Project 2005-4: Zoning and typology of carbonatation – a tool for gold and VMS exploration

Carbonatation is a common alteration for gold and base metal mineralisation. The type and zoning of carbonate species are even used as exploration guides at different scales. However, traditional methods for establishing the carbonatation involve identification by X-ray diffraction, colourimetry or microprobe; methods that are costly, especially in time. At the same time, huge lithogeochemical databases are hardly used in establishing carbonate types, other than the Normat method developed by Mathieu Piché.

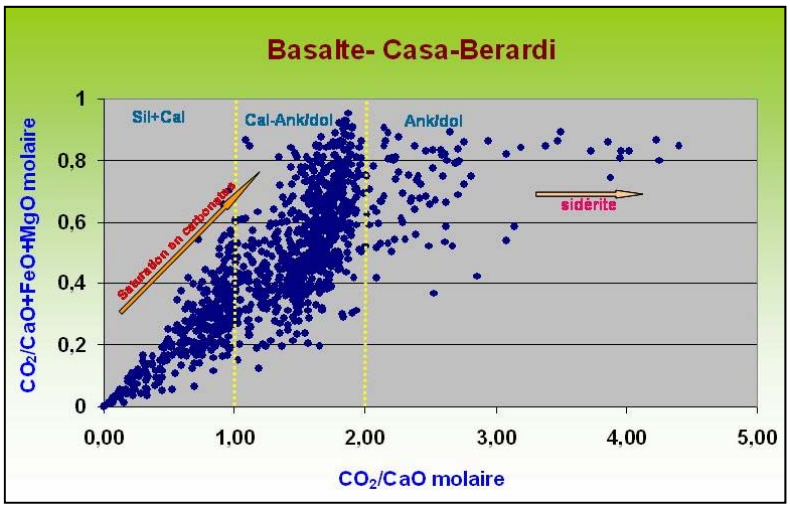

Diagram showing the level of carbonate saturation (ordinate) as a function of the discrimination index of the carbonate phases (from the silicate zone to the siderite zone) for basalt samples from Casa Berardi.

The tool developed as part of this project uses lithogeochemical data as the basis. On one hand, the method allows assessing the intensity or saturation of carbonatation, a relationship established from the ability of a rock to combine with CO_2 (CO_2/CaO+FeO+MgO molar); on the other, the assessment of speciation or discrimination of carbonates controlled by the CO_2/CaO molar ratio.

Summary: Project 2005-4	
Objectives	• To document the reliability of carbonate zoning for defining alteration halos, the type of mineralisation and the proximity of the mineralisation in VMS and gold-bearing contexts. • To develop a tool or recipe for processing lithogeochemical data that can differentiate carbonate types.
Results	• A lithogeochemical discrimination method that can determine from three indices the type of carbonate present for a set of samples with a determination or an estimation of the amount of CO_2. • Useful at a local level for real cases in an orogenic gold setting (Casa-Berardi) and in a volcanogenic massive sulphide setting (Bouchard-Hébert). • Useful on a regional level for the Abitibi Subprovince.
Tools and Innovations	• Discrimination diagram for carbonates; • Identification of the various carbonate phases present and their zoning, using the new method developed during this project; • Favourable association between some types of carbonates and the presence of orogenic gold or base metals (VMS).
Note	• This project continues in 2006-2007 (project 2006-4).