New absolute paleointensity results from ~250 Ma Kuznets Traps. Weak versus strong geomagnetic field at the P-T boundary.

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We present absolute paleointensity results obtained from a collection of samples from ~250 Ma Kuznets Traps (Kuznets Depression, Southern Siberia). In addition to similar age these rocks display geochemical signatures similar to those reported for basalts of Siberan Traps and represent the southernmost affinity of the latter.

The primary nature of magnetic remanence in studied rocks was established by previous paleomagnetic studies. Rock magnetic analysis indicates that the main magnetic mineral is titanomagnetite in a predominantly single-domain state with Curie temperatures between ~275 and 350\textdegree{}C. Scanning electron microscopy showed that titanomagnetite grains range in size from 0.5 to 1 \textmu{}m. Individual grains are separated from each other and “sealed” within silicate matrix, which largely predetermined perfect preservation of primary mineral textures.

Paleointensity estimates were obtained using the Coe-version of Thellier-Thellier double-heating protocol with partial TRM checks. 36 samples (5 sites taken along the Tom River) yielded straight Arai-Nagata diagrams within temperature interval between 100 to 275\textdegree{}C. The average paleointensity value obtained from these samples was calculated at 12.7 ± 1 \textmu{}T (with a factor \textit{q} of about 11) with corresponding VDM=2.1 ± 0.2 × 10^{-22} \textit{Am}^2.

Arai-Nagata diagrams for 20 samples from two other sites (collected in quarries on the Karakansky ridge) display more complex behavior. Straight linear segment of Arai plots between ~100 and 300\textdegree{}C yielded an average paleointensity value of 44 ± 1 \textmu{}T, which corresponds to a VDM=7.0 ± 0.1 × 10^{-22} \textit{Am}^2. However on higher temperatures, NRM vs. TRM data have a trend of flattening that increase in artificial TRM is accompanied by no loss of NRM. We interpret this observation as a result of laboratory-induced thermochemical alteration, namely, unmixing of homogeneous Ti-magnetites into Ti-rich and Fe-rich phases, with the latter phase responsible for such NRM-lost vs. TRM-gained behavior. Thermomagnetic analyses on these samples indicated mineralogical changes that set approximately at 300\textdegree{}C, supporting our interpretation. However, reversible thermomagnetic curves and \textit{p}-TRM checks within 10\% from initial \textit{p}TRM, below ~300\textdegree{}C suggest that paleointensities determined between ~100 and 300 \textdegree{}C of Arai plots are trustworthy.
We will discuss our results and reasons for such radical differences between paleointensity estimates obtained from the same suite of rocks sampled at different locations.

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