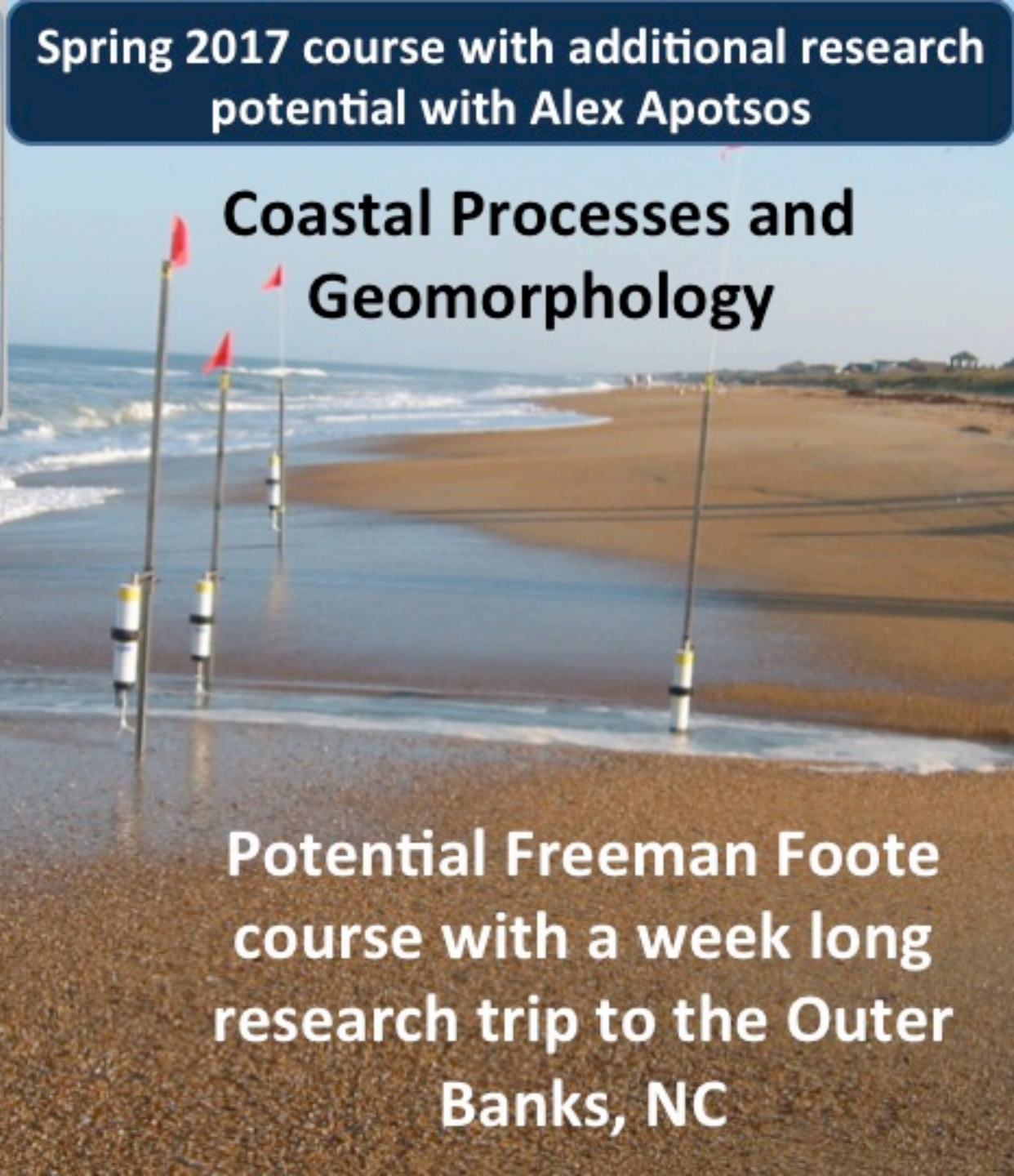


Spring 2017 course with additional research potential with Alex Apotsos

Coastal Processes and Geomorphology

Potential Freeman Foote course with a week long research trip to the Outer Banks, NC



Research with Professor Mea Cook

Opportunities for students of all class years

Goal: To study the circulation of the Bering Sea from the last ice age through today

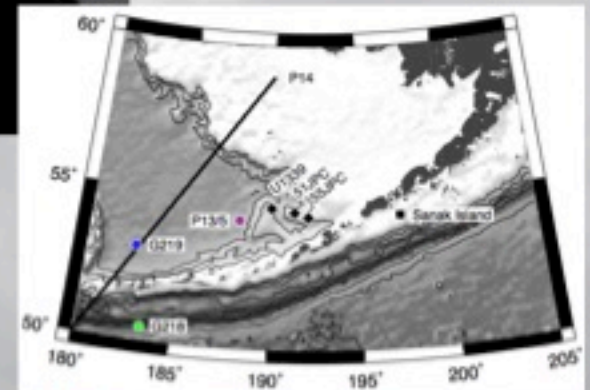
Why: The Bering Sea affects global climate because of its role in ocean circulation. The North Pacific circulation may have changed rapidly in the past, but we don't understand why or how.

Site: Marine sediment cores from the SE Bering Sea, and lake cores from Sanak Island, in the eastern Aleutians

Skills/experience: Oceanography (GEOS 104) is recommended. Thesis students, take GEOS215 (Climate Changes) before or during senior year. Project is lab-based, and doesn't require any previous experience.



How: We'll match volcanic ash layers between the lake and marine sediments using major and trace element geochemistry.

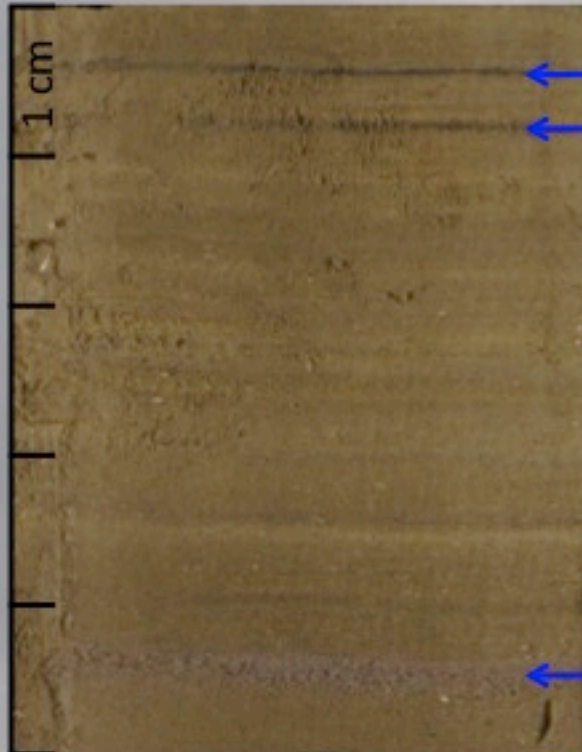


The next step is to radiocarbon date plant matter in the lake cores and fossils in the marine cores. The difference in between terrestrial and marine carbon is a proxy for the strength of ocean circulation

Research with Professor Mea Cook

Opportunities for students of all class years

Tephra in marine sediments:



Questions you could address in a thesis/ind project:

The chemistry of a tephra reflects both their petrological origin, and the transport of the tephra to the sediments. **Can we uniquely match lake and marine tephra by their stratigraphy, radiocarbon age and geochemistry?**

The radiocarbon age of the surface ocean (and the organisms that live there) varies through time. **How did the surface water age change through time, and how is related to changes in climate and sea ice?**

Unknown changes in surface ocean radiocarbon age are the biggest obstacle to accurate radiocarbon dating and reconstructing ocean circulation with radiocarbon. With tephrochronology, we can get around that! **How did Bering Sea change through time, and what was its impact on global climate?**

Foraminifera:



Summer research with David Dethier

Title: Urban hydrology at the new Environmental Center at Williams College

Introduction: This urban hydrology project continues Caro Atwood's '16 thesis work at the new Environmental Center at Williams College, which aims to be certified by the Living Building Challenge (LBC) process. LBC requires that: (1) all the water needed by the building, its occupants and surrounding gardens is produced onsite, and (2) surface water does not flow offsite. Meeting the ambitious goals of LBC requires careful measurement of hydrologic budgets, cautious use and clever communication about water. This work continues Caro's analysis of water inflows, use, and losses as part of the LBC process.

When: Summer 2016, supported by the Zilkha Center or Bronfman Science Center—8 to 10 weeks of funding

Who: Williams Geosciences or Environmental Sciences students with field experience and coursework that includes hydrology



Wetland area between the Center and the new Library, where water level is monitored



Caro Atwood '16 and Stephen Mayfield '16 measuring water flow

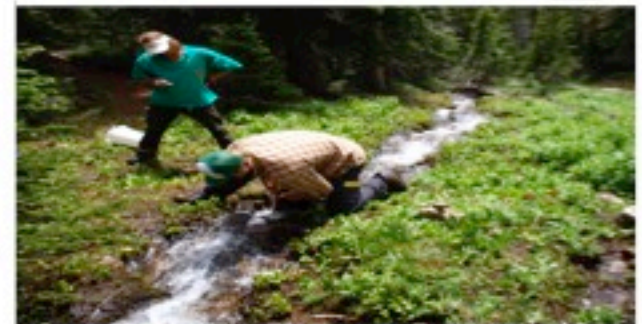
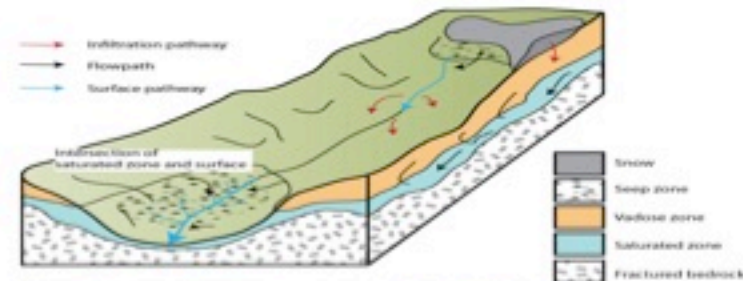
Summer research with David Dethier

Title: *Tracking channel losses to groundwater in the alpine and subalpine zone, Colorado Front Range*

Introduction: Snowmelt dominates the hydrology of headwater catchments in much of the Western USA, where it is the major source of water delivered to semiarid areas downstream. Water budget accounting assumes that stream channels are impermeable, but there is considerable evidence that at least some headwater streams lose substantial amounts of flow to deeper groundwater reservoirs. This study seeks to better quantify these losses and surface infiltration rates in the Niwot Ridge area of the Front Range west of Boulder, Colorado, building on the theses of Victor Major '15 and Ian Nesbitt '14.

When: Summer 2016, supported by the Geosciences Department or Bronfman Science Center—8 to 10 weeks of funding; ~3 weeks of field studies

Who: Senior thesis students with strong field skills, majoring in Geosciences or Environmental Sciences, Geosciences track



Conceptual model of streambed losses to groundwater (Major, 2015) and discharge measurement by Major and Will Wicherski '15 on the upper Fourmile drainage.

Field work in western Massachusetts:
Identifying terrane boundaries
Detrital zircon
Geochemistry

July or August- Structural Geology required, Petrology recommended

Summer Opportunities
with Paul Karabinos

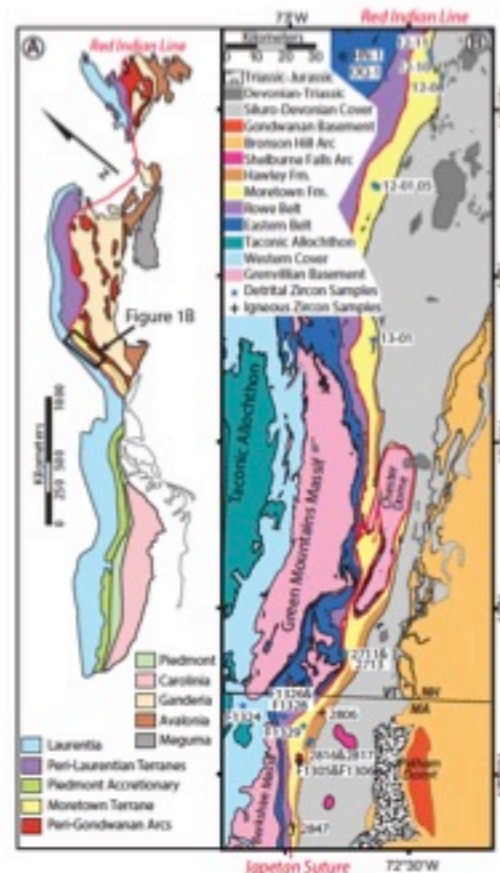
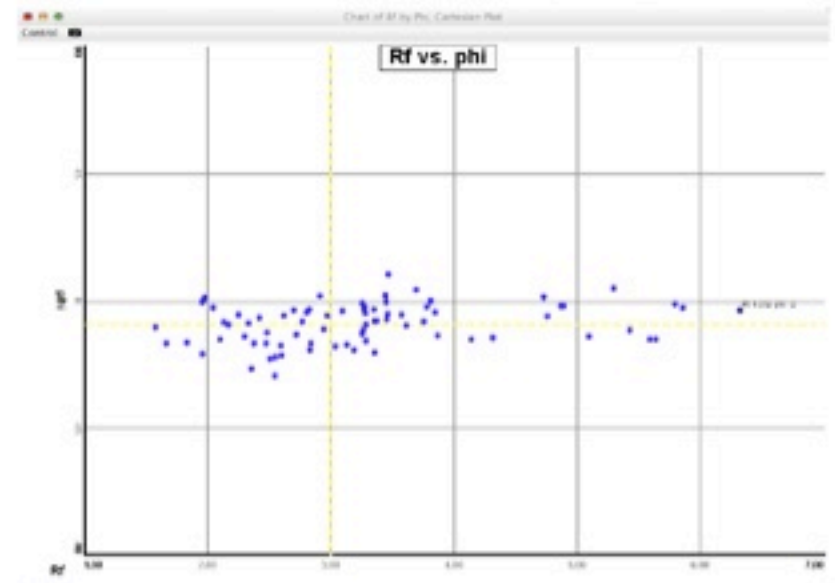
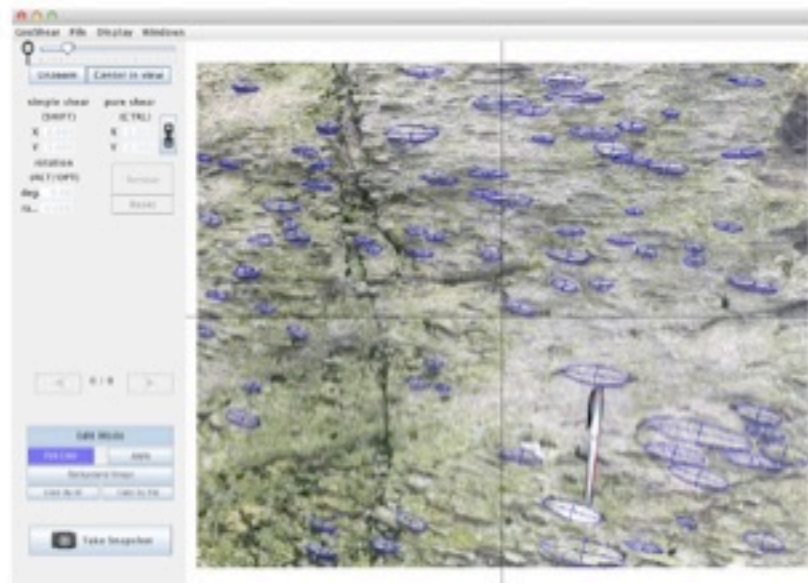


Figure 1. A: Tectonic map of the Appalachian Mountains (modified from Hibbard et al., 2006). B: Simplified geological map with locations of dated samples (modified from Ratcliffe et al., 2011).

Strain in Conglomerates: Field work studying strain in western New England

July or August - Structural Geology required



Research with Rónadh Cox: Impact cratering and volcanism on Io

Thesis project 2016–2017 or 2017–2018

GOAL: Test the hypothesis that impact cratering may trigger volcanic activity on Io

WHERE: Williamstown (no fieldwork with this one!)

HOW: map volcanic centres on Io and calculate their size distributions. Calculate volcanic resurfacing rates on Io and compare to expected impact rates

COURSES: 214 (GIS and Remote Sensing), STAT 201, and 217T (Planets and Moons)



Research with Rónadh Cox: Coastal boulder deposits

Thesis project 2016–2017; position also for a field assistant

GOAL: Evaluate relationships between storm wave conditions and boulder movement

WHERE: Aran Islands (fieldwork) and Queens University Marine Lab

HOW: recreate topography in wave basin, and simulate storm conditions

COURSES: 302 (Sedimentology) required; 201 (geomorphology) and 214 (GIS Remote Sensing) desirable



Research with Rónadh Cox: Coastal boulder deposits



Research with Rónadh Cox: Field expedition to supergiant boulders in the Bahamas



Spring Break 2016
Positions for two students
Reconnaissance trip for upcoming
research project



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Figure 1. Two boulders (#1 and #2 of Hearty, 1997) on coastal ridge of North Eleuthera Island, Bahamas. Scale: person in both photos = 1.6 m. Estimated weight of largest boulder (#1, on left) is ~ 2300 tons.



Research with Prof Phoebe Cohen: Understanding the preservation of fossils during Snowball Earth

Goal: Understand how and why fossils are preserved in between the two Snowball Earth events

Why: What was life doing during the Snowball Earth “intermission” and how can we tell? Little is known about how life reacted to major climactic events and the role such events may play in major evolutionary trends

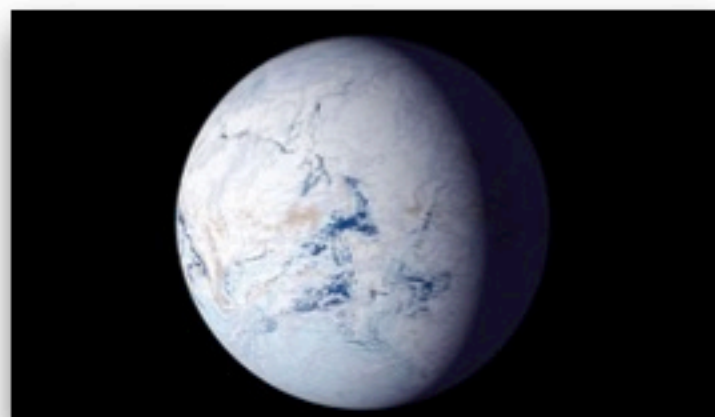
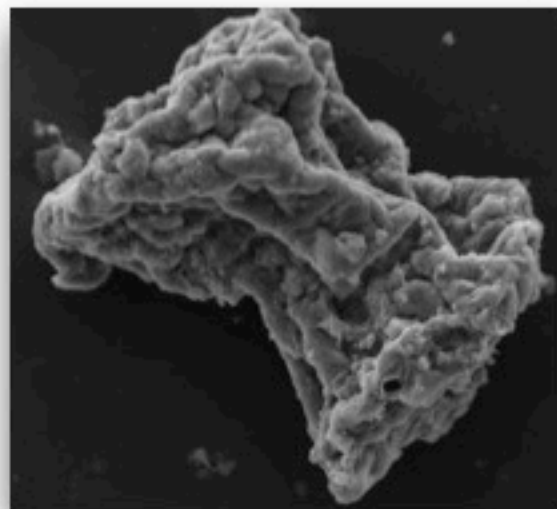
Site: Williams College

How: Analyzing samples from Mongolia to discover and describe new fossil forms in the context of changing sedimentology and geochemistry.

When? Spring and/or Summer 2016 and beyond

Skills you will learn: basic chemistry, microscopy, paleontological techniques

Course Prerequisites: GEOS 101 or 212 or talk to Phoebe





Summer Research with Prof Phoebe Cohen: Field & Lab work on NY State Microfossils

Goal: Understand the pattern of microfossil diversity & preservation across the Devonian extinction event in Western NY; explore the microfossil record's relationship to animal diversity.

Why: Organic-walled microfossils provide an important window into environmental and evolutionary change in the Paleozoic. How did these groups (likely algal and animal) react to the Devonian extinction event?

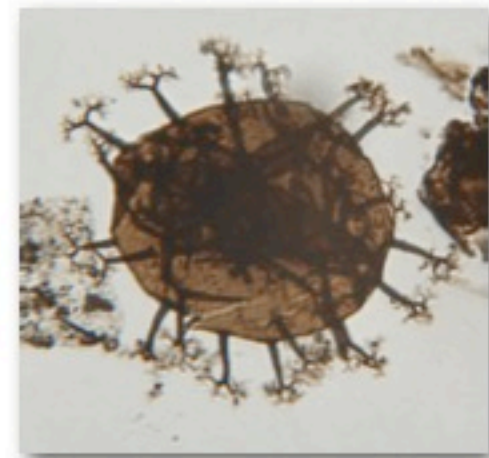
Site: Western NY State and Williams College

How: Field work in Western NY to collect samples with Dr. Diana Boyer of SUNY Oswego. Work at Williams to analyze samples and fit the data into existing geochemical and trace fossil data.

Who? Could be senior thesis project or summer research project (preferably with follow up during the semester)

Skills you will learn: paleontology, field experience, microscopy

Course Prerequisites: GEOS 101 or 212



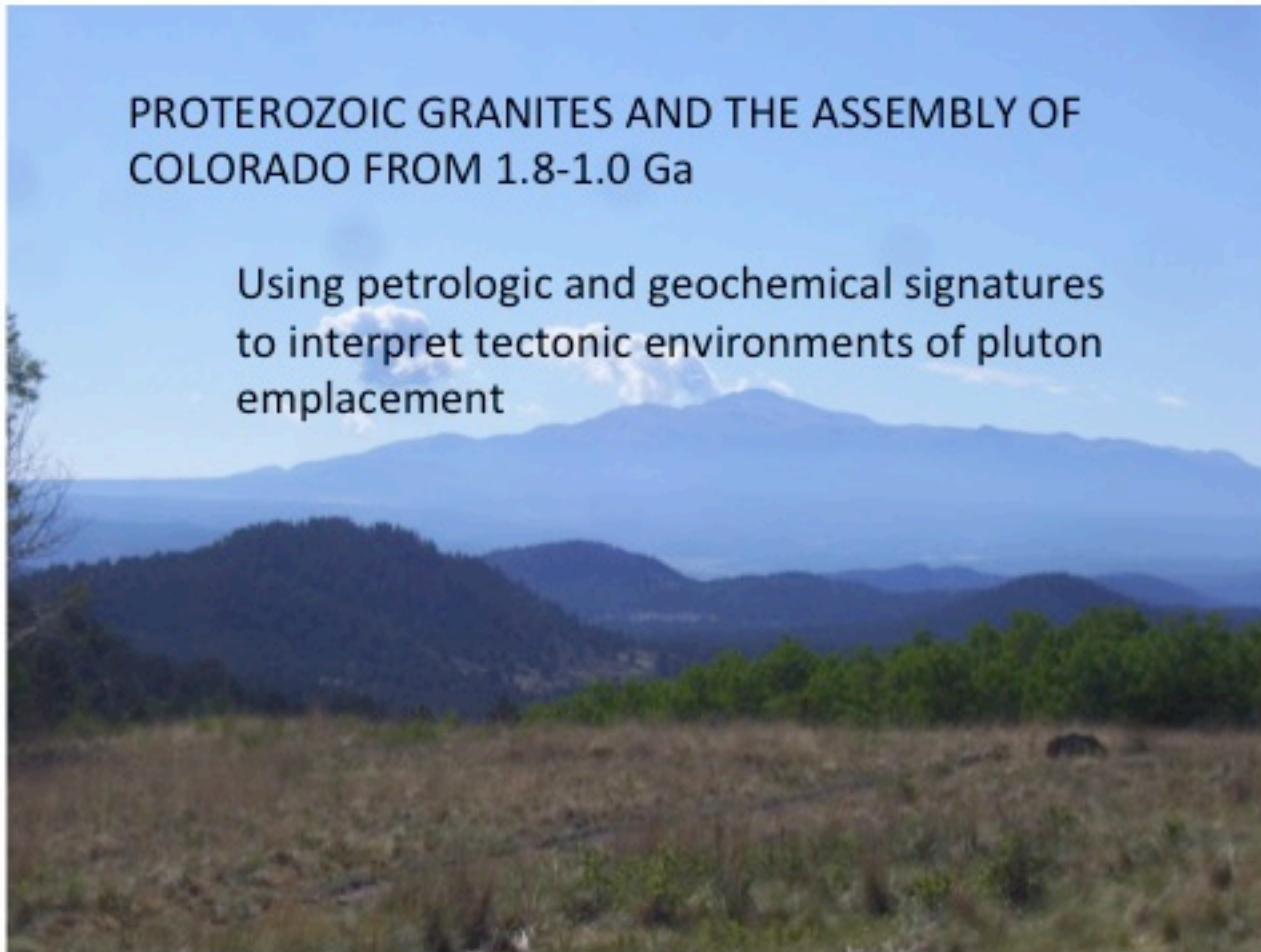
Bud Wobus.... Petrology, mineralogy and geochemistry in the interpretation of igneous and metamorphic rocks. ESPECIALLY granites and their explosive volcanic equivalents (Colorado Precambrian; coastal Maine)



Possible thesis projects for rising seniors

PROTEROZOIC GRANITES AND THE ASSEMBLY OF COLORADO FROM 1.8-1.0 Ga

Using petrologic and geochemical signatures to interpret tectonic environments of pluton emplacement



Summer, 2016

- The focus this summer will be on the unstudied geochemistry of a broad and diverse group of granitic plutons belonging to the middle generation of Proterozoic granitic rocks (ca. 1.4 Ga) in the Colorado Front Range.
- Field work approx. one week in late August to collect samples (after prior background study of the problem on campus). Any relation to the newly recognized Picuris orogeny?

KECK GEOLOGY CONSORTIUM



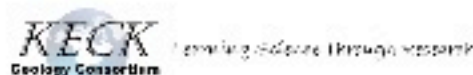
A national consortium of 18 liberal arts colleges to promote collaborative undergraduate research in the Geosciences. Funded by NSF/REU, ExxonMobil, and the member colleges.

Current juniors from the 18 colleges can apply for a position on one of 7 new or continuing research projects beginning this summer. The projects usually entail a month of field work, followed by a year of senior thesis research at the home institutions. The projects re-convene to present results at the annual Keck Geology Research Symposium in the spring.

Students receive a stipend and travel/support funds for the summer work and travel/housing funds for the spring symposium (usually held at one of the member colleges but likely at the ExxonMobil Research Labs near Houston in 2016).

Projects are small....usually 6-9 students and 2 or 3 faculty. A thesis advisor at the home college collaborates on the project during the academic year. Applications can be completed online before the end of January, and you **MUST** have a senior thesis advisor at Williams when you apply! See Bud Wobus for details.

Keck Research Projects, 2016-17



NSF-REU UNDERGRADUATE RESEARCH OPPORTUNITIES, SUMMER 2016

The Keck Geology Consortium announces the following projects for SUMMER 2016. Project descriptions, updated project dates and all application materials are available on our website keckgeology.org.

APPLICATION DEADLINE: FEBRUARY 7th, 2016

Robert J. Vargas,
Director,
Keck Geology
Consortium
Dept. of Geology,
Fresno State,
100 E. Beech St.,
Fresno, CA 93743

Carol Morgan,
Administrative
Assistant

Office: 559.437.5643
Fax: 559.433.4332
rob.vargas@fresno.edu

Antelope College

Baker College

Cal State

California State

Central Valley

Trinity College of

California State

Franklin & Marshall

College

St. Mary's College

Washington

State

Eastern

Idaho

University

Utah

Washington and Lee

University

Western Kentucky

Western

Michigan

State

Island Tephrostratigraphy – Tephrostratigraphy in Iceland: Andrew de Wit (Franklin & Marshall College) and Christopher Hamilton (University of Arizona); 6 Students; Dates: July/August 2016 (exact dates TBD).

Great Lakes Dendrochronology – Dendrochronological Analysis of Inactive Forest Stands in Relation to Climate and Water-level Fluctuations in the Great Lakes: Kim Diver (Wesleyan University); 3 Students; Dates: July 6 – August 3, 2016 (exact dates TBD).

Mexican Ecology – Historical Ecology of Marine Mollusks in the Northern Gulf of Mexico: Investigating Anthropogenic Impacts to Coastal Ecosystems Through Live-Dead Analysis: Paul Hamik (Franklin & Marshall College); 3 Students; Dates: mid-June to mid-July (exact dates TBD).

Sediment Block Testimonies: Tectonic Evolution of a Deeply Eroded Arc System: A Study of the Physical and Petrologic Evolution of the Salinas Block, central coastal California: Alan Chapman (Massachusetts College) and Sarah Horowitz (Wayne State University); 6 Students; Dates: June 1 – June 30, 2016 (exact dates TBD).

Wisconsin Lake Ecology: Sediment Assemblages as Indicators of Environmental Quality in Temperate Lakes of Wisconsin: Jill Leonard-Fragal (Washington & Lee University) and Andrew Michelson (University of Pittsburgh); 9 Students; Dates: July 2 – August 2 (exact dates TBD).

Victoria, B.C. Paleosolubility: Evaluating the Slip History of Coastal Faults Underlying Fossiliferous Coastal Columbia – Implications for Seismic Hazard: Kristin Merrill (University of Victoria) and Tom Gardner (Trinity University); 4 Students; Dates: June 15 – July 16 (exact dates TBD).

Beaver and Geomorphology: The Role of Beavers in Sediment and Carbon Budgets of the Adirondack Mountains, NY: Matthew Jurgens (Washington and Lee University); 3 Students; Dates: June 17 – August 14 (exact dates TBD).

Magma Transport, Iceland: Constraints on Magma Transport and Injection Dynamics at a Glaciated, Active Ridge, Southeast Iceland: Megan Pollock (The College of Wooster) and Ben Edwards (Dickinson College); 6 Students; Mid-June – Mid-July, (exact dates TBD).

The Keck Geology Consortium encourages applications from students from groups underrepresented in the Earth Sciences (see keckgeology.org).

IMPORTANT NOTE: Due to cuts in our funding from the National Science Foundation, students for 2016 projects will only be recruited from the 16 Keck member institutions.

SUMMER FIELD COURSES

SUMMER FIELD COURSES

WHAT? Intensive 4-6 week courses to learn field or marine science techniques. Several types of field projects are usually presented in the land-based programs....bedrock vs surficial mapping, etc. Some programs are more specialized: hydrology, engineering geology, volcanology.....

WHERE? Many field camps are in the Rocky Mountains...some are travelling programs, others have fixed bases.

WHO? Maybe you? Most students are rising seniors or recent graduates. They come from small colleges and large universities ; field courses are required by many schools for the geology major (not at Williams). Check pre-requisites to ascertain eligibility.

Summer Field Courses, ctd.

WHY? Required for admission to many graduate schools. As important as GIS in your c.v. when applying for many kinds of jobs in Geoscience. AND...a way to make your subsequent semester courses come alive and to begin to build an association of peers in your profession. They can be lot of fun as well as hard work....total immersion geology in neat parts of the country, with students from all over!

THE BAD NEWS....Most cost over \$4000, and they keep you from earning during those several weeks.

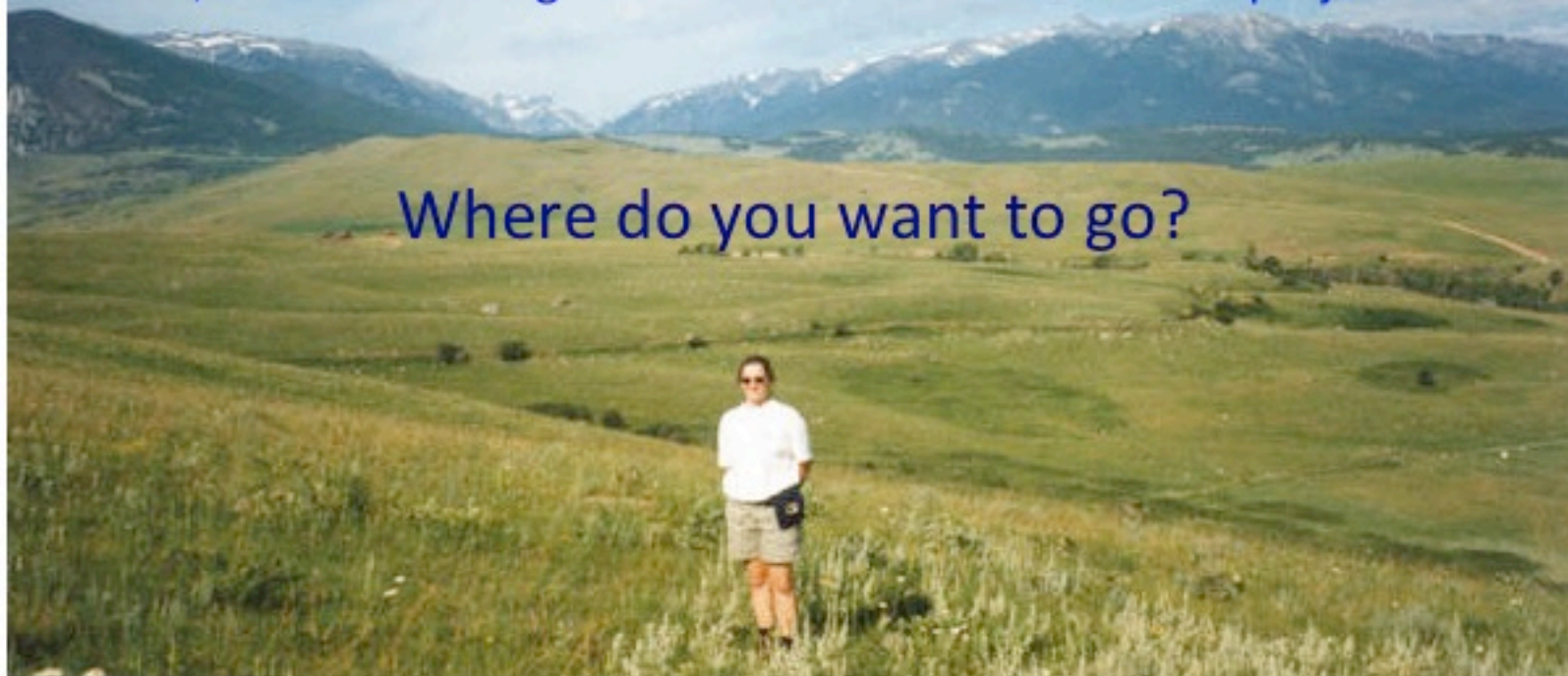
SOME GOOD NEWS....The GEOS Department has several endowed funds to provide partial scholarships for field programs. Other national scholarship programs are also available.

Applications due by end of January...see Bud Wobus.

The Interest Fellowship

Endowed in memory of Lauren Interest '98, the fellowship provides \$2000 to fund a geoscience-related field or travel project

Where do you want to go?



Past recipients have gone to:

- Norway to investigate the petroleum industry
- Chile to learn about salmon farming
- Pakistan to examine water rights practices
- Dominica to check out the boiling lake
- Arizona to explore volcanoes
- Glacier National Park to experience rocks and ice

**2016-2017 applications
(1-page project description)
accepted any time.
Talk to one of us about your
idea!**