

The Seismic Zone of Southern Paraguay with a Revised Catalog: Another Example of Intraplate Activity in a Lithospheric Thin Spot?

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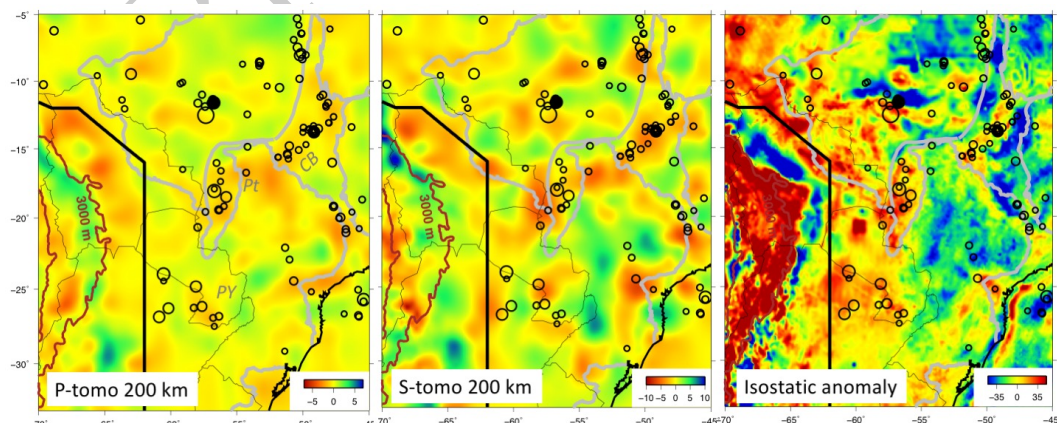
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Abstract

The causes of intraplate seismicity are still a matter of debate and many hypotheses have been proposed to explain earthquake zones in stable continental interiors, such as different mechanisms of stress concentration and different definitions of weak zones. In central and western Brazil earthquakes generally occur above regions with low P- and S-wave velocities in the upper mantle. This has been used to explain the seismicity as due to stress concentration in areas of thin lithosphere. Alternatively, flexural stresses have also been proposed to explain the same seismic zones. A revised earthquake catalog for Paraguay (filtered for uniform distribution) shows a concentration of events in the southern part of the country, near the Argentinian border. Recent teleseismic P- and S-wave tomography results indicate low-velocities beneath southern Paraguay. Previous models of seismic zones had suggested that the seismicity in Paraguay could be part of the same seismic zone of the Pantanal Basin in western Brazil. The recent tomography results and the revised catalog indicate that the southern Paraguay seismicity is separated from the Pantanal zone by a high-velocity lithosphere. This suggests that the model of thin lithospheric spots, used to explain the seismicity in Central Brazil (Goiás-Tocantins seismic zone) and in the Pantanal Basin, may also be applicable to southern Paraguay. On the other hand, southern Paraguay is characterized by positive isostatic gravity anomalies. This means that a contribution from flexural stresses (similar to Central Brazil) could also help explain this new seismic zone.



Epiceenters of the uniform catalog (circles) compared with a) P-wave anomalies (Portner et al., 2018), b) S-wave anomalies (Rodríguez et al., 2018), and c) isostatic gravity anomalies (Sá, 2004). Thick solid line is the limit of the earthquake catalog. Velocity anomalies in %, gravity in mGal. PY = Paraguay, Pt = Pantanal Basin; CB = Central Brazil. Gray lines are main geological provinces.

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