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Tectonics of Sabana de Bogotá and its relationship with hydrogeology

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Abstract
La Sabana de Bogotá is an intermountain basin of 4500 km2 located at 2600 m in the Cordillera Oriental of the Colombian Andes. This basin formed contemporaneously with the Andean rising (beginning of the Miocene) and reached its current height in the late Pliocene. The mountain belts are formed by a Cretaceous - Paleogene sedimentary rock sequence and the fluvial and lacustrine fillings are Neogene.
Tectonic deformation has been interpreted in terms of the Andean orogeny, compressional structural style oriented NNE-SSW, which are typical folds limited by thrust defined generally by the lack of stratigraphic record. However, there are particular difficult to explain the proposed deformation style: inversion of the two flanks of regional folds, turnover of these structures and large areas of intense tectonic deformation that show kinematic features with an almost total dominance for lateral displacement faults.
In this geological setting, hydrogeological models made in the area, based on the characteristics of primary porosity of the rock sequences, regardless of fracture patterns without studies of meso or microtectonics, show a wide dispersion in the data and uncertainties about whether the basin is open or closed.
Therefore, the authors have collected primary information documented in the geology, geomorphology and secondary data analysis in geophysics and seismology.
Within are determined geological tectonic stress and the proposal of a structural system that includes kinematic analysis based on data collected more than 20,000 fracture data (with special emphasis on mesoscopical plane of faults of which about 5% are striated planes and the direction and characterization of open fractures), detailed mapping in pilot areas, the testing of different structural systems in primary Andean flanks of structures that show inversion or opposite tectonic vergence, the alignment of hot springs, mineralized zones and salt diapirs, where structural measurements were made also.
The geomorphological are control channels, the existence of at least 3 levels of terraces formed in the last 25,000 years and photogeological lineaments.
Geophysicists include the occurrence of earthquakes with very localized fault damage zones coincide with the most conspicuous transversal features, regional gravity anomalies and thicknesses of Quaternary filling systems controlled by transversal faults.
This study leads to propose that there is a structural style with direction NNE-SSW and a crossed WNW-ESE trend (sinistral sense) with a conjugated ENE-WSW (dextral sense). Most of open fractures are lined with WNW sinistral faults, which also have a vertical component usually normal. The implications of the proposed structural system can provide in enhancing understanding of hydrological flows to an area containing about 25% of the Colombian population and has directed its water supply projects in an emergency to a system of deep wells.