

# Dr. Mark Albert Torres

[torres-lab.github.io](https://torres-lab.github.io) | [Mark.Torres@rice.edu](mailto:Mark.Torres@rice.edu)

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## ACADEMIC APPOINTMENTS

### **RICE UNIVERSITY** | ASSISTANT PROFESSOR (2017 - )

Department of Earth, Environmental, & Planetary Sciences 6100 Main Street MS-126, Houston, TX 77005

### **CALTECH** | TEXACO POSTDOCTORAL FELLOW (2015-2017)

Division of Geological & Planetary Sciences | Supervisors: Dr. Michael Lamb and Dr. Woodward Fisher

## EDUCATION

### **UNIVERSITY OF SOUTHERN CALIFORNIA** | PH.D. IN GEOCHEMISTRY (2015)

### **PITZER COLLEGE** | B.A. IN GEOLOGY WITH HONORS & MINOR IN ENVIRONMENTAL STUDIES (2010)

## HONORS AND AWARDS

2021 F.W. Clarke Medal Geochemical Society

## EXTERNAL FUNDING

- '22 **NSF: Collaborative Research: EAR-Climate: Physical Controls on CO<sub>2</sub> Release from Shale Weathering**  
Funds to Rice: \$258,177 | End Year: 2025 | Co-PI
- '21 **NSF: Collaborative Research: Boron in soil carbonates: developing a quantitative soil CO<sub>2</sub> proxy**  
Funds to Rice: \$319,659 | End Year: 2024 | Co-PI
- '20 **NSF: Collaborative Research: EAGER: Using allies to expand your network: Implementing a psychological methodology to attract and retain underrepresented (UR) students in geoscience**  
Total Award: \$253,432 | End Year: 2022 | Co-I
- '20 **NSF: Does Sediment Storage Set the Pace of the Terrestrial Organic Carbon Cycle?**  
Funds to Rice: \$413,794 | End Year: 2023 | Sole PI
- '19 **ACS-PRF: Coupling Autogenic Sedimentation to the Geologic C Cycle Using New Theory and Data**  
Funds to Rice: \$110,000 | End Year: 2022 (NCE:2023) | Sole PI
- '19 **Sloan: Novel Weathering Reactions & Sedimentary Forcings as Controls On Seawater Chemistry**  
Funds to Rice: \$70,000 | End Year: 2021 | Sole PI

## TEACHING

- Senior Honors Thesis (EEPS 401) | Fall 2022, Spring 2023
- Earth & Planetary Surface Environments (EEPS 321) | Fall 2020, 2021, 2022
- Advanced Topics: Basin Sedimentology & Stratigraphy (ESCI 546) | Spring 2019, 2020
- Isotope Geochemistry (EEPS 433/633) | Fall 2019
- Geochemistry of Earth's Surface (EEPS 415/615) | Fall 2018, Spring 2021, Spring 2023
- Global Biogeochemical Cycles (ESCI 340) | Spring 2018-2020
- Mountains, Climate & Global Carbon Cycling (ESCI 555) | Fall 2017

## ADVISING

**POSTDOCTORAL RESEARCHERS:** D. Johnson ('20-'22), E. Ramos ('21-)

**GRADUATE STUDENTS:** M. Gammerman ('22-), H. Zhou ('20-), D. Jana ('20-), W. Larsen ('19-), Y. Hou ('18-), T. Cole (M.sc; '17-'20), J. Spector ('17), P. Kemeny (Caltech '16-'22)

**UNDERGRADUATE STUDENTS:** S. Buchanan ('18), M. Hale ('18-'20), N. Osmani ('19), J. Alanis ('19), K. Russo ('21) G. Burke ('22), S. Suniga ('22), B. Singh ('22), M. Borle ('22), D. De Leon ('22), D. Veldkamp ('22)

## INVITED PRESENTATIONS

- '23 University of Pennsylvania, Dartmouth, University of California - Riverside, Smithsonian Tropical Research Institute
- '22 University of Iceland, Institut de Physique du Globe Paris
- '21 University of Texas - Arlington, [Consortium of Universities for the Advancement of Hydrologic Science](#) , Geological Society of America Conference, Goldschmidt Conference, University of New Hampshire, University of Chicago
- '20 University of Cambridge, [Earth2Earth](#) , Luquillo Critical Zone Observatory Webinar, California Institute of Technology, University of Utah, Woods Hole Oceanographic Institution
- '19 Geobiology Summer Course, Asian Sedimentary Consortium, Exxon-Mobil
- '18 Goldschmidt Conference, Industry Rice Earth Science Symposium
- '17 Texas A&M, University of Texas - Austin

## UNIVERSITY SERVICE

- Scientia Organizer and Speaker (2023)
- “The End of Ice” Roundtable Discussion (2023)
- E4 Steering Committee (2023-)
- Planetary Science Faculty Search (2022)
- Undergraduate Curriculum Committee (2022-)
- Field Trip Committee Chair (2022-)
- Environmental Field Station Working Group (2021-)
- Department Ombud (2019-)
- Faculty Associate Duncan College (2018-)
- Weiss/Pan Postdoctoral fellowship committee (2016-)

## PROFESSIONAL SERVICE

- [PaleoCamp](#) Instructor (2022)
- Associate Editor for the American Journal of Science (2022-)
- Goldschmidt Conference Organizing Committee (2022)
- USC Young Researchers Program Guest Lecturer (2021)
- Goldschmidt Conference Session Convener (2018)
- Department of Energy - Office of Biological and Environmental Research Proposal Review Panel (2018)
- AGU Conference Session Convener (2019, 2020)
- Reviewer: Science, Nature Geoscience, Proceedings of the National Academy of Sciences, AGU Advances, Science Advances, Geophysical Research Letters, Earth and Planetary Research Letters, Environmental Science & Technology, Water Resources Research, Geochimica et Cosmochimica Acta, American Journal of Science, Earth Surface Dynamics, Journal of Geophysical Research - Earth Surface, Geochemistry, Geophysics, Geosystems, NSF, NASA, +others

## Publications

[Link to Google Scholar](#)

\* = graduate mentee \*\* = postdoc mentee \*\*\* = undergraduate mentee

## Submitted / in press

- [IR1] P. Kemeny\*, G.K. Li, M. Douglas, J. Adkins, W. Berelson, N. Dalleska, M.P. Lamb, W. Larsen\*, J. Magyar, N. Rollins, J.C. Rowland, I. Smith, M.A. Torres, S. Webb, A.J. West, and W.W. Fischer. Permafrost degradation in the Koyukuk River system and the timescale dependence of sulfur-carbon-climate feedbacks. in review at Global Biogeochemical Cycles.
- [IR2] M.A. Torres. The Major Element Geochemistry of Surface Waters: Fluxes, Sources, and Controls. Invited book chapter in the Treatise of Geochemistry, in prep.

## Published

- [P1] Z. Li, Y.G. Zhang, M.A. Torres, and B.J.W. Mills. Neogene burial of organic carbon in the global ocean. Nature, 2023.

- [P2] T. L. Cole\*, M.A. Torres, and P. C. Kemeny\*. The hydrochemical signature of incongruent weathering in Iceland. *Journal of Geophysical Research: Earth Surface*, 2022.
- [P3] Y. Hou\* and M.A. Torres. Autogenic signals in sedimentary organic carbon records. *Geophysical Research Letters*, 2022.
- [P4] K.E. Clark, V. Bravo, S. Giddings, K. Davis, G. Pawlak, M.A. Torres, A. Adelson, C. Cesar, X. Boza, and R. Collin. Land use and land cover shape river water quality at a continental caribbean land-ocean interface. *Frontiers in Water - Environmental Water Quality*, 2022.
- [P5] A. Xu, T. Loch-Temzelides, C. Adiole, N. Botton, S.G. Dee, C.A. Masiello, M. Osborn, M.A. Torres, and D.S. Cohan. Race and ethnic minority, local pollution, and covid-19 deaths in texas. *Scientific Reports*, 12(1):1–9, 2022.
- [P6] P.C. Kemeny\* and M.A. Torres. Presentation and applications of mixing elements and dissolved isotopes in rivers (ME-ANDIR), a customizable MATLAB model for monte carlo inversion of dissolved river chemistry. *American Journal of Science*, 2021.
- [P7] P.C. Kemeny\*, M.A. Torres, M.P. Lamb, S.M. Webb, N. Dalleska, T.L. Cole\*, Y. Hou\*, J. Markse, J.F. Adkins, and W.W. Fischer. Organic sulfur fluxes and geomorphic control of sulfur isotope ratios in rivers. *EPSL*, 2021.
- [P8] M.A. Torres and J.J. Baronas. Modulation of Riverine Concentration-Discharge Relationships by Changes in the Shape of the Water Transit Time Distribution. *Global Biogeochemical Cycles*, 2021.
- [P9] P.C. Kemeny\*, G.I. Lopez, N.F. Dalleska, M.A. Torres, A.J. West, J. Hartmann, and J.F. Adkins. Sulfate sulfur isotopes and major ion chemistry reveal that pyrite oxidation counteracts CO<sub>2</sub> drawdown from silicate weathering in the Langtang-Narayani River system, Nepal Himalaya. *Geochimica et Cosmochimica Acta*, 2020.
- [P10] M.A. Torres, P.C. Kemeny\*, M.P. Lamb, Cole\* T.L., and W.W. Fischer. Long-term storage and age-biased export of fluvial organic carbon: field evidence from West Iceland. *Geochemistry, Geophysics, Geosystems*, 2020.
- [P11] S.G. Dee, M.A. Torres, R. Martindale, A. Weiss, and K. DeLong. The future of reef ecosystems in the Gulf of Mexico: insights from coupled climate model simulations and ancient hot-house reefs. *Frontiers in Marine Science*, 2019.
- [P12] C.A. Lee, H. Jiang, R. Dasgupta, and M.A. Torres. *A Framework for Understanding Whole-Earth Carbon Cycling*, page 313–357. Cambridge University Press, 2019.
- [P13] M.A. Torres, S. Dong, A.J. West, and K.H. Nealson. The kinetics of siderophore-mediated olivine dissolution. *Geobiology*, 2019.
- [P14] J.J. Baronas, M.A. Torres, A.J. West, O. Rouxel, B. Georg, J. Bouchez, J. Gaillardet, and D.E. Hammond. Ge and Si isotope signatures in rivers: A quantitative multi-proxy approach. *Earth and Planetary Science Letters*, 503:194–215, 2018.
- [P15] M. A. Torres, G. Paris, Jess F. Adkins, and W. W. Fischer. Riverine evidence for isotopic mass balance in the Earth’s early sulfur cycle. *Nature Geoscience*, 2018.
- [P16] M.A. Torres, A.B. Limaye, V. Ganti, M.P. Lamb, A.J. West, and W.W. Fischer. Model predictions of long-lived storage of organic carbon in river deposits. *Earth Surface Dynamics*, 2017.
- [P17] M.A. Torres, N. Moosdorf, J. Hartmann, Jess F. Adkins, and A. J. West. Glacial weathering, sulfide oxidation, and global carbon cycle feedbacks. *Proceedings of the National Academy of Sciences*, 2017.
- [P18] M.A. Torres, J.J. Baronas, K.E. Clark, S.J. Feakins, and A.J. West. Mixing as a driver of temporal variations in river hydrochemistry. Part 1: insights from conservative tracers in the Andes-Amazon. *Water Resources Research*, 2017.
- [P19] J.J. Baronas, M.A. Torres, K.E. Clark, and A.J. West. Mixing as a driver of temporal variations in river hydrochemistry. Part 2: Major and trace element concentration dynamics in the Andes-Amazon. *Water Resources Research*, 2017.
- [P20] M.A. Torres, A.J. West, K.E. Clark, G. Paris, J. Bouchez, C. Ponton, S.J. Feakins, Galy V., and J.F. Adkins. The acid and alkalinity budgets of weathering in the andes-amazon system: Insights into the erosional control of global biogeochemical cycles. *Earth and Planetary Science Letters*, 2016.
- [P21] M.A. Torres, A.J. West, and K. E. Clark. Geomorphic regime modulates hydrologic control of chemical weathering in the Andes-Amazon. *Geochimica et Cosmochimica Acta*, 2015.

- [P22] M.A. Torres, A.J. West, and G. Li. Sulphide oxidation and carbonate dissolution as a source of CO<sub>2</sub> over geological timescales. *Nature*, 2014.
- [P23] K.E. Clark, M.A. Torres, A.J. West, R.G. Hilton, M. New, A.B. Horwath, J.B. Fisher, J.M. Rapp, A. Robles Caceres, and Y. Malhi. The hydrological regime of a forested tropical Andean catchment. *Hydrology and Earth System Sciences*, 2014.
- [P24] M.A. Torres and R.R. Gaines. Paleoenvironmental and Paleoclimatic Interpretations of the Late Paleocene Goler Formation, Southern California, USA, Based On Paleosol Geochemistry. *Journal of Sedimentary Research*, 2013.

## Conference Abstracts (since 2017)

- [A1] H. Zhou\*, M.A Torres, N.B Harris, G. Costin, and T. Terlier. Micro-scale geochemical analysis of molybdenum distribution in shales deposited under different redox conditions. In AGU, 2022.
- [A2] M.A. Torres, Y. Hou\*, D. Johnson\*\*, Z. Li, K. Straub, and Y. Zhang. How do the internal dynamics of sedimentary systems affect organic carbon burial and environmental signal preservation? In AGU, 2022.
- [A3] Y. Hou\*, J.J. Baronas, P. Kemeny\*, and M.A Torres. Glaciation, landscape, and chemical weathering: Interpreting sedimentary records from (non-)glacial lakes in iceland with a multi-proxy approach (OSPA winner). In AGU, 2022.
- [A4] P. Kemeny\*, G.K. Li, M. Douglas, J. Adkins, W. Berelson, N. Dalleska, M.P. Lamb, W. Larsen\*, J. Magyar, N. Rollins, J.C. Rowland, I. Smith, M.A. Torres, S. Webb, A.J. West, and W.W. Fischer. Permafrost degradation in the Koyukuk River system and the timescale dependence of sulfur-carbon-climate feedbacks. In AGU, 2022.
- [A5] E. Ramos\*\*, Y. Hou\*, S. Muñoz, W. Larsen\*, D. Ibarra, and M.A. Torres. Silicate weathering intensity assessments obscured by congruent weathering of a mixed volcanic watershed: A case study of the Upper Deschutes Basin, Oregon, USA. In AGU, 2022.
- [A6] D. Jana\*, M.A. Torres, K. Thirumalai, and U. Jammalamadaka. Understanding the effects of post-depositional processes on foraminiferal paleotemperature proxies: Insights from x-ray microct scanning. In AGU, 2022.
- [A7] M. Nutt, H. Zhou\*, J. Scheingross, and M.A Torres. The role of tectonics in regulating co<sub>2</sub> release from shale weathering. In AGU, 2022.
- [A8] Y. Hou\*, P. Kemeny\*, and M.A. Torres. Constraining Secondary Clay Formation with Ge/Si Ratios and Water Isotopes at Efri Haukadalsa River and Adjacent Catchments in Western Iceland. In AGU, 2021.
- [A9] K. Russo\*\*, Y. Hou\*, W. Larsen\*, R. Collin, K.E. Clark, V. Bravo, C. Cesar, X. Boza, and M.A. Torres. Effect of River-Seawater Mixing on Silica Concentrations in Almirante Bay, Panama. In AGU, 2021.
- [A10] D. Jana\*, M.A. Torres, K. Evans, U. Jammalamadaka, T. Terlier, and K. Thirumalai. Foraminifera as indicators of the effects of bottom-water circulation on marine sedimentary archives. In AGU, 2021.
- [A11] H. Zhou\*, M.A. Torres, G. Costin, T. Terlier, and N. Harris. Micro-scale analyses of traditional geochemical proxies for organic matter preservation in mudstones. In AGU, 2021.
- [A12] W. Larsen\*, M. Chapela Lara, C. Lopez-Lloreda, W.H. McDowell, and M.A. Torres. Preferential Flowpaths Drive Solute Dynamics in Tropical Catchments: Unmixing Sources with Isotopic and Solute-based Approaches. In AGU, 2021.
- [A13] M.A. Torres, Z. Li, and Y. Zhang. Sedimentation rate scaling in the global ocean. In AGU, 2021.
- [A14] M.A. Torres, M. Chapela Lara, K.E. Clark, R. Collin, Y. Hou\*, P. Kemeny\*, W. Larsen\*, C. Lopez-Lloreda, W.H. McDowell, and K. Russo\*\*. Invited: The evolution of earth's surface from the perspective of modern rivers. In GSA 2021.
- [A15] M.A. Torres, P. Kemeny\*, and D. Johnson\*\*. Invited: The role of biogeochemical transients in Earth's habitability. In Goldschmidt Proceedings, 2021.
- [A16] M.A. Torres, K.E. Clark, R. Collin, Y. Hou\*, W. Larsen\*, V. Bravo, C. Cesar, and X. Boza. Hydrochemical monitoring of rivers in the bocas del toro region of panama: insights into impacts on coastal environments. In AGU, 2020.
- [A17] Y. Hou\* and M.A. Torres. Autogenic signals in sedimentary organic carbon records. In AGU, 2020.
- [A18] W. Larsen\*, M. Chapela Lara, C. Lopez-Lloreda, W.H. McDowell, and M.A. Torres. Revisiting solute dynamics in the luquillo critical zone observatory using young water fractions. In AGU, 2020.

- [A19] S. Preston, A. Xu, M. Osborn, S. Dee, T. Loch-Temzelides, M.A. Torres, C. Masiello, D. Cohan, C. Adiole, N. Botton, S. Breaux, M. Ding, B. Gelman, L. Guo, L. Lu, and Zhou J. The environmental impacts of covid-19 in texas: an integrative, multivariate geospatial analysis and mapping software. In AGU, 2020.
- [A20] M.A. Torres, Y. Hou\*, and T. Cole\*. The Autogenic Carbon Cycle . In Gordon Geobiology, 2020.
- [A21] Y. Hou\* and M.A. Torres. Effects of stochastic sedimentation on organic carbon diagenesis and preservation. In AGU, 2019.
- [A22] T. Cole\*, P. Kemeny\*, J. Nittrouer, and M.A. Torres. Elucidating terrestrial organic carbon burial mechanisms—insights from the western irish namurian basin, county clare, ireland. In AGU, 2019.
- [A23] A Joshua West, Valier Galy, Gen Li, Mark Torres, Camilo Ponton, and Sarah J Feakins. Field constraints from the amazon basin reveal a rapid rate constant for oxidation of rock-derived organic carbon. In AGU, 2019.
- [A24] Y. Zhang, L. Ziyue, M.A. Torres, and B. Mills. Neogene burial of organic carbon in the global ocean. In AGU, 2019.
- [A25] M.A. Torres, J. Baronas, T. Cole\*, and N. Osmani\*\*\*. Model-Data Comparison in River Hydrochemistry. In Goldschmidt Proceedings, 2019.
- [A26] T. Cole\*, P. Kemeny\*, W.W. Fischer, M. Lamb, and M.A. Torres. Evaluating the Environmental and Lithological Controls on Silicate Weathering in Iceland. In AGU, 2018.
- [A27] M.A. Torres, J. Baronas, A.J. West, and R.B. Georg. Invited: Using Isotopic Tracers to Decode Concentration-Discharge Relationships. In Goldschmidt Proceedings, 2018.
- [A28] J. Gonzalez, M.A. Torres, M.T. Colucci, S.B. Jacobsen, and C.T. Lee. C, N, H, O, S and Trace Element Determinations in Organic-Rich Sediments and Some Igneous Rocks Types by Tandem LA-LIBS ICP-MS. In Goldschmidt Proceedings, 2018.
- [A29] M.T. Colucci, S.B. Jacobsen, J. Gonzalez, M.A. Torres, , C.T. Lee, D. Savard, R. Neumann, and J.W. Boyce. Tandem LA-ICP-MS & LIBS; A New Micro-Analytical Technique for the Measurement of Every Element in the Periodic Table. In Goldschmidt Proceedings, 2018.
- [A30] M.A. Torres, P.C. Kemeny\*, W.W. Fischer, and M.P. Lamb. Radiocarbon constraints on the coupled growth of sediment and organic carbon reservoirs in fluvial systems. In Gordon Geobiology, 2018.
- [A31] N. Moosdorf, M.A. Torres, J. Hartmann, Jess F. Adkins, and A. J. West. Global Carbon Cycle Feedbacks of Glacial Weathering. In Goldschmidt Proceedings, 2017.
- [A32] M.A. Torres, P.C. Kemeny\*, W.W. Fischer, and M.P. Lamb. Radiocarbon constraints on the coupled growth of sediment and organic carbon reservoirs in fluvial systems. In AGU, 2017.
- [A33] P. Kemeny\*, M.A. Torres, S. Webb, M. Lamb, J.F. Adkins, and W.W. Fischer. Organic Sulfur Fluxes and Isotope Mass Balance in Rivers. In Goldschmidt Proceedings, 2017.