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The potential influence of mountain belts on Ediacaran-Cambrian ecosystems of western Gondwana

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Western Gondwana formed by the amalgamation of landmasses through consumption of intervening Neoproterozoic oceanic domains. Accretionary processes dominated during the Tonian and Cryogenian (ca. 900-680 Ma), with protracted closure of the Goiás-Pharusian and Adamastor oceanic realms. Docking of island-arc terranes, subduction polarity reversal and development of continental arcs on the South American blocks ensued by ca. 660-620 Ma. This was followed by collision of the “Central African Block”, which comprised the Congo-São Francisco paleocontinent and its reworked margins, with probable Rodinia offspring such as the West African-São Luís, Parnaíba, Paranapanema and Rio de La Plata paleocontinents at 630-600 Ma. Closure of internal branches of the Adamastor ocean followed between 580-560 Ma, and finally, collision of the Amazonian paleocontinent around 540-520 Ma marked the final amalgamation of Gondwana. Those collisions produced and preserved retro-eclogites and continental UHP rocks associated with deep continental subduction, slab breakoff, and broad-scale exhumation. The resulting mountains were the main sediment source for Ediacaran-Cambrian foreland and intracontinental basins throughout western Gondwana. These basins contain records of the first widespread complex life forms. However, in contrast to the newborn coeval marginal basins of Laurentia, Baltica, and Siberia that remained open to the global sea, intracontinental basins of Gondwana became progressively landlocked as they were surrounded by developing orogenic belts during the Neoproterozoic transition from Rodinia to Gondwana. Progressive basin restriction led to widespread anoxia and the demise of complex life forms. Other possible effects of the surrounding mountain belts on the large epeiric basins of Gondwana and their influence both in the development of Ediacaran-Cambrian ecosystems and Earth's biogeochemical cycles, atmospheric composition and climate will be further considered and quantified. This work is supported by FAPEMIG-Brazil through grant number PPM-00618-18, by CNPq-Brazil through grants number 408815/2021-3 and 304509/2021-3, and by Instituto Serrapilheira - Brazil through grant number Serra-1912-31510 (Project MOBILE, geolifemobile.com).