SOURCE COMPOSITIONS OF LARGE TEPHRA-PRODUCING ERUPTIONS IN ALASKA

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SOURCE COMPOSITIONS OF LARGE TEPHRA-PRODUCING ERUPTIONS IN ALASKA

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INTRODUCTION

This report includes new *in situ* geochemical analyses from previously collected samples originally utilized/interpreted in the *Geochemistry, Geophysics, Geosystems* publication "Probabilistic source classification of large tephra producing eruptions using supervised machine learning: An example from the Alaska-Aleutian arc" (Lubbers, Loewen, and others, 2023). The samples and analyses comprise 31 eruptions from 16 Alaska volcanoes (fig. 1). All samples have been archived in the Geologic Database of Information on Volcanoes in Alaska (GeoDIVA; Cameron and others, 2022, doi.org/10.14509/geodiva). Data associated with this report can be downloaded from doi.org/14509/31091. Tables include:

- **References:** This table includes references used throughout the following tabs. There are columns for "short" (i.e., in-text) and "full" (i.e., bibliography) versions of each reference.
- **Samples:** This table includes metadata for all analyzed samples. Samples can be linked across tables using the AT_num column.
- **EPMA:** This table includes electron probe microanalyzer (EPMA) analyses. Analyses are of matrix glass. This table can be linked to the Samples table by the AT_num column.
- **Laser:** This table includes laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) analyses of matrix glass. This table can be linked to the Samples table by the AT_num column.
- **EPMAStandards:** This table includes EPMA standard reference material (SRM) analyses.
- **EPMAStandardsSummary:** This table includes summary statistics for EPMA SRM analyses. The EPMAStandardsSummary and the LaserStandardsSummary tables are not machine-readable and are supplementary tables to the text.
- **LaserStandards:** This table includes LA-ICP-MS SRM analyses.
- **LaserStandardsSummary:** This table includes summary statistics for LA-ICP-MS SRM analyses. The LaserStandardsSummary and the EPMAStandardsSummary tables are not machine-readable and are supplementary tables to the text.

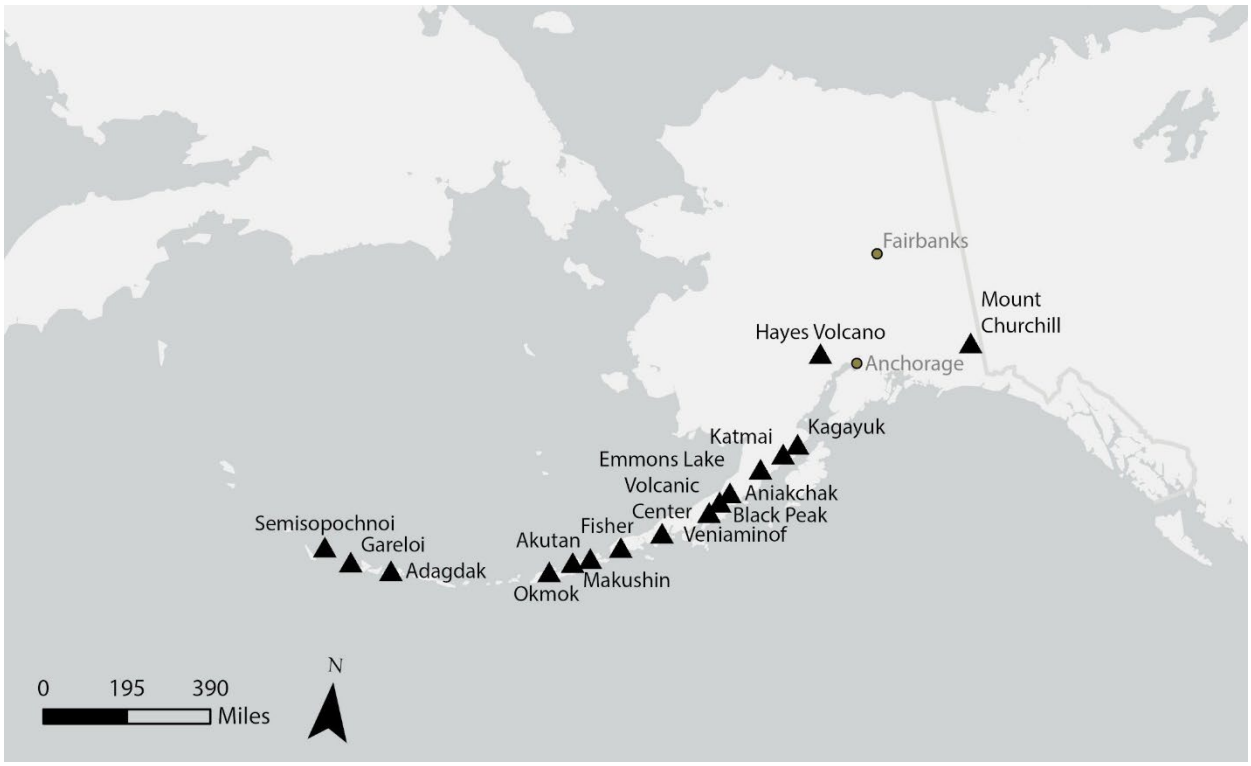

Figure 1. Location map of volcanoes where samples presented in this report were collected.

DOCUMENTATION OF METHODS

Field Data

Station names (StationID) were assigned to sample locations and areas of general observation; sample names (SampleID) correspond to specific samples and include sample descriptions. Laboratory id numbers (AT_num) were assigned during laboratory processing and analysis to keep track of "child" samples. All requisite metadata for samples (e.g., collection date, location, collector) can be found by querying the Geologic Database for information on Volcanoes in Alaska (GeoDIVA; doi.org/10.14509/geodiva) using the StationID.

Electron Microprobe Analyses

Tephra samples were mounted in epoxy and polished for EPMA analysis at the USGS Menlo Park JEOL JXA 8530 F+ EPMA. Detailed methodology of analysis accuracy and precision is found in Loewen and others (2023).

Laser Ablation Analyses

Trace element concentrations in tephra were measured using an Applied Spectra RESOlution SE ArF excimer laser system connected to a ThermoFisher Scientific iCAP-RQ ICP-MS at the Oregon State University W.M. Keck Collaboratory for Plasma Spectrometry. Analyses were conducted with a 24 μm spot, pulse rate of 10 Hz, fluence of 7.2 J/cm^2, and ablation time of 22 seconds. Elemental concentrations were calculated from raw signals using the software LaserTRAM-

DB (Lubbers, Kent, and Russo, 2023), which follows the methodology of Longerich and others (1996). The silicon (Si) isotope ^{29}Si was used as the internal standard, and GSE-1G was the primary calibration standard. Si concentrations were independently constrained using EPMA analyses of the same region of matrix glass. Secondary SRMs included GSD-1G, BCR-2G, ATHO-G, and NIST-612.

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We thank the field geologists who, over numerous decades, collected most of the samples used in this project. Analytical assistance was provided by Dawn Ruth (EPMA) and Chris Russo (LA-ICP-MS). We would also like to thank Simone Montayne and Laura Walkup for their constructive reviews. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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