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Featured Article

SCIENCE:

Cover: Plastiglomerate fragments interspersed with plastic debris, organic material, and sand on Kamilo Beach, Hawaii. Photo by K. Jazvac. See related article, p. 4–8.

2014 GSA Annual Meeting & Exposition

GSA News

An anthropogenic marker horizon in the future rock record

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ABSTRACT

Recognition of increasing plastic debris pollution over the last several decades has led to investigations of the imminent dangers posed to marine organisms and their ecosystems, but very little is known about the preservation potential of plastics in the rock record. As anthropogenically derived materials, plastics are astonishingly abundant in oceans, seas, and lakes, where they accumulate at or near the water surface, on lake and ocean bottoms, and along shorelines. The burial potential of plastic debris is chiefly dependent on the material's density and abundance, in addition to the depositional environment. Here, we report the appearance of a new "stone" formed through intermingling of melted plastic, beach sediment, basaltic lava fragments, and organic debris from Kamilo Beach on the island of Hawaii. The material, herein referred to as "plastiglomerate," is divided into in situ and clastic types that were distributed over all areas of the beach. Agglutination of natural sediments to melted plastic during campfire burning has increased the overall density of plastiglomerate, which inhibits transport by wind or water, thereby increasing the potential for burial and subsequent preservation. Our results indicate that this anthropogenically influenced material has great potential to form a marker horizon of human pollution, signaling the occurrence of the informal Anthropocene epoch.

INTRODUCTION

Plastics, or synthetic organic polymers, are lightweight, durable products that are used for a number of consumer and non-consumer goods (Barnes et al., 2009). As anthropogenically derived materials, plastics only began to appear in the 1950s, with production and disposal rates increasing steadily over the past 60 years (Ryan and Moloney, 1993; Moore, 2008). Combined with abysmal rates of recovery, a massive amount of plastic debris has accumulated in Earth's waterways and along shorelines (Derraik, 2002; Thompson et al., 2004; Corcoran et al., 2009; Law et al., 2010). These plastics have been proven dangerous to marine organisms and seabirds through ingestion, entanglement, and disruption of feeding patterns (Laist, 1997; Eriksson and Burton, 2003; Boren et al., 2006; Gregory, 2009; Aloy et al., 2011). In addition, adsorption of persistent organic pollutants (POPs) onto plastics (Mato et al., 2001; Endo et al., 2005; Rios et al., 2007, 2010) enhances the potential for bioaccumulation from ingested microplastics into fish. The unknown effect on apex predators, such as humans, is a major concern. These POPs, such as polychlorinated biphenyls (PCBs), can cause serious health effects, as they have been shown to be endocrine-disrupting chemicals and carcinogens (Bergman et al., 2013).

The degradation of plastic material is a slow process that can occur mechanically, chemically (thermo- or photo-oxidative), and to a lesser degree, biologically (Kulshreshtha, 1992; Shah et al., 2008; Cooper and Corcoran, 2010). The persistence of plastic in the environment has been estimated to be in the range of hundreds to thousands of years, although longevity can increase in cool climates and where material is buried on the ocean bottom or under sediment (Gregory and Andrady, 2003). A recent study examining the accumulation of marine ocean debris at depths of 25–3971 m over a 22-year period shows that 33% of all debris in Monterey Bay, California, USA, is composed of plastic litter (Schlining et al., 2013). Similar results from other localities reveal that much of plastic debris is below the water surface (Goldberg, 1997; Galgani et al., 2000; Keller et al., 2010). This debris may be composed of high-density plastics or low-density plastics with fouled surfaces (Ye and Andrady, 1991; Goldberg, 1997; Gregory, 2009; Lobelle and Cunliffe, 2011). Given the low water temperatures and decreased exposure to UV light at greater depths within and below the photic zone, sunken plastic debris has good potential to persist and eventually form part of the rock record. On beaches, plastic debris, such as resin pellets, fragments, and expanded polystyrene up to 11 mm in size, may be preserved within the upper 5 cm of beach sediment (Kusui and Noda, 2003). Claessens et al. (2011) identified microplastics in beach sediment cores at depths down to 32 cm. In addition, Fisner et al. (2013), in their study of polycyclic aromatic hydrocarbons in pellets, were able to locate plastic debris at sediment depths as great as 1 m. However, we found no visible loose plastic fragments at depths >10 cm in sand on Kamilo Beach, Hawaii. Given the beach's constant exposure to the northeasterly trade winds, much of the small (<10 cm), lightweight plastic debris is blown to the backshore environment, where it becomes trapped in vegetation. On a beach as dynamic as Kamilo, preservation of plastics in the sediment column could occur where trapped sediment is covered with sand or where a polymer is combined with a much denser material. We observed the results of this density increase on Kamilo Beach, where great quantities of melted plastic have mixed with the substrate to create new fragments of much greater density, herein referred to as "plastiglomerate."

CHARACTERISTICS OF KAMILO BEACH

The location of the Hawaiian Islands within the North Pacific subtropical gyre makes them vulnerable to acting as sinks for plastic debris (Moore, 2008). The anticyclonic movement of surface ocean currents within the gyre results in preferential

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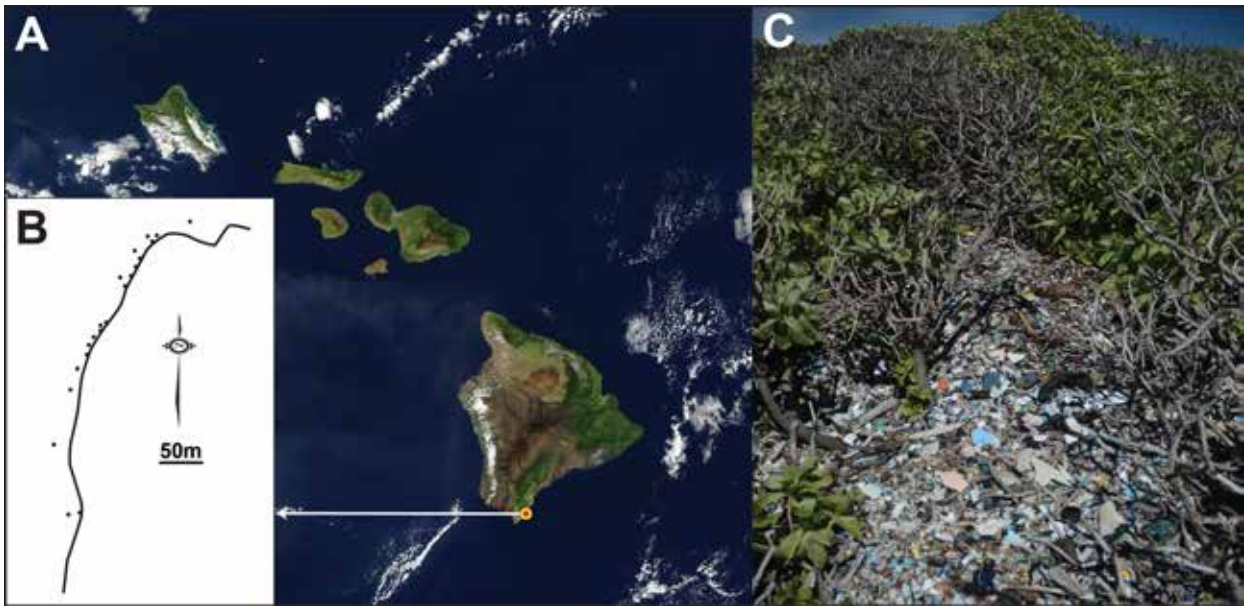

Figure 1. Location and characteristics of Kamilo Beach. (A) Location of Kamilo Beach along the southeast shore of the island of Hawaii (satellite image of 13 Dec. 2002, available at http://visibleearth.nasa.gov). (B) Sampling locations along the Kamilo Beach shoreline (Pacific Ocean east of the dark line). (C) Plastic "confetti" trapped within vegetation.

deposition of marine debris along the eastern and southeastern windward shorelines of the major Hawaiian Islands (Corcoran et al., 2009; McDermid and McMullen, 2004). Kamilo Beach, located on the southeastern tip of the island of Hawaii, is notable for its accumulation of vast amounts of marine debris (Moore, 2008) (Figs. 1A and 1B). Typical plastic debris include derelict fishing gear, including nets, oyster spacer tubes and buoys; food and drinking containers; resin pellets; and abundant multi-colored fragments or "plastic confetti" (Fig. 1C). The main stretch of Kamilo Beach is ~700 m long, and its northern termination is marked by a rocky headland jutting 300 m oceanward at low tide. The beach is accessible by four-wheel drive vehicle only, and it is an ~12 km drive from the nearest paved road. The remoteness of the beach plays an important role in the formation of a potential plastiglomerate marker horizon, as most visitors camp for extended periods of time and build fires for cooking and warmth. In addition, regular, organized beach clean-ups are difficult.

FORMATION OF PLASTIGLOMERATE ON KAMILO BEACH

We use the term plastiglomerate to describe an indurated, multi-composite material made hard by agglutination of rock and molten plastic. This material is subdivided into an in situ type, in

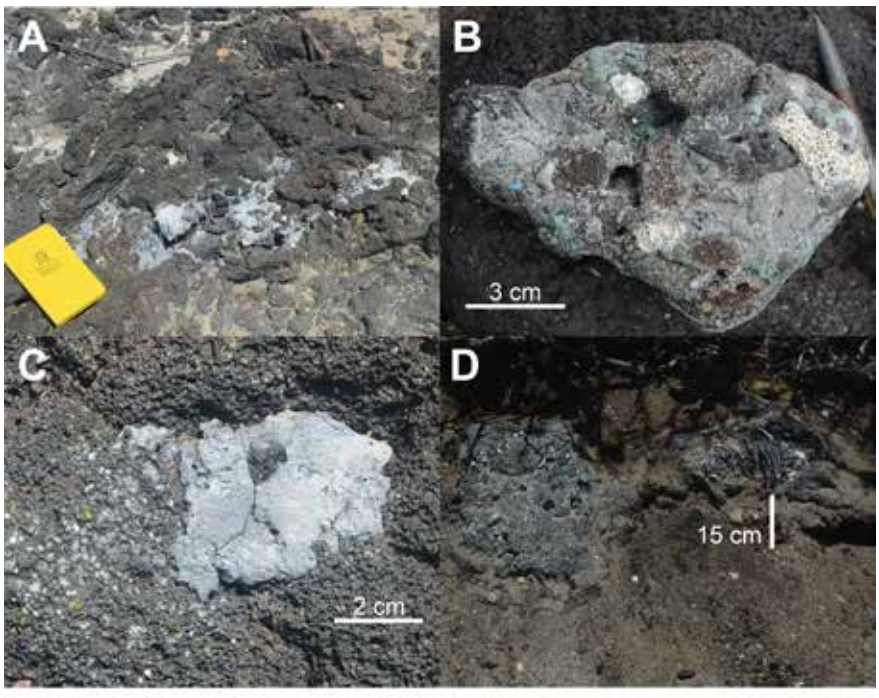

Figure 2. Characteristics of the two types of plastiglomerate. (A) In situ plastiglomerate wherein molten plastic is adhered to the surface of a basalt flow. Field book is 18 cm long. (B) Clastic plastiglomerate containing molten plastic and basalt and coral fragments. (C) Plastic amygdales in a basalt flow. (D) Large in situ plastiglomerate fragment. Adhered molten plastic was found 15 cm below the surface. Note the protected vegetated location.

which plastic is adhered to rock outcrops, and a clastic type, in which combinations of basalt, coral, shells, and local woody debris are cemented with grains of sand in a plastic matrix (Figs. 2A and 2B). Of the 21 sample locations containing plastiglomerate on Kamilo Beach, in situ plastiglomerate was identified at nine. Partially melted polymers adhered to basalt outcrops included fishing nets, piping, bottle caps, and rubber tires. Locally, molten plastic had infilled vesicles in volcanic rock, thereby forming plastic amygdales (Fig. 2C). The largest surface exposure of in situ plastiglomerate was 176 × 82 cm, which was evident only following removal of 15 cm of beach sediment (Fig. 2D). Beach sand and woody debris were locally adhered to the plastic surfaces. Based on its location in more sheltered regions of the beach or within depressions of volcanic rock outcrops, in situ plastiglomerate is interpreted to represent campfire debris.

Clastic plastiglomerate fragments, >2 cm in size, were collected from 21 locations along Kamilo Beach. In addition, we measured the abundance and sizes of angular, clastic plastiglomerate fragments in a quadrat measuring 5 m × 5 m. Partially buried, fractured, in situ plastiglomerate at the center of the quadrat is interpreted as the source of the angular fragments. One hundred and sixty-seven fragments were identified, ranging in size from 2.0 to 22.5 cm, with 55% represented by fragments <4.5 cm. In contrast to the angular nature of the fragments within the quadrat, clastic plastiglomerate fragments found closer to the water and along the strandline were rounded (Fig. 2B) as a result of abrasion in the foreshore environment. A total of 205 fragments sampled from Kamilo Beach displayed different combinations of coral pebbles, plastic, basalt pebbles, woody debris (including charcoal, nuts, and seeds), and sand (including shell fragments) (Fig. 3A). Angular fragments <4 cm in size mainly comprised the sand-plastic group, whereas larger angular fragments were predominantly composed of sand, plastic, basalt pebbles, and woody debris. This discrepancy may be a result of the preferential weathering of organic woody debris and charcoal from the larger fragments, leaving smaller fragments devoid of organic material.

Although plastic debris in some plastiglomerate fragments was melted beyond recognition, we were able to identify distinct types of plastic in most samples. Plastic types included netting/ropes, pellets, partial containers/packaging, lids, tubes/pipes, and "confetti" (Figs. 4A–4D). The latter plastic type was most abundant, as it represents the embrittled remains of intact products, such as containers (Fig. 3B). Partial containers and lids were preserved and were identified in 22% of all fragments. Approximately 20% of the samples contained evidence of fishing-related debris, as indicated by netting, ropes, nylon fishing line, as well as remnants of oyster spacer tubes. We observed that some of the plastiglomerate had been buried by sand and organic debris, as well as having been trapped within vegetation, which demonstrates the potential for preservation in the future rock record.

We measured the bulk density of 20 clastic plastiglomerate fragments sampled from Kamilo Beach. Bulk density of the clastic fragments ranged from 1.7 to 2.8 g/cm^3, with the highest values determined from fragments rich in basalt pebbles. The measured bulk densities show that plastiglomerate has greater potential to become buried and preserved in the rock record than plastic-only particles, which typically have densities in the range of 0.8–1.8 g/cm^3 (Kholodovych and Welsh, 2007).

SOURCE OF MOLTEN PLASTIC

Although the island of Hawaii is volcanically active, the recorded locations of flowing lava over the past century are not coincident with the location of Kamilo Beach. Therefore, the plastiglomerate we sampled from Kamilo Beach cannot be the result of molten lava and polymer interaction. These plastiglomerate fragments were formed anthropogenically. Burning plastic debris in an open environment results in the release of chemical substances, such as carbon monoxide, polycyclic aromatic hydrocarbons, and dioxins (EPA, 2013). These pollutants can cause neurological symptoms, cancer, and hormonal disruptions in humans. In this regard, Kamilo Beach provides an example of an anthropogenic action (burning) reacting to an anthropogenic problem (plastics pollution), resulting in a distinct marker horizon of the informal Anthropocene epoch. Although campfire burning is responsible for the plastiglomerate on Kamilo Beach, it is conceivable that the global extent of plastic debris could lead to

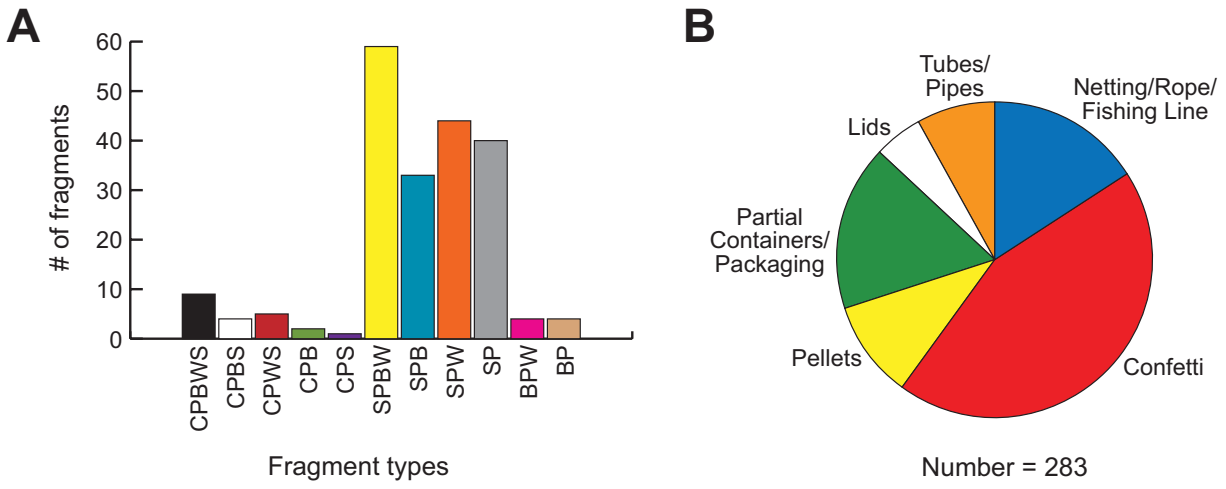

Figure 3. Diagrams illustrating the types of plastiglomerate and relative percentages of adhered plastic fragments. (A) Material composing the sampled plastiglomerate: B—basalt clasts; C—coral fragments; P—plastic; S—sand and sand-size shelly fragments; W—woody debris. (B) Pie diagram showing the relative abundance of different plastic products in plastiglomerate.

Figure 4. Photographs of clastic plastiglomerate on Kamilo Beach. (A) Subrounded fragment containing basalt clasts, molten plastic, yellow rope, and green and red netting. (B) Portions of black and green plastic containers adhered to basalt fragments and connected by netting. (C) Fragment containing plastic pellets and "confetti" with woody debris. (D) Adhered mixture of sand, black tubing, a bottle lid, "confetti," netting, and part of a plastic bag.

similar deposits where lava flows, forest fires, and extreme temperatures occur.

INFORMAL ANTHROPOCENE EPOCH

According to the geologic timescale, we are currently living in the Holocene epoch. However, Crutzen and Stoermer (2000) proposed the term "Anthropocene" to represent the period of time between the latter half of the 18th century and the present day. Although other workers have considered the onset of this informal epoch to have occurred at slightly different times (Ruddiman, 2003; Doughty et al., 2010), researchers agree that the Anthropocene is a time span marked by human interaction with Earth's biophysical system (Zalasiewicz et al., 2011; Syvitsky, 2012). Geological evidence used in supporting this assertion comes from Holocene ice cores and soil profiles. For example, methane concentrations measured in ice cores display an increase at ca. 5000 yr B.P., which contrasts with the expected decline in CH_4 at that time, based on the orbital-monsoon cycle theory (Ruddiman and Thomson, 2001). Ruddiman and Thomson propose that this anomalous rise in CH_4 can be linked to early agricultural practices in Eurasia. In addition, an increase in atmospheric CO_2 at ca. 8000 yr B.P., as determined from ice cores, was explained by Ruddiman (2003) as a result of early forest clearance.

Soil profiles from peat bogs in Norway indicate an increase in lead concentrations in Europe over the past 300 years (Dunlap et al., 1999). Lead concentrations prior to ca. 1950 AD are attributed to mining activities, whereas a second Pb compositional signature in soil younger than 1950 AD is consistent with atmospheric lead derived mainly from combustion of leaded gasoline. Certini and Scalenghe (2011) suggested that anthropogenic soils are the "golden spikes" for the Anthropocene because they contain evidence of soil management practices for enhancing fertility. Examples include terracing, and formation of mixed charcoal, manure, plant debris, and animal bones.

Atmospheric compositions and soil management practices are only two indicators of anthropogenic activity, but relatively few examples of solid, human-made materials are preserved in the sediment record (Zalasiewicz et al., 2008). Even rarer are items that are correlatable on a global scale. Given the ubiquity of non-degradable plastic debris on our planet, the possibility of their global preservation is strong. Our study presents the first rock type composed partially of plastic material that has strong potential to act as a global marker horizon in the Anthropocene.

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Manuscript received 3 Sept. 2013; accepted 8 Nov. 2013. ◆

Tourism Vancouver/Clayton Perry.

Annual Meeting & Exposition

GSA 2014

19-22 October | Vancouver, BC, Canada

Yellowhead Lake. Used with permission from Wikipedia. Photo by Frank Kovalchek.

Contents

VANCOUVER, B.C.
CANADA

Berg Lake/Canadian Rockies.

Message from the 2014 Local Committee General Chairs

It's that time of year again—time to pencil in October for a visit to beautiful British Columbia, Canada! For the first time, Vancouver will host the GSA Annual Meeting (19–22 October 2014), and we are looking forward to an outstanding conference.

Because the meeting will be held downtown in the Vancouver Convention Centre, the breathtaking views of the harbour and north shore Coast Mountains may prove a slight distraction. However, we will keep you busy with 249 proposed sessions, 38 short courses and workshops, and 28 field trips throughout the Pacific Northwest—from the Pardee Keynote Symposium "Great Earthquakes, the Cascadia Subduction Zone, and Society" to the "Okanagan Valley Geology, Terroir, and Wines" field trip, we hope these will allow you to sample a wide range of topics in the earth sciences, as well as some of our local beverages!

Home to the 2010 Winter Olympics, Vancouver is a modern, vibrant, and multicultural city with something for everyone. From beautiful Stanley Park to the Vancouver Aquarium, Science World, Vancouver Art Gallery, and the Dr. Sun Yat-Sen Classical Chinese Garden, Vancouver is home to a wide range of attractions for you and your family. Although a little early for ski season, it is only a two-hour drive along the scenic Sea-to-Sky highway to Whistler-Blackcomb. Come for the conference, but feel free to stay to visit one of Canada's gems—there's loads to see and do out this way!

See you in October!

Glyn Williams-Jones and **James MacEachern**
General Chairs, Vancouver Local Committee

ORGANIZING COMMITTEE

General Co-Chairs

James MacEachern, Simon Fraser University, jmaceach@sfu.ca
Glyn Williams-Jones, Simon Fraser University, glynwj@sfu.ca

Technical Program Chair

Kevin Mickus, Missouri State University,
kevinmickus@missouristate.edu

Technical Program Co-Chair

Patrick Burkhart, Slippery Rock University,
patrick.burkhart@sru.edu

Field Trip Co-Chairs

Shahin Dashtgard, Simon Fraser University, sdashtgard@sfu.ca
Brent Ward, Simon Fraser University, bcward@sfu.ca

Student Committee

Oliver Friesen (Chair), Patty Hayduk, Carly Smythe,
Allison Westin, Joshua Wiebe

Host University

Simon Fraser University

ACTION DATES

Open Now: Abstract submission, registration, housing, student travel grants, and student volunteer sign-up

5 June: Event Space Request deadline (standard fees)

27 June: International Travel Grants deadline

29 July: Abstracts deadline

15 Sept.: Early registration deadline

15 Sept.: Travel grants deadline

22 Sept.: Registration cancellation deadline

1 Oct.: Housing deadline

GSA 2014 Highlights

1. This year's first scientific field trip gets under way on Wed., 15 Oct. **When does *your* field trip start?**

2. **Learning doesn't wait!** Five short courses kick off this popular program at 8 a.m. Fri., 17 Oct., and more than 30 short courses are offered on Sat., 18 Oct.

Tourism Vancouver/Capilano Suspension Bridge Park.

VISAS FOR VISITING CANADA

All annual meeting participants who are not from visa-exempt countries (see **www.cic.gc.ca/english/visit/visas.asp**) will need a temporary resident visa from Citizenship and Immigration Canada (CIC) to enter Canada.

If you require a visa, we encourage you to submit your application as early as possible. You can submit applications online, by mail, or in person at a visa application center. To save time, we encourage you to apply online. You will need a credit card and the ability to create electronic copies of your supporting documents, such as your passport, using a scanner or camera. Go to **www.cic.gc.ca/ctc-vac/getting-started.asp** to learn more.

It is extremely important that applicants complete the visa application fully. All required documents, including a letter of invitation issued by the conference host, should be included. These documents are listed in the document checklist that forms part of the visa application kit.

International Students Studying in the U.S.

(1) Before you go to Canada, you should ensure that all your U.S. immigration documents are in order so that you will not have any problems returning to the USA. (2) Unless your country of citizenship is among the Canada's visa-exempt countries, you will need to obtain a temporary resident visa. Learn more at **www.canadavisa.com/us-international-student-travel.html.**

TRAVEL & TRANSPORTATION

Coordinating your travel is a major challenge in most cities. Vancouver makes things easy with its reliable, clean, and efficient public transportation network and its world-class network of ferries.

Vancouver is located just 30 km north of the Canada/U.S. border at the southern edge of British Columbia. The city sits at the foot of the Coast Mountain Range near the mouth of the Fraser River and on the shore of the Pacific Ocean.

Getting to Vancouver

- **By Air:** All major airlines will take you directly to Vancouver International Airport (YVR; www.yvr.ca), which is about a 25-min. train ride from the Vancouver Convention Centre.
- **By Car from Seattle:** Take Interstate 5 (I-5), which becomes Hwy 99 (the "Sea-to-Sky Highway") across the Canada/U.S. border. Approx. driving time: three hours (235 km/145 mi).
- **By Rail:** Amtrak (www.amtrakcascades.com), Via Rail Canada (www.viarail.ca), and the Rocky Mountaineer (www.rockymountaineer.com) offer service to and from downtown Vancouver's Pacific Central Station. The approx. travel time from Seattle is four hours.

From the Airport (YVR)

- **The Canada Line rail system** (http://thecanadaline.com/) offers automated rapid transit service between Vancouver and the Vancouver International Airport with an approx. travel time of 25 min.
- **By Bicycle!** YVR is committed to operating in a sustainable manner, and cycling is a travel option to get to and from Vancouver International Airport. Learn more at www.yvr.ca/en/getting-to-from-yvr/bicycles-cycling-routes.aspx.
- **Other travel options** are detailed online at www.yvr.ca/en/getting-to-from-yvr.aspx.

Transportation Options in Vancouver

- **Public Transit:** Trans Link, which includes the popular Skytrain, gets you "everywhere you want to go in metro Vancouver": www.translink.ca.
- **Water taxis: Seabus** (www.translink.ca), **Aquabus** (www.thaquabus.com; bike friendly) and **False Creek Ferries** (www.granvilleislandferries.bc.ca/).
- **For more information** on getting around Vancouver, including maps, visit **www.tourismvancouver.com.**

GSA 2014 Highlights

3. **Get a jumpstart** on seeing who's at the meeting, finding friends, and making plans at the **Icebreaker** on Sat., 18 Oct., 5–7 p.m.

ACCOMMODATIONS

Reservations & information: community.geosociety.org/gsa2014/vancouver/lodging

Reservation deadline: Wed., 1 Oct., at 9 a.m. PST.

MCI Group Canada is the official GSA housing bureau; please make your reservations through their online system rather than directly with a hotel. Use of the housing bureau saves you (and GSA) money and provides reservation protection, flexibility, and assistance by

- **Safeguarding** you from potential scams via unauthorized booking companies;
- **Guaranteeing** your accommodations if a particular hotel has oversold rooms; and
- **Supporting** you should any issues arise with your reservation.

The annual meeting hotels were chosen for the numerous benefits they offer when booked through GSA's housing bureau, including

- **Complimentary** or reduced-cost Internet in guest rooms;
- **Friendly** booking terms with no pre-payment required (you will be asked for a credit card number to hold the room; no charges will be made to that card until check out); and
- **Networking** opportunities with other attendees staying at the same hotel.

Annual Meeting Hotels (*details are online*)

Best Western Plus Downtown Vancouver	$129
Days Inn Vancouver Downtown	$139
Fairmont Hotel Vancouver (Co-HQ Hotel)	$239
Fairmont Waterfront Hotel	$239
Four Seasons Hotel Vancouver	$199
Georgian Court Hotel	$159
Hampton Inn & Suites by Hilton Vancouver-Downtown	$159
Hyatt Regency Vancouver (HQ Hotel)	$249
Pan Pacific Vancouver	$249
Renaissance Vancouver Hotel Harbourside	$249
Sheraton Vancouver Wall Centre Hotel	$159
Sutton Place Hotel	$175
Vancouver Marriott Pinnacle Downtown	$249

Note: Prices are listed in Canadian dollars [CAD] and do not include tax. See the annual meeting website for details. HQ—headquarters.

Upgrade/Suite Raffle

To thank you for booking your hotel through MCI Group Canada, you will be entered in a raffle to win an upgrade (Jr. Suite or Deluxe Corner King) for your entire stay (valid for a three-night stay or longer). Your reservation must be made by 26 Aug. in order to qualify; winners will be notified via e-mail.

Confirmations

MCI Group Canada will send your housing confirmation number to you via e-mail. If you do not receive a confirmation or if you have questions, contact the housing bureau at GSAhotels@mci-group.com with "GSA Annual Meeting" in your subject line.

Changes and Cancellations

We encourage you to make any modifications to your reservation online. However, if you prefer to have assistance in modifying your reservation, please note that you may be charged a reprocessing fee of $50 (CAD); see the website for detailed contact information. Cancelling within 72 hours of your arrival date will incur a fee of one night's room rate plus tax, depending on your hotel's cancellation policy. Please confirm your length of stay with the hotel when you check in. Should you decide to leave early, the hotel may charge an early departure fee.

Groups

Groups may request sub-blocks of 10 or more rooms, which will be allocated on a first-come, first-served basis. The number of rooms and requested hotels cannot be guaranteed. Please contact GSAhotels@mci-group.com for further information. Fees apply for sub-blocks.

Room Sharing

Follow the GSA Travel & Housing Bulletin Board link at community.geosociety.org/gsa2014/vancouver/lodging to find folks to share housing, airport shuttles, and/or carpool.

Tourism Vancouver/Aerial. Photo by Albert Normandin.

GSA 2014 Highlights

4. And it starts… Sun., 19 Oct.: 8 a.m. Thousands of **Technical Session presentations** begin, running until Wed. at 5 p.m.

Tourism Vancouver/Capilano Suspension Bridge Park.

LOCAL TOURS

The following local tours are open to all registered GSA Annual Meeting attendees and guests.

101. **Vancouver's Cultural Mosaic.** Sun., 19 Oct., 9:30 a.m.–4:30 p.m. US$130; min. 20 participants.

Embark on a cultural journey through Richmond, South Vancouver, and Chinatown, stopping in neighborhoods, markets, and historical sites to experience the various communities that have flourished since the arrival of the first Europeans. Visit the largest Buddhist temple outside of Asia, relive the history of the West Coast fishing industry, and enjoy a feast for the senses at the Punjab Market and shop-lined streets of Chinatown. The day ends with a visit to the Dr. Sun Yat-Sen Classical Chinese Garden. An Indian buffet lunch is included.

102. **Tastes of the Far East.** Mon., 20 Oct., 10 a.m.–2 p.m. US$100; min. 12 participants.

Take a guided walking tour to explore Chinatown's intriguing sights and fragrances and get an up-close-and-personal look into Vancouver's Asian community. Visit the Dr. Sun Yat-Sen Classical Chinese Garden. Stroll along the bustling streets and visit stores that sell unusual fruits, vegetables, and seafood. Get a glimpse into the centuries-old herb culture of a Chinese pharmacy and admire the beauty of jade, china, and silk. Top the experience off with a traditional dim-sum lunch. Transfers to/from Chinatown are included.

103. **First Nations Heritage Tour.** Tues., 21 Oct., 1–5 p.m. US$70; min. 20 participants.

The First Nations peoples have inhabited the Pacific Northwest for thousands of years, and their history and continuing culture are evident throughout Vancouver. In Stanley Park, learn the history and significance of the totem poles, then head to the University of British Columbia campus for a guided tour of the world-renowned Museum of Anthropology. Wander through the Great Hall and contemplate and marvel at dramatic views over the Haida houses. The tour ends with a stop at Hill's Gallery, the largest northwest coast native art gallery in North America.

104. **Coastal Rainforest Nature Walk.** Wed., 22 Oct., 8:30 a.m.–12:30 p.m. US$80; min. 12 participants.

Just 30 minutes from downtown Vancouver, discover the fascinating ecosystem of the Northwest Pacific Rainforest. Enjoy the sights, sounds, and scents of the rainforest while your experienced naturalist guide explains the workings of this unique ecosystem. Included with this tour is a gourmet snack under the canopy—the ultimate opportunity to savor this once-in-a-lifetime experience!

105. **Enchanting Victoria.** Thurs., 23 Oct., 8:30 a.m.–8:30 p.m. US$172; min. 30 participants.

Extend your stay to take advantage of a spectacular post-meeting tour to Vancouver Island! Sail through the Gulf Islands to Victoria, the province's capital city. Begin your visit with a morning at Butchart Gardens, world-famous for spectacular year-round floral displays. A scenic drive will then take you to the heart of Victoria. The city's strong British influence remains today in its red double-decker buses, turn-of-the-century buildings, tweedy wool shops, lively pubs, and afternoon tea. Enjoy free time to explore the Harbour, the Parliament Buildings, and the legendary Fairmont Empress, and stroll around the many quaint shops of Chinatown and Bastion Square, or savor a traditional afternoon tea or a visit to the Royal BC Museum and its current touring exhibition "Vikings."

GUEST PROGRAM

PENROSE GUEST HOSPITALITY SUITE

GSA warmly welcomes all members of the GSA community from near and far. As part of that welcome, we offer registered guests and Penrose Circle Invitees a comfortable Hospitality Suite for rest and relaxation while technical sessions are going on. The Suite will offer complimentary refreshments, entertaining and educational seminars, and local experts ready to answer your questions about Vancouver. Local tours and activities will also be offered for an additional fee. We hope that you take advantage of the tours to get out-of-doors and learn about the area from the knowledgeable tour guides.

GSA 2014 Highlights

5. Bring your lunch and enjoy Harry (Hap) McSween's **Presidential Address.** You'll also be able to catch up on some Society and GSA Foundation news at this event: Sunday, noon–1 p.m.

DUNCAN BC CANADA

3rd International EarthCache Mega Event

Saturday, 11 Oct. 2014

Duncan (Vancouver Island), British Columbia, Canada

EarthCaching gets people out in the field to learn about their planet first-hand. Participants in this annual event will learn all about EarthCaching, interact with EarthCachers from around the globe, meet EarthCache developers and reviewers, find local EarthCaches, and engage in many other exciting and educational activities. The 2014 event takes place one week before the GSA Annual Meeting & Exposition (19–22 Oct.), so join us at the event, explore the great geology of British Columbia, then attend the Annual Meeting!

For details, go to

- www.3iee.com
- www.earthcache.org
- www.facebook.com/earthcache

or

contact Gary Lewis at glewis@geosociety.org.

Let Earth be your teacher!

CHILDCARE BY KIDDIECORP

Location: Vancouver Convention Centre–West

Hours: Sun.–Wed., 7 a.m.–6 p.m. daily

Ages: Six months to 12 years.

Cost: US$7 per hour per child with a consecutive 2-hour min. per child. At least one parent must be registered for the meeting.

Late pick-up fee: US$5 per child for every five minutes the parent is late.

More info: www.kiddiecorp.com/parents.html

Register securely here: https://www.kiddiecorp.com/gsakids.htm

Cancellations: For a full refund, cancellations must be made to KiddieCorp prior to 23 Sept. Cancellations made after 23 Sept. will incur a 50% fee. No refunds after Sat., 18 Oct.

Contact: KiddieCorp: +1-858-455-1718, info@kiddiecorp.com; GSA meetings: meetings@geosociety.org.

About: KiddieCorp is a nationally recognized company that provides onsite children's activities for a comfortable, safe, and happy experience for both kids and parents! GSA has used their service for more than eight years. Childcare services are a contractual agreement between each individual and the child care company. GSA assumes no responsibility for the services rendered.

Tourism Vancouver/ Coast Mountain Photography.

GSA 2014 Highlights

6. Inspired to shop and pick up new books? The **Exhibit Hall** opens at 2 p.m. on Sunday!

7. **Meet your posters!** Presenters will be available to discuss their research with you in the poster hall during the evening beer receptions. More of a morning person? Like-minded poster presenters will be on-hand for two hours in the morning.

REGISTRATION

Early registration deadline: 15 September

Cancellation deadline: 22 September

Fees (in U.S. dollars)

	EARLY		STANDARD*	
	Full Meeting	**One Day**	**Full Meeting**	**One Day**
Professional member	$355	$230	$435	$260
Professional member (70+)	$260	$160	$345	$185
Professional non-member	$475	$305	$545	$325
Student member/ recent graduate	$115	$75	$150	$85
Student non-member	$155	$100	$190	$110
High School Student	$40		$40	
K–12 Teacher	$55		$65	
Field Trip or Short Course Only	$40		$40	
Guest or Spouse	$85		$90	
Low-Income Country**	50%		50%	

*Fees for onsite registration will be collected in U.S. dollars and credit cards only (no checks).

**Participants from countries classified as "Low or Lower Middle Income Economies" by the World Bank need only pay 50% of the category fee for full meeting or one-day registration; however, online registration is not available. Please download and fill out a hard-copy registration form and mail it to GSA, 3300 Penrose Place, Boulder, CO 80301, USA.

Events Requiring Tickets/Advance Registration

Several GSA Divisions and Associated Societies will hold breakfasts, lunches, receptions, and awards presentations that require a ticket and/or advance registration. A complete list of ticketed events is available on the meeting website. Don't forget to purchase a ticket when you register for GSA 2014!

Student Volunteer Program

Students: Earn FREE meeting registration when you volunteer to work at the meeting for ten hours, PLUS a US$25 stipend for every five hours worked, PLUS get an insider's view of the meeting! Sign up early online for the best selection of jobs, then register for the meeting as a student volunteer.

Special Requests

GSA strives to create a pleasant and rewarding experience for every attendee. Let us know in advance of the meeting if you have needs that require extra attention. Most dietary considerations can be met without any additional charge. Be sure to check the box when you register online and describe your need in the space provided.

Don't forget to:

- Register for tours, special events, field trips, and short courses;
- Purchase tickets for your Division and Associated Society functions;
- Apply for a Student Travel Grant by 15 September (after you register);
- Make your hotel reservation; and
- Book your travel.

Are you passport ready?

TRAVEL GRANTS

Need Financial Support to Help Get You to The Meeting?

GSA Sections, Divisions, and Associated Societies are ready to help! Various groups are offering grants to help defray your costs for registration, field trips, travel, etc., at the GSA Annual Meeting. Check out the meeting website for application and deadline information. Eligibility criteria and deadline dates may vary by grant.

For meeting attendees who reside outside of North America, check the International Travel Grant webpage at www.geosociety.org/sections/International/travelGrants.htm. The deadline to apply is 27 June.

Interested in helping students participate in the meeting?

Every year, a large percentage of students apply for travel grants for the meeting but do not receive an award due to a limited number of funds. ***You*** can help reduce this number by donating as little as US$10 via your registration form. **100% of funds collected go to students!**

TWO-YEAR COLLEGE FACULTY STIPEND

Apply between 1 July and 1 Oct. 2014

Thanks to Subaru of America, Inc., GSA is able to offer stipends of US$200 to up to 23 two-year college faculty members who register for the 2014 Annual Meeting *and* attend a short course. Stipends will be distributed *after* the annual meeting; however, recipients will be notified prior to the meeting. These stipends are available on a first-come, first-served basis.

To qualify, you must

- Provide proof (signature of your dean or supervisor or a human resources rep.) that you teach at least half-time at a two-year college;
- Attend at least one short course (the short-course leader will verify your attendance); and
- Download, complete, and e-mail the form at **community.geosociety.org/gsa2014/educators** to Davida Buehler at dbuehler@geosociety.org (your subject line must read "2 year college reimbursement").

Funds are limited; we are only able to provide stipends for the first 23 applicants who submit completed forms.

Thank you

Tourism Vancouver/First Nations building.

GSA 2014 Highlights

8. **Beer-O'clock:** Sun.–Wed., 5–6:30 p.m. (with an additional half hour on Sunday during the Exhibit Hall Opening Reception).

CALL FOR PAPERS

Abstracts deadline: 29 July

The GSA Annual Meeting & Exposition in Vancouver has a *multitude* of interesting science presentations scheduled. Go to **www.geosociety.org/meetings/2014/sessions/topical.asp** to view topical sessions and learn more.

DISCIPLINE SESSIONS: Discipline sessions are created by pooling together abstracts submitted to a particular discipline category.

TOPICAL SESSIONS: Topical sessions are topically focused for a motivating exchange of science. If you would like to submit an abstract to a particular topical session, you can review the list online.

DIGITAL POSTERS: Present your science using your own computer software. Two topical sessions are accepting digital poster presentations: T57 and T73. Due to the costs of Internet and monitors, the fee to submit an abstract to these sessions is US$80.

PARDEE KEYNOTE SYMPOSIA: Pardee Keynote Symposia represent leading-edge, interdisciplinary sciences and address broad, fundamental geoscience issues and/or areas of public policy. Speakers in these sessions are leaders in their fields.

Submitting an Abstract

- **Submission deadline:** Tuesday, 29 July;
- **Go to** http://community.geosociety.org/gsa2014/science/sessions to begin your submission;
- **An abstract submission fee** of US$45 for professionals; US$25 for students; and US$80 for digital posters will be charged; and
- **You may present two volunteered abstracts** during the meeting, *as long as one is a poster (including digital poster) presentation.*

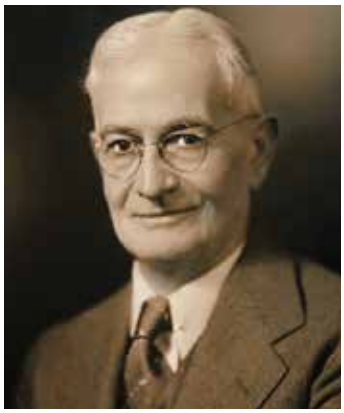
Three Ways to Present

1. **Oral:** The normal length of a talk is 12 min., plus three min. for Q&A. You *must* visit the Speaker Ready Room at least 24 hours before your scheduled presentation. All technical session rooms are equipped with a PC using MS Office 2010.
2. **Posters:** You will be provided with one horizontal, free-standing 8-ft-wide by 4-ft-high display board and Velcro for hanging your poster. Each poster booth will share a 6-ft-long by 30-inch-wide table. Electricity will NOT be available this year; please plan your presentation accordingly.
3. **Digital Posters:** You will be provided with one horizontal, freestanding 8-ft-wide by 4-ft-high display board and Velcro for hanging your display. You will also have a 40–46-inch monitor on a 6-ft-long by 30-inch-wide table; electricity for your laptop (bring your own laptop); and a VGA cable along with sound. Mac users: Bring your own white dongle.

Hours for poster and digital poster presentations: 9 a.m.–5 p.m. on Sunday, with authors present 3–5 p.m.; and 9 a.m.–6:30 p.m. Mon.–Wed., with authors present during the afternoon beer reception, 5–6:30 p.m. Presenters will also be at their posters for two hours in the morning or afternoon, as assigned.

2014 Joint Technical Program

Chair: Kevin Mickus, kevinmickus@missouristate.edu
Co-Chair: Patrick Burkhart, patrick.burkhart@sru.edu



PARDEE KEYNOTE SYMPOSIA

Pardee Keynote Symposia are named in honor of GSA Fellow and benefactor Joseph Thomas Pardee (1871–1960) via a bequest from Mary Pardee Kelly. Pardee is perhaps best known for his work on Glacial Lake Missoula. These symposia consist of invited presentations covering the following topics.

P1. **Apatites I Have Known: From Man to Mars**
Advocates: Sarah W. Keenan; Lawrence A. Taylor

This session is a transdisciplinary overview of past, current, and future research on apatite, P biogeochemical cycling, and P as a limiting resource in terrestrial, lunar, and martian systems. This session covers the mineralogy of apatite, its variations in chemistry as indicators of origins, its major importance for biosystems, its essential role in propagation of life, uses of apatite chemistry for solution to geologic and planetary problems, its major occurrences as geologic deposits on Earth, and its major role across several sciences. Cross-disciplinary exchanges will help to advance our understanding of the P biogeochemical system on Earth and beyond.

P2. **Mass Extinctions: Volcanism, Impacts, and Catastrophic Environmental Changes**
Advocates: David P.G. Bond; Gerta Keller; Thierry Adatte

Recent advances in the stratigraphic and geochemical records of mass extinctions, bolide impacts, and large igneous province (LIP) volcanism have greatly enhanced our understanding of the causes and consequences of global change. The impact-kill scenario, popularized in the 1970s and 1980s, has slowly receded in favor of terrestrial causes that might ultimately have derived from LIPs. However, the actual mechanisms by which either impacts or LIP eruptions can induce up to 95% of species extinction remain controversial. This session provides a platform to evaluate the current records of volcanism and impacts and associated environmental changes across Earth's major mass extinction events.

P3. **Energy Resource Development and Groundwater: Looking Broader and Deeper**
Advocates: Grant Ferguson; Andrew H. Manning

Energy resource development is perturbing groundwater systems at an increasing rate. Installation of deep wells, hydrofracking, and wastewater injection have the potential to broadly alter groundwater quality and flow, particularly in deep aquifers. Understanding these impacts requires knowledge of hydrogeology over a range of scales and depths. However, our understanding of deep systems and their hydraulic connections to shallow groundwater is poor. This session provides a venue for the presentation of current research on the impacts of energy resource development on deep and shallow groundwater resources and discourse on research needs for characterizing and managing such impacts.

P4. **Great Earthquakes, the Cascadia Subduction Zone, and Society**
Advocates: Andrew Meigs; Chris Goldfinger

The Cascadia subduction zone is arguably one of the biggest seismic hazards in North America, yet it has not been the site of a great subduction zone earthquake since 26 Jan. 1700. Probing of Cascadia's earthquake history and potential and recent great earthquakes in Indonesia, Chile, and Japan have led to tremendous new advances in characterization of the seismic hazard associated with subduction zone earthquakes. This session will explore advances in our understanding subduction zone dynamics and earthquake recurrence, modes of fault behavior, tsunami hazard, and the scale of exposure of society to the hazards.

P5. **The Cordilleran Ice Sheet: A Glacial Legacy in the Pacific Northwest**
Advocates: Andrew J. Stumpf; John Clague; Kathy Goetz Troost

The Cordilleran Ice Sheet (CIS), one of three continental ice sheets that covered large parts of North America, played an important role in shaping the present landscape of westernmost Canada and adjacent parts of the United States. This symposium explores major advances in understanding the growth/decay of the CIS; the relation of the ice sheet to North Pacific Quaternary climate and sea-level change; migrations of humans, megafauna, and flora; and the ice sheet's legacy for modern civilization. Talks/posters in this symposium will be of broad interest to researchers in several fields, including geology, geophysics, geography, and biology.

GSA 2014 Highlights

9. Did you say **Exhibit Hall Opening Reception?** YES! Come one, come all—make this your second icebreaker party of the meeting, from 5 to 7 p.m. on Sunday; check your nametag for handy drink tickets.

10. **Is it Monday yet?** So much has already happened! Talks start and posters post at 8 a.m.

11. The **Exhibit Hall opens at 9 a.m.** and stays open an hour and a half after oral technical sessions close.

CONTINUING EDUCATION CREDITS (CEUs)

The Annual Meeting provides an excellent opportunity for you to earn CEUs toward your general continuing education requirements for your employer or K–12 school. Credits are available for technical sessions, short courses, and field trips.

The numbers: Ten contact hours are required for one CEU. For example, one day (8 hours) of technical sessions equals 0.8 CEUs.

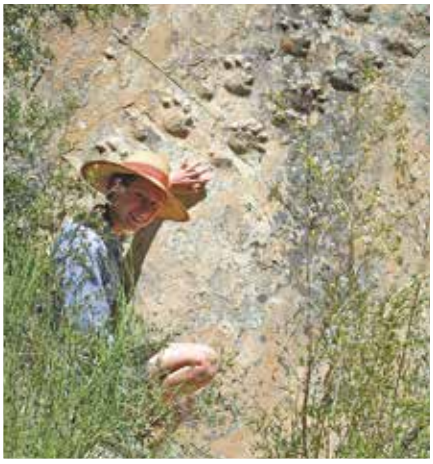
How do I get credit? After the meeting, contact Beth Engle at bengle@geosociety.org for a meeting evaluation form. After we receive the evaluation, we will send your CEU certificate to you in the mail (usually within two weeks).

GSA MENTOR PROGRAMS

GSA runs four mentoring programs at the Annual Meeting. These programs:

- Concentrate on employment within various sectors (*Geology in Government* and *Geology in Industry*), specialties (*John Mann Mentors in Applied Hydrogeology*), and specific issues (*Women in Geology*);
- Facilitate future career choices by sharing resources, skills, and knowledge;
- Enhance professional development and personal growth;
- Provide networking opportunities with professionals and other students; and
- Provide attendees with critical feedback (the government and industry programs are driven entirely by students' questions).

community.geosociety.org/gsa2014/science/careers



GEOCORPS™ AMERICA

Fall/Winter 2014–2015

Application deadline: 1 July

The next GeoCorps America fall/winter season runs from Sept. 2014 through May 2015. GeoCorps America provides paid, short-term geoscience opportunities on public lands managed by the National Park Service, the U.S. Forest Service, and the Bureau of Land Management. All levels of geoscientists—students, educators, professionals, retirees, and others—are encouraged to apply.

Past/Current GeoCorps Participants—Please consider attending this fall's GSA Annual Meeting & Exposition, which will feature the fourth annual GeoCorps Alumni Reception, plus a GeoCorps topical session, at which you are encouraged to present your GeoCorps work!

For more information, contact Matt Dawson, mdawson@geosociety.org, +1-303-357-1025, or Allison Kerns, akerns@geosociety.org, +1-303-357-1097.

www.geosociety.org/geocorps • www.facebook.com/geocorps
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Top and bottom: Cassi Knight, Grand Canyon National Park, 2013. Middle: Erin Smith, Mount Rainier National Park, 2013.

SCIENTIFIC FIELD TRIPS

Field-trip chairs: Brent Ward and **Shahin Dashtgard,** gsatrips@sfu.ca

GSA contact: Beth Engle, bengle@geosociety.org

Please contact trip leaders directly if you have questions. All trips begin and end at the Vancouver Convention Centre unless otherwise indicated.

401. **Exploring the Linkages between Glaciation, Outburst Floods, and the Generation of Palouse Loess in Washington State.** Wed.–Fri., 15–17 Oct. US$385. This trip begins in Pasco, Washington, USA, and ends in Seattle, Washington, USA. **Leaders:** Mark R. Sweeney, Univ. of South Dakota; Eric McDonald, David R. Gaylord, Katharine Huntington.

402. **Karst Lands of Central Vancouver Island.** Wed.–Sat., 15–18 Oct. US$621. This trip begins and ends in Nanaimo, British Columbia. **Leader:** Tim R. Stokes, Vancouver Island Univ.

403. **Channeled Scablands.** Wed.–Sat., 15–18 Oct. US$485. **Leaders:** Brent C. Ward, Simon Fraser Univ.; John J. Clague.

404. **Natural Channel Networks on Alluvial Fans in Pacific Northwest Coastal Forests.** Wed.–Sat., 15–18 Oct. US$373. This trip begins and ends in Nanaimo, British Columbia. **Leaders:** Thomas H. Millard, B.C. Ministry of Forests, Lands and Natural Resource Operations; William (Bill) C. Floyd, Neil Goeller.

405. **Okanagan Valley Geology, Terroir, and Wines.** Wed.–Sat., 15–18 Oct. US$613. This trip begins in Kelowna, British Columbia, and ends in Vancouver, British Columbia. **Leaders:** Robert J. Fulton, RJ Fulton Geosciences; C.A. Scott Smith, Andrew V. Okulitch, Patricia A. Bowen.

406. **Southern British Columbia Porphyry Cu (-Au, Mo) Deposits and Their Host Rocks.** Thur.–Sat., 16–18 Oct. US$582. **Leaders:** Thomas Bissig, Univ. of British Columbia; Murray M. Allan, Farhad Bouzari.

407. **Occurrence and Hazard of Post-Glacial Holocene Landslides from the Mount Meager Volcanic Complex, Cascade Volcanic Arc.** Thur.–Sat., 16–18 Oct. US$400. **Leaders:** Nicholas J. Roberts, Simon Fraser Univ.; Pierre A. Friele, Carie-Ann Lau.

408. **Canadian Cascade Volcanism: Subglacial to Explosive Eruptions along the Sea to Sky Corridor, British Columbia.** Thur.–Sat., 16–18 Oct. US$372. **Leaders:** Graham D.M. Andrews, California State Univ. Bakersfield; Kelly Russell, Lucy Porritt.

409. **The Life and Times of the Cordilleran Ice Sheet around the Southern Fraser Plateau, B.C.** Thur.–Sat., 16–18 Oct. US$416. **Leaders:** Tracy A. Brennand, Simon Fraser Univ.; Olav B. Lian, Andrew J. Perkins.

410. **Urban Geology and Geoheritage of Metro Vancouver, B.C.** Fri., 17 Oct. US$104. **Leaders:** Michael C. Wilson, Douglas College; Lionel E. Jackson Jr.

411. **The Cretaceous-Cenozoic Coast-Cascade Orogen Chilliwack Valley–Harrison Lake Connection.** Fri.–Sat., 17–18 Oct. US$269. **Leaders:** Dan Gibson, Simon Fraser Univ.; James W.H. Monger.

412. **Glaciers, Isostasy, and Eustasy in the Fraser Lowland: Resolving Late-Pleistocene Glaciation across the International Border.** Fri.–Sat., 17–18 Oct. US$264. This trip begins in Bellingham, Washington, USA, and ends in Vancouver, British Columbia. **Leaders:** Douglas H. Clark, Western Washington Univ.; Michele N. Koppes.

413. **Mount Baker Lahars and Debris Flows, Ancient, Modern and Future.** Sat., 18 Oct. US$96. This trip begins and ends in Bellingham, Washington, USA. **Leaders:** David S. Tucker, Western Washington Univ.; Scott R. Linneman, Christopher S. Magirl, Kevin M. Scott.

414. **Late Glacial and Holocene Sedimentation and Investigation of Fjord Tsunami Potential in Lower Howe Sound, British Columbia.** Sat., 18 Oct. US$152. **Leader:** Lionel E. Jackson, Simon Fraser Univ.

415. **An Introduction to the Geology of the Vancouver Area.** Sat., 18 Oct. US$111. **Leaders:** Lindsay Bottomer, Entrée Gold Inc.; Catherine J. Hickson.

416. **Full Access to the Geology of the Sea-to-Sky Highway.** Sat., 18 Oct. US$100 professional; US$23 student. **Leaders:** Brett Gilley, Univ. of British Columbia; Christopher Atchison. Students: Contact info@theiagd.org to get your trip paid for!

GSA 2014 Highlights

12. **Lunchtime Lectures** are like the "gold nuggets" of the meeting—from the Halbouty talk to hot topics, you'll find some treasure here from noon to 1 p.m., Mon.–Wed.

13. **Don't forget about Beer-O'clock** (5–6:30 p.m.)—This is also a great chance to meet all the poster presenters for the day.

SCIENTIFIC FIELD TRIPS (*continued*)

417. **Applied Geomorphology along the North Slopes of Burrard Inlet in North and West Vancouver.** Sat., 18 Oct. US$94. **Leaders:** Mike Roberts, Simon Fraser Univ.; Derek G. Turner.

418. **Landslides and Slope Stability Adjacent to the Lower Fraser River Valley East of Chilliwack and Hope, and along the Lower End of the Fraser River Canyon.** Sat., 18 Oct. US$122. **Leaders:** Bruce Thomson, British Columbia Provincial Government; Andrée Blais-Stevens, Matthias Jakob.

419. **Sea-to-Sky Geotour for Teachers.** Sun., 19 Oct. US$85. **Leaders:** Malaika Ulmi, Geological Survey of Canada; Melanie Kelman, Dylan Watt.

420. **Tertiary Stratigraphy and Structure of the Eastern Flank of the Cascade Range, Washington.** Thur.–Sat., 23–25 Oct. US$404. This trip begins at the Vancouver Railroad Station, and ends in Seattle, Washington, USA. **Leader:** Eric S. Cheney, Univ. of Washington.

421. **Multiple Younger Dryas and Allerød Moraines (Sumas Stade) in the Fraser Lowland and Late Pleistocene Glaciomarine Drift (Everson Interstade).** Thurs., 23 Oct. US$104. This trip begins and ends in Bellingham, Washington, USA. **Leader:** Don J. Easterbrook, Western Washington Univ.

422. **Abbotsford Aquifer: The Intricacies of a Long-Term, Transboundary Water Quality Issue.** Thur., 23 Oct. US$95. **Leaders:** M. Cathy Ryan, Univ. of Calgary; Diana M. Allen, Edwin E. Cey.

423. **Kirk Bryan Field Trip: Glacial History, Geomorphology and Natural Hazards along the Sea-to-Sky Highway.** Thur., 23 Oct. US$100. **Leaders:** Brent C. Ward, Simon Fraser Univ; John J. Clague, Pierre A. Friele.

424. **Flood History of the Fraser River.** Thur.–Fri., 23–24 Oct. US$291. **Leader:** Jonathan F. Hughes, Univ. of the Fraser Valley.

425. **Victoria, Visit to Institute of Ocean Sciences, Pacific Geoscience Centre, Ocean Networks Canada**. Thur.–Fri., 23–24 Oct. US$287. **Leaders:** David Gwyn Lintern, Geological Survey of Canada; Philip R. Hill, Cooper Stacey, Kate Moran.

426. **Hydrogeology of the Nanaimo Lowlands.** Thur.–Fri., 23–24 Oct. US$388. **Leaders:** Stephen E. Grasby, Natural Resources Canada; Rae Dawn Keim.

427. **Geoarchaeology of the Fraser Canyon and Sea to Sky Highway.** Thur.–Fri., 23–24 Oct. US$215. **Leaders:** Francesco Berna, Simon Fraser Univ.; Peter Locher.

428. **Volcanism and Interglacial Interaction in the Wells Gray–Clearwater Volcanic Field, East Central British Columbia.** Thur.–Sat., 23–25 Oct. US$375. **Leaders:** Catherine J. Hickson, Consultant Geoscientist (formerly GSC); Nathalie Vigouroux, Crystal A. Huscroft.

Okanagan Highlands outcrop. Photo by Bruce Archibald.

SHORT COURSES

Early registration deadline: 15 September

Registration after 15 September costs an additional US$30

Cancellation deadline: 22 September

The following courses are open to everyone. Early registration is highly recommended to ensure that courses will run. Go to **community.geosociety.org/gsa2014/science/courses** or contact Jennifer Nocerino at jnocerino@geosociety.org for course abstracts and additional information.

Can I take a short course if I'm not registered for the meeting? YES! Just add a meeting nonregistrant fee (US$40 by 15 Sept.) to your course enrollment cost. If you then decide to attend the meeting, your payment will be applied toward meeting registration.

GSA K–12 teacher members do not need to register for the meeting or pay the nonregistrant fee in order to sign up for short courses.

Will I get continuing education credits (CEUs)? Yes! After the meeting, contact Jennifer Nocerino at jnocerino@geosociety.org for a course evaluation form. After she receives the evaluation, she will send your CEU certificate via e-mail. Check each course description for the CEUs offered.

Two-Year College Faculty: Thanks to Subaru of America, Inc., 23 two-year college professors (at least half-time) who attend any one short course will be reimbursed US$200! For more information see p. 17 or contact Davida Buehler at dbuehler@geosociety.org.

501. **Sequence Stratigraphy for Graduate Students.** Fri.–Sat., 17–18 Oct., 8 a.m.–5 p.m. **US$25**; includes lunch. Limit: 55. CEU: 1.6. **Extra!** Upon completion of the course, participants will receive a US$25 coupon redeemable at the onsite GSA bookstore. **Instructors:** Bret Dixon, Anadarko; Art Donovan, BP; Morgan Sullivan, Chevron; Bob Stewart, ExxonMobil; Kirt Campion, Marathon.

502. **Field Safety Leadership.** Fri.–Sat., 17–18 Oct., 8 a.m.–5 p.m. **US$25**; includes continental breakfast and lunch. Limit: 24. CEU: 1.6. **Extra!** Upon completion of the course, participants will receive a US$25 coupon redeemable at the onsite GSA bookstore. **Instructors:** Kevin Bohacs, ExxonMobil Upstream Research Co.; David Story, ExxonMobil Upstream Research Co.; Pam Collins, ExxonMobil Upstream Research Co.

503. **Introduction to Petroleum Structural Geology.** Fri.–Sat., 17–18 Oct., 8 a.m.–5 p.m. **US$25**; includes continental breakfast and lunch. Limit: 30. CEU: 1.6. **Extra!** Upon completion of the course, participants will receive a US$25 coupon redeemable at the onsite GSA bookstore. **Instructors:** J. Steve Davis, ExxonMobil Upstream Research Co.; Peter Hennings, ConocoPhillips.

504. **Structural and Stratigraphic Concepts Applied to Basin Exploration.** Fri.–Sat., 17–18 Oct., 8 a.m.–5 p.m. **US$25**; includes continental breakfast and lunch. Limit: 30. CEU: 1.6. **Extra!** Upon completion of the course, participants will receive a US$25 coupon redeemable at the onsite GSA bookstore. **Instructors:** Lori Summa, ExxonMobil Upstream Research Co.; Bob Stewart, ExxonMobil Exploration Co.; Renee Breedlovestrout, ExxonMobil Exploration Co.

505. **Siliciclastic Core-Logging for Graduate Students.** Fri.–Sat., 17–18 Oct., 9 a.m.–5 p.m. **US$75.** Limit: 24. CEU: 1.4. **Instructors:** Shahin Dashtgard, Simon Fraser Univ.; James MacEachern, Simon Fraser Univ.

506. **Near-Surface Geophysics for Non-Geophysicists.** Sat., 18 Oct., 8 a.m.–5 p.m. **US$105**; includes course materials. Limit: 30. CEU: 0.8. **Instructor:** Gregory Baker, Univ. of Tennessee.

507. **Introduction to Terrestrial Laser Scanning (Ground-Based LiDAR) for Earth Science Research.** Sat., 18 Oct., 8 a.m.–5 p.m. **US$41; includes lunch.** Limit: 24. CEU: 0.8. **Instructors:** Christopher Crosby, UNAVCO; Marianne Okal, UNAVCO; Carlos Aiken, Univ. of Texas at Dallas.

508. **The Water-Energy Nexus: Earth-Science Research Questions.** Sat., 18 Oct., 8 a.m.–5 p.m. **US$76.** Limit: 40. CEU: 0.8. **Instructors:** Richard Healy, USGS; Bridget Scanlon, Univ. of Texas at Austin; Mark Engle, USGS.

509. **Seismic Structural Interpretation for Academic Faculty.** Sat., 18 Oct., 8 a.m.–5 p.m. **US$100.** Limit: 27. CEU: 0.8. **Instructors:** Bob Krantz, ConocoPhillips; Simon Kattenhorn, ConocoPhillips; Barbara Tewksbury, Hamilton College.

GSA 2014 Highlights

14. Monday makes school cool: **Alumni receptions** go all night!

15. **Tuesday:** Now you're getting into the rhythm: 8 a.m.: talks & posters • noon: lunchtime lecture 2 • 1 to 5 p.m.: more talks & posters • 5–6:30: Beer O'clock & time to chat with poster presenters, speakers, exhibitors, GSA staff, students, and GSA Fellows.

SHORT COURSES (*continued*)

510. **Wet, Slimy Convecting Rockball: Geobiology, Earth/Life Coevolution, and the Ubiquity of Biofilms.** Sat., 18 Oct., 8 a.m.–5 p.m. **US$88.** Limit: 40. CEU: 0.8. **Instructors:** Kurt Grimm, Univ. of British Columbia; Sean Crowe, Univ. of British Columbia.

511. **Apple iPad and iPhone as Tools for Field Use.** Sat., 18 Oct., 8 a.m.–4 p.m. **US$137.** Limit: 15. CEU: 0.7. **Instructor:** Brian Saunders, White Raven Innovations Limited.

512. **Geobiodiversity Database and Quantitative Stratigraphy.** Sat., 18 Oct., 8:30 a.m.–5 p.m. **US$20.** Limit: 40. CEU: 0.75. **Extra!** Upon completion of the course, participants will receive a $US25 coupon redeemable at the onsite GSA bookstore. **Instructors:** Junxuan Fan, Nanjing Institute of Geology and Palaeontology; Peter Sadler, Univ. of California at Riverside; H. David Sheets, Canisius College; Shuang-ye Wu, Univ. of Dayton.

513. **Introductory Remote Sensing for Geoscientists.** Sat., 18 Oct., 9 a.m.–5 p.m. **US$109.** Limit: 16. CEU: 0.7. **Instructor:** John Chadwick, College of Charleston.

514. **Deep Carbon through Deep Time.** Sat., 18 Oct., 9 a.m.–5 p.m. **US$30; includes lunch.** Limit: 40. CEU: 0.7. **Instructor:** Robert Hazen, Carnegie Institution of Washington and Deep Carbon Observatory.

515. **Subaqueous Paleoseismology Methods.** Sat., 18 Oct., 9 a.m.–4 p.m. **US$89; includes lunch.** Limit: 20. CEU: 0.6. **Instructors:** Chris Goldfinger, Oregon State Univ.; Randy Enkin, Geological Survey of Canada; Audrey Dallimore, Geological Survey of Canada.

516. **An Introduction to POGIL (Process Oriented Guided Inquiry Learning) Using Climate Change Activities.** Sat., 18 Oct., 9 a.m.–4 p.m. **US$15; includes lunch.** Limit: 30. CEU: 0.6. **Instructor:** Daniel King, Drexel Univ.

517A. **Teaching Geoscience in Society: Building Relevance and Interest in the Geosciences by Adding InTeGrate Resources to Your Class.** Sat., 18 Oct., 8 a.m.–noon. **US$50** for one course—*or get two-for-one!*—pay the same amount when you combine it with afternoon course 517C *or* 517D. Limit: 23. CEU: 0.4. **Instructors:** Anne Egger, Central Washington Univ.; David McConnell, North Carolina State Univ.

517B. **Improving Spatial Thinking in the Geological Sciences.** Sat., 18 Oct., 8 a.m.–noon. **US$50** for one course—*or get two-for-one!*—pay the same amount when you combine it with afternoon course 517C *or* 517D. Limit: 23. CEU: 0.4.

Tourism Vancouver/ English Bay Inuksuk.

Instructors: Basil Tikoff, Univ. of Wisconsin–Madison; Tim Shipley, Temple Univ.

517C. **Student Learning Outcomes and Program Assessment.** Sat., 18 Oct., 1–5 p.m. **US$50** for one course—*or get two-for-one!*—pay the same amount when you combine it with morning course 517A *or* 517B. Limit: 23. CEU: 0.4. **Instructors:** David Mogk, Montana State Univ.; Mary Savina, Carleton College.

517D. **Extreme Makeover Geosciences Style—Infusing Existing Curricula with the Spirit of the New Next Generation Science Standards (NGSS): Integrating Content, Scientific and Design Practices, and Cross-Cutting Themes.** Sat., 18 Oct., 1–5 p.m. **US$50** for one course—*or get two-for-one!*—pay the same amount when you combine it with morning course 517A *or* 517B. Limit: 23. CEU: 0.4. **Instructors:** Aida Awad, Maine East High School; Susan Buhr, Univ. of Colorado; Sara Harris, Univ. of British Columbia.

518A. **Teaching Controversial Issues 1: Climate and Energy.** Sat., 18 Oct., 8 a.m.–noon. **US$35** for one course—*or get two-for-one!*—pay the same amount when you combine it with afternoon course 518D, 518E, *or* 518F. Limit: 40. CEU: 0.4. **Instructors:** Don Duggan-Haas, Paleontological Research Institution/Museum of the Earth; Glenn Dolphin, Univ. of Calgary; Laura Guertin, Penn State–Brandywine; Scott Mandia, Suffolk County Community College; Robert Ross, Paleontological Research Institute/Museum of the Earth.

518B. **The Crunching of Cascadia: Discovering Deformation with Data.** Sat., 18 Oct., 8 a.m.–noon. **US$35** for one course—*or get two-for-one!*—pay the same amount when you combine it with afternoon course 518D, 518E, *or* 518F. Limit: 18. CEU: 0.4. **Instructors:** Shelley Olds, UNAVCO; Nancy West, Quarter Dome Consulting; Vince Cronin, Baylor Univ.

518C. **Crosscutting Earth Themes.** Sat., 18 Oct., 8 a.m.–noon. **US$35** for one course—*or get two-for-one!*—pay the same amount when you combine it with afternoon course 518D, 518E, *or* 518F. Limit: 18. CEU: 0.4. **Instructor:** Susan Eriksson, Eriksson Associates.

518D. **Teaching Controversial Issues 2: Evolution of Life and Earth.** Sat., 18 Oct., 1–5 p.m. **US$35** for one course—*or get two-for-one!*—pay the same amount when you combine it with morning course 518A, 518B, *or* 518C. Limit: 40. CEU: 0.4. **Instructors:** Don Duggan-Haas, Paleontological Research Institution/Museum of the Earth; Glenn Dolphin, Univ. of Calgary; Laura Guertin, Penn State–Brandywine; Scott Mandia, Suffolk County Community College; Robert Ross, Paleontological Research Institute/Museum of the Earth.

518E. **Yellowstone National Park as a Hotbed for Inquiry.** Sat., 18 Oct., 1–5 p.m. **US$35** for one course—*or get two-for-one!*—pay the same amount when you combine it with morning course 518A, 518B, *or* 518C. Limit: 18. CEU: 0.4. **Instructors:** Shelley Olds, UNAVCO; Nancy West, Quarter Dome Consulting; Vince Cronin, Baylor Univ.

518F. **Introduction to Critical Zone Science and Observatories.** Sat., 18 Oct., 1–5 p.m. **US$35** for one course—*or get two-for-one!*—pay the same amount when you combine it with morning course 518A, 518B, *or* 518C. Limit: 18. CEU: 0.4. **Instructor:** Timothy White, Penn State.

519A. **Digital Mapping and Data Collection for Field Environments.** Sat., 18 Oct., 8 a.m.–noon. **US$50** for one course—*or get two-for-one!*—pay the same amount when you combine it with afternoon course 519C *or* 519D. Limit: 30. CEU: 0.4. **Instructors:** Steven Whitmeyer, James Madison Univ.; Terry Pavlis, Univ. of Texas–El Paso; Lawrence Malinconico, Lafayette College; Richard Langford, Univ. of Texas–El Paso.

519B. **GigaPan and GigaMacro for the Geosciences.** Sat., 18 Oct., 8 a.m.–noon. **US$50** for one course—*or get two-for-one!*—pay the same amount when you combine it with afternoon course 519C *or* 519D. Limit: 30. CEU: 0.4. **Instructors:** Jennifer Piatek, Central Connecticut State Univ.; Bill Richards, North Idaho College; Ron Schott, Bakersfield College.

519C. **Google Maps Engine, Earth Engine, and Big GeoData.** Sat., 18 Oct., 1–5 p.m. **US$50** for one course—*or get two-for-one!*—pay the same amount when you combine it with morning course 519A *or* 519B. Limit: 30. CEU: 0.4. **Instructors:** Jeffrey Ryan, Univ. of South Florida; Kristen St. John, James Madison Univ.

519D. **Using Google Earth to Teach Interpretation of Geologic Processes, Bedrock Structures, and Geologic History.** Sat., 18 Oct., 1–5 p.m. **US$50** for one course—*or get two-for-one!*—pay the same amount when you combine it with morning course 519A *or* 519B. Limit: 30. CEU: 0.4. **Instructors:** Barbara Tewksbury, Hamilton College; Heather Almquist, Univ. of Montana.

520. **Optical Properties of Minerals in Thin Section: Quantitative Methods in Birefringence.** Sat., 18 Oct., 8 a.m.–noon. **US$25.** Limit: 24. CEU: 0.4. **Instructor:** James Nicholls, Univ. of Calgary.

521. **Making Digital Geologic Maps with the NCGMP09 Database Schema.** Sat., 18 Oct., 8 a.m.–noon. **US$TBA.** Limit: 31. CEU: 0.4. **Instructor:** Ralph Haugerud, USGS.

522. **Developing an Effective Broader Impacts Plan for Engaging Undergraduate Researchers.** Sat., 18 Oct., 8 a.m.–noon. **US$40.** Limit: 28. CEU: 0.4. **Instructors:** Aisha Morris, UNAVCO; Donna Charlevoix, UNAVCO.

523. **Getting Started in Undergraduate Research for New, Future, and Current Faculty.** Sat., 18 Oct., 1–5 p.m. **US$40.** Limit: 20. CEU: 0.4. **Instructor:** Lydia Fox, Univ. of the Pacific.

524. **Hands-On Experiences with Stable Isotopes in the Geosciences Curriculum.** Sat., 18 Oct., 1–5 p.m. **US$25.** Limit: 24. CEU: 0.4. **Extra!** Upon completion of the course, participants will receive a US$25 coupon redeemable at the onsite GSA bookstore. **Instructors:** Anne Jefferson, Kent State Univ.; Elizabeth Griffith, Univ. of Texas Arlington; Joseph Ortiz, Kent State Univ.; David Dees, Kent State Univ.

525. **Geoscience Career Workshop: Launch Your Job Search.** Sat., 18 Oct., 1–5 p.m. **US$15.** Limit: 100. CEU: 0.4. **Extra!** Upon completion of the course, participants will receive a US$15 coupon redeemable at the onsite GSA bookstore. **Instructor:** Tahlia Bear, GSA.

526. **Detrital Mineral U-Pb Geochronology and Hf Isotope Geochemistry: Theory, Methodology, and Applications to Northern Cordilleran Research.** Sat., 18 Oct., 9 a.m.–5 p.m. **US$35.** Limit: 40. CEU: 0.7. **Instructor:** George Gehrels, University of Arizona.

527. **Earthscope Institute: Geochronology and the Earth Sciences.** Fri.–Sat., 17–18 Oct., 8:30 a.m.–5:30 p.m. **US$50** (FREE for students); includes lunch. Limit: 70. CEU: 1.6. **Instructors:** Rebecca Flowers, Univ. of Colorado–Boulder; James Metcalf, Univ. of Colorado–Boulder; Ramon Arrowsmith, Arizona State Univ.; Blair Schoene, Princeton Univ.; Tammy Rittenour, Utah State Univ.

GSA 2014 Highlights

16. **The meeting does not end on Wednesday!** Or at least not until after Beer O'clock. The Exhibit Hall closes at 2 p.m., talks end at 5 p.m., and your evening beer will be served in the Poster Hall.

GSA ASSOCIATED SOCIETY **COURSES**

SOCIETY OF ECONOMIC GEOLOGISTS

Applied Structural Geology in Exploration and Mining. Fri.–Sat., 17–18 Oct., 9 a.m.–5 p.m. Limit: 40. **Instructors:** Julia Kramer Bernhard, SRK Consulting; Hubert Mvondo, SRK Consulting; Wayne Barnett, SRK Consulting; Findlay Craig, SRK Consulting. For course cost, contact Elizabeth Holley at elizabethholley@segweb.org.

PALEONTOLOGICAL SOCIETY

Reading and Writing of the Fossil Record: Preservational Pathways to Exceptional Fossilization. Sat., 18 Oct., 9 a.m.–6 p.m. FREE, with no registration needed and no course attendance limit. **Instructors:** Marc Laflamme, Univ. of Toronto; James D. Schiffbauer, Univ. of Missouri; and Simon Darroch, Yale Univ.
Learn more at **www.paleosoc.org.**

Note: GSA does not handle registration for these courses. Please use the contact information provided online to learn more and to register.

CAREER ENHANCEMENT

GEOSCIENCE CAREERS IN INDUSTRY PROGRAM

Connecting Students and Industry

This day of progressive sessions includes a student workshop to prepare for job searches, a poster session for students to discuss their research with sponsoring companies, and the popular "Geology in Industry" lunch panel. In the afternoon, students will have a chance to learn about the companies, their unique cultures and work environments, and the types of geoscience careers available. The program concludes with an evening reception for student research presenters, sponsoring corporations, and GSA's recently graduated members. Learn more and register via the annual meeting community page, community.geosociety.org/gsa2014/science/careers/.

EMPLOYMENT SERVICE CENTER

We're With You Year-Round

If you are close to graduating or are looking for a new position, this service is for you! Prior to the Annual Meeting, employers post jobs in this database and search résumés to set up interviews during the meeting. Don't miss this opportunity! GSA members can post their résumés for FREE. Learn more at community.geosociety.org/gsa2014/science/careers/.

K–12 TEACHERS

Stock up on Continuing Education

Short courses are an excellent way to earn professional development hours, and there are several courses this year designed specifically for you. This year, K–12 teachers who attend a short course in the morning will be able to attend a short course in the afternoon for free! Check the meeting website to see which courses are included in this special.

SCIENCE COMMUNICATION WORKSHOP

Hone Your Skills

Hyatt Regency Vancouver, Sat., 18 Oct., 8 a.m.–noon.

Professionals: US$35; students US$25. Includes continental breakfast.

Limit: 30. *Sign up when you register for the meeting.*

Instructors: Christa Stratton, Justin Samuel, and Kasey White of The Geological Society of America, and Beth Bartell of UNAVCO.

Scientist-communicators who can present messages clearly and foster respect between science and the lay public are essential for true public engagement with critical scientific issues, but traditional scientific training typically does not prepare scientists to be effective communicators. This workshop will give you guidance on how to hone your public communication and outreach skills as well as the opportunity to practice in a safe and comfortable setting.

You'll Learn

- How to create clear and concise messages that are targeted to your audience;
- How to stay on-message during a media interview;
- Best practices in social media communications;
- How to identify opportunities for interacting with the lay public in your community; and
- How to approach policy makers on scientific issues.

GSA 2014 Highlights

17. **Now's your chance:** If you are too busy before and during the meeting—all post-meeting field trips depart Thursday morning, 23 Oct.! (Check early for availability.)

Back for an encore in 2014 is the highly successful workshop for early-career geoscientists on the process of preparing and publishing papers.

What's Your Problem; What's Your Point?

When: Saturday, 18 Oct., 8:30–11 a.m.

FREE (but an application is required) — *Light breakfast provided.*

Publishing your work is important, but how do you go about it? This workshop, led by science editors from GSA's journals, will focus on the process of preparing your research for submission to scholarly journals. Presentations by the three editors will be followed by roundtable discussions and a question-and-answer period.

Before You Begin

You have a big pile of data and lots of good ideas. How do you parse all that into discrete, coherent papers? Knowing how to frame and structure your work for publication is fundamental. Find out what editors and reviewers look for, such as whether the paper fits the scope of the journal to which it was submitted, and whether the stated aims of the paper match the results and interpretations reported.

Writing and Revising

The aim of this workshop isn't to address the writing process itself, but to focus on the bigger creative picture. How do you frame your paper to meet the journal's aims and the reviewers' expectations? Find out what makes a well-prepared manuscript, from an attention-getting cover letter to an introduction that serves its purpose to well-thought-out figures and tables that communicate your ideas.

- Get advice on what to include, what to leave out, and how best to structure your manuscript.
- Learn how to avoid frustrating your paper's reviewers.
- Then learn how to submit your paper online and what to expect during the review and publication process.

Reviewing: Be a Part of the Scholarly Community

Peer review is integral to publishing, so both reviewing and being reviewed are essential parts of your role as a scientist. As an early-career author, what kind of criticism should you expect and how should you respond to critical reviews? Reviewing the work of others is also a great way to discover what works in a paper and what does not, and it teaches you the things to avoid in your own writing. Hear from the experts on what constitutes a good review and how you benefit from being a reviewer.

Apply to Attend

Space is limited for this workshop. Please e-mail **editing@geosociety.org** for an application. We welcome applications from graduate students, early-career researchers, people getting back into research after a hiatus, post-docs, or anyone for whom this discussion is relevant.

GSA 2014

19-22 October | Vancouver, BC, Canada

EXHIBIT WITH GSA!

The Geological Society of America invites your company or institution to increase its visibility and showcase its products and services at the GSA Annual Meeting & Exposition in beautiful Vancouver, British Columbia, Canada, on 19–22 October 2014.

The GSA meeting is a world-class event that attracts an average of 6,000 global earth scientists, geologists, geophysicists, educators, and students at all levels of expertise and from all sectors: academia, government, business, and industry. Exhibits will be located in the Vancouver Convention Centre.

What does this mean to you?

- Visit one-on-one with the leading geoscientists in the world;
- Meet face-to-face with more than 2,000 prospective students in a relaxed, informal setting;
- If you're introducing a new product, revitalizing an old one, or would like to highlight your services, you'll meet your future customers at the GSA Annual Meeting Expo.

Benefits of exhibiting:

- Promotion in GSA's conference-related print and electronic products: *GSA Today*, the official conference program, and special meeting editions of GSA's e-newsletter, *GSA Connection*;
- Additional market outreach opportunities;
- Your products and services listed in the on-site conference program and on GSA's website before and after the meeting;
- Up to 50 one-time VIP admission passes so you can invite customers to the exhibit hall;
- For commercial booths: One complimentary meeting registration (approx. $460 value) per organization so you can experience the whole meeting; and
- An exhibitor's lounge so you can relax and take a break.

Learn more at **community.geosociety.org/gsa2014/exhibitsponsor/.**

Calling all

SPONSORS

Does your company employ geoscientists?
Or does your company provide goods and services important to the work of geoscientists? Be front and center with visibility to thousands at GSA's Annual Meeting & Exposition.

Sponsorship support is vital to the success of our meeting and we value your participation.

2014 GSA ANNUAL MEETING & EXPOSITION

Find Treasures at the GSA Foundation's Silent Auction

Thanks to everyone who supported the GSA Foundation's 2013 Silent Auction in Denver. We had an amazing event! Funds raised helped support *On To the Future*, GSA's Diversity in the Geosciences project to bring 125 students from underrepresented geosciences groups to their first annual meeting. The remarkable attendance at the anniversary event helped increase awareness of the Foundation's fundraising mission in support of Society-wide projects and programs.

Donate to the Foundation's Silent Auction

We're seeking items that broadly pertain to the geosciences:

- Geo-gifts, jewelry, and apparel donations are great for our pre-holiday meeting;
- Help us build our "well-equipped geoscientist" with tools, field gear, supplies, software;
- Donate geologic specimens, gems, and fossils;
- Contribute to our selection of wine and wine accessories;
- Give gift certificates (i.e., Amazon, special events, trips, restaurants); and
- Remember that GSA meeting attendees love books.

Proceeds from this year's Silent Auction will help support GSA's Diversity Committee's projects.

Visit us in Vancouver.
Browse! Bid! Buy!

Contact: GSA Foundation Silent Auction, Ann Crawford, acrawford@geosociety.org, +1-800-472-1988 ext. 1053.

GSA 2014

SPONSORSHIP OFFERS

- Contact with thousands of the best and brightest geoscience students soon to be entering the workforce;
- Visibility throughout the meeting, onsite and beyond, to a relevant audience; and
- Awareness of your company as a partner supporting GSA's programs and doing business in our members' communities.

Opportunities range from sponsorship of the Geoscience Career program, where you can get to know potential future hires, to elements of the meeting, such as networking lounges, the icebreaker opening reception, field trips, and the mobile meeting app—all of which offer high visibility to attendees.

Learn more at **community.geosociety.org/gsa2014/exhibitsponsor/**
or contact Debbie Marcinkowski at +1-303-357-1047 or dmarcinkowski@geosociety.org
for help in selecting the best fit for your company.

Tourism Vancouver/ Dannielle Hayes.

Event Space Requests

You still have time to reserve a meeting room for your business meeting, luncheons, award ceremonies, parties, alumni receptions, and more. Please complete and submit the Event Space Request Form at **community.geosociety.org/gsa2014/socialbusiness/spacerequest** along with your payment. Your event space request will assist GSA staff in determining the size of room needed for your event.

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http://community.geosociety.org/gsa2014/home/

The Geological Society of America® ON TO THE FUTURE 2014

Back by Popular Demand

In its inaugural year, GSA's On To the Future (OTF) Program supported 121 diverse students to attend the 2013 GSA Annual Meeting in Denver. Of the 121 students, 47% were the first students in their families to attend college (first-generation); 39% were non-Caucasian; 7% were veterans; and 7% were students with disabilities. OTF plans to fund more diverse students to attend the 2014 Annual Meeting.

To learn more about this program and/or to help fund students, please go to **community.geosociety.org/OTF/.**

Photo by Bret Webster.

MEET US IN THE SOCIAL MEDIA–SPHERE

Twitter @geosociety #GSA2014

Facebook https://www.facebook.com/GSA.1888

LinkedIn https://www.linkedin.com/company/geological-society-of-america

GSA's Connected Community

http://community.geosociety.org

Commentary

GSA CONNECTED COMMUNITY INITIATIVE

Robert J. "Bob" Tracy, *GSA Fellow*

I am sure that most of you have noticed that GSA has been shifting its communications more and more to the new GSA Connected Community in the last year or so. Those of you who serve on various GSA committees should already have noticed this transition, which was approved by Council and is being implemented by GSA staff.

GSA values your membership and appreciates every member's commitment and investment of resources in the Society, and we feel that the Connected Community will ultimately lead to more efficient and effective communication between the Society and our members as well as member-to-member discussions and exchanges. Joining the GSA Connected Community is actually quite easy, since all members already have a profile that has been created from the member database.

Once you have logged in, you can complete and customize your profile by adding any other relevant personal or professional information that you think is appropriate, and adding a photo of yourself. I personally like to see colleagues in the field or in their labs, rather than posing for a "mug shot," but, of course, the choice is yours! A variety of security settings are in place so that you can customize access to each part of your profile information and decide how it should be used. The Connected Community is ideal for conducting discussions and utilizes a hybrid of listserv and threaded-discussion–forum technology. Such discussions are the primary communications vehicle for groups inside the Connected Community. If you belong to one or more GSA Divisions, you will be subscribed to the respective Division community discussion group so you can keep up with your colleagues in that discipline. Any member can belong to the Open Forum (all-GSA) community discussion; members without a Division affiliation will be subscribed to the Open Forum. Members will automatically receive a "daily digest" e-mail for each community they belong to, highlighting discussion posts on days when there is activity.

Just over 10% of the membership has joined the Connected Community so far . We are confident that many more of you will recognize the advantages of this new communications tool if you have a chance to try it, so the Society has decided to fully launch the GSA Connected Community by enrolling all members in the near future. All members who do not currently belong to the GSA Connected Community will receive an e-mail to inform them that they have been enrolled. They will also receive instructions on how to log in and change their settings if they don't wish to receive e-mails or would like to get them in "real time" rather than as a daily digest. Of course, anyone who is automatically enrolled can opt out at any time—the directions for unsubscribing will be prominently displayed. But I strongly encourage all of you to give it a try—as a long-time member of GSA (since 1968) and as a member of GSA Council, I have found the GSA Connected Community to be a valuable new resource for members, and I think you will as well.

For the advancement of gemmological science

We proudly present the new Dr. Eduard Gübelin Research Scholarship, an annual grant supporting a scientific research project in the field of gemmology in the broadest sense. The annual value is CHF 30,000 (USD 33,000).

For guidelines, application forms and further information please see:

www.gubelingemlab.com/scholarship/

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The Role of the Geoscientist in Building and Maintaining Infrastructure

GSA members are invited to submit comments and suggestions regarding the following Position Statement DRAFT by 15 July 2014. Go to **www.geosociety.org/positions/** to learn more and submit comments.

Position Statement

Geoscientists have a fundamental role in the planning, construction, and maintenance of infrastructure systems with respect to their relationship to local geology.

Purpose

This position statement (1) summarizes The Geological Society of America's consensus view on the importance of geoscientists' contribution to infrastructure concerns; (2) describes geoscientists' roles in addressing aging and expanded infrastructure; and (3) recommends actions to incorporate geoscientists, expand consistency of skills, and educate the public on the natural resource setting for infrastructure systems.

Rationale

Infrastructure comprises the interdependent technical structures and public works systems that support society—including roads, bridges, waterways, water supply, sewers, electrical grids, and telecommunications. These systems provide services and resources essential to maintaining the health, safety, and sustainability of communities. A large portion of existing infrastructure was built over the past century; however, without ongoing maintenance and improvement, these systems will deteriorate over time, and in many locations they are approaching and even exceeding their original design life. Additionally, recent gains in prosperity and population in emerging economies have increased demand for the improvement and expansion of infrastructure systems.

The viability and integrity of public works is also dependent on the quality and availability of industrial minerals and rocks used in the construction process. While it is clear that current infrastructure needs crucial assessment, maintenance, and upgrades, future infrastructure likely will require new design approaches and priorities. The highly interdependent nature of geology and the built environment necessitates a thorough understanding of earth dynamics and geologic materials in the engineering and construction of these complex systems.

Geoscientists are essential in the planning, design, and construction of infrastructure, as well as its maintenance and modernization. This includes (1) characterization of subsurface geological conditions with respect to their effect on design, construction, and on-going sustainability; (2) planning for new infrastructure and the assessment of existing infrastructure with respect to environmental impact, natural resource availability, and the incorporation of regional and site-specific natural-hazard analysis; (3) evaluating and monitoring construction methods in high-risk areas (e.g., unstable slopes, high water table, and sensitive soil conditions); and (4) continual monitoring of geologic conditions at sensitive and critical facilities (e.g., power plants).

Competent infrastructure is not only dependent on the geologic conditions where these systems are built, but also on the expertise of the geoscientist involved in the environmental and geotechnical study that compliments the engineering. This expertise is the result of education, experience, and qualification. Licensure of applied geologists, or a similar form of certification, ensures minimum criteria of knowledge and work history necessary to promote consistent best practices and ethical conduct.

Recommendations

1. **Governments at all levels are encouraged to incorporate licensed geologists or geologic engineers in the infrastructure design and planning process.**[1] In order to promote the value (and participation) of geoscientists in infrastructure development and maintenance, it is essential to incorporate licensed geologists or geologic engineers in planning and design. For example, in some municipalities, geologists are required to provide recommendations and participate in the design process for development on steep slopes in known landslide hazard areas. Similar planning-level participation from geologists is essential for construction in flood zones, earthquake prone regions, and karst environments. Geoscientists' involvement with planning and design will raise the awareness and consideration of geologic conditions.
2. **Legislative bodies and government agencies are encouraged to include geoscientists within the public process.** If not properly planned, the basic infrastructure of communities can be quickly overwhelmed, especially in the face of disaster. Flood damage from levee failures along the Mississippi River in 2011, damage to power grids and transportation systems in the northeastern United States due to Hurricane Sandy in 2012, and hindering of post-typhoon aid to the Philippines due to substantial airport damage from Typhoon Haiyan in 2013 are reminders of the havoc resulting from poor planning and infrastructure disrepair. Inclusion of geoscientists in legislative forums, especially those concerning policy, can provide needed awareness of the relevance of the role the earth sciences play in planning public works.
3. **Establish and promote consistent requirements of professional geologist licensure programs.** Some countries, notably Canada and Australia, and parts of the United States and Europe require licensure or comparable certification if geoscience activities are to be performed in the public domain. In the United States, 30 states are members of the National Association of State Boards of Geology (ASBOG), which uses standardized ASBOG examinations to license professional geologists and provides guidance in maintaining a registration program for professional geologists. Licensure requirements promote technical consistency in the profession and reinforce best practices to ensure public safety and welfare.

4. **Increase awareness about natural hazards in high risk communities.**[2, 3] The scientific knowledge afforded by geoscientists is essential in providing guidance for infrastructure design when building in areas that are threatened by natural hazards (e.g., floods, earthquakes, landslides, tsunamis, and storm surges).
5. **Institutions of higher learning are invited to partner with applied earth-science professionals to contribute practical curricula with a focus on infrastructure systems.**[1] Increasing urbanization and demands for improvement in existing infrastructure require a highly skilled, versatile, and innovative workforce of applied earth-science professionals. Given the growing demand and infrastructure needs, the role of the applied geoscientist—especially one who has geotechnical and engineering expertise—will be crucial in the coming years.

Referenced GSA Position Statements That Support These Recommendations

1. Promoting Earth Science Literacy for Public Decision Making, April 2013: http://www.geosociety.org/positions/pos21_ESLiteracy.pdf.
2. Geoscience and Natural Hazards Policy, revised April 2012: http://www.geosociety.org/positions/pos6_natHazards.pdf.
3. Managing U.S. Coastal Hazards, October 2013: http://www.geosociety.org/positions/position22.htm.

Opportunities for GSA and GSA Members to Help Implement Recommendations

- **Licensing or certifying geologists** is an important component for increasing public and political recognition and support for the science and profession. Professional geoscientists in countries or provinces without licensure should consider developing accreditation programs. In the United States, geologists in states without licensure are encouraged to contact ASBOG to learn how to bring licensure into their states or to obtain professional certification from a national organization, such as the American Institute of Professional Geologists (AIPG). Geologists are also encouraged to contact legislatures to promote the addition of geologist licensure to state or national legislation.
- **Work with local and regional planning boards** or institutions to educate them on the value of geoscientists in the planning and design of infrastructure systems.
- **Support government geologic surveys.** These institutions provide the essential knowledge base and resources for developing and building infrastructure.
- **Encourage and provide expert input** on public policy that will improve society's resilience to natural hazards.
- **Promote partnerships between geology departments,** especially those working in tandem with civil engineering programs, and practicing professional geoscientists to review academic curricula with a focus on skills used in infrastructure planning, development, and maintenance. Encourage experienced earth-science professionals with pertinent industry knowledge to share their knowledge and perspective with geology and geologic engineering programs. Fostering such partnerships would provide useful insight into developing pertinent curricula that would prepare college graduates to meet the future challenges of society. As part of the curriculum review, coursework should be considered that would satisfy educational requirements in countries or regions where certification or licensure is required to practice geology in the public domain.

About The Geological Society of America

The Geological Society of America, founded in 1888, is a scientific society with more than 26,000 members from academia, government, and industry in more than 100 countries. Through its meetings, publications, and programs, GSA enhances the professional growth of its members and promotes the geosciences in the service of humankind. Headquartered in Boulder, Colorado, USA, GSA encourages cooperative research among earth, life, planetary, and social scientists, fosters public dialogue on geoscience issues, and supports all levels of geoscience education. Please direct inquiries about the GSA or this position statement to Kasey White, GSA's Director for Geoscience Policy, at +1-202-669-0466 or kwhite@geosociety.org.

GSA Division Awards

MINERALOGY, GEOCHEMISTRY, PETROLOGY, AND VOLCANOLOGY (MGPV) DIVISION

Nominations due 15 July 2014

The MGPV awards emphasize achievements in geologic and multidisciplinary approaches, recognizing that geologic work is by nature generalistic and has an important field component, with Earth as the natural laboratory.

MGPV Distinguished Geologic Career Award

This award will go to an individual who, throughout his or her career, has made distinguished contributions in one or more of the following fields of research: mineralogy, geochemistry, petrology, and volcanology, with emphasis on multidisciplinary, field-based contributions.

Nominees need not be citizens or residents of the United States, and membership in The Geological Society of America is not required. The award will not be given posthumously.

MGPV Early Career Award

This award will go to an individual near the beginning of his/her professional career who has made distinguished contributions in one or more of the following fields of research: mineralogy, geochemistry, petrology, and volcanology, with emphasis on multidisciplinary, field-based contributions. This is a new award that was generously endowed by the estate of James B. Thompson Jr., who believed in the importance to geology of understanding minerals. J.B. Thompson's work, regardless of subject, was always based on solid field observations. In his acceptance speech for the Day Medal in 1964, he said, "True success in the laboratory should stimulate field investigations rather than discourage them. It would be embarrassing indeed if we were to construct an internally consistent geology, chemically and physically sound, perfect in fact but for one flaw: the lack of a planet to fit it."

Nominations are restricted to those who are within eight years of their final degree. For example, awards decided before 31 Dec. 2014 will include all candidates whose final degree was awarded no earlier than 1 Jan. 2007. Extensions of up to two years will be made for nominees who have taken career breaks for family reasons or serious illness. Nominees need not be citizens or residents of the United States, and membership in The Geological Society of America is not a requirement. The award will not be given posthumously.

How to Nominate

Submit a cover letter from an MGPV Division member, no longer than three pages, summarizing the nominee's most important accomplishments in geologic approaches to mineralogy, geochemistry, petrology, and/or volcanology. Special attention should be paid to describing how the nominee's published work demonstrates field-based multidisciplinary geologic accomplishments of a ground-breaking nature. The letter should include the name, address, and contact information of the nominator as well as from whom letters of support can be expected. The nominee's curriculum vita and three letters of support (either from members or non-members of GSA and/or the MGPV Division should also be included. Send materials to J. Alex Speer, Mineralogical Society of America, 3635 Concorde Pkwy Ste 500, Chantilly, Virginia 20151-1110, USA, jaspeer@minsocam.org. For more information, go to www.geosociety.org/divisions/mgpv/awards.htm.

LIMNOGEOLOGY DIVISION

Kerry Kelts Student Research Awards

Applications due 1 Aug. 2014

This award (US$1,000) for undergraduate or graduate student research related to limnogeology, limnology, or paleolimnology is named in honor of Kerry Kelts, a visionary limnogeologist and inspiring teacher. The award will be presented at the Limnogeology Division Business Meeting and Reception at the 2014 GSA Annual Meeting in Vancouver in October. Note that the 2015 award deadline will be earlier, in spring, to better serve students needing research funds during summer.

How to Nominate

The application consists of a research summary and a short CV (two pages max.). The research summary must contain a description of the proposed research, its limnogeological significance, why the award funds are needed for the project, and a brief description of the student's other funding sources. Be sure to include a title. The maximum length is five pages, including figures and captions; the list of references cited is not included in this limit.

Prepare your application as PDF(s) that include your last name in the file name(s), and send it to Amy Myrbo at amyrbo@umn.edu. Please include "Kelts Award application" in the subject line.

If you are interested in supporting this awards program, please send your donations, designated for the Kerry Kelts Research Awards of the Limnogeology Division, to GSA, P.O. Box 9140, Boulder, Colorado 80301-9140, USA. Or visit www.gsafweb.org/makeadonation.html and select the Kerry Kelts Student Research Award. For more information, please visit http://rock.geosociety.org/limno/Kelts_Award_2014_announcement.html.

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Help Shape the Future of Geoscience— Serve on a GSA Committee!

Deadline: 15 July 2014

Terms begin 1 July 2015 (unless otherwise indicated)

If you are looking for the opportunity to work toward a common goal, give back to GSA, network, and make a difference, then we invite you to volunteer (or nominate a fellow GSA member) to serve on a Society committee or as a GSA representative to another organization.

Learn more and access the nomination form at www.geosociety.org/aboutus/committees/. Use the online form or download a hardcopy and mail it to Pamela Fistell, GSA, P.O. Box 9140, Boulder, CO 80301-9140, USA; fax: +1-303-357-1074; pfistell@geosociety.org.

2015–2016 VACANCIES

Committee	Vacancies/Terms
Academic and Applied Geoscience Relations	Two 3-year terms (AM, T/E)
Annual Program	Two 4-year terms (AM, B/E)
Arthur L. Day Medal Award	Two 3-year terms (T/E)
Diversity in the Geosciences	Three 3-year terms (AM, T/E)
Education	Two 4-year terms and one 2-year term (AM, B/E, T/E)
eGSA	Two 3-year terms (AM, T/E)
Geology and Public Policy	Two 3-year terms (AM, B/E, T/E)
Joint Technical Program	Two 2-year terms, starting 1 Dec. 2014 (T/E)
Membership	One 3-year term (B/E)
Nominations	Two 3-year terms (B/E, T/E)
Penrose Conferences and Field Forums	Two 3-year terms (T/E)
Penrose Medal Award	Two 3-year terms (T/E)
Professional Development	One 3-year term (T/E)
Publications	One 4-year term (AM, B/E, T/E)
Research Grants	Seven 3-year terms (B/E, C)
Young Scientist Award (Donath Medal)	Two 3-year terms (T/E)

REPRESENTATIVES TO OTHER ORGANIZATIONS

GSA Representative to the AAAS Consortium of Affiliates for International Programs (CAIP)	One 3-year term, starting 1 Jan. 2015 (T/E)
GSA Representative to the U.S. National Committee for Soil Science (USNC/SS)	One 3-year term, starting 1 July 2015 (T/E)

AM—Meets at the Annual Meeting
B/E—Meets in Boulder or elsewhere
C—Extensive time commitment required during application review period (15 Feb.–15 Apr.)
T/E—Communicates by phone or electronically

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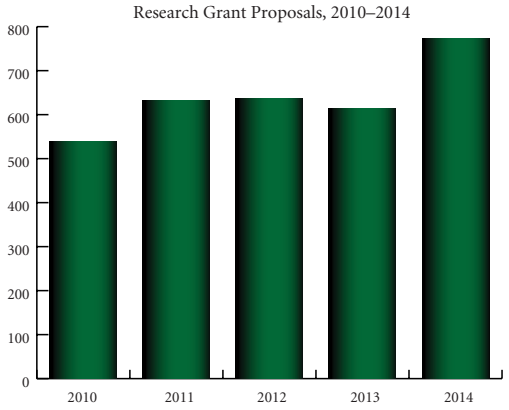
P. Geoffrey Feiss, GSA Foundation President

Generous GSA Members Fund On To the Future and Travel Grants for Northeastern Section Urban/Metropolitan University Students

Thanks again to all our donors! We want to remind you of the impact your generosity has had on advancing the careers of young geoscientists. With your support, hundreds of students have access to experiences that enhance their scientific skills and establish relationships that will shape their professional path in the geosciences. You and other generous donors have enabled us to reach our US$70,000 goal for funding On To the Future program for 2014.

A generous a three-year pledge by GSA member Paula Gural and her husband Jeffrey will enable GSA to serve more students. In addition to an OTF cohort of 125, who will attend the Annual Meeting, five students from urban and metropolitan universities affiliated with GSA's Northeastern Section will receive a generous travel grant to attend the 2015 through 2018 Northeastern Section meetings. Tahlia Bear, GSA's new Careers and Diversity Program Manager, will coordinate these programs. A special *thank you* to the Gurals and to every member who has helped GSA move forward boldly with these initiatives.



Of course, support from GSA members and corporate sponsors remains essential to meeting the needs of growing participation in established and beloved programs.

GSA's venerable research grant program received 774 proposals this year, a 26% increase over 2013.

This summer, through the GeoCorps™ America and Mosaics in Science programs, GSA will help place a record 147 geoscientists in paid, temporary positions on public lands managed by the National Park Service, the U.S. Forest Service, and Bureau of Land Management.

Simply stated, your financial partnership is a key catalyst to expanding successful programs to meet growing demand. We welcome your inquiries about how you can support both innovative and established programs, and thereby strengthen our profession. Thanks again to all GSA members who have enabled GSA to move boldly forward with these initiatives.

Please contact Chris Tallackson for information on how to support GSA programs at ctallackson@geosociety.org or +1-303-357-1007, or make a gift online at **www.gwafweb.org,** the GSA Foundation's secure giving website.

Classified Rates—2014

Ads (or cancellations) must reach the GSA advertising office no later than the first of the month, one month prior to the issue in which they are to be published. Contact advertising@geosociety.org, +1.800.472.1988 ext. 1053, or +1.303.357.1053. All correspondence must include complete contact information, including e-mail and mailing addresses. To estimate cost, count 54 characters per line, including punctuation and spaces. Actual cost may differ if you use capitals, boldface type, or special characters. Rates are in U.S. dollars.

Classification	Per Line for 1st month	Per line each addt'l month (same ad)
Positions Open	$9.10	$8.85
Fellowship Opportunities	$9.10	$8.85
Opportunities for Students		
First 25 lines	$0.00	$5.00
Additional lines	$5.00	$5.00

Positions Open

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Appointment: 12-month appointment. Tenure and departmental affiliation will be considered based on candidate's background and interest. Position is located on the campus of Texas A&M University in College Station, Texas.

General Duties and Responsibilities: The successful candidate is expected to lead the Texas Water Resources Institute (twri.tamu.edu) which focuses on water-related applications, including water quality, supply, and water use in Texas, the U.S., and internationally. The director will provide intellectual, philosophical, and strategic leadership to system faculty, and the institute's scientists, staff, and students to meet teaching, research, and extension missions. The director will be responsible for developing optimum tactical and strategic responses to water-related issues and opportunities and will manage the human and fiscal resources, including leading a contract and grants program that elevates water-related efforts throughout the Texas A&M University System.

Required Education/Experience: Position requires a Ph.D. and fifteen years of relevant post-Ph.D. experience with a documented record of distinction in teaching, research, and/or extension, along with experience leading and managing interdisciplinary water-related programs and teams.

Preferred Education/Experience: Preference will be given to candidates with a Ph.D. in water-related science, engineering, policy or management and who are recognized experts in the field.

Application Instructions: Applicants should apply online at **https://greatjobs.tamu.edu** (NOV #07633). An application should contain: (1) a cover letter which outlines the candidate's vision for the position: (2) a current resume or curriculum vitae; and (3) contact information for three references. Address inquiries to Search Committee Co-Chairs: Dr. Binayak Mohanty, 2117 TAMU, College Station, TX 77843-2117, bmohanty@tamu.edu, +1-979-458-4421; Dr. Jaroy Moore, 1102 E. FM 1294, Lubbock, TX 79403-6603, j-moore@tamu.edu, +1-806-746-6101. **Equal Opportunity/Affirmative Action/Veterans/Disability Employer**

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WISCONSIN GEOLOGICAL & NATURAL HISTORY SURVEY

The Wisconsin Geological & Natural History Survey (WGNHS) invites applications for a Samples and Laboratories Manager. We seek candidates with proven organizational and analytical skills to assist with the study of rock and sediment samples and associated data by WGNHS colleagues, collaborators, and clients. A strong record of successful educational outreach is also required.

The WGNHS, a unit within University of Wisconsin–Extension, has established itself as a nationally recognized research and outreach organization through its innovative work related to the bedrock, groundwater, and glacial geology of Wisconsin. We are now looking to enhance our basic and applied research programs by strengthening our capabilities in the areas of samples and laboratories management. The successful candidate will play a leading role in the management of the WGNHS' Research Collections and Education Center as well as geologic and geochemical laboratories. Laboratory/analytical experience related to Paleozoic or Precambrian chronostratigraphy, hydrostratigraphy, provenance, or diagenesis is a plus.

Our academic atmosphere, collaborative opportunities with university, state, and federal colleagues, focus on research and outreach, and compact size sets the WGNHS apart from most geoscientific organizations. Take this opportunity to grow with us. For more information, please visit **http://wgnhs.uwex.edu/jobs/.** Application submission deadline: **1 July 2014.**

FULL TIME LECTURESHIP IN GEOLOGY
CALIFORNIA STATE UNIV., BAKERSFIELD

The Dept. of Geological Sciences at California State University, Bakersfield, invites applications for a full-time (academic year) lecturer position starting 8 Sept. 2014, and continuing through the end of the 2015–2016 academic year. The position is not tenure-track but it is renewable pending funding, and subject to performance review. The successful candidate will be expected to be able to teach undergraduate geology courses including general education, lower- and upper-division majors courses, and, possibly, a graduate course in their area of expertise. A Ph.D. in geology or closely related field is preferred, but a M.S. will also be considered. A candidate with an emphasis in groundwater hydrology or mineralogy/petrology is preferred but the position is open and other areas of emphasis will also be considered.

Review of applications will begin immediately, and continue until the position is filled. For questions, contact Jan Gillespie at +1-661-654-3040 or by e-mail at jgillespie@csub.edu. CSUB is strongly committed to excellence and cultural diversity. The university actively seeks candidacy of women, underrepresented groups, and all qualified individuals.

ENERGY GEOSCIENCES POSITION
ENERGY SCIENCES INSTITUTE
YALE UNIVERSITY

Yale University seeks to recruit faculty at the mid-career or senior rank to the newly established **Energy Sciences Institute** in the area of energy geosciences with a focus on carbon management. The Institute is one of several science and engineering initiatives located at Yale's West Campus, a recently acquired 136-acre campus that has provided the University with unparalleled opportunities to stimulate and support cutting-edge, interdisciplinary research. Institute faculty have primary appointments in any of several science departments within the Faculty of Arts and Sciences. This position will be a primary appointment in the Dept. of Geology and Geophysics. Candidates must have a Ph.D. in a relevant discipline, and an outstanding record of research that demonstrates originality in addressing significant questions in the study of energy geoscience using field, experimental, and/or theoretical approaches. Relevant research areas include, but are not limited to: geochemistry, fluid mechanics, and rock mechanics relating to carbon sequestration; geoengineering; carbon cycle processes; and monitoring or subsurface imaging. Applicants should create a profile at **https://academicjobsonline.org/ajo/jobs/4004** and upload a statement of research plan, curriculum vitae, and up to five reprints of published work(s). Applicants should also arrange for four references to upload their letters of recommendation. For further information, contact Ryan Croteau at ryan.croteau@yale.edu or Energy Sciences Center P.O. Box 27388 West Haven, CT 06516-7390. The review of applications will begin on **1 Sep 2014**. Yale University is an affirmative action, equal opportunity employer. Yale values diversity among its faculty, students, and staff and strongly encourages applications from women, persons with disabilities, underrepresented minorities, and protected veterans.

ASSOCIATE DIRECTOR FOR RESEARCH
ASSOCIATE OR SENIOR SCIENTIST
KANSAS GEOLOGICAL SURVEY (KGS)
UNIVERSITY OF KANSAS, LAWRENCE

Full-time position to provide advice and direction on research and assist in day-to-day operation of the KGS. The individual will be expected to lead an externally funded, active research program in an area relevant to Kansas. Academic (Faculty-equivalent), sabbatical-eligible position at the rank of Associate or Senior Scientist. Requires Ph.D. in geology or closely related geoscience field, at least five years supervisory/management experience in scientific programs or organizations. Full position information at **www.kgs.ku.edu/General/jobs.html.** Review begins 15 June 2014. Apply online at employment.ku.edu/academic/101BR. For information about the position, or to recommend qualified candidates, contact Rex Buchanan,rex@kgs.ku.edu, +1-785-864-2106. For other aspects of the position contact Annette Delaney, hr@kgs.ku.edu, +1-785-864-2152. KU is an EO/AAE. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability, or protected veteran status.

TENURE-TRACK FACULTY
POSITIONS IN GEOLOGY
PEKING UNIVERSITY, BEIJING

Peking University offers tenure-track positions for outstanding young scientists who worked in geological disciplines including Petrology and Mineralogy, Isotopic Geochemistry, Structural Geology and Tectonics, Palaeontology and Biostratigraphy. Successful candidates will be provided competitive salaries

and start-up funds, in line with national recruitment program of the "One-Thousand- Young-Scientists-Program" of the Chinese government or the "One-Hundred- Scientists-Project" of Peking University.

Applicants should have a Ph.D. degree within ten years from a reputable university or research institution, and should have several years' postdoctoral experience. Candidates with proven tenure-track record of research fellow or faculty status are strongly encouraged to apply. Salary level and other supports provided by Peking University include

- Starting-up funds up to 1-3 million RMB yuan, from the "One- Thousand- Young- Scientists-Program" of the Chinese government or the "One-Hundred-Scientists-Project" of Peking University.
- Salary level depends on qualification, annual salary in the scale of 0.2-0.4 million RMB yuan, subject to the background of the candidate;
- Housing and moving costs up to 1 million RMB yuan;
- Other benefits such as excellent education opportunity for children, and health care, etc.

All interested applicants should submit: (1) a cover letter, (2) CV, (3) a research and teaching statement, (4) a list of up to five references, and (5) five representative publications.

All application material should be send via e-mail to Prof. Yongfeng Zhu (yfzhu@pku.edu.cn).

POSTDOCTORAL RESEARCH ASSOCIATE, GEOCHEMISTRY, PRINCETON UNIV.

We are accepting applications for a postdoctoral researcher in biogeochemistry in the Department of Geosciences at Princeton University. Qualifications include a Ph.D. in Geosciences or a related field. Areas of research include isotopic studies of the organic matter trapped within marine microfossils, including diatoms. Expertise in nitrogen isotope geochemistry, paleoceanography, and sedimentary separations is strongly preferred. The position is available for one year, with a possibility for renewal up to two years, contingent upon satisfactory performance and funding. Applicants should include a cover letter, a curriculum vitae including a publication list, and contact information for three references by applying on the Princeton University jobsite at https://jobs.princeton.edu/ Requisition 1400252.

Princeton University is an equal opportunity employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability status, protected veteran status, or any other characteristic protected by law. This position is subject to the University's background check policy.

HEAD OF EARTH & ENVIRONMENTAL SCIENCES AND PHYSICAL GEOGRAPHY ASSOCIATE OR FULL PROFESSOR IRVING K. BARBER SCHOOL OF ARTS & SCIENCES, UNIV. OF BRITISH COLUMBIA OKANAGAN CAMPUS, KELOWNA

We seek a candidate with demonstrated excellence in research and teaching, strong management skills, and proven ability to lead and motivate faculty, staff, and students. The position of Head will be available 1 July 2015 with a five-year renewable term.

Deadline for applications: **15 Aug. 2014.** Apply online at **www.hr.ubc.ca/careers-postings/faculty.php.** Job ID 17993. Inquiries: Associate Dean for Faculty, Irving K. Barber School of Arts and Sciences (Louise.Nelson@ubc.ca).

Opportunities for Students

Ph.D. Fellowship in Paleobiology/Paleontology at the University of Pennsylvania. A Ph.D. fellowship in Paleobiology is available in the Dept. of Earth and Environmental Science at the University of Pennsylvania. Prof. Lauren Sallan seeks a graduate student to address major paleobiological questions, such as how global change has affected life over time, how life evolves at high levels (macroevolution), and the origins of living biodiversity. Specific topics include, but are not limited to: the causes and consequences of the end-Devonian mass extinction and similar events, the role of predation in setting marine biodiversity, the origins of "living fossils," the effect of the Late Paleozoic Ice Age on the evolution of major groups and early vertebrate evolution. The student can also develop a new project that address the same major questions using quantitative, phylogenetic and descriptive methods. While research in the lab has focused on fishes, any suitable and well-preserved group of fossil animals may be used. Interested students should contact Prof. Sallan directly (laurensallan@gmail.com; arriving at Penn in July 2014) for details.

39th INHIGEO Symposium

International Commission on the History of Geological Sciences

6–10 July

Asilomar Conference Grounds, Pacific Grove, California, USA

Early registration deadline: 2 June

Dual Conference Themes

- Doing the History of the Earth Sciences: What, Why and How?
- California's Place in the History of the Earth Sciences

The program includes 50 oral presentations and a dozen posters. Four panels will address topical issues.

Keynote Speakers

Claudine Cohen: "How should the history of geology be done? Exploring scientific knowledge, practices and culture"

Eldridge Moores: "Gold in 'them thar hills' and valleys: California's gifts to geology"

Ernst Hamm: "Doing the history of the earth sciences: What and why?"

William R. Dickinson: "From California geology to plate tectonics and a circum-Pacific perspective on global geology"

Special Lecture

Charles Paull: "Monterey Canyon: Super highway to the deep-sea" (before the excursion to Point Lobos)

Closing Banquet Talk

Henry Frankel: "Getting submerged for thirty-six years in the drift controversy"

community.geosociety.org/INHIGEO2014/

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Letter

Dear Sirs,

Here is my letter for GSA TODAY. The new GSA revised climate change statement is less bad, but it is not yet good. It notes that climate changes occur from natural causes, but that they occur periodically is still missing. Does the committee that put the statement together doubt cyclicity of ice ages or the 1000-year cyclicity recorded in human history and by six other proxies from around the world? Is no member of the committee aware that the Medieval warm time was warmer than today? That was before fossil fuels were used by the few people alive then.

Periodicity is not new in the geologic literature. Why was it ignored in the new policy statement on climate change?

Sincerely yours,
L.F. Platt
GSA Fellow
Emeritus Professor of Geology
Ph.D. at Yale, 1960

Send letters by e-mail to gsatoday@geosociety.org or by post to Managing Editor, *GSA Today*, P.O. Box 9140, Boulder, CO 80301-9140, USA. Please keep your letter to 300 words or fewer; letters longer than 300 words will not be published. The *GSA Today* managing editor will edit letters for length and clarity. All letters will be forwarded to the *GSA Today* science editors for review before publication, and *GSA Today* reserves the right to reject any letter at the discretion of the science editor. Opinions presented do not reflect official positions of the Society.

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