# The Geologic Division Retirees Newsletter



First Digital USGS National Oil and Gas Assessment, 1995

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An organization of retirees of the Geologic Division, U.S. Geological Survey, who seek to keep in touch with each other and with their former Agency.

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#### About the Cover:

At the 1995 annual AAPG national meeting, Dave Houseknecht demonstrates the new 1995 National Oil and Gas Assessment CD-ROM to Michael Halbouty. Names of other viewers not available. Photo by John Keith.

**From the President** 



If you are like me, you are glad to see 2020 drawing to an end. With the promise of vaccines for COVID-19, I am buoyed up by the prospect of 2021 being near normal. I have been blessed that Rob and I have a family COVID bubble (or pod): our daughter Sarah (a AAAS Fellow at NIH), her husband Mike (on a one-year alternate workplace agreement), and their son Russell (who will be 5 months old at Christmas) live with us. It's a joy to watch Russell grow and change. Rob and I have adapted to new technology, using Zoom to meet with our investment club or discuss books with my book club or keep in touch with co-workers known as "Divas Drinking Distantly" instead of "Dining Divas. "

The USGS staff has adjusted to working and meeting virtually, using a Microsoft collaboration product called **Teams**. This product lets people chat, call, videoconference, and collaborate online. I have heard several reports that people are feeling very productive working from home and that **Teams** has improved the effectiveness of staff meetings.

As you know, the Survey is operating under a

continuing resolution yet again. That means no new work can begin which affects grants and contracting. was The FY2020 budget apportioned at \$1,270,957,000, to remain available until September 30, 2021; of which \$84,337,000 shall remain available until expended for satellite operations; and of which \$76,164,000 shall be available until expended for deferred maintenance and capital improvement projects that exceed \$100,000 in cost: Provided, That none of the funds provided for the ecosystem research activity shall be used to conduct new surveys on private property, unless specifically authorized in writing by the property owner: Provided further, That no part of this appropriation shall be used to pay more than one-half the cost of topographic mapping or water resources data collection and investigations carried on in cooperation with States and municipalities.

The proposed President's Budget for the Survey in FY2021 was \$971 million. The House mark increased that number to \$1.3 billion. The Senate mark is expected to be similar, but the enactment of a FY2021 Federal budget is not anticipated anytime soon. In FY2020, Congress appropriated a large increase, \$181 million, in our facilities improvement budget to cover a new building for the Hawaiian Volcano Observatory, a new Hydrologic Instrumentation Facility, and a new Wildlife Health Center. These construction projects are continuing in FY2021. For FY2020, the Congress did not approve the Director's request to move the Director's Office and program staffs to Denver, CO. Last fiscal year the USGS budget had 7 science line items, not including Director's and administration costs, and at our request Congress agreed to consolidate these to 5; the new line items are as follows, with numbers from the House mark:

Energy-Minerals \$91 M Hazards \$194 M plus funds for the new HVO Water Resources \$283 M Core Science Systems (including Sioux Falls center and geologic mapping program) \$252 M Ecosystems

(including climate change studies) \$261 M

The remainder of the \$1.3 billion is made up of administrative and facilities funds. For more information about the FY2021 budget proposal, check out:

https://www.usgs.gov/about/organization/sciencesupport/budget/usgs-fy2021-budget

Wishing all of you good health,

Susan Russell-Robinson

## **New Members**

Anna Wilson Nick VanDriel

# Essays, Anecdotes, and History

# USGS Scientist Emeritus James G. Moore Awarded Penrose Medal

# Tom Murray

The Geological Society of America's Penrose Medal was established in 1927 to be awarded in recognition of eminent research in pure geology, for outstanding original contributions, or for achievements that mark a major advance in the science of geology. It is the Geological Society of America's highest honor for an earth scientist.

Jim Moore forged whole new ways of understanding volcanoes, their deformation of oceanic lithosphere, and how Jim's batholiths grow. breakthrough showing that colossal submarine landslide deposits flank the Hawaiian chain, with likely coeval tsunami deposits washed to unimagined island heights, brilliantly clarified that Earth's volcanoes often fail catastrophically. His discovery that collapsing eruption columns drive devastating high-velocity base surges, as at nuclear explosions, forever changed older subaqueous interpretations of countless cross-bedded volcaniclastic deposits. Jim's visionary work on submarine basalts inaugurated the study of volatiles in basaltic magmas, and he used volatiles to understand magma transport and submarine eruption. He showed how pillow lavas actually form, grippingly filmed in Fire under the Sea. Darwin and Dana proposed that ocean island volcanoes subside, but Jim first used ages of drowned coral reefs to measure Hawaiian subsidence rates, geologically constraining strength estimates of oceanic lithosphere. He recognized zonation of western North America's batholiths, quantified as his 1950s Quartz Diorite Line, that he interpreted as demarking the western limit of continental igneous sources - a prediction that prompted testing and confirmation by landmark isotopic studies. Jim's careful mapping first revealed the Sierra Nevada batholith's two-stage construction separated by a major dike swarm, a succession now fundamental to models of Cordilleran tectonics. Jim proposed the now-accepted geologic structures of Hawaiian volcanoes, tuyas (flat-topped subglacial volcanoes), and diatreme-like Surtsey volcano. His 1980 monitoring and analysis of Mount St. Helens and its catastrophic failure, blast, and giant umbrella cloud were influential. Other visionary contributions include explanations of granite magma-chamber processes, how accretionary lapilli form in eruption clouds, and more recently, Sierran landform processes. Jim's career-long insights have had far-reaching impact across a wide breadth of our science.

# Assignment by the USGS to a UNEP/UNESCO/USSR Scientific Study on Landslides -- 1981 to 1983 Bob Schuster

In 1981, UNEP (United Nations Environment (United Programme) and UNESCO Nations Educational, Scientific, and Cultural Organization) funded earth scientists and engineers of the Soviet Union on a research project entitled "Protection of the Lithosphere as an Environmental Component" (it was really a study of landslides and mudflows - a common problem in the USSR). To monitor this study, UNEP/UNESCO established a 10-man (5 Russians, 5 "westerners") International Scientific Council for Protection of the Lithosphere and asked the U.S. Government to assign a landslide/mudflow expert to the Council. Their request was passed down to the Director of the USGS, and because of my previous experience in the Soviet Union, I was selected to participate from 1981 to completion of the study.

The purposes of the Scientific Council were to advise the Russian scientists and engineers on project efforts, to monitor the project so UNEP/UNESCO could get their "money's worth," and to co-author with the Russians a textbook (in Russian and English) on landslides. The Scientific Council met four times: in Moscow, Prague, Paris, and Tokyo. During this period, working with the Russians was not always an easy chore, partially because the Soviet Union and the West were politically opposed in what was known to the world as the "Cold War." The USSR was led by Premier Leonid Brezhnev until his death in November 1982 at which time he was succeeded by Yuri Andropov; neither was very favorable to the United States. However, our main causes of friction with the Soviet team were technical, not political. There were numerous incidents in which we Westerners disagreed scientifically with the Russians and their terminology, mostly through interpreters.

# First Scientific Council Meeting, October 1981

The first meeting of the Scientific Council occurred in Moscow in October, 1981. It took place immediately after a Soviet-sponsored UNESCO International Symposium on Water-Related Exogenous Geological Processes and Prevention of Their Negative Impact on the Environment (a typical Soviet conference title) held in Alma-Ata (now Almaty), Soviet Socialist Republic of Kazakhstan This was the first of my several visits to Alma-Ata, on the edge of the Pamir Himalaya, and I enjoyed it very much. After the Alma-Ata conference, our group flew to Moscow for the first meeting of the Scientific Council. With me was my old USGS friend Dave Varnes. We stayed at the Hotel Sport, a new hotel that the Russians had built for attendees at the 1980 Moscow Olympic Games. That evening, Dave and I were invited by a few close Russian hosts to join them for a drink at the hotel's bar. Well, it turned out that "a drink" was really six glasses of vodka (various types), brandy, cognac, etc., that were set before each of us. I managed to down my six glasses O.K., but poor Dave, who was suffering from stomach problems he had acquired in Alma-Ata the day before, was smart enough to not try to finish his. Our first Scientific Council meeting began the next day. It was a fairly

dreary affair. We Westerners spent much of our time arguing with the Soviet team over technical issues and terminology. The high point of our four-day-long meeting (socially speaking) was an evening party at the Geological Department, Moscow State University (the 26-story skyscraper in central Moscow). Anticipating an opportunity to create a little levity at the party, I had brought from Colorado a car bumper sticker that stated in large print: "Reunite Gondwanaland." (Gondwanaland was the hypothetical continent of the Mesozoic era thought by geologists to have linked land masses that later separated to form parts of South America, Africa, India, and Australia.) Professor George S. Zolotarev, Head of the Geological Department and a noted Soviet scientist (and no friend of the United States), was at the party, and I decided to formally present the bumper sticker to him. Because Professor Zolotarev spoke no English, I asked Dr. Valentina Shibakova (an old friend of mine), who got the joke, to make the presentation and translation. Zolotarev also got the geologic joke and retorted with: "Dr. Schuster, this is not the time for political statements!" This got a big laugh from everyone who understood the joke.

# Second Scientific Council Meeting, May, 1982

The second UNEP/UNESCO Scientific Council Meeting was held in Prague, Czechoslovakia, in May, 1982. I chaired the 5-day meeting; my wife Pat accompanied me on the trip. There were supposed to be two or three other foreign wives along, but for various reasons Pat was the only one who showed. To keep the wives occupied and happy during the 5-day technical meetings, the Communist Czech government had set aside a luxurious black Skoda sedan (their version of an American Cadillac) with a driver and woman interpreter/guide to show the wives around Prague and environs. Because Pat was the only wife, she had the car, driver, and interpreter/guide all to herself for the entire 5 days (while I was arguing with the Russians). She visited castles, museums, art galleries, had great Czech lunches, etc. The guide and interpreter, a government chemist, had a week free from her chemistry and a great opportunity to practice her English on a friendly and sociable American woman. At the end of the work-week, a fancy luncheon was arranged for Council members (and Pat) at the huge, brand-new Communist "Palace of Culture" in Prague (opened in 1981 as a monument to the Communist regime; today known as the Prague Congress Centre). For evening entertainment that week, Pat and I were taken to the National Opera at the world-famous Smetana Hall, and one evening we enjoyed an "oompah-pah" German-style beer garden. At the Prague meetings, I mentioned to Czech officials that my grandfather, Frank Schuster, had been born in about 1870 in the South Bohemian town of Krumau (now Czesky Krumlov) about 90 miles south of Prague. They agreed to take Pat and me there for a oneday visit after our Scientific Council meetings. So, we spent the day visiting Budweiss (Cesky Budejovice, the home of the original Budweiser beer, about 20 miles north of Cesky Krumlov) and Cesky Krumlov itself. We had an address in a suburban village at the edge of Prague, Kristanov (Christenberg) where Grandpa Schuster's family lived, but found that the village had been in the current Czech/Austrian military zone and had been torn down by the Czechs. Cesky Krumlov had been one of the most beautiful medieval small cities in Europe, but under Communism, had gotten somewhat "dowdy" (however, well worth visiting). Two decades later, we again visited Cesky Krumlov (after the Communists were thrown out) under the current Czech government, it is again a beautiful small city in medieval style.

# Third Scientific Council Meeting, May 1983

In May 1983 at UNESCO Headquarters in Paris I participated in the UNESCO International Symposium on *Soil and Rock Investigations by In-situ Testing*,

which was followed by the third meeting of our Scientific Council. Our meeting was primarily devoted to writing toward publication by the Council of a Russian/English text on landslides and mudflows. During the week, Council members stayed in a small hotel one block from the Eiffel Tower, which I walked by every day, but didn't go up. During the week, I got tired of the ubiquitous French food, but soon found an American Haagen-Dazs ice cream shop less than a block from our hotel. Lived on banana splits, etc., for a better part of the week – didn't help my waistline.

## Fourth Scientific Council Meeting, August 1983

In August 1983, in Tokyo and Osaka, I participated in our fourth (and last) Scientific Council meeting. The meeting began in Osaka as part of a oneday UNESCO Symposium on Landslides. The symposium consisted of formal presentations on landslide hazards to a Japanese audience by Russians and our five-man foreign Council members, the Russians in the morning, we "foreigners" in the afternoon. We Westerners dutifully sat through the boring Russian presentations in the morning, but in the afternoon during our presentations, all of the Soviet team headed to downtown Tokyo "to see the sights." (I don't think any of the Russians had ever been to a modern "non-Soviet" city like Tokyo before; they were overwhelmed by the relative splendor). Because of the Russian team's absence that afternoon when other presentations were made, our Japanese conference hosts were not happy with the Soviets. At the end of our meetings, the Japanese were pleased to escort the Russian team to their Aeroflot flight headed home to Moscow. After the day of technical presentations, the remainder of our Tokyo meetings were devoted to "team writing" of our forthcoming Russian/English text on landslides. After the Russians left for home, our Japanese hosts asked if there was anything in Japan I would like to visit. I took them up on their offer. In onsite study of the May 1980 Mount St. Helens eruption

in the State of Washington, I had learned that a very similar event had occurred in 1888 at Mount Bandai (Bandai-san) volcano on Honshu Island about 110 miles northeast of Tokyo. The eruption had caused a huge rock avalanche that dammed streams forming three mountain lakes which still exist in Bandai National Park. The Japanese agreed that a visit to Bandai would be worthwhile. So, the next morning I joined about a dozen young Japanese government geologists and engineers to climb the volcano (elevation: 5968 ft.) and reconnoiter the large rock avalanche and dammed lakes (Hibarako Lake, Onogawako Lake, and Akimotoku Lake; all three are beautiful). That night, the group stayed at the posh Bandai Hot Springs resort near the mountain, and the young government scientists/engineers asked me to be the "guest of honor" at a Geisha Party at the lodge. We were entertained for hours by two "high-class" geishas and a sword dancer. Had a great meal with plenty of sake (Japanese rice wine). Our group played "Jan Ken Pon" (the international one-on-one game known in the United States as "Rock, Paper, Scissors"; it originated in Japan) with the individual geishas – the loser in each round had to "bottoms up" a small cup of sake.

After a few hours, some of the young Japanese had taken on a little too much sake. Near the end of the party, one of them grabbed the ornate black, lacquered headdress from one of the geishas and plopped it on my head (I looked like an idiot!). Through an interpreter, I told the geisha whom I was talking to that: "If my wife ever hears about this, she'll divorce me!" She countered with: "If your wife divorces you, I'll marry you if you you'll take me to America". Enough said! Several of the Japanese took embarrassing photos of me with the lacquered wig on. I took the best of the photos back to Colorado to show to my wife; then destroyed them (too embarrassing). I didn't really want the Schuster family to remember me in a geisha headdress. That was the only geisha party, ever. It was a lot of fun, and nothing serious or immoral happened.

The next day, I thanked my Japanese colleagues and headed for Colorado. The two-year Scientific Council efforts ended happily and productively. UNEP/UNESCO were pleased that our team concluded that the Soviet efforts in the study had produced satisfactory results, including a two-volume textbook published in Russian (and, in which I had authored three chapters). English title: *Landslides and Mudflows*; editors: E.A. Kozolovsky, C.P. Young, J. N. Hutchinson. The book is available (in English) at the UNESCO Library.

# USGS Cooperative Activities with the USSR and Russia (1984-1996): Science and Some Interesting Stories Paul Hearn

In 1967, a major topic of discussion among U.S. high school seniors was the two years of a foreign language required to graduate from a four-year college. At a mixer for rising freshmen a friend who was a junior at the time told me to, "Take Russian – it's an easy B." Following his advice, I took 2 years of Russian, never getting a grade over C+, but becoming fascinated with Russian history. I graduated with a B.A. in Russian, then discovered the Earth Sciences, getting a M.S. in Geochemistry and Ph.D. in Geology in 1983. I was hired by the USGS in 1975, working as a geochemist until 1988, when I transferred to the Office of International Geology.

In the 1980s and early 1990s the USSR was struggling with a stagnating economy, the stress of keeping up with the West militarily, plunging oil prices, the burden of the war in Afghanistan, and ultimately the collapse and breakup of the USSR itself. Mikhail Gorbachev, who was named general secretary of Communist Party in 1985, had begun a campaign of glasnost (openness) and perestroika (restructuring) that encouraged dialog and the introduction of some market reforms. These actions eventually destabilized the Party by opening it up to criticism of its entire Finally. structure. the catastrophic explosion Chernobyl's number 4 reactor in Ukraine in 1986 exposed the USSR to the world at its worst, as the true magnitude of the radiation released was revealed together with various Soviet efforts to suppress information about the event and the associated loss of life. Against this backdrop, Chief Geologist Ben Morgan and Assistant CG Bill Greenwood began efforts in 1988 to engage the Geologic Division with its counterparts in the USSR in order to learn more about the Soviets' oil, gas, coal, and minerals programs. The USGS joined an interagency U.S. delegation in discussions with their Soviet counterparts in Moscow that resulted in the signing of the U.S-Soviet Basic Sciences Agreement in 1989. Α subsidiary Memorandum of Understanding (MOU) between the USGS, the Soviet Ministry of Geology, and the Soviet Academy of Sciences was signed by USGS Director Dallas Peck later that year. This MOU was key to maintaining contact with Soviet earth scientists after the breakup of the USSR on December 26, 1991. It also led to additional agreements and new projects in the late 90s and early 2000s, benefiting from this early cooperation.

This essay is a summary of the principal USGS cooperative projects with the USSR, Russia, Ukraine, Armenia, Kazakhstan, Azerbaijan, and Kirgizstan from 1986 to 1996, interspersed with a few interesting stories.

# 1986 - Travels with Sergei

In 1986 I met a visiting Soviet geologist named Sergei Diakov, who had wanted to visit USGS and was interested in seeing some local geology. I invited him to accompany me on what turned out to be a ~1200 mile loop through the Piedmont, Blue Ridge, Valley and Ridge, and Appalachian Plateau provinces of Virginia, Tennessee, and North Carolina. One morning we happened to have breakfast in a pancake house just

outside Knoxville. Just after we'd sat down a local opened the door asking who had left the lights on that car with a U.S. Federal Government sign. This resulted in a chorus of catcalls from the other customers over the wastage of their tax dollars by the Federal Government. I sheepishly got up and turned off the lights in our car then returned to our table. Sergei, who was silent during all the commotion, leaned over to me and whispered, "This would not happen in my country." He was right. At the 1984 International Geological Congress in Moscow, I signed up for a field trip to look at various rare mineral occurrences around Lake Baikal in eastern Siberia. Our bus was accompanied by a police escort who actually forced locals off the road who did not respond to their commands to make way. If they complained they were likely to be hit with a stiff fine. Sergei and I began a friendship in 1986 that continues today. He is now an economic geologist with Anglo American specializing in porphyry copper deposits and lives in southern California with his family.

# 1987 - Plate Tectonics

One of the scientific "battles" fought during the Cold War involved plate tectonic theory, embraced by the West, and Soviet "Fixist" theory, which explained the composition and structure of the crust through the vertical movement of mantle fluids into overlying crustal rocks. In the summer of 1987 a fellowship from the NAS allowed me to spend two months at the Soviet Academy of Sciences' Vernadsky Institute of Geochemistry in Moscow, working with Dr. Eric Senderov, who led a research team focused on the crystal structure of feldspars. Little did I know that I would end up in front of an auditorium of Soviet scientists defending plate tectonic theory.My research at USGS during the previous four years had involved the discovery of widespread potassic alteration of lower Paleozoic carbonate rocks in the Central and Southern Appalachians. Working with John Sutter, a

geochronologist, and Harvey Belkin, a fluid inclusion specialist, we were able to show that the alteration occurred some 300 m.y.a later than the known age of the host carbonates (~500 m.y.a) and involved 100-200C brines. This led to the conclusion that the alteration was caused by the gravity flow of hot brines from buried sediments uplifted during the plate collisions of the Alleghenian Orogeny. This phenomenon was also shown to be consistent with the many small Pb/Zn deposits in the central and southern Appalachians.I gave an overview of this work to an auditorium full of Russian scientists at the Vernadsky Institute. When I began to explain the proposed mechanism of plate collision, uplift, and gravity flow of hot brines, a hand shot up and the question was asked, "What evidence do you have that this plate tectonic theory is correct?" Little did I know that I had stumbled into an ongoing battle between plate tectonic theory and Soviet "fixist" theory. Later that year I later discovered an article written by Evgeniya Albats, a Russian investigative journalist, describing her experiences at a conference on deep ocean trenches held in Yuzhno-Sakhalinsk in August, 1987. Her interviews yielded the following quotes:

Bill Melson (Smithsonian) "We were shocked to learn that this (plate tectonic) theory is still controversial here; in the West these arguments died off twenty years ago."

Vladimir Belousov (Institute of the Physics of the Earth), a prominent Soviet advocate of alternatives to the theory of plate tectonics: "I don't think it possible for there to be supporters of the new global tectonics at our institute."

Overheard in audience: "We should develop our own (i.e. Russian) concepts." and "We don't need to pursue the hypotheses of others (i.e. foreign ones)".

Hindsight is indeed 20/20, but it still seems hard to understand why the Soviets failed to recognize evidence of plate tectonics in their own country's geology. Just to mention a few examples, the Lake Baikal rift, the Kamchatka-Kuriles volcanic arc, and the 1988 Spitak, Armenia earthquake offered good examples of the movement of crustal plates. It seems to me that this battle had a lot to do with Russian pride. It was the outright rejection of the alternative theory that discouraged objective analysis of the data. As is often the case, the story is more complicated. In fact, scientists in East Siberia studying the genesis and mechanisms of the Lake Baikal Rift were publishing papers as early as 1980 that recognized lateral crustal motion as a major factor in the evolution of the rift. Lev Zonenshain and Mikhail Kuzmin were among the Russian scientists who formed the leading edge of a movement that embraced plate tectonic movement as the best explanation, publishing a several books and papers on the topic in the late 1980s and into the early 1990s.



1989 - Arrival of the Soviet RV Akademik Mstislav Keldysh in Washington, D.C.

The International Geologic Congress (IGC), which is normally held every four years in a different country, was scheduled to take place in Washington, D.C. during the summer of 1989. At a time when the lack of hard currency was making it difficult for the USSR to send their scientists overseas, the Soviet Academy of Sciences had the idea to send some 70 scientists to the meeting aboard the 401 ft. RV Akademik Mstislav Keldysh.

Having just joined OIG, it fell to me to find a berth for the ship somewhere on the Potomac near Washington. I knew there was a stretch of waterfront in Alexandria that could dock large ships, having used a dock there when USGS was conducting its Potomac River study in the 80s. Picking up the telephone, I discovered that this location had been given by the Federal Government to an Eskimo tribal council in Alaska (the Cook Inlet Tribal Council), in a settlement over the loss of Eskimo territories in previous years. After more calls, I reached an attorney who was managing the council's affairs. I explained our request to him, and a week later he called back to tell me that the Council had affection for the Russians, due to the fact that so many of their relatives and friends lived on the Soviet side of the Bering Sea. They generously allowed the Keldysh to berth there for 2 weeks.



As I soon discovered the Keldysh was already famous because of the two Finnish-built deep submersibles it carried, and the ship itself was also built in Finland. It seems the Navy feared that a fleet of the subs could threaten underwater communication cables, explaining why no European nations were willing to place bids on the work. Perhaps the most well-known of the many notable dives these subs made was the discovery of the Titanic by Bob Ballard (WHOI) in 1985, which was incorporated into the James Cameron film Titanic in 1997. Needless to say, the Keldysh attracted quite a bit of attention as it sailed up the Potomac past the Naval Weapons Center in Dahlgren and the USMC base at Quantico, reportedly accompanied by several Marine helicopters as it made its way to Washington.

Once the Keldysh had berthed in Alexandria, another drama soon unfolded. The ship had arrived with the 70 Soviet scientists aboard holding seamen's visas, which only allowed them to get off the boat and restricted their movements to the immediate area. making the Congress in D.C. off limits. The INS showed up and basically said there was no way in hell they'd issue 70 new visas. National Geographic, which had planned to join the Keldysh for a dive off the coast of Bermuda after the Congress, vented their spleen on the INS and the USGS. Fortunately, calmer minds prevailed, and INS left still refusing to issue new visas, but with a nod and a wink agreed to look the other way. Disaster averted, the visitors were also connected with USGS geologists who offered to take them on short field excursions to see some local geology. Unfortunately, following the IGC, another small drama unfolded. A dispute over duty payments for a large collection of rare gems and minerals the Soviets brought to the IGC caused U.S. Customs to refuse to allow the ship to depart. After some rather heated discussions, the issue was resolved, another diplomatic incident avoided, and the Keldysh made its way down the Potomac and out into the Atlantic. Just before the Keldysh departed, I was invited to join the ship off the coast of Bermuda, where the world-famous shark expert Eugenie Clark was waiting to use the MIR submersibles to study a rare species of deep water sharks. While I wasn't able to make a descent in a sub myself, getting to meet Eugenie Clark and seeing the MIR's deployed was a nice end to this entire experience.



Eugenie Clark examines deep water sharks from Suruga Bay, Japan, in 1980. David Doubilet New York Times Feb. 25, 2015

Next issue: Seismic profiling and piston coring in Lake Baikal, Eastern Siberia

# Early Days at Nevada Test Site with Bark Ekren Ernie Anderson

As a newbie to the USGS in 1963, I gained Bart's confidence as his assistant during the final field checking of the Skull Mountain Quadrangle at the Nevada Test Site. Bart had already demonstrated his prowess in geologic mapping and was about to do so leadership, for planning, and execution of reconnaissance geologic studies. For both of us, the next few years were dominated by the Atomic Energy Commission's need to move their nuclear testing farther and farther away from their facilities near Mercury, NV and the nervous city leaders in Las Vegas who were getting pressured by concerns of sloshing in martini glasses. The first step was to Paiute Mesa directly north of the existing Test Site. The "Mesa" moniker portended a quick result stemming from the relatively simple underlying layer-cake geology; and soon Bart was asked to lead a reconnaissance geologic investigation of several mountain ranges to the north, most of which were within the Nellis Air Force Bombing and Gunnery Range. Bart was a super patriot, and he recognized these assignments for what they were; his country had a "need to know," and he was determined the need would be met. He was also an

adventurer, and although there was some apprehension about roaming around in an active bombing range, he relished these assignments with a pioneering spirit. We began field work in the western part in the bitter cold of December by spending most of a day removing pack-rat debris from a cave that had previously been used by cow-punchers prior to removal of the region from public access. We burned hundreds of pounds of the debris in a huge fire outside the cave and moved in using the old stove, tables, benches, and bed frames. Bart, the pioneer, was in heaven! He was clearly the leader and the heart and soul of the effort, and as we assembled each evening in the cave it was shake-down time during which he began to assemble a geologic story from our separate efforts. And as the campfire morphed from fire to embers, he entertained us all with his endless stories about his early days in North Dakota and his days of brutal cold, comradery, and danger in the Ardenz Forest fighting the Germans.

Bart was all about getting the job done, and when he observed an absence of structural data (fault and bedding attitudes) on the air photos of one of the geologists, and dealt with the disruptive effect of another geologist not returning to camp one night, those two were soon gone from the team. In the first case, the geologist was focused on sampling rocks for a geochemical study of personal interest and in the second the geologist was simply not cut out for field work. That winter and spring we moved eastward range by range, and the job of coordinating our movements with the military brass was a significant burden for Bart. He dealt with the burden like a true field commander but was often flummoxed by barriers to "getting the job done." There was a second field season and a third during which a map and report began to take shape. By then, the "team" was reduced to Bart and me—a fortunate circumstance and a time of major growth for his "side kick"! We learned that the danger posed to a couple of tiny specks in a vast area only a small part of which served as active targets

was near zero. We began a program of cat-n-mouse with the security guards, with Bart instituting some unwritten rules such as "drive slow on dusty roads" and "don't park the truck on high points of efficient sun reflection." Through his charm and good nature, Bart ultimately forged good relations with the guards as well as with Colonel Halligan in Las Vegas (Bart ultimately named a prominent peak after the Colonel for the evolution of his understanding of our disparate needs). We got to where we needed to go, "the job got done," and I sometimes was a disappointment to Bart. He would tell stories into the night, and as we lay under the stars he'd occasionally say "Ernie, are you still awake?" There had to be times of no response!

As the yield of planned nuclear tests increased, sights were set on central Nevada and Amchitka Island, Alaska, as possible test areas. Bart was once again pressed into service to reconnoiter the ranges in central Nevada; ranges that are lofty and precipitous, the area vast, and the task daunting. By then, I had been given assignments separate from Bart and had developed my own research agenda focused on geologic anomalies in the Lake Mead area and along the Colorado River to the south. Once, when discussing my progress with Bart, he said "Ernie, this work will one day make you famous." Those words from my mentor were more important than the frequent increases to my pay, and it was 35 years before Bart let me know how stung he was by my choosing a path that ended our partnership. Also, let us not forget what "getting the job done" was all about. The Nation needed to conduct nuclear tests that posed a minimum threat to the ground water, atmosphere, and the public. This meant finding prescribed rocks and conditions in the subsurface by melding surface geology with subsurface geophysics and drill hole data. Bart's experience and geologic savvy were critical elements in what, overall, was a fantastic success story. As modern-day politicians play a dangerous game of discrediting and disrespecting public servants, too bad there's not a god-like referee

to hold up the career of Bart Ekren and say with a booming voice "N0, NO, LOOK HERE, THIS IS WHAT THEY ARE REALLY LIKE!"

# Memorials

#### Jerry Consul

Jerry Consul passed away peacefully on January 10, 2020 in Puerto Vallarta, Mexico, where he was on vacation with his wife of 58 years, Ruth, their son Ari, and two close friends. Ruth followed Jerry, passing away on April 7, 2020. Jerry joined the Analytical Laboratories Branch of Geologic Division in 1980 and worked as a microchemist in Menlo Park for 11 years. During this time he not only did routine analyses but also collaborated with Paul Lamothe in developing new techniques in plasma spectroscopy. Jerry became the A-Labs collateral safety officer and then moved on to become Safety Officer for the Western Region of Geologic Division, where he served another 11 years until his retirement in 2002. I had known Jerry causally since the 1970s, but got to know him well when I became Regional Geologist in 1998. I quickly realized that Jerry was an ideal Safety Officer. He had little truck with bureaucratic reporting requirements but was passionate about practical safety matters. In Jerry's own words: "I was able to convey that I was not forcing bureaucratic manure down their throat [and] not erecting stumbling blocks, but rather was facilitating safety. I would let people know what we had to do to be in compliance, but then tell them what we really need to do to improve safety..."

Jerry's history was very unusual for a USGS employee. Born in Trieste, Italy, as Erminio Consulo, he never lived with his parents but grew up in an orphanage and then in a foster home in a tough neighborhood. He describes his childhood during the Second World War as "self-sufficient and relying on my wits", stating that "The world I grew up in was tough and crazy". The local Catholic church served as a safe place for kids to play, and Jerry became an altar boy. Later in life, he learned that his Catholic father was killed in 1945 at the Nazi Natzwiller-Struthof concentration camp in Alsace and that his Jewish mother died in 1943 while being transported to Auschwitz. After the war, Jerry's uncle sent him to a Jewish facility outside of Florence, Italy, where Jerry learned Hebrew, accepted the Jewish faith, and took the name Yermiyahu. In 1946 he sailed on a dangerously overcrowded boat to Israel, where he worked on two kibbutzim and served skillfully as a sapper (a mine-demolition expert) in the Israeli army, being wounded in the 1956 Sinai war with Egypt. After discharge from the army, he entered a workstudy program at the Weizmann Institute and learned English from his girlfriend. In 1962, Jerry's boss got a job at Stanford University, and Jerry accompanied him there as a microanalyst. After attempts to create careers in photography, the alternative press, property management, marketing chelating resins, and managing a wire and cable company, Jerry followed Al Truesdell's advice and applied for a microchemist job at the USGS in Menlo Park. This synopsis of Jerry's amazing life is encapsulated from the book My three lives: Erminio, Yermiyahu, Jerry, dictated to his friend Mike Morganstern in 2006 when Jerry was immobile for three months while recovering from a broken leg. The book is an incredible read! It can be obtained from www.lulu.com (I also can send you a pdf). Jerry's worldview, on pages 209-217 is particularly insightful.

Finally, on a lighter note, Jerry devoured classical music (particularly opera), loved movies (he could remember details from every film he had seen) and was the most proficient punster I have ever encountered—in English, his third language! For the past 20 years, Jerry and Ruthie met my wife, Pat, and me every Saturday morning for breakfast. We miss them.

----- Patrick Muffler



**Avery Drake** 

Avery Ala Drake, Jr. died peacefully at home on July 7, 2020 at the age of 93. Avery, the son of Dr. Avery Ala Drake, Sr. and Mrs. Mary Genevieve (Wilson) Drake, was born January 17, 1927, in Kansas City, Missouri; a son of Missouri. At an early age, he and his family moved to Rolla, Missouri, where his father, a physician, established a practice. He attended the Rolla Public Schools. On graduation from high school, he was inducted into the Army where he served as an infantry sergeant and continued in the Reserves. He first entered the Missouri School of Mines in February 1947. He was awarded a B.S. in Mining Engineering, Mining Geology Option in May 1950. He began graduate work at Missouri School of Mines in September 1950 and was appointed Graduate Assistant in Mining Engineering. He received a M.S. from the same institution in 1952. He joined the Denver USGS in 1952 and began field work on the Wood and East Calhoun mines, Central City district, Colorado. Subsequently moving to the Washington, DC USGS offices, his passion and curiosity about geology and science took him around the world. He participated in the 1961 U.S. National Science Foundation U.S. Navy expedition to the Bellingshausen Sea, Antarctica, where he charted the Eights Coast, and to Brazil where he developed advanced geologic field methods courses for the Brazilian Department of Mines and Energy, and throughout the United States for field work. From the 1960s onward, Avery was a major force in the mapping and interpretation of the mid-Atlantic Appalachian Piedmont terranes and related rocks. There is not a quadrangle in this area where Avery did not have an influence. He specialized in regional and structural geology and tectonics for 43 years at the U.S. Geological Survey until his retirement and beyond, serving as an Emeritus Scientist for a dozen years. An avid oenophile, Avery hosted wine tastings over the decades at his home and at the Cosmos Club, and he was awarded Chevalier de l'Ordre du Merite Agricole by the French government for the promotion of French wines in the USA. Avery is survived by his wife of 53 years, Colette; their children, Avery III (Mia) and Isabelle (Amy), and grandchildren; Drake and Claire-Solene Becka.

---- Harvey Belkin and The Washington Post



Jack Epstein

Jack Burton Epstein, a career geologist with the U.S. Geological Survey (USGS) passed away in May 2020 at his home in Great Falls, Virginia. His career and contributions to the USGS spanned more than 60 years from his time as a summer field assistant while attending college, through 40 years as a research geologist, and more than 15 years as an emeritus Jack was born December 27, 1935 in scientist. Brooklyn, New York and attended CUNY- Brooklyn College where he received his Bachelor of Science degree in geology in 1956. He earned his Master of Science degree in 1958 from the University of Wyoming, and his doctorate degree in geology in 1970 from The Ohio State University. His master's thesis was geologic mapping of the Fanny Peak quadrangle, Black Hills of Wyoming and South Dakota, and his Ph. D. dissertation focused on the geology of the Stroudsburg adjacent quadrangle and areas. Pennsylvania and New Jersey.

Jack married fellow geology student Anita Fishman (Anita Epstein Harris) in 1958, and both were assistant geologists for the late Irving J. Witkind of the USGS, mapping in and around Yellowstone National Park. This relationship with the National Park Service would last throughout his career. While Jack, Anita, and Irving were camping in the western part of the Park in August 1959, the magnitude 7.2 magnitude Hebgen Lake earthquake occurred. This event changed the course of Jack's mapping project and launched him into emergency response and studies of earthquake features. Years later, he was honored as an invited speaker by the National Park Service (NPS) at the 50<sup>th</sup> anniversary of the earthquake in 2009. As an avid photographer, the NPS funded Jack to reoccupy stations for a before, immediately after, and decades later compilation. After the completion of his work in Montana, Jack was assigned to the USGS groundwater office in Alexandria, Louisiana. About one year later he decided he wanted to avoid working in bayous and swamps and pursued his Ph. D. at The Ohio State University where he concentrated on the geology of the Appalachians in Pennsylvania and New Jersey. Through his entire career, he maintained interest in the areas he had worked in including the Black Hills, Yellowstone National Park, and the central and

northern Appalachians; however not the Louisiana bayous. Beginning in graduate school he observed color differences in microfossil conodonts, and continuing through the 1970s, Jack collaborated with Anita's development of the conodont color alteration index (CAI) as a tool for assessing paleothermal conditions in Paleozoic rocks.

Jack's contributions to the USGS centered on applied science where geologic studies were linked to societal issues. As he worked in the Washington, D.C., area for the USGS, he was an important liaison to other Federal agencies and was sought out by the National Park Service, Fish and Wildlife Service, and Forest Service for geologic studies for land management. Jack was selected by the National Park Service in 2000 to be a representative to the newly formed National Cave and Karst Research Institute (NCKRI), Federal Working Group to establish conservation of caves and karst on federal lands. His love of National Parks and the outdoors led to long relationships with parks in and around the Black Hills of South Dakota and Wyoming (including Devils Tower, Wind Cave, and Jewel Cave), the Delaware Water Gap, New Jersey and Pennsylvania, and Shenandoah National Park and the Appalachian Trail.

Jack's career as a public servant was highlighted by interactions with other federal and state agencies. He cooperated with the Pennsylvania Geological Survey; was a member of the Department of Interior Resource and Land Information Program; was a program manager of the National Environmental Overview Program; and managed preparation of the National Atlas of geologic hazards, resources, and environmental constraints, to name a few. Over the years, Jack was a productive project chief for the USGS and served as Chief of the Branch of Eastern Regional Geology from 1994-1996. He was a willing and insightful peer reviewer of innumerable manuscripts for colleagues both in and outside of USGS.

Although Jack spent most of his career at the USGS National Center in Reston, Virginia, he traveled much around the U.S. leading numerous field trips for the profession and for the public. Jack had a wonderful gift of translating science to the lay person. He was a master of preparing field trip guidebooks that could be used for decades to come, and his road logs were unmatched. Jack's passion for geology was passed on to many students of the science. He was a mentor to many young, and not so young, geologists as he eagerly and unselfishly shared his knowledge and wisdom. Perhaps Jack's most genuine characteristic was his sense of humor. Jack was a modest man with a wonderful sense of humor. The humor showed itself in every talk he ever gave, on field trips and in many starring roles in the USGS Pick and Hammer Shows. Through many stressful times, he knew how to break the tension and teach others that there are times not to be taken too seriously. Jack's passion, vision, inspiration, and humor will be missed, and we recognize his dedication to geology, but even more so his dedication to those he touched and mentored. He is survived by his two daughters, Dr. Laura Neustater of Fort Lauderdale, Florida, and Cyndi Morgan of Great Falls, Virginia.

----- Randy Orndorff, David Weary, and Peter Lyttle

(The original memorial has a list of Jack's publications. For those who would like that list, please write to Randy Orndorf at rorndorf@usgs.gov)--Ed.)



**Ralph Erickson** 

Ralph Leroy Erickson passed away Friday, June 12, in Lecanto, Florida, under the tender care of his special angel, caretaker Crystal Owens, and VITAS hospice. Ralph was born to Axel and Alice Erickson on May 17, 1923 (Norwegian Independence Day), in Egan, S. Dakota, and grew up in Flandreau, S. Dakota. When he was three, his father loaded him onto a hay wagon and headed for the field behind a pair of horses. Suddenly, one of the horses tried to bolt. Axel jumped off the wagon between the horses and tried to calm them. He was stomped to death in front of his toddlerson. This event colored every aspect of Ralph's adulthood, having seen his father killed and then being raised by a single mother during the Depression. It was a constant reminder of the fragility of life. At the beginning of WWII, Ralph was enrolled at Miami University of Ohio, following his older brothers to college there. In 1943, he enlisted in the Army and then served in both the European and Pacific theaters, spending 1945-46 in Japan as a secretary, taking shorthand dictation and typing military documents, keeping track of supplies and the repair of military equipment.

Upon returning Stateside, he returned to Miami of Ohio, earning a B.A. in geology. Thanks to the GI Bill, he was able to pursue graduate studies in geology,

earning a Master's Degree at Michigan State, and a Ph.D. at the University of Minnesota. After graduation, he was hired by the U.S. Geological Survey in Denver. He enjoyed an outstanding 38-year career, internationally recognized as an expert in economic geology and geochemical exploration. In 1966 in Cortez, Nevada, his pioneering work led to the discovery of one of the major gold deposits found in the 20th century. The site has become the largest goldproducing mine in the United States. He enjoyed his field projects in Nevada, Arkansas, Missouri, Illinois, Kansas, and overseas in Brazil and Inner Mongolia. In Denver, he served as Chief, Branch of Exploration Research for 3 years and subsequently as Regional Geologist for the 15-state Central Region of the USGS. He was cited for his work in the Wall St. Journal, and he was awarded both the Meritorious Service and the Distinguished Service Awards by the Interior Department for his contributions as an innovative scientist, administrative leader, and world-renowned leader in geochemical exploration. Upon retirement in 1989, he and his wife discovered Sugarmill Woods in Homosassa Springs, Florida, and they were extremely happy there for the last 30 years, enjoying many new friends, being able to golf, fish, and generally pursue their contagious enthusiasm for life.

Ralph was preceded in death by his parents, his 2 older brothers, Virgil and Byron, and the mother of his children, Bette Frasure. Cherishing the memory of this gentle, loving soul is his beloved wife of 50 years, Marjorie (Suzi) Erickson, his sons Jon Christian and Jeffrey Joel, who live in Mericourt, France, daughters Karen Erickson and Erica Erickson, both of Denver, plus step-sons Jeff Rickard (Kristine), in Carmel, Indiana, and Rich Rickard in Denver, brother-in-law David Levering, Denver, five grandchildren, four stepgrandchildren, and many other relatives, friends, and colleagues scattered throughout the country.

In lieu of a memorial service, the family asks only that all who knew and loved Ralph raise a toast and a prayer to honor his memory. Memorial contributions may be made to VITAS or to the Citrus Co., Florida, Animal Shelter.

----- the Erickson family



**Jane Ferrigno** 

Jane Willmott Goodwin Ferrigno, 79, passed away peacefully on August 14, 2020. She was born February 26, 1941 to Cecil and Esther Goodwin in Boston, MA, and married to James "Jim" Ferrigno September 1, 1963. After graduating from Hull High in 1958, and Brown University in 1962 (B.A. in geology), Jane went on to work as a geologist at the Smithsonian Institution where she met and married Jim. After that, she went to work with the USGS, spending nearly 50 years interpreting Landsat imagery of glacial geologic features. She authored and edited many works published within the field of glaciology. In order to be with her young children, she also drove a school bus, and dabbled in real estate for a time. Jane was an avid explorer and spent her lifetime embracing everyone and living life to its fullest potential. She loved reading, sailing, bowling, swimming, hiking and camping, volleyball, bridge, cribbage, jigsaw puzzles, crossword puzzles, dancing, researching genealogy,

and spending time with her grandchildren on intergenerational adventures. Jane served on countless committees at Great Falls United Methodist Church, and spent many years as the UMW president, as well as serving as lay leader and liturgist during many Sunday church services. She loved to travel and has been to every continent, including Antarctica; visited over 40 countries, and been on 30+ cruises. There is even a Ferrigno Glacier in Antarctica named after her in honor of her extensive contributions to glacial research.

Jane is survived by Jim, her husband of nearly 57 years; sister-in-law Rachel Goodwin, brother George and wife Linda, sister Anne and husband Joe; 3 children (Jean Marzolf and husband Karl, Julie Weigel and husband Michael, Jeremy Ferrigno and wife Charlotte); as well as 9 grandchildren (Karen [Marzolf] Blakney and husband Josiah, Erica Marzolf, Emily [Weigel] Guthrie and husband Kyle, Amy Marzolf and fiancé Daniel Skinner, Matthew Weigel, John Weigel, Hannah Weigel, Joseph Ferrigno, and Jessica Ferrigno); and 3 great grandchildren (Alana and Aaliyah Skinner, and Kayden Guthrie). Jane is preceded in death by her parents Cecil and Esther Goodwin, and brother James "Jim" Goodwin.

----- the Ferrigno family



Norman Frederiksen

It is with great sadness that we announce the passing of our husband, father, and grandfather, Norman Frederiksen, on October 6, 2020. Norman was the son of Oliver and Jane Frederiksen and was born on August 11, 1932, in Vienna, Austria. His father was of Danish descent and Norman was very proud of his distinguished Danish heritage. He was deeply devoted to his wife and family, and he is survived by his loving Elke Frederiksen and daughter Kirsten wife Frederiksen, son-in-law Erik De Jonghe, grandchildren Oliver and Lilli De Jonghe, good friend and brotherin-law Hans- Dieter Petersen and his wife Edda Petersen, as well as ten nephews and nieces. He grew up mainly in Oxford, Ohio, but moved with his parents to Germany for his senior year of high school. He became fluent in German, and he was stationed with the U.S. Army in Berlin as a translator of East German intercepts during the Cold War. He received his undergraduate degree in geology from Hamilton College and a Master's degree from Pennsylvania State University, then worked as a geologist for Mobil Oil in Dallas, Texas. He met his beloved wife Elke in Dallas; they were very happily married for 58 years. Norman earned his Ph.D. from the University of Wisconsin/ Madison and spent the last 28 years of his career as an accomplished and well-known research geologist at the U.S. Geological Survey. He explored the California coast extensively for research, as well as Alaska, the East Coast, and the Gulf Coast, determining the age of fossils for oil exploration. He also worked abroad often, in Europe, Australia, India, and Pakistan. He enjoyed teaching local geologists during many of these trips. He particularly loved his vacations in northern Germany and Denmark. Norman had a special gift for music, played clarinet and guitar, and was a lifelong classical music enthusiast. In his later years, as he suffered from dementia, he was always calmed by music, especially when played by his grandchildren to him. He spent his last years under the supportive care of Eden Kosher Homes in Potomac and his devoted caregivers Fabienne and Maryse. No services will be held. In lieu of flowers, please send a donation to Doctors Without Borders.

----- the Frederiksen Family



Hal Gluskoter

Harold Jay Gluskoter, age 85, died in Colorado on 3 September 2020 after a short illness. A Champaign, Illinois native, Hal was born on May 8, 1935 to Ann and Sam Gluskoter. He graduated from University Laboratory (Uni) High School, Champaign in 1952 and matriculated at the University of Illinois, Champaign-Urbana with the goal to become a lawyer. Shut out of a freshman General Science course, he signed up for Geology 101 on the recommendation of his friend's mother and never looked back. He received a BS from the University of Illinois, Champaign-Urbana, a MS from the University of Iowa, Iowa City and a PhD in 1962 from the University of California, Berkeley. Hal's PhD dissertation was on the geology of a portion of western Marin County, California, an area filled with black igneous rocks. He pursued the motif of black rocks and in 1962 joined the Illinois State Geological Survey, Urbana Illinois, as a geologist, and rose to be the head of Coal Section. In 1965, he developed the method of low-temperature ashing for coal, which is the most convenient method for separating mineral matter from coal with the minimum of heating and of transformation of the mineral matter. The publication Trace elements in coal: Occurrence and distribution, Gluskoter et al. 1977, Illinois Geological Survey circular 499 was the seminal publication that brought the importance of trace elements in coal to the attention of the coal. environmental, and geological community. Hal left Urbana in 1978 and joined Exxon, Houston, Texas as a Research Supervisor. In 1985, Hal became Chief of the Branch of Coal Geology at the U.S. Geological Survey, Reston, VA. After that administrative tour, he was a senior research geologist until retirement in 2002. From 2002 to 2012, he was a USGS scientist emeritus. His research interests included trace elements in coal, coal resource assessments that include coal geochemistry as it is related to coal utilization, and the environment and more recent studies of the potential for sequestering carbon dioxide in coal beds.

Hal received the Gordon H. Wood, Jr. Memorial Award from the AAPG Energy Minerals Division, Eastern Section in 1992, and the Gilbert H. Cady Award from the GSA Energy Geology Division in 1994. He is survived by his wife Leah (Levin), two sons, a daughter, and many grandchildren.

----- Harvey Belkin



**Fred Houser** 

Frederick Northrop Houser, 95, a retired USGS geologist, died March 12th in Tucson, Arizona. Fred was born in Lakeview, Michigan, June 6, 1924, the son of Frederick Ferris Houser and Rosalind Janette Houser (Northrop). He graduated from Michigan State University and received a M.S. Degree in Geology from the University of Arizona, Tucson. He worked first as a geologist with Skelly Oil Co., in Midland, Texas, and then joined the USGS in 1949. Fred's Survey assignments included exploration for uranium in Florida, Colorado, Utah, and Arizona; geology and geochemistry for selection of safe sites for nuclear tests at the Nevada Test Site and Amchitka Island, Alaska; and geology and seismicity for safety of nuclear generating stations proposed in Alaska, the lower 48 states, and Puerto Rico. Fred spent 1943-45 in WW II as a B-24 bomber pilot in the South Pacific areas of Australia, New Guinea, Halmahera, Borneo, and Philippine Islands, flying 46 missions in about 500 combat flying hours. Fred is survived by his wife Brenda and by his three children Jan, Steve (Michele), and Dorothy (Marty) and by grandchildren Adam and Brent.

----- the Houser family

#### **Ellie Keefer**

Yes, she came from a geological family. Both her father [Samuel Knight], whom you have read about, and her grandfather (Wilbur C. Knight) were professors of geology at the University of Wyoming. Mom started her career as an assistant in the Laramie field office, doing all manner of work to support the geologists working there. In addition to the office responsibilities, her work involved being part of field parties on projects in the Tetons-Jackson Hole region of Wyoming. After that, her career took a hiatus, and she rejoined the USGS after we moved to the Denver area in 1963. She worked both in Denver, and for a few years in Reston, as part of the Mineral Resources group that was developing and implementing an early computer database system to inventory mineral resources information that was being developed by the Survey. She did a lot of computer work in the days when computer work involved producing massive decks of cards that would be fed through the reader of a mainframe computer. In Denver, for at least part of that time, she worked with a group in the satellite office on McIntyre Rd. in Arvada. If I remember right, the head of that group was Al Maranzino.

----- Dave Keefer

## Vic Labson

Victor Franklin Labson, 68, of Lakewood, Colorado and Reston, Virginia, died in his Lakewood home on November 1, 2020. He was born in Washington, D.C. to Arnold and Dorothy (née Deskin) Labson, and relocated with his family to San Francisco, California during his high school years. While still pursuing his Ph.D. in Engineering Geosciences from the University of California at Berkeley, he joined the U.S. Geological Survey (USGS) in 1977, relocating to the Denver, Colorado office in 1985. A voracious reader and a man whose humility belied a probing intellect, he devoted his life to civil service in the name of science and international collaboration. Vic will be remembered for his thoughtfulness, a wry sense of humor, his devotion to his family, and his dedication to fostering the careers of many colleagues at the USGS and around the world. He is survived by his wife of 41 years, Rebecka Snell Labson, and his children, Eva Labson and husband Kevin Blum; and Daniel and wife Linsey Labson.

Vic's career at the USGS spanned 43 years. In the first half of his career, he made great contributions first as a research scientist and then as a science manager of a USGS research group that develops and applies geophysical techniques to map variations in the magnetic and electromagnetic properties of the Earth's crust—providing knowledge about many globally important issues such as geologic hazards, water, energy, mineral resources, and the environment. As a science manager, Vic also helped foster many innovative interdisciplinary collaborations among many types of scientists. In his last role he served as USGS Director of International Programs in Reston, Virginia. In that capacity, he was the Survey's principal advisor regarding international activities and scientific cooperation in a broad variety of geologic, hydrologic, biologic, and geographic research—Vic's leadership in this area greatly enhanced the contributions of USGS science globally, and positively affected the geological surveys of countries worldwide.

In recognition of his passion for mentoring scientists, the family requests, in lieu of flowers, that donations be given in his honor to Advancing Science in America (ARCS) or the American Geophysical Union (AGU).



#### **Doug Morton**

Douglas Maxwell Morton, 85, of Moreno Valley, California, passed away on September 16, 2020, at home surrounded by his family. He was the beloved husband of Robyn (nee McLauchlin), loving father of Gregory (Ana), Cynthia (Joseph), and Karen, loving grandfather of Natalie, Alex, Kevin, and Nicholas, dear brother of Donald Morton (deceased) and Richard Morton (Cathy), and a beloved uncle and brother-inlaw to his large extended family that he cared for deeply. Born in Hemet, California, on June 15, 1935, he was the son of Maddeline Morton. Doug attended Hemet High School, graduated from the University of California, Riverside with a degree in Geology, and the University of California, Los Angeles with a Ph.D. in Geology. In 1963, Doug began his career as a geologist with the California Division of Mines and Geology, and in 1972 embarked on a 32-year career with the US Geological Survey. In 1984, Doug received the Department of the Interior (DOI) Meritorious Service Award. In 2007, he received the Distinguished Service Award, the highest honorary recognition bestowed upon an employee by the DOI. Doug was a prolific research scientist and the world's expert on the geology of Southern California, having published over 170 scientific papers and geologic maps. Additionally,

Doug was a faculty member at the University of California, Riverside for 42 years. Doug was an accomplished birder and he had a strong influence on the birding community in California from the 1970s to the 1990s. He was always generous about sharing his passion of birds and is responsible for inspiring many people to become birders. An avid gardener, Doug tended to both ornamental and edible plants and for years kept a large and stunning display of orchids. Doug was a loving and caring husband, married to his wife Robyn soon to be 62 years. Doug took great pride in his three children and their life endeavors, and he spent years teaching culinary techniques to his four grandchildren. He enjoyed watching his grandchildren grow into fine young adults.

In lieu of flowers, memorial contributions may be made to the Douglas M. Morton Memorial Scholarship, UCR Foundation, PO Box 112,

Riverside, CA 92502-0112.

https://dougmortonlakeview.wordpress.com/douglasm-morton-memorial-scholarship-fund-for-studentfield-studies. Additional information regarding the Scholarship can be obtained by contacting Michael McKibben at michael.mckibben@ucr.edu.

## Memorial Tribute to Doug Morton

from Scott Tilley (Doug's Administrative Officer, ORG) and Lindsay Nichols (Doug's Office Secretary, ORG)

Doug Morton was selected as Chief, Office of Environmental Geology, Geologic Division, Reston, Virginia, in 1980. Prior to his selection, Doug was Chief, Branch of Western Environmental Geology, Menlo Park, California (during Doug's tenure, the name of the Office [and corresponding Branches] was changed to the Office of Regional Geology [ORG]). Doug was Office Chief from 1980 to 1984. He supervised the Branches of Eastern, Central, and Western Regional Geology; Isotope Geology; Astrogeology; and Paleontology & Stratigraphy. Doug was a wonderful man with a great sense of humor and a love of USGS and the Geologic Division. He brought to ORG a sense of humor and love for the science, but also a concern for his staff, providing direction and support in their efforts to produce significant results in scientific publications. Doug also worked with the six Branches that reported to him to develop strong relationships within the Geologic Division and with other Federal agencies to bring in outside funding to meet program goals. Being a Californian, Doug had a wonderful smile and a sense of humor that would often take many of us by surprise as he was pulling our legs! It was such a sense of, could we say, California humor, that was real, exciting, and memorable to those of us looking for bright days! He loved to see the faces on his troops when he would pull their legs by telling Branch Chiefs he was going to reassign some of their dollars! Doug had the utmost respect for his staff and Branch personnel. He was a model manager, and his employees loved him no matter what tasks were covered. He led by example and gave credit to his employees, even when much of the credit should have gone to him. He was a great man in science and management and was welcoming to his staff, many of whom would come in to talk science or other administrative issues. Doug always said he had the best staff in the USGS! Those of us still around remember his great insight into humankind and his strong belief in the science the Office was undertaking; we always worked with less funding than we needed, but we always made it to the end of the year in good shape! It was a great four years and very sad for his Office staff when he returned to California in 1984. He was truly missed then and much more today. He was a giant in USGS science and management and left an indelible mark on scientific and administrative personnel. May he be welcomed in Heaven with science to watch over in the Geologic world and his loving family!

#### **Dick Pike**

Richard (Dick) J. Pike died in his sleep February 1st after a long battle with Alzheimer's disease. During his Survey career of 45 years, he studied impact craters on the Moon, helped define terrain conditions for the lunar rover, devised an aggregate measure of topographic shape that he called the geometric signature, and applied topographic analysis to landslide studies. He had developed a passionate interest in landscape and its shapes at the University of Michigan as a student of the pioneering terrain analyst Walter F. Wood, and he studied and applied geomorphometry throughout his career. He joined the Survey in 1968 and spent the first part of his career working on planetary issues in Astrogeology, particularly impact craters and lunar terrain characteristics. In 1987 he moved to Regional Geology in Menlo Park, where he applied his knowledge of shape analysis in the emerging era of GIS analysis of elevation grids (DEMs), which were then becoming detailed and accurate enough to be really useful. Results included landslide studies, quantitative confirmation of photointerpretive studies and, working with colleagues in Topographic Division, the application of shaded relief techniques. Highlights of his publications were the spectacular shaded relief image of the United States (I-Map 2206), which replaced the cartographic drawings of Harrison and Raisz in representing the land forms of the U.S. and the derivative Tapestry of Time and Terrain (I-Map 2720), which overlaid geology on that shaded image. Throughout his career, Dick was an advocate for improved understanding of topography, the application of geomorphometric techniques to geologic problems, and always, careful use of the English language.

----- Colin Williams



**Meyer Rubin** 

Meyer Rubin, age 96, died on May 2, 2020 in Manassas, VA of complications from COVID-19. A Chicago native, he was born on February 17, 1924, the son of Abraham and Esther Rubin. After graduating from Englewood High School, Chicago in 1941, Meyer enlisted into a University of Chicago run meteorology program for the US Army Air Forces. Upon completion, he was shipped off first to Port Moresby, New Guinea and then later to the Philippines to forecast weather for long-range flights in the WWII Pacific Theater. Later, after the Japanese surrender, he was sent to Tokyo as part of the occupation forces. But before going overseas, he married his high school sweetheart, Mary Louise Tucker. After the war, he returned to the University of Chicago and earned a BS, MS, and later a PhD.

Meyer joined the USGS in 1950 as part of the Military Branch run by Frank Whitmore. In 1952, Hans Suess established one of the first radiocarbon laboratories in the world in the USGS building basement on 1800 F St. NW, Washington, DC. Meyer joined the project in December 1953, and became Project Chief when Suess left the USGS in 1955 to go to Scripps. For about 40 years, the 14C laboratory, using the Suess acetylene technique, age dated thousands of samples from USGS collaborators and other researchers from around the world. Rubin's early work was instrumental in clarifying the complicated stratigraphy of glacial fluvial and drift sedimentation from the Wisconsin Stage glaciation. The 1964 Alaska earthquake brought together Meyer and George Plafker (USGS Menlo Park) to work out the uplift and deformation from this earthquake. These studies by Plafker, Rubin and colleagues were very important evidence for the existence of subduction processes during the early debates of plate tectonics. In the 1970s, collaborating with Rocky Crandall and Don Mullineaux, 14C dating documented an eruption periodicity at Mt. St. Helens. They suggested in their 1975 paper that another eruption was very likely before the end of the century. The May 18, 1980 eruption proved them correct. In the late 1980s, a new 14C dating technique was developed using accelerator mass spectrometry. Using this new technique, Meyer collaborated with other researchers in the dating of the Shroud of Turin. The old Suess acetylene anticoincidence counters and the gas purification apparatus, now in Reston, VA, were dismantled in the early 1990s and Meyer retired and Jack McGeehin took over the 14C laboratory using accelerator mass spectrometry. Meyer became a Scientist Emeritus in now what is the Florence Bascom Geoscience Center and came in until driving became too much of a chore. His wife of 72 years, Mary Louise predeceased him in 2015. He is survived by three sons, many grandchildren and great grandchildren.

----- Harvey Belkin

#### **Rob Wells**

My husband, Rob Wells, a Geologic Division retiree, died peacefully at home, surrounded by family, on September 12. He had been active and robustly healthy before a sudden illness resulted in septic shock and various complications. A private memorial was held for immediate family. Rob joined the Publications Division of USGS in Lakewood as a tecnical publications editor. He became the supervisor of the text editing group within the Geologic Division, Branch of Central Technical Reports. After the RIF in 1995, Rob became an online publishing specialist in the Geologic Division's Central Publishing Group. Prior to our marriage in 1996, Rob was transferred to the Branch of Energy Resources in the same role. Rob took early retirement in 1999.

----- Diane N. Wells (formerly Diane N. Jones)

## **Paul Williams**

(Memorial in next issue. Please see memorial by Pete Rowley and others on Geological Society of America website.)

Other Deaths

Raymond Dant, 1930-2020 Phil Hageman Tillie Miesch, wife of Al

# RETIREE PUBLICATIONS 2013 – 2020

**Note**: The references below are compiled from information available as of 2 December 2020. These references are "new" since the Winter 2020 Newsletter (Number 78). An effort is made to compile **ALL** known publications (whatever year) by Geologic Division Retirees (GDR) for inclusion in the Master List of GDR Publications (now being maintained and updated by Bob Tilling). Please send complete references for any new publications (but not those still "in press") to Bob (e-mail: <u>rtilling@usgs.gov</u> or <u>volkno.rit@gmail.com</u>), with cc to Jim McNeal (e-mail: <u>imcneal@usgs.gov</u>) as back-up, for listing in the next Newsletter and for updating the Master List.

#### DAVID BUKRY publications:

- Barron, John, Heusser, Linda, Addison, Jason, <u>Bukry, David</u>, Schwartz, Valerie, and Wagner, Amy, 2019, *Holocene paleoclimatology and paleoceanography of core PS1410-06GC from offshore Santa Cruz, California*: Pacific Climate Workshop, poster. 10.13140/RG.2.2.29885.51684.
- John A. Barron, Jason A. Addison, <u>David Bukry</u>, Summer Praetorius, James Bischoff, Mary McGann, and Valerie Schwartz, 2019, *High Resolution Reconstruction of Primary Productivity and Climate of the Central Gulf of California During the Past 7400 years*: American Geophysical Union Annual Meeting, Poster OS53D-1557.
- Barron, John A., Addison, Jason A., Heusser, Linda E., <u>Bukry</u>, <u>David</u>, Schwartz, Valerie, and Wagner, Amy, 2019, An 11,300 yr record of paleoclimatology and paleoceanography of the central California coast in a gravity core from Pioneer Seamount: Quaternary International, https://doi.org/10.1016/j.quaint.2019.12.019.

#### JOHN P. LOCKWOOD publications:

- Trusdell, F. A. and Lockwood, J.P., 2019, Geologic Map of the central-southeast flank of Mauna Loa Volcano, Island of Hawaii, Hawaii: USGS Scientific Investigations Map 2932-B, 1:50,000.
- Trusdell, F. A. and <u>Lockwood, J.P.</u>, 2020, *Geologic Map of the* Southern Flank of Mauna Loa Volcano, Island of Hawai'i, Hawaii: USGS Scientific Investigations Map 2932-C, 1:50,000.

#### SCOTT A. MINOR publications:

Minor, S.A., Caine, J.S., Ruleman, C.A., Fridrich, C.J., Chan, C.F., Brandt, T.R., Holm-Denoma, C.S., Morgan, L.E., Cosca, M.A., and Grauch, V.J.S., 2019, *Geologic map of the Poncha Pass area, Chaffee, Fremont, and Saguache Counties, Colorado*: U.S. Geological Survey Scientific Investigations Map 3436, 3 sheets, scale 1:24,000, <u>https://doi.org/10.3133/sim3436</u>.

- Schmidt, Kevin M. and <u>Minor, Scott A.</u>, 2020, Correlating observations of surface water with field-measured permeability on Santa Rosa Island, Channel Islands National Park, CA, [abst]: Geological Society of America, Abstracts with Programs. Vol. 52, No. 4, <u>https://doi.org/10.1130/abs/2020CD-347133.</u>
- Schmidt, K.M., and <u>Minor, S.A.</u>, 2020, Surface water availability and field-measured permeability on Santa Rosa Island, Channel Islands National Park, CA: Abstract 669856, to be presented at 2020 AGU Fall Meeting, 7-11 Dec.

#### FORREST G. POOLE publications:

- <u>Poole, F.G.</u>, and Amaya-Martínez, R., 2018, *Coeval basins within early Mesozoic Cordilleran retroarc foreland system of Sonora, Mexico*: Geological Society of America Abstracts with Programs, v. 50, no. 5, ISSN 0016-7592 doi: 10.1130/abs/2018RM-313909.
- <u>Poole, F.G.,</u> Sandberg, C.A., and Amaya-Martínez, R., 2018, *Continuous Paleozoic stratigraphic and structural trends across Sonora indicate no major offset by strike-slip faults in northwest Mexico*: Geological Society of America Abstracts with Programs. v. 50, no. 5, ISSN 0016-7592 doi: 10.1130/abs/2018RM-314044.

#### MARITH C. REHEIS publications:

- Reheis, M.C., Miller, D.M., McGeehin, J.P., Redwine, J.L., Oviatt, C.G., and Bright, Jordon, 2015, *Directly dated OIS 3 lake-level record from Lake Manix, Mojave Desert, California*: Quaternary Research, v. 83, p. 187-203.
- Pederson, J.L., Janecke, S.U., <u>Reheis, M.C.</u>, Kaufman, D.S., and Oaks, R.Q. Jr., 2016, *Chapter 2—The Bear River's history and diversion: Constraints, unsolved problems, and implications for the Lake Bonneville record, in:* Oviatt, C.G., and Shroder, J.F. Jr., Lake Bonneville: A Scientific Update: Developments in Earth Surface Processes, v. 20, p. 28-59.

- Reheis, M.C., Goldstein, H.L., Reynolds, R.L., Forman, S.L., Mahan, S.A., and Carrara, P.E., 2018, *Late Quaternary loess and soils on uplands in the Canyonlands and Mesa Verde areas, Utah and Colorado*: <u>Quaternary</u> <u>Research, v.</u> 89, p. 718-738.
- Knott, J.R., Phillips, F.M., <u>Reheis, M.C.</u>, Sada, D., Jayko, A., and Axen, G., 2018, *Geologic and hydrologic concerns about pupfish divergence during the last glacial maximum*: Proceedings Royal Society B, v. 285: 20171648. <u>http://dx.doi.org/10.1098/rspb.2017.1648</u>.
- Reheis, M.C., Caskey, J., Bright, J., Paces, J.B., Mahan, S.A., Wan, E., 2020, *Pleistocene lakes and paleohydrologic environments of the Tecopa Basin: constraints on the drainage integration of the Amargosa River*: Geological Society of America Bulletin, v.132, p.1537–1565.

#### RICHARD L. REYNOLDS publications:

- Neff, J.C., <u>Reynolds, R.L.</u>, Munson, S. Fernandez, D., Belnap, J., 2013, *The role of dust storms in atmospheric particle concentrations at two sites in the western U.S.*: Journal of Geophysical Research 118(19), 11,201-11,212. doi:10.1002/jgrd.50855. http://onlinelibrary.wiley.com/doi/10.1002/jgrd.50855/full.
- Lawrence, C.R, <u>Reynolds, R.L.</u>, Ketterer, M., and Neff, J.C., 2013, *Aeolian controls on soil geochemistry and weathering fluxes in high-elevation ecosystems of the Rocky Mountains, USA*: Geochimica et Cosmochimica Acta 107, 27-46.
- <u>Reynolds, R.L.</u>, Cattle, S.R., Moskowitz, B.M., Goldstein, H.L., Yauk, K., Flagg, C., Berquó, T., Kokaly, R.F., Morman, S., Breit, G., 2014, *Iron oxide minerals in dust of the Red Dawn event in eastern Australia, September* 2009: Aeolian Research 15, 1-13. http://dx.doi.org/10.1016/j.aeolia.2014.02.003.
- Ghio, A., others, Goldstein, H.L., <u>Reynolds, R.L.</u>, 2014, *Biologic effects of desert dust in respiratory epithelial cells and a murine model*: Inhalation Toxicology 26(5): 299–309. http://informahealthcare.com/doi/abs/10.3109/0895837 8.2014.888109.
- <u>Reynolds, R.L.</u>, Goldstein, H.L., Moskowitz, B.M., Bryant,
  A.C., Skiles, S.M., Kokaly, R.F., Flagg, C.B., Yauk, K.,
  Berquó, T., Breit, G., Ketterer, M., Fernandez. D.,
  Miller, M.E., Painter, T.H., 2014, Composition of dust
  deposited to snow cover in the Wasatch Range (Utah,
  USA): Controls on radiative properties of snow cover
  and comparison to some dust-source sediments:
  Aeolian Research 15, 73-90.
  DOI:10.1016/j.aeolia.2013.08.001.

- Flagg, C., Neff, J.C., Belnap, J., <u>Reynolds, R.L.</u>, 2014, *Spatial and temporal patterns of dust emissions (2004-2012) in semi-arid landscapes, southeastern Utah, USA*: Aeolian Research 15, 31-43. http://dx.doi.org/10.1016/j.aeolia.2013.10.002.
- Gray, J.E., Hines, M.E., Goldstein, H.L., <u>Reynolds, R.L.</u>, 2014, *Mercury deposition and methylmercury formation in Narraguinnep Reservoir, southwestern, Colorado, USA*: Applied Geochemistry 50, 82-90.
- Whitney, J.W., Buckingham, S.E., Breit, G.N., Bogle, R.C. Luo, L., <u>Reynolds, R.L.</u>, Goldstein, H.L., Vogel, J. M., 2015, *Yardang evolution and climate variability on Mesquite Lake Playa, Mojave Desert*: Geomorphology 230, 13-25.
- Skiles, S. M., Painter, T.H., Belnap, J., Holland, L., <u>Reynolds</u>, <u>R.L.</u>, Goldstein, H.L., Lin, J., 2015, *Regional variability in dust-on-snow processes and impacts in the Upper Colorado River Basin*: Hydrologic Processes 29, 5,397-5,413. doi:10.1002/hyp.10569.
- Moskowitz, B.M., <u>Reynolds, R.L.</u>, Goldstein, H.L., Berquó, T., Kokaly, R.F., Bristow, C.S., 2016, *Iron oxide minerals in dust-source sediments from the Bodélé Depression*, *Chad: Implications for radiative properties of dust plumes from the Sahara and potential nutrients*: Aeolian Research 22, 93-106. DOI:10.1016/j.aeolia.2016.07.001.
- Reynolds, R.L., Munson, S.M., Fernandez, D.P., Neff, J.C., 2016, Concentrations of mineral aerosol from desert to plains across the central Rocky Mountains, western United States: Aeolian Research 23, 21-35. DOI:10.1016/j.aeolia.2016.09.001.
- Goldstein, H.L., Breit, G.N., <u>Reynolds, R.L.</u>, 2017, Controls on the chemical composition of saline surface crusts and emitted dust from a wet playa in the Mojave Desert (USA): Journal of Arid Environments 140, 50-66. DOI:10.1016/j.jaridenv.2017.01.010.
- Zhang Z., Goldstein H.L.., <u>Reynolds R.L.</u>, Hu Y., Wang X., Zhu M., 2017, *Phosphorous speciation and solubility in aeolian dust deposited in the interior American West*: Environ. Sci. Technol., Environmental Science & Technology 2018 52 (5), 2658-2667. DOI: 10.1021/acs.est.7b04729
- Hettiarachchi, E., <u>Reynolds, R. L.</u>, Goldstein, H. L., Moskowitz, B., Rubasinghege, Gayan, 2018, *Iron dissolution and speciation in atmospheric mineral dust: Metal-metal synergistic and antagonistic effects*: Atmospheric Environment, 187, 417–423. https://doi.org/10.1016/j.atmosenv.2018.06.010

- Urban, F.E., Goldstein, H.L., Fulton, R., <u>Reynolds, R.L.</u>, 2018, Unseen dust emission and global dust abundance: Documenting dust emission from the Mojave Desert (USA) by daily remote camera imagery and winderosion measurements: Journal of Geophysical Research: Atmospheres, 123. https://doi. org/10.1029/2018JD028466.
- Reheis, M.C., Goldstein, H.L., <u>Reynolds, R.L</u>., Forman, S.L, 2018, *Late Quaternary loess and soils on uplands in the Canyonlands and Mesa Verde areas, Utah and Colorado*: Quaternary Research, 89 (3), 718-738, doi:.org/10.1017/qua.2017.63.
- Hettiarachchi, E., <u>Reynolds, R.L.</u>, Goldstein, H.L., Moskowitz, B., Rubasinghege, Gayan, 2019, *Bioavailable iron production in airborne mineral-dust: Controls by chemical composition and solar flux*: Atmospheric Environment, 205, 90-102. Doi.org/10.1016/j.atmosenv.2019.02-037.
- <u>Reynolds, R.L.</u>, Goldstein, H.L., Kokaly, R., Moskowitz, B.M., Munson, S.M., Solheid, P., Breit, G.N., Derry, J., 2020, *Dust deposited on snow cover in the San Juan Mountains, Colorado, 2011-2016: Compositional variability bearing on snow-melt effects*: Journal of Geophysical Research: Atmospheres, 125, e2019JD032210. https://doi.org/ 10.1029/2019JD032210.

#### **ROBERT T. RYDER** publication:

Trippi, Michael H., <u>Ryder, Robert T.</u>, and Enomoto, Catherine, 2019, *Geologic cross section A-A' through the Appalachian basin from the southern margin of the Ontario Lowlands province, Genesee County, western New York, to the Valley and Ridge province, Lycoming County, north-central, Pennsylvania*: U.S. Geological Survey Scientific Investigations Map SIM-3425, 2 plates with pamphlet, 74 p.

#### JOHN F. SLACK publications:

- <u>Slack, J.F.</u>, 2019, Stratiform tourmalinites: Revised genetic models and exploration applications, in Life with ore deposits on Earth: University of Glasgow, Glasgow, Scotland, Proceedings of the 15<sup>th</sup> Biennial SGA Meeting, v. 1, p. 99-102.
- Trumbull, R.B., Codeço, M.S., Jiang, S.-Y., Palmer, M.R., and <u>Slack, J.F.,</u> 2020, *Boron isotope variations in tourmaline from hydrothermal ore deposits: A review of controlling factors and insights for mineralizing systems*: Ore Geology Reviews, v. 125, <u>https://doi.org/10.1016/j.oregeorev.2020.103682</u>.

- Slack, J.F., 2020, *Potential for Sullivan-type Pb-Zn-Ag deposits in modern marine basins*: Mineralium Deposita, v. 55, p. 1271-1278.
- Slack, J.F., Neymark, L.A., Moscati, R.J., Lowers, H.A., Ransom, P.W., Hauser, R.L., and Adams, D.T., 2020, Origin of tin mineralization in the Sullivan Pb-Zn-Ag deposit, British Columbia: Constraints from textures, geochemistry, and LA-ICP-MS U-Pb geochronology of cassiterite: Economic Geology, v. 115, doi:10.5382/econgeo.4761.
- <u>Slack, J.F.</u>, Van Baalen, M., and Reusch, D.R., 2020, *Regional* geochemical variations in a metamorphosed black shale: A reconnaissance study of the Silurian Smalls *Falls Formation, Maine, USA*: Atlantic Geology, v. 56, p. 231-255.
- Neymark, L., Moscati, R., <u>Slack, J.F.</u>, and Larin, A., 2020, *How robust is cassiterite as a U-Pb geochronometer*?: Goldschmidt2020 Conference, June 21-26, 2020, Honolulu, Hawaii, Abstracts Volume.
- Barnes, B.D., <u>Slack, J.F.</u>, Hannington, M.D., Planavsky, N.J., and Kump, L.R., 2020, *The role of seafloorhydrothermal activity as a driver of marine anoxia*: Goldschmidt2020 Conference, June 21-26, 2020, Honolulu, Hawaii, Abstracts Volume.
- Sindol, G.P., Babechuk, M.G., Conliffe, J., Rosca, C., Schoenberg, R., and <u>Slack, J.F.</u>, 2020, *Oceanatmosphere redox conditions recorded by the 1.88 Ga Sokoman IF*: Goldschmidt2020 Conference, June 21-26, 2020, Honolulu, Hawaii, Abstracts Volume.



