

Early Jurassic paleopoles from the Hartford continental rift basin (eastern North America): Was an abrupt change in polar wander associated with the Central Atlantic Magmatic Province?

Details

Meeting [2007 Fall Meeting](#)

Section [Geomagnetism and Paleomagnetism](#)

Session [Paleomagnetism in Orogenic Settings II](#)

Identifier GP54A-06

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Index [Magnetostratigraphy \[1520\]](#)

Terms [Paleomagnetism applied to tectonics: regional, global \[1525\]](#)

Abstract

The recent recognition of what may be the largest igneous province on Earth, the ~200 Ma Central Atlantic magmatic province (CAMP), with its close temporal proximity to major biotic turnover at the Triassic/Jurassic boundary, adds impetus for seeking confirmation of possibly related geodynamic phenomena. For example, CAMP emplacement seems to coincide temporally with an abrupt change in North American apparent polar wander at the so-called J1 cusp, which has been suggested to reflect a major plate reorganization or an episode of true polar wander. However, early Jurassic paleopoles from the Moenave and Wingate Formations from the Colorado Plateau that virtually define the J1 cusp have few reliable counterparts from elsewhere in North America. The thick section of cyclical Lower Jurassic continental sediments with interbedded CAMP lava flows in the Hartford basin of Connecticut and Massachusetts provides an opportunity to test the reality of the J1 cusp. We collected about 400 oriented samples distributed over 80 outcrop sites that represent a ~2500 meter-thick composite section of the Shuttle Meadow and East Berlin sedimentary formations, which are interbedded with CAMP lava units, and the lower Portland Formation, which consists of cyclical lacustrine to fluvial sediments of Early Jurassic age that conformably overlie the CAMP extrusive zone in the Hartford basin. Normal and reverse polarity ChRM directions define a coherent magnetostratigraphy and are supported by a reversal test and a positive fold test. The distribution of ChRM direction from the sediments is flattened and the mean is significantly shallower than from the coeval CAMP lavas. E/I analysis of the Hartford sedimentary ChRM data produces a result consistent with the geomagnetic field model at a mean flattening factor of 0.54; the corrected mean direction is steeper and not significantly different from the mean inclination of the Newark and Hartford CAMP volcanic units.

Cite as: Author(s) (2007), Title, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract GP54A-06

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