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- [About](#)
- [Meetings](#)
- [Virtual Posters](#)
- [Sections](#)
- [Index Terms](#)

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Paleomagnetic Evidence for a Transpressional Grenville Orogen: Sinistral Offsets Between Amazonia and Laurentia Point to an Evolving Rodinia

Details

Meeting [2005 Fall Meeting](#)

Section [Geomagnetism and Paleomagnetism](#)

Session [Geomagnetism and Paleomagnetism General Contributions Posters](#)

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Index Terms [Paleomagnetism applied to tectonics: regional, global \[1525\]](#)
[Continental cratons \[8103\]](#)
[Continental margins: convergent \[8104\]](#)
[Precambrian \[9619\]](#)

Abstract

We report three new paleomagnetic poles from the Amazon craton for the Meso/Neoproterozoic Grenvillian interval, a period notable for the eponymous continental collision that affected the eastern margin of Laurentia. The poles were derived from study of ca.1230 Ma mafic sills (Figueira Branca $^{40}\text{Ar}/^{39}\text{Ar}$ biotite), the 1149 $\pm$ 7 Ma sediments of the Aguapeí Gp. (U-Pb SHRIMP analysis of authigenic xenotime) and the ca.980 Ma basaltic dykes and flat-lying flows ($^{40}\text{Ar}/^{39}\text{Ar}$ biotite) that intrude and overlie the Aguapeí Gp. sediments. These new data define a skeletal apparent polar wander path marked by a counterclockwise loop, similar to that observed for North America and Baltica. A pole-by-pole comparison of the Amazon and North American data demonstrates the evolving paleogeographic affinity of these two continents, marked by the large-scale strike-slip movement of Amazonia relative to Laurentia. The 3000 km of sinistral offset between these two continents is substantiated by a 200 Ma record of sinistral transpression recorded in the 1.2-1.15 Ga deformation of basement rocks of the Amazon craton, the 1.1 Ga Nova Brasilândia belt, and the 1.05-1.0 Ga Sunsas belt of eastern Bolivia. Our observations suggest that transpressional collision of the

Amazon craton and Laurentia was responsible for the bulk of Grenvillian deformation, as opposed to the multiple continents required by other Rodinia models.

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