Physical rock property collection and characterization of the Abitibi greenstone belt

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Metal Earth is a multi-faceted study aimed at understanding varying metal endowment in different areas with similar geology, with a focus on greenstone belts of Archean age. Two major components of this study are the collection of geological and geophysical datasets. This includes geological mapping and sampling, which accompany the seismic, magnetotelluric, and gravity surveys along 13 transects within Ontario and Québec. These datasets are being augmented with petrophysical data, namely magnetic susceptibility and density, collected during the project as well as data compiled from government organisations. The goal of the petrophysical study is to better understand the rock properties of the surface geology along the Metal Earth transects. The petrophysical properties are tied to both the geology and geophysical response of the regions and will contribute towards their combined interpretations. Specifically, these values can be used to constrain a petrophysical model through its development, ensuring the model is consistent with the geophysical data, the mapped geology, and the petrophysical measurements. As a part of Metal Earth, we were able to acquire 5105 magnetic susceptibility readings from 370 outcrops and 2700 density values during the 2017 summer along the Chibougamau, Amos-Malartic, and Rouyn Noranda transects. The magnetic susceptibility values were collected using Terraplus KT-10 meters. A minimum of 10 readings were taken for each surveyed outcrop. Subsequently, rock samples were collected from the outcrops to measure density by using Archimedes' method. These readings will be combined with more than 12000 magnetic susceptibility and 3500 density values from the Ontario Geological Survey and the Geological Survey of Canada. The newly collected rock property values will be compiled in a table containing the mean, standard deviation, distribution, and the maximum and minimum values of the properties. These values will be utilized to help 2D and 3D modelling of the public domain magnetic data and the gravity data collected during this project.