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VIRTUAL GEOMAGNETIC POLE POSITIONS FROM 1.1 GA INTRUSIVE ROCKS OF THE LLANO UPLIFT, CENTRAL TEXAS

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Most Late Mesoproterozoic paleomagnetic poles for Laurentia have been derived from rocks of the Canadian shield. Isolated but regionally extensive exposures of ca. 1.1 Ga granitoids in the Llano Uplift, central Texas, offer a potential opportunity to greatly expand the geographical coverage and to test previous assumptions of the autochthonous nature of this portion of the southern margin of Laurentia. We collected suites of samples for paleomagnetic analysis from: 1) coarse-grained Town Mountain Granite (TMG) of the Granite Mountain pluton, 2) a fine-grained melarhyolite dike and 3) a rhyolite porphyry dike ("llanite"). Published U-Pb zircon ages for TMG plutons range from 1070 to 1116 Ma; Rb-Sr whole rock and mineral isochron ages and K-Ar hornblende ages for the same bodies are 25 to 60 million years younger. The melarhyolite dike, which has a U-Pb zircon age of 1098 ± 3 Ma, and the llanite dike, for which we report a new U-Pb zircon age of 1092 ± 3 Ma, have a reported Rb-Sr whole rock isochron age that is within about 10 million years of these U-Pb zircon ages, consistent with grain size and textural indications of more rapid cooling. All sampled bodies are post-tectonic with respect to country rock gneisses and schists and have not experienced any younger deformation or metamorphism.

All samples were subjected to progressive thermal demagnetization; characteristic directions of magnetization were calculated by the principal component method. The melarhyolite dike has been completely remagnetized and no ancient direction could be isolated. In contrast, the llanite dike and TMG have stable directions well-removed from the present field. The virtual geomagnetic pole position (VGP) of the llanite dike coincides with other North American VGP's of ca. 1100 Ma, whereas the TMG VGP falls on the North American apparent polar wander path at a position corresponding to an age of about 1050 Ma. This latter age is within the range of Rb-Sr whole rock and K-Ar hornblende ages for the TMG. The VGP's are thus consistent with isotopic evidence for relatively rapid cooling of the llanite dike and slower cooling of the TMG. Our data support earlier assumption of no relative motion between the Canadian shield and the Llano Uplift since ca. 1100 Ma.