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Scotia Plate Dynamics: insights from seismotectonics and numerical modeling

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The Scotia plate and surrounding areas is a beautiful and complex geodynamic system, which accommodates the large-scale sinistral strike-slip motion between South-America and Antarctica plates. It comprises active and fossil oceanic spreading, arc-shaped orogenic belts at the periphery of the system, crustal strike-slips and transform zones, extensional basins, and subductions. A careful structural analysis of the larger Scotia area based on ETOPO1 dataset, together with a new seismotectonic synthesis including stress inversion (CMT dataset), and finite elements numerical modeling (SHELL code), allow to better characterize the current strain and stress states of this complex system. Comparisons between the actual states of strain and stress provided by focal mechanism inversions in homogeneous sectors, and the states of strain and stress modelized using numerous test-configurations, led us to investigate both the kinematic conditions at the boundaries of the system and the role of rheological parameters. This study provides a new regionalization and quantification of the stress variations in the larger Scotia plate system. It rises up the matter of regional evolution from compressional zones (Ande, Sandwich subduction front), to strike-slip (Nord and South Scotia ridges), and extensional areas (Bransfield basin, Sandwich subduction extrado), and provides new constrains to discuss the related geodynamic processes.