

Use of Anisotropy of Magnetic Susceptibility (AMS) to analyze petro-fabrics in Cu- and PGE-bearing gabbroic units of the Marathon Cu-PGE deposit, Ontario.

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Petrofabric assessment of Cu- and PGE-bearing gabbroic units has been conducted on oriented drill core samples obtained from the Main Zone of the Marathon Cu-PGE deposit. Samples taken from three oriented drill cores representing mineralized and non-mineralized zones were analyzed using Anisotropy of Magnetic Susceptibility (AMS). These magmatic Cu-PGE sulphide deposits are proposed to have formed by intrusion of a crystal mush within a magma conduit setting. Magnetic anisotropy is influenced by the preferred orientation of the long axes of grains of magnetite, which is similar to the overall petrofabric of the samples defining the flow direction of the crystal-bearing magma. Susceptibility ellipsoids constructed from analysis of AMS measurements were plotted on a Flinn diagram to investigate the dominant petro fabric textures, which indicated the presence of a well-defined planar fabric. Samples that gave results of the highest degree of planar fabrics were from the Two Duck Lake Gabbro lithology; the lithological host of most of the Marathon deposit. Stereonet projection of the directional distribution analysis of the maximum and intermediate vector directions of the susceptibility ellipsoid orientations gives a well-defined planar fabric orientation of strike 170° and dip 20° to the west, in excellent agreement with proposed flow direction based on 3d modeling of footwall troughs and contained higher grade mineralization. The AMS fabric orientation is a potential tool to independently indicate flow structures in magmatic systems