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Paleointensity study on obsidians of Pleistocene Age from Armenia

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Volcanic glass is often considered an ideal recording material for paleointensities. Experiments to determine the ancient field intensity are time consuming and mostly have low success rates. Studies have shown that the usage of glassy samples can increase success rates very much as the remanence carriers are in or close to the single domain range. However, it was found that hydration and/or devitrification may falsify the results and maybe hard to identify. Here we investigate up to ∼6 myr old subaerial obsidians of rhyolitic composition from Armenia to examine time dependencies in such processes and to obtain high quality field records. We present data from 60 subaerial obsidian samples from nine volcanic structures of Armenia. Almost all samples show a linear directional component which trends towards the origin of projection in both thermal and alternating field demagnetization experiments. The 1.75 and ∼6myr old glasses are inversely magnetized while all other samples show normal polarity. Titanomagnetites with varying titanium content and Curie temperatures at 190 to 270°C and 530° to 570°C, respectively, were revealed to be the remanence carriers. Almost all thermomagnetic curves are reversible underlining the thermal stability of the material. Thellier-type experiments with alteration and tail checks were used to determine paleointensities. Virtual axial dipole moments of $4.6*10^{22}$ Am^2 (0.5Ma), $8.6*10^{22}$ Am^2 (0.65Ma), $9.4*10^{22}$ Am^2 (1.5Ma), $6.9*10^{22}$ Am^2 and $7.3*10^{22}$ Am^2 (∼6 Ma) were found which agrees well with published reference data (Channell et al., 2009). The thermal stability, low alteration and good accordance with other data support the suitability of glassy materials for geomagnetic field studies and also shows the potential of subaerial obsidian to identify the source areas of prehistoric obsidian artefacts.