

## Supplementary figures



**Figure Sup-I Photograph of the eruption column of the May 2011 Grímsvötn eruption.** Photograph taken at 22:24 UTC on 21 May by Ólafur Sigurjónsson í Forsæti, looking east towards the volcano. There is a clear distinction between the dark, lower, tephra-rich cloud moving southwards, which was responsible for the majority of deposition within Iceland, and the pale, upper, tephra-poor cloud that drifted northwards. Air mass trajectory models indicate that the tephra transported to the UK came from the lower part of the eruption column.

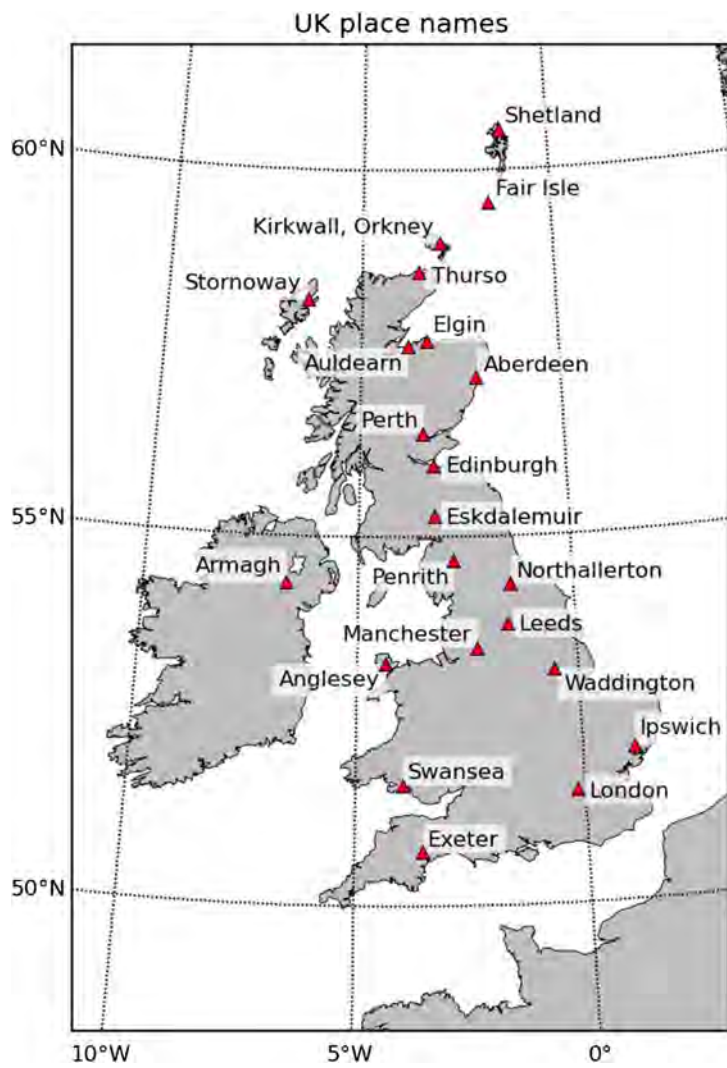
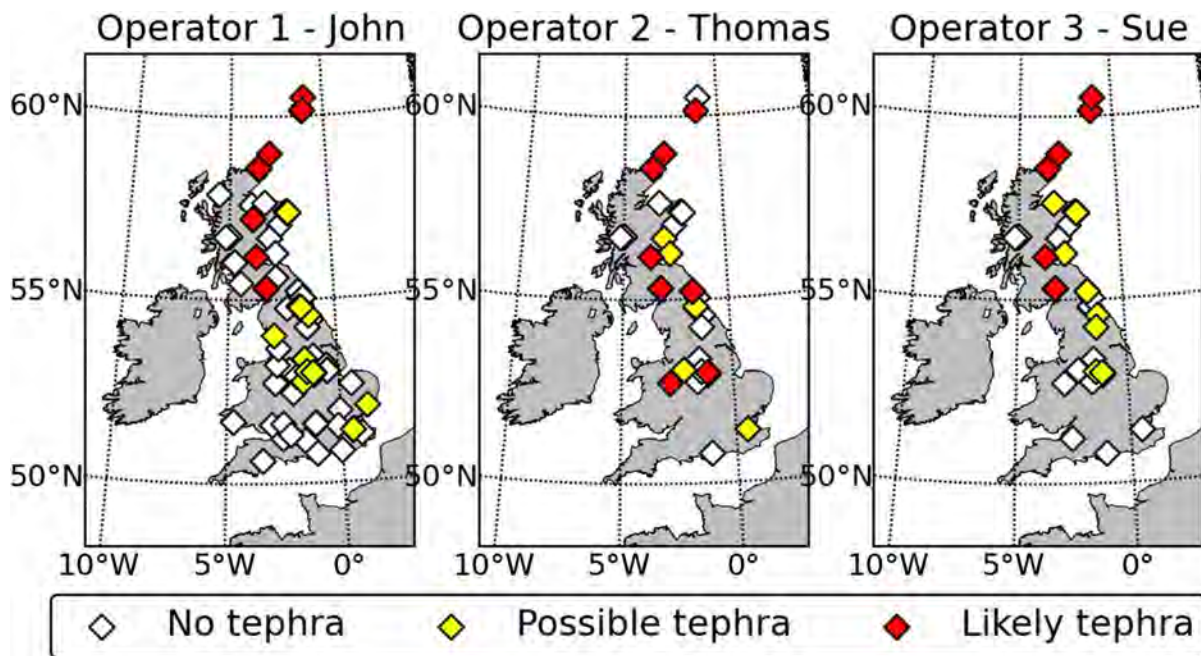


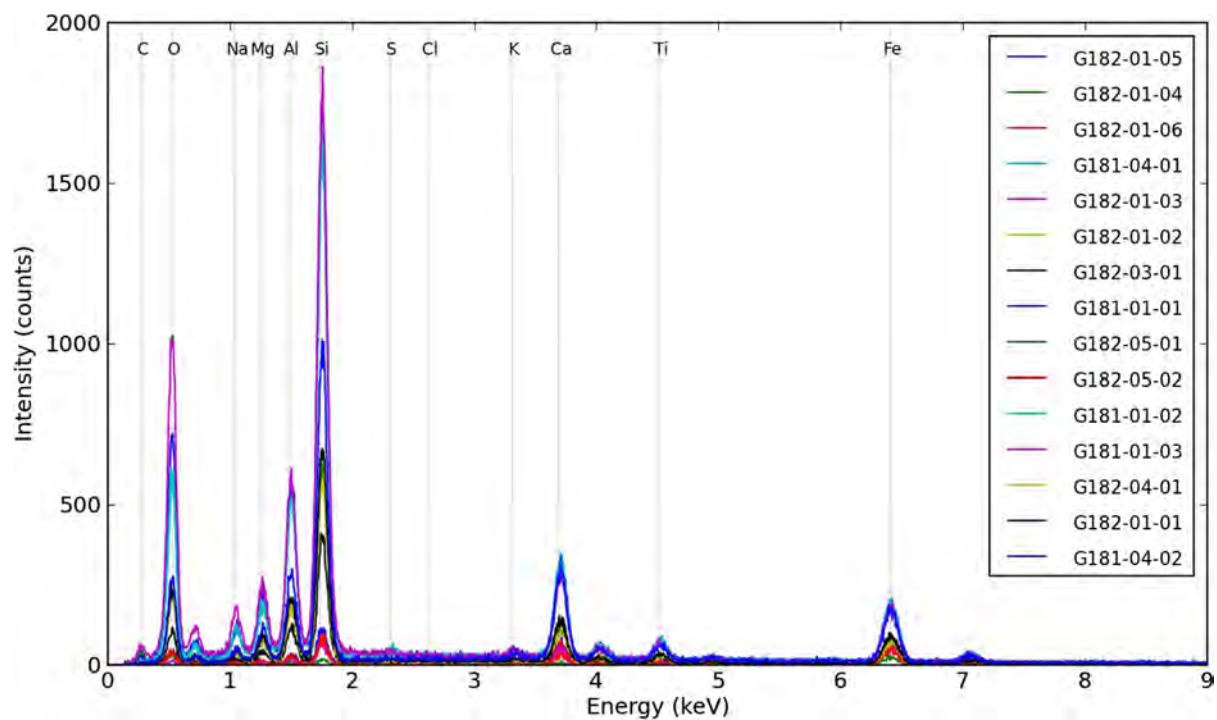
Figure Sup-II Map of UK place names used within the manuscript.



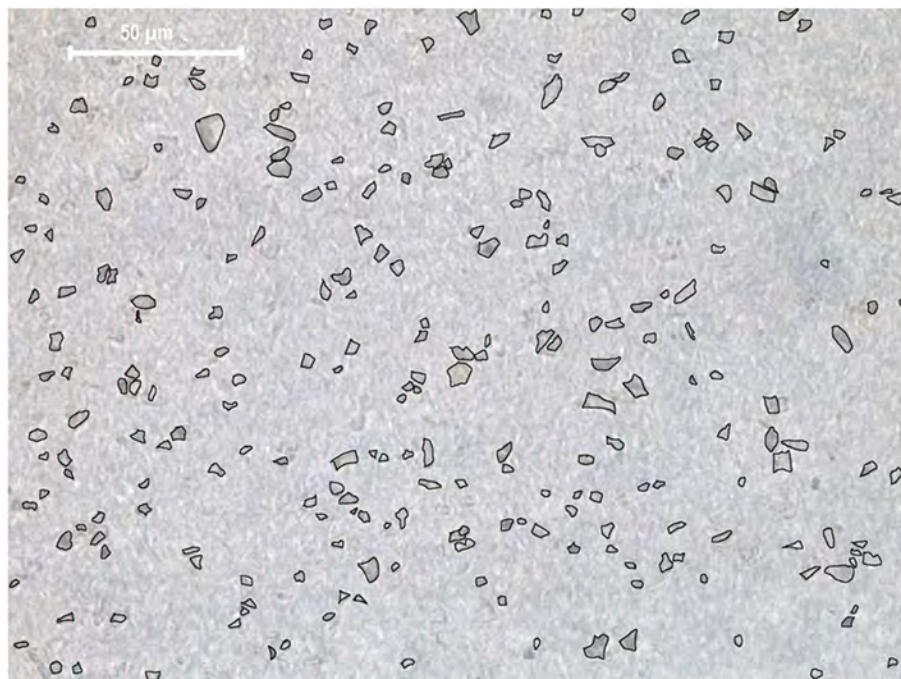
**Figure Sup-III Photograph of tephra deposited on a car roof in Kirkwall, Orkney on the morning of 24 May 2011.** In parts of northern Scotland, tephra was visible where it was deposited on smooth, clean surfaces. A length of sticky tape was used to collect a sample. Photograph by Dr Kirsty Cole.



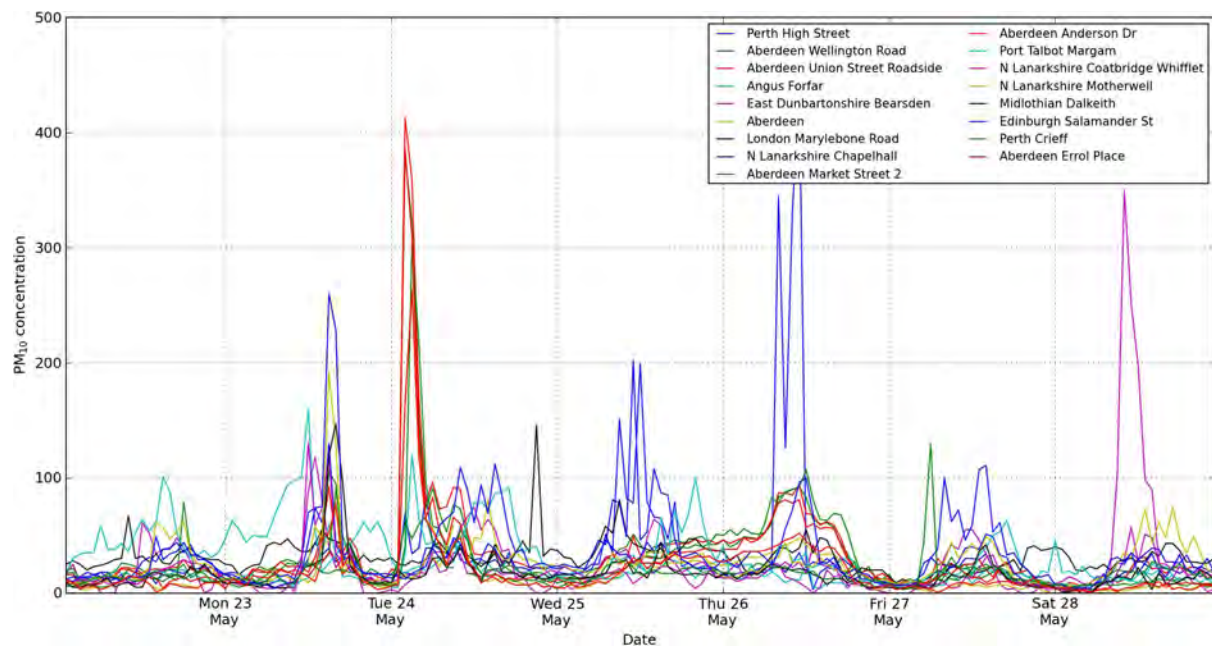
**Figure Sup-IV Comparison of tape-on-paper sample results from different operators.** Time constraints meant that only a subset of samples could be examined by multiple operators. Locations were given a score of 0 (no tephra), 1 (possible tephra), 2 (likely tephra), and the final results (Figure 3) were the mean score, rounded to the nearest whole number.



**Figure Sup-V SEM EDS results from individual ash grains collected from close to Grímsvötn.** These form a reference dataset and the average of these was compared with samples collected in the UK, e.g. Figure 4.



**Figure Sup-VI Image analysis to measure grainsize distribution at Eskdalemuir.** Contrast between grains was too low for automatic detection, so they were highlighted by hand prior to analysis. Analysis was performed using the ImageJ software package.



**Figure Sup-VII Traces of PM<sub>10</sub> concentration from sites that had a peak hourly concentration of >100 mg m<sup>-3</sup>. Background levels are generally higher from 12:00 on 23 May to 00:00 on 27 May.**