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The critical asperities along South America subduction zone

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Delineation of asperities are currently accomplished after the occurrence of earthquakes, mainly using waveform or tsunami modeling and in the recent decade using other methods such as geodetic and InSAR. Different studies have shown that the asperities are stationary and they rupture during different earthquakes repeatedly. So by constraining asperity locations we can focus on smaller regions along the fault and increase the chance of success in correct decoding of seismic activities in the context of forecasting the future great earthquakes. It is necessary to search for geophysical methods to detect the asperities. Subduction zones are areas of interest from different points of view. They are the location of great earthquakes causing tsunamis. Hence they are the location of larger asperities, increasing the chance of being detected using geophysical methods. By this assumptions we developed a gravity-derived measure called “trench parallel Bouguer anomaly”, TPBA, which enables detecting large asperities along subduction zones just by gravitational data. We applied the new measure on the South America subduction zone and determined the forearc segments based on TPBA. By constraining the location of asperities, we focused on the current and historical seismic activities and in order to assess the interplate coupling we used outer-rise and down-dip earthquakes. Considering all these measures and in addition using the rupture pattern of previous great earthquakes along different forearc zones, we try to give the likely scenarios and the future faulting extents of critical segments along the South America forearc.