Late Devonian paleomagnetism of the North Tien Shan, Kyrgyzia: Does secular variation vary at a short time scale ?

Mikhail Bazhenov (1), Rob Van der Voo (2), Natalia Levashova (1), and Ada Dominguez (2)

(1) Geological Institute, Russ. Acad. Sci., Moscow, 109017Russian Federation (mibazh@mail.ru), (2) Department of Geological Sciences, University of Michigan, Ann Arbor, Michigan 48109-1005, USA (voo@umich.edu)

We studied sixty lava flows from an about 600-meter thick pile of Upper Devonian (Frasnian) basalts and andesites of the Aral Formation in the North Tien Shan (Kyrgyzia, Central Asia). With the aid of stepwise thermal demagnetization, a high-temperature dual-polarity component was reliably isolated from most flows. These new data were combined with those from the lower part of this formation [Levashova et al., 2007]. The primary origin of the high-temperature component is demonstrated by positive reversal, conglomerate and fold tests. The most prominent and intriguing feature of this Late Devonian dataset is a clear distinction in angular dispersion between the lower and upper parts of the studied section: a rather low concentration parameter (k ∼13) and several excursions are found in the former, while about four times better grouping is observed for dual-polarity vectors from the upper part of the formation. We favor a geomagnetic origin for this difference and advocate a hypothesis that the magnitude of secular variation could randomly vary several-fold over time intervals of 100 ky -1 My. This is in sharp contrast with other models of secular variation, where this magnitude is assumed to be time-independent (for a certain latitude). Our hypothesis accounts for the observed irregularities in paleomagnetic data but makes it more difficult to successfully establish a correlation between secular variation and other parameters like geographic latitude, reversal frequency, or age.