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Exploration for Neoarchean intrusion-related gold deposits in the Abitibi greenstone belt of the Superior Craton, Canada, is of increasing interest as the two most recent Abitibi gold mines are intrusion-related. Late-Archean alkaline intrusions in the Abitibi Subprovince are separated into three groups based on their geophysical and geochemical signatures: (1) large, heterogeneous, unmineralized plutons; (2) small magnetite rich-syenites with magmatic gold, which is often remobilized along fault arrays; (3) small magnetite poor-quartz-syenites to alkali granites with magnetite-rich halos and magmatic gold mineralization. The positive, aeromagnetic high centred signature of some gold-bearing intrusions is related to the high content in magnetite of the more ferromagnesian intrusions resulting from their magmatic evolution. Intrusions with an annular shape record a lower Fe_2O_3t content in their less magnetite-rich cores and gold mineralization occurs within their magnetite-rich metasomatized host-rocks. If the aeromagnetic signature has an annular-shape, the lower-magnetic zones in the magnetic aureole are the more favourable zones. For those with a positive magnetic signature, the intrusion itself is the target.

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