

Comments to Anonymous reviewer

Comment 1: “The first three sentences of the abstract are really background for the paper, rather than new information. I would recommend removing these sentences and focusing the abstract on information that results from this research, even if it makes the abstract very short. This is, after all, a study based on one very small dataset.”

Response: We agree with the reviewer that these lines do not represent our results, and have removed two of the three sentences. We have kept the first sentence of the abstract as it helps to place the work in context, and helps define why we are doing the work in the first place. The first lines of the abstract are now the following:

“Volcanic tephra are independent age horizons and can synchronize strata of various paleoclimate records including ice and sediment cores. The Holocene section of the Greenland Ice Core Project (GRIP) ice core is dated by multi-parameter annual layer counting, and contains peaks in acidity, SO_4^{2-} and microparticle concentrations at a depth of 429.1 m to 429.3 m, which have not previously been definitively ascribed to a volcanic eruption.”

Comment 2: “Even though the analyses of glass presented in this paper are so scattered that accuracy and precision becomes almost a moot point, I would like to suggest that the authors make an attempt to quantify and present this information with their analysis. They have analyzed SRMs as part of their work, and at the very least should present accuracy and precision for those data. However, I would like to suggest that they select a suitable glass (such as SRMs KN18, KE 12 or some other alkaline glass), crush some to a fine grain size, mount it using the same methods that they used for their unknowns and analyze it using the methods that they describe in the paper. This would then provide a more realistic assessment of accuracy and precision than analyzed polished SRMs. I think that this would add significant scientific value to the paper, and would also make their analysis method for these very fine glass particles more widely usable, because researchers would have some idea of the quality of analysis that they would be able to obtain using these methods.

Response: We agree with the reviewer that we should provide more details regarding the reference materials. We have incorporated the multiple analyses of reference materials into Table 1 and also include the following paragraph in the methods section:

The quality of analyses was determined using certified minerals and glasses as reference standards including CFA47 trachytic, ALV981R23 basaltic, and KE12 pantelleritic glasses (Table 1). Accuracy and precision of each oxide and used standard are reported in Marianelli and Sbrana (1998), although all standards were measured as polished surfaces. SEM-EDS microanalysis was carried out on individual particles using a Philips XL30 EDAX DX4. Operating conditions were 20 kV and ~0.1 nA beam current, 2200 CPS, the X-ray take off angle was 35°, the working distance was 10 mm, specimen tilt was 0°, the elevation angle was 35°, and the azimuth was 45°. A raster area of about 100 μm^2 was employed for glass analysis to reduce the light element loss. The analyses were normalized to 100 wt% using the associated EDAX. Analytical results, errors, reproducibility and detection limits using international standards for the SEM-EDS technique are reported in Marianelli and Sbrana (1998). The tephra investigated in this study are alkali-rich, which limits the number of international or certified standards with suitable compositions.