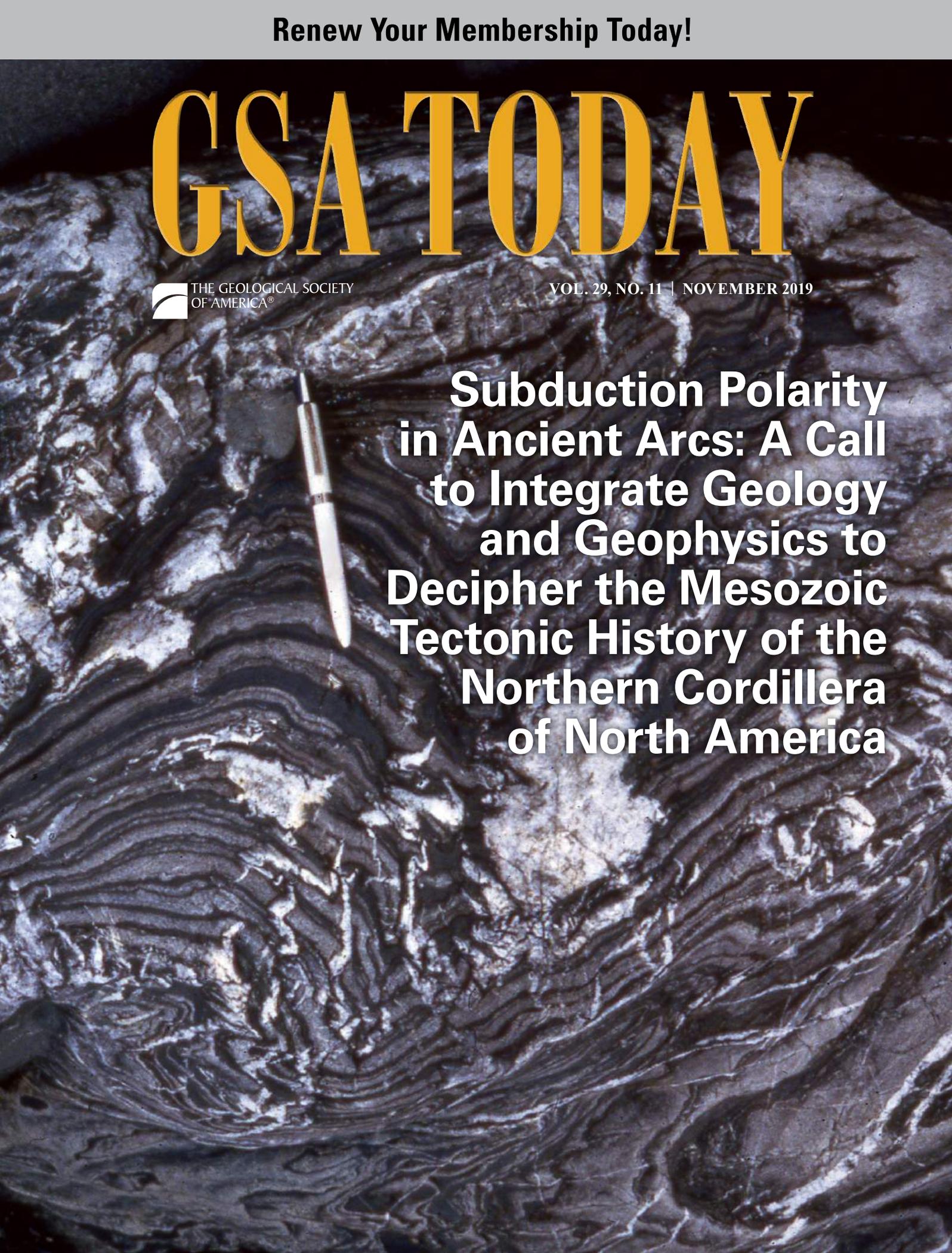


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Tectonic History of the
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SCIENCE

4 **Subduction Polarity in Ancient Arcs: A Call to Integrate Geology and Geophysics to Decipher the Mesozoic Tectonic History of the Northern Cordillera of North America**

Terry L. Pavlis et al.



Cover: Early Jurassic blueschist facies metamorphic rocks from the Raspberry Schist on Kodiak Island, southern Alaska, preserved along the forearc-accretionary complex boundary of the outermost Early Jurassic arc in the Northern Cordillera. The outcrop shows interlayered quartz and Fe- and Mg-rich pelite, interpreted as a chert and mudstone protolith. The coeval development of the arc and subduction complex and later tectonic juxtaposition along the backstop of the Chugach accretionary complex indicate polarity of subduction was dipping east or north in present-day coordinates. Photo by Sarah Roeske. See related article, p. 4–10.

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Subduction Polarity in Ancient Arcs: A Call to Integrate Geology and Geophysics to Decipher the Mesozoic Tectonic History of the Northern Cordillera of North America

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ABSTRACT

Recent syntheses of Cordillera tectonics contain contradictory views of subduction polarity in the late Mesozoic, and this contradiction has implications for whole-earth processes. The long-held view of east-dipping subduction throughout the Late Jurassic–Early Cretaceous Cordillera is challenged by tectonic models calling on a west-dipping subduction system that led to the collision of oceanic arcs, ribbon-continentals, or both, with North America. Evidence in support of these models are seismic anomalies in the deep mantle inferred to represent subducted lithosphere from a west-dipping slab. We argue that this “bottom-up” approach to tectonic synthesis carries assumptions that are as great as or greater than ambiguities from the “top-down” approach of surface geology. Geologic evidence from the northern Cordillera is inconsistent with west-dipping subduction in Jura–Cretaceous time and requires long-lived east-dipping subduction along much of the Cordilleran margin. West-dipping subduction in Triassic–Early Jurassic time has been documented and may be the source of the seismic anomalies. We encourage the broader community to come to consensus on integration of these deep images with surface geology.

INTRODUCTION

Regional syntheses of Cordilleran tectonics were central to the plate tectonic revolution with a series of papers that placed the geology of the continental United States into the new paradigm (e.g., Burchfiel and

Davis, 1972) in which the Sierra Nevada, Great Valley, and Franciscan triad formed above a late Mesozoic, east-dipping subduction zone. Similar relations have since been used to reconstruct arc polarity in many other orogens.

Cordilleran tectonics saw a paradigm shift in the late 1970s when paleomagnetic data (e.g., Hillhouse, 1977) together with geologic syntheses led to the terrane concept (e.g., Coney et al., 1980). These insights led to the recognition that both collision and strike-slip juxtaposition must have occurred along the Cordillera margin, and multiple terranes comprising different arc elements were scrambled to make the terrane collage.

There has been a recent resurgence in Cordilleran-wide syntheses based in large part on three new data sources: (1) developments in geochronology; (2) Earthscope geophysical data; and (3) geodetic data that reveal active deformation in the Cordillera. The integration of these data provides new opportunities for understanding the long-term evolution of the Cordillera. Challenges arise from a disconnect between two approaches: (1) geological studies that use a *top-down approach*, in which surface geology is projected to infer relations at depth and back in time; and (2) geophysical studies that use a *bottom-up approach* that projects features imaged in the lower crust and mantle to the surface and back in time. Although these approaches should converge on a similar solution, they are often diametrically opposed because of different underlying assumptions.

We here consider an example of where geologic and geophysical interpretations lead to fundamentally different conclusions regarding the polarity of subduction along the Cordilleran margin during late Mesozoic time. We argue from a northern Cordilleran perspective that some recent syntheses (e.g., Johnston, 2008; Hildebrand, 2009; Sigloch and Mihalynuk, 2017) ignored or dismissed a fundamental observation; namely, that there is compelling geologic evidence that subduction along the northern Cordilleran margin has been east-dipping for at least the last ~125 m.y., and likely can be traced ~75 m.y. further back into the Late Triassic. The objective of this article is to compare these approaches for evaluating subduction polarity in ancient margins. Successful integration of the two approaches will be required to fully understand the configuration of ancient subduction zones.

FUNDAMENTAL CONTROVERSY OF SUBDUCTION POLARITY

Uncertainties regarding the late Mesozoic evolution of the Cordilleran margin focus primarily on (1) the size of the ocean basin separating the Wrangellia composite terrane (WCT) or Insular superterrane from the continental margin; and (2) the location, polarity, and age of subduction zones that closed this basin (Fig. 1). One set of models, mainly based on geologic observations, shares an interpretation that this basin closed during Jura–Cretaceous time along an east-dipping¹ subduction zone built along the continental margin,

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¹Note that because the Alaskan margin is curved this terminology can be confusing. We generally use east dipping or west dipping to reflect the pre-oroclinal geography, but also use north or south dipping when discussing modern geometries.

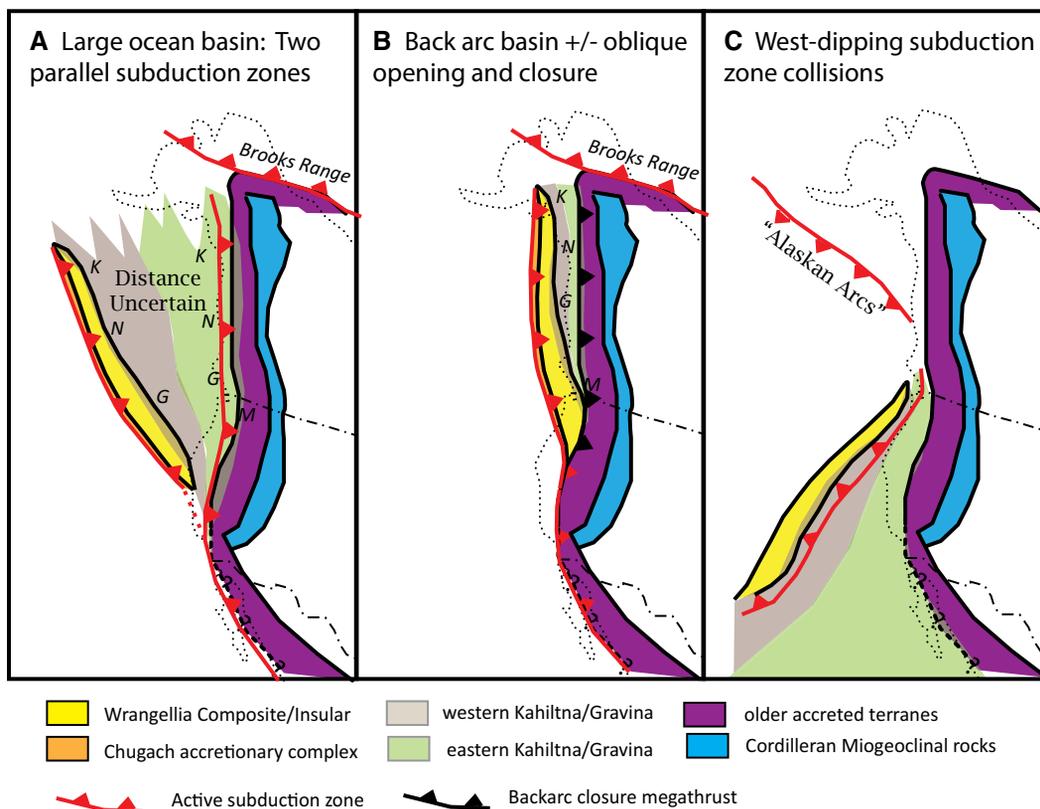


Figure 1. End-member models for Early Cretaceous paleogeography. (A) and (B) are both east-dipping subduction models distinguished by the magnitude of the east-dipping megathrust between the Insular (Wrangellia composite terrane [WCT]) and Intermontane terranes (purple); either as a normal subduction zone (A) or a megathrust closing a backarc basin (B) that opened in the Jurassic after an earlier collision of the Insular terrane. Marine basins: K—Kahiltna; N—Nutzotin; G—Gravina; M—Methow. (C) West-dipping subduction zone between the Insular (WCT) and Intermontane terranes (purple) after Sigloch and Mihalynuk (2017). In this model, the Insular terrane migrates from an offshore position during Late Jurassic time and collides far to the south with a north-to-south closure during mid-Cretaceous time. Note also the inferred polarity of north Pacific subduction zones in this model (labeled Alaskan arcs) and distinctions with subduction polarities in models A and B. Figure modified from Kapp and Gehrels (1998).

and that a second east-dipping subduction zone existed along the outboard margin of the WCT (Figs. 1A and 1B [see footnote 1]). A second group of models emphasizes collision along a west-dipping subduction zone on the inboard margin of the WCT (Sigloch and Mihalynuk, 2017; Fig. 1C) or between the entire terrane collage and North America (Johnston, 2008; Hildebrand, 2009).

The top-down interpretation of subduction polarity is based on (1) structural vergence in accretionary prisms; (2) the presence and position of high-*P/T* mineral assemblages; (3) the location of forearc versus backarc strata; and (4) age and geochemical patterns within the magmatic arc. These features have been used to infer subduction polarity since the advent of plate tectonics (e.g., Miyashiro, 1972; Ernst,

1973; Dickinson, 1974). These interpretations are complicated by the potential for large-scale displacement along strike-slip faults within and between the various convergent margin assemblages, and by removal of elements by subduction erosion or exhumation during collision. These complications are the reasons for discrepancies among existing models based on geology (Fig. 1). For example, a minimum of 700–1500 km of post-latest Cretaceous dextral strike-slip is known from geologic relationships alone in the northern Cordillera (Stamatatos et al., 2001), and the total dextral slip could be far larger (e.g., Garver and Davidson, 2015). Similarly, the boundary between the WCT and the continent records closure of an ocean basin, a relationship first established by Richter and Jones (1973), but along

much of the suture zone², exhumation along this contact reaches lower-crustal depths in the hanging-wall (e.g., Hollister, 1982), confounding any attempts to reconstruct the eroded material.

The bottom-up interpretation of polarity is based on tomographic images of large, near-vertical features in the mantle interpreted as subducted slabs (Sigloch and Mihalynuk, 2017). These slabs are now in the mantle more than 3000 km from their presumed paleotrench. To restore the pathway over this distance requires multiple assumptions, including the nature of the mantle anomaly, uncertainties in slab sinking rates, and models of absolute plate motion. Problems with absolute plate motion models based on hot spots have been known since the first plate reconstructions that used them (Engebretson

²We use the terms suture or suture zone as nongenetic terms for areas showing demonstrable evidence of the closure of a deep ocean basin, regardless of basin size; i.e., open ocean versus marginal basin.

et al., 1984). Nonetheless, the evidence used to support west-dipping subduction is that when North America is restored to its mid-Cretaceous position, the Cordilleran margin lay *east* of the deep mantle anomalies. Hence, a west-dipping subduction zone provides a simple explanation, albeit dependent on these assumptions.

GEOLOGIC OBSERVATIONS SUPPORTING EAST-DIPPING SUBDUCTION—THE TOP-DOWN APPROACH

Here we review the geologic evidence for subduction polarity in the northern Cordillera using distributions of key tectonic elements.

Chugach Accretionary Complex

The Chugach accretionary complex is exposed outboard of Early–Middle Jurassic plutonic rocks of the Jurassic Talkeetna arc built on the northern WCT (Fig. 2). It records progressive outboard accretion of an ~60–100-km-wide package of sedimentary/volcanic rocks with metamorphic or maximum depositional ages that young consistently to the south, away from the arc (e.g., Plafker et al., 1994; Amato et al., 2013). This age progression matches classic forearc accretionary models with gaps in the record compatible with subduction erosion.

The oldest rocks in the accretionary complex from north (closest to the arc) to south (outboard) are blueschist-facies fault-bounded slices of oceanic material, with 204–185 Ma crystallization ages (e.g., Sisson and Onstott, 1986; Roeske et al., 1989). The accretion record is missing between ca. 185–170 Ma, which corresponds to an inboard migration of the arc, when subduction erosion destroyed part of the forearc (Clift et al., 2005) and the forearc basin became well established (Stevens Goddard et al., 2018). This lack of preservation is cited by Sigloch and Mihalyuk (2017) as evidence that the accretionary complex is not linked with the Jurassic arc system despite the clear evidence globally that subduction erosion removes material from subduction complexes (e.g., von Huene and Scholl, 1991). Continued accretion and underplating produced (1) a *mélange* assemblage with maximum depositional ages (MDA) of 170–155 Ma; (2) blueschists constrained by MDA to ca. 135–100 Ma (Day et al., 2016); (3)

sinistral-oblique south-directed thrusting at 125–120 Ma (Labrado et al., 2015); (4) a greywacke/conglomerate package from 100 to 90 Ma (Amato et al., 2013); and (5) turbidites from 90 to 70 Ma (Amato et al., 2013). Intermittent accretion continues to the present day.

These data demonstrate a strong temporal link between this accretionary complex and the adjacent forearc basin and arc. When younger strike-slip displacement is restored, this link has led to the long-standing interpretation that subduction polarity along what is now the southern/western margin of Alaska to British Columbia and the Pacific Northwest has been continuous from ca. 210 Ma to present. The recent reference to this interpretation as a “myth” (Sigloch and Mihalyuk, 2017) is perplexing, as no other reasonable tectonic scenario has been suggested to explain the presence of blueschist-facies rocks located in the “backstop” of an accretionary complex and coeval with an oceanic magmatic arc in the adjacent terrane.

Forearc Basin Strata (Cook Inlet–Matanuska–Wrangell Mountains Basins)

Thick successions of Middle Jurassic to Upper Cretaceous siliciclastic strata and minor volcanic rocks lie inboard (north) of the Chugach accretionary complex and outboard (south) of volcanic-plutonic belts attributed to arc magmatism in south-central Alaska. These strata reflect deposition in intra-arc and forearc depocenters with respect to the Talkeetna–Chitina–Chisana arcs to the north (Trop and Ridgway, 2007), and sediment was sourced chiefly from these arcs (Stevens Goddard et al., 2018). Locally, sediment was eroded from sources within the Chugach accretionary complex starting in early Late Cretaceous time. U–Pb detrital zircon data show a shared source of magmatic-arc sediment for both the forearc basin and accretionary complex during the Jurassic and Cretaceous, and this Mesozoic detrital link between the accretionary complex, the forearc basin, and the magmatic arc on the upper plate indicates a kinship between these different elements (Stevens Goddard et al., 2018). Moreover, detrital zircon populations from Albian and younger strata reflect sedimentary linkage with sources in the WCT and Intermontane terranes (Reid et al., 2018).

The spatial configuration of these three tectonic elements requires north-dipping (present coordinates) subduction beneath the outboard margin of WCT (Fig. 2) throughout late Mesozoic time.

Magmatic Arc Rocks (Talkeetna–Chitina–Chisana–Kluane–Coast Mountains Arcs)

In southern Alaska, the Jurassic arc system built on the WCT is the Peninsular terrane, or Talkeetna arc. This arc shows a continuous magmatic record from ca. 200–150 Ma, but magmatism migrated northward in time with Early Jurassic rocks exposed in an upturned crustal-mantle section to the south and an Early to Middle Jurassic granitic batholith on the north (e.g., Clift et al., 2005; Hacker et al., 2011). Although early studies using geochemical trends in the batholith allowed from south-dipping subduction (Reed et al., 1983), those studies failed to recognize that the Early Jurassic rocks to the south were part of the same arc system. Thus, a broader view of geochemical trends shows a pattern indicative of northward subduction with mafic rocks to the south and more silicic rocks to the north and an age trend indicating northward migration of the magmatic arc (Clift et al., 2005; Rioux et al., 2007). This pattern, together with age-equivalent accretionary complex rocks exposed to the south (Amato et al., 2013), leaves virtually no doubt that Jurassic subduction was north dipping (Fig. 2A).

Middle Jurassic to Late Cretaceous plutons and associated volcanic rocks intrude and overlie much of the WCT in south-central Alaska (Plafker and Berg, 1994) and continue southward along the coast to central British Columbia, where they become the western Coast Mountains batholith (Gehrels et al., 2009). A first-order observation concerning the polarity of these arcs is that all segments record eastward migration of magmatism at ~2 km/m.y. from ca. 120–80 Ma (Cecil et al., 2018). This rate, age, and direction of arc migration are also shared by the Sierra Nevada and Peninsular Range batholiths, which are interpreted to have faced to the west in nearly all Cordilleran syntheses. These magmatic shifts are consistent with evidence in the accretionary complex for subduction erosion and ridge subduction (e.g., Amato et al., 2013).

Backarc/Retroarc Basin Strata (Kahiltna-Nutzotin-Dezadeash- Gravina-Tyaughton/Methow Basins)

From Alaska to Washington, a belt of Jura-Cretaceous marine assemblages separates the WCT from terranes that had previously been attached to the continental margin (Fig. 1). This basin consists of an outboard belt that was deposited on and derived from the WCT and an inboard belt that was deposited on and derived from the Intermontane terranes. These stratigraphic ties are accepted by Sigloch and Mihalyuk (2017), but in their interpretation the outboard belt formed in the forearc of a west-dipping subduction zone located along the inboard margin of the WCT (Figs. 1C and 2B).

In south-central Alaska, the Upper Jurassic to Upper Cretaceous marine clastic strata are referred to as the Kahiltna assemblage (K on Fig. 1) (Hults et al., 2013). Prior to final closure, Kahiltna assemblage strata along the southern margin of the basin were sourced from WCT rocks in a backarc position. Northern Kahiltna assemblage strata were sourced from the Intermontane terrane in a forearc basin position related to north-dipping subduction beneath inboard terranes. Metamorphic rocks, mélangé, and submarine fan strata are all part of the Kahiltna assemblage and represent a zone of crustal thickening with south-vergent structures (e.g., Brennan et al., 2011). Results from these studies indicate an inboard- (north-) dipping subduction zone along the northern margin of the Kahiltna basin that closed during Late Cretaceous time (Hampton et al., 2010). In eastern Alaska and the Yukon Territory, age-equivalent basal strata belong to the Nutzotin Mountains sequence and the Dezadeash Formation (N on Fig. 1). Sedimentological and detrital data reflect a provenance chiefly from Mesozoic arc sources within the WCT (e.g., Lowey, 2018).

In southeastern Alaska, age-equivalent basal strata, referred to as the Gravina belt, accumulated along the inboard margin of the Insular terrane and the outboard margin of the Intermontane terrane (G on Fig. 1) (McClelland et al., 1992). Western Gravina strata positionally overlie and were derived chiefly from the WCT to the west (Yokelson et al., 2015). In contrast, Jurassic-Cretaceous strata of the eastern Gravina belt positionally overlie Middle Jurassic or older rocks of inboard terranes

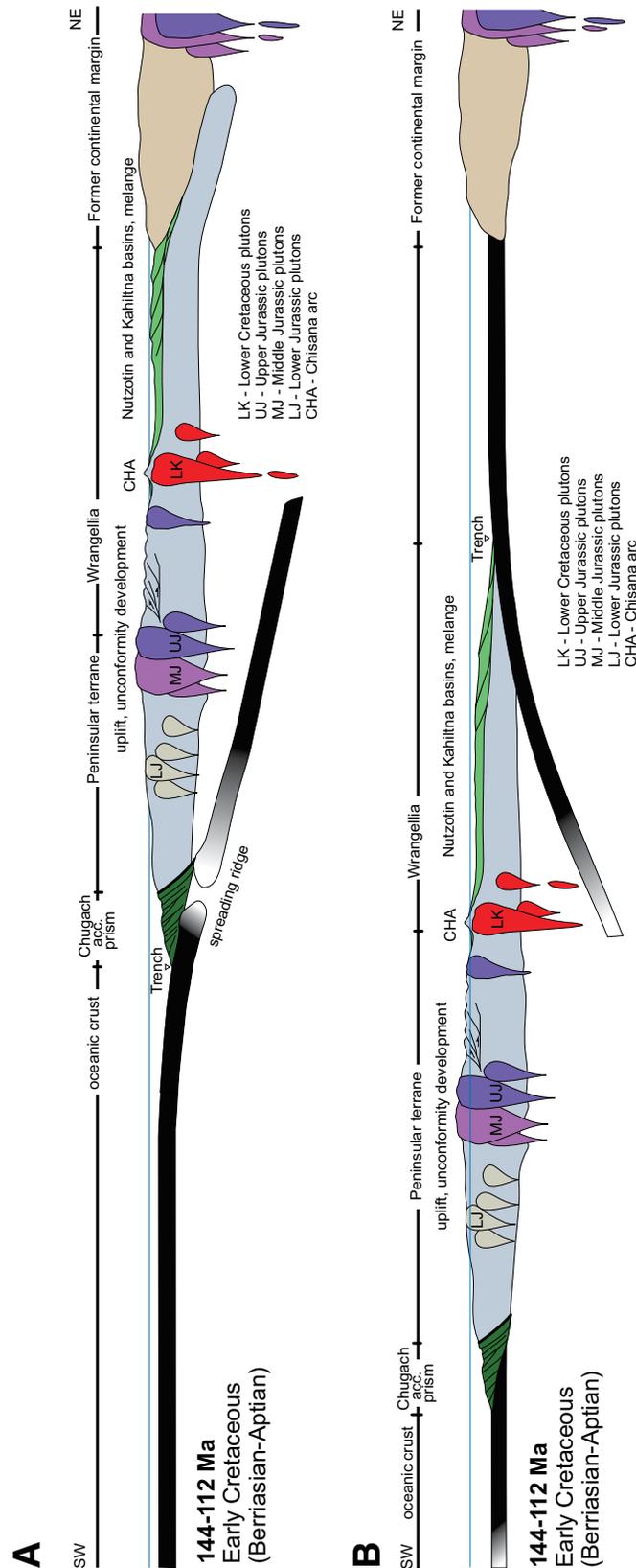


Figure 2. Schematic cross sections showing inferred tectonic framework of the south-central Alaska segment of the Insular terrane during Late Jurassic-Early Cretaceous time. (A) East-dipping model. Note inboard-dipping subduction beneath the Wrangellia-Peninsular terrane (i.e., Insular terrane) based on accretionary complex, forearc basin, magmatic arc elements, narrowing/closure of remnant ocean basin, and regional shortening/uplift during Early Cretaceous collision/accretion of the terrane. (B) West-dipping model, based on ideas presented in Sigloch and Mihalyuk (2017). This model does not explain the position of the Chugach accretionary complex relative to the arc rocks or the vergence of deformation within the marginal basins such as the Kahiltna. Modified from Trop and Ridgway (2007).

and accumulated outboard of the eastern Coast Mountains batholith. Western facies of the Gravina belt are interpreted to have been juxtaposed against eastern facies of the Gravina belt by Early Cretaceous sinistral strike-slip followed by mid-Cretaceous structural imbrication (Monger et al., 1994). Nowhere along British Columbia or southeast Alaska have direct remnants of subduction been observed within the basinal strata or along these thrusts.

Farther to the south, eastern facies strata of the Gravina belt extend into the Tyaughton-Methow basin (M on Fig. 1), which also consists of Upper Jurassic–Cretaceous marine strata and subordinate volcanic rocks. These basins are interpreted to record east-dipping subduction during Late Jurassic–Early Cretaceous time, followed by arrival of the Insular terrane along the Cordilleran margin during Albian time (e.g., Surlless et al., 2014). These relations suggest that most basin strata formed along an east-dipping subduction zone constructed on most of the western margin of the North American continent. Deep exhumation and strike-slip faulting obscure details (Figs. 1A and 1B), but there is no evidence to support the interpretation of Sigloch and Mihalynuk (2017) that these basins formed in a west-dipping subduction zone.

Evidence from Northern Alaska

The only part of the northern Cordillera that has a clear geologic signal of post-mid Jurassic outboard (away from continental margin) subduction is in northernmost Alaska (e.g., Moore et al., 1994). There, in the Brooks Range, structural and metamorphic evidence shows subduction of the continental margin beneath a Late Jurassic–earliest Cretaceous island arc, the Koyukuk terrane (Box and Patton, 1989). Fragments of an ocean basin were emplaced on the continental margin as the Angayucham complex during collision at ca. 145–135 Ma (Roeske et al., 1989; Lemonnier et al., 2016). Possible tectonic connections, if any, between the northern and southern Alaska Mesozoic arcs are highly uncertain, particularly given that this collision occurred prior to the opening of the Canada basin when the orogen faced north, not south (Figs. 1A

and 1B). Thus, extrapolating this outward-dipping subduction-collision system to all of the Cordilleran margin (e.g., Sigloch and Mihalynuk, 2017) is not warranted.

Summary of the Geologic Data

The most marked differences in the models (Fig. 1) are (1) the inferred polarity of subduction zones during Late Jurassic–Early Cretaceous time; and (2) the nature of the suture zone inboard of the WCT. The upper-plate geology preserves abundant lines of evidence for an east-dipping subduction zone beneath the outboard margin of WCT during Jurassic–Late Cretaceous time as well as south to north closure of a marine basin between the WCT and North America along an east-dipping megathrust. There is virtually no evidence for west-dipping subduction anywhere along the inboard margin of the WCT.

DISCUSSION AND CONCLUSIONS

Alternative Explanation of Geophysical Observations

Although we have emphasized the geologic record relative to the WCT here, the record of east-dipping subduction during Late Jurassic through Late Cretaceous time is even better established along the continental margin of Oregon, California, and northwestern Mexico by the Sierra Nevada, Great Valley, and Franciscan assemblages. Any tectonic model calling on west-dipping subduction during this time interval must address how these iconic tectonic relations have been misinterpreted by generations of geologists (e.g., Dickinson, 1974). Ribbon continent reconstructions of western North America (e.g., Johnston, 2008) provide alternate views, but represent even more glaring contradictions to generations of geologic studies (see discussion in Sigloch and Mihalynuk, 2017).

It is important to note that there is evidence of west-dipping subduction in the Cordillera, but it is clearly pre-Late Jurassic and does not involve the WCT (Monger, 2014). Instead, vast areas that comprise the terranes inboard of the WCT show evidence of Permo-Triassic ocean basin closure along a west-dipping subduction interface that existed until Early–Middle Jurassic time. Widespread

ophiolitic rocks associated with the system, and their emplacement over rocks that were clearly part of the North American passive margin from southern British Columbia (e.g., Slide Mountain terrane; Roback et al., 1994) to Alaska (e.g., Seventy Mile terrane; Dusel-Bacon et al., 2006), attest to a collision along a west-dipping subduction zone. We follow Monger (2014) in suggesting that this event provides a likely explanation of the geophysical observations of Sigloch and Mihalynuk (2017). A scenario that incorporates these earlier events as an explanation of the tomographic anomalies is provided in GSA Data Repository Fig. DR1³.

Reconciling the Top-Down Record with the Bottom-Up Record: Implications for Whole-Earth Processes

Reconciling these issues is an important problem because it relates to whole-earth processes of mantle convection and past plate motion. We suggest that a challenge to the broader community is providing clear tests of the hypothesis that the deep anomalies are indeed subduction zone remnants, which will require clear correlations to the geologic record. Conversely, assuming the interpretation of the deep anomalies as subducted lithosphere is correct, the community must develop tectonic models that fit both the deep geophysical data and the geologic record. Resolving this conflict is a fundamental tectonic problem that requires integrated analysis between geologists and mantle observers/modelers.

The diversity of tectonic models (Fig. 1) places the community in a quandary. New models based on geophysics can stir debate, but these insights must be consistent with the geologic record and what the tomography data actually show (e.g., Liu, 2014). Nonetheless, among a larger group of northern Cordilleran geologists, the evidence from surface geology seems overwhelmingly opposed to the tomography-based conclusions. How then can we proceed? One approach is to assemble working groups with broad knowledge that tackle a problem by integrating information from a wide range of approaches and attempt to arrive at a solution that honors all observations. Alternatively, new insights might arise from technological advances (e.g.,

³GSA data repository item 2019259, Figure DR1, showing the tectonic models discussed in the text in a global projection, is online at www.geosociety.org/datarepository/2019.

Walker et al., 2019) that require abandoning existing hypotheses and exploring fundamentally different interpretations.

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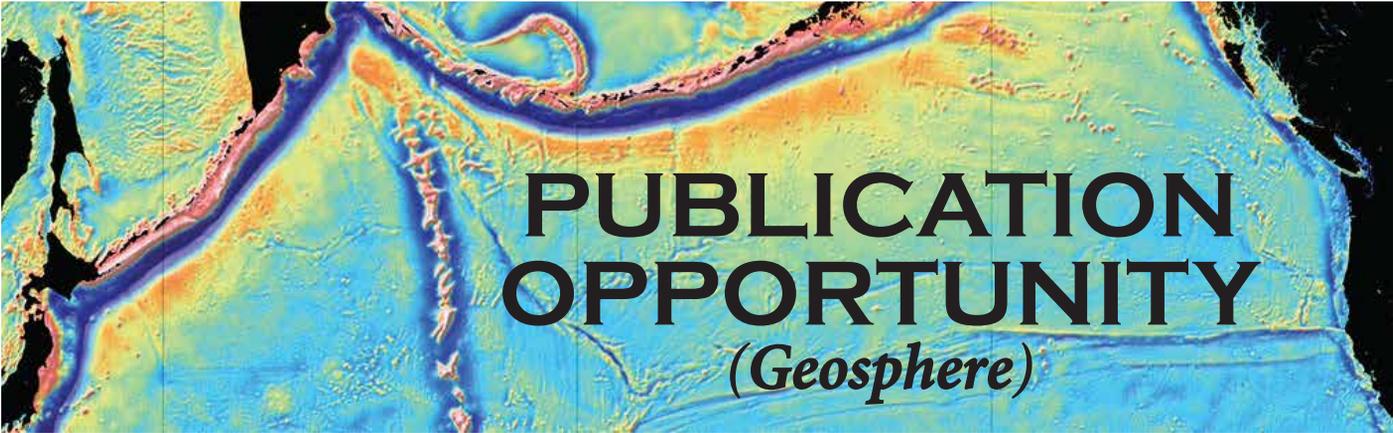
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PUBLICATION OPPORTUNITY (*Geosphere*)

SUBDUCTION TOP TO BOTTOM 2

- Up-to-date overview of subduction zone processes and products (a follow-up to AGU Geophys. Monogr. v. 96)— Being published in *Geosphere* (all-electronic) themed issue, currently with 52 papers; **submissions accepted into mid-2020**
- Guest Editors Gray Bebout, Dave Scholl, Bob Stern, Laura Wallace, and Philippe Agard
- Top to Bottom Structure (Guest Associate Editor Contacts):

What goes in (Sediment, Oceanic Crust) (Mike Underwood, Andy Fisher)

Forces Driving Subduction (Taras Gerya)

Subduction Initiation (Mark Reagan)

Outer Rise, Early Subduction, Forearc (Doug Wiens, César Ranero, Nathan Bangs)

Deformation Processes at Subduction Interfaces (Seismogenic Zone to Sources of ETS;
Shuichi Kodaira, Susan Bilek, Samuel Angiboust)

Upper Plate Deformation (Frédérique Leclerc, Nathalie Feuillet)

Forearc Metamorphism (Sarah Penniston-Dorland, Åke Fagereng)

Mantle Wedge Processes (Maureen Long, Marco Scambelluri)

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Crust Formation (Kiyoshi Suyehiro, Kent Condie)

Resource Implications (Gray Bebout)

Education/Outreach (Bob Stern)



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Upcoming Award Deadlines



For details, see the October *GSA Today* or go to www.geosociety.org/about-awards. For award nominations, go to www.geosociety.org/awardnoms. You can also email awards@geosociety.org.

2020 GSA Medals and Awards

Nomination deadline: 1 Feb. 2020

- Penrose Medal
- Day Medal
- Young Scientist Award (Donath Medal)
- GSA Public Service Award
- Randolph W. “Bill” and Cecile T. Bromery Award for Minorities
- GSA Distinguished Service Award
- Doris M. Curtis Outstanding Woman in Science Award
- Geologic Mapping Award in Honor of Florence Bascom
- Honorary Fellow

John C. Frye Environmental Geology Award

Nomination deadline: 31 Mar. 2020

In cooperation with the Association of American State Geologists and supported by endowment income from the GSA Foundation’s John C. Frye Memorial Fund, GSA makes an annual award for the best paper on environmental geology published either by GSA or by a state geological survey. Learn more at www.geosociety.org/GSA/Awards/Frye.aspx.

2020 Cole Research Grant Awards

Application deadline: 1 Feb. 2020

- The **Gladys W. Cole Memorial Research Award** for research on the geomorphology of semiarid and arid terrains in the United States and Mexico is awarded annually to a GSA member or Fellow between 30 and 65 years of age who has published one or more significant papers on geomorphology.
- The **W. Storrs Cole Memorial Research Award** for research on invertebrate micropaleontology is awarded annually to a GSA member or Fellow between 30 and 65 years of age who has published one or more significant papers on micropaleontology.

Learn more about these post-doc research awards at www.geosociety.org/GSA/grants/postdoc.aspx.

AGI AWARDS

Nomination deadline: 1 Feb. 2020

Submit nominations for the following awards at www.agiweb.org/direct/awards.html.

- The **AGI Medal in Memory of Ian Campbell** recognizes singular performance in and contribution to the profession of geology.
- The **AGI Marcus Milling Legendary Geoscientist Medal** is given to a recipient with consistent contributions of high-quality scientific achievements and service to the earth sciences having lasting, historic value; who has been recognized for accomplishments in field(s) of expertise by professional societies, universities, or other organizations; and is a senior scientist nearing completion or has completed full-time regular employment.

For a listing of other national awards and links to information and nomination forms, go to www.geosociety.org/awards/national.htm.

Nominate a Deserving Colleague for GSA Fellowship

GSA members are elected to Fellowship in recognition of distinguished contributions to the geosciences. The primary nominator must be a current GSA Fellow. Election requirements are online at www.geosociety.org/Fellowship. Deadline: 1 Feb. 2020.

How to Nominate

1. Write a letter of support;
2. Collect two additional letters of support (one must be from a Fellow; both must be current GSA members);
3. Obtain the nominee's CV or résumé (two-page limit); and
4. Complete the online nomination form and upload the supporting documents at www.geosociety.org/FellowNoms.

Halbouty Lecture Nominations for the 2020 Annual Meeting

All GSA members are encouraged to submit nominations for the Michel T. Halbouty Distinguished Lecturer. The Halbouty Lectures typically encompass a broad swath of geology centered on natural-resource issues. The winner of this award will give a presentation at the 2020 GSA Annual Meeting in Montréal, Québec, Canada, in October. The award comes with an honorarium that will be presented to the awardee at the meeting. www.geosociety.org/GSA/About/awards/GSA/Awards/Halbouty.aspx

2020 Graduate Student Research Grants

The primary role of the GSA research grants program is to provide partial support of master's and doctoral thesis research in the geological sciences for graduate students enrolled in universities in the United States, Canada, Mexico, and Central America. In 2019, the program awarded US\$812,000 to 392 graduate students (~52% of the 748 who applied), with an average grant of US\$2,071.

GSA strongly encourages women, minorities, persons with disabilities, and other groups that are underrepresented in the geosciences to participate fully in this program. Apply online (www.geosociety.org/gradgrants) starting 1 Dec. 2019. Submissions must be completed by 3 Feb. 2020, at 5 p.m. MST. Attend the webinar on 19 Nov. 2019 at 11 a.m. MST for application strategies; see <https://bit.ly/2AScoeg>.



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Folarin Kolawole used his 2018 research grant for a study of pre-existing structures in the Precambrian basement rocks in the Arbuckle Mountains, Oklahoma, USA, to assess their implications for induced seismicity.

More Research Grants for Graduate Students and Others

GSA provides members with additional opportunities to apply for research funding. Applications for these programs will be accepted starting 1 Dec. 2019. Submissions must be completed by 3 Feb. 2020, at 5 p.m. MST.

- Farouk El-Baz Student Research Grant—*Desert studies*
- Awards for Geochronology Student Research2 (AGeS2) Program—*Geochronology*
- ZEISS-GSA Research Grant—*Microscopy*

2019–2020 Richard H. Jahns Distinguished Lecturer



Scott Lindvall

Scott Lindvall has been named the 2019–2020 Richard H. Jahns Distinguished Lecturer in Applied Geology. The lectureship is supported by the Association of Environmental and Engineering Geologists (AEG) and the GSA Environmental and Engineering Geology Division. The purpose of the lectureship is to promote student awareness of applied geology through a series of talks at academic

institutions and professional meetings.

Lindvall is a certified engineering geologist in California with 35 years of experience working in the consulting industry, performing seismic and geologic hazard analyses, fault investigations, and engineering geology studies for both existing and proposed critical facilities. He is particularly interested in advancing the state of the practice by incorporating recent research on active faults and seismic sources into the evaluation of dams, aqueducts, pipelines, nuclear facilities, and other infrastructure.

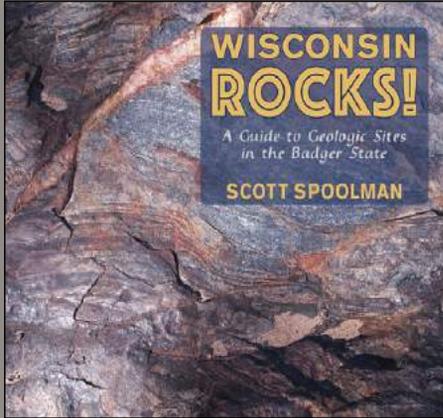
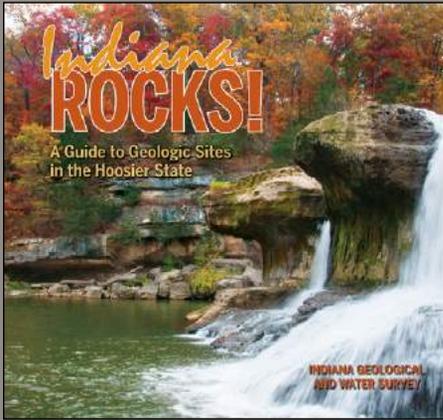
Lindvall received his B.S. in geology from Stanford University in 1984 and his M.S. in geology from San Diego State University in 1988. Richard Jahns was Lindvall's undergraduate advisor at Stanford, which makes this award especially meaningful to him. He has spent the majority of his career working for consulting firms specializing in seismic hazards and engineering geology. He currently manages the Lettisi Consultants International Southern California office, and prior to this, worked many years at both William Lettisi & Associates and Lindvall, Richter & Associates.

His interest in geology came at a young age growing up in the Transverse Ranges of Southern California. His geologist father, Eric Lindvall, helped instill an appreciation of the outdoors (and therefore geology) and was later instrumental in shaping Lindvall's career. His interest in earthquakes was triggered at nine years old in the early morning hours of 7 February 1971, with the M6.6 San Fernando earthquake. Experiencing strong ground shaking from the main shock and several large aftershocks in the epicentral region, while dust was slowly rising from rock falls in the surrounding canyons, left a lasting impression.

Lindvall looks forward to sharing his research on active faults and seismic sources and his experience in developing practical solutions to engineering geology problems for critical infrastructure. Lecture topics include

- Crossing the San Andreas Fault: Improving the Resilience of the Los Angeles Aqueduct System
- The 1971 San Fernando Earthquake and Paleoseismology of the Sierra Madre Fault System
- A Tale of Three Dams along the Owens Valley Fault System
- Characterizing Fault Displacement Hazards: Significant Progress and Significant Uncertainties
- Seismic Source Characterization for Evaluating Nuclear Power Plants in the Central and Eastern United States
- Careers for Students in Applied Geology: Options to Consider

For further details regarding Lindvall's lectureship, go to https://www.lettisci.com/wp-content/uploads/2019/08/AEG_2019.pdf. Please email any speaking requests to lindvall@lettisci.com to schedule a presentation between now and September 2020.



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Scientific Division Awards

Congratulations to All 2019 GSA Division Award Recipients

GSA's Scientific Division awards presented at this year's annual meeting are listed below.

Learn more about GSA's specialty Divisions at www.geosociety.org/divisions.

Energy Geology

Gilbert H. Cady Award

C. Blaine Cecil, U.S. Geological Survey

Antoinette Lierman Medlin Research Award

Samuel Neely, Texas A&M University

Michelle Chrapa, Texas A&M University

Engineering and Environmental Geology

E.B. Burwell, Jr., Award

Dennis M. Staley, Jacquelyn Negri, Jason W. Kean, Jayme L.

Laber, Anne C. Tillery, and Ann M. Youberg, 2017, Prediction

of spatially explicit rainfall intensity–duration thresholds for

post-fire debris-flow generation in the western United States:

Geomorphology, v. 278, p. 149–162, [https://doi.org/10.1016/](https://doi.org/10.1016/j.geomorph.2016.10.019)

[j.geomorph.2016.10.019](https://doi.org/10.1016/j.geomorph.2016.10.019).

Richard H. Jahns Distinguished Lecturer (2019–2020)

Scott Lindvall, Lettis Consultants International

Roy J. Shlemon Scholarship Awards

Ian A. Godwin, Arkansas State University

Cory Wallace, Colorado School of Mines

Geoarchaeology

Rip Rapp Archaeological Geology Award

Kathleen Nicoll, University of Utah

Claude C. Albritton, Jr., Memorial Student Research Award

Miriam Rothenberg, Brown University

Adam White, University of California Berkeley

Geobiology & Geomicrobiology

Outstanding Contributions in Geobiosciences Award—Pre-Tenure

Elizabeth (Betsy) Swanner, Iowa State University

Outstanding Contributions in Geobiosciences Award—Post-Tenure

Clara Chan, University of Delaware

Outstanding Contributions in Geobiosciences Award—

Distinguished Career

Russell Shapiro, California State University at Chico

Geoinformatics and Data Science

Outstanding Contributions Award

J. Douglas Walker, University of Kansas

Geology and Society

E-an Zen Fund Geoscience Outreach Grant

Gabriel-Philip Santos, Lisa Lundgren, Brittney Stoneburg,

Michelle Barboza-Ramirez, and Michael Ziegler, Geology of

Science Fiction Pop-Up Museum program presented by the

Cosplay for Science Initiative

Leila M. Joyce Seals and Irmarris Rivera Llavona,

The Geology Project

Geophysics

George P. Woollard Award

Emily Brodsky, University of California Santa Cruz

Geoscience Education

Biggs Award for Excellence in Earth Science Teaching

Sarah L. Sheffield, University of California Santa Cruz

Iris Moreno Totten Geoscience Education Research Award

Cissy Ballen, Auburn University

Distinguished Service Award

Chris Atchison, University of Cincinnati

History and Philosophy of Geology

Mary C. Rabbitt History of Geology Award

Naomi Oreskes, Harvard University

Hydrogeology

O.E. Meinzer Award

Bridget Scanlon, University of Texas at Austin

Birdsall-Dreiss Distinguished Lecturer (2020)

Laura Crossey, University of New Mexico

George Burke Maxey Distinguished Service Award

Alan E. Fryar, University of Kentucky

Kohout Early Career Award

Barret L. Kurylyk, Dalhousie University

Limnogeology

Israel C. Russell Award

Thomas Johnson, Large Lakes Observatory at the University of

Minnesota Duluth, University of Massachusetts Amherst

Kerry Kelts Student Research Awards

Sarah Katz, University of Michigan

Mineralogy, Geochemistry, Petrology, and Volcanology

Distinguished Geologic Career Award

Suzanne Mahlburg Kay, Cornell University

Early Career Award

Christy B. Till, Arizona State University

Planetary Geology

G.K. Gilbert Award

Alfred McEwen, University of Arizona

Ronald Greeley Award for Distinguished Service

Debra Buczkowski, Johns Hopkins University Applied Physics Laboratory

Pellas-Ryder Award

Simon J. Lock, Harvard University

Quaternary Geology and Geomorphology

Kirk Bryan Award for Research Excellence

Kristen L. Cook, Jens M. Turowski, and Niels Hovius, 2014, River gorge eradication by downstream sweep erosion: *Nature Geoscience*, v. 7, p. 682–686, <https://doi.org/10.1038/NGEO2224>.

Distinguished Career Award

Allan Ashworth, North Dakota State University

Farouk El-Baz Award for Desert Research

Steve Forman, Baylor University

Gladys W. Cole Research Award

Glenn Thackray, Idaho State University

Sedimentary Geology

Laurence L. Sloss Award

Marjorie Chan, University of Utah

Stephen E. Laubach Structural Diagenesis Research Award (jointly with the Structural Geology and Tectonics Division)

Kayla Smith, Utah State University

Structural Geology and Tectonics

Career Contribution Award

Gautam Mitra, University of Rochester

Outstanding Publication Award

John M. Fletcher, Michael E. Oskin, and Orlando J. Teran, 2016, The role of a keystone fault in triggering the complex El Mayor–Cucapah earthquake rupture: *Nature Geoscience*, v. 9, p. 303–307, <https://doi.org/10.1038/ngeo2660>.

Other awards presented at the annual meeting include:

GSA International

James B. Thompson, Jr., Distinguished International Lecturer Award

Frank Corsetti, University of Southern California

Laurent Jolivet, Université Pierre et Marie Curie

Distinguished Career

Paul Jeff Fox, Texas A&M University

Cushman Foundation

W. Storrs Cole Memorial Research Award

Ashley M. Burkett, Oklahoma State University

American Geosciences Institute

AGI Medal in Memory of Ian Campbell

Barbara Murphy, Clear Creek Associates

Northwestern Earth and Planetary Sciences

\$200,000

Nemmers Prize in Earth Sciences

Call for Nominations

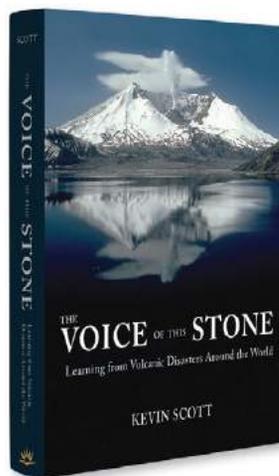


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Rocky Mountain Section

72nd Annual Meeting of the Rocky Mountain Section, GSA
Provo, Utah, USA

4–5 May 2020

www.geosociety.org/rm-mtg



Mount Timpanogos. Photo by Hike395 via Wikimedia Commons.

LOCATION

We are excited to announce that the GSA 2020 Rocky Mountain Section Meeting will be held in Provo, Utah, USA. The meeting will be held in one of the most geologically diverse sites in America: We will be three kilometers from the base of the actively growing Wasatch Range, which marks the boundary between the Rocky Mountain and Basin and Range physiographic provinces, and within an hour of Precambrian tillite and Mississippian limestone, Sevier and Laramide structures, Tertiary intrusives and ore bodies, Pleistocene Lake Bonneville shoreline features, and Holocene faulting. Provo is less than an hour from the Salt Lake City International Airport, has a thriving restaurant scene, and has been ranked by *Outside* magazine as one of the best places to live in the United States.

CALL FOR PAPERS

Abstract deadline: 4 Feb. 2020

Submit online at www.geosociety.org/rm-mtg

Abstract submission fee: US\$18 for students and US\$30 for all others. If you cannot submit an abstract online, please contact Heather Clark, +1-303-357-1018, hclark@geosociety.org.

TECHNICAL PROGRAM

Theme Sessions

- T1. **Extensional Tectonics in the Rocky Mountain Region from the Precambrian to the Quaternary.** Jason W. Ricketts, The University of Texas at El Paso, jricketts@utep.edu.
- T2. **Geohazards of the Rocky Mountain West and Beyond.** Emily Kleber, Utah Geological Survey, ekleber@utah.gov.
- T3. **Innovative Methods for Analyses of Fault Hazards Studies.** James Evans, Utah State University, james.evans@usu.edu.
- T4. **Reconstructing a Lost World: The Paleoclimate, Paleobiology, and Geology of the Late Cretaceous Southern Utah Plateau Region.** Landon Burgener, North Carolina State University, lkburgen@ncsu.edu.
- T5. **Use It or Lose It: Developing Paleontological Interpretive Sites for Education and Resource Protection.** James Kirkland, Utah Geological Survey, jameskirkland@utah.gov.
- T6. **Advances in Rocky Mountain Region Paleontology.** Brooke Long-Fox, South Dakota School of Mines and Technology, brooke.long@mines.sdsmt.edu.
- T7. **Geologic Maps—The Foundation of Research and Exploration.** Grant Willis, Utah Geological Survey, grantwillis@utah.gov.
- T8. **Mining in the Rocky Mountain Region and Beyond: Risks and Opportunities.** Steven H. Emerman, Malach Consulting, SEmerman@gmail.com.
- T9. **Innovative Technologies to Improve Mine Site Characterization: Extracting Value from Your Drone Data.** Kara Haas, SiteSee, khaas@ramboll.com.
- T10. **Geology of the San Rafael Swell, East-Central Utah.** Thomas C. Chidsey, Utah Geological Survey, tomchidsey@utah.gov.
- T11. **Federal and State Geologists of the Rocky Mountain Section: Who Are They, What Are They Working On, and How Can Everyone Collaborate?** Cianna Wyshnytzky, USDA–Natural Resources Conservation Service, cianna.wyshnytzky@usda.gov.
- T12. **Advances and Applications of River Science in the West.** Sharon Bywater-Reyes, University of Northern Colorado, sharon.bywaterreyes@unco.edu.
- T13. **Geomorphic and Paleoclimate Records from the Intermountain West.** Tammy Rittenour, Utah State University, tammy.rittenour@usu.edu.
- T14. **Bonneville Basin: Geology of Pleistocene and Holocene Lakes.** Adam P. McKean, Utah Geological Survey, adamckean@utah.gov.
- T15. **Hydrology of the Western United States.** Daren Nelson, Utah Valley University, nelsonda@uvu.edu.
- T16. **Effective and Innovative Teaching and Curricula in the College Geoscience Classroom.** Doug Czajka, Utah Valley University, cdczejka@uvu.edu.

T17. **Undergraduate Research (Posters).** Daniel Horns, Utah Valley University, hornsda@uvu.edu.

FIELD TRIPS

Trip registration opens in December. For additional information, please contact the Field Trip co-chairs Michael Stearns, mstearns@uvu.edu; Andra Chica, andrea.chica@icloud.com; and Patricia Garcia, pgarcia@uvu.edu.

The Gigantic Markagunt and Sevier Gravity Slides Resulting from Mid-Cenozoic Catastrophic Mega-Scale Failure of the Marysvale Volcanic Field. Robert F. Biek, Utah Geological Survey, bobbiek@utah.gov.

Tracking Dinosaurs in Canyon County (Moab). ReBecca Hunt-Foster, National Park Service, Dinosaur National Monument, rebecca_hunt-foster@nps.gov.

Dinosaur National Monument and Other Mesozoic Sites of Northeastern Utah. ReBecca Hunt-Foster, National Park Service, Dinosaur National Monument, rebecca_hunt-foster@nps.gov.

Tectonic Evolution of the Sevier and Laramide Belts in Northern Utah. Adolph Yonkee, Weber State University, ayonkee@weber.edu.

Geology of Bryce Canyon and Zion National Parks. Grant Willis, Utah Geological Survey, grantwillis@utah.gov.

Lake Bonneville and Great Salt Lake. Jack Oviatt, Kansas State University, joviatt@ksu.edu.

The Integrated Contact Metamorphic and Magmatic Record from the Alta–Little Cottonwood Stock System. Michael Stearns, Utah Valley University, mstearns@uvu.edu.

REGISTRATION

Early registration deadline: 30 March

Cancellation deadline: 6 April

Registration opens in February. For further information or if you need special accommodations, please contact the general chair, Daniel Horns, hornsda@uvu.edu.

ACCOMMODATIONS

Hotel registration deadline: 13 April

A block of rooms has been reserved at the Provo Marriott Hotel & Conference Center, 101 West 100 North, Provo, Utah 84601, USA, located in the heart of vibrant Provo. The meeting rate is US\$134 per night plus tax. The hotel offers many amenities (restaurants, bar, pool, Wi-Fi), and the Convention Center is just steps away. Reservations can be made by calling

+1-800-228-9290, or registering online at <https://www.marriott.com/event-reservations/reservation-linkmi?id=1561663720563&key=GRP&app=resvlink>. Please be sure to identify yourself with the 2020 Annual Meeting of the Rocky Mountain Section to ensure you receive the contracted rate. Complimentary parking is available on-site at the hotel.

OPPORTUNITIES FOR STUDENTS AND EARLY CAREER PROFESSIONALS

Career Mentoring Luncheons

Ask your career-related questions and learn about non-academic pathways in the geosciences while networking with professionals at the Roy J. Shlemon and John Mann Mentor Luncheons. Students and early career professionals are welcome.

Career Workshop Series

This three-part series will feature career development planning, an exploration of geoscience job sectors, and information on best practices for crafting a résumé and cover letter. Non-technical skills and workforce statistics will be reviewed. No registration is required, and everyone is welcome.

To learn more about mentors and career workshops, go to www.geosociety.org/mentors/ or contact Jennifer Nocerino at jnocerino@geosociety.org.

Student Volunteers

Take advantage of work opportunities to earn free meeting registration. Students interested in helping with the various aspects of the meeting should contact Wilma B. Aleman Gonzalez, U.S. Geological Survey, waleman@usgs.gov.

PROFESSIONALS

If you would like to share your interest, enthusiasm, and experience in applied geology, consider being a GSA mentor at the meeting. Being a mentor is a rewarding experience. To learn more, contact Jennifer Nocerino at jnocerino@geosociety.org.

This meeting also offers an excellent opportunity to earn CEUs toward your continuing education requirements for your employer, K–12 school, or professional registration. The CEU certificate can be downloaded from the meeting website after the meeting.

LOCAL COMMITTEE

General Co-Chair: Daniel Horns, hornsda@uvu.edu

Technical Program Co-Chairs: Nathan Toke, nathan.toke@uvu.edu; Michael Bunds, bundsmi@uvu.edu

Field Trip Co-Chairs: Michael Stearns, mstearns@uvu.edu; Andra Chica, andrea.chica@icloud.com; Patricia Garcia, pgarcia@uvu.edu

Student Volunteer Chair: Justin White

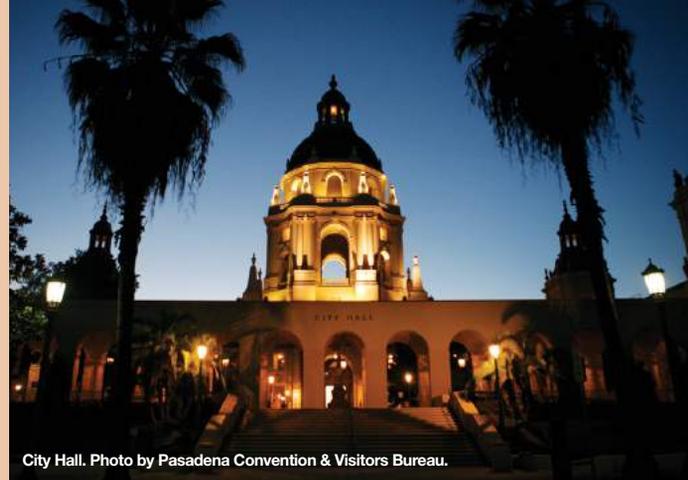
Cordilleran Section

116th Annual Meeting of the Cordilleran Section, GSA

Pasadena, California, USA

12–14 May 2020

www.geosociety.org/cd-mtg



City Hall. Photo by Pasadena Convention & Visitors Bureau.

LOCATION

Pasadena, California, USA—the Crown City—is one of California's iconic cities and is centered in a region defined by its geology. The landscape surrounding Pasadena reflects many past phases of geologic activity, all the while it continues to change through the slow motion of faults, the movement of water, the cycle of wind and fire and landslides, and many other processes. Its location affords access to world-famous faults, rugged mountains with an almost two-billion-year geologic history, well-known sedimentary basins with vast petroleum reserves, and legendary earthquakes, landslides, and other geologic hazards. Building on the extraordinary geological features of the surrounding region, we have devised a diverse program reflecting fundamental and applied aspects across earth-science disciplines.

CALL FOR PAPERS

Abstract deadline: 11 Feb. 2020

Submit abstracts online at www.geosociety.org/cd-mtg.

Abstract submission fee: US\$18 for students and US\$30 for all others. If you have questions about online submission, please contact Heather Clark, +1-303-357-1018, hclark@geosociety.org.

In addition to the following Theme Sessions, we are soliciting abstracts for general discipline sessions. For more information, contact the Technical Session chair, Robinson Cecil, robinson.cecil@csun.edu.

TECHNICAL PROGRAM

Theme Sessions

- T1. **The Changing Face of Paleontology: In Honor of the Career Contribution of Dr. Richard L. Squires.** Linda A. Ritterbush, California Lutheran University, ritterbu@callutheran.edu; Mary McGann, U.S. Geological Survey, mmcgann@usgs.gov.
- T2. **La Brea Tar Pits: Old Bones and New Insights.** Donald R. Prothero, Cal Poly Pomona, donaldprothero@att.net.
- T3. **Finding Fault: Slip Rates across the Southern California Plate Boundary.** Richard Heermance, California State University Northridge, richard.heermance@csun.edu; Kate Scharer, U.S. Geological Survey, kscharer@usgs.gov.
- T4. **The Kinematics, Dynamics, and Surface Expression of Faults in Eastern California—Improving Hazard Forecasts and Long-Term Slip Histories.** Elizabeth Haddon, U.S. Geological Survey, ehaddon@usgs.gov; Scott Bennett, U.S. Geological Survey, sekbennett@usgs.gov; Janis Hernandez, California Geological Survey, janis.hernandez@conservation.ca.gov; Katherine Kendrick, U.S. Geological Survey, kendrick@usgs.gov; Dave Miller, U.S. Geological Survey, dmiller@usgs.gov.
- T5. **Paleoearthquake Records of the North American Cordillera.** Sinan Akciz, California State University Fullerton, sakciz@fullerton.edu; Janis Hernandez, California Geological Survey, Janis.Hernandez@conservation.ca.gov; Brian Olson, California Geological Survey, Brian.Olson@conservation.ca.gov.
- T6. **New Constraints on the Evolution of the Southern California Bight: Understanding Diffuse Plate Boundaries across Multiple Scales from Laboratory and Numerical Models to Field Observations.** Drake Singleton, San Diego State University & Scripps Institution of Oceanography, dsinglet@ucsd.edu; Boe Derosier, Scripps Institution of Oceanography, bderosie@ucsd.edu.
- T7. **Integrated Subduction Zone Systems: Advances in Understanding Landscape Evolution, Deformation, and Tectonics.** Melanie Michalak, Humboldt State University, melanie.michalak@humboldt.edu; Francis Sousa, Oregon State University, francis.sousa@oregonstate.edu; Rebecca Dorsey, University of Oregon, rdorsey@uoregon.edu.
- T8. **Exhumation and Uplift of the Sierra Nevada and Tehachapi Mountains.** Ann Blythe, Occidental College, ablythe@oxy.edu; Jeffrey Lee, Central Washington University, jeff@geology.cwu.edu.
- T9. **The Enigmatic Late Cretaceous–Paleogene Tectonic Evolution of the Southwestern USA.** Richard V. Heermance, California State University Northridge, richard.heermance@csun.edu; Scott Johnston, Cal Poly San Luis Obispo, scjohnst@calpoly.edu; John Singleton, Colorado State University, John.Singleton@colostate.edu.
- T10. **Quaternary Volcanism in California.** Seth Burgess, U.S. Geological Survey, sburgess@usgs.gov; Jorge Vazquez, U.S. Geological Survey, jvazquez@usgs.gov; Andrew Calvert, U.S. Geological Survey, acalvert@usgs.gov.

- T11. **Impacts of Arc Activity on the Rheology of the Lithosphere across Convergent Margins.** Snir Attia, University of Southern California, sattia@usc.edu; Katie Ardill, University of Southern California, kardill@usc.edu; Tarryn Cawood, University of Southern California, cawood@usc.edu; William Schmidt, University of Southern California, wlschmid@usc.edu.
- T12. **Igneous Minerals as Capsules of Length and Time-Scale Information for Magma Processes in Magma Plumbing Systems.** *Cosponsored by GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Vali Memeti, California State University Fullerton, vmemeti@fullerton.edu; Cal Barnes, Texas Tech University, cal.barnes@ttu.edu.
- T13. **Magma Emplacement from Arcs to Outcrops: Patterns, Processes, and Rates across Multiple Scales.** Cullen Scheland, University of Southern California, scheland@usc.edu; Scott Paterson, University of Southern California, paterson@usc.edu.
- T14. **Magmatic Rates, Processes, and Spatiotemporal Evolution of Arc Activity.** Katie Ardill, University of Southern California, kardill@usc.edu; Barbara Ratschbacher, California Institute of Technology, ratschba@gps.caltech.edu; Scott Paterson, University of Southern California, paterson@usc.edu; Cullen Scheland, University of Southern California, scheland@usc.edu; Ana Martinez-Ardila, Loma Linda University, anmartinez@llu.edu.
- T15. **Petrology, Geochemistry, and Structure of Cordilleran Batholiths through Space and Time.** *Cosponsored by GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division; GSA Structural Geology and Tectonics Division.* Madeline J. Lewis, California Institute of Technology, mjlewis@caltech.edu; Claire E. Bucholz, California Institute of Technology, cbucholz@caltech.edu; Jade Star Lackey, Pomona College, JadeStar.Lackey@pomona.edu; Juliet Ryan-Davis, California Institute of Technology, jrd@caltech.edu.
- T16. **Metamorphic Processes in Cordilleran Arc Systems.** Joshua Schwartz, California State University Northridge, joshua.schwartz@csun.edu; Jade Star Lackey, Pomona College, JadeStar.Lackey@pomona.edu.
- T17. **Sediment Stories: Utilizing Sediment to Understand and Document the Processes That Shape Earth's Surface.** Joe Carlin, California State University Fullerton, jcarlin@fullerton.edu; Andrew Gray, University of California Riverside, agray@ucr.edu.
- T18. **From Coasts to Deserts to Mountains: What Can the Past Tell Us about California's Future?** Matthew E. Kirby, California State University Fullerton, mkirby@fullerton.edu; Elizabeth Fard, University of California Los Angeles, ellyfard@gmail.com; Jessie George, University of California Los Angeles, jmgeorge@ucla.edu; Jiwoo Han, University of California Los Angeles, hjsing@ucla.edu; Kathleen Johnson, University of California Irvine, kathleen.johnson@uci.edu; Glen Sproul dit MacDonald, University of California Los Angeles, glen@geog.ucla.edu.
- T19. **Hydrology and Hydrogeology of Arid and Semi-Arid Regions.** M. Hassan Rezaie Boroon, California State University Los Angeles, mrezaie@calstatela.edu.
- T20. **Hydrogeology (Posters).** Barry Hibbs, California State University Los Angeles, bhibbs@calstatela.edu; M. Hassan Rezaie Boroon, California State University Los Angeles, mrezaie@calstatela.edu.
- T21. **Geoscience in the Two-Year-College (2YC) Community: Sharing Successes, Growing Pains, and Lessons Learned.** Elizabeth Nagy, Pasadena City College, eanagy-shadman@pasadena.edu; Martha House, Pasadena City College, mahouse@pasadena.edu; Tania Anders, Mt. San Antonio College, tania.anders@mtsac.edu.
- T22. **Celebrating Indigenous Voices and Perspectives in Geoscience.** Diamond Tachera, University of Hawai'i at Mānoa, diamondt@hawaii.edu; Brytne Okuhata, University of Hawai'i at Mānoa, bokuhata@hawaii.edu; Jennifer Wong-Ala, Oregon State University, wongalaj@oregonstate.edu.
- T23. **Professional Pathways within the Geosciences.** Jennifer Wilson, Six Rivers Geosciences, jwilson@sixriversgeosciences.com.
- T24. **Convergence of Earth, Data, and Behavior Science.** Beth Weinman, Fresno State University, bweinman@csufresno.edu; Criss Wilhite, Fresno State University, crissw@csufresno.edu.
- T25. **Undergraduate Research (Posters).** *Cosponsored by the Council on Undergraduate Research (CUR)—Geological Sciences.* Jeff Marshall, Cal Poly Pomona, marshall@cpp.edu.

FIELD TRIPS

Trip registration will open in February 2020. For additional information, please contact the Field Trip chairs: Richard Heermance, richard.heermance@csun.edu, and Joshua Schwartz, joshua.schwartz@csun.edu.

Recent Advancements in Geochronology, Geologic Mapping, and Landslide Characterization in Basement Rocks of the San Gabriel Mountains Block. Jonathan Nourse, Cal Poly Pomona, janourse@cpp.edu; Brian Swanson, California Geological Survey, Brian.Swanson@conservation.ca.gov; Nicolas Barth, University of California Riverside, nic.barth@ucr.edu; Joshua Schwartz, California State University Northridge, joshua.j.schwartz@gmail.com.

Tectonic and Magmatic Evolution of Salinian and Nacimiento Blocks, Central Coastal California. *Cosponsored by GSA Structural Geologic and Tectonics Division; GSA Geochronology*

Division; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division. Alan Chapman, Macalester College, chapman@macalester.edu; Scott Johnston, Cal Poly San Luis Obispo, sejohnst@calpoly.edu; John Singleton, Colorado State University, John.Singleton@colostate.edu; Owen Anfinson, Sonoma State University, anfinson@sonoma.edu; Jeremy Hourigan, University of California Santa Cruz, hourigan@ucsc.edu.

Late Quaternary Offset on the Central Sierra Madre Fault and Timing of Terrace Formation along the San Gabriel Mountains Range Front. Kate Scharer, U.S. Geological Survey, kscharer@usgs.gov; Reed Burgette, New Mexico State University, burgette@nmsu.edu.

Structure, Metamorphism, and Geodynamic Significance of the Catalina Schist Terrane. John Platt, University of Southern California, jplatt@usc.edu; Marty Grove, Stanford University, mjgrove@stanford.edu.

Geology of Central and Western Santa Cruz Island. Thomas Davis, Geologic Maps Foundation, geologicmapsfoundation@gmail.com; Rick Behl, California State University Long Beach, Richard.Behl@csulb.edu; Katie O'Sullivan, California State University Bakersfield, kosullivan@csub.edu.

Montecito Debris Flow of 9 January 2018: Physical Processes and Social Implications. *Cosponsored by University of California Santa Barbara Earth Research Institute.* Edward Keller, University of California Santa Barbara, keller@ucsb.edu.

The Geology and Ambiguities of the Coyote Mountains, Western Salton Trough, Southern California. George Morgan, georgemorgan@cox.net.

SHORT COURSES

Short Course registration will open in February 2020. For additional information, please contact the Short Course chair, Kathie Marsaglia, kathie.marsaglia@csun.edu.

Use of Magmatic Structures for Unraveling the Evolution of Magmatic Systems: Combined Field, Structural, and Geochemical Techniques. *Cosponsored by GSA Structural Geology and Tectonics Division; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Scott Paterson, University of Southern California, paterson@usc.edu; Katie Ardill, University of Southern California, kardill@usc.edu; Cal Barnes, Texas Tech University, cal.barnes@ttu.edu; Vali Memeti, California State University Fullerton, vmemeti@fullerton.edu.

Using Thermal Infrared Spectral Imagery Data for Geological and Earth Science Applications. *Cosponsored by The Aerospace Corporation.* Rebecca (Amber) Witkosky, Millennium Space Systems, lithia35@gmail.com; David Tratt, The Aerospace Corporation, david.m.tratt@aero.org; Kerry Buckland, The Aerospace Corporation, kerry.n.buckland@aero.org; Patrick Johnson, The Aerospace Corporation, patrick.d.johnson@aero.org; Joann Stock, California Institute of Technology, jstock@gps.caltech.edu.

Increase the Use of Data, Math, and Societal Relevance in Your Undergraduate or 9–12 Classroom. *Cosponsored by Geodesy Tools for Societal Issues (GETSI) Project; National Association of Geoscience Teachers.* Becca Walker, Mt. San Antonio College, walkerbecca@gmail.com; Beth Pratt-Sitaula, UNAVCO, prattsitaula@unavco.org; Rachel Teasdale, California State University Chico.

Applied Forensic Geochemistry: Applications of Sr/Pb to Resolve Issues in Environmental Remediation. Richard W. Hurst, California Lutheran University, rhurst@callutheran.edu.

REGISTRATION

Early registration deadline: 6 April

Cancellation deadline: 13 April

Registration for the meeting opens in February 2020. For further information or if you need special accommodations, please contact meeting general chair, Doug Yule, doug.yule@csun.edu.

ACCOMMODATIONS

A block of rooms has been reserved at the Westin Pasadena at 191 N. Los Robles Ave., Pasadena, California 91101, USA, which is where the conference will be held. The room rate is US\$179 per night plus tax. Make reservations by calling +1-866-837-4181 (toll-free) or the hotel directly at +1-626-304-1403. When booking, please refer to the Cordilleran Section of the Geological Society of America.

OPPORTUNITIES FOR STUDENTS AND EARLY CAREER PROFESSIONALS

Career Mentoring Luncheons

Ask your career-related questions and learn about non-academic pathways in the geosciences while networking with professionals at the Roy J. Shlemon and John Mann Mentor Luncheons. Both students and early career professionals are welcome.

Career Workshop Series

This three-part series will feature career development planning, an exploration of geoscience job sectors, and information on best practices for crafting a résumé and cover letter. Non-technical skills and workforce statistics will be reviewed. No registration is required, and everyone is welcome.

To learn more about mentors and career workshops, go to www.geosociety.org/mentors or contact Jennifer Nocerino at jnocerino@geosociety.org.

ORGANIZING COMMITTEE

Meeting General Chair: Doug Yule, doug.yule@csun.edu

Technical Program Chair: Robinson Cecil, robinson.cecil@csun.edu

Field Trip Chairs: Richard Heermance, richard.heermance@csun.edu; Joshua Schwartz, joshua.schwartz@csun.edu

Workshop Chair: Kathie Marsaglia, kathie.marsaglia@csun.edu
Student Volunteers, Exhibits: Elizabeth Nagy, eanagy-shadman@pasadena.edu

Sponsorship Chair: Doug Yule, doug.yule@csun.edu

2020 GSA Section Meetings



South-Central

9–10 March
Fort Worth, Texas, USA
Chairs: Omar Harvey, omar.harvey@tcu.edu; Arne Winguth, awinguth@uta.edu
www.geosociety.org/sc-mtg

Fort Worth Stockyards. Photo by Visit Fort Worth.



Joint Southeastern–Northeastern

20–22 March
Reston, Virginia, USA
Chairs: Arthur Merschat, amerschat@usgs.gov; Patrick Burkhart, patrick.burkhart@sru.edu
www.geosociety.org/se-mtg

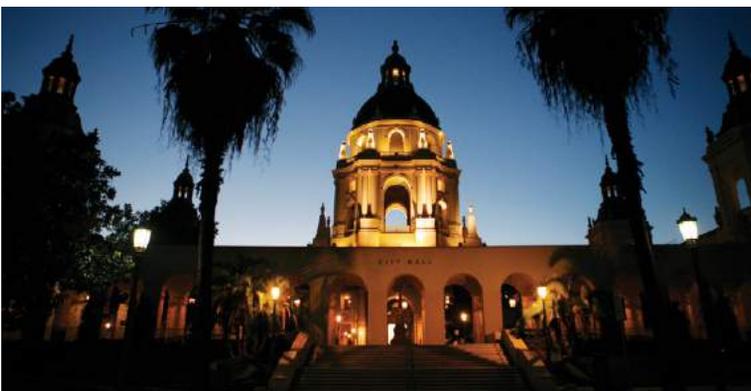
Great Falls Park. Photo by Visit Fairfax.



Rocky Mountain

4–5 May
Provo, Utah, USA
Chair: Daniel Horns, hornesda@uvu.edu
www.geosociety.org/rm-mtg

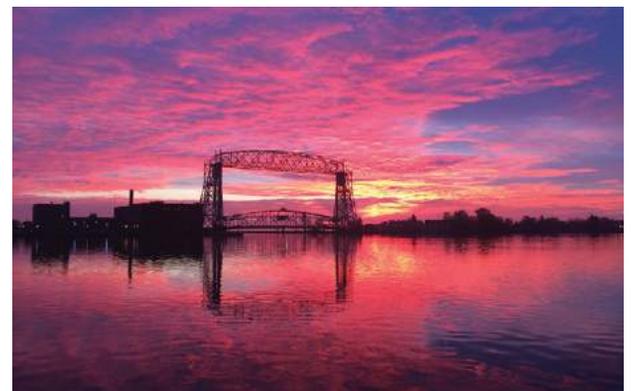
Mount Timpanogos. Photo by Hike395 via Wikimedia Commons.



Cordilleran

12–14 May
Pasadena, California, USA
Chair: Doug Yule, doug.yule@csun.edu
www.geosociety.org/cd-mtg

City Hall. Photo by Pasadena Convention & Visitors Bureau.



North-Central

18–19 May
Duluth, Minnesota, USA
Chair: Karen Gran, kgran@d.umn.edu
www.geosociety.org/nc-mtg

Aerial Lift Bridge at sunrise. Photo by Visit Duluth.



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GeoCorps provides paid geoscience opportunities in partnership with government agencies and other organizations committed to science and stewardship, including the Bureau of Land Management (BLM) and the USDA Forest Service.

All levels of geoscientists—students, educators, professionals, retirees, and others—are encouraged to apply. Opportunities for spring/summer 2020 will be posted online and open for applications beginning in December 2019.

www.geosociety.org/geocorps



Clockwise from left: Cole Blasko collecting data at a culvert in the Chippewa National Forest. Kai Morsink uses a grid to record the exact arrangement of stones in a prehistoric archaeological feature. Rebecca Anderson in Umpqua National Forest taking a stream crossing measurement with the level. Anthony Spiegel and Bridget Murray in Meeker, Colorado, painting bat boxes with Rocky Mountain Youth Corps participants.

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The National Park Service (NPS) Geoscientists-in-the-Parks (GIP) program places college students and early career professionals (18–35 years old) in NPS units for three months to one year to assist with geology and integrated science projects. This program is a partnership between the NPS, GSA, and Stewards Individual Placement Program. Opportunities for spring/summer 2020 will be posted online and open for applications at the beginning of December 2019.

www.geosociety.org/gip



Clockwise from top left: John He examining a rock on Mica Mountain, Saguaro National Park. Alex Ennes leading a Geology Walk on Door Trail in Badlands National Park. Susie Hertfelder preparing fossils in the Richard Ditton Learning Lab at the Las Vegas Natural History Museum during National Fossil Day, 2018. Eddie Cascella mixing sediment samples together from Cape Cod National Seashore's Nauset Marsh before bagging it and sending it to a lab for further analysis.

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Amistad National Recreation Area

Alexander Klug

Assateague Island National Seashore

Hannah Wirth

Badlands National Park

Jessica DeSmet

Alexandra Ennes

Nicholas Hernandez

Jessica Millman

Alexi Richmond

Badlands National Park and Florissant

Fossil Beds National Monument

Bret Buskirk

Bandelier National Monument

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Biscayne National Park

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Laura Yates

Canyonlands National Park and

Capitol Reef National Park

Christopher Benson

Cape Cod National Seashore

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Cape Lookout National Seashore

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Capitol Reef National Park

Collin Jensen

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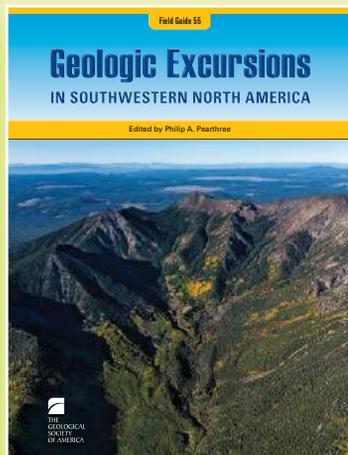
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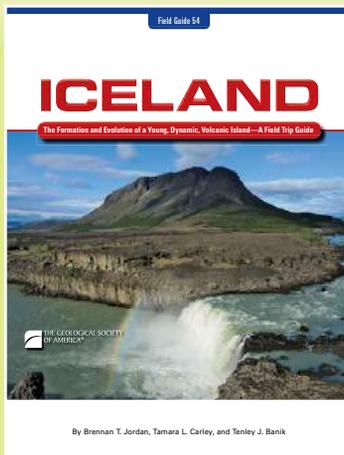
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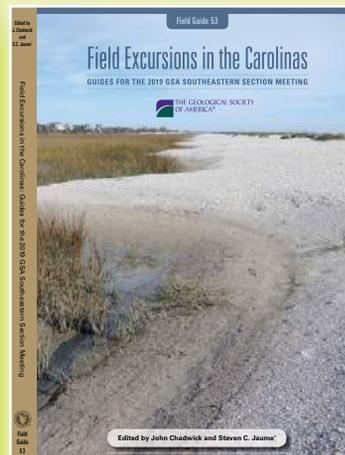
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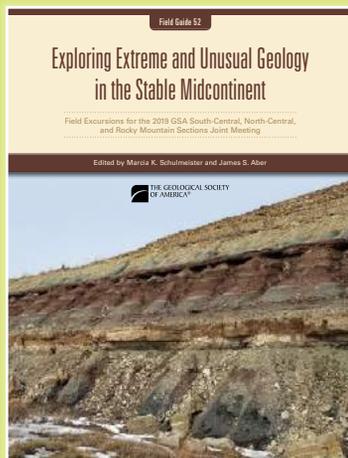
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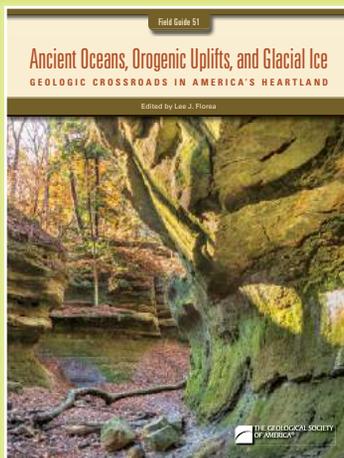
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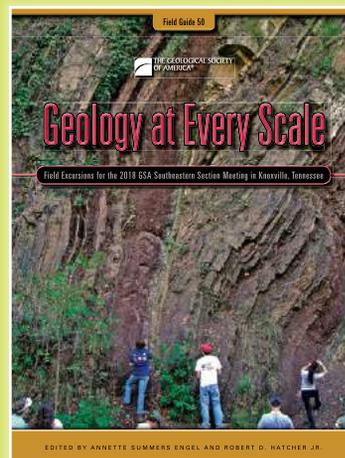
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Is Your Science Policy Relevant? And a Few Lessons



Caitlin Keating-Bitonti

During my 2018–2019 Congressional Science Fellowship in U.S. Senator Tom Udall’s (D-NM) office, I had the opportunity to work on drafting several pieces of legislation. The pieces of legislation that I worked most closely on were related to wildlife corridors and to reforestation on U.S. Forest Service lands. In the broadest sense, I consider myself to be a geologist, and in the narrowest sense, I consider myself to be a micro-

paleontologist. Thus, I do not have much knowledge of wildlife ecology and wildlife management, or plant physiology and forest ecology, yet here I was in the Senator’s office working on legislation that involved all of these fields.

To those in Congress, I was a scientist, but I felt that I did not have the expertise to confidently approach these pieces of legislation as a scientist. One aspect of Congress that I truly appreciated was the freedom to frequently respond to queries with “I do not know” or “I am not an expert in that” or “let me find out and get back to you.” About midway through my fellowship year, I started building confidence in my ability to work on legislation and began ramping up the level of intensity and effort I was putting into these two bills. This included soliciting feedback from scientists who worked on these specific issues where I lacked the requisite expertise. I did this by sending cold emails asking for help.

I worked closely with five academic scientists over the span of my fellowship year to help strengthen the legislation I was preparing for introduction. With these scientists, I worked to craft meaningful definitions for terms used in bills (many bills have a definition section and it is crucially important to get those definitions right); to create strategies to implement relevant science methodology and data into the bill; and to identify means to quantify the success of a program should the bill be passed into law. I was beyond impressed with the willingness and thoughtfulness of these scientists, and I am grateful to them for their generosity in working with me.

How did I identify these scientists given I was not working on paleontology-related legislation and there is no scientist hotline for policy makers to call?

The first scientist with whom I established a working relationship was a professor at a university in New Mexico and, thus, a constituent of Senator Udall’s. While this academic was in D.C. for a scientific conference, he made the trip up to Capitol Hill to meet with me to request that the Senator maintain funding for the National Science Foundation in fiscal year 2020 and continue to provide broad scientific research support—as most academics do when they visit their congressional representatives, who are appropriators as well. We also spent some time chatting about his research lab and its ongoing projects. Our conversation made a strong impression on me. As I dove deeper into one of the pieces of legislation I was tasked with for my fellowship year, I remembered the expertise of this scientist and emailed

him to ask for advice on some topics I was unfamiliar with even though his research did not technically touch on any policy.

Lesson 1: Take the time to meet with your representative’s staff (e.g., GSA Geoscience Congressional Visits Day). This may result in Hill staffers seeing you as being relevant to the policy-making process without you having to actively pursue research in science policy.

During my email exchanges with this scientist, he provided me with the contact information for another scientist in his field and recommended that I reach out to this individual to gather further and slightly different insight into the bill. This resulted in my first true cold email to get additional information relevant to the bill, and also a working relationship with a second academic, who, again, had no policy experience.

Once the bill was close to complete, I began shopping the bill around to offices in the U.S. House to identify a representative who could lead the bill there. When discussing the details of the bill with one interested office and sharing how it was drafted, those staff members were intrigued that I had solicited the feedback of academics, one of whom happened to be from Senator Udall’s home state. Thus, they requested that I reach out to experts at research institutes or universities located in their home state for input as well before they signed onto the bill. To identify a contact person to satisfy this office’s request, I Googled names in relevant academic departments and then sent out more cold emails. Without going into the details of why I had emailed them specifically, I asked if they had the time and interest to review draft bill language. Again, I was beyond impressed with the willingness of scientists to provide insightful comments without questioning the motives or reasons for a cold email from a different state’s Senator’s staffer. Lesson 2: Keep your professional web page current and well organized to both help others find you and quickly identify your expertise.

As I shopped the bill around on Capitol Hill, word spread about it—as most things do on the Hill. A few outside, non-governmental groups requested to review the drafted bill. The comments I received on the bill from these groups led me down a rabbit hole. Fortunately, to properly address and respond to these comments, I recalled a congressional briefing on landslides (unrelated to the bill I was working on) that I had previously attended. One of the expert panelists spoke about something tangentially related to the comments I had received, so I took a chance and cold emailed him for help. This person provided me with a prompt response and started an email chain with a colleague who was better informed on this issue. Through this email exchange, I became better informed and able to address the comments that I received from the groups. Lesson 3: Be willing to participate in congressional briefings. Hill staffers attend these briefings to learn and some might even follow up with you.

To answer the question: Is Your Science Policy Relevant? Yes, you and your science can be policy relevant. I encourage the GSA community to visit or contact your congressional representatives to let them know about your science and to be open to the

idea of serving in a congressional briefing or hearing. All of the scientists with whom I worked during my fellowship year were academics with limited to no policy experience, and they were all invaluable to the legislative drafting process. I sincerely appreciated all of the time and energy they took to work with me, and I hope that they found a sense of accomplishment in applying their science to the legislative process.

This manuscript is submitted for publication by Caitlin Keating-Bitonti, 2018–2019 GSA-USGS Congressional Science Fellow, with the understanding that the U.S. government is authorized to reproduce and distribute reprints for governmental use. The one-year fellowship is supported by GSA and the U.S. Geological Survey, Department of the Interior, under Assistance Award no. G18AP00098. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. government. Keating-Bitonti works in the office of Senator Tom Udall (D-NM) and can be contacted by e-mail at crkeatin@gmail.com.

2019–2020 GSA-USGS Congressional Science Fellow Announced



Mike O'Connor

GSA and the U.S. Geological Survey are pleased to announce that Mike O'Connor will serve as the 2019–2020 GSA-USGS Congressional Science Fellow. He will spend a year in the office of Representative Paul Tonko (D-NY) working on energy and environmental issues.

O'Connor is a hydrologist with an extensive background in water resources and cold regions. While at the University of Texas working with Bayani Cardenas,

O'Connor used fieldwork and numerical models to substantially

improve our understanding of how fast and how deep climate change-induced permafrost thaw will occur in Alaska. The fieldwork was conducted out of Toolik Field Station on the Alaskan North Slope, and was partially supported by GSA grant funds.

O'Connor served as a graduate research fellow within Oak Ridge National Laboratory's Climate Change Science Institute, working closely with a team of environmental system modelers. He also served as an intern for both the Texas Senate Committee on Agriculture, Water, and Rural Affairs (spring 2015) and in the U.S. House of Representatives Committee on Natural Resources (summer 2017), where he helped communicate policy-relevant science to lawmakers and their staff.

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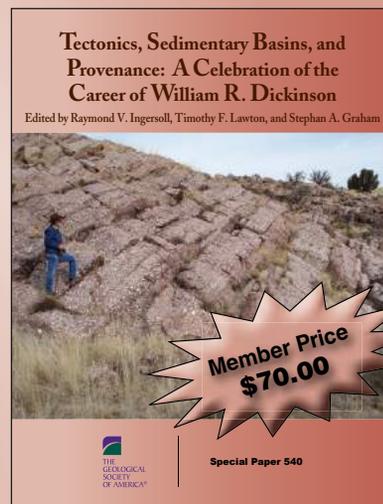
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Edited by Raymond V. Ingersoll,
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Through a remarkable combination of intellect, self-confidence, engaging humility, and prodigious output of published work, William R. Dickinson influenced and challenged three generations of sedimentary geologists, igneous petrologists, tectonicists, sandstone petrologists, archaeologists, and other geoscientists. A key figure in the plate-tectonic revolution of the 1960s and 1970s, he explained how the distribution of sediments on Earth's surface could be traced to tectonic processes, and is widely recognized as a founder of modern sedimentary basin analysis. This volume consists of 31 chapters related to Dickinson's research interests; many of the authors are his former students, their students, and their students' students, demonstrating his continuing profound influence. The papers in this volume are an impressive tribute to the depth and breadth of Bill Dickinson's contributions to the geosciences.

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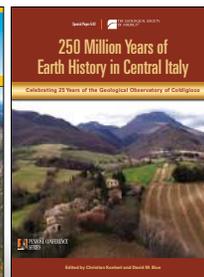
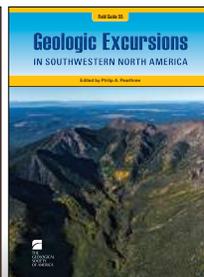
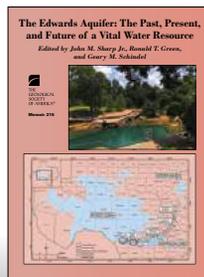
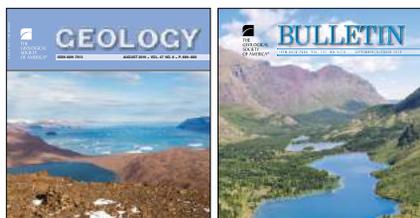
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Ads (or cancellations) must reach the GSA advertising office no later than the first of the month, one month prior to the issue in which they are to be published. (Note: Combined March/April issue releases on March schedule.) Print ads will also appear on the Geoscience Job Board to coincide with the month of print issue. **Contact: advertising@geosociety.org, +1-800-472-1988 ext. 1053, or +1-303-357-1053.** Email correspondence should include complete contact information (including phone and mailing address). Rates are in U.S. dollars.

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POSITIONS OPEN

Igneous and/or Metamorphic Petrology, Sonoma State University (SSU)

The Department of Geology at SSU is seeking a highly motivated and dynamic teacher/scholar to teach and conduct research with undergraduate students in geology, with expertise in igneous and/or metamorphic petrology. The successful candidate will be encouraged to initiate and maintain research activities that involve undergraduate students, to seek grant funding for scholarly work, and to make substantive and documentable contributions to their discipline. This candidate will also be working with a diverse team of faculty, staff, and students. To apply, go to www.sonoma.edu/jobs, select "External Applicant," and search for the "Geology Tenure Track Faculty" position. Review of applications will begin on December 2nd, 2019. Please contact the search committee chair, Matty Mookerjee, matty.mookerjee@sonoma.edu, with any questions about this position.

Tenure Track Assistant Professor in Remote Sensing/Geospatial Technology, California State Polytechnic University, Pomona

The Geological Sciences Department at California State Polytechnic University, Pomona (Cal Poly Pomona) invites applications for a tenure-track, ASSISTANT PROFESSOR position, beginning in the 2020–2021 academic year. We invite applications from geoscientists whose research incorporates data from ground-based remote sensing or observations from unmanned aerial vehicles or satellites, and the position is open to a broad range of research specializations, such as natural hazards, active tectonics, environmental geoscience, and/or climate change. A Ph.D. in geology, geophysics, environmental geoscience or a directly related science or engineering discipline is required. The successful candidate will have the potential for excellence in undergraduate and graduate teaching, and for developing an externally-funded research program that will involve undergraduate and Master's students. Teaching responsibilities will typically include a mix of geoscience courses at the lower division, upper division, and graduate levels, and will incorporate classes in Geographic Information

Systems, Remote Sensing or other specialty courses in the candidate's area of expertise. Demonstrated experience with data collection and analysis using modern instrumentation is expected. Preferred qualifications include demonstrated success with external funding, established ties to research institutions, industry or government agencies and interest in developing intradepartmental and cross-campus collaborations. At Cal Poly Pomona we cultivate student and faculty success through a diverse culture of experiential learning, discovery, and innovation. Cal Poly Pomona is committed to being the model for an inclusive polytechnic university that inspires creativity and innovation, embraces local and global challenges, and transforms lives. The position is open until filled. First consideration will be given to completed applications received no later than December 30, 2019. Full position description and application procedure: <http://www.cpp.edu/~faculty-affairs/open-positions/>.

Assistant Professor, Paleontology, University of North Carolina Wilmington

The Department of Earth and Ocean Sciences at the University of North Carolina Wilmington seeks a tenure-track Assistant Professor in Paleontology to begin August 2020. We seek an individual with expertise in Conservation Paleobiology whose research integrates paleoecological, paleoclimatological, and geochronological methods, with a strong potential to utilize UNCW's coastal setting within the Atlantic Coastal Plain in their research and teaching. Candidates must have completed a Ph.D. in geology, geoscience, or a related field. The successful candidate will: (1) be committed to exceptional teaching at the introductory level (e.g., physical and historical geology, natural disasters, environmental geology), including oversight of laboratory sections, as well as upper-level undergraduate and graduate courses (e.g., vertebrate and/or invertebrate paleontology, paleoecology, conservation paleobiology), (2) support the established undergraduate and graduate degree programs within the Department of Earth and Ocean Sciences by advising majors and by actively recruiting and mentoring students, and (3) establish and maintain a vigorous research program with a significant field component that involves both undergraduate and graduate students, and complements and interfaces with our emerging directions and strengths in coastal and marine processes and hazards, climate/paleoclimate studies, volcanic processes/hazards, crustal dynamics, tectonics of orogenic systems, and water resource issues.

To apply, please visit <https://jobs.uncw.edu/postings/15779>. Priority consideration will be given to applications received by November 15, 2019, but applications will be accepted until the position is filled. For questions about the position, contact search committee chair Dr. Todd LaMaskin (lamaskint-at-uncw.edu). For questions regarding the online application system contact Human Resources at UNCW. (<https://uncw.edu/hr/employment.html>).

UNCW is located five miles from the Atlantic

Ocean on a beautiful 656-acre campus in the historic port city of Wilmington, North Carolina, on the Cape Fear River. The University currently enrolls approximately 17,000 students. For further information about UNCW, please visit <https://uncw.edu>.

UNCW actively fosters a diverse and inclusive working and learning environment and is an equal opportunity employer. Qualified individuals from all racial, ethnic, or other minority groups, veterans, and individuals with disabilities are strongly encouraged to apply.

Assistant Professor—Surficial Processes Department of Geology & Geography, West Virginia University Job Number: 13110

The Department of Geology & Geography at West Virginia University invites applications for a tenure-track assistant professor position starting in August 2020. A Ph.D. or equivalent degree in Geoscience or a related field is required at the time of appointment. We seek applications from individuals with expertise in the study of surficial processes. Relevant specialties might include land surface dynamics, landscape evolution, geohazards, tectonic geomorphology, critical zone studies, fluvial systems, stream restoration, and land-use dynamics. The successful applicant will demonstrate potential to establish a vigorous externally funded research program, publish scholarly work, mentor graduate students, contribute to diversity and inclusion, and teach at the undergraduate and graduate levels to support our Geology, Geography, and Environmental Geoscience programs (including a junior-senior level course in Geomorphology). Those with the ability to carry out big-data analytics and modeling are encouraged to apply.

West Virginia, with its steep topography, narrow valleys, frequent floods and landslides and a history of anthropogenic landscape change, offers endless research targets. The WV GIS Technical Center (wvgis.wvu.edu) in the Department provides opportunities for collaboration, as does the WVU Institute for Water Security and Science (iwss.wvu.edu). In addition to working with colleagues in Geology and Geography, the new hire will also have the opportunity to collaborate with scientists in WVU's Davis College of Agriculture and Natural Resources and the Statler College of Engineering.

WVU (www.wvu.edu) is a comprehensive land-grant university that enrolls about 29,000 students. It is classified as "R1-very high research activity" by the Carnegie Foundation. WVU is located in Morgantown (www.morgantownwv.gov) which is ranked in the Top 100 Best Places to Live in America. The immediate region has a diverse population of about 200,000 residents. The community lies within a high technology corridor that includes several federal research facilities such as DOE's National Energy Technology Laboratory, as well as resource-based industries. The city is readily accessible to Pittsburgh and Washington, DC.

To apply for this position, visit <https://careers.wvu.edu>, navigate to the position title listed above, and submit, (1) a single PDF file including a statement of research interests, a statement of

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teaching philosophy, a current curriculum vitae, and a statement describing the candidate's potential to further our progress in building a diverse and inclusive academic community (to be evaluated without regard to the candidate's personal demographics); (2) a list of names and e-mail addresses for at least three individuals who can provide prompt letters of recommendation; and (3) pdf files of up to three publications.

Review of applications will commence on November 11, 2019, and continue until the position is filled. For additional information, please see <https://www.geo.wvu.edu/faculty-and-staff/surficial> or write to Surficial.Processes@mail.wvu.edu. WVU is an EEO/Affirmative Action Employer and welcomes applications from all qualified individuals, including minorities, females, individuals with disabilities, and veterans.

Assistant Professor in Geological Sciences (Mineralogy/Petrology), University of Missouri

The Department of Geological Sciences at the University of Missouri invites applications for a tenure-track position at the rank of Assistant Professor in the fields of mineralogy and petrology. Potential areas of research interest could include igneous and/or metamorphic petrology, volcanology, meteoritics, planetary geology, geochemistry, mineral surface chemistry, and/or other related areas of expertise. This position has an anticipated Fall 2020 start date. As a minimum qualification, a Ph.D. in geological sciences or related field by the time of appointment is required. The successful candidate will be expected to teach across the curriculum, including mineralogy and courses within their expertise, and to build an externally funded research program that complements the existing strengths in paleobiology, geochemistry, structural geology, and geophysics. Applicants will be evaluated on their ability to conduct independent research and effectively teach students across the curriculum at the graduate and undergraduate levels. Information about our department and our undergraduate and graduate curricula can be found at our department website [geology.missouri.edu].

Our department occupies a building dedicated to Geological Sciences, and houses numerous analytical facilities [geology.missouri.edu/research-facilities] including a new X-ray Tomographic and Scanning Electron Microscopy laboratory [xray.missouri.edu] as one of the MU Research Core Facilities, and a high-performance computing cluster. Elsewhere on campus is a wide variety of geochemical instrumentation at the MU Research Reactor [murr.missouri.edu] and at other research core facilities [research.missouri.edu/about/cores].

About the University and Columbia, Missouri. The University of Missouri (also known as Mizzou or MU) is located in Columbia, Missouri. As Missouri's largest public research university, Mizzou has an enrollment of ~30,000 students, is a Research I designated institution, is a member of the Association of American Universities, and is the flagship campus of the four-campus University of Missouri

System. Mizzou is one of only five universities nationwide with law, medicine, veterinary medicine, and a nuclear research reactor on one campus.

With a population of ~125,000, Columbia is located midway between Missouri's largest cities, St. Louis and Kansas City. Money magazine, Fortune magazine, U.S. News & World Report, and others have named Columbia one of the best places in the United States to live and among the top 10 college towns because of its high quality of life. Columbia is home to nationally renowned public schools, including two top-ranked high schools. The city provides many opportunities for art, culture, and music enthusiasts, and has been recognized as a bike-friendly community with many parks and trails.

To apply. Please apply on line at: <http://hrs.missouri.edu/find-a-job/academic> (Job Opening ID 31617). Use the online application to upload (i) a letter of application that describes your teaching and research experience; (ii) a CV; (iii) a statement describing research and teaching interests and a plan for attracting students, including students from demographic groups who traditionally have been underrepresented in the geological sciences; and (iv) a statement of inclusion and diversity. Three reference letters are required and should be sent (electronically or hard copy) to Dr. James Schiffbauer (schiffbauerj@missouri.edu), Chair of the Search Committee. Applicants may contact the Chair of the Search Committee with questions about the job duties. Please contact Human Resource Services (muhrs@missouri.edu) with any questions about the application process. Review of application materials will begin on Tuesday, December 17th, 2019. To ensure full consideration, applications should be complete (including reference letters) on or before this date. The position will remain open until filled.

The University of Missouri and the Department of Geological Sciences are fully committed to achieving the goal of a diverse and inclusive academic community of faculty, staff, and students. The University of Missouri is an Equal Opportunity/Access/Affirmative Action/Pro Disabled & Veteran Employer. To request ADA accommodations, please contact the Office of Accessibility & ADA Education at 573-884-7278 or CheekA@missouri.edu.

Three Positions in Sedimentary Geology, University of Houston

The University of Houston Department of Earth and Atmospheric Sciences invites applications for three tenure-track positions in the general field of sedimentary geology. Hiring will be at the assistant professor level with up to one hire at the associate professor level. Experience and qualifications will be used to determine the appropriate title of assistant or associate. This is a cluster hire that will focus on interpretation of records of changing environments on Earth's surface.

We are particularly interested in researchers with a focus on the areas of paleoclimate, paleoceanography, paleogeography, biogeochemistry, carbon cycles and proxies, the role of tectonics in building the sedimentary record, source to sink processes,

and coastal evolution. The research of successful applicants may concentrate on either chemical or clastic sedimentary rocks and may use data from outcrops, cores, modern environments, the subsurface, or experimental or modeling studies. Integration of geophysical data, petrographic observations, and facies analysis is particularly encouraged.

The successful candidates will be expected to build active collaborations within and outside the university, to develop internationally recognized, externally funded research programs, to teach graduate and undergraduate level courses that bridge theory and practical applications in the geosciences, and to use their research to enhance experiential learning at UH.

The University of Houston is an equal opportunity/affirmative action employer. Minorities, women, veterans, and persons with disabilities are encouraged to apply.

The University of Houston is responsive to the needs of dual career couples. Furthermore, we welcome candidates whose experience in teaching, research, or community service has prepared them to contribute to our commitment to diversity and excellence. More information about the department can be found at <http://www.uh.edu/nsm/earth-atmospheric/>. Candidates must have a Ph.D. or equivalent in earth science or a related field at the time of the appointment.

Review of applications will begin on October 31st, 2019, and continue until the positions are filled. Candidates should submit: 1) a statement of teaching and research interests, 2) a curriculum vitae, 3) a list of at least three possible references and their contact information. Applications should be submitted online through <https://jobs.uh.edu/>. A background check is required prior to interviewing. Questions about these positions may be directed to search committee chair Julia Wellner (jwellner@uh.edu).

Notes to Applicant: Official transcripts are required for a faculty appointment and will be requested upon selection of the final candidate. All positions at the University of Houston are security sensitive and will require a criminal history check.

Assistant (Tenured-Track) or Associate (Tenured), Professor in Igneous and/or Metamorphic Petrology, The University of Texas at Austin

The Department of Geological Sciences at The University of Texas at Austin seeks to hire a faculty member in the field of igneous and/or metamorphic petrology at the Assistant (tenure-track) or Associate Professor (tenured) level. We seek an outstanding scientist who will establish an innovative, world class, externally funded research program in the petrological evolution of the Earth and possibly other terrestrial bodies. We seek a candidate who will take advantage of the extensive analytical and/or computational capabilities of the Jackson School and complement our existing research strengths. A Ph.D. is required by the expected start date.

The Department of Geological Sciences is part of the Jackson School of Geosciences (JSG), which

also includes two research units, the Institute for Geophysics and the Bureau of Economic Geology. With over 190 research scientists and faculty, the Jackson School of Geosciences is one of the largest academic earth science schools in the country. The University is located in a thriving metropolitan area with a dynamic, multicultural community of over 1 million people. The department is interested in building a culturally diverse intellectual community and we strongly encourage applications from all underrepresented groups. The University of Texas at Austin is an Equal Opportunity Employer with a commitment to diversity at all levels.

Review of applications will begin December 17, 2019, and continue until the position is filled. Interested applicants should submit a cover letter; CV; research statement; teaching statement; statement addressing past and/or potential contributions to diversity through research, teaching, and/or service; and a list of at least three individuals who would be able to provide letters of reference. Submit copies of these materials through Interfolio's "Apply Now" option: Further instructions can be found at: apply.interfolio.com/68792.

The University of Texas at Austin, as an equal opportunity/affirmative action employer, complies with all applicable federal and state laws regarding nondiscrimination and affirmative action. The University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, national origin, age, marital status, sex, sexual orientation, gender identity, gender expression, disability, religion, or veteran status in employment, educational programs and activities, and admissions.

Applied Geophysics, University of Toronto

The Department of Earth Sciences [<http://www.es.utoronto.ca/>] in the Faculty of Arts & Science at the University of Toronto invites applications for a full-time tenure stream position in the area of Applied Geophysics. The appointment will be at the rank of Associate Professor or Professor, and will commence on July 1, 2020, or shortly thereafter. The successful candidate will be appointed as the endowed Teck Chair in Exploration Geophysics for a five-year term, renewable following a favourable review.

Applicants must have earned a PhD degree in geophysics, physics, or a related area, with a demonstrated exceptional record of excellence in research and teaching. Candidates will have an established international reputation and will be expected to sustain and lead innovative and independent research at the highest international level and to maintain an outstanding, competitive, and externally funded research program. The successful candidate is expected to establish and maintain research programs that utilize and develop geophysical tools (e.g., seismic, magnetic, electrical, gravitational, and electromagnetic methods) for applications in (but not limited to) exploration and management of natural resources, environmental engineering, architecture and civil engineering. We seek candidates whose research program and teaching interests complement existing strengths of the

department [<https://www.es.utoronto.ca/research/faculty-interests/>] and the university in tectonics, seismology, rock mechanics, mineral deposits, machine learning, and high-performance computing, and enhance the long-standing tradition of excellence in pure and applied geophysics research in the Faculty of Arts & Sciences.

Candidates must provide evidence of research excellence as demonstrated by a record of sustained high-impact contributions and publications in top-ranked and field relevant journals, the submitted research statement, presentations at significant conferences, distinguished awards and accolades, and other noteworthy activities that contribute to the visibility and prominence of the discipline, as well as strong endorsements from referees of high standing.

Evidence of excellence in teaching will be provided through teaching accomplishments, the teaching dossier submitted as part of the application including a strong teaching statement, sample course syllabi, and the teaching evaluations, as well as strong letters of reference. The successful candidate will be expected to teach introductory geoscience courses and graduate and upper level undergraduate courses in fields related to their specialization, including field-based teaching of undergraduate and graduate students.

Toronto is a centre of activity for international geophysical exploration, and many companies specialising in exploration technology are located in the area. The Teck Chair will be expected to take advantage of industry and industry-focussed governmental research funding to establish and lead a vigorous programme of research and graduate study in the field of exploration geophysics. The successful candidate will be expected to enhance the Department's links with the Department of Physics and the Lassonde programme in the Faculty of Applied Sciences & Engineering.

Salary and rank will be commensurate with qualifications and experience.

All qualified candidates are invited to apply online by clicking the link below. Applicants must submit a cover letter; a current curriculum vitae; statements describing their research program and teaching philosophy (of no more than 5 pages each); and a teaching dossier to include a teaching statement, sample course syllabi and teaching evaluations.

Applicants must also arrange to have three letters of reference sent directly by the referee via email (on letterhead and signed) to geol_sec@es.utoronto.ca by the closing November 18, 2019.

Submission guidelines can be found at <http://uoft.me/how-to-apply>. We recommend combining attached documents into one or two files in PDF/MS Word format. If you have any questions about this position, please contact geol_sec@es.utoronto.ca.

The University of Toronto is strongly committed to diversity within its community and especially welcomes applications from racialized persons / persons of colour, women, Indigenous / Aboriginal People of North America, persons with disabilities, LGBTQ persons, and others who may contribute to the further diversification of ideas.

As part of your application, you will be asked to complete a brief Diversity Survey. This survey is voluntary. Any information directly related to you is confidential and cannot be accessed by search committees or human resources staff. Results will be aggregated for institutional planning purposes. For more information, please see <http://uoft.me/UP>.

All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority.

Tenure-Track Assistant Professor, Solid Earth Processes in the Lithosphere, Florida State University

The Department of Earth, Ocean and Atmospheric Sciences (EOAS) at the Florida State University (FSU) seeks a Solid Earth Geologist with preference for a Metamorphic petrologist for a tenure-track Assistant Professor position. The ideal candidate will employ "process" oriented research that provides insight into the transfer of heat and mass in the lithosphere by integrating natural observations, analytical methods, and complementary numerical modeling. Research areas could include but are not limited to fluid-rock interactions, interaction of lithosphere and exosphere, volatile sequestration, and time-scales and rates of lithospheric processes approached from a petrological perspective.

Candidates must hold a doctorate from an accredited institution or the highest degree in Earth Science or a related field. The appointee is expected to develop and maintain a vigorous externally funded research program and to teach at the undergraduate and graduate levels. The appointee is also expected to contribute to the department's strong commitment to field-based undergraduate education, which includes FSU's Geology field course.

Applicants should submit a cover letter, curriculum vitae, statement of research and teaching interests, and contact information for three references using FSU's electronic submission system at <http://jobs.fsu.edu>. Applications should be submitted to job opening # 46341. Review of applications will begin Nov 18, 2019. The deadline for receipt of applications is Jan, 2, 2020. Inquiries may be addressed to the chair of the search committee, Prof. Mainak Mookherjee, mmookherjee@fsu.edu.

FSU is An Equal Opportunity/Access/Affirmative Action/Pro Disabled & Veteran Employer. FSU's Equal Opportunity Statement can be viewed at: https://www.hr.fsu.edu/PDF/Publications/diversity/EEO_Statement.pdf. Diversity, equity, and inclusion are core values at FSU and the Department of Earth, Ocean and Atmospheric Science. Our excellence can only be fully realized by faculty, students, and staff who share our commitment to these values. Successful candidates for our faculty positions will demonstrate evidence of a commitment to advancing equity and inclusion through their research, teaching, and/or service.

Assistant Professor, Environmental Volcanology/Petrology, North Carolina State University

The Department of Marine, Earth, and Atmospheric Sciences (MEAS) at North Carolina State University intends to fill a tenure-track assistant professor

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position in environmental volcanology/petrology.

Desirable expertise includes research employing observation, experiments, and modeling to investigate the origin of magmatism in different tectonic settings, the role of volatiles in volcanic eruptions and short and/or long-term climate change, and/or geohazards. The anticipated start date is August 16, 2020.

Applicants must hold a Ph.D. degree in Earth or related sciences. The successful candidate must demonstrate strong potential for outstanding accomplishments in research, research supervision, and teaching. Enthusiastic engagement in NC State's undergraduate and graduate degree programs in Earth, marine and atmospheric sciences is expected. Course offerings may include undergraduate or graduate classes in mineralogy, hard rock petrology, or other classes commensurate with the candidate's interest and expertise. MEAS places a high value on excellent instruction and the use of innovative teaching methods.

Initial review of applications is expected to begin by December 1, 2019, with on campus interviews scheduled for early 2020. Further details are available at <https://meas.sciences.ncsu.edu/>. Applications must be submitted online at <http://jobs.ncsu.edu/postings/121811> or search for position number 00001313. Applications from women, minorities, and persons with disabilities are encouraged.

Tenure-Track Assistant Professor in Geohazards or Environmental Health, The University of Texas Arlington

The Department of Earth and Environmental Sciences at the University of Texas Arlington invites applications for a tenure-track faculty position in broadly construed areas related to geohazards or environmental health at the level of Assistant Professor. Faculty candidates for higher ranks with exceptional track records will also be considered. We seek a broadly-trained geoscientist or environmental scientist who complements the interdisciplinary nature of our earth and environmental science program. While candidates from all sub-disciplines of earth and environmental sciences are encouraged to apply, we are particularly interested in candidates with expertise in one of the following areas: geohazards, processes leading to earthquakes, rock strength change, landform response to disturbances, climate change and its impact, data analytics, dynamical or statistical modeling, the exposome, biomarkers, and metabolics.

Applicants should have a doctoral degree in earth and environmental sciences or a related field. Successful candidates are expected to demonstrate a commitment to diversity and equity in education through their scholarship, teaching, and/or service. We are deeply committed to increasing diversity and especially encourage applications from women and minority scholars.

Review of applications will begin immediately and continue until the position is filled. For full consideration, applications should be submitted by November 16th, 2019. Full position description and application are at <https://uta.peopleadmin.com/>

postings/10400. The position ID is F00174P. A complete application includes: 1) curriculum vitae, 2) summary of current and proposed research (max. two pages), 3) statement of teaching interests (max. one page), and 4) names and email addresses of three references. Question regarding this position may be directed via email to Dr. Majie Fan, Search Committee Chair at mfan@uta.edu, or departmental administration at lpantner@uta.edu.

Assistant Professor, Tenure-Track, Emory University

Location: Atlanta, Georgia; Salary: Open; Type: Full Time—Entry; Required Education: Doctorate

The Department of Environmental Sciences at Emory University, Atlanta, GA, seeks applicants for a full-time, nine-month tenure-track Assistant Professor position with a focus on biogeochemistry, beginning fall semester 2020. Research may address any aspect of biogeochemical cycling, with a preference for work focused on anthropogenic environmental change and/or novel trans-disciplinary integration. The successful candidate will demonstrate a clear trajectory for excellence in both research and teaching and a commitment to enhancing inclusion and diversity. Full description and application submission at: <https://apply.interfolio.com/68144>.

Review begins on November 11, 2019, but applications received up to 30 days after review begins will be given full consideration. Questions related to the position (but not application materials) should be addressed to: envs.search@emory.edu. Emory is an EEO/AA employer.

Assistant Professor of Geology, Ohio Wesleyan University

The Department of Geology and Geography at Ohio Wesleyan University invites applications for a full-time (tenure-track) Assistant Professor of Geology with an expertise in Tectonics and Structural Geology to begin in Fall 2020. Applicants should possess a PhD in Geology with an expertise in Tectonics and Structural Geology and a strong commitment to teaching. ABD applicants within one year of completion of their PhD with a similar expertise and teaching commitment will be considered. The successful candidate will be expected: to teach approximately 9 contact hours per semester focusing on Physical and Environmental Geology, Tectonics, Structural Geology, Geological Techniques; to develop new courses in their expertise that complement the existing curriculum; to contribute to the interdisciplinary majors (for example, Planetary Science, Environmental Science) that Geology participates in; and to develop a research program that engages undergraduate students. Ohio Wesleyan places significant value of teaching, expects excellence and innovation in the classroom, and close educational interaction between faculty and students. The University also values and expects scholarly research and active engagement with professional activities. The Geology and Geography department currently has 5 tenure-track faculty positions (3 in Geology and 2 in Geography). Further information about the department can be found at www.owu.edu/geology.

Ohio Wesleyan University, a private liberal arts college located 20 miles north of Columbus, in Delaware, Ohio, promotes and celebrates an inclusive environment free from constraints in areas of culture, race, sex, disability, sexual orientation, gender identity and/or expression, age, religion, family relationship, or economic barriers. Applications by members of all underrepresented groups are encouraged as OWU is an equal opportunity institution and has a strong commitment to supporting diversity, equity and inclusion.

Completed application packets will include:

- (1) Cover Letter
- (2) Resume or Curriculum Vitae
- (3) Three Letters of Recommendation
- (4) Statement on teaching philosophy
- (5) Statement on research interests and how undergraduate students would be involved in that research
- (6) Statement on diversity and inclusiveness that describes how your teaching, scholarship, mentoring and/or service might contribute to a liberal arts college that has diversity and inclusiveness as part of its core values

Please submit all application materials as PDF's to: geologysearch@owu.edu

The application deadline is December 1, 2019. Application review will begin immediately and will continue until the position is filled.

Assistant Professor, Hydrology and Surface Processes, Baylor University

Baylor University is a private Christian university and a nationally ranked research institution, consistently listed with highest honors among The Chronicle of Higher Education's "Great Colleges to Work For." The University is recruiting new faculty with a deep commitment to excellence in teaching, research and scholarship. Baylor seeks faculty who share in our aspiration to become a tier one research institution while strengthening our distinctive Christian mission as described in our strategic vision, Pro Futuris, www.baylor.edu/profuturis/ and academic strategic plan, Illuminate www.baylor.edu/illuminate. As the world's largest Baptist University, Baylor offers over 40 doctoral programs and has more than 17,000 students from all 50 states and more than 85 countries.

Baylor seeks to fill the following tenure-track faculty position within the Department of Geosciences, College of Arts and Sciences:

Assistant Professor, Hydrology and Surface Processes. The Baylor University Department of Geosciences seeks a dynamic scholar in hydrology and surface processes beginning August 2020. Candidates should possess a Ph.D. in a geoscience, hydrology, or closely related discipline. We seek an innovative scientist with demonstrated research excellence. Specific areas of interest could include water connections within anthropogenic and natural systems, ecohydrology, remote sensing, climate change, fluvial geomorphology, and intersections between water and energy, all at scales ranging from the local watershed to global. We welcome candidates who bring new perspectives and a commitment to teaching and mentoring of undergraduate, graduate, and postdoctoral students. Our department includes 17 tenured

and tenure-track geoscientists, with considerable facilities and resources. Water-related research is a priority for the Geosciences and other STEM departments, with multiple opportunities for cross-disciplinary collaborations.

The application package for this position should include a cover letter, curriculum vitae, 3 peer-reviewed publications, separate research and teaching statements, and the names and contact information of 3 references. Submit the application package electronically via Interfolio (<http://apply.interfolio.com/66785>).

If there are questions please contact the chair of the search committee, Dr. Joe Yelderman (email: joe_yelderman@baylor.edu). Faculty will also be available to discuss the position at the AGU meeting in San Francisco.

Salary is commensurate with experience and qualifications. Applications will be reviewed beginning 11/01/2019 and will be accepted until the position is filled. To learn more, please visit these links: <https://www.baylor.edu/geosciences/>, <https://www.baylor.edu/artsandsciences/>.

Baylor University is a private not-for-profit university affiliated with the Baptist General Convention of Texas. As an Affirmative Action/Equal Opportunity employer, Baylor is committed to compliance with all applicable anti-discrimination laws, including those regarding age, race, color, sex, national origin, marital status, pregnancy status, military service, genetic information, and disability. As a religious educational institution, Baylor is lawfully permitted to consider an applicant's religion as a selection criterion. Baylor encourages women, minorities, veterans, and individuals with disabilities to apply.

Tenure Track Assistant Professor Position in Earth Surface Processes, University of Alaska Anchorage

The Department of Geological Sciences at the University of Alaska Anchorage (UAA) (www.uaa.alaska.edu/geology/) seeks applications from exceptional candidates for a tenure-track faculty position at the Assistant Professor level in the broad area of Earth Surface Processes, with a start date of August 2020. We aim to complement existing areas of research expertise in hydrology, environmental geochemistry, structure, and stratigraphy. The successful candidate is expected to teach undergraduate and graduate courses to a diverse student body in the B.S. and M.S. programs in geological sciences.

Although all areas of Earth Surface Processes will be considered, expertise in modeling of geomorphological, coastal, cryospheric, and/or marine processes is desired. The position is associated with a \$20 million, 5-year National Science Foundation EPSCoR (Established Program to Stimulate Competitive Research) grant that supports interdisciplinary research in the State of Alaska. During the first three years at UAA, the successful applicant will serve as a member of the EPSCoR team for the project "Fire and Ice: Navigating Variability in Boreal Wildfire Regimes and Subarctic Coastal Ecosystems." Applicants are encouraged to consult the Alaska EPSCoR website at www.alaska.edu/

epscor for further information. Contributing to the boreal fire component and the ability to integrate across the coastal margins component is central to the project.

Applicants must hold a Ph.D. in geological sciences or a closely related discipline, and preferably have post-doctoral and teaching experience. The position requires research, teaching, and service components that support UAA's mission. The successful candidate will be expected to teach core courses and/or develop specialty courses for the graduate (M.S.) and undergraduate academic programs, develop a vigorous externally funded research program, and mentor graduate students. Interested applicants should submit a statement of interest that outlines their qualifications for this position and includes a research plan, teaching interests, curriculum vitae, and the names and contact information of at least three references. Applications must be submitted to Job #512846 at alaska.edu/jobs/. For questions about this position, please contact Dr. Lee Ann Munk, Chair of the Search Committee, at lamunk@alaska.edu. Review of applications will begin November 8, 2019 and will continue until the position is filled.

UAA is an AA/EO Employer and Educational Institution. Applicant must be eligible for employment at the time of initial appointment under the immigration Reform and Control Act of 1986 and subsequent amendments. Your application for employment with UAA is subject to public disclosure under the Alaska Public Records Act.

Igneous Petrology, Western Washington University

The Geology Department at Western Washington University (WWU) invites applications for a tenure-track, assistant professor position with specialty in Igneous Petrology to begin Sept 16, 2020. We seek individuals who are enthusiastic about teaching and who will establish a vigorous research program, and are particularly interested in those who will combine field and analytical, experimental or modeling approaches in their research, and who will involve undergraduate and Masters-level students in their research.

The ideal candidate will enhance our existing strengths in geoscience teaching and research by developing new courses and research avenues in igneous petrology. Broad areas of interest include, but are not limited to, the timescales of magmatic processes, the evolution of the continental crust, mantle, oceanic lithosphere/ocean island/mid-ocean ridge processes, the recycling of elements and volatiles within arc magmas and subduction systems, and links between tectonic and magmatic processes.

For details about the position, application information and instructions, go to the WWU Employment website <http://employment.wvu.edu/cw/en-us/job/497184/assistant-professor-of-igneous-petrology>.

Review of applications begins December 15, 2019 and continues until position is filled. Please contact the search committee chair, Susan DeBari (debari@wvu.edu) for questions about this position.

Assistant Professor, Geology, Marine and Coastal Science, Western Washington University

The Geology Department and the Marine and Coastal Science (MACS) program at Western Washington University (WWU) invite applications for two tenure-track, assistant professor positions with specialties in one of three fields:

Coastal Geomorphology/Coastal Geohazards. The ideal candidate will enhance our existing strengths in geoscience teaching and research by developing new courses and research avenues in coastal geomorphology, coastal tectonics and geo-hazards. Broad areas of interest include, but are not limited to, coastal erosion and sediment transport, delta evolution, beach/tidal morphodynamics, marine geohazards, and tectonic processes that impact coastal zones, including uplift, subsidence, and tsunami generation and impacts.

Paleoceanography/Paleoclimatology. The ideal candidate will enhance our existing strengths in geoscience teaching and research by developing new courses and research avenues in paleoceanography/paleoclimatology. Broad areas of interest include, but are not limited to, oceanic circulation and heat transport, micropaleontology/paleoecology, the carbon cycle, and geochemical processes that are related to climate variations on geological timescales. Tools and techniques used to address these problems can include geochemical or sedimentological proxies of climate variations, paleontological proxies/indicators of climate variations, physical oceanographic data, or other appropriate techniques.

Marine Geologist. The ideal candidate will enhance our existing strengths in geoscience teaching and research by developing new courses and research avenues in marine geology with a focus on crustal/lithospheric evolution and/or tectonic processes. Broad areas of interest include, but are not limited to, formation of the oceanic lithosphere and crustal evolution, geodynamics of the ocean basins, hydrothermal circulation at mid-ocean ridges, geochemistry of rock-water interactions, submarine volcanic systems, or tectonic processes associated with oceanic plate boundaries. Tools and techniques used to address these problems can include geochemical analyses, geophysical methods, geospatial analysis, textural rock analysis, numerical models, or other appropriate techniques.

These positions will begin Sept 16, 2020. As members of the group of initial faculty hires into the MACS program, the successful applicant will foster an interdisciplinary approach to teaching and research in geology and marine science. We seek individuals who are enthusiastic about teaching and who will establish a vigorous research program, and are particularly interested in those who will combine field, experimental, and/or modeling approaches in their research program, and who will involve undergraduate and Masters-level students in their research.

To apply, and for further details regarding qualifications and position responsibilities, please see <http://employment.wvu.edu/cw/en-us/job/497185/assistant-professor-geology-marine-and-coastal-science>.

GEOSCIENCE JOBS & OPPORTUNITIES

Please contact the search committee chair, Bernie Housen (bernieh@wsu.edu) for questions about these positions. Review of applications begins October 14, 2019 and continues until the positions are filled.

Assistant Professor, Earth Materials, School of the Environment Washington State University

The School of the Environment at Washington State University invites applications for an Assistant Professor in Earth Materials, to begin August 2020, with an emphasis in petrology, mineralogy, volcanology, magmatic processes, or tectonic processes. The candidate will take a leadership role in developing and funding research initiatives that take advantage of WSU's Peter Hooper GeoAnalytical Laboratory and the Radiogenic Isotope and Geochronology Laboratory, which maintain state-of-the-art capabilities in whole rock and micro-scale major and trace element analysis, geochronology, and radiogenic and stable isotope geochemistry. Lab facilities include current generation electron microprobe, X-ray fluorescence, inductively-coupled plasma mass spectrometer, and laser ablation facilities (<https://environment.wsu.edu/facilities/geoanalytical-lab/>).

The successful candidate will: (i) develop an externally funded research program; (ii) publish

research in top quality journals; (iii) teach undergraduate and graduate courses in Earth Materials; (iv) mentor graduate students; (v) take a leadership role in the GeoAnalytical Laboratory; (vi) work with faculty and mentor students from a wide range of backgrounds; and (vii) serve university and professional organizations. To learn more and apply, visit: <https://www.wsujobs.com/postings/48041>. WSU is an EO/AA Educator and Employer.

FELLOWSHIP OPPORTUNITIES

2020 Exploration Fellowship in Earth and Space Science, Arizona State University

The School of Earth and Space Exploration (SESE) in The College of Liberal Arts and Sciences at Arizona State University invites applications for the postdoctoral research scholar position of Exploration Fellow. The mission of the postdoctoral fellowship is to foster SESE's interdisciplinary research program by attracting and supporting outstanding early-career scientists and engineers to pursue independent research in collaboration with SESE faculty. Research areas within SESE encompass theoretical and observational astrophysics, astrobiology, cosmology, earth surface processes, planetary science, instrumentation and systems engineering,

and science education. Anticipated start date for the position is July 2020. Incoming Fellows will receive an annual stipend of \$65,000 with health benefits, plus \$12,000 per year in discretionary research funds. A relocation allowance will be provided. The initial appointment is for one year with subsequent annual renewal for up to a total of three years, contingent upon satisfactory performance, the needs of the university, and availability of resources.

Interested candidates should contact two faculty members in SESE to discuss potential collaborative research topics and determine whether they would agree to serve as an Exploration Fellow mentor. When a topic of mutual interest between the applicant and potential faculty mentors is identified, the applicant should submit a research proposal as a single PDF that includes: (1) a cover letter identifying the proposed research topic and the names of the two faculty mentors, (2) a current CV, (3) a research proposal not longer than five pages (including figures and references), and (4) one paper exemplifying the applicant's research. Applicants should arrange for three letters of reference to be submitted separately. Preference will be given to proposals that include interdisciplinary research spanning multiple research areas within SESE.

Essential duties of the position: The successful applicant will conduct original research, document

The Geological Society of America Foundation Seeks to Hire a President

The mission of the Geological Society of America Foundation (GSAF) is to develop and provide funds to support the goals and programs of the Geological Society of America (GSA). GSAF provides over \$1 million annually to the Society.

The president of the Foundation is the principal officer and oversees the conduct of the fund-raising activities and reports to the GSAF Board of Trustees. Duties include preparation and execution of the Foundation Operations and the Foundation-to-Society Transfer budgets, supervision of Foundation Operations Manager and Director of Development, implementation of strategic initiatives, and other directives approved by the Board of Trustees. The president also maintains close relations with the GSA Executive Director and attends Society scientific or organizational meetings as necessary.

The position is part-time (0.5 FTE) and is located at GSA Headquarters in Boulder, Colorado, USA. For the right candidate, business may be conducted remotely with some time required on-site.

Key Qualifications

- Geoscientific expertise and credentials are mandatory (BS/BA in geoscience required, MS/MA or higher preferred, professional experience demonstrated).

- Executive or board experience, especially not-for-profit experience, is highly desirable.
- Demonstrated skill and success in several critical aspects, including fund-raising, organizational management and supervision, and scientific literacy.
- Other credentials or experience may also be valuable and will be evaluated on a case-by-case basis.

Contact HR@geosociety.org for further information.

Salary range is US\$70,000 to US\$75,000. Benefits include 403(b) and PTO (20 plus hours/week for PTO). Applications accepted until 1 Dec. 2019 (or until filled); expected hiring April 2020, with reporting date in June 2020 to allow overlap with the incumbent.

Submit cover letter, résumé, and three professional references. The cover letter must detail why the applicant is a perfect fit for this position, include examples of fundraising, and not-for-profit experience if applicable. Please submit your application to HR@geosociety.org no later than 1 Dec. 2019.

Equal Opportunity Employer: minority/female/disability/veteran.

results and write journal articles, and present at scientific meetings.

Minimum Qualifications: Ph.D. by the time of appointment in a field relevant to Earth and Space exploration, including (but not limited to) astrophysics, physics, chemistry, geology, biology, and engineering. Candidates must be within five years from receipt of the doctoral degree.

Desired Qualifications: (1) research proposal that demonstrates relevance, interdisciplinary merit, and/or potential impact of the proposed research activities to the overarching “big picture” research questions in the field and to the mission of SESE; (2) a record of prior achievement and experience demonstrating the potential to accomplish proposed research objectives; (3) evidence of strong verbal and written communication skills.

Application materials should be submitted as a single PDF file. The application, and any related questions, should be submitted by email to exppd@asu.edu, addressed to the Exploration Fellowship Committee. Applications will only be given full consideration when all materials described above are received.

Initial deadline for receipt of complete applications is 15 December, 2019; applications will continue to be accepted on a rolling basis for a reserve pool. Applications in the reserve pool may then be reviewed in the order in which they were received until the position is filled. Reference Job ID 14087.

More information about the Exploration Fellowship can be found at <http://sese.asu.edu/exploration-fellowship>.

More information about the department can be found here: <https://sese.asu.edu/>.

Postdoctoral benefits can be found at: <https://cfo.asu.edu/postdoctoral-scholars>.

The College of Liberal Arts and Sciences (<https://thecollege.asu.edu/faculty>) at ASU values cultural and intellectual diversity, and continually strives to foster a welcoming and inclusive environment. We are especially interested in applicants who can strengthen the College diversity of the academic community.

Background check is required for employment. Arizona State University is a VEVRAA Federal Contractor and an Equal Opportunity/Affirmative Action Employer. All qualified applicants will be considered without regard to race, color, sex, religion, national origin, disability, protected veteran status, or any other basis protected by law: <https://www.asu.edu/aad/manuals/acd/acd401.html> and <http://www.asu.edu/titleIX/>.

In compliance with federal law, ASU prepares an annual report on campus security and fire safety programs and resources. ASU's Annual Security and Fire Safety Report is available online at <https://www.asu.edu/police/PDFs/ASU-Clery-Report.pdf>. You may request a hard copy of the report by contacting the ASU Police Department at 480-965-3456.

Flint Postdoctoral Fellowship, Department of Geology & Geophysics, Yale University

The Department of Geology and Geophysics at Yale University (<http://earth.yale.edu>) announces

an annual competition for the Richard Foster Flint Postdoctoral Fellowship. We welcome applicants with research interests in climatic processes, Cenozoic paleoclimate, historical climate records, and future climate predictions, using either archive- or modeling-based investigations. Specific research areas include, but are not limited to, glaciology; climatology; atmospheric and oceanic circulation; low-temperature geochemistry; paleobiological and paleoecological responses to climate change; and coupling between tectonic, climatic, environmental, and biotic processes. This postdoctoral position is awarded for two years and includes a stipend (\$60,000/yr) and research funds (\$5,000/yr), plus health-care benefits and limited expenses for relocation. Applicants should contact a sponsor in the Department to discuss potential research projects, and then submit a short (2–3 page) statement of research interests and a proposed research plan, a curriculum vitae with a full list of publications, an endorsement letter from the sponsoring faculty member, and three confidential letters of reference. Applications should be submitted online at <http://apply.interfolio.com/68371>. The deadline for receipt of all application materials is December 15, 2019, and successful candidates are expected to begin their program at Yale between July 1 and December 31, 2020. Yale University is an Affirmative Action/Equal Opportunity employer. Yale values diversity among its students, staff, and faculty and strongly welcomes applications from women, persons with disabilities, protected veterans, and underrepresented minorities.

OPPORTUNITIES FOR STUDENTS

Graduate Student Opportunities, Case Western Reserve University. Students with backgrounds in geology, physics, chemistry, biology, engineering, and related fields are encouraged to apply for our Ph.D. and M.S. programs in Earth, Environmental, and Planetary Sciences. Areas of active research in the Department include planetary geology and geodynamics, planetary materials, high-pressure mineral physics and geochemistry, core and mantle processes, environmental science, sedimentary geology, and sediment transport. For more information, please visit <http://eeps.case.edu> or write to eeps-gradinfo@case.edu. Financial assistance is available. Application deadline: 1/15/2020.

Graduate Research Opportunities at Purdue.

The Department of Earth, Atmospheric, and Planetary Sciences (EAPS) at Purdue University is looking for enthusiastic and self-motivated graduate students for a variety of research projects in Geology and Geophysics, and Planetary, Environmental, and Atmospheric Sciences. As a multidisciplinary department within the College of Science, EAPS draws students from a variety of STEM backgrounds. We offer 4 years of guaranteed financial support and a variety of fellowships. Students with demonstrated academic and research excellence are invited to explore funded opportunities at <http://www.eaps.purdue.edu/gradresearch>. Come see our booth at AGU.

Graduate Assistantship, New Mexico Highlands University.

Graduate assistantships are available for students wishing to pursue an MS in Geology - Environmental Science beginning Spring or Fall 2020 term. The NMHU Environmental Geology Program strengths are in Petrology, Environmental geochemistry, Water Resources & Water Quality, Paleomagnetism, Volcanology, and collaborative endeavors with the New Mexico Forest and Watershed Restoration Institute. The Paleomagnetism-Rock Magnetism, Powder X-Ray Diffraction, and Water Chemistry laboratories support wide-ranging analytical and field research. The NMHU campus is situated at the boundary of the Great Plains and the Sangre de Cristo Mountains. Campus is located within one to two hours from Cenozoic volcanic fields, Precambrian rock exposures, glaciated valleys, desert terrains, and several world-renowned geologic features - the Valles Caldera and the Rio Grande Rift. A low student:faculty ratio, state-of-the-art laboratory facilities, and committed faculty provide students with a superior learning experience. The graduate assistantship includes a nine-month stipend and tuition waiver per academic year. Application review begins 01/10/19 Spring and 01/02/20 Fall. For more information, contact Dr. Petronis, Environmental Geology, NRM Department, New Mexico Highlands University, Box 9000, Las Vegas, New Mexico 87701, mspetro@nmhu.edu. For disabled access or services call 505-454-3513 or TDD# 505-454-3003. AA/EOE Employer.

Webinar: GSA Research Grants—Steps to Success

Tuesday, 19 Nov., 11 a.m.–noon (MST)

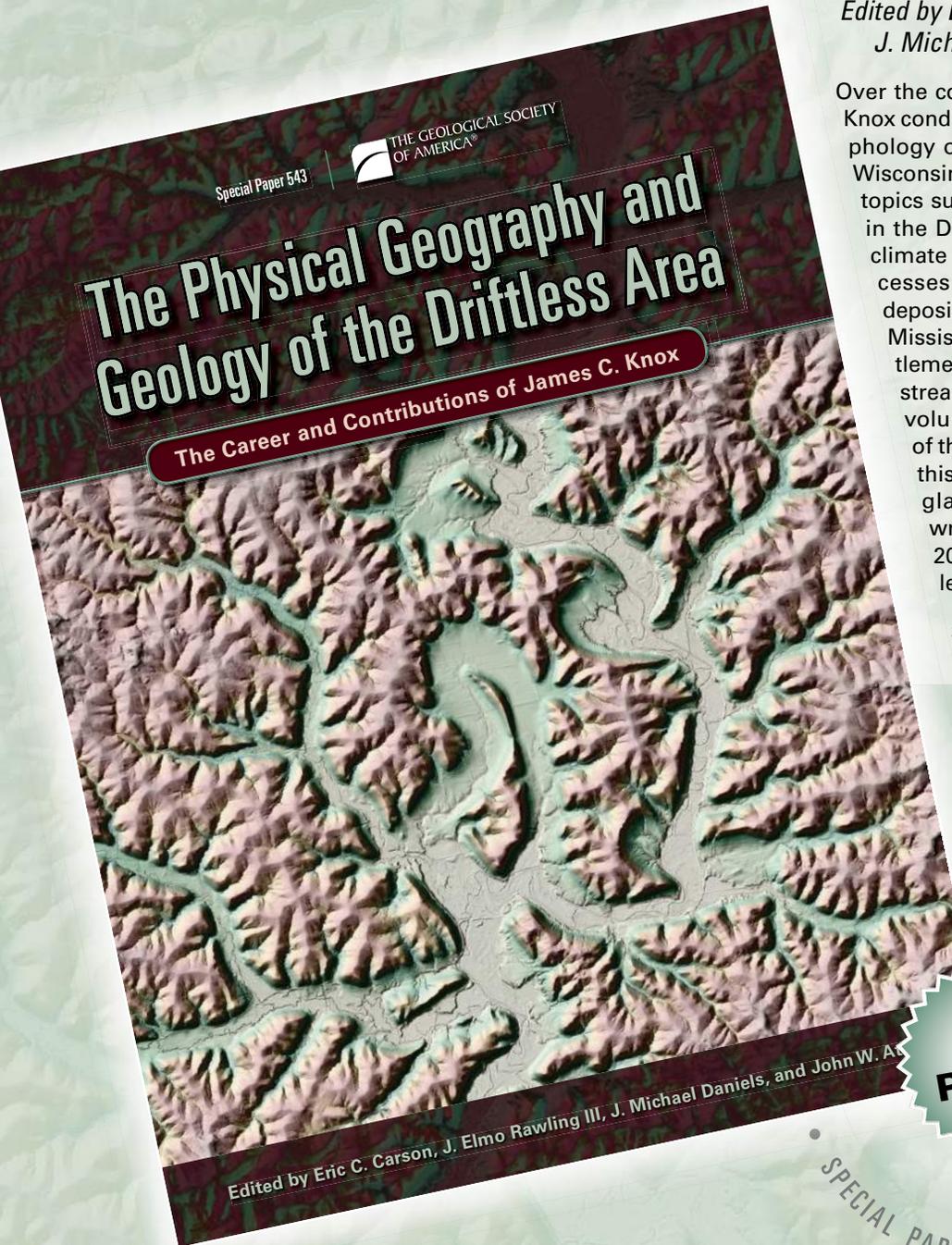
The Chair of the GSA Graduate Student Research Grant Committee and a recent student grant recipient will provide tips on how to write a successful grant proposal. The webinar will focus on the GSA Graduate Student Research Grant program (http://www.geosociety.org/GSA/Education_Careers/Grants_Scholarships/Research_Grants/GSA/grants/gradgrants.aspx), but many of the strategies discussed would be beneficial when applying to other grant opportunities, including GSA's Undergraduate Research Grants, as well as opportunities outside of GSA. Bring questions, and bring a friend! Register now at <https://bit.ly/2AScoeg> to reserve your spot.

The Physical Geography and Geology of the Driftless Area: The Career and Contributions of James C. Knox

Edited by Eric C. Carson, J. Elmo Rawling III, J. Michael Daniels, and John W. Attig

Over the course of his 43-year career, James C. Knox conducted seminal research on the geomorphology of the Driftless Area of southwestern Wisconsin. His research covered wide-ranging topics such as long-term landscape evolution in the Driftless Area; responses of floods to climate change since the last glaciation; processes and timing of floodplain sediment deposition on both small streams and on the Mississippi River; impacts of European settlement on the landscape; and responses of stream systems to land-use changes. This volume presents the state of knowledge of the physical geography and geology of this unglaciated region in the otherwise-glaciated Midwest with contributions written by Knox prior to his passing in 2012 and by a number of his former colleagues and graduate students.

SPE543, 156 p., ISBN 9780813725437



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THE GEOLOGICAL SOCIETY
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“By GSA investing in my field camp experience, I feel they have invested in me.”

GSA is dedicated to enriching the geosciences by investing in student success. A critical component to this—and to geoscience education in general—is fieldwork. In the field, students are able to apply the concepts they learn in the classroom while gaining valuable, practical experience they will carry forward throughout their careers. Increasingly, however, the financial cost of pursuing fieldwork can be prohibitive.

Through GSAF’s J. David Lowell Field Camp Opportunity Fund, you can help provide crucial financial support for aspiring geoscientists so they can develop their field skills. Two 2019 GSA Field Camp Scholars—Holly Olivarez, a first-year Ph.D. student at the University of Colorado Boulder, and Cody Keith, a student at the University of Alaska Fairbanks pursuing a dual B.A. in geoscience and petroleum engineering—described how their GSA-supported fieldwork grounded and enriched their classroom experiences while providing important training they would not have received otherwise.

For Holly, who participated in the University of New Mexico’s field geography course, the experience of getting into the field was life altering. “Field camp changed my life in many ways! My appreciation for fieldwork and instruments has grown exponentially. To be able to interpret what the rock, geomorphology, structural features, fossils, vegetation, and more are telling us is a skill I will never forget. It was the only course in my undergraduate studies that really taught me how to understand what the geology of an area is telling us—a skill not learned in a classroom. The fieldwork, the team effort, and the perspective gained during field camp are invaluable to my future. By GSA investing in my field camp experience, I feel they have invested in me, and believe I have what it takes to one day be an experienced geologist.”

This echoes Cody’s field camp experience—an eight-week course in geologic mapping that took him from Denali National

Park to the Alaskan wilderness. “Field camp served as a capstone experience for my geology studies and is absolutely essential to a well-rounded geoscience education. It is one thing to learn about a geologic phenomenon in the classroom, but actually having to identify it in the field is an exercise that solidifies concepts. The experience reinforces classroom learnings, develops interpretation skills, and cultivates a greater sense of independence. I feel much more confident in my understanding of geologic principles.”

While these experiences left a lasting impression, they were not without cost. Both Holly and Cody expressed immense gratitude for the financial support provided by the Field Camp Scholarships. For Cody, the award allowed him to “stay afloat” with college expenses. His eight-week course was an expensive endeavor, with the timing and location making summer employment impossible. “The Field Camp Scholarship helped to bridge this gap, allowing me to enjoy the field camp experience with less economic stress. The economic commitment for the student is daunting but worthwhile, and support from outside individuals and organizations helps make this valuable opportunity possible for students.” In Holly’s case, the scholarship allowed her to pay for camp and to purchase the necessary tools. In the end, she hopes that “individuals will support field camp opportunities for students because of the direct impact a donation makes. Because of the GSA Field Camp Scholarship, from day one I approached field camp knowing I had the support of GSA behind me!”

Will you support aspiring geoscientists like Holly and Cody?

Your generosity helps countless students gain the field experience and training necessary to pursue careers addressing events that impact people, the environment, societies, and economies around the world. If you would like to support the J. David Lowell Field Camp Opportunity Fund, please contact Debbie Marcinkowski at +1-303-357-1047 or via email at dmarcinkowski@geosociety.org.



From Left: Cody Keith during his field camp experience at Denali National Park, Alaska, USA. Holly Olivarez on the first day of her fieldwork in the San Pedro Mountains, New Mexico, USA.

Join us for GSA's next epoch of **DISCUSSION & DISCOVERY**



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Penrose CONFERENCE

Revitalize your geology at GSA's Penrose Conference, the premier small meeting for collaborative research around the world. Introducing a brand-new format and criteria for submission.

Streamlined Submission and Review Process Proposals will only be accepted 1 Nov. – 15 Dec. and acceptances will be announced in March.

Scientific Breadth within Earth and Planetary Science

Each conference subject should be under current investigation and active discussion by researchers in the field and/or laboratory and may be wide ranging in the scope of research or topic. Proposals should work to bring together support from multiple divisions, organizations, and societies.

Diversity within the Science and the Community To ensure a broad-ranging stimulus, proposals should include balance with early to late career scientists from underrepresented groups and gender among the Conveners and participants.

Competitive Review Process Proposals will be evaluated on their scientific merit, scientific breadth, and diversity of participants, disciplines, and scope. Only one Penrose Conference will be selected per year.

Expanded Review Committee The Penrose Conference committee will be made up of seven (7) voting members including past Conveners of a Penrose Conference, past Leaders of a Thompson Field Forum, and Early Career Scientists.

Funding GSA and GSA Foundation have increased the funding to US\$20,000 per Penrose Conference (one per year).

Proposal Submissions Accepted: 1 Nov. through 15 Dec. 2019 | Recipient Announced: March 2020

www.geosociety.org/Penrose

Questions: Becky Sundeen at bsundeen@geosociety.org

A new slate for **RESEARCH & DISCOVERY**

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Thompson FIELD FORUM

Revitalize your geology at GSA's Thompson Field Forum; trips that capture the essence of geologic discoveries or controversial topics. Introducing a brand-new format and criteria for submission.

Streamlined Submission and Review Process Proposals will only be accepted 1 Nov. – 15 Dec. and acceptances will be announced in March.

Scientific Breadth within Earth and Planetary Science Each field forum subject should be under current investigation and active discussion by researchers in the field and/or laboratory and may be wide ranging in the scope of research or topic. Proposals should work to bring together support from multiple divisions, organizations, and societies.

Diversity within the Science and the Community To ensure a broad-ranging stimulus, proposals should include balance with early to late career scientists from underrepresented groups and gender among the Conveners and participants.

Competitive Review Process Proposals will be evaluated on their scientific merit, scientific breadth, and diversity of participants, disciplines, and scope. Only one Thompson Field Forum will be selected per year.

Expanded Review Committee The Thompson Field Forum committee will be made up of seven (7) voting members including past Conveners of a Penrose Conference, past Leaders of a Thompson Field Forum, and Early Career Scientists.

Funding GSA and GSA Foundation have increased the funding to US\$20,000 per Thompson Field Forum (one per year).

Proposal Submissions Accepted: 1 Nov. through 15 Dec. 2019 | Recipient Announced: March 2020

www.geosociety.org/Thompson

Questions: Becky Sundeen at bsundeen@geosociety.org



25–28 October

GSA 2020

Montréal, Québec, Canada

GSA 2020 Annual Meeting & Exposition



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Call for Field Trip, Short Course, and Technical Session Proposals

It's time to plan for our 2020 Annual Meeting in Montréal, Québec, Canada. We look forward to highlighting the geology in the area. We challenge you to propose a field trip, short course, and/or a technical session that will teach your colleagues and promote discussion about the incredible regional geology.

Show the geology by leading a Field Trip.

Field Trip proposal deadline: 1 Dec. 2019

Trips can be anywhere from a half day to five days long. Field trip proposals may be submitted by any member of GSA, its Associated Societies, or anyone else.

<https://gsa.confex.com/gsa/2020AM/fieldtrip/cfs.cgi>

Exchange the geology by organizing and chairing a Technical Session.

Technical Session deadline: 1 Feb. 2020

Proposals are being taken for both Pardee Symposia and Topical Sessions.

<https://gsa.confex.com/gsa/2020AM/cfs.cgi>

Share the geology as an instructor through a Short Course.

Short Course proposal deadline: 1 Feb. 2020

Courses run the Friday and Saturday before the Annual Meeting and are typically a half day to two full days.

<https://gsa.confex.com/gsa/2020AM/shortcourses/cfs.cgi>



A MESSAGE FROM THE GSA EXECUTIVE DIRECTOR

Dear Colleagues,

GSA is committed to the ideal of scientific discovery, rigor, diversity, and integrity.

I invite you to prepare a proposal for a technical session for the 2020 Annual Meeting that reflects your expertise and research but also pushes the boundaries of the discipline. Without expanding our horizon, we will not move the geosciences forward and keep our relevance. I also challenge you to broaden your reach with whom you collaborate by including diversity in all ways—discipline, career progression, and individuals.

Thank you for considering sharing your science and work at the GSA Annual Meeting.

Vicki S. McConnell