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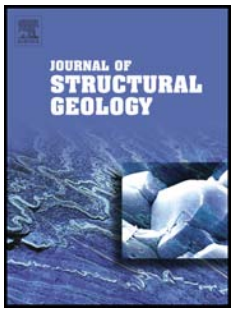

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Evolution of the stress and strain fields in the Eastern Cordillera, Colombia

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ABSTRACT

This work integrates stress data from Global Positioning System measurements and earthquake focal mechanism solutions, with new borehole breakout and natural fracture system data to better understand the complex interactions between the major tectonic plates in northwestern South America and to examine how the stress regime in the Eastern Cordillera and the Llanos foothills in Colombia has evolved through time. The dataset was used to generate an integrated stress map of the northern Andes and to propose a model for stress evolution in the Eastern Cordillera. In the Cordillera, the primary present-day maximum principal stress direction is WNW-ESE to NW-SE, and is in the direction of maximum shortening in the mountain range. There is also a secondary maximum principal stress direction that is E-W to ENE-WSW, which is associated with the northeastward "escape" of the North Andean block, relative to stable South America. In the Cupiagua hydrocarbon field, located in the Llanos foothills, the dominant NNE-SSW fractures are produced by the Panama arc-North Andes collision and range-normal compression. However, less well developed asymmetrical fractures oriented E-W to WSW-ENE and NNW-