Fayol N, Jebrak M, Harris LB, 2013, Gold associated with Neoarchean alkaline intrusion, Lac Bachelor, Abitibi, Canada, Abstract, Goldschmidt, Florence, Italy

Recent alkaline intrusion-related gold deposits have been recognized worldwide (e.g. Cripple Creek, Ladolam). Similar Neoarchean deposits are now recognized in the Canadian Superior Province but their metallogeny is still misunderstood; the Lac Bachelor gold deposit is a key example. It is located within the Desmaraisville basin, a "Timiskaming-type" basin in the Abitibi Greenstone Belt Where it is hosted by a volcano-sedimentary assemblage, mafic and felsic intrusions, and associated with regional NE-SW oblique-slip faults. Gold mineralization is located on the margin of the O'Brien stock, a polyphase alkaline quartz-syenite body which intrudes andesite and tuff. It displays porphyritic and equigranular textures. Injections of aplitic dykes occurred in late events. The O'Brien stock is mainly composed of Na- and K-feldspars, quartz, and mafic minerals. Purple fluorite is present, both disseminated in the syenite and in quartz-fluorite-pyrite veins that appears as comagmatic. The Lac Bachelor gold deposit is characterized by several mineralized zones among which the Main zone (ZP) and the B zone (ZB) are the most economically important. A porphyrystyle mineralization is present at the stock margin with quartz, quartz-magnetite, quart-fluorite, and pyrite stockwork. Subhorizontal quartz-fluorite veins extend into the host rocks proximal to the stock. The Main and B zones are mainly localized in tuffs at the edges of the pluton and follow preexisting discontinuities. Gold occurs in association with disseminated pyrite, magnetite, haematite, and rare chalcopyrite and pyrrhotite. In the ZP and lesser in the ZB, the magnetite is oxidized into haematite. Gold is present in highly altered (haematite-carbonate) zones associated with disseminated pyrite. The ZB is less haematized than the ZP, which is consistent with the timing: structural relations between these zones suggest that the ZB was formed first and the ZP occurred after. The hydrothermal event is clearly related to the intrusion of the O'Brien syenite. However, fluids appear to have followed pre-existing discontinuities that focused mineralization. Results illustrate the complementary roles of magmatic and structural controls during the mineralization processes.

NSERC-CMIC Mineral Exploration Footprints Project Contribution 028.