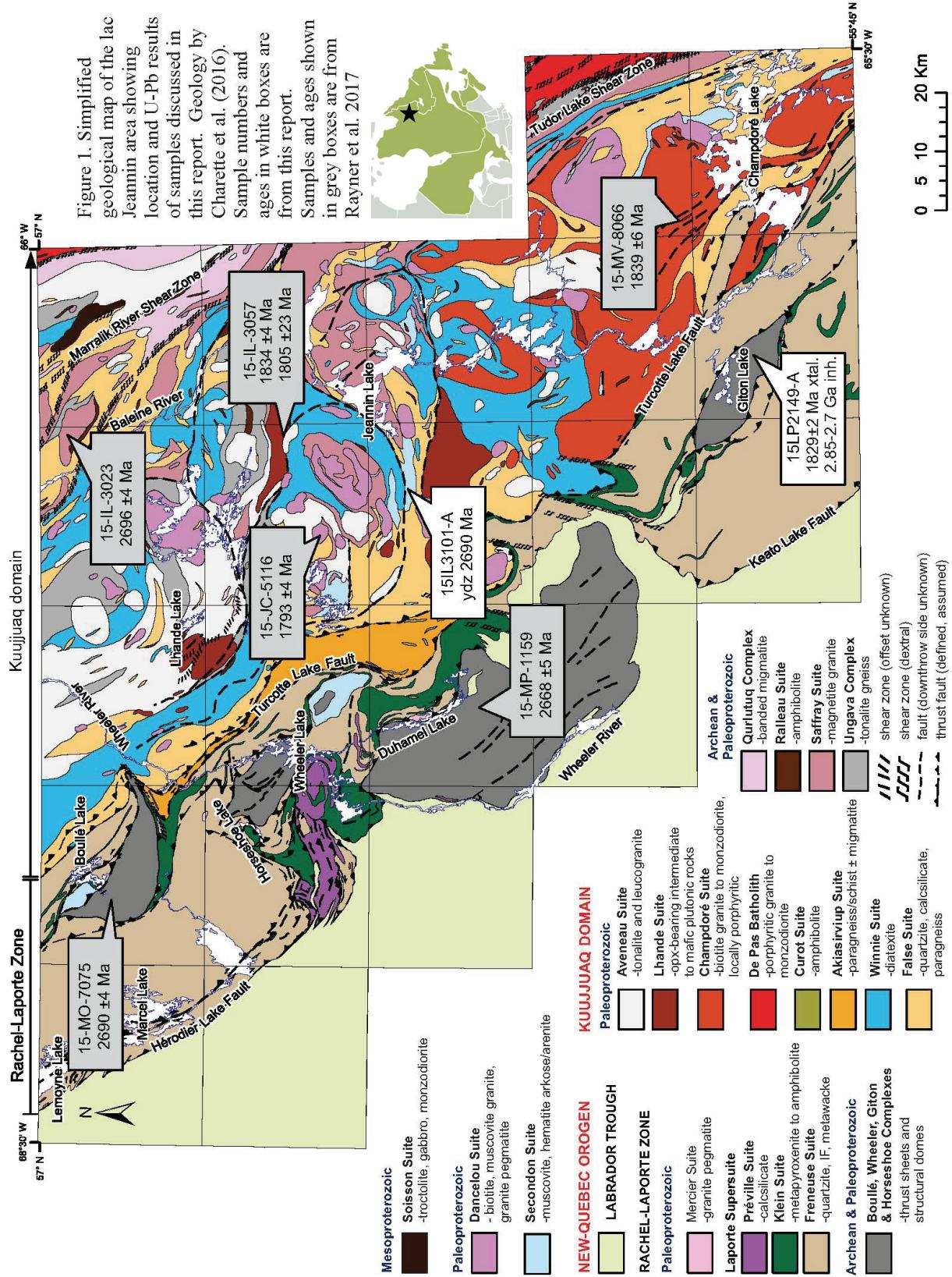
This report presents Sensitive High Resolution Ion Microprobe (SHRIMP) U-Pb geochronological results from 2 samples from the Jeannin Lake region of northeastern Quebec (NTS sheet 24B, and adjacent parts of 24A, Figure 1). This completes the analytical work on samples collected by the Ministère de l'Énergie et des Ressources naturelles (MERN) during geological mapping in the summer of 2015 as part of the five year Churchill Camp project. Analytical support was provided through Natural Resources Canada's Geomapping for Energy and Minerals program (GEM2) Hudson-Ungava project.

A summary of the regional geological context can be found in Rayner et al. (2017) and Charette et al. (2016).

This report consists of a brief summary of analytical methods followed by separate sections for each sample containing lithological and zircon descriptions, detailed presentation of the geochronological results, and preferred interpretation. A data table containing the UTM coordinates for each sample and all SHRIMP analytical results are given in the accompanying Microsoft Excel spreadsheet entitled Table 1. The data is presented in this report for integration into later publications which will explore the geological and tectonic significance of the results.

## ANALYTICAL PROCEDURES

Samples were disaggregated using standard crushing/pulverizing techniques followed by density separation using the Wilfley table and heavy liquids followed by magnetic separation and hand picking. SHRIMP analytical procedures followed those described by Stern (1997), and Stern and Amelin (2003). Briefly, zircon grains were cast in a 2.5 cm diameter epoxy mount (along with fragments of the Geological Survey of Canada (GSC) laboratory reference zircon (z6266, with  $^{206}\text{Pb}/^{238}\text{U}$  age = 559 Ma). The mid-sections of the zircon were exposed using 9, 6, and 1  $\mu\text{m}$  diamond compound, and the internal features of the grains (such as zoning, structures, alteration, etc.) were characterized in back-scattered electron mode (BSE) utilizing a Zeiss Evo 50 scanning electron microscope. The count rates at eleven masses including background were sequentially measured with a single electron multiplier. Off-line data processing was accomplished using SQUID2 (version 2.50.11.10.15, rev. 15 Oct 2011). The  $1\sigma$  external errors of  $^{206}\text{Pb}/^{238}\text{U}$  ratios reported in the data table incorporate the error in calibrating reference material. Common Pb correction utilized the Pb composition of the surface blank (Stern, 1997). Details of the analytical session, including spot size, number of scans, calibration error, and the applications of any intra-element mass fractionation (IMF) corrections are given as a footnote in Table 1. Isoplot v. 4.15 (Ludwig, 2003) was used to generate concordia plots and calculate weighted mean ages.



## RESULTS

### **15LP2149-A (GSC lab number 12331) Giton complex, diatexite**

The Giton Complex includes migmatites of sedimentary origin that form thrust layers in the Rachel-Laporte Zone. This unit is characterized by a distinct magnetic signature relative to the surrounding volcano-sedimentary rocks. Migmatites were divided into two informal units: a migmatitized paragneiss unit and a heterogranular diatexite unit.

A sample of homogeneous diatexite with microcline phenocrysts was sampled for geochronology (Figure 2a). In general, the diatexite composition varies from granodiorite to quartz monzodiorite. It contains between 15 and 30% centimetric phenocrysts of plagioclase and potassium feldspar. Centimetric to decimetric schlieren or rafts of variably migmatitized biotite garnet paragneiss comprise ~10% of the rock.

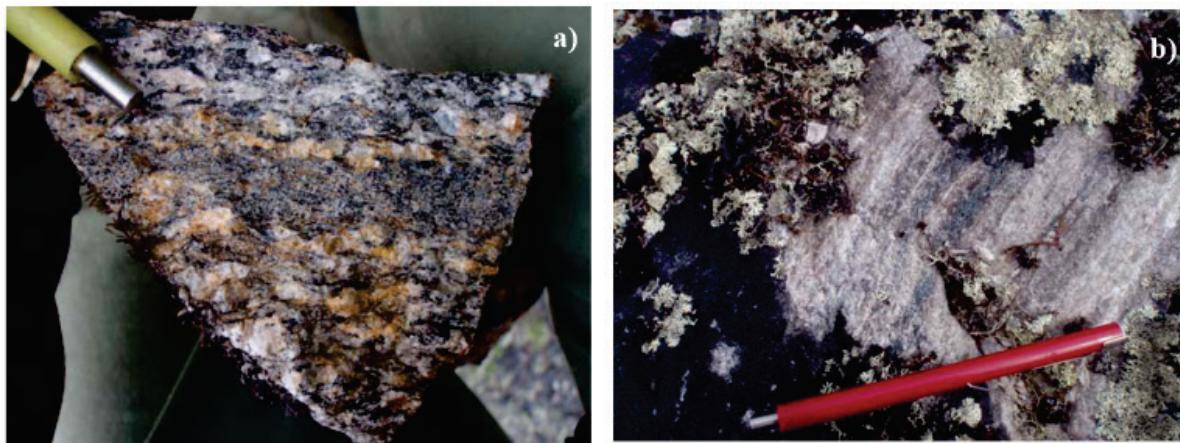
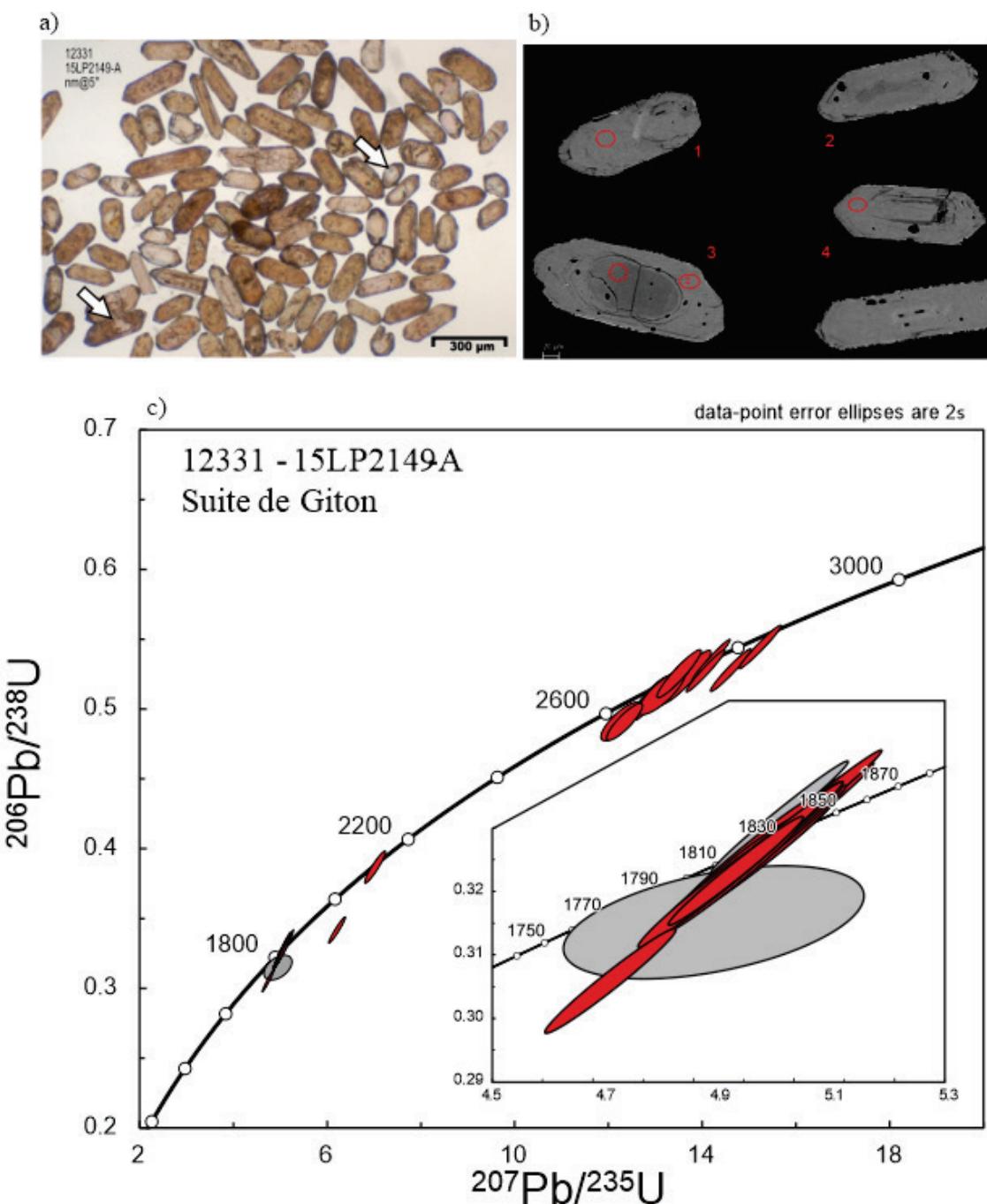


Figure 2. a) Fresh surface of diatexite 15LP2149-A. Metallic tip of pen magnet is 1cm long. b) Weathered surface of meta-arkose 15IL3101-A. Pen magnet is 12.5cm long.

Abundant colourless to pale brown zircon grains were recovered (Fig. 3a). In transmitted light, fractures and inclusions are visible in most of the brown zircon grains. Colourless zircon is present as discrete grains but also as cores surrounded by brown zircon. In backscattered electron (BSE) images the brown zircon grains exhibit well-developed fine oscillatory zoning while the colourless zircon is typically unzoned and exhibits a weak BSE response (dark grey) (Fig. 3b). Thirty-nine analyses of 36 grains were carried out, yielding dates between 2847 Ma and 1814 Ma (Table 1, Figure 3c). A cluster of 13 analyses from unzoned regions of zircon grains and characterized by U concentrations less than 500 ppm (e.g. grain 3, Figure 3b) return Archean ages and are interpreted as inherited. A single grain (#17) returned an age of 2117 Ma. A replicate analysis of this grain confirmed this Paleoproterozoic age. The high U (500-1200ppm), oscillatory-zoned zircon (both from rims and discrete grains) yield a weighted mean  $^{207}\text{Pb}/^{206}\text{Pb}$  age of  $1829 \pm 2$  Ma (MSWD = 1.02, probability of fit = 0.44, excluding 2 analyses) which is interpreted as the crystallization age of the diatexite (Fig. 3c) and the high grade crustal melting event. The presence of a ca. 2.12 Ga inherited zircon indicates that this diatexite was derived from the melting of Paleoproterozoic rocks, inferred to be sedimentary in origin.

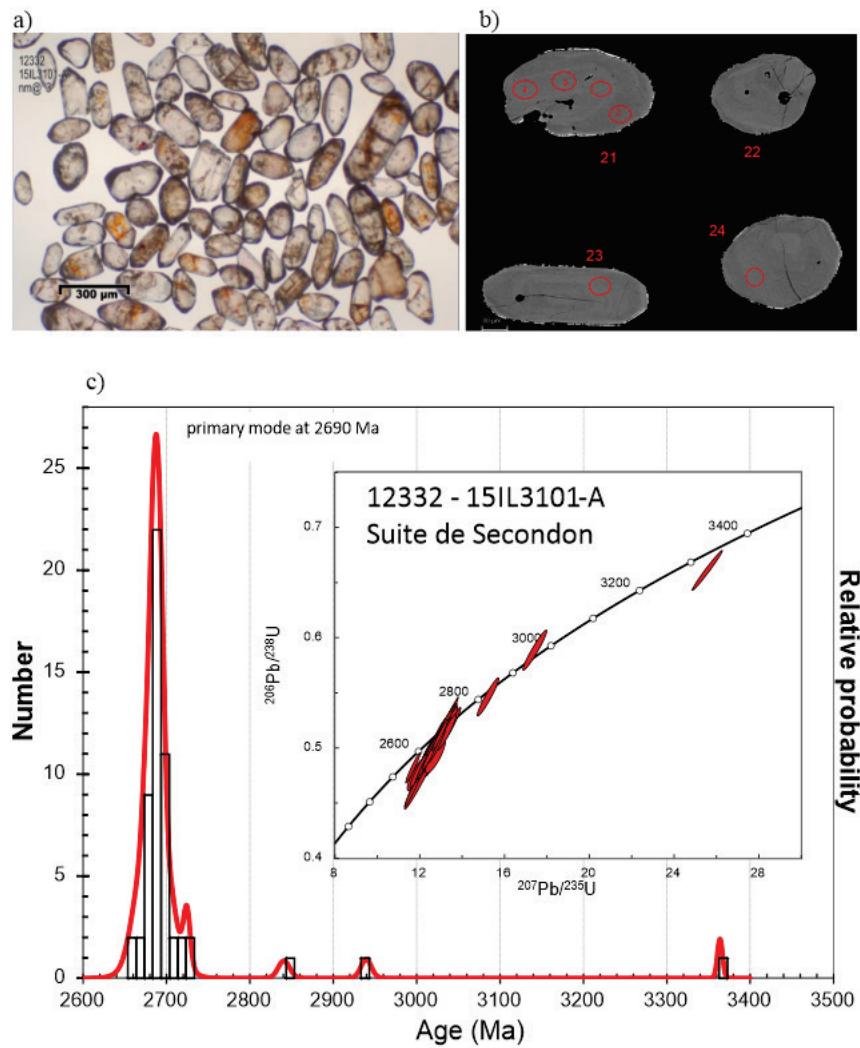


*Figure 3 a)* Plain light photomicrograph of the zircons from 15LP12149-A. White arrows highlight zircon grains with colourless cores. *b)* Representative BSE images of dated zircon. Red ellipses show analysis sites. Grain numbers correspond to the results given in the data table. *c)* Concordia diagram illustrating U-Pb SHRIMP results. Error ellipses are at the 95% confidence level. Inset: Detail of ca. 1.83 Ga results. Grey ellipses were excluded from the calculation of the crystallization age. See text for discussion.

### **15IL3101-A (12332) Seondon suite, meta-arkose**

The Seondon Suite in the Jeannin Lake area groups together well-preserved metasedimentary sequences consisting of meta-arkose (Figure 2b), conglomerate, meta-arenite, metaconglomerate, and muscovite, hematite and specularite schist that have not been affected by metamorphic migmatitization and recrystallization (Charette et al., 2016). The Seondon suite forms metasedimentary sequences less than 5 km wide, mainly located in the central-south part of the Core Zone, west of the De Pas Batholith. However, some exposures have been observed in the Rachel-Laporte Zone near culminations of Archean rocks (Figure 1). These are tentatively correlated with the Milamar Formation (Seward Group) of Dimroth et al. (1976) further south in Labrador.

Abundant detrital zircon were recovered from the arkose (Figure 4a). In transmitted light images these range from clear and colourless to pale brown/orange and moderately turbid. Fractures are common. In BSE images zoning is commonly faint, broad and concentric (Figure 4b). There is no evidence of rims or other overprints.



*Figure 4 a) Plain light photomicrograph of the zircons from 15IL3101-A. b) Representative BSE images of dated zircon. Red ellipses show analysis sites. Grain numbers correspond to the results in Table 1. c) Combined histogram and probability density diagram. Includes all data ( $n=56$ , includes 1 replicate. All data within 11% of concordance). Inset: Concordia diagram illustrating U-Pb SHRIMP results. Error ellipses are at the 95% confidence level*

Fifty-six analyses were carried out on 53 individual zircon grains, yielding dates between 3364 and 2611 Ma (Figure 4c). The dominant mode of the combined probability density/histogram plot is centered at 2690 Ma. Older detritus (ca. 2.72 Ga, 2.84 Ga, 2.94 Ga and 3.36 Ga) is rare. A single, younger, 2.61 Ga analysis (12332-21.1) was not reproducible, thus the maximum age of deposition of this sediment is best constrained by the primary mode at 2690 Ma.

## ACKNOWLEDGEMENTS

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