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# The controversial rigidity of southern Africa block: Insights from geodetic results and seismicity

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The southern Africa block (SAB) is one of the 4 blocks of the Africa plate (Mukandila, 2020). Using the east African seismicity as defined by Bird (2002), the Zululand boundary between the Nubia and Somalia plates separates this block into eastern (SABE) and western (SABW) sub-blocks. In addition, the level of seismicity in this region is remarkable (e.g., the 2006 Mozamique Mw 7 and 2017 Botswana Mw 6.5 earthquakes). However, there is no dense geodetic studies that establish correlation between the seismic activity and active deformation in this intraplate tectonic domain. In this study, we use position timeseries (longer than 20 years) from about 65 GNSS stations in southern Africa. The rigorous inversion of the GNSS velocities using the least square method and Newton-Raphson methods. The combined two methods make it possible to minimize the uncertainties in the location coordinates and angular velocities of the Euler poles (0.5e**-5° and 0.5e**-5 °/Ma, respectively). This approach made it possible to determine three Euler poles with the aforementioned precision, namely the pole of the SAB and those of its respective sub-blocks. The relative velocities between the southern and northern sub-blocks of (~0.157) mm/yr. at south and (0.185) mm/yr., respectively, with respect to the Zululand bourdary line describe a predominantly extensional deformation regime that correlates with seismic activity in the region.