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ESTIMATING INTRAPLATE DEFORMATION AND STRESSES IN BRAZIL: COMPARISON OF GNSS DATA AND FOCAL MECHANISMS

Assumpcao Marcelo (1), Marques Haroldo (2), Pádua Marcelo Banik (2), Padilha Antonio Lopes (2), Vitorello Icaro (2)*

(1)UNIVERSITY OF SAO PAULO, (2)INPE

**marcelo.assumpcao@iag.usp.br*

Focal mechanisms in Brazil show that mid-plate stresses in South America are predominantly compressional: 85% are reverse or strike-slip, and only 15% are normal faulting. Despite the small number of focal mechanisms and sparse coverage, regional patterns can be recognized with SHmax oriented roughly E-W in the south and central part, similar to the sub-Andean region, and NW-SE in the northern, Amazonian region. This pattern is believed to result from plate boundary forces, spreading stresses along the continental margin and flexural stresses from lithospheric loading. We attempt to estimate mid-plate strain rates using the best GNSS stations (operation periods of 8 or more years, and velocity uncertainties less than about 0.1 mm/y). Velocities for the best stations of the Brazilian Continuous Monitoring System (RBMC, which is part of SIRGAS - Geocentric Reference System of the Americas) were calculated with GIPSY code including all atmospheric corrections, tide effects and seasonal variations, similar to the JPL/NASA method. Linear strain rates were obtained between several pairs of stations. In the central part of the country, most linear strains (measured between pairs of stations) indicate shortening, consistent with the predominance of reverse faulting. However, strain rates do not clearly indicate a preferred principal direction and do not seem compatible with the stress patterns derived from the local mechanisms. When a station pair includes one station near the coast, the linear strain rates indicate extension. This could be interpreted as due to spreading of the continental margin towards the ocean, away from the central part of the continent. Similarities and inconsistencies between the estimated strain rates and stress patterns will be discussed.

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