

PALEOMAGNETISM OF PROTEROZOIC GEOLOGICAL UNITS FROM THE AMAZONIAN CRATON, AND ITS PARTICIPATION IN THE COLUMBIA, RODINIA, AND GONDWANA SUPERCONTINENTS

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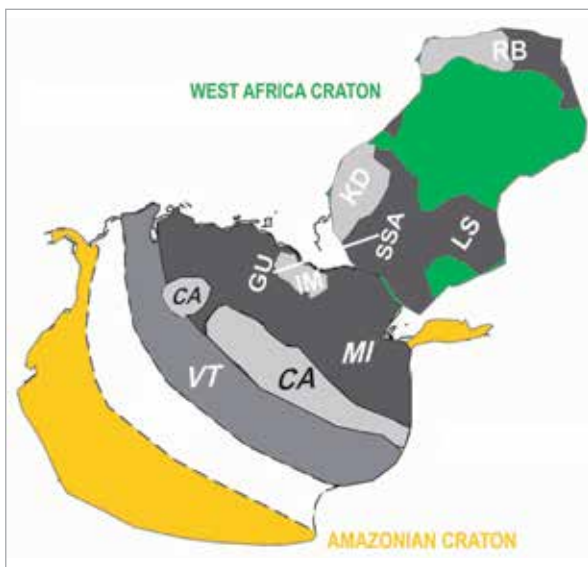


Figure 1. Paleogeography of proto-Amazonian and West African cratons at 1.96 Ga based on paleomagnetic and geological data. The Guri (GU) and Sassandra (SSA) lineaments were aligned in the figure. Symbols as in Bispo-Santos et al. (2014a)

The main purpose of this project is to elucidate the geodynamic evolution of the Amazonian Craton and its interaction with other continental blocks during the Proterozoic, using key paleomagnetic poles, and monomineral Ar-Ar, U-Pb, and Lu-Hf geochronology. Geodynamic models proposed for the craton in global paleogeographic reconstructions (supercontinents) will be tested by the paleomagnetic data. The chosen targets for this study are unmetamorphosed intrusive and extrusive bodies of different ages, located at key areas: felsic and associated mafic rocks from the Sobreiro Formation and Iriri Group (1.88 Ga) and mafic to felsic rocks from the Jamon Suite (1.88 Ga), both situated in the Pará State; volcanic rocks (1.42 Ga) from the Figueira Branca Intrusive Suite and mafic dykes from the Tapirapé Mafic Suite, both situated in the Mato Grosso State; and mafic volcanic rocks from the Alto Candeias Intrusive Suite (1.35 Ga), in the Rondônia State. Paleomagnetic analyses of other geological units that are already in progress will also be a part of this project: Surumu Group (1.98-1.96 Ga), Roraima Supergroup (1.87 Ga) and 1.78 Ga sills cutting these rocks from Roraima State, the Guadalupe Intrusive Suite and the Nova Guarita dyke swarm (1.42 Ga) from northern Mato Grosso State, and mafic dikes (Nova Lacerda region, 1.36-1.38 Ga) and sills (Rio Branco region, 0.98 Ga) cutting the Aguapeí sedimentary rocks in the southwestern Mato Grosso State. Eventually, other units may be studied according to results. At least eight field trips are planned for sampling the different geological units, with the participation of expert geologists in the respective areas.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

Paleomagnetic and geochronological data obtained in this project have contributed significantly to elucidate the participation of the Amazonian Craton in the paleogeography of the Columbia and Rodinia Supercontinents, and also in the process of amalgamation of Gondwana. The paleomagnetic study of the 1980-1960 Ma felsic volcanic rocks from the Surumu Group suggests that proto-Ama-zonia and West Africa took part of the same continental mass at about 1960 Ma ago, in a paleogeography where the Guri (Guiana Shield) and Sassandra (West Africa Craton) lineaments were aligned. Several paleomagnetic and geochronological studies were performed in Paleo- to Mesoproterozoic geological units from the Roraima and Mato Grosso States. A well-dated 1789 ± 3 Ma paleomagnetic pole was obtained for sills from the Avanavero magmatism (Roraima State – Guiana Shield). Comparison of this pole with other similar in

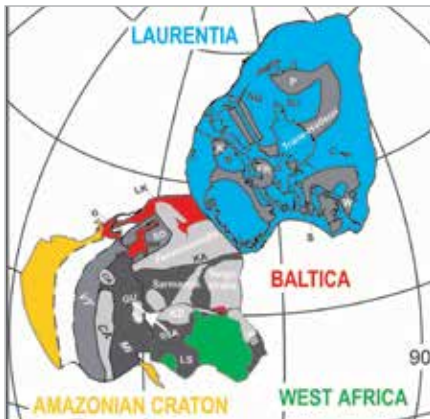


Figure 2. Paleogeography of the nucleus of Columbia Supercontinent at 1.78 Ga based on paleomagnetic and geological data. Symbols as in Bispo-Santos et al. (2014b)

age poles from Baltica and Laurentia corroborates the paleogeographic reconstruction proposed by other authors, where the proto-Ama-zonia/West Africa was directly linked to Baltica/Laurentia, forming the core of Columbia. The paleomagnetic pole obtained for sedimentary rocks from the Fortuna Formation (Aguapeí Group), collected near to Vila Bela (close to the Brazil-Bolivia frontier), with an age of 1150 Ma seems to support a dynamic interaction between the Amazonian Craton and Laurentia along the Sunsás and Grenville belts during the formation of Rodinia. Mafic sills near Rio Branco (MT) cut the sedimentary rocks actually known as belonging to the Vale da Promissão Formation (Aguapeí Group). A recent U-Pb (baddeleyite) dating of one of the sills yielded an age of 1439 ± 4 Ma for these rocks. Both sills and sedimentary rocks yielded similar paleomagnetic poles, and these poles are also similar to the Mesoproterozoic (~1420 Ma) Nova Guarita and Indivaí poles, suggesting an older age for these sedimentary rocks. Finally, paleomagnetic data obtained for alkaline rocks from the Planalto da Serra area (~610 Ma) suggest that final collision of the Amazonian Craton with São Francisco Craton in Gondwana occurred at about 530-525 Ma ago, after the Clymene ocean closure.

MAIN PUBLICATIONS

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