

# Dr. J. Jotautas Baronas

Postdoctoral Research Associate

Darwin College

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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

**2017 – 2020 | 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.

### 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 H<sub>2</sub>O, SO<sub>4</sub>, Sr, and Nd.
- Establishing the full carbon budget of major Southeast Asian rivers and their net effect on atmospheric pCO<sub>2</sub>. 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.

### JACOBS UNIVERSITY BREMEN | UNDERGRADUATE | 2009-2011

- Extracted and identified valuable phospholipids in marine microalgae using HPLC-MS, in order to improve commercial viability of algal carbon sequestration systems in development.

### FRAUNHOFER UMSICHT INSTITUTE | INTERNSHIP | 2009

- Developed and patented reactive polymer additives to improve properties of wood-plastic-composite materials, used to replace plastics in low cost applications, reducing their carbon footprint.

## PUBLICATIONS

### PEER-REVIEWED

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 OR PREPARATION

- \* **Baronas, J.J.**, E.T. Tipper, M.J. Bickle, R.G. Hilton, E.I. Stevenson, C.R. Hackney, D.R. Parsons, S. Darby, C. Larkin, Aung Myo Khaing. Sediment flux and composition in large river channels: a robust empirical hydrodynamic calibration of the Irrawaddy and the Salween rivers. *In prep. for JGR: Earth Surface*
- \* **Baronas, J.J.**, M.A. Torres, A.J. West, R.B. Georg, K.C. Clark, E. Burt, D.E. Hammond. Uniform hydrologic response of silicate weathering across a geomorphic gradient in the Peruvian Andes. *In prep. for Geophysical Research Letters*
- \* Torres, M.A., **J.J. Baronas**. Hydrologic non-stationarity can explain weathering-derived solute concentration dynamics in streams. *In prep. for Water Resources Research*
- \* **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 prep. for Frontiers in Earth Science*
- \* **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. *In prep. for Global Biogeochemical Cycles*
- \* 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. Stammenitz. Freshwater monitoring with nanopore sequencing. *In prep. for Nature Biotechnology*

### 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

### INVITED EXTERNAL TALKS

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 (\* INDICATES MENTORED STUDENT)

- 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**, K Relph. Li Isotope Fractionation in Weathering Regimes: Understanding Interlayer Sites on Clay Minerals. ***Goldschmidt Conference***.
- 2019 – Tipper, ET, EI Stevenson, K 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, M 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 – **Baronas, JJ**, MA Torres, AJ West, DE Hammond, OJ Rouxel, B Georg, J Bouchez, J Gaillardet. Ge, Si, and Li isotope geochemistry in global rivers: element-specific response to weathering intensity. ***IsoNose Metal Stable Isotope Geochemistry Workshop***.
- 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***.
- 2016 – **Baronas, JJ**, MA Torres, KE Clark, MA, AJ West. Trace element concentration-discharge dynamics along a geomorphic gradient in the Andes-Amazon. ***Southern California Geobiology symposium, Pasadena, USA***.
- 2016 – Dellinger, M, RG Hilton, AJ West, MA Torres, KW Burton, KE Clark, **JJ Baronas**. Tracing oxidative weathering from the Andes to the lowland Amazon Basin using dissolved rhenium. ***AGU Fall Meeting***.
- 2016 – Monteverde, D, WM Berelson, **JJ Baronas**, S Sanudo-Wilhelmy. Flavins in coastal marine sediments: new perspectives on diagenetic electron transfer. ***AGU Fall Meeting***.
- 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***.
- 2015 – **Baronas, JJ**, MA Torres, AJ West, DE Hammond, KE Clark, S Opfergelt, KW Burton, et al. Multi-proxy investigation of silicate weathering: Ge/Si,  $\delta^{30}\text{Si}$ ,  $\delta^7\text{Li}$ , and  $\delta^{74}\text{Ge}$  in Peruvian and Costa Rican watersheds. ***Southern California Geobiology symposium, Riverside, USA***.
- 2015 – Torres, MA, AJ West, **JJ Baronas**, C Ponton, KE Clark, SJ Feakins, V Galy. Floodplain modulation of solute fluxes from mountainous regions: the Amazonian Madre de Dios river case study. ***AGU Fall Meeting***.
- 2015 – Monteverde, D, **JJ Baronas**, WM Berelson, D Burdige, N Rollins, S Sanudo-Wilhelmy. Dissolved B-vitamins in coastal marine sediments of San Pedro Basin, CA. ***AGU Fall Meeting***.
- 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

- **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

### FIELDWORK

- **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

### 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

## SERVICE

### ACADEMIA

- **Member**, Darwin College Education and Research Committee, 2019–2020.
- **Co-convenor**, Darwin College Science Seminar Series, 2019–2020.
- **Primary session convener**, Goldschmidt Conference 2019: "09b: Understanding the Critical Zone Using the Composition of Particles, Solutes, and Gases Transported by Rivers".
- **Reviewer**: 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 • Scientific Reports
- **Co-organizer**, Southern California Geobiology Symposium (50+ presenters, 100+ attendees), 2014

### OUTREACH

- **Co-chair of organizing committee**, Cambridge Forum on Diversity and Equality in Science and Policy (100+ attendees) | 2019
- **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
- **Student mentor**, Young Researchers Program | 2014

## 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  
• joshwest@usc.edu • +1-213-740-6736 • Zumberge Hall of Science, Los Angeles, CA 90089, USA

**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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