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Emerald Mining in Large Scale Debris and Slumped Blocks from the Eastern Cordillera of Colombia

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The Colombian emeralds are well-known green gems, which are very famous in its unique characteristics and quality of color and sizes in the world. It is dominantly distributed in the Eastern Cordillera of Colombia with underground mining in various locations of about 3km² and a total extent of 500km², separated by approximately 130Km are located the Eastern Emerald Belt (EEB) and the Western Emerald Belts (WEB), in a general context they share chemical and tectonic similarities, but, with a complex tectonic evolution.

The geology of emerald and its tectonic configuration is believed to be composed of a series of disharmonic structures, e.g. thrust and folded areas. Current and past exploitations created many mines, more than few tens in WEB, which are predominantly distributed in three areas, Muzo, Cunas and Coscuez. Based on field surveys into those mines, we observed paths that suggest the location of mines in debris flow deposits or slumped areas, which are characterized by matrix-supported structures with block sizes ranging from few cm to hundreds of meters. Rock types of blocks include black shale, calcite-rich veins with emeralds, stratiform-pyrite shale, hydrothermal hydraulic breccia, albitite. Most of the emeralds occur in calcite veins, but those cannot be traced along the veins in the mines and suddenly crosscut with no common factors involved (faults, discontinuities). The lines of evidence suggest that the current mining of the emeralds in some places takes place on slumped blocks or matrix of debris flow deposits. These observations attached with remote sensing techniques (DEM, DTM, LANDSAT, AERIAL IMAGES) on WEB show slumped areas are well correlated with emerald mines in those three exploited areas. These findings could be of great usefulness for further exploration, ongoing research projects about the Eastern cordillera uplifting and emeralds worldwide tectonostratigraphy.

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