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U–Pbdating on detrital zircon and Nd and Hf isotopes related to the provenance of siliciclastic rocks of the Amazon Basin: Implications for the origin of Proto-Amazonas River

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Previous provenance studies along the Amazonas river have demonstrated that the Amazon drainage basin has been reorganized since the Late Cretaceous with the uplift of the Andes and the establishment of the transcontinental Amazon fluvial system from Late Miocene to Late Pleistocene (Hoorn et al., 1995; Potter, 1997, Wesselingh et al., 2002; Figueiredo et al. 2009, Campbell et al., 2006, Nogueira et al. 2013).There is a lack of data from Eastern and Central Amazonia and only limited core data from the Continental Platform near to current Amazonas river mouth. Central Amazonia is strategic to unveil the origin of Amazonas River because it represents the region where the connection of the Solimões and Amazonas basin can be studied through time (Nogueira et al. 2013). Also, there is a shortage of information on the old Precambrian and Paleozoic sediment sources relative to Cretaceous and Miocene siliciclastic deposits of the Solimões and Amazonas basins.

We collected stratigraphic data, detrital zircon U-Pb ages and Nd and Hf isotopes from Precambrian, Paleozoic, Cretaceous and Miocene siliciclastic deposits of the Northwestern border of Amazonas Basin. They are exposed in the Presidente Figueiredo region and in the scarps of Amazon River, and occur to the east of the Purus Arch. This Northwest-Southeast trending structural feature that divides the Solimões and Amazonas basin was active at various times since the Paleozoic.

Detrital zircon ages for the Neoproterozoic Prosperança Formation yielded a complex signature, with different populations of Neoproterozoic (550, 630 and 800 Ma) and Paleoproterozoic to Archean sources (1.6, 2.1 and 2.6 Ga). Also Nd and Hf isotopes show two groups of TDM model ages between 1.4 to 1.53 Ga and 2.2 and 3.1 Ga. Sediments typical of Paleozoic sedimentary rocks of the Nhamundá and Manacapuru Formations revealed NdTDM model ages of 1.7, 2.2 and 2.7 Ga, but Hf isotopes and U-Pb zircon ages are more varied. They characterize a provenance dominated by Mesoproterozoic sources (1.0, 1.2 Ga) and subordinate Neoproterozoic(550-800 Ma) and Archean derivation (2.67 Ga). On the other hand, detrital zircon and Hf and NdTDM model ages for the Cretaceous Alter do Chão Formation yielded a unique Paleoproterozoicages between 2.0 and 2.3 Ga that can be correlated to sources derived from Maroni-Itacaiúnas and Central Amazonian basement provinces.

The contribution of Precambrian and Paleozoic rocks exposed during the installationof the Amazonas drainage were probably significant .Such a large contribution from Neoproterozoic and Mesoproterozoic sources are not common in the proximal Amazon Craton basement .This new proposal open new perspectives to understand better the initial history of Amazon River with indication of the probable source areas during Late Cenozoic.

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