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Image analyses in bauxitic ores: The case of the Apulian karst bauxites

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This study concern two different karst bauxite deposits of the Apulia region (southern Italy). These deposits outcrop in the Murge and Salento areas: the Murge bauxite (upper Cretaceous) is a typical canyon-like deposit formed in a karst depression whereas the Salento bauxite (upper Eocene - Oligocene) is the result of the erosion, remobilization and transport of older bauxitic material from a relative distant area. This particular bauxite arrangement gave the name to all the same bauxite deposits which are thus called Salento-type deposits. Bauxite's texture is essentially made of sub-circular concentric aggregates, called ooids, dispersed in a pelitic matrix. The textural properties of the two bauxitic ores, as assessed by SEM-EDX, are different. In the bauxite from the canyon-like deposit the ooids/matrix ratio is higher than in the Salento-type bauxite. Furthermore the ooids in the Salento-like bauxite are usually made by a large core surrounded by a narrow, single, accretion layer, whereas the ooids from the canyon-like deposit have a smaller core surrounded by several alternating layers of Al-hematite and boehmite (Mongelli et al., 2014).
In order to explore in more detail the textural features of both bauxite deposits, particle shape analyses were performed. Image analyses and the fractal dimension have been widely used in geological studies including economic geology (e.g. Turcotte, 1986; Meakin, 1991; Deng et al., 2011). The geometric properties evaluated are amounts of ooids, average ooids size, ooids rounding and the fractal dimension D, which depends on the ooids/matrix ratio. D is the slope of a plotting line obtained using a particular counting technique on each sample image.
The fractal dimension is slightly lower for the Salento-type bauxites. Since the process which led to the formation of the ooids is related to an aggregation growth involving chemical fractionation (Mongelli, 2002) a correlation among these parameters and the contents of major elements may exists. We observe significant correlation for the Salento type-bauxites only, likely because their ooids have a more homogeneous chemical and mineralogical composition.
The geometric parameter which has a significant correlation with chemical contents is the amount of ooids. A positive correlation exists between amount of ooids and the alumina content (r= 0.79; α< 0.5%) whereas the correlation between amount of ooids and the iron content (r= -0.83; α< 0.5%) is negative. This involves image analyses may represent an useful tool for exploration of bauxitic ores.

Deng J., Wang Q., Wan L., Liu H., Yang L., Zhang L., 2011. A multifractal analysis of mineralization characteristics of the Dayingezhuang disseminated-veinlet gold deposit in the Jiaodong gold province of China. Ore Geology Reviews 40, 54–64.

Meakin P., 1991. Fractals aggregates in geophysics. Reviews of geophysics 29, 3, 317-354.

Mongelli G., 2002. Growth of hematite and boehmite in concretions from ancient karst bauxite: clue for past climate. Catena 50, 43-51.

Mongelli G., Boni M., Buccione R., Sinisi R., 2014. Geochemistry of the Apulian karst bauxites: chemical fractionation and parental affinities. Ore Geology Reviews 63, 9-21.

Turcotte D.L., 1986. Fractals and fragmentation. Journal of Geophysical Research 91, 1921-1926.