Memorial to Gregory D. Harper 1953–2024

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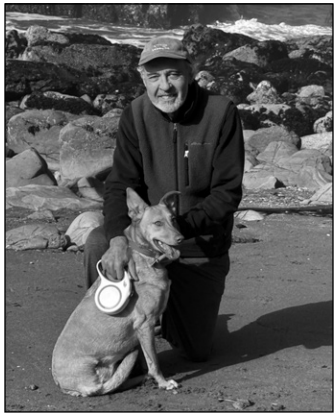
Gregory D. Harper, Ph.D., emeritus professor of geology, University at Albany, passed away on 5 November 2024 after a brave and courageous battle with cancer. He is survived by his loving wife, Nancy Sloan. Greg grew up in Hastings, Nebraska. His parents owned a small restaurant, which served breakfast and lunch. As a teenager, Greg would often work in his parents' restaurant. For one summer, Greg became a full-time line cook. It was in his parents' restaurant where Greg learned to cook pancakes—which he would make often in camp before fieldwork. Greg attended the University of Nebraska–Lincoln, where he graduated in 1975 with a B.S. in geology, and minors in mathematics and physics. In 1995, the Department of Earth and Atmospheric Sciences at the University of Nebraska gave Greg their Distinguished Alumni Award.



Greg Harper and his dog, Ginger, after retiring from University at Albany, living in the Pacific Northwest. Credit: Nancy Sloan.

Greg's undergraduate fieldwork in the Agate Fossil beds led to a fascination with paleontology, which continued into his professional career. As a result of his undergraduate work in the Agate Fossil beds, a Miocene mammal quarry in the Marsland Formation was named in Greg's honor in 1974 (Harper Quarry; see Hunt, 1978). Although not trained as a paleontologist, Greg enjoyed collecting fossils at critical contacts and localities. He would often comment that fossil hunting was an almost Zen-like experience. Greg's work included discovery of new fossil species, which were named in his honor. These include the radiolarian *Neotripocyclia harperi* (Pessagno et al., 1993) collected from Galice Formation chert above the Josephine ophiolite, and the foraminifera *Bathysiphon harperi* (Miller, 1995) collected from the Days Creek Formation of the Myrtle Group above the Snowcamp remnant of the Coast Range ophiolite.

Greg attended the University of California, Berkeley, in the fall of 1975 with the original intent of focusing his Ph.D. research on geophysics. However, upon discovering that geophysicists

never went outside, Greg decided a field-based research project would be more appealing. Greg's original advisor at Berkeley was Jason Saleeby. Saleeby left a strong first impression on Greg's Nebraskan sensibilities due to Jason's long hair, casual attire, and embrace of the Berkeley lifestyle. Saleeby suggested Greg should conduct his research in the Sierra Nevada Mountains, but Greg did not want to work in an area where, in his opinion, everyone else was working. So instead, he went to the Klamath Mountains, northern California–southern Oregon, to work on rocks he was told were equivalent to the Sierras.

Greg's first experience in the western Klamath Mountains was daunting. The rugged peaks and canyons felt impossibly challenging to a person who grew up on the Great Plains of Nebraska. Despite the shock of his first impression, Greg would continue to work in the Klamath Mountains continuously for 30 years and episodically for the rest of his career. This research often included collaborations with Cal Barnes, Jason Saleeby, Art Snoke, Jim Wright, and Aaron Yoshinobu, among others.

Lionel Weiss became Greg's Ph.D. advisor after Saleeby left Berkley in 1978. Weiss helped Greg focus on structural geology within his field area. Sedimentary petrologist Richard Hay and paleontologist William Berry also served on Greg's dissertation committee—reinforcing Greg's diverse interests within geology disciplines and pointing toward his outstanding skills as a field geologist. Greg graduated with his Ph.D. in geology from Berkeley in 1980.

Greg's research in the western Klamath Mountains focused on ophiolites, oceanic lithosphere, and accompanying rocks. His detailed mapping of the Late Jurassic Josephine ophiolite and the overlying Galice Formation (e.g., Harper, 1984, 1994, 2006) set the stage for numerous quantitative studies of the ophiolite's origin, tectonic setting, magma genesis, and final closure in the Nevadan orogeny. With his collaborators, he would work out the initial rifting of older accreted terranes to create the marginal basin of the Josephine ophiolite and the outboard Rogue-Chetco arc, the deposition of the Galice Formation conformably on the Josephine ophiolite, and the arc and the partly cratonic provenance of the Galice. See the selected bibliography below for some examples of this tremendous work.

In 1980, Greg took an assistant professor position in the Department of Geology and Geophysics at the University of Utah in Salt Lake City. While at Utah, Greg worked on Precambrian rocks in Utah, Idaho, and Wyoming. In the Wind River Range, Wyoming, Greg discovered a dismembered Archean (>2.63 Ga) complex that contained all traditional units of an ophiolite except for the basal peridotite (see Harper, 1985a). The report of this discovery was adventurous for the time, as evidence for plate tectonic processes in the Archean were not then widely recognized nor accepted (except by the geologists at the State University of New York at Albany).

In 1984, Greg left Utah for the Department of Geological Sciences, State University of New York at Albany, filling the position left by the departure of Kevin Burke. While at Albany, Greg mentored seven master's students and five doctoral students, as well as serving as a member of the degree committee of a significant number of other graduate students. The geological sciences department Greg joined at Albany consisted of just eight faculty, and at the time included Bill Kidd, Win Means, Akiho Miyashiro, T. Mark Harrison, and his research lab professional Matt Heizler (Albany Geological Sciences, 1985). Here, Greg was very active in teaching, graduate student mentoring, and scholarship, being one of three faculty in the tectonics and structural geology group.

While at Albany, Greg continued to work in the western Klamath terrane. However, he expanded his research into new areas. He studied oceanic faulting in Jurassic Apennine ophiolites in northern Italy. He participated in the Ocean Drilling Program Leg 148, south of the Costa Rica Rift, southeastern Pacific Ocean. Leg 148 returned to Hole 504B and drilled into the lower sheeted dike section of the oceanic crust. Leg 148 also drilled at Site 896 to help provide better insights into off-axis hydrothermal activity and volcanic stratigraphy in this oceanic setting.

Greg also collaborated with Marty Giaramita and Jason Saleeby on ophiolites and terranes within the Oregon Coast Range. This research in the Oregon Coast Range included the Snowcamp Mountain ophiolite and Wild Rogue ophiolite remnants of the Coast Range ophiolite, the Pickett Peak terrane, and Elk outlier. Toward the end of his time in geology, Greg moved north to the central Cascades of Washington state, where he collaborated with Bob Miller and Jonathan Miller on the Ingalls ophiolite complex. This work revealed the polygenetic nature of the Ingalls ophiolite complex. Greg's major contribution was work on ophiolitic breccia and sedimentary serpentinite within the eastern portion of the ophiolite, which helped support previous interpretations of the fracture zone setting for the Ingalls.

Greg worked at the University at Albany until he retired in December of 2004, publishing 56 peer-reviewed scholarly works and ~80 conference presentations, and securing eight externally funded grants from the National Science Foundation and Ocean Drilling Program. His graduate students were inspired by his involvement in and devotion to fieldwork-based scientific discovery. He formed the backbone of course offerings in tectonics during all his time at Albany and, in this and other undergraduate courses, provided inspirational teaching to geology majors and also to the wider undergraduate population in the course "Planet Earth."

After retirement, Greg moved back to northern California and became involved in holistic healing. Greg took great joy in alternative healing and desired to share this passion with others. Greg later migrated north to Oregon and then finally settled in southern Washington. While in retirement, Greg collaborated with the NASA Astrobiology Institute (NASA ABI, 2010). Greg helped NASA Astrobiology Institute scientists understand the field context and geological setting of ultramafic and other rocks within the Josephine and Coast Range ophiolites. Samples were used to help identify habitability for future Martian missions, as well as increase flyover instrument spectra references (NASA ABI, 2010).

In the final years of Greg's life, he was drawn back to unanswered questions in the western Klamath terrane. This included determining the detrital zircon age of a sandstone interbedded in the pillow basalts of the 164–162 Ma Josephine ophiolite (see Harper, 1994; MacDonald et al., 2006), in collaboration with Alan Chapman—another former Saleeby graduate student. This interbedded sandstone has dates that are younger than many dates (Chapman, 2025, personal commun.) determined for the overlying Galice Formation (159–150 Ma; see LaMaskin et al., 2022; Surpless et al., 2026) and younger than the Callovian fossils located within this same outcrop (Pessagno et al., 2000). It appears that this intra-pillow sandstone is younger than the U-Pb dated part of the ophiolite but also among the youngest sediments associated with the mostly older Galice Formation. Clearly, Greg's work continues to provide insight into Klamath geology and to challenge conventional thinking.

REFERENCES CITED

Albany Geological Sciences, 1985, SUNY Albany Department of Geological Sciences Graduate Program Brochure: https://www.atmos.albany.edu/geology/webpages/dogsbro85.pdf (accessed October 2025).

Hunt, R.M., Jr., 1978, Depositional setting of a Miocene mammal assemblage, Sioux County, Nebraska (U.S.A.): Palaeogeography, Palaeoclimatology, Palaeoecology, v. 24, p. 1–52, https://doi.org/10.1016/0031-0182(78)90006-8.

LaMaskin, T.A., Rivas, J.A., Barbeau, D.L., Jr., Schwartz, J.J., Russell, J.A., and Chapman, A.D., 2022, A crucial geologic test of Late Jurassic exotic collision versus endemic re-accretion in the Klamath Mountains Province, western United States, with implications for the assembly of western North America: Geological Society of America Bulletin, v. 134, p. 965–988, https://doi.org/10.1130/B35981.1.

Miller, W., III, 1995, Examples of Mesozoic and Cenozoic *Bathysiphon* (Foraminiferida) from the Pacific Rim and the taxonomic status of *Terebellina* Ulrich, 1904: Journal of Paleontology, v. 69, p. 624–634, https://doi.org/10.1017/S0022336000035162.

NASA ABI, 2010, NASA Astrobiology Institute, 2010 Annual Report: https://astrobiology.nasa.gov/nai/annual-reports/2010/arc/mineralogical-traces-of-early-habitable-environments/index.html (accessed August 2025).

Pessagno, E.A., Blome, C.D., Meyerhoff Hull, D., and Six, W.M., 1993, Jurassic Radiolaria from the Josephine ophiolite and overlying strata, Smith River subterrane (Klamath Mountains), northwestern California and southwestern Oregon: Micropaleontology, v. 39, p. 93–166, https://doi.org/10.2307/1485837.

Pessagno, E.A., Jr., Hull, D.M., and Hopson, C.A., 2000, Tectonostratigraphic significance of sedimentary strata occurring within and above the Coast Range Ophiolite (California Coast Ranges) and the Josephine Ophiolite (Klamath Mountains), northwestern California, *in* Dilek, Y., Moores, E.M., Elthon, D., and Nicolas, A., eds., Ophiolites and Oceanic Crust: New Insights from Field Studies and the Ocean Drilling Program: Geological Society of America Special Paper 349, p. 383–394, https://doi.org/10.1130/0-8137-2349-3.383.

Surpless, K.D., Alford, R.W., Barnes, C., Yoshinobu, A., and Weis, N.E., 2023, Late Jurassic paleogeography of the U.S. Cordillera from detrital zircon age and hafnium analysis of the Galice Formation, Klamath Mountains, Oregon and California, USA: Geological Society of America Bulletin, v. 136, p. 1488–1510, https://doi.org/10.1130/B36810.1.

Surpless, K.D., Barnes, C., and Yoshinobu, A., 2026, Record of the Late Jurassic Cordilleran margin from detrital zircon analysis of the Galice and Mariposa Formations, California and Oregon, *in* Gordon, S.M., Miller, R.B., Rusmore, M.E., and Tikoff, B., eds., Jurassic–Paleogene Tectonic Evolution of the North American Cordillera: Geological Society of America Special Paper 565, p. 189–227, https://doi.org/10.1130/2025.2565(10).

SELECTED BIBLIOGRAPHY OF GREGORY D. HARPER

1982 Evidence for large-scale rotations at spreading centers from the Josephine ophiolite: Tectonophysics, v. 82, p. 25–44, https://doi.org/10.1016/0040-1951(82)90086-5.

1984 The Josephine ophiolite, northwestern California: Geological Society of America Bulletin, v. 95, p. 1009–1026, https://doi.org/10.1130/0016-7606(1984)95<1009:TJONC>2.0.CO;2.

1984 (with Wright, J.E.) Middle to Late Jurassic tectonic evolution of the Klamath Mountains, California-Oregon: Tectonics, v. 3, p. 759–772, https://doi.org/10.1029/TC003i007p00759.

1985a A dismembered Archean ophiolite, Wind River Mountains, Wyoming (USA): Ofioliti, v. 10, p. 297–306.

1985b Tectonic evolution of slow spreading mid-ocean ridges and consequences of a variable depth to the brittle/ductile transition: Tectonics, v. 4, p. 395–409, https://doi.org/10.1029/TC004i004p00395.

1986 (with Link, P.K.) Geochemistry of upper Proterozoic rift-related volcanics, northern Utah and southeastern Idaho: Geology, v. 14, p. 864–867, https://doi.org/10.1130/0091-7613(1986)14<864:GOUPRV>2.0.CO;2.

1988 Episodic magma chambers and amagmatic extension in the Josephine ophiolite: Geology, v. 16, p. 831–834, https://doi.org/10.1130/0091-7613(1988)016<0831:EMCAAE>2.3.CO;2.

1988 (with Bowman, J.R., and Kuhns, R.) A field, chemical, and stable isotope study of subseafloor metamorphism of the Josephine ophiolite: Journal of Geophysical Research, v. 93, p. 4625–4656, https://doi.org/10.1029/JB093iB05p04625.

1994 A review of hemipelagic and turbidite sedimentation associated with the Josephine Ophiolite, California: Ofioliti, v. 19, p. 397–411.

1994 (with Treves, B.E.) Exposure of serpentinites on the ocean floor: Sequence of faulting and hydrofracturing in the northern Apennine ophicalcites: Ofioliti, v. 19, p. 435–466.

1994 (with Saleeby, J.B., and Heizler, M.) Formation and emplacement of the Josephine ophiolite and the age of the Nevadan orogeny in the Klamath Mountains, California-Oregon: U/Pb zircon and $^{40}Ar/^{39}Ar$ geochronology: Journal of Geophysical Research, v. 99, p. 4293–4321, https://doi.org/10.1029/93JB02061.

1995 Pumpellyosite and prehnitite associated with epidosite in the Josephine ophiolite–Ca metasomatism during upwelling of hydrothermal fluids at a spreading axis, *in* Schiffman, P., and Day., H., eds., Low Grade Metamorphism of Mafic Rocks: Geological Society of America Special Paper 296, p. 101–122, https://doi.org/10.1130/SPE296-p101.

1996 (with Tartarotti, P.) Structural evolution of upper layer 2, Hole 896A, *in* Alt, J.C., Kinoshita, H., Stoking, L.B., and Michael, P.J., eds., Proceedings of the Ocean Drilling Program, Scientific Results, Volume 148: College Station, Texas, Ocean Drilling Program, p. 245–260, https://doi.org/10.2973/odp.proc.sr.148.132.1996.

2003 Fe-Ti basalts in the Josephine ophiolite and propagating ridge tectonics, Klamath Mountains, California-Oregon: Geological Society of America Bulletin, v. 115, p. 771–787, https://doi.org/10.1130/0016-7606(2003)115<0771:FBAPTI>2.0.CO;2.

2003 Tectonic implications of boninite, arc tholeiite, and MORB magma types in the Josephine Ophiolite, California-Oregon, *in* Dilek, Y., and Robinson, P.T., eds., Ophiolites in Earth History: Geological Society, London, Special Publication 218, p. 207–229.

2003 (with Miller, R.B., MacDonald, J.H., Jr., Miller, J.S., and Mlinarevic, A.N.) Evolution of a polygenetic ophiolite: The Jurassic Ingalls Ophiolite, Washington Cascades, *in* Swanson, T.W., ed., Western Cordillera and Adjacent Areas: Geological Society of America Field Guide 4, p. 251–265, https://doi.org/10.1130/0-8137-0004-3.251.

2006 Structure of syn-Nevadan dikes and their relationship to deformation of the Galice Formation, western Klamath terrane, northwestern California, *in* Snoke, A.W., and Barnes, C.G., eds., Geological Studies in the Klamath Mountains Province, California and Oregon: Geological Society of America Special Paper 410, p. 121–140, https://doi.org/10.1130/2006.2410(06).

2006 (with Giaramita, M.J.) Geochemistry of ophiolitic rocks associated with the western part of the Elk outlier of the western Klamath terrane, southwestern Oregon, *in* Snoke, A.W., and Barnes, C.G., eds., Geological Studies in the Klamath Mountains Province, California and Oregon: Geological Society of America Special Paper 410, p. 153–176, https://doi.org/10.1130/2006.2410(08).

2006 (with MacDonald, J.H., Jr., and Zhu, B.) Petrology, geochemistry, and provenance of the Galice Formation, Klamath Mountains, Oregon–California, *in* Snoke, A.W., and Barnes, C.G., eds., Geological Studies in the Klamath Mountains Province, California and Oregon: Geological Society of America Special Paper 410, p. 77–101, https://doi.org/10.1130/2006.2410(04).

2006 (with Schoonmaker, A., and Heizler, M.T.) Tectonic emplacement of the Snowcamp remnant of the Coast Range ophiolite near Game Lake, southwestern Oregon, *in* Snoke, A.W., and Barnes, C.G., eds., Geological Studies in the Klamath Mountains Province, California and Oregon: Geological Society of America Special Paper 410, 177–197, https://doi.org/10.1130/2006.2410(09).

2008 (with MacDonald, J.H., Jr., Miller, R.B., Miller, J.S., Mlinarevic, A.N., and Schultz, C.E.) The Ingalls ophiolite complex, central Cascades, Washington: Geochemistry, tectonic setting, and regional correlations, *in* Wright, J.E., and Shervais, J.W., eds., Ophiolites, Arcs, and Batholiths: A Tribute to Cliff Hopson: Geological Society of America Special Paper 438, p. 133–159, https://doi.org/10.1130/2008.2438(04).

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