

Long-term Relief Evolution of the Andean Chain in the Bongará Region (Northern Peru): Implications for the Genesis of Supergene Ore Deposits

Anna Sorrentino¹, Nicola Mondillo^{1, 2}, Ettore Valente¹

1. University of Naples Federico II, Naples, Italy, 2. Natural History Museum, London, United Kingdom

A morphometric approach, based on the investigation of the topography and river network features of two hydrographic basins, Utcubamba and Chiriaco, was applied to determine the relationship between the irregular distribution of vertical motions (e.g., surface uplift) and the genesis of supergene Zn deposits located in the Bongará district, in the north-eastern sector of the Peruvian Andes. In the area three mixed supergene-hypogene ore deposits have been recognized: Mina Grande, Cristal and Florida Canyon. The Florida Canyon deposit falls within the Eastern Cordillera, in the Utcubamba Basin, and represents one of the most important Zn-Pb MVT deposits hosted in the carbonate and former evaporite-bearing rocks of the Pucará Group. The mineralization consists mainly of sulfides and only one-third of the resource is nonsulfides and is hosted in Triassic rocks. The Mina Grande and Cristal deposits fall within the western margin of the Subandean Fold-and-Thrust Belt, in the Chiriaco Basin, and consist mainly of nonsulfide ores with less sulfides hosted in more recent Jurassic rocks.

The research has been carried out through the evaluation of the parameters such as elevation, local relief, swath profile, river longitudinal profiles, slope/area analysis to derive the normalized channel steepness index (k_{sn}) and transformed river profiles (χ -long profiles). The spatial distribution of such indexes allowed to derive some consideration about the spatial distribution of vertical motions (e.g., surface uplift). Furthermore, the sharp increase in maximum, mean and minimum elevation moving from the Utcubamba Basin to the Chiriaco Basin, coupled with a jump in the mean K_{sn} values, suggest that the Chiriaco Basin has experienced either more recent surface uplift or surface uplift at rates higher than the Utcubamba Basin. This trend seems to be confirmed by the uneven erosion that the Florida Canyon and the Mina Grande – Cristal deposits have experienced.