ALASKA GEOLOGY
Newsletter of the
Alaska Geological Society

Rare Earth Element (REE) Deposits Associated with the Lower Jurassic Peralkaline Granite at Bokan Mountain Southeast Alaska

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The Bokan Mountain granite complex in southernmost southeast Alaska hosts structurally controlled U, Th, and rare earth element (REE) deposits, including the Ross Adams mine, from which about 77,000 metric tons of high grade uranium ore was produced between 1957 and 1971. In map view the Bokan Mountain granite pluton is a little more than 3 km in diameter, composed mainly of medium-grained peralkaline granite that is seriate to porphyritic and contains aegirine and arfvedsonite. Andalusite in hornfelsed pelite, biotite-apatite pairs in host Ordovician granodiorite, and fluid inclusion data from the Bokan granite indicate epithermal emplacement of the pluton and dikes. The Ross Adams uranium deposit consists of a brecciated, mineralized shear zone 7-10 m in diameter that cuts across the pluton margin and extends about 300 m along a northerly trend that contains NW-striking en echelon lenses with strike lengths in excess of 30 m and widths of 3 m; these faults and tensional features indicate a sinistral sense of shear. Hematitic alteration on fractures that cut the ore veins, and quartz veins above and parallel to these ore veins that contain fluorite, aegirine, and sulfides, are attributed to deposition from late hydrothermal fluids. Elsewhere, mineralized pegmatites and felsic vein-dike systems intrude the Bokan Mountain granite and extend along steep structures for more than 6 km NW and SE from the stock. Pegmatites range up to 10 m in width; dikes are finer grained at greater distances from the stock. The dikes are typically less than a meter wide; the largest dike system is the Dotson trend, which consists of sets of steep, subparallel 2-mm- to 70-cm-wide dikes in a zone 50 m wide. Dikes have chilled margins, but commonly have wavy irregular contacts with wispy apophyses and anastomozing networks of crosscutting veins. The dikes commonly have pegmatitic quartz-albite cores and dark aphanitic selvages composed of iron-REE oxides (FeREO). Many dikes contain internal parallel felsic dikes that have chilled margins and REO selvages, indicating multiple,

AGS Luncheon

Date & Time: **Jan. 19th, 11:30 am – 1:00 pm**

Program: **Rare Earth Element Deposits Bokan Mountain, SE Alaska**

Speaker(s): **Susan M. Karl, U.S. Geol. Survey**

Place: **BP Energy Center**

Reservations: **Please make your reservation before noon Tuesday, Jan. 17th, 2012.**

Cost: **Seminar only, no meal: Free**

Reserve a box lunch: $15

Reserve a hot lunch: $20

Lunch with no reservation:
On an "as-available" basis only

E-mail reservations: **vp@alaskageology.org**
Or phone (907) 644-4429

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www.alaskageology.org

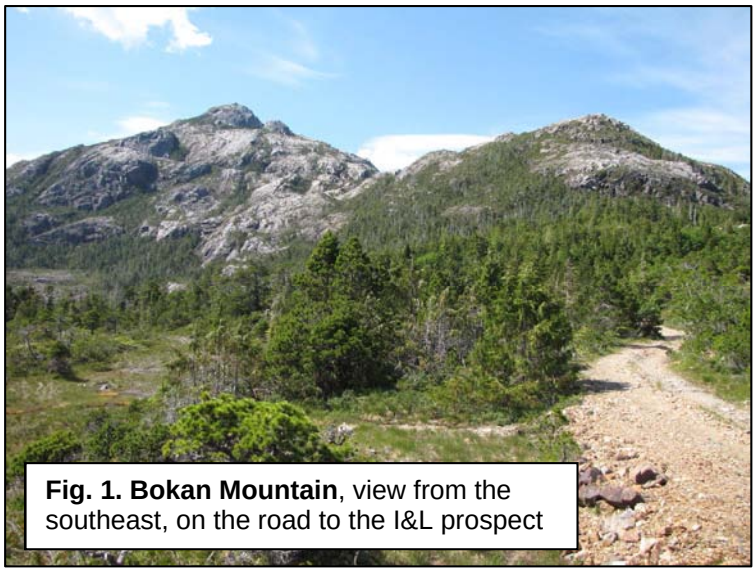

Fig. 1. Bokan Mountain, view from the southeast, on the road to the I&L prospect

discrete episodes of dike intrusion along active structures. The Geiger dike contains en echelon quartz-filled tension gashes and cm-scale offsets of internal veins that indicate a sinistral sense of shear. Late pyrite veins and mineralized quartz veins fill shear zones that cut the pegmatites and dikes and are consistent with sinistral kinematics. Some Dotson dikes show similar fabrics. One cm-scale sinistral offset of a pegmatite at the I & L prospect is coated with dark FeREO mineralization attributed to late hydrothermal fluids. The granite, pegmatites, dikes, and quartz veins are commonly cut by late, steep, EW- and NW-SE-trending structures that range from discrete faults to shear zones tens of meters across. Pervasive protoclastic textures in the granite are reflected in cracked feldspars and strained quartz. Pinch-and-swell pegmatites within the grantie stock are also pervasively brecciated. In some cases the shear zones are mineralized with hematitic REO coatings that permeate along grain contacts for several meters into the granite, dikes, and country rocks. At the Wennie prospect, black FeREO mineralization enriched in heavy REE (HREE) permeates granite up to 5 m adjacent to shear zones. Several shear zones at the Wennie site have sinistral fabrics, and one shear zone is offset 3 cm by a mineralized normal fault. In calcareous argillite and marble near the southern contact of the pluton, meter-scale sinistral shear zones host fluorite-REO mineralization at the Piper Purple prospect. Throughout the Bokan Mountain complex, late hydrothermal and metasomatic mineralization show enrichment of HREE relative to REE mineralization in the earlier pegmatites and dikes; we infer remobilization and concentration of REE during successive injection events in an active tectonic environment. Fabric analysis of host rocks indicates the lack of a

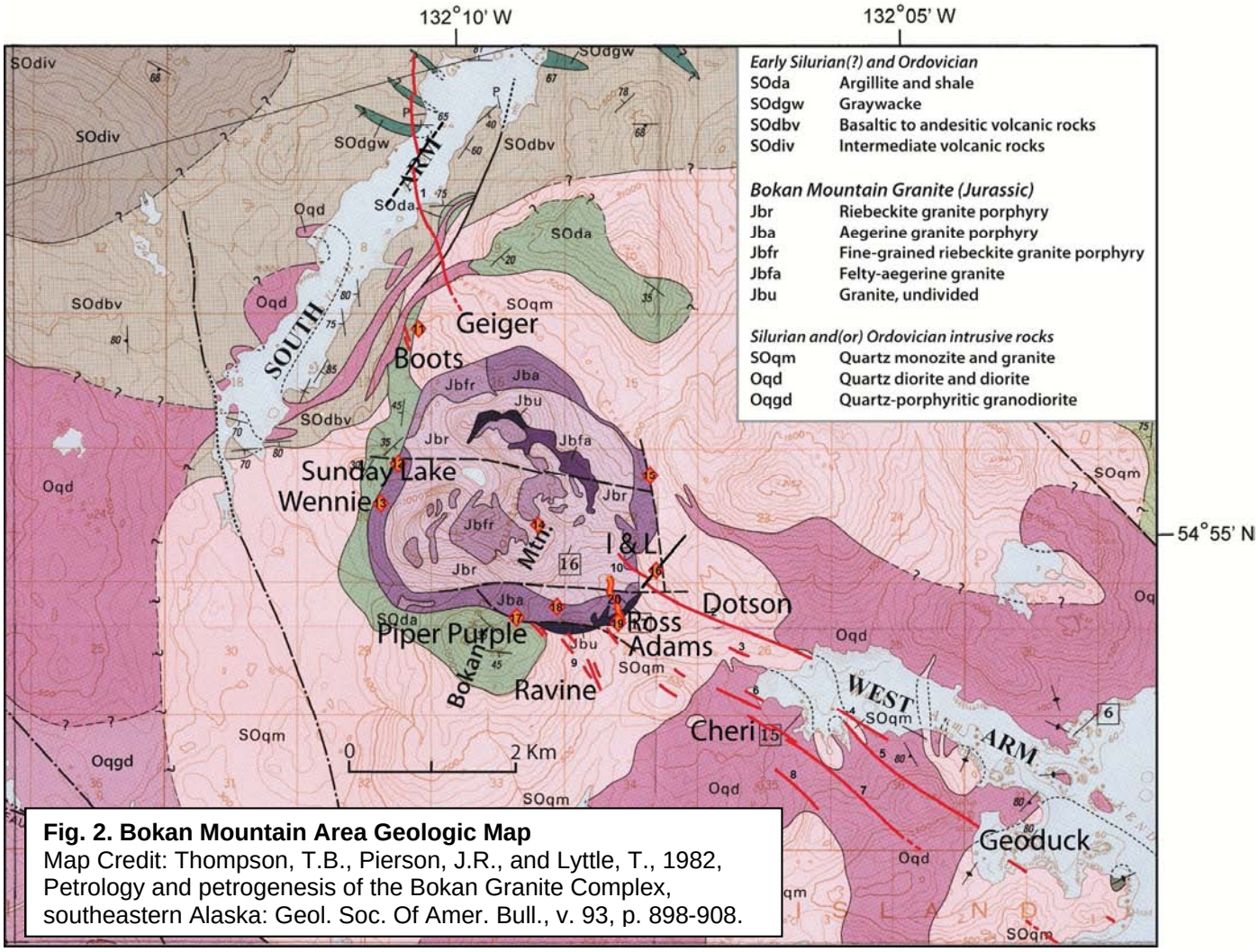

Fig. 2. Bokan Mountain Area Geologic Map
Map Credit: Thompson, T.B., Pierson, J.R., and Lyttle, T., 1982, Petrology and petrogenesis of the Bokan Granite Complex, southeastern Alaska: Geol. Soc. Of Amer. Bull., v. 93, p. 898-908.

dominant NW-trending regional fabric prior to intrusion of the Bokan Mountain granite. Repeated magmatic and hydrothermal injections and displacement of earlier injections within dikes that occupy steep km-scale structures indicate the structures remained active during intrusion and cooling of the complex. Late Jurassic and Early Cretaceous lamprophyre dikes cut the late shear fabrics in the Bokan Mountain pluton and mineralized dike complex.

The host rocks to the Bokan peralkaline granite complex are Ordovician monzonites and diorites that intrude metavolcanic and metasedimentary rocks of the Neoproterozoic Wales Group and Ordovician Moira Group, which have been shown to represent an oceanic arc in the Alexander terrane. Geochemical analyses show that Bokan Mountain granites and dikes have high concentrations of K, Na, and incompatible elements, low Al contents, and high Rb/Sr ratios. REE normalized to chondrite show flat to slightly LREE and HREE enriched (V-shaped) patterns, with a large negative Eu anomaly. Trace element ratios classify the Bokan Mountain granite as an A-type, anorogenic granite. Elevated contents of incompatible elements and high positive ε_{Nd} values support a depleted upper mantle source for the granite, unaffected by contamination from continental crust or the Neoproterozoic-Ordovician arc complex. The geochemical and isotopic signatures are consistent with an extensional tectonic setting. A new U-Pb zircon age for the Bokan Mountain granite of 177 Ma has few counterparts in the Alexander terrane, limited to the REO-bearing Dora Bay pluton located 25 km NW of Bokan Mountain, and rhyolites of the bimodal Moffat Volcanics, 100 km to the SE of Bokan Mountain in British Columbia. There was no arc activity in the Alexander terrane in the Early or Middle Jurassic. The late Early Jurassic alkaline igneous rocks are located along the southern margin of the Alexander terrane in southeast Alaska, transverse to the orientation of both the Late Triassic arc and the Late Jurassic-Cretaceous arc, which extend for more than 1000 km along the length of the terrane. Paleomagnetic analyses place the Alexander terrane approximately 19º north of the Equator in the Late Triassic and indicate 138 degrees of clockwise rotation. The Dora Bay, Bokan Mountain, and Moffat Island igneous complexes may represent extensional jogs along Early Jurassic sinistral-oblique translational structures within the Alexander terrane that were active during rotation and northward migration of the terrane.

About the Speaker:

Sue earned a BA degree from Middlebury College in 1973, and first came to Alaska in 1973 as a teacher in the VISTA (Volunteers in Service to America) program. Following that year, she stayed in Alaska and worked in mineral exploration for RioTinto, WGM, and Urangeschellschaft in 1974-1976 while taking classes at UAF. In 1977 she transferred to Stanford University and completed a PhD at Stanford in 1983. She has worked in the Alaskan Geology Section of the USGS Minerals Program since 1977. Sue has worked all over the state as a mapper and stratigrapher, with emphasis on sedimentary petrology, igneous geochemistry, and the tectonic setting of mineral deposits. She is currently working on sedimentary petrology and stratigraphy for the Western Alaska Range project, the tectonic setting and distribution of Quaternary volcanoes and related thermal springs in southeast Alaska, PGE sources and the tectonic setting of ultramafic rocks in southeast Alaska, and REE sources and the tectonic setting of peralkaline granite at Bokan Mountain in southeast Alaska. Sue is a career member and fellow of numerous professional organizations, and has been an executive, board member, and/or committee chair in the Alaska Geological Society since 1990. She especially likes participating on the scholarship committee and giving a boost to young geologists. Sue's family includes 2 kids in college, 25 dogs, and a cat: she enjoys hiking, camping, sea-kayaking, river rafting, skiing, dogsledding, and life in Alaska.

From the President's Desk …

I would like to wish all the members a peaceful and rewarding 2012. As a new year's resolution why not decide to get more involved in the Alaska Geological Society. Whether it's through contributing articles to the newsletter (see below), leading a field trip, volunteering to work on one of the several committees, or running for elected office, it's never too early, or too late, to increase your participation in the society. You can also help by keeping on the lookout for new members and encouraging students, both undergraduate and graduate, to join the society.

As I mentioned in last month's newsletter, AGS is looking for volunteers to write articles for publication in the newsletter. Robert Blodgett has agreed to contribute monthly articles dealing with various aspects of Alaskan geology. I am looking forward to getting his opinion on a vast array of topics. If you would like to join Robert and contribute articles on any aspect of geoscience, submit your contributions to Greg Wilson who is responsible for assembling and distributing the newsletter. He can be contacted at: Gregory.c.wilson@conocophillips.com .

This month's luncheon presentation by Sue Karl of the U. S. Geological Survey will be on "Rare Earth Element (REE) Deposits Associated with the Lower Jurassic Peralkaline Granite at Bokan Mountain, Southeast Alaska". Sue has spent most of her adult life in Alaska and is very knowledgeable of the local geology, so come early to get a good seat.

- Ken

The Alaska Geological Society

LUNCHEON SCHEDULE 2011 - 2012

Updates on the web at:
http://www.alaskageology.org

September 2011	Thursday, Sept. 15th, Paul Decker, DNR Source-Reservoired Oil Resources, North Slope Alaska
October 2011	Thursday, Oct. 20th, Kristine Crossen and David Yesner, UAA, Youngest Mammoths in America: 5700 Year Old Mammoth Remains from Qagnax Cave, Pribilof Islands, Alaska
November 2011	Thursday, Nov. 17th, Tom Homza, Shell Exploration & Production, Toward an Integrated Model for the Canada Basin: Implications for North Alaska
December 2011	Thursday, Dec. 8th – Tad Smith (SEG 2011 Honorary Lecturer), Apache Corporation, Practical Seismic Petrophysics: The Effective Use of Log Data for Seismic Analysis (Joint meeting AGS / GSA)
January 2012	Thursday, Jan 19th – Sue Karl, U.S. Geological Survey: Rare Earth Element Deposits, Bokan Mt., SE Alaska
February 2012	Tentative
March 2012	Tentative (AAPG Distinguished Lecturer)
April 2012	Tentative
May 2012	Tentative

If you would like to volunteer a talk or would like to suggest a speaker, please contact Dick Garrard at 644-4429.

ALASKA FOSSIL OF THE MONTH

KIRKIDIUM ALASKENSE (KIRK & AMSDEN)

by Robert B. Blodgett

In this inaugural issue of a monthly series of short notes intended for publication in the Alaska Geological Society Newsletter, I hope to draw light on a number significant Alaskan guide fossils which are useful for biostratigraphic, biogeographic, and paleoecologic studies, as well as rock correlation of our State's complex geology. The fossil species selected for this issue is the late Silurian (Ludlow) age brachiopod *Kirkidium alaskense* (Kirk and Amsden, 1952). This species was named *Conchidium alaskense* by Kirk and Amsden (1952), but subsequent study of certain relatively large pentameroid brachiopods by Amsden and others (1967), suggested that some of the species formerly included in the genus *Conchidium* had differing internal features, requiring the establishment of a new genus *Kirkidium*, which included *C. alaskense* (the use of parantheses around the name of the authors of *K. alaskense* indicates that the genus assignment had changed since the establishment of the species).

This species is a prominent faunal element of upper Silurian (Ludlow) limestones of the Alexander terrane of southeast Alaska, where it can found in Heceta Limestone on Prince of Wales and Heceta Islands (Kirk, 1918; Kirk and Amsden, 1952, Eberlein and Churkin, 1970; Eberlein and others, 1983) and the Kuiu Limestone on Kuiu Island (Kindle, 1907, 1908 [referred to in these two publications as *Conchidium knighti*]; Muffler, 1967). The species is easily recognizable in outcrops even by non-geologists due to its relatively large size and typical mass accumulations in shell bank deposits composed almost wholly of this singe species (see illustrations below for examples). The size and shell bank style accumulations suggest that this species was adapted to relatively high energy conditions in a rough-water environment. This species as well as other associated brachiopod species found in upper Silurian strata of the Alexander terrane have their most similar counterparts in age equivalent rocks of northeast Siberia (Blodgett and others, 2010).

The genus name *Kirkidium* was named in honor Edwin Kirk, a geologist/paleontologist with the former Branch of Paleontology & Stratigraphy of the USGS. Kirk made two separate trips to Alaska in 1917 and 1918, and collected many hundreds of species of this species along the shoreline on Heceta Island while working out of boats in southeast Alaska. He had a strong interest in the Silurian fauna of southeast Alaska and published a number of papers on brachiopods (including three new genera he established: *Brooksina*, *Cymbidium*, and *Harpidium*), gastropods, bivalves from there. Later in his career, he continued

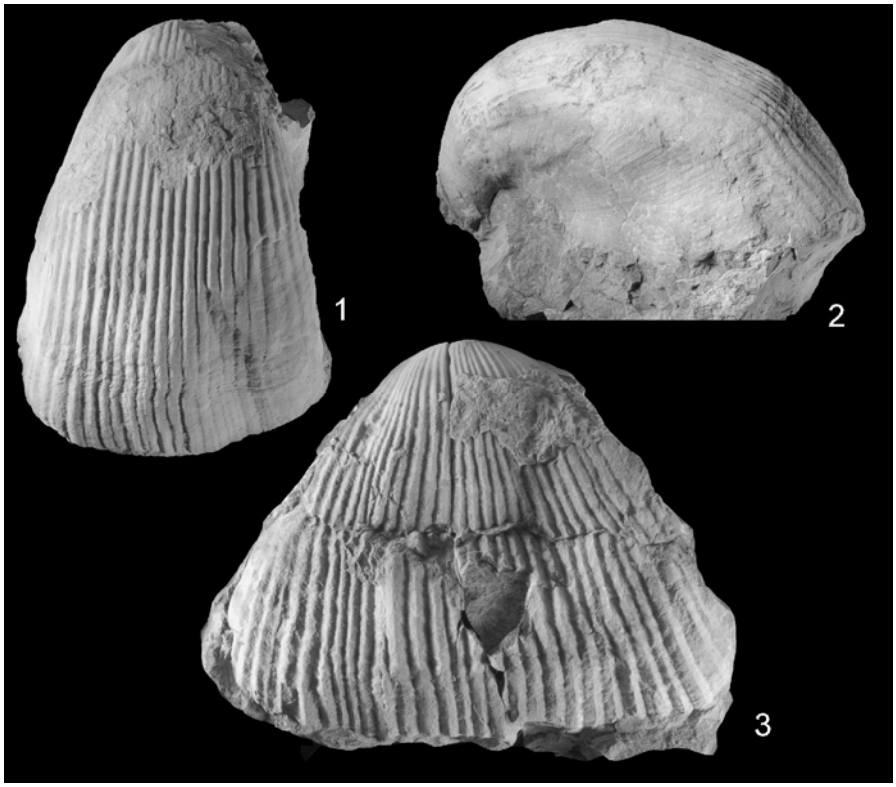

Figure 1. Three views of specimens of *Kirkidium alaskanse* (Kirk and Amsden) found in the Heceta Limestone on Prince of Wales Island. These illustrated forms range from 8-12 cm in length.

fieldwork in Nevada, and as a result of fall into an abandoned mineshaft lost his leg due to gangrene. He was a stalwart paleontologist to the end of his life, and was ultimately found dead in his office in the Smithsonian Institution where the Branch of Paleontology and Stratigraphy was based. In honor of his great contributions to Alaskan geology, a gastropod genus *Kirkospira* Rohr and Blodgett was named in his honor from upper Silurian strata of the Willoughby Limestone in Glacier Bay, southeast Alaska.

Figure 2. Bank-like accumulation of *Kirkidium alaskanse* (Kirk and Amsden) in upper Silurian strata of the Heceta Limestone on Prince of Wales Island.

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SCHOLARSHIPS 2012

AGS encourages any students who have a project in Alaska to apply for either or both the Alaska Geological Society and Don Richter Memorial scholarships.

Each year AGS awards several scholarships to BA, BS, MS, and PhD candidates who have projects in Alaska. The AGS scholarships range in size from $500 to $2500. The Richter Scholarship is a single annual award for $1500. Please forward this message to any students that may be qualified to apply for these scholarships, and any faculty who may have students working on Alaskan projects.

Scholarship application information is available on the AGS website: http://www.alaskageology.org/scholarships.htm

For questions contact Sue Karl, AGS Scholarship Chair, at 907-786-7428.

News From Past Scholarship Recipients

Recipient: Julie Elliott (AGS Scholarship 2009, Richter Scholarship 2010)
Active Tectonics of Southern Alaska and the Role of the Yakutat Block Constrained by GPS

Southeast and south central Alaska encompass multiple tectonic regimes. In the east, the Fairweather – Queen Charlotte fault system forms a major transform boundary. In the west, subduction of the Pacific plate occurs along the Aleutian megathrust. Adding to the complexity, the Yakutat block is actively colliding with, accreting to, and partially subducting beneath southern Alaska. As part of the St. Elias Erosion/Tectonics Project (STEEP) designed to gain a better understanding of the region's tectonics, I (along with other UAF personnel) made measurements at 65 GPS sites, including over 40 newly established sites, in the Chugach and St. Elias mountains. I used GPS data from these sites and over 100 sites in southeast Alaska to constrain a tectonic model for the Yakutat block collision and its effects on southern Alaska and eastern Canada.

According to the model, the Yakutat block itself moves NNW at a rate of 50 mm/yr. This velocity has a magnitude almost identical to that of the Pacific plate, but the azimuth is more westerly. Along its eastern edge, the Yakutat block appears to be fragmenting into small crustal slivers. Part of the strain from the collision is transferred east of the Fairweather – Queen Charlotte fault system, causing the region inboard of the Fairweather fault to undergo a distinct clockwise rotation into the northern Canadian Cordillera. About 5% of the relative motion is transferred even further east, causing small northeasterly motions that extend far into the northern Cordillera.

Further north, the GPS data and model results indicate that the current deformation front between the Yakutat block and southern Alaska runs along the western side of the Malaspina Glacier. The majority of the ~37 mm/yr of relative convergence is accommodated along a narrow band of thrust faults concentrated in the southeastern part of the St. Elias orogen. Near the Bering Glacier, the tectonic regime abruptly changes as crustal thrust faults give way to subduction of the Yakutat block beneath the western St. Elias orogen and Prince William Sound. This change aligns with the Gulf of Alaska shear zone, implying that the Pacific plate may be fragmenting in response to the Yakutat collision. From the Bering Glacier, the subduction interface extends north and west beneath much of the Chugach mountain range. The Bering Glacier region is undergoing internal deformation that may correspond to the final stage of accretion of the Yakutat block sedimentary layers. At the western end of the study region, the model suggests that the crust is laterally escaping along the Aleutian forearc.

Overall, these results indicate that the tectonic picture along the southern Alaska margin is not a simple one comprised of a few major elements. Instead, the margin is made up of a number of small blocks and deformation zones with relative motion distributed across a variety of structures. Combined with other GPS-based studies, my model suggests that the entire northern Pacific margin is mobile.

NOTE FROM JULIE ELLIOTT:
The AGS and Richter Memorial Scholarships I received supported completion of the fieldwork needed for my PhD, which I received in August 2011. I am now a postdoc at Cornell where I am using geodetic data to study glacier change in Alaska.

The paper focusing on southeast Alaska has been published in JGR:

Elliott, J. L., C. F. Larsen, J. T. Freymueller, and R. J. Motyka (2010), Tectonic block motion and glacial isostatic adjustment in southeast Alaska and adjacent Canada constrained by GPS measurements, J. Geophys. Res., 115, B09407, doi:10.1029/2009JB007139

Additional papers looking at the Chugach-St. Elias regions are in preparation.

I would like to thank AGS for the support,
Julie

Recipient: Erin E. Donaghy (AGS Scholarship 2009, Richter Scholarship 2011)

Sedimentology, Depositional Age, and Provenance of Sedimentary and Volcanic Rocks Exposed Along Willow Creek, Eastern Susitna Basin, South-Central Alaska: Implications for Modification of a Forearc Basin by Spreading Ridge Subduction

Upper Paleocene-Eocene sedimentary and volcanic strata of the Arkose Ridge Formation exposed in the southern Talkeetna Mountains record fluvial-lacustrine deposition in a forearc basin modified by Paleogene spreading ridge subduction beneath southern Alaska. This is the first detailed study of the westernmost portion of the outcrop belt, which extends along the western flank of the Talkeetna Mountains and includes thick, well-exposed outcrops along Willow Creek in the eastern Susitna basin. New lithofacies analyses, U-Pb ages of detrital zircon grains, and compositional data were obtained from stratigraphic sections within the 467 m thick Arkose Ridge Formation outcrop at Willow Creek to help constrain the depositional environments as well as the age, lithology, and location of source terranes supplying detritus. New geologic mapping at Willow Bench and the Kashwitna River Bluff, north of Willow Creek, help constrain volcanic and plutonic source terranes that provided detritus to the westernmost Arkose Ridge Formation strata.

Westernmost Arkose Ridge Formation strata unconformably overlie a granodiorite pluton that yields Late Cretaceous U-Pb zircon ages (79-69 Ma; 58 total grains from two samples). Four lithofacies associations characterize the Arkose Ridge Formation strata at Willow Creek: poorly sorted, boulder-pebble conglomerate with minor channelized sandstone (FA1); poorly to moderately sorted, cobble-pebble conglomerate with imbricated conglomerate and channelized sandstone (FA2); channelized sandstone with scours, cross-stratification, and carbonaceous debris (FA3); and basaltic-andesitic lava flows with massive bases and vesicular tops (FA4). Conglomerate detrital modes are dominated by plutonic clasts (diorite, granodiorite, gabbro; 31% of all clasts) and volcanic clasts (basalt, andesite; 60% of all clasts). U-Pb ages from 189 detrital zircon grains in two sandstone samples reveal three main populations: Latest Cretaceous to Early Paleocene (85-60 Ma; 63% of all grains); early Late Cretaceous (100-85 Ma; 30%) and Early Cretaceous to Jurassic (200-100 Ma; 5%). Sparse Late Paleocene (59-58 Ma; 2%) detrital zircon ages are the youngest age population and represent the maximum depositional age of the Willow Creek strata. A plot of U/Th vs U-Pb ages show that >99% of all analyzed grains have <10 U/Th ratios, consistent with mainly igneous source terranes. New geologic mapping at Kashwitna River Bluff and Willow Bench document Paleogene aphanitic, black lavas unconformably overlie the underlying Cretaceous granitoid pluton.

Collectively, these new compositional and geochronologic data from Willow Creek suggest: (1) Sediment was deposited by debris flow, hyperconcentrated flow, and streamflow on high-gradient braided streams influenced by episodic volcanic eruptions. (2) Local Cretaceous plutons and Paleogene volcanic centers at Willow Bench and Kashwitna River Bluff were important sediment sources. (3) Deposition took place after ca. 59-58 Ma, consistent with 60-56 Ma isotopic ages reported from volcanic interbeds from other Arkose Ridge Formation strata in the southern Talkeetna Mountains. (4) Exhumation of Cretaceous granitoid underlying and exposed north of the Willow Creek section occurred by 59 Ma followed by subsidence coeval with erosion between 59-55 Ma.

Conventional models for sediment deposition in forearc basins predict a progressive succession from marine to nonmarine deposystems with exhumation of the magmatic arc and continued filling of the basin. Second-order tectonic processes, such as flat-slab subduction of thickened oceanic crust from spreading ridges, can significantly modify the configuration and depositional processes within forearc basins such that they do not coincide with the traditional models of sediment deposition. Paleogene subduction of young oceanic crust beneath the Cretaceous magmatic arc would prompt increased compressive stress, rock uplift, and unconformity development in the upper plate followed by forearc subsidence and sediment accumulation (Arkose Ridge Formation) during passage of a slab window and progressively older crust. Integration of geochronologic and compositional data from Willow Creek with previous studies of Arkose Ridge Formation strata in the southern Talkeetna Mountains provide valuable insight on the complex lateral variations in sediment accumulation and depositional environments in forearc basins during a well-documented episode of spreading ridge subduction.

The **American Geological Institute** provides a comprehensive list of national and international geoscience meetings at: **http://calendar.agiweb.org**

Local Meetings:

American Water Resources Association—Alaska Section
http://www.awra.org/state/alaska/index.html

Alaska Geological Society
http://www.alaskageology.org
Lunch meetings are held monthly September through May in Anchorage. For more information, contact Jim Clough, 451-5030.

Alaska Miners Association
http://www.alaskaminers.org/
The Anchorage branch of the AMA holds weekly meetings at 7 AM every Friday at the Denny's on Northern Lights and Denali. They hold regular luncheon meetings in association with SME. For more information, contact the AMA office at 563-9229.

American Institute of Professional Geologists
http://www.aipg.org
AIPG holds regular quarterly evening Section meetings in Anchorage and Fairbanks. For more information contact Mark Lockwood, President, at Shannon & Wilson, Inc., in Fairbanks, 907-458-3142.

Chugach Gem & Mineral Society
http://www.chugachgms.org
CG&MS holds all meetings at the First United Methodist Church on 9th Avenue. Contact their hotline at 566-3403 for information on regular monthly business meetings, monthly potlucks, and guidebook sales, including the new Alaska Rockhound Guidebook.

Geophysical Society of Alaska
http://gsa.seg.org/
Luncheon meetings are held monthly September through May at the ConocoPhillips Tower. For more information, contact Phil Rorison, 265-6321

Society of Petroleum Engineers
http://alaska.spe.org/

UAS Environmental Science Program
http://www.uas.alaska.edu/envs

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The Alaska Geological Society is an organization which seeks to promote interest in and understanding of Geology and the related Earth Sciences, and to provide a common organization for those individuals interested in geology and the related Earth Sciences.

This newsletter is the monthly (September-May) publication of the Alaska Geological Society, Inc. Number of newsletters/month: ~300

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MEMBERSHIP INFORMATION

AGS annual memberships expire November 1. The annual membership fee is $20/year. You may download a membership application from the AGS website and return it at a luncheon meeting, or mail it to the address above.

Contact membership coordinator Greg Wilson with changes or updates (e-mail: gregory.c.wilson at conocophillips.com; phone: 907-263-4748)

All AGS publications are now available for on-line purchase on our website. Check to see the complete catalogue.
http://www.alaskageology.org/publications

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1/3 Page- $470/9mo, $105/1mo; size=7.0 x 3.5 or 3.0 x 7.5 inch
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Full Page--$1000/9mo, $165/1mo; size=7.5 x 9.0 inch
1mo rate=(9mo rate/9)+$50 (rounded up).

Contact Tim Ryherd (907) 269-8771 for advertising information.

Membership Notes

Annual Dues for Membership in AGS are now $20.00

Membership renewal is Nov. 1st

2011 - 2012 Alaska Geological Society Board

Note: e-mail addresses now contain “at” instead of “@” Please change to @ when typing.

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Redoubt Volcano 2009
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