Mir R, Perrouty S, Berube P, Smith RS, 2017, Integration of Airborne EM and ground IP surveys with geological structures in the footprint of the Canadian Malartic gold deposit, QC, Canada, Abstract, PDAC-SMC, Toronto, ON

Airborne EM and ground IP survey data are commonly collected when exploring for ore deposits, and have been demonstrated to be successful tools to detect sulfide-rich areas in VMS or porphyry systems. The interpretation of the resistivity and chargeability maps, however, represents a great challenge when exploring for disseminated gold deposits. In this preliminary work, we compared resistivity variations with known geological features in the vicinity of the world-class Canadian Malartic gold deposit. This low-grade, large-tonnage deposit is mainly hosted by metasedimentary rocks of the Pontiac Subprovince to the south of the Cadillac – Larder Lake Deformation Zone. Previous structural studies show that: 1) the gold is distributed along two major trends (NW-SE and EW); 2) it was preferentially deposited near intrusive bodies during the D_2 deformation event; and 3) these intrusions and their associated mineralization are systematically located within a structurally complex zone (F_1 and F_2 fold hinges). Therefore, interpreting major structural trends, intrusive bodies and structurally complex zones from geophysical datasets could lead to the identification of the most prospective areas. An airborne DIGHEM survey and a recently completed compilation of historical IP surveys both produce resistivity maps that have general agreement. Preliminary interpretation shows that the structural orientation of the resistivity "lineaments" is subparallel to the S_2 foliation (NW-SE to E-W) and that the structurally complex zones, which host intrusive rocks and mineralization, display low resistivity values (they correspond to higher permeability zones). The possible control of structural orientation on resistivity at Canadian Malartic suggests that airborne EM and ground IP survey may be used to detect favorable structural setting for mineralization. Petrophysical resistivity measurements and inversions of such surveys should therefore consider the anisotropy of resistivity to provide more realistic geological and structural models.

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