Shishaldin Volcano 2019–2020 and 2023 eruption chronology data

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Raw Data File 2026-15

Webcam image from south of Shishaldin Volcano (station BRPK) showing high fountaining and light ash emissions at the start of "Event 9" of the 2023 eruption. AVO image ID 194824.

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Shishaldin Volcano 2019–2020 and 2023 eruption chronology data

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INTRODUCTION

This report presents chronology data documenting 2019–2020 and 2023 eruptive activity of Shishaldin Volcano, the tallest and most active volcano on Unimak Island and one of the most historically active centers in the Alaska–Aleutian Arc (fig 1). Prior to these recent eruptions, Shishaldin also experienced a major eruption in 1999 (Nye and others, 2002), followed by a smaller, summit-confined event in 2014. Eruption chronologies document both volcanic processes and volcano observatory responses necessary for improved system models and response plans. The data provided in this report were compiled by Alaska Volcano Observatory staff and research affiliates as part of ongoing volcanic hazard monitoring efforts. This report is a preliminary data release to support the simultaneous development of several topical reports on the two recent eruptions of Shishaldin Volcano. These data and accompanying discussion are released as a DGGS Raw Data File, and all publication components are available from the DGGS website at https://doi.org/10.14509/32077.

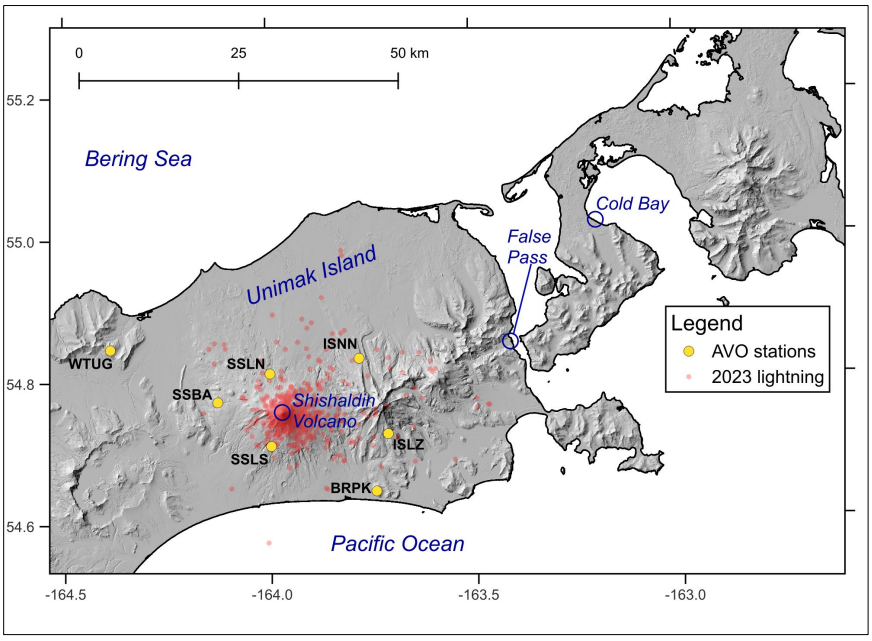

Figure 1. Hillshade map of Unimak Island and the western tip of the Alaska Peninsula. Alaska Volcano Observatory (AVO) monitoring stations (seismic, infrasound, webcam) referenced in this data report are labeled, along with the locations of lightning (in red) detected during the 2023 Shishaldin Volcano eruption. Hillshade is derived from the USGS IFSAR digital elevation model.

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DATA PRODUCTS

This data release is a compilation of eruption chronology observations from multiple disciplines. Table 1 lists the available data tables, which are provided in a Microsoft Excel (.xlsx) workbook as separate tabs. Table 2 lists the summary seismic data files included with this report. These files are organized by station and year and provided in comma-separated values (.csv) format. All location latitude-longitude data included in this report are based on the WGS84 datum. Free text fields provide narrative as recorded by the observer. Appendix A lists and defines most abbreviations used throughout the data tables. Complete documentation of the methods is provided in several in-progress publications for a special collection in the Bulletin of Volcanology. Partial citations are provided in the bibliographic reference list, and we anticipate versioning this report with final citations when those papers are finalized. All data presented here are subject to revision as these papers go through peer review. Readers are directed to the special collection papers for complete method documentation.

Table 1. List of multi-disciplinary data compilation tables. Column definitions are listed in the accompanying data dictionary.

Table Name	Description
data_dictionary	A spreadsheet that provides definitions for fields used throughout the dataset.
event_summary	Summary data for major eruption events from 2019–2020 and 2023.
info_products	All formal information products issued by AVO from 2019 to 2024. Daily and weekly update products are not included.
PIREPS	Compiled list of pilot reports describing eruption behavior in 2019–2020 and 2023.
ash_webcam	Webcam observations of ash and incandescence during the 2023 eruption.
ash_GOES	Ash heights derived from GOES-17 or GOES-18 satellite data for the 2019–2020 and 2023 eruptions, detailed in Gomez-Patron and others (unpub. data). Data are provided every 10 minutes but only during identified eruption events.
SO2	SO_2 detected from satellite data by the TROPOMI sensor during the 2019–2020 and 2023 eruptions, detailed in Lopez and others (unpub. data).
lightning	Lightning detections during the 2023 eruption, detailed in Mota and others (unpub. data).
RSDB_surfaceT	AVO remote sensing qualitative observations of surface temperatures from satellite and webcam data for the 2019–2020 and 2023 eruptions.
VRP_VIIRS	Volcanic Radiative Power data from VIIRS satellite imagery, following the Hotlink method of Saunders-Shultz and others, 2024.
VRP_GOES	Volcanic Radiative Power data from GOES-17 or GOES-18 satellite data for the 2019–2020 and 2023 eruptions, following MIROVA methodology (Coppola and others, 2016) adapted by Gomez-Patron and others (unpub. data). Data are provided every 10 minutes but only during identified eruption events.
ashfall_reports	Community reports of ashfall during the 2019–2020 and 2023 eruptions submitted through the USGS "Is Ash Falling" webform (Wallace and others, 2015).
infrasound_SSLS	Infrasound data during the 2023 Shishaldin Volcano eruption events for station SSLS, located west of Shishaldin at 54.7094° latitude and −163.9972° longitude. Data are provided every 1 minute but only during identified eruption events.

The data dictionary files for each table provide additional documentation. The event_summary data table includes data derived from other observation-specific data tables, but also some data only available for an event as a whole, such as eruption mass derived from plume height using the methods of Mastin (2007) or Aubry and others (2023), with model application detailed in Mota and others (unpub. data).

Seismic data (indexed in table 2) include 1-minute real-time seismic amplitude measurements (RSAM) based on Endo and Murray (1991) and surface wave reduced displacement values based on Fehler (1983), with a Shishaldin-specific station normalization scheme detailed in Fee and others (in press).

Table 2. List of tables of real-time seismic amplitude measurements. Files are organized by station and year. Data processing details are provided in Fee and others (in press). Column definitions are identical for all seismic tables and listed in the accompanying data dictionary. Data are provided every 1 minute for the entire eruption and unrest periods of the 2019–2020 and 2023 eruptions.

File	Eruption period and station
seismic_data_dictionary	A spreadsheet that provides definitions for fields used throughout the dataset.
seismic_SSBA_2019	July 1, 2019 – July 1, 2020, for station SSBA, located west of Shishaldin at 54.7717˚ latitude and -164.1266˚ longitude.
seismic_SSBA_2023	July 1, 2023 – February 1, 2024, for station SSBA, located west of Shishaldin at 54.7717˚ latitude and -164.1266˚ longitude.
seismic_SSLN_2019	July 1, 2023 – February 1, 2024, for station SSLN, located north of Shishaldin at 54.8114˚ latitude and -163.9986˚ longitude.
seismic_SSLN_2019	July 1, 2023 – February 1, 2024, for station SSLN, located north of Shishaldin at 54.8114˚ latitude and -163.9986˚ longitude.
seismic_SSLS_2019	July 1, 2019 – July 1, 2020, for station SSLS, located west of Shishaldin at 54.7094˚ latitude and -163.9972˚ longitude.
seismic_SSLS_2023	July 1, 2023 – February 1, 2024, for station SSLS, located west of Shishaldin at 54.7094˚ latitude and -163.9972˚ longitude.

ACKNOWLEDGMENTS

Data included in this report represent the collective efforts of the entire staff of the Alaska Volcano Observatory (AVO). While only major contributors to the final data products are listed here, many of the observations and the overall response were made possible through the significant contributions of AVO personnel from the U.S. Geological Survey, the University of Alaska Fairbanks Geophysical Institute, and the Alaska Division of Geological & Geophysical Surveys. This work was supported by the U.S. Geological Survey Volcano Hazards Program through Alaska Volcano Observatory Cooperative Agreement Nos. G21AC10384 and G22AV00137. Data peer review was provided by Sarah Ogburn, and metadata review by Simone Montayne. 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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APPENDIX A - ABBREVIATIONS

Table A1. Abbreviations used throughout the data tables are listed here (capitalization may vary).

Abbreviation	Meaning
ABV[1]	Above
AKFSS[2]	Alaska Flight Service Station report
ASL[2]	Above sea level
AVO[3]	Alaska Volcano Observatory
BLK[2]	Black
CDB[2]	Cold Bay airport
CLD[1]	Cloud
DURC[2]	Duration
DUR[1]	Duration
DURD[2]	Duration
E[1]	East
ENE[1]	East-north-east
ESE[1]	East-south-east
EST[1]	Estimate or estimated or estimation
FL[1]	Flight level, altitude in hundreds of feet referenced to a standard pressure of 29.92 inHg
FM[1]	From
FOV[3]	Field of view
FT[1]	Feet
KFP[2]	False Pass, Alaska, airport identifier
KT[1]	Knots
LGT[1]	Light or Lightning
MET[1]	Meteorological
MI[2]	Miles
MIN[1]	Minutes
MOV[1]	Move or Moving
MT[1]	Mountain (note officially, Shishaldin Volcano)
MVG[2]	Moving
N[1]	North
NE[1]	North-east
NEG[1]	Negative
NM[1]	Nautical miles
NNE[1]	North-north-east
NNW[1]	North-north-west
NW[1]	North-west
OCNL[1]	Occasional
OVR[2]	Over
PCT[1]	Percent

[1] These are standard aviation abbreviations in the PIREPs table, and only a partial list is included here. See International Civil Aviation Organization (2016) for a full list.
[2] Non-standard abbreviations interpreted from the pilot reports.
[3] Abbreviation used elsewhere in the report.

PDC[3]	Pyroclastic density current
PIREP[2]	Pilot Reports
POSS[1]	Possible
RMK[1]	Remark (often only "RM")
S[1]	South
SE[1]	South-east
SIGMET[1]	Weather information statement for aviation
SKC[2]	Clear Sky
SO2[3]	Sulfur dioxide
SSE[1]	South-south-east
SSW[1]	South-south-west
SW[1]	South-west
TFR[2]	Temporary flight restriction
TROPOMI[2]	TROPOspheric Monitoring Instrument
VA[1]	Volcanic ash
W[1]	West
WNW[1]	West-north-west
WSW[1]	West-south-west
ZAN[1]	Referring to the Anchorage Air Route Traffic Control Center

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[1] These are standard aviation abbreviations in the PIREPs table, and only a partial list is included here. See International Civil Aviation Organization (2016) for a full list.
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