THE OROGENIC TRIAD OF THE BRASILIANO OROGEN IN RIO GRANDE DO SUL, BRAZIL

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ABSTRACT: The presence of a granitic batholith, a fold and thrust belt and a foreland basin in Rio Grande do Sul are now described as coeval units and all part of an orogenic triad. Previous incorrect interpretation of the age of the Porongos Group as an 800 Ma fold and thrust belt positioned the group apart from the Pelotas Batholith (600 Ma) and the Camaquã Basin (600 Ma). Advanced geological understanding and voluminous U-Pb zircon dating led to the clarification of the Neoproterozoic geology of the Sul-Riograndense Shield. All three units formed during the time span 650-550 Ma, so they are the result of a single crustal deformation process. The Rio de la Plata Craton occupied the entire shield before 800 Ma to be deformed and melted to form the granitic rocks. Craton rocks, including the cover Santana Formation, were eroded and shed sediments into the sedimentary basins during 650-550 Ma. The Pelotas Batholith on the east was formed in magmatic lulls at 650-630 Ma and 600-550 Ma, with significant magmatic flux at 630-600 Ma. The different granitic suites (Pinheiro Machado, Cordilheira, Erval, Encruzilhada) yielded sediments to the basins as they rose and were exposed to erosion. The Pelotas Batholith thus constituted the mountain range of the orogenic core. The rise of the range caused flexural bending of the lithosphere, with the systematic and continuous formation and deformation of the Porongos Group fold and thrust belt at 650-550 Ma. Farther west, the flexural bending formed the Camaquã Basin in the foreland, with deposition of flysch (Maricá Group) at the base and molasse (Santa Bárbara Group) at the top at 630-550 Ma and intercalated volcanism. Craton reactivation broke the foreland and concentrated deformation in the intramontane basins, thus forming the schistosity of the Porongos Group. Two craton shoulders are observed, one along the Encantadas Complex and the other along the belt constituted by the Vigia gneiss-Neto Rodrigues gneiss, which is well-marked in aeromagnetometric signals. The orogenic triad of a granitic core-fold and thrust belt-foreland basin presently identified in the Sul-Riograndense Shield may be common in the Brasiliano Orogen along eastern South America. The triad has been described in the Alps, Himalayas, North American Cordillera, and China.The triad is an integrated interpretation in Rio Grande do Sul of the Ediacaran-Cambrian geological evolution of the continent and elevates the understanding of processes to the equivalent units present in all orogens of the continents.

KEYWORDS: OROGENIC TRIAD, BRASILIANO OROGEN, RIO GRANDE DO SUL