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DGGS ACTIVE IN ALASKA VOLCANO OBSERVATORY MISSION

Christopher J. Nye, *Alaska Geological Survey*

The Alaska Volcano Observatory (AVO) is widely recognized by the scientific community, government organizations at all levels, and the general public as the authoritative source on active Alaskan volcanoes and the hazards they pose. AVO is a multi-agency program, and DGGS plays a vital role in that program.

The AVO Mission

AVO uses federal, state, and university resources to monitor and study Alaska's hazardous volcanoes, fulfilling three primary objectives:

- To implement and maintain an effective program of volcano monitoring to detect signs of unrest at dangerous volcanoes in Alaska. AVO monitored increasing unrest at Redoubt in 1989, and Spurr in 1992 and provided advance notice of impending eruptions as well as the onset of the eruptions.
- To provide timely and accurate information on volcanic hazards, issue warnings of imminent activity, and distribute notice of eruptions to local, state, and federal officials and the public. For all Alaskan eruptions since 1989, and for many Kamchatkan eruptions, AVO provided open lines of communication to the Federal Aviation Administration, affected boroughs and cities, the U.S. Coast Guard, and the state Department of Environmental Conservation, as well as the press.
- To assess and publish reports on volcanic hazards and conduct basic geological, geochemical, and geophysical investigations of Alaskan volcanoes. AVO is the center for scientific studies of Alaskan volcanoes.

AVO—A Multi-Agency Observatory

AVO is a cooperative program of DGGS, the U.S. Geological Survey (USGS), and the University of Alaska Fairbanks Geophysical Institute (UAF/GI), and was formed in the Spring of 1988 by a formal Memorandum of Understanding. At present about $3 million of funding for AVO comes directly from the USGS, $2 million from a special appropriation to the Federal Aviation Administration (FAA) that is passed to and through the USGS, a few hundred thousand dollars from the State of Alaska by way of telecommunication costs and unrecovered salary by UAF faculty, and a few tens of thousands of dollars from DGGS in salary matching money. AVO is led by the Scientist-in-Charge (SIC), a USGS employee in Anchorage, and Coordinating Scientist (CS), a UAF/GI employee in Fairbanks. One DGGS staff member serves on the central management panel along with the SIC, CS, and the USGS Volcano Hazards Program Manager.

DGGS provides about ten percent of the manpower for AVO, and manages about ten percent of the budget, including helicopter chartering for major field efforts.

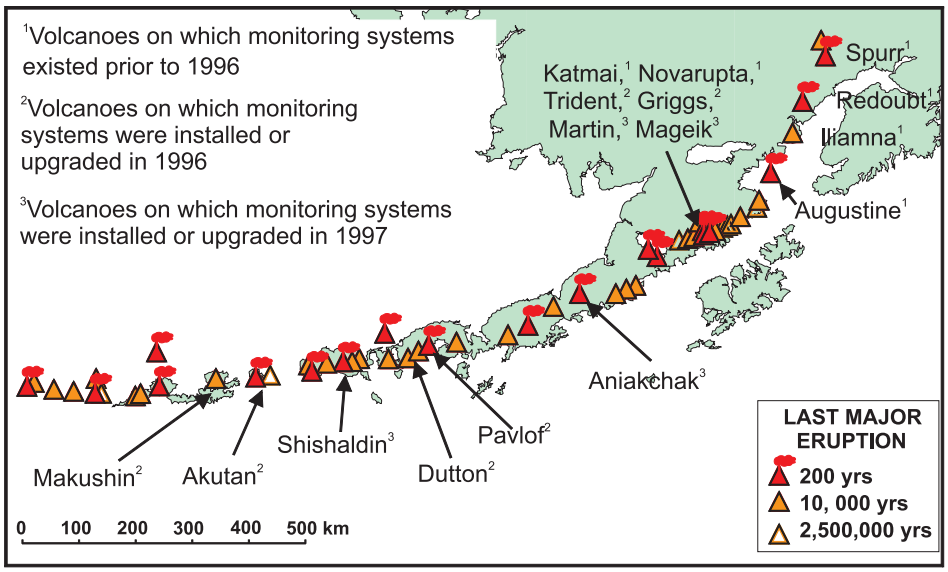
AVO is like a three-legged milking stool or a troika—the work of all three agencies is vital in supporting the AVO mission. Tasks are not split as much by agency as by capabilities of individuals, and interagency teams are common. The pooling of the strengths and mandates of the partner agencies yields enormous strength for AVO. The USGS has the federal hazard mitigation mandate, and through the USGS, AVO has formed partnerships with other national and international agencies. The university contributes a strong research component, vital for achieving new understanding of volcano behavior. The presence of DGGS assures that AVO is attentive and responsive to state needs. Alaska gets a large management role for very little investment.

AVO is a cooperative program of DGGS, the U.S. Geological Survey, and the University of Alaska Fairbanks Geophysical Institute.

In recognition of AVO's effectiveness, Vice President Al Gore awarded AVO a National Performance Review Award in 1996 for its "contribution to building a government that works better and costs less." The actual award is called the Hammer Award because it is an inexpensive carpenter's hammer which evokes memories of runaway military spending.

Scope of DGGS Participation

The activities of DGGS staff within AVO are diverse, and capitalize on particular strengths of DGGS's organizational structure and staff. Some examples are listed on the following page:



AVO Web Site

DGGS created and maintains AVO's Internet web site (http://www.avo.alaska.edu). This site has thousands of visitors each month, and provides current information about Alaskan volcanism, as well as extensive background information on Alaska's volcanoes. Much of the site content is drawn from other AVO partner agencies, but DGGS provides site design, construction, and maintenance. DGGS also has led the creation of a new internal site which is used for volcano monitoring. This site, which displays near-real-time seismic and satellite data as well as calendars, log sheets and communication tools, permits sophisticated volcano monitoring from virtually anywhere. This eases the burden on staff during extended 24-hour monitoring. The scripts that produce the seismic and satellite data displays were written by AVO partners. Site design, maintenance, and all log tools are by DGGS.

Geology and Geochemistry

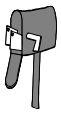
DGGS staff lead the interagency geologic teams for Spurr, Douglas, and Shishaldin volcanoes—about one-quarter of the volcanoes for which AVO has active geologic projects. These mapping projects will provide the detailed understanding of the history of individual volcanoes that is critical for hazard assessment. DGGS also coordinates the acquisition and archiving of geochemical data, and provides important expertise in the interpretation of trace-element geochemistry.

Coordination of Logistical Planning for AVO Expansion

From its 1988 inception through 1995, AVO concentrated primarily on monitoring the volcanoes of the Cook Inlet region. In 1996 and 1997, with new money from the FAA, AVO expanded to include direct monitoring of selected volcanoes on the Alaska Peninsula and in the eastern Aleutian Islands (see map). These field seasons were the largest volcanological field campaigns in Alaska in the last half-century. During each two-month season about 30 scientists and engineers working a combined two person-years prepared, shipped, and installed about 20,000 pounds of monitoring equipment at several volcanoes and conducted geologic and hazards studies of those volcanoes. At least three helicopters were in use simultaneously. DGGS acted as top-level coordinator for these efforts, as well as leading the Shishaldin geologic project and contributing to Makushin mapping.

AVO's Future

AVO has grown ten-fold since its inception nearly ten years ago. It is now a robust, dynamic leader in volcano monitoring and hazard mitigation in the north-Pacific region. In the future it is most likely that AVO will continue on at about its present size. AVO will maintain its existing monitoring, gradually extend monitoring to new volcanoes, continue geologic and hazards studies, and respond to volcanic crises. DGGS has a vital role in this mission and a strong commitment to delivering timely volcano information to the public.



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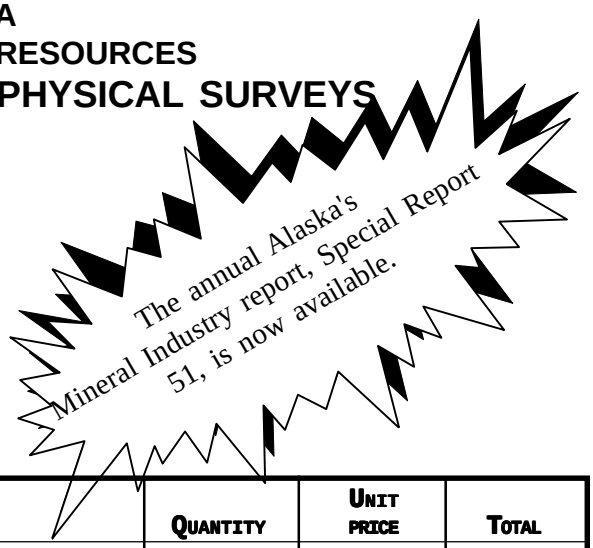

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Dear Readers:

What a summer! Alaska is benefiting from more mineral exploration, development, and production than the state has seen in over 15 years. The prolific Fairbanks mineral district began celebrating its one-hundredth anniversary year, and DGGS was working hard to help create the next 100 years of mineral development in the state. Laurel Burns, in a virtuoso exhibition of project management, had five airborne geophysical mineral inventory surveys simultaneously on line. Rocky Reifenstuhl and Karen Clautice each assembled all-star teams of geologists to conduct ground-truth geologic mapping and mineral inventories of prospective terrain in the Manley-Tofty and Upper Chulitna mineral districts, respectively. The teams included DGGS geologists (DeAnne Pinney, Shirley Liss, Ellen Harris, and Tom Bundtzen); University of Alaska professor Rainer Newberry, U.S. Geological Survey geologists Jim Dover and Marti Miller, and consulting paleontologist Robert Blodgett. At the Alaska Volcano Observatory, DGGS geologist Chris Nye took on and successfully executed the managerial and logistical tasks of coordinating the fieldwork needed to extend the volcano hazard-monitoring network farther to the west in the Aleutians. Jim Clough, working with Texas Bureau of Economic Geology geologists Roger Tyler and Andrew Scott, made on-site evaluations of candidate drill-test areas in several Alaska coal basins in anticipation of funds to initiate exploratory drilling for coalbed methane gas next summer.

In August, Tom Bundtzen, DGGS's senior economic geologist, transferred his talents to the private sector. Although bad news for DGGS, the good news is that Tom's energy and skills are still being used to help build the economy of Alaska. Tom began his career with DGGS over 25 years ago as a student assistant. He worked with Art Rose, Gordon Herreid, and Tom Smith, and was sent along to keep me alive and out of trouble in the Brooks Range my first summer in Alaska. Tom quickly set about building a legacy of field mapping that will be hard to match. While with DGGS, he had primary responsibility for 116 geologic reports, including 57 "Bundtzen-quality" geologic maps—and two more are on the way. There is no way to account for Tom's contributions to ad hoc public and state-initiated queries about mineral deposits and regional geology. He is justly famous for his work in making the state's annual minerals industry report a national standard for content and presentation. Tom had a major role in bringing the Mental Health Trust Lands settlement to a successful conclusion. His work in southwestern Alaska did much to establish the geologic framework currently being used to delineate a major new mineral belt in that part of the state. Through his work with Russian geological institutions in the Russian Far East, Tom has become one of the nation's most knowledgeable geologists on eastern Russia mineral deposits. I expect we will see Tom active in the Russian arena as well as in Alaska.

Tom Bundtzen leads a group of DGGS geologists down the Kuskokwim River to investigate geology and potential materials sites. A map of the Horn Mountains incorporating some of the data collected on this trip is expected to be completed by the end of 1997.

DGGS was pleased to participate in the International Symposium on Mining held during September in Fairbanks. DGGS or its predecessor agencies have been active in the state's mining industry since territorial days. This history was reflected in the division's display booth designed and staffed by Martha Murphree, Ann-Lillian Schell, and Fred Sturmann, that traced the evolution of geologic mapping in the Fairbanks area from early reconnaissance maps to modern detailed airborne geophysical surveys. Laurel Burns provided the symposium participants with a well-received explanation and overview of the utility and scientific principles underlying the recent geophysical surveys.

Milton A. Wiltse

Sincerely,
Milton A. Wiltse
Director and State Geologist

State of Alaska
Department of Natural Resources
Division of Geological & Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, AK 99709-3645

SR 51. **Alaska's mineral industry 1996,** by R.C. Swainbank, T.K. Bundtzen, A.H. Clough, and M.W. Henning, 1997, 68 p. Free.

RI 97-16a. **Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map A - North Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, 3 colors, scale 1:63,360. $4.

RI 97-16b. **Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map B - South Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, 3 colors, scale 1:63,360. $4.50.

RI 97-16c. **Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map C - Zarembo Island and eastern Prince of Wales Island,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, 3 colors, scale 1:63,360. $4.

RI 97-16d. **Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map D - Western Etolin Island,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, 3 colors, scale 1:63,360. $4.

RI 97-16e. **Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map E - Groundhog Basin,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, 3 colors, scale 1:63,360. $4.

RI 97-17a. **Total field magnetics of the Stikine area, Southeast Alaska, Map A - North Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, full color, scale 1:63,360. On-demand color plot from electronic file, 400 dpi. Made on request. $13.

RI 97-17b. **Total field magnetics of the Stikine area, Southeast Alaska, Map B - South Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, full color, scale 1:63,360. On-demand color plot from electronic file, 400 dpi. Made on request. $13.

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RI 97-18a. **900 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map A - North Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, full color, scale 1:63,360. On-demand color plot from electronic file, 400 dpi. Made on request. $13.

RI 87-18b. **900 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map B - South Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, full color, scale 1:63,360. On-demand color plot from electronic file, 400 dpi. Made on request. $13.

RI 97-18c. **900 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map C - Zarembo Island and eastern Prince of Wales Island,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, full color, scale 1:63,360. On-demand color plot from electronic file, 400 dpi. Made on request. $13.

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RI 97-19a. **7200 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map A - North Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, full color, scale 1:63,360. On-demand color plot from electronic file, 400 dpi. Made on request. $13.

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RI 97-20. **Geologic map of the Makushin volcanic field, Unalaska Island, Alaska,** by V.S. McConnel

PDF 97-29i. **CIPW norm, trace element, and Sr isotopic data for igneous rocks of the Tanana B-1 Quadrangle and vicinity,** by R.J. Newberry and S.A. Haug, September 1997, 16 p. $2.

PDF 97-37a. **Flight lines of the Stikine area, Southeast Alaska, Map A - North**

Public-Data Files (PDF) are unpublished documents that make project data immediately available to the public. PDFs usually comprise raw data and have not undergone peer review or been edited by DGGS staff. In many cases, PDFs are later released as DGGS Reports of Investigations (RI), Special Reports (SR), or Professional Reports (PR). Prices for PDFs are determined by their individual reproduction prices and are thus sold at copying costs. Information Circulars (IC) are normally free.

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Duncan Canal, by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.

PDF 97-37b. **Flight lines of the Stikine area, Southeast Alaska, Map B - South Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.50.

PDF 97-37c. **Flight lines of the Stikine area, Southeast Alaska, Map C - Zarembo Island and eastern Prince of Wales Island,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.

PDF 97-37d. **Flight lines of the Stikine area, Southeast Alaska, Map D - Western Etolin Island,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $3.75.

PDF 97-37e. **Flight lines of the Stikine area, Southeast Alaska, Map E - Groundhog Basin,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.

PDF 97-38a. **Clear film version of RI 97-16A. Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map A - North Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, Electromagnetic anomalies and magnetic contours 100% black; topography 50% black. 1 sheet, scale 1:63,360. Diazo film. Made on request. $23..

PDF 97-38b. **Clear film version of RI 97-16B. Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map B - South Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, Electromagnetic anomalies and magnetic contours 100% black; topography 50% black. 1 sheet, scale 1:63,360. Diazo film. Made on request. $31..

PDF 97-38c. **Clear film version of RI 97-16C. Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map C - Zarembo Island and eastern Prince of Wales Island,** by DGGS, Dighem, and WGM Staff, 1997, Electromagnetic anomalies and magnetic contours 100% black; topography 50% black. 1 sheet, scale 1:63,360. Diazo film. Made on request. $23..

PDF 97-38d. **Clear film version of RI 97-16D. Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map D - Western Etolin Island,** by DGGS, Dighem, and WGM Staff, 1997, Electromagnetic anomalies and magnetic contours 100% black; topography 50% black. 1 sheet, scale 1:63,360. Diazo film. Made on request. $18..

PDF 97-38e. **Clear film version of RI 97-16E. Total field magnetics and electromagnetic anomalies of the Stikine area, Southeast Alaska, Map E - Groundhog Basin,** by DGGS, Dighem, and WGM Staff, 1997, Electromagnetic anomalies and magnetic contours 100% black; topography 50% black. 1 sheet, scale 1:63,360. Diazo film. Made on request. $23..

PDF 97-39a. **900 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map A - North Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.

PDF 97-39b. **900 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map B - South Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.50.

PDF 97-39c. **900 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map C - Zarembo Island and eastern Prince of Wales Island,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.

PDF 97-39d. **900 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map D - Western Etolin Island,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $3.75.

PDF 97-39e. **900 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map E - Groundhog Basin,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.

PDF 97-40a. **7200 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map A - North Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.

PDF 97-40b. **7200 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map B - South Duncan Canal,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.50.

PDF 97-40c. **7200 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map C - Zarembo Island and eastern Prince of Wales Island,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.

PDF 97-40d. **7200 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map D - Western Etolin Island,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $3.75.

PDF 97-40e. **7200 Hz coplanar resistivity of the Stikine area, Southeast Alaska, Map E - Groundhog Basin,** by DGGS, Dighem, and WGM Staff, 1997, 1 sheet, blueline, scale 1:63,360. $4.

PDF 97-41. **CD-ROM digital archive file of 1997 survey data for Stikine area, Southeast Alaska,** by DGGS, Dighem, and WGM Staff, September 1997. $150.

PDF 97-42. **Zip disk containing gridded files and section lines of 1997 geophysical survey data for Stikine area, Southeast Alaska,** by DGGS, Dighem, and WGM Staff, September 1997. $20.

PDF 97-43. **Portfolio of aeromagnetic and resistivity maps of the Stikine area, Southeast Alaska,** by Burns, L.E., September 1997. Includes color and shadow maps. Maps fit on 8 1/2" x 11" sheet. Price to be determined.

PDF 97-44. **Project report of the airborne geophysical survey for Stikine area, Southeast Alaska,** by Ruth Pritchard, September 1997. Price to be determined.

PDF 97-45a-k. **Total field magnetics and detailed electromagnetic anomalies of the Stikine area, Southeast Alaska,** by DGGS, Dighem, and WGM Staff, September 1997, 11 sheets, blueline, scale 1:31,680. Sheets sold individually. $4.25/sheet.

PDF 97-46. **Preliminary geologic map and data table from the Ophir C-1 and western Medfra C-6 Quadrangles, Alaska,** by Thomas K. Bundtzen, DeAnne S. Pinney, and Gregory M. Laird, July 1997, 11 p., 1 sheet, scale 1:63,360. $7.

PDF 97-47. **Hydrologic and water quality study of Hoseanna Creek basin near Healy, Alaska: 1995-1996 progress report,** by Jim Vohden, June 1997, 34 p. $3.40.

PDF 97-49. **Compositions of placer gold in the Rampart-Eureka-Manley Tofty area, eastern Tanana and western Livengood Quadrangles, central interior Alaska, Determined by electron microprobe analysis,** by R.J. Newberry and K.H. Clautice, September 1997, 49 p. $4.90.