A new reference material for gold grain counting in heavy mineral concentrates

L.P. BÉDARD [1]*, J.-F. BOIVIN [1], P. SIMARD [1] AND R. GIRARD [2]

[1]Sciences de la Terre, Université du Québec à Chicoutimi, Chicoutimi, QC, G7H 2B1 Canada (*correspondence: pbedard@uqac.ca, jean-francois.boivin3@uqac.ca, patrick_simard2@uqac.ca)

[2]IOS Services Géoscientifiques inc. Chicoutimi, QC, Canada; rejeang@iosgeo.com

Gold grain counting is a popular exploration technique in surveys of glaciated terrain. However, there are currently no dependable reference materials (RM) adapted to this technique, seriously limiting quality control and the evaluation of the proficiency of those who analyze the material. Presently, quantitative assessment of the quality of gold grain counting is very difficult, given that sample processing involves a complex sequence of manipulations: sampling, sieving, heavy mineral concentration, and super-concentration (in either a field or laboratory setting), followed by visual sorting or grain counting under a microscope. To improve quality assessment, each preparation step along this sequence would need the use of a RM. Our RM presented here has been developed to assess the quality of the final, and most critical, step of this sequence: gold grain counting under microscope. Our goal is to prepare a RM for gold grain counting in order to quantify the performance of both mineralogists and automated methods.

The RM in preparation is comprised of two components: well-characterized gold grains and heavy minerals from a gold-free area. The gold comes from the tailings of an old Zn deposit, from which 1 g of <250 μm gold grains were extracted from 1.5 metric tons of tailing and then mixed with the barren heavy mineral concentrate. Our RM aims to have a concentration of 50 grains$\cdot$g^{-1} of heavy mineral concentrate to ensure the count is above typical background of 1–20 grains. This concentration is sufficiently high to be statistically significant but at a low enough concentration to minimize counting time. The aimed precision for the number of gold grains in our RM is 10% based on 20 samples (e.g., 45–55 gold grains per sample). After preparation, the actual grain abundance will be measured through automated optical grain counts and microtomography. Computed tomography provides an accurate grain count and produces a catalog of grain shapes. The automated optical system, currently under development, uses spectral imaging.