

Dr. J. Jotautas Baronas

Postdoctoral Research Associate
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EDUCATION

2017 | PHD IN EARTH SCIENCES, UNIVERSITY OF SOUTHERN CALIFORNIA, USA

Advisor: Douglas E. Hammond • Thesis: "Germanium and silicon isotope geochemistry in terrestrial and marine low-temperature environments"

2014 | MSc IN EARTH SCIENCES, UNIVERSITY OF SOUTHERN CALIFORNIA, USA

Advisor: Douglas E. Hammond • Thesis: "Germanium-silicon fractionation in a continental shelf environment: Insights from the Northern Gulf of Mexico"

2011 | BSc IN CHEMISTRY, JACOBS UNIVERSITY BREMEN, GERMANY

POSITIONS

STARTING 2021 FEB | MARIE SKŁODOWSKA-CURIE FELLOW

INSTITUT DE PHYSIQUE DU GLOBE DE PARIS, FRANCE

2017 JUL – 2021 JAN | POSTDOCTORAL RESEARCH ASSOCIATE

DEPT. OF EARTH SCIENCES, UNIVERSITY OF CAMBRIDGE, UK

RESEARCH

GENERAL INTERESTS

- Biogeochemical processes controlling Earth surface conditions.
- Water-rock interaction in low-temperature environments.
- Development and application of novel isotopic tracers.

INSTITUT DE PHYSIQUE DU GLOBE DE PARIS | INDEPENDENT FELLOWSHIP | STARTING 2021 FEB

- Insights into weathering reaction kinetics from the relationship between stream elemental and isotopic composition and water transit times in a volcanic catchment.
- Experimental constraints on the kinetic and equilibrium controls on isotope and trace element fractionation during mineral weathering, using batch and column flow-through reactors.
- Mechanistic constraints and parametrization of the sensitivity of weathering reactions to hydrology and climate.

UNIVERSITY OF CAMBRIDGE | POSTDOCTORAL | 2017-PRESENT

- Developing new approaches to quantify sediment transport in large rivers, coupling depth sampling, acoustic backscatter data, and hydrodynamic modeling.
- Resolving geomorphic, lithological, and climatic controls on denudation and weathering in major Southeast Asian river basins (Irrawaddy, Salween, Mekong). Developing a novel modeling framework that traces solute and sediment provenance and quantifies silicate, carbonate, and pyrite weathering, using elemental and isotopic composition of H₂O, SO₄, Sr, and Nd.
- Establishing the full carbon budget of major Southeast Asian rivers and their net effect on atmospheric pCO₂. Tracing source and fate of organic carbon using stable and radio-isotopes of DOC and POC.

UNIVERSITY OF SOUTHERN CALIFORNIA | GRADUATE | 2011-2017

- Developed a method for stable Ge isotope analysis in environmental fluids. Made first measurements of germanium (Ge) isotopic composition in seawater, rivers, and marine pore waters.
- Developed Ge-Si isotope multi-proxy system as a tool to distinguish between mineral weathering and biotic controls on Si cycling in soils and streams.
- Quantified the effect of marine sediment authigenesis on global Ge and Si cycles. Established first order controls on Ge isotope systematics in marine sediments.

PUBLICATIONS

(* INDICATES MENTORED STUDENT)

PEER-REVIEWED

10. **Baronas, J.J.**, E.I. Stevenson, C.R. Hackney, S.E. Darby, M.J. Bickle, R.G. Hilton, C.S. Larkin, D.R. Parsons, Aung Myo Khaing, E.T. Tipper. Integrating suspended sediment flux in large alluvial river channels: Application of a synoptic Rouse-based model to the Irrawaddy and Salween rivers. *Journal of Geophysical Research: Earth Surface*, 2020 . [link]
9. **Baronas, J.J.**, A.J. West, K.W. Burton, D.E. Hammond, S. Opfergelt, P. Pogge von Strandmann, R.H. James, O.J. Rouxel. Ge and Si isotope behavior during intense tropical weathering and ecosystem cycling. *Global Biogeochemical Cycles*, 2020 . [link]
8. **Baronas, J.J.**, D.E. Hammond, O.J. Rouxel, D.R. Monteverde. A first look at dissolved Ge isotopes in marine sediments. *Frontiers in Earth Science*, 2019 . [link]
7. **Baronas, J.J.**, M.A. Torres, A.J. West, O.J. Rouxel, R.B. Georg, J. Bouchez, J. Gaillardet, D.E. Hammond. Ge and Si isotope signatures in rivers: A quantitative multi-proxy approach. *Earth and Planetary Science Letters*, 2018 . [link]
6. Monteverde, D.R., J.B. Sylvan, C. Suffridge, **J.J. Baronas**, E. Fichot, J.A. Fuhrman, W.M. Berelson, S. Sañudo-Wilhelmy. Distribution of extracellular flavins in a coastal marine basin and their relationship to redox gradients and microbial community members. *Environmental Science and Technology*, 2018 . [link] (* contributed fieldwork and labwork)
5. **Baronas, J.J.**, M.A. Torres, K.C. Clark, 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 . [link]
4. Torres, M.A., **J.J. Baronas**, K.C. Clark, S. Feakins, 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 . [link] (* contributed fieldwork, labwork, data interpretation, and writing)
3. **Baronas, J.J.**, D.E. Hammond, J. McManus, C. Siebert, C.G. Wheat. A global Ge isotope budget. *Geochimica et Cosmochimica Acta*, 2017 . [link]
2. Haskell, W.Z., M.G. Prokopenko, D.E. Hammond, R.H.R. Stanley, W.M. Berelson, **J.J. Baronas**, J.C. Fleming, L. Aluwihare. An organic carbon budget for coastal Southern California determined by estimates of upwelled nutrients, net production, and export. *Deep Sea Research Part I: Oceanographic Research Papers*, 2016 . [link] (* contributed labwork and data interpretation)
1. **Baronas, J.J.**, D.E. Hammond, W.M. Berelson, J. McManus, S. Severmann. (2016) Germanium-silicon fractionation in a river-influenced continental margin: The Northern Gulf of Mexico. *Geochimica et Cosmochimica Acta*, 2016 . [link]

MANUSCRIPTS IN REVIEW

- **Baronas, J.J.**, D.E. Hammond, M. Bennett, O.J. Rouxel, L.H. Pitcher, L.C. Smith. Ge/Si and Ge isotope fractionation during weathering of glacial till: field and experimental data from West Greenland. *In review at Frontiers in Earth Science* .
- Torres, M.A., **J.J. Baronas** . Modulation of riverine concentration-discharge relationships by changes in the shape of the water transit time distribution. *In review at Global Biogeochemical Cycles* . [pre-print]
- Urban, L., A. Holzer, **J.J. Baronas**, M. Hall, P. Braeuninger-Weimer, M. Scherm, D. Kunz, S. Perera, D.E. Martin-Herranz, E.T. Tipper, S.J. Salter, M.R. Stammnitz. Freshwater monitoring with nanopore sequencing. *In review at eLife* [pre-print]
- Tipper, E.T., E.I. Stevenson, V. Alcock, A.C.G. Knight, **J.J. Baronas**, R.G. Hilton, M.J. Bickle, C.S. Larkin, L. Feng*, K.E. Relph*, and G. Hughes*. Muddying the waters: Sediment-water cation exchange reduces silicate weathering feedback. *In review at PNAS* .
- Relph*, K.E., E.I. Stevenson, A.V. Turchyn, G. Antler, M.J. Bickle, **J.J. Baronas**, D.R. Parsons, S.E. Darby, E.T. Tipper. Using oxygen and sulfur isotopes to partition sources of riverine sulfate and reassess the carbon budgets of large rivers. *In review at Earth and Planetary Science Letters* .
- Larkin, C.S., A.M. Piotrowski, R.S. Hindshaw, G. Bayon, R.G. Hilton, **J.J. Baronas**, M. Dellinger, R. Wang, E.T. Tipper. Constraints on the reactivity of suspended particulate matter in a major Arctic river from neodymium isotopes. *In review at Earth and Planetary Science Letters* .

PATENTS

Baronas, JJ, M Duhme, R Kopitzky. Fiber reinforced composites, processes for their preparation and their use. *DE Patent 102,010,031,892*, 2012. [link]

SELECTED PRESENTATIONS

(* INDICATES MENTORED STUDENT)

INVITED EXTERNAL TALKS

2020 – **Source-to-Sink Webinar Series, North Carolina State University.** Measuring suspended sediment and carbon transport in large rivers: a new approach applied to the Irrawaddy and the Salween.

2020 – **Goldschmidt Conference.** Deconvolving the effects of lithology, sorting, and chemical weathering using compositional analysis of Irrawaddy River sediments.

2019 – **Darwin College.** Learning from rivers about long-term controls on Earth's climate.

2018 – **AGU Fall Meeting.** The global $\delta^{74}\text{Ge}$ cycle.

2018 – **Rice University.** Ge and Si isotopes: simple mass balance approaches to quantifying geochemical processes.

2017 – **GFZ Potsdam.** Germanium, silicon, and their isotopes: tracing weathering across space and time.

2016 – **Institut de Physique du Globe de Paris.** Multi-proxy investigation of silicate weathering.

CONFERENCE ABSTRACTS

2020 – **Baronas, JJ**, AG Lipp, EI Stevenson, MJ Bickle, O Shorttle, E Tipper. Deconvolving the effects of lithology, sorting, and chemical weathering using compositional analysis of Irrawaddy River sediments. *Goldschmidt Conference*. [link to online presentation]

2020 - **Baronas, JJ**, EI Stevenson, CR Hackney, SE Darby, MJ Bickle, RG Hilton, CS Larkin, DR Parsons, Aung Myo Khaing, ET Tipper. Revised sediment transport model for estimation of suspended sediment flux and chemical composition of the Irrawaddy and Salween rivers. *EGU General Meeting*. [link to online presentation]

2019 – **Baronas, JJ**, E Tipper, M Bickle, RG Hilton, EI Stevenson, C Hackney, DR Parsons. Preliminary weathering and carbon budgets for the Irrawaddy and the Salween rivers. *Goldschmidt Conference*.

2019 – Torres, MA, **JJ Baronas**, T Cole, N Osmani. Model-Data Comparison in River Hydrochemistry. *Goldschmidt Conference*.

2019 – Feng*, L, ET Tipper, **JJ Baronas**, KE Relph*. Li Isotope Fractionation in Weathering Regimes: Understanding Interlayer Sites on Clay Minerals. *Goldschmidt Conference*.

2019 – Tipper, ET, EI Stevenson, KE Relph*, CS Larkin, **JJ Baronas**, G Hughes*. Equilibrium between river water chemistry and the sediment exchange pool in some of the world's largest rivers? *Goldschmidt Conference*.

2018 – **Baronas, JJ**, ET Tipper, MJ Bickle, RG Hilton, DR Parsons, EI Stevenson. Suspended sediment composition of the Irrawaddy and Salween rivers: grain-size dependence and spatiotemporal variations. *AGU Fall Meeting*.

2018 – Hou*, Y, DE Hammond, W Berelson, JF Adkins, **JJ Baronas**, A Lunstrum. Ge/Si biogeochemistry in North Pacific sediments. *AGU Fall Meeting*.

2018 – Relph*, K, ET Tipper, M Bickle, AV Turchyn, G Antler, L Feng, **JJ Baronas**. Sources of sulfate in the Mekong River. *Goldschmidt Conference*.

2018 – Torres, MA, **JJ Baronas**, AJ West, RB Georg. Using isotopic tracers to decode concentration-discharge relationships. *Goldschmidt Conference*.

2017 – **Baronas, JJ**, DE Hammond, OJ Rouxel. The global $\delta^{74}\text{Ge}$ cycle (invited). *AGU Fall Meeting*.

2017 – **Baronas, JJ**, ET Tipper, K Relph, M Bickle, RG Hilton, C Hackney, C Eardley, DR Parsons, S Darby, H Chapman. Weathering and carbon fluxes of the Irrawaddy-Salween-Mekong river system. *AGU Fall Meeting*.

2016 – **Baronas, JJ**, MA Torres, AJ West, KE Clark. Mixing as a driver of temporal variations in river hydrochemistry: concentration-runoff dynamics in the Andes-Amazon. *AGU Fall Meeting*.

2016 – **Baronas, JJ**, DE Hammond, OJ Rouxel, AJ West, MA Torres, S Opfergelt, KW Burton, RH James, P Pogge von Strandmann, D Monteverde, J Gaillardet, J Bouchez, V Galy. Germanium stable isotopes: is there potential for paleo-weathering reconstruction? *Goldschmidt Conference*.

2015 – **Baronas, JJ**, MA Torres, AJ West, DE Hammond, KE Clark, S Opfergelt S, KW Burton. Combining Ge/Si, $\delta^{30}\text{Si}$, and $\delta^{74}\text{Ge}$ to unravel controls on weathering and solute production in tropical catchments. *Goldschmidt Conference*.

2014 – **Baronas, JJ**, DE Hammond, J McManus, C Siebert, G Wheat. Marine budget for germanium stable isotopes. *Ocean Sciences Meeting*.

2014 – **Baronas, JJ**, DE Hammond, MA Torres, AJ West, J McManus, C Siebert. Germanium as a Critical Zone proxy: $\delta^{74}\text{Ge}$ and Ge/Si in waters from the Peruvian Andes and Amazon. *AGU Fall Meeting*.

2013 – **Baronas, JJ**, DE Hammond, WM Berelson, J McManus, S Severmann. Silica and germanium cycling in a coastal shelf environment: Insights from northern Gulf of Mexico. *Goldschmidt Conference*.

2012 – **Baronas, JJ**, DE Hammond, WM Berelson, J McManus, S Severmann. An investigation of controls on oceanic Ge/Si ratios, a potential proxy for changes in the biogeochemical cycling of Si. *AGU Fall Meeting*.

AWARDS

FUNDING

- **Marie Skłodowska-Curie Individual Fellowship** | 184 700 EUR, over 2 years | European Commission Horizon 2020 Framework Programme | 2020
- **Pathfinder Graduate Student Fellowship** | 5000 USD | Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI) | 2016
- **Gold Family Graduate Fellowship** | 7000 USD | University of Southern California | 2015
- **Student and Postdoctoral Research Fellowship** | 3600 USD | International Cooperation in Ridge-crest Studies (InterRidge) | 2015
- **Graduate Student Research Grant** | 2500 USD | Geological Society of America (GSA) | 2015
- **Elsevier PhD Student Research Grant** | 1500 USD | International Association of Geochemistry (IAGC) | 2015
- **Graduate Student Research Fellowship** | 3000 USD | University of Southern California | 2014, 2015

HONORS

- **Darwin College Postdoctoral Associate** | University of Cambridge | 2018-2020
- **Order of the Torch (outstanding leadership and community service)** | University of Southern California | 2017
- **Outstanding Student Paper Award (OSPA) in Biogeosciences** | AGU Fall Meeting | 2016
- **John Montagne Graduate Student Research Award for Best Quaternary Geology proposal** | GSA | 2015
- **Outstanding Teaching Assistant Award** | University of Southern California | 2012
- **Merit-based scholarship** | Jacobs University Bremen | 2008-2011

TEACHING

RESEARCH MENTOR

- **Katy Relph** | PhD research | University of Cambridge
- **Linshu Feng** | PhD & undergraduate research | University of Cambridge
- **Charlie Eardley** | undergraduate research | University of Cambridge
- **Yi Hou** | undergraduate research | University of Southern California
- **Renee Wang** | undergraduate research | University of Southern California
- **Hasana Johnson** | high-school summer student | University of Southern California

TEACHING ASSISTANT

- **Intro Geology (Part 1A)** | 1st-year undergraduate course | University of Cambridge
- **Geochemistry** | Graduate course | University of Southern California
- **Field Geology** | 3rd/4th-year undergraduate field course | University of Southern California
- **Climate Change** | 1st/2nd-year undergraduate course | University of Southern California
- **Earth History** | 1st/2nd-year undergraduate course | University of Southern California
- **Crises of a Planet** | 1st/2nd-year undergraduate course | University of Southern California
- **Oceanography** | 1st/2nd-year undergraduate course | University of Southern California
- **Organic Chemistry** | 1st-year undergraduate course | Jacobs University Bremen

FIELDWORK

- **Certification** - Outdoor First Aid - ITC Level 3 Award | 2020-2023
- **Leader** - several multi-week field expeditions in Myanmar, collecting river water and sediment, operating Acoustic Doppler Current Profiler, processing and analyzing samples. | 2018-2019
- **Participant** - several multi-week expeditions in Peruvian Amazon, Arctic Canada, China, Laos, Cambodia, and Myanmar collecting river water and sediment, operating Acoustic Doppler Current Profiler, processing and analyzing rain, river, rock, and soil samples. | 2016-2018
- **Co-leader** - several one-day research cruises in Southern California Bight aboard R/V Yellowfin, deploying multicorer, core incubation experiments, pore water extraction. | 2012-2014
- **Participant** - three-week research cruise in the Gulf of Mexico aboard R/V Endeavour, deploying CTD and multicorer, collecting seawater, sediment, and pore waters, performing core incubations, and analyzing seawater and pore water chemical composition. | 2012

SERVICE

ACADEMIA

- **Member**, Darwin College Education and Research Committee | 2019–2020
- **Co-convenor**, Darwin College Science Seminar Series | 2019–2020
- **Primary session convenor**, Goldschmidt Conference | 2019, 2021
"Understanding the Critical Zone Using the Composition of Particles, Solutes, and Gases Transported by Rivers"
- **Reviewer**: Geology • Geophysical Research Letters • American Journal of Science • Earth and Planetary Science Letters • Geochimica et Cosmochimica Acta • Global Biogeochemical Cycles • Chemical Geology • Water Resources Research • Geobiology • Biogeochemistry • Marine Geology • Journal of Geochemical Exploration • Polar Research • Environmental Earth Sciences • Geosphere • Nature Communications • Scientific Reports
- **Co-organizer**, Southern California Geobiology Symposium (50+ presenters, 100+ attendees) | 2014

EQUALITY, DIVERSITY, AND INCLUSION

- **EDI Working group member**, Dept. of Earth Sciences, University of Cambridge | 2020
Part of student and postdoc initiative, re-evaluating and proposing changes to admissions process, field accessibility, colonial legacy in teaching, and bystander training, among other EDI issues in the Department of Earth Sciences
- **Speaker**, Young Researchers Program, University of Southern California | 2020
Conversation with public high school students about what it's like to be a geochemist and how to become one
- **Co-chair of organizing committee**, Cambridge Forum on Diversity and Equality in Science and Policy | 2019
Organized an event of 100+ attendees and over 20 speakers, panelists, and presenters, discussing solutions to issues faced by underrepresented groups at Cambridge University and academia in general
- **Student mentor**, Young Researchers Program, University of Southern California | 2014
Designed and supervised a 6-week summer research project by a local high school student; wrote college admissions reference letters

OUTREACH

- **Member of executive committee**, Cambridge University Science and Policy Exchange | 2018–2019
- **Founder and President**, USC Science Policy Group | University of Southern California | 2015–2017
- **Co-author**, advisory letter solicited by US Congress Rep. H. A. Waxman regarding climate change impact on California | 2013
- **Author**, science outreach blog SoSociety.wordpress.com | 2012–2015
- **Member**, USC Water Conservation task force | 2015

ACADEMIC REFERENCES

Dr. Douglas E. Hammond • Professor • Dept. of Earth Sciences, University of Southern California
• dhammond@usc.edu • +1-213-740-5837 • Zumberge Hall of Science, Los Angeles, CA 90089, USA

Dr. A. Joshua West • Associate Professor • Dept. of Earth Sciences, University of Southern California
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Dr. Edward Tipper • Lecturer (Assistant Professor) • Dept. of Earth Sciences, University of Cambridge
• ett20@cam.ac.uk • +44-1223-333-451 • Downing St, Cambridge, CB2 3EQ, UK

Dr. Michael J. Bickle, FRS • Professor of Tectonics • Dept. of Earth Sciences, University of Cambridge
• mb72@esc.cam.ac.uk • +44-1223-333-484 • Downing St, Cambridge, CB2 3EQ, UK

Dr. Olivier J. Rouxel • Director • Marine Geosciences Unit, French Research Institute for Exploitation of the Sea (Ifremer)
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