Jordon D. Hemingway, Ph.D.

Assistant Professor of Surface Earth Evolution

jhemingway@ethz.ch

0000-0002-8299-2255

ETH zürich

Geological Institute

Department of Earth Sciences

Sonneggstrasse 5, 8092 Zürich

Research & Teaching Interests

Broadly-trained geochemist with expertise in biogeochemical cycling. Technical skills include thermodynamic and kinetic modeling, development of new molecular and isotopic techniques, measurement of stable- and radio-isotopes. Author of 20 peer-reviewed publications (plus 3 under review), with 12 as first author. Ability to teach wide range of undergraduate and graduate courses in biogeochemistry, Earth-surface processes, sedimentology, and oceanography.

Research Experience

2021– **Assistant Professor of Surface Earth Evolution**
Geological Instutute, Deptartment of Earth Sciences, ETH Zürich

2017–2021 **Postdoctoral Fellow in Geochemistry**
Dept. of Earth & Planetary Sciences, Harvard University

Project: Constraining pyrite weathering using oxygen isotopes
Advisor: David Johnston

Project: Deciphering sources of bacteriohopanepolyols using carbon isotopes
Advisor: Ann Pearson

Education

2017 **Ph.D. in Marine Chemistry & Geochemistry**
MIT/WHOI Joint Program in Oceanography

Thesis: Understanding terrestrial organic carbon export – A time-series approach
Advisor: Valier Galy

2011 **B.S. in Environmental Engineering Sciences & Chemistry**
University of California, Berkeley

Project: Mechanisms and consequences of annual estuary mouth closure
Advisor: Mark Stacey

Publications | 12/23 as first author (*Indicates equal contributions)

Under Review

[1] **Hemingway, J.D.**: Biosynthetic isotope fractionation negligibly impacts biomarker ^{14}C ages, *Organic Geochemistry*, under review.

[2] Elling, F.J., Evans, T.W., **Hemingway, J.D.**, Kharbush, J.J., Nathan, V., Bayer, B., Santoro, A.E., Spieck, E., Summons, R.E., Pearson, A.: Marine and terrestrial nitrifying bacteria are sources of diverse bacteriohopanepolyols, *Geobiology*, under review.

[3] Elling, F.J.*, **Hemingway, J.D.***, Kharbush, J.J., Becker, K.W., Polik, C.A., Pearson, A.: Linking diatom-diazotroph symbioses to nitrogen cycle perturbations and dee-water anoxia: Insights from Mediterranean sapropel events, *Earth and Planetary Science Letters*, under review.

Accepted and Published

[4] **Hemingway, J.D.***, Henkes, G.A.*: A disordered kinetic model for clumped isotope bond reordering in carbonates, *Earth and Planetary Science Letters*, accepted.

[5] Boral, S., Peucker-Ehrenbrink, B., **Hemingway, J.D.**, Sen, I.S., Galy, V.V., Fiske, G.J.: Controls on short-term dissolved $^{87}Sr/^{86}Sr$ variations in large rivers: Evidence from the Ganga-Brahmaputra, *Earth and Planetary Science Letters*, accepted.

[6] Drake, T.W., **Hemingway, J.D.**, Kurek, M.R., Peucker-Ehrenbrink, B., Holmes, R.M., Galy, V.V., Moura, J.M.S., Mitsuya, M., Wassenaar, L.I., Six, J., Spencer, R.G.M.: The pulse of the Amazon: Fluxes of dissolved organic carbon, nutrients, and ions from the world's largest river, *Global Biogeochemical Cycles*, accepted, 2021.

[7] Eglinton, T.I.*, Galy, V.V.*, **Hemingway, J.D.**, Feng, X., Bao, H., Blattmann, T.M., Dickens, A.F., Gies, H., Giosan, L., Haghipour, N., Hou, P., Lupker, M., McIntyre, C.P., Montluçon, D.B., Peucker-Ehrenbrink, B., Ponton, C., Schefuß, E., Schwab, M.S., Voss, B.M., Wacker, L., Wu, Y., Zhao, M.: Climate control on terrestrial biospheric carbon turnover, *Proceedings of the National Academy of Sciences USA*, 118, e2011585118, 2021.

[8] Elling, F.J., **Hemingway, J.D.**, Evans, T.W., Kharbush, J.J., Spieck, E., Summons, R.E., Pearson, A.: Vitamin B_{12}-dependent biosynthesis ties amplified 2-methylhopanoid production during oceanic anoxic events to nitrification, *Proceedings of the National Academy of Sciences USA*, 117, 32996–33004, 2020.

[9] **Hemingway, J.D.**, Olson, H., Turchyn, A.V., Tipper, E.T., Bickle, M., Johnston, D.T.: Triple oxygen isotope insight into terrestrial pyrite oxidation, *Proceedings of the National Academy of Sciences USA*, 117, 7650–7657, 2020.

[10] Boral, S., Sen, I.S., Ghosal, D., Peucker-Ehrenbrink, B., **Hemingway, J.D.**: Stable water isotope modeling reveals spatio-temporal variability of glacier meltwater contributions to Ganges River headwaters, *Journal of Hydrology*, 577, 123983, 2019.

[11] **Hemingway, J.D.**, Rothman, D.H., Grant, K.E., Rosengard, S.Z., Eglinton, T.I., Derry, L.A., Galy, V.V.: Mineral protection regulates long-term global preservation of natural organic carbon, *Nature*, 570, 228–231, 2019.

[12] **Hemingway, J.D.**, Spencer, R.G.M., Podgorski, D.C., Zito, P., Sen, I., Galy, V.V.: Glacier meltwater and monsoon precipitation drive Upper Ganges Basin dissolved organic matter composition, *Geochimica et Cosmochimica Acta*, 244, 216–228, 2019.

[13] Bao, R., McNichol, A.P., **Hemingway, J.D.**, Lardie-Gaylord, M.C., Eglinton, T.I.: Influence of different acid treatments on the radiocarbon content spectrum of sedimentary organic matter determined by RPO/AMS, *Radiocarbon*, 61, 395–413, 2019.

[14] Kusch, S., Shah-Walter, S.R., **Hemingway, J.D.**, Pearson, A: Improved chromatography reveals new bacteriohopanepolyol isomers in marine sediments, *Organic Geochemistry*, 124, 12–21, 2018.

[15] **Hemingway, J.D.**, Kusch, S., Shah-Walter, S.R., Polik, C.A., Elling, F.J., Pearson, A: A novel method to measure the ^{13}C composition of intact bacteriohopanepolyols, *Organic Geochemistry*, 123, 144–147, 2018.

[16] **Hemingway, J.D.**, Hilton, R.G., Hovius, N., Eglinton T.I., Haghipour, N., Wacker, L., Chen, M.-C., Galy, V.V.: Rapid microbial oxidation of lithospheric organic carbon in tropical mountain soils, *Science*, 360, 209–212, 2018.

[17] Drake, T.W., Guillemette, F., **Hemingway, J.D.**, Chanton, J.P., Podgorski, D.C., Zimov, N.S., Spencer, R.G.M.: The ephemeral signature of permafrost carbon in an Arctic fluvial network, *Journal of Geophysical Research B.*, 123, JG004311, 2018.

[18] **Hemingway, J.D.**, Rothman, D.H., Rosengard, S.Z., Galy, V.V.: Technical note: An inverse method to relate organic carbon reactivity to isotope composition from serial oxidation, *Biogeosciences*, 14, 5099–5114, 2017.

[19] **Hemingway, J.D.**, Schefuß, E, Spencer, R.G.M., Dinga, B.J., Eglinton, T.I., McIntyre, C., Galy, V.V.: Hydrologic controls on the seasonal and inter-annual variability of Congo River particulate organic matter source and reservoir age, *Chemical Geology*, 466, 454–465, 2017.

[20] **Hemingway, J.D.**, Gagnon, A.R., Galy, V.V., Grant, K.E., McNichol, A.P., Rosengard, S.Z., Soulet, G., Zigah, P.K.: Assessing the blank carbon contribution, isotope mass balance, and kinetic isotope fractionation of the ramped pyrolysis/oxidation instrument at NOSAMS, *Radiocarbon*, 59, 179–193, 2017.

[21] Orsi, W.D., Coolen, M.J.L., Wuchter, C., He, L., More, K.D., Irigoien, X., Chust, G., Johnson, C., **Hemingway, J.D.**, Lee, M., Galy, V.V., Giosan, L: Climate oscillations reflected in the Arabian Sea subseafloor microbiome, *Scientific Reports*, 7, 6040, 2017.

[22] **Hemingway, J.D.**, Schefuß, E, Dinga, B.J., Pryer, H., Galy, V.V.: Multiple plant-wax compounds record differential sources and ecosystem structure in large river catchments, *Geochimica et Cosmochimica Acta*, 184, 20–40, 2016.

[23] Plata, D., **Hemingway, J.D.**, Gschwend, P.: Polyparameter linear free energy relationship for wood char-water sorption coefficients of organic sorbates, *Environmental Toxicology & Chemistry*, 34, 1464–1471, 2015.

Published Code Packages

[1] **Hemingway, J.D.**: *Isotopylog*: Open-source tools for clumped isotope kinetic data analysis, 2020-, doi:10.5281/zenodo.4005822, 2020.

[2] **Hemingway, J.D.**: *Fouriertransform*: Open-source tools for FT-ICR MS data analysis, 2017-, doi:10.5281/zenodo.1158757, 2017.

[3] **Hemingway, J.D.**: *Rampedpyrox*: Open-source tools for thermoanalytical data analysis, 2016-, doi:10.5281/zenodo.3960330, 2017.

Presentations | presenting author only (‡Indicates invited presentation)

Seminars and Colloquia

[1] ‡**Hemingway, J.D.**, Goldberg, M., Olson, H., Waldeck, A., Johnston, D.T., Turchyn, A.V., Tipper, E.T., Bickle, M., Bufe, A., Hovius, N.: Pyrite oxidation in the global sulfur and oxygen cycles: insight from triple oxygen isotopes of sulfate, *Pennsylvania State University Department Seminar*, State College, USA, 2020.

[2] ‡**Hemingway, J.D.**, Rothman, D.H., Hilton, R.G., Hovius, N., Eglinton, T.I., Derry, L., Grant, K.E., Galy, V.V.:: What controls natural organic carbon preservation?, *Rutgers University Department Seminar*, New Brunswick, NJ, USA, 2020.

[3] ‡**Hemingway, J.D.**, Rothman, D.H., Hilton, R.G., Hovius, N., Eglinton, T.I., Derry, L., Grant, K.E., Galy, V.V.: What controls natural organic carbon preservation?, *Lamont Doherty Earth Observatory Department Seminar*, Palisades, NY, USA, 2020.

[4] ‡**Hemingway, J.D.**, Rothman, D.H., Hilton, R.G., Hovius, N., Eglinton, T.I., Derry, L., Grant, K.E., Galy, V.V.: What controls natural organic carbon preservation?, *Institute of Arctic and Alpine Research, CU Boulder Department Seminar*, Boulder, CO, USA, 2020.

[5] ‡**Hemingway, J.D.**, Rothman, D.H., Hilton, R.G., Hovius, N., Eglinton, T.I., Derry, L., Grant, K.E., Galy, V.V.: What controls natural organic carbon preservation?, *University of California, Santa Barbara Department Seminar*, Santa Barbara, CA, USA, 2020.

[6] ‡**Hemingway, J.D.**, Rothman, D.H., Hilton, R.G., Hovius, N., Eglinton, T.I., Derry, L., Grant, K.E., Galy, V.V.: A theory of natural organic matter preservation: the role of minerals, *Rice University Department Seminar*, Houston, TX, USA, 2020.

[7] ‡**Hemingway, J.D.**, Rothman, D.H., Hilton, R.G., Hovius, N., Eglinton, T.I., Derry, L., Grant, K.E., Galy, V.V.: What controls organic carbon preservation through geologic time?, *University of Chicago Department Seminar*, Chicago, IL, USA, 2020.

[8] ‡**Hemingway, J.D.**, Elling, F.J., Kharbush, J.J., Becker, K.W., Polik, C.A., Pearson, A. : Episodic marine anoxia driven by diatom-diazotroph symbiosis, *MIT Department Seminar*, Cambridge, MA, USA, 2019.

[9] ‡**Hemingway, J.D.**, Rothman, D.H., Grant, K.E., Rosengard, S.Z., Eglinton, T.I., Derry, L.A., Galy, V.V.: Aging and persistence of natural organic matter, *NOSAMS Advisory Panel Meeting* (CFAMS/Schneider Prize Seminar), Woods Hole, MA, USA, 2019.

[10] ‡**Hemingway, J.D.**, Rothman, D.H., Grant, K.E., Rosengard, S.Z., Eglinton, T.I., Derry, L.A., Galy, V.V.: A theory of natural organic matter preservation, *Harvard University Department Seminar*, Cambridge, MA, USA, 2019.

[11] ‡**Hemingway, J.D.**, Rothman, D.H., Grant, K.E., Rosengard, S.Z., Eglinton, T.I., Derry, L.A., Galy, V.V.: A theory on the persistence of natural organic matter, *LDEO Department Seminar*, New York, NY, USA, 2019.

[12] ‡**Hemingway, J.D.**: Linking carbon isotopes and hydrology, *USGS Water Science Center: New Mexico*, NM, USA, 2016.

[13] ‡**Hemingway, J.D.**, Rothman, D.H., Hilton, R.G., Eglinton, T.I., Galy, V.V.: Quantifying petrogenic organic carbon oxidation in mountainous soils using Ramped PyrOx, *NOSAMS Advisory Panel Meeting*, Woods Hole, MA, USA, 2016.

[14] ‡**Hemingway, J.D.**, Schefuß, E., Spencer, R.G.M., Dinga, B.J., Pryer, H., Galy, V.V.: Using biomarkers to understand ecosystem structure in large river catchments: Insights from time-series measurements, *WHOI Department Seminar*, Woods Hole, MA, USA, 2016.

[15] ‡**Hemingway, J.D.**, Schefuß, E., Dinga, B.J., Pryer, H., Galy, V.V.: Central African biomarkers: Paleo insights from modern suspended sediments, *WHOI Department Seminar*, Woods Hole, MA, USA, 2014.

[16] ‡**Hemingway, J.D.**, Galy, V.V., Hilton, R.G., Hovius, N.: Terrestrial organic carbon export from high-standing tropical islands: Presence of pre-aged soil OC?, *ETH Department Seminar*, Zürich, Switzerland, 2014.

Conference submissions

[1] **Hemingway, J.D.**, Johnston, D.T.: What controls sedimentary pyrite δ^{34}S values? Insight from theoretical models and modern sediment profiles, *AGU Fall Meeting*, San Francisco, CA, USA, 2020.

[2] **Hemingway, J.D.**, Olson, H., Turchyn, A.V., Tipper, E.T., Bickle, M., Johnston, D.T.: Interpreting ^{17}O signals of geologically preserved sulfate: Insight from modern Himalayan rivers, *Gordon Research Conference*, Galveston, TX, USA, 2020.

[3] **Hemingway, J.D.**, Olson, H., Turchyn, A.V., Tipper, E.T., Bickle, M., Johnston, D.T.: Interpreting triple oxygen isotope signals from geologically preserved sulfate: Insights from modern Himalayan rivers, *AGU Fall Meeting*, San Francisco, CA, USA, 2019.

[4] ‡**Hemingway, J.D.**, Rothman, D.H., Grant, K.E., Rosengard, S.Z., Eglinton, T.I., Derry, L.A., Galy, V.V.: Reactivity and preservation of natural organic carbon, *Shackleton Meeting*, London, UK, 2019.

[5] ‡**Hemingway, J.D.**, Rothman, D.H., Grant, K.E., Rosengard, S.Z., Eglinton, T.I., Derry, L.A., Galy, V.V.: Aging and persistence of natural organic matter, *Banff Geobiology Conference*, Banff, Canada, 2019.

[6] **Hemingway, J.D.**, Rothman, D.H., Grant, K.E., Rosengard, S.Z., Eglinton, T.I., Derry, L.A., Galy, V.V.: Aging and persistence of natural organic matter, *Northeast Geobiology Conference*, Amherst, MA, USA, 2019.

[7] **Hemingway, J.D.**, Elling, F.J., Polik, C.A., Pearson, A.: Reconstructing past nitrogen cycling: Insights from bacteriohopanepolyol ^{13}C compositions, *AGU Fall Meeting*, Washington, D.C., USA, 2018.

[8] ‡**Hemingway, J.D.**, Rothman, D.H., Grant, K.E., Rosengard, S.Z., Galy, V.V.: Persistence of natural organic matter, *AGU Fall Meeting*, Washington, D.C., USA, 2018.

[9] ‡**Hemingway, J.D.**, Hilton, R.G., Hovius, N., Eglinton T.I., Haghipour, N., Wacker, L., Chen, M.-C., Galy, V.V.: Rapid microbial oxidation of lithospheric organic carbon in tropical mountain soils, *Goldschmidt*, Boston, MA, USA, 2018.

[10] **Hemingway, J.D.**, Hilton, R.G., Hovius, N., Eglinton, T.I., Galy, V.V.: Rapid microbial oxidation of rock-derived organic carbon in tropical mountain soils, *Goldschmidt*, Paris, France, 2017.

[11] **Hemingway, J.D.**, Schefuß, E., Spencer, R.G.M., Dinga, B.J., Eglinton, T.I., McIntyre, C., Galy, V.V.: Hydrologic controls on Congo River particulate organic carbon sources and reservoir age, *AGU Fall Meeting*, San Francisco, CA, USA, 2016.

[12] ‡**Hemingway, J.D.**, Rothman, D.H., Galy, V.V.: Kinetics and decomposition, *Ramped PyrOx Workshop*, Woods Hole, MA, USA, 2016.

[13] **Hemingway, J.D.**, Schefuß, E., Dinga, B.J., Pryer, H., Galy, V.V.: Alkanes, alcohols, and fatty acids record complementary signals in fluvial sediments: Insights from a three-year Congo River time-series, *AGU Fall Meeting*, San Francisco, CA, USA, 2015.

[14] **Hemingway, J.D.**, Schefuß, E., Dinga, B.J., Pryer, H., Galy, V.V.: Plant waxes in Congo River suspended sediments: Applications for paleoclimate and carbon cycling, *ETH Plant-Wax Workshop*, Ascona, Switzerland, 2015.

[15] **Hemingway, J.D.**, Galy, V.V., Hilton, R.G., Hovius, N.: Typhoon-mediated organic carbon export in the Western Pacific: The role of steep, mountainous rivers, *AGU Fall Meeting*, San Francisco, USA, 2014.

[16] **Hemingway, J.D.**, Galy, V.V.: The role of terrestrial organic carbon export in the global carbon cycle: Insights from the Ganges-Brahmaputra river system, *Graduate Climate Conference*, Seattle, WA, USA, 2014.

[17] **Hemingway, J.D.**, Galy, V.V., Hovius, N.: Organic carbon export from steep, mountainous rivers in high-standing tropical islands, *Goldschmidt*, Sacramento, CA, USA, 2014.

[18] **Hemingway, J.D.**, Galy, V.V., Peucker-Ehrenbrink, B.: Characterizing organic carbon export from four New England rivers, *ASLO Aquatic Sciences*, New Orleans, LA, USA, 2013.

Grants, Fellowships, & Awards | ≈$3,350,000 to date

Research Grants

[1] **Starting Grant: €2,460,000 (2021–26, P.I.)**
European Research Council
Title: Reconstructing the effect of sulfide respiration on global redox state: insights from experiments, observations, and models (RESPIRES)

[2] **EAGER Award: $100,000 (2018–20, Co-P.I.)**
National Science Foundation
Title: Unraveling riverine sulfate using minor oxygen isotopes

[3] **Petroleum Research Fund: $110,000 (2018–20, Co-P.I.)**

American Chemical Society
Title: Linking pyrite weathering to long-term organic matter burial

Fellowships

[4] **Climate and Global Change (2018, alternate)**
National Oceanic and Atmospheric Administration
Title: Quantifying weathering feedbacks to global change: The importance of pyrite oxidation

[5] **Graduate Research Fellowship: ≈$150,000 (2012–15, P.I.)**
National Science Foundation
Title: Predicting sorption of hydrophobic organic contaminants based on molecular properties and intermolecular interactions

Other Awards

[6] **CFAMS/Schneider Prize, WHOI ($1000; 2019)**

[7] **Coastal Oceans Institute, WHOI ($2,500; 2013)**

[8] **Ocean Ventures Fund, WHOI ($15,000; 2013)**

Teaching & Advising Experience

Teaching Assistant

Responsibilities included developing new class materials, leading class discussions, grading all assignments, and meeting with students individually.

Course: Marine Chemistry, Fall 2013. (G, 15 students)
Institution: Massachusetts Institute of Technology

Advising Experience

Responsibilities included teaching chemical laboratory techniques, instrument training, and aiding in development and execution of research projects.

Mentees: 1 graduate rotation student (2017), 5 undergraduate students (2014–), 1 laboratory researcher (2018-)

Professional Engagement & Activities

Outreach

Activities included serving on conference organizing committees, chairing conference sessions, and publishing outreach articles.

[1] **Conference Organizing Committees**
Conference: AGU Fall Meeting (2019, 2020); Gordon Research Conference (2020); Goldschmidt (2018, 2021); MIT Water Club (2015); Graduate Climate Conference (2014)
Role: Session (co-)convener; at-large organizer

[2] **Outreach Articles**
Title: Earth's Riverine Bloodstream
Publication: *Oceanus Magazine*, 51, 12–14, 2015.

Fieldwork

Planned and executed fieldwork campaigns in collaboration with local and international researchers. Targeted either carbonate sedimentary formations or solid and dissolved material transported by rivers and landslides.

[1] **Agouron Advanced Geobiology Course, Apennines, Italy (2019)**

[2] **Shale Hills CZO, Central Pennsylvania, USA (2018)**

[3] **Southern Alps, New Zealand (2017)**

[4] **Congo River, Republic of Congo (2016)**

[5] **Garwahl Himalaya, India (2014)**

[6] **Narragansett Bay, New England, USA (2012–13)**

Peer Reviewer	*ACS Earth & Space Chemistry; Biogeosciences; Chemical Geology; Earth and Planetary Science Letters; Environmental Science & Technology; Geobiology; Geochimica et Cosmochimica Acta; Journal of Geophysical Research; Limnology & Oceanography; National Science Foundation; Nature; Nature Communications; Nature Reviews Earth and Environment; Organic Geochemistry; PLOS One; Proceedings of the National Academy of Sciences; Radiocarbon*
Professional Organizations	American Geophysical Union; Geobiology Society; Geochemical Society