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by
Rainer J. Newberry[1], Trystan M. Herriott[2], Marwan A. Wartes[2],
Robert J. Gillis[2], and Alicja Wypych[2]

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Division of Geological & Geophysical Surveys
3354 College Road
Fairbanks, Alaska 99709-3707
907-451-5010
dggspubs@alaska.gov
dggs.alaska.gov

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INTRODUCTION

The Alaska Division of Geological & Geophysical Surveys, in collaboration with the University of Alaska Fairbanks, collected mafic rocks in the Ivishak River area of the northeastern Brooks Range during summer 2009 for geochemical sampling. The sampled rocks, including lava flows, sills, and limy volcaniclastic strata, crop out within the carbonate-platform succession of the Carboniferous Lisburne Group. Refer to Herriott and others (2011) for additional information regarding the geologic and geographic context of these samples, preliminary implications of the geochemical data presented here, and a summary of known mafic rock occurrences in the Arctic Alaska terrane. The analytical data tables associated with this report are being released in digital format as comma-delimited text (CSV) files. A complete explanation of the data file structure and contents can be found in the metadata file associated with the digital version of this report, which is available from the DGGS website (doi: 10.14509/29563).

SAMPLE COLLECTION

Mafic rock samples were collected from the Lisburne Group for petrographic, geochronologic, and geochemical analyses. A diverse suite of geochemistry samples was obtained to evaluate petrogenesis and tectonic setting for the mafic rocks and to constrain the lithologic variability in the interval. We typically collected several kilograms of rock at each sampling locality, using a rock hammer to sample material beneath the weathering rind of an outcrop's surface. Sampled material was placed in muslin or canvas bags that were labeled with pertinent stratigraphic and location information. Location data were collected with handheld GPS devices, with location accuracy error typically less than 10 meters; latitude and longitude were recorded—and reported here—in NAD27.

ANALYTICAL METHODS

Four samples were prepared and analyzed at the X-ray fluorescence laboratory of the University of Alaska Fairbanks. The preparation included cutting samples into 4-cm-diameter discs and polishing them on a lapidary wheel. The polished sample slabs were directly analyzed using the PANalytical Axios wavelength-dispersive XRF and SuperQ™ software. Nb, Rb, Sr, Y, and Zr were measured using the 37mmRbSrYZr analytical routine; other elements were measured with the IQ+37mmVac analytical routine. The 37mmRbSrYZr routine uses specific predetermined peak and background positions for which X-ray intensities are measured for 2–800 seconds (depending on the element). The intensity of the Rh Compton peak was used to estimate mass-absorption coefficients (MACs) for both unknowns and well-characterized natural standards. Peak intensities were computed and converted to concentrations using calibration curves employing at least ten natural rock standards. These procedures were routinely checked by analysis of secondary natural standards that were not employed in making the calibration curves. Elemental abundances are typically within 2–5% of the amount present for concentrations >10 times the detection limit; within 5–10% of the amount present for concentrations 4–10 times the detection

[1] *Department of Geosciences, University of Alaska Fairbanks, P.O. Box 755780, Fairbanks, Alaska 99775-5780;*
[2] *Alaska Division of Geological & Geophysical Surveys, 3354 College Road, Fairbanks, Alaska 99709-3707;*

limit; and within 30% of the amount present for concentrations near the detection limit. The IQ+37mmVac program scans over a series of energies corresponding to a range from Ce K-alpha to O K-alpha. Peak heights and backgrounds and X-ray elemental interferences were picked with the software and checked manually to ensure quality control. Elemental abundances for all elements with atomic numbers between 8 and 92 were estimated from artificial standards; these estimations were used to calculate MACs for each element present above the detection limit. Revised concentrations were employed to calculate revised MACs until a stable solution was determined. Elemental abundances were then normalized to 100%. The software was routinely checked using pressed pellets of well-characterized natural rock standards. Elemental abundances are within 1–2% of the amount present for major elements, 2–5% of the amount present for minor elements, and 5–10% of the amount present for trace elements.

ACKNOWLEDGMENTS

Wesley K. Wallace (deceased) collected additional samples from the Lisburne Group mafic rocks and mapped the geology of the area with Herriott and Gillis. Simone Montayne assisted in preparation of the data tables and metadata for this release. This work was funded by the State of Alaska.

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