INTERACTIVE COMMENT by M. Sigl

Response: We thank Dr. Sigl for his suggestions on how to improve our work. We agree that highlighting the elemental composition of the other relatively coeval volcanoes helps to emphasize how we conclude that these GRIP ice core tephra are likely from the Veusvius A.D. 79 Pompeii eruption. We include the geochemical characterization of the major (≥ 4 VEI) eruptions between 50 – 100 AD in Figure 4. As detailed in our responses to Referees 1 and 2, the geochemical characterization of the other coeval volcanoes demonstrates that the only eruptions that could have resulted in such high-alkali tephra are Sete Cidades (A.D. 90 ± 100) and Furnas (A.D. 80 ± 100). However, the GRIP tephra consistently have higher $K_2O + Na_2O$ weight percentages than would be expected from either of these two Azores eruptions (Figure 4). To the best of our knowledge, more detailed geochemical data on the tephra from these eruptions and information on other large historic volcanic eruptions of Vesuvius recorded in Greenland ice does not exist.

We realize that our original Figure 2 caused confusion regarding the depth of the tephra particles in comparison with the $\delta^{18}O$ peak. Please see our above response to Dr. Baillie for a detailed description of the timing of the eruption, interpretations of the $\delta^{18}O$ signal, the depth of the microparticles, and the timing of the Vesuvius eruption. In addition to the changes described in our response to Dr. Baillie, we have also included the following text: "*Even if we conclude that the GRIP tephra are from Vesuvius, the fact that the Vesuvius tephra exist within the $\delta^{18}O$ (warm season) peak as well as the 20 cm offset between the acidity peak and tephra fragments remains (Figure 2). Historical data and volcanological literature supply ample evidence that the Vesuvius eruption occurred in August A.D. 79 (e.g. Lanphere et al., 2006 and references within). If the eruption occurred during September or October A.D. 79, the settling of tephra into the fresh snow after the eruption and the compaction of this snow during the subsequent ~ 2000 years of accumulation (429 meters) suggests that the location of the tephra particles within the $\delta^{18}O$ (warm season) peak is physically possible (Figure 2). The stratigraphic difference between the $\delta^{18}O$ peak (warm season) and the $\delta^{18}O$ valley (cold season) is only 5 cm.*"