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Paleoproterozoic andesitic volcanism in the southern Amazonian craton (northern Brazil); lithofacies analysis and geodynamic setting

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Precambrian volcanism played an important role in geological evolution and formation of new crust. Most of the literature on Precambrian volcanic rocks describes settings belonging to subaqueous volcanic systems. This is likely because subaerial volcanic rocks in Proterozoic and Archean volcano-sedimentary succession are poorly preserved due to erosive/weathering processes. The late Paleoproterozoic Sobreiro Formation (SF) here described, seems to be one of the rare exceptions to the rule and deserves particular attention. SF represents the subaerial expression of an andesitic magmatism that, linked with the upper felsic Santa Rosa F., composes the Uatumã Group. Uatumã Group is an extensive magmatic event located in the Xingú region, southwestern of Pará state, Amazonian Craton (northern Brazil). The Sobreiro volcanism is thought to be related to an ocean-continent convergent margin. It is characterized by ∼1880 Ma well-preserved calc-alkaline basaltic/andesitic to andesitic lava flows, pyroclastic rocks and associated reworked successions. The superb preservation of its rock-textures allowed us to describe in detail a large variety of volcaniclastic deposits. We divided them into primary and secondary, depending if they result from a direct volcanic activity (pyroclastic) or reworked processes. Our study reinforces the importance of ancient volcanic arcs and rocks contribution to the terrestrial volcaniclastic sedimentation and evolution of plate tectonics. The volcanic activity that produced pyroclastic rocks influenced the amount of detritus shed into sedimentary basins and played a major role in the control of sedimentary dispersal patterns. This study aims to provide, for the first time, an analysis of the physical volcanic processes for the subaerial SF, based in field observation, lithofacies analysis, thin section petrography and less geochemical data. The modern volcanological approach here used can serve as a model about the evolution of Precambrian volcano-sedimentary basins. Our approach permits to better identify different processes operating on volcanic edifices and to constrain the depositional environment and thus geodynamic setting of Precambrian continental volcanic belts.
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