Analysis of data on large explosive eruptions of stratovolcanoes to constrain under-recording and eruption rates

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We have analysed the Large Magnitude Explosive Volcanic Eruptions database (LaMEVE) for volcanoes that classify as stratovolcanoes. A non-parametric statistical approach is used to assess the global recording rate for large (M4+). The approach imposes minimal structure on the shape of the recording rate through time. We find that the recording rates have declined rapidly, going backwards in time. Prior to 1600 they are below 50%, and prior to 1100 they are below 20%. Even in the recent past, e.g. the 1800s, they are likely to be appreciably less than 100%.The assessment for very large (M5+) eruptions is more uncertain, due to the scarcity of events. Having taken under-recording into account the large-eruption rates of stratovolcanoes are modelled exchangeably, in order to derive an informative prior distribution as an input into a subsequent volcano-by-volcano hazard assessment. The statistical model implies that volcano-by-volcano predictions can be grouped by the number of recorded large eruptions. Further, it is possible to combine all volcanoes together into a global large eruption prediction, with an M4+ rate computed from the LaMEVE database of 0.57/yr.