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EVALUATION OF AGING AND HYDRATION IN NATURAL VOLCANIC GLASS: MAGNETIC PROPERTY VARIATIONS DURING ARTIFICIAL AGING AND HYDRATION EXPERIMENTS

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The recorded geomagnetic field intensity is a function of magnetic mineralogy, grain size, and mineral concentration as well as material stability in nature and during laboratory experiments. Fresh, unhydrated, volcanic glasses are recognized as a nearly ideal natural material for use in paleo intensity experiments because they contain the requisite SD to PSD magnetic particles. It is unclear how mineralogy and hence magnetization might change with age as the metastable glass structure relaxes and/or the glass becomes hydrated. Bulk magnetic properties as a function of age show no clear trend, even over hundreds of millions of years. This may be since even in fresh glass, there are small-scale differences in magnetic properties due to variation cooling rate or composition variations. Therefore, to better understand how magnetic mineralogy evolves with time and hydration, we conducted artificial aging and hydration experiments on fresh, unhydrated rhyolitic and basaltic glasses. Here, we present the results of these experiments. Aged samples are dry- annealed at 200°C, 300°C and 400°C for up to 240 days. A second set of samples are hydrated under pressure at 300°C and 450°C. In all cases IRM acquisition is monitored to assess changes in the coercivity spectrum and sIRM. Preliminary aging results show that in basaltic and rhyolitic glass there is one main peak coercivity at ~ 150 mT and ~ 35 mT, respectively. An increasing sIRM and decreasing peak coercivity trend is observed in basaltic glasses whereas no trend is shown in the rhyolitic glass in both parameters after 240 days for all temperatures in aging experiment. This could be caused by the coarsening of the existing magnetic grains as the glass structure relaxes during to aging. We tentatively conclude that one should be cautious with using older glassy samples in absolute paleointensity experiments.