**Lucas and Lacourse Supplemental Information and Supplemental Table 1**

**Electron microprobe analysis of Mazama tephra in Roe Lake sediment core**

Several hundred glass shards from the Roe Lake sediment core, varying in size from 20 to 300 μm, were mounted in epoxy on a glass slide and polished. Major element concentrations of 27 glass shards were determined by electron microprobe analysis at the University of British Columbia. Operating conditions were 15 kV and 25 nA, with a 5 μm beam, with peak counting times as follows: Si, Al, K (15 s); Ti, Mn, Fe (25 s); Mg, Ca (20 sec); and Na (4 s). To limit volatilization by the electron beam, Na was counted first, and background counts were only made on first and last samples in the analytical run. Fragments of Mt. Meager dacite glass were also analyzed to check for accuracy, and showed results within 5% of values reported in Rust et al. (1999) for all elements except Na (20%) and Ti (25%), which occur at trace levels. There is limited variability in the composition of the glass shards from Roe Lake. The average composition is an excellent match to Mazama tephra standards (Supplemental Table 1) reported in Foit et al. (1993) and Briggs et al. (2006).

**References**

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**Supplemental Table 1:** Major element composition of glasses in the Roe Lake, Pender Island sediment core and Mazama tephra standards.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Glass Shard Code** | **SiO2** | **TiO2** | **Al2O3** | **FeO** | **MgO** | **CaO** | **Na2O** | **K2O** | **Analytical****Total** |
| Roe g1 | 72.36 | 0.40 | 14.07 | 2.43 | 0.50 | 1.51 | 4.24 | 2.78 | 98.29 |
| Roe g2 | 72.53 | 0.44 | 14.13 | 2.43 | 0.45 | 1.59 | 4.17 | 2.86 | 98.59 |
| Roe g4 | 72.49 | 0.37 | 14.33 | 2.19 | 0.48 | 1.60 | 4.56 | 2.86 | 98.88 |
| Roe g5 | 73.52 | 0.43 | 14.48 | 2.47 | 0.48 | 1.58 | 4.07 | 2.98 | 100.02 |
| Roe g9 | 72.80 | 0.44 | 14.23 | 2.40 | 0.45 | 1.64 | 4.53 | 2.88 | 99.37 |
| Roe g10 | 72.16 | 0.43 | 14.19 | 2.28 | 0.46 | 1.54 | 4.05 | 2.81 | 97.91 |
| Roe g11 | 73.01 | 0.44 | 14.26 | 2.37 | 0.44 | 1.55 | 4.01 | 2.86 | 98.93 |
| Roe g12 | 73.56 | 0.45 | 14.19 | 2.38 | 0.45 | 1.61 | 3.15 | 2.79 | 98.59 |
| Roe g15 | 73.20 | 0.49 | 14.52 | 2.52 | 0.49 | 1.57 | 4.41 | 2.67 | 99.85 |
| Roe g16 | 72.00 | 0.43 | 14.17 | 2.35 | 0.48 | 1.60 | 4.18 | 2.80 | 98.01 |
| Roe g18 | 73.55 | 0.47 | 13.98 | 2.40 | 0.46 | 1.53 | 4.19 | 2.84 | 99.42 |
| Roe g19 | 73.71 | 0.47 | 13.89 | 2.51 | 0.48 | 1.53 | 3.83 | 2.80 | 99.20 |
| Roe g20 | 74.01 | 0.46 | 14.32 | 2.56 | 0.48 | 1.57 | 4.29 | 2.82 | 100.51 |
| Roe g21 | 73.13 | 0.42 | 14.44 | 2.59 | 0.48 | 1.53 | 4.44 | 2.73 | 99.75 |
| Roe g22 | 72.22 | 0.41 | 14.11 | 2.38 | 0.47 | 1.59 | 4.31 | 2.75 | 98.24 |
| Roe g23 | 72.32 | 0.40 | 14.01 | 2.31 | 0.46 | 1.59 | 4.68 | 2.87 | 98.64 |
| Roe g29 | 71.69 | 0.38 | 13.87 | 2.28 | 0.47 | 1.63 | 4.06 | 2.84 | 97.21 |
| Roe g31 | 71.58 | 0.46 | 13.95 | 2.41 | 0.52 | 1.75 | 3.87 | 2.69 | 97.23 |
| Roe g42 | 72.55 | 0.48 | 14.19 | 2.72 | 0.45 | 1.72 | 4.57 | 2.83 | 99.50 |
| Roe g45 | 72.53 | 0.43 | 14.14 | 2.30 | 0.51 | 1.64 | 4.49 | 2.71 | 98.76 |
| Roe g47 | 72.67 | 0.45 | 14.13 | 2.32 | 0.44 | 1.71 | 4.61 | 2.81 | 99.15 |
| Roe g48 | 72.91 | 0.45 | 14.44 | 2.55 | 0.47 | 1.56 | 4.92 | 2.87 | 100.16 |
| Roe g49 | 71.59 | 0.44 | 13.94 | 2.26 | 0.47 | 1.65 | 4.44 | 2.71 | 97.49 |
| Roe g50 | 72.78 | 0.43 | 14.27 | 2.58 | 0.48 | 1.55 | 4.54 | 2.79 | 99.42 |
| Roe g51 | 73.24 | 0.46 | 14.66 | 2.34 | 0.46 | 1.64 | 4.43 | 2.81 | 100.04 |
| Roe g59 | 73.62 | 0.42 | 14.07 | 2.42 | 0.43 | 1.50 | 4.27 | 2.86 | 99.60 |
| Roe g60 | 73.06 | 0.45 | 14.21 | 2.48 | 0.40 | 1.52 | 4.27 | 2.80 | 99.19 |
| Analytical Mean | 72.77 | 0.44 | 14.19 | 2.42 | 0.47 | 1.59 | 4.28 | 2.81 | 98.96 |
| Std. Dev. | 0.67 | 0.03 | 0.20 | 0.12 | 0.03 | 0.06 | 0.34 | 0.07 | 1.51 |
| **Mean 100a** | 73.53 | 0.44 | 14.34 | 2.44 | 0.47 | 1.61 | 4.33 | 2.84 | 100.00 |
| Std. Dev. 100 | 0.67 | 0.03 | 0.20 | 0.12 | 0.03 | 0.07 | 0.34 | 0.07 | 1.53 |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | **SCb** |
| **Mazama standardc** | 73.26 | 0.42 | 14.34 | 2.26 | 0.43 | 1.59 | 4.80 | 2.74 | **0.96** |
| **Mazama standardd** | 72.99 | 0.44 | 14.38 | 2.48 | 0.47 | 1.68 | 4.47 | 2.72 | **0.98** |

a Mean composition standardized to 100 wt.%

a Similarity coefficient (SC) is the weighted average of eight oxide concentration ratios between the mean composition of the Roe Lake tephra samples and Mazama tephra standards, after Borchardt et al. (1972). A SC of 1 represents a perfect match.

c Mazama standard from Fort Rock Valley, Oregon, reported in Foit et al. (1993)

d Mazama standard #30 in the tephra identification database, GeoAnalytical Laboratory at Washington State University, reported in Briggs et al. (2006)