

Alida Perez-Fodich, Ph.D

aliperezfodich.github.io

University of Chile
Department of Geology
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EDUCATION

- 2019 PhD in Geological Sciences: Geochemistry and Isotope Geology
Department of Earth and Atmospheric Sciences, Cornell University

Dissertation: Understanding volcanic weathering processes through geochemical modeling, trace elements and hydrology. Advisor: Dr. Louis Derry
- 2013 MSc in Geology
Department of Geology, University of Chile. Advisor: Dr. Martin Reich
- 2010 BSc in Geology
Department of Geology, University of Chile

PROFESSIONAL APPOINTMENTS

- 2020–Present Assistant Professor
Department of Geology, University of Chile

PUBLICATIONS (*indicates student/postdoc author)

- Perez-Fodich, A.**, Derry, L.A., Marçais, J., Walter, M.T. (2024) The effect of weathering in runoff-to-groundwater partitioning in the Island of Hawai'i: perspectives for landscape evolution. *Earth and Planetary Science Letters*, 635, 118687, doi:[10.1016/j.epsl.2024.118687](https://doi.org/10.1016/j.epsl.2024.118687).
- Gleeson, S.A., **Perez-Fodich, A.**, Reich, M. (2024) Laterite and supergene copper deposits; ore deposits formed in the Critical Zone. In *Treatise in Geochemistry* 3rd Edition, Ch 44, doi:[10.1016/B978-0-323-99762-1.00012-7](https://doi.org/10.1016/B978-0-323-99762-1.00012-7).
- Munoz-Saez, C., Gong, J., **Perez-Fodich, A.**, van Zulen, M. (2023) Environmental and hydrogeochemical controls of spicule geysirite in opaline hot spring deposits. *Earth and Space Science*, 10(3), e2022EA002645, doi:[10.1029/2022EA002645](https://doi.org/10.1029/2022EA002645).
- Pourret, O., Anand, P., Bots, P., Cottrell, E., Dosseto, A., Gunter, A., Hedding, D.W., Ibarra, D.E., Irawan, D.E., Johannesson, K., Labidi, J., Little, S., Liu, H., Makhubela, T.V., Carbonne, J.M., **Perez-Fodich, A.**, Riches, A., Tartèse, R., Tripathi, A. (2022) Evolution of diversity in

the editorial boards of *Geochimica et Cosmochimica Acta* and *Chemical Geology*. *European Science Editing*, 48:e89470. doi:[10.3897/ese.2022.e89470](https://doi.org/10.3897/ese.2022.e89470)

Fernandez, N.M., **Perez-Fodich, A.**, Derry, L.A., Druhan, J.L. (2021) A first look at Ge/Si partitioning during amorphous silica precipitation: Implications for Ge/Si as a tracer of fluid-silicate interactions. *Geochimica et Cosmochimica Acta*, 297, 158-178. doi:[10.1016/j.gca.2021.01.007](https://doi.org/10.1016/j.gca.2021.01.007)

Perez-Fodich, A., & Derry, L. A. (2020) A model for germanium-silicon equilibrium fractionation in kaolinite. *Geochimica et Cosmochimica Acta*, 288, 199-213. doi:[10.1016/j.gca.2020.07.046](https://doi.org/10.1016/j.gca.2020.07.046)

Perez-Fodich, A., & Derry, L. A. (2019). Organic acids and high soil CO₂ drive intense chemical weathering of Hawaiian basalts: Insights from reactive transport models. *Geochimica et Cosmochimica Acta*, 249, 173-198. doi:[10.1016/j.gca.2019.01.027](https://doi.org/10.1016/j.gca.2019.01.027)

Alvarez, F., Reich, M., Snyder, G., **Perez-Fodich, A.**, Muramatsu, Y., Daniele, L., & Fehn, U. (2016). Iodine budget in surface waters from Atacama: Natural and anthropogenic iodine sources revealed by halogen geochemistry and iodine-129 isotopes. *Applied Geochemistry*, 68, 53-63. doi:[10.1016/j.apgeochem.2016.03.011](https://doi.org/10.1016/j.apgeochem.2016.03.011)

Alvarez, F., Reich, M., **Perez-Fodich, A.**, Snyder, G., Muramatsu, Y., Vargas, G., & Fehn, U. (2015). Sources, sinks and long-term cycling of iodine in the hyperarid Atacama continental margin. *Geochimica et Cosmochimica Acta*, 161, 50-70. doi: [10.1016/j.gca.2015.03.032](https://doi.org/10.1016/j.gca.2015.03.032)

Perez-Fodich, A., Reich, M., Alvarez, F., Snyder, G. T., Schoenberg, R., Vargas, G., Muramatsu, Y., Fehn, U. (2014). Climate change and tectonic uplift triggered the formation of the Atacama Desert's giant nitrate deposits. *Geology*, 42(3), 251-254. doi:[10.1130/g34969.1](https://doi.org/10.1130/g34969.1)

Reich, M., Snyder, G. T., Alvarez, F., **Perez, A.**, Palacios, C., Vargas, G., Cameron, E. M., Muramatsu, Y., Fehn, U. (2013). Using iodine isotopes to constrain supergene fluid sources in arid regions: insights from the chuquicamata oxide blanket. *Economic Geology*, 108(1), 163-171. doi:[10.2113/econgeo.108.1.163](https://doi.org/10.2113/econgeo.108.1.163)

SUBMITTED, UNDER REVIEW, IN PREP

Gonzalez-Cariqueo, J.*, **Perez-Fodich, A.**, Pfeiffer, M., Peña, M. The strontium isotopic composition of the mesozoic sedimentary formations of the Southern Central Andes (33°-34°s) and its paleogeographic implications. Under Review for *Journal of South American Earth Sciences*.

Fernandez, N.M., **Perez-Fodich, A.** Soil Ge/Si and Si stable isotopes as viable long-term records of desilication. In prep. for *Geophysical Research Letters*.

Peña-Echeverría, A.*, Louvat, P., Tardani, D., **Perez-Fodich, A.** Weathering rates of rivers draining volcanoes in the Southern Andes. In prep. for *Earth and Planetary Science Letters*.

Bustamante, V.*, Muñoz-Saez, C., Derry, L.A., **Perez-Fodich, A.** Paleoenviromental

constraints in the precipitation rates of siliceous sinter deposits in El Tatio Geyser Field. In prep. for *Geochimica et Cosmochimica Acta*.

Perez-Fodich, A., Derry, L. A., Smieska, L. Fe oxidation and trace element gradients during early weathering of spheroidally weathered Hawaiian basalts. In prep. for *Chemical Geology*.

Macchioli, M.*, Soto, A.*, Pfeiffer, M., **Perez-Fodich, A.** Solute sources and concentration-discharge relations in semiarid mountainous watersheds. In prep. for *Vadose Zone Journal*.

Perez-Fodich, A. & Fernandez, N.M., A global assessment of germanium resources in hydrothermal fluids. In prep. for *Ore Geology Reviews*.

RESEARCH GRANTS

As Principal Investigator (PI) or Co-PI

- 2023 FONDEF IDeA Grant ID23I10167 (**co-PI**): “Desarrollo de una herramienta para la evaluación de la calidad del agua superficial de cuencas prioritarias en escenarios futuros de cambio climático”. ANID (Chilean Science Foundation). \$300,000
- 2022 FONDECYT Postdoctoral 2022 Grant 3220318 (**co-PI**): “Concentration-discharge patterns in a Mediterranean watershed under increasing drought: insights on solute and water sources and fluxes, and chemical weathering rates in the Maipo River, central Chile”. ANID (Chilean Science Foundation). \$150,000
- 2020 FONDECYT Iniciacion 2020 Grant 11200656 (**PI**): “Chemical weathering fluxes from continental arc volcanoes and their implication for elemental and atmospheric CO₂ budgets in the Southern Andes”. ANID (Chilean Science Foundation). \$130,000
- 2020 U-Inicia 2020 Grant UI- 006/20 (**PI**): "Flujos de meteorización química en arcos volcánicos continentales y sus implicancias para los balances de elementos y dióxido de carbono atmosférico en los Andes del Sur". University of Chile. \$11,000
- 2019 International Association of Geochemistry Student Research Grant. \$2,200
- 2018 Make Our Planet Great Again Short-stay Research Grant. \$9,000
- 2018 Cornell Research Travel Grant. \$2,000
- 2017 Cornell High Energy Synchrotron Source (CHESS). Beamtime
- 2017 Geological Society of America Graduate Student Research Grant. \$1,325
- 2017 Donovan Research Fund Cornell University. \$1,000
- 2016 Integral Consulting Research Grant. \$2,000
- 2016 Arthur L. Bloom Grant for Pacific Studies. \$1,000

As part of the research team

- 2023 Anillo WEF-Chile ATE220029: “The water-energy-food nexus for urban areas in Central Chile. ANID (Chilean Science Foundation).

- 2023 FONDECYT Regular Grant 1230161: “Timing and tempo of supergene enrichment of copper deposits in the Coastal Cordillera metallogenic province, north-central Chile”. ANID (Chilean Science Foundation).
- 2021 Nodos para el desarrollo en investigación de Laboratorios Naturales en Chile 2021 NODOSLN000: “Laboratorio Natural Montañas de los Andes del Sur de Chile”. ANID (Chilean Science Foundation).

FELLOWSHIPS

- 2014 CONICYT PhD Fellowship (Chilean Science Foundation). \$200,000
- 2014 Fulbright Foreign Student PhD Fellowship.
- 2007 Anglo American Excellence Undergraduate Scholarship. \$20,000

INVITED TALKS

- 2023 Instituto de Ingeniería, Universidad de O’Higgins, November 16th 2023: “Understanding weathering processes through geochemical and hydrological modeling”
- 2021 Geochemistry group GFZ Postdam, October 25th 2021: “Trace elements and reactive transport models to investigate weathering in volcanic provinces”
- 2021 Red Internacional para Estudiar la Calidad Física de Suelos derivados de Cenizas Volcánicas, September 9th 2021: “Understanding volcanic weathering and soil formation processes in the Island of Hawaii through geochemical modeling and hydrology”
- 2021 Lawrence Berkeley National Laboratory, Lithium Resource Research and Innovation Center, May 26th 2021: “A geochemical perspective on the groundwater cycling stories of iodine and lithium in the Atacama Desert”
- 2020 GET Université de Toulouse III, Paul Sabatier, February 12th 2020: “Understanding weathering processes using trace elements”
- 2020 Institut de Physique du Globe de Paris, January 17th 2020: “Understanding volcanic weathering processes”.

DEPARTMENT TALKS

- 2022 Department of Geology, University of Chile, August 24th 2022: “Trace elements and reactive transport models to investigate weathering in volcanic provinces”

CONFERENCE PRESENTATIONS (only **first** or student* author)

- 2023 Peña, A.*, **Perez-Fodich, A.**, Muñoz-Saez, C., Sanchez-Alfaro, P., Tardani, D. Seasonal variability in solute patterns and implications for rock weathering rates in the active volcanic watersheds of Southern Andes. AGU Fall Meeting 2023. San Francisco CA, USA.
- 2023 **Perez-Fodich, A.**, Derry, L.A. What happens when weathering reduces the permeability of rocks? XVI Congreso Geológico Chileno, Santiago, Chile.
- 2023 **Perez-Fodich, A.**, Fernandez, N.M. Un modelo de transporte reactivo para el fraccionamiento de isótopos de Si y razones Ge/Si. XVI Congreso Geológico Chileno. Santiago, Chile.
- 2023 Peña-Echeverría, A.*, **Perez-Fodich, A.**, Tardani, D., Louvat, P. Estimación de la influencia termal en los ríos de las cuencas volcánicas de los Andes del Sur (38° a 42°S). XVI Congreso Geológico Chileno. Santiago, Chile.
- 2023 Macchioli Grande, M.*, Soto, A.*, González, J.*, Pfeiffer, M., **Perez-Fodich, A.** Spatial and temporal dynamics of solute sources and fluxes in a Mediterranean catchment of Central Chilean Cordillera. XVI Congreso Geológico Chileno, Santiago, Chile.
- 2023 Clericus, A.*, Reich, M., **Perez-Fodich, A.**, Barra, F., del Real, I., Procesos de mineralización en la Zona Crítica: simulación del enriquecimiento supérgeno de cobre mediante modelos de transporte reactivo. XVI Congreso Geológico Chileno. Santiago, Chile.
- 2023 Bustamante, V.*, **Perez-Fodich, A.**, Muñoz-Saez, C., Derry, L.A., Precipitation rates in El Tatio geothermal field: in-situ experiments as an approach to understand trace element partitioning. XVI Congreso Geológico Chileno, Santiago. Chile.
- 2023 **Perez-Fodich, A.**, Fernandez, N.M. Partitioning of Ge/Si and Si-stable isotopes during weathering of granites and basalts: A reactive transport perspective. Goldschmidt Conference 2023. Lyon, France.
- 2023 Bustamante, V.*, **Perez-Fodich, A.**, Muñoz-Saez, C., Derry, L.A., Trace element partitioning in siliceous sinters as a function of silica precipitation rates in El Tatio geothermal field. Goldschmidt Conference 2023. Lyon, France.
- 2023 Peña, A.*, **Perez-Fodich, A.**, Louvat, P., Tardani, D. Ge/Si and $\delta^{11}\text{B}$ for quantifying hydrothermal inputs in river solute fluxes in active volcanoes in the Southern Andes. Goldschmidt Conference 2023. Lyon, France.
- 2022 **Perez-Fodich, A.**, Louvat, P., Peña, A.*, Tardani, D. The chemical composition and weathering rates of rivers draining volcanoes in the Southern Andes. Goldschmidt Conference 2022. Honolulu HI, USA.

- 2022 **Perez-Fodich, A.**, Munoz-Saez, C., Derry, L., Gong, J. Ge/Si ratios in hydrothermal fluids from El Tatio: Understanding the effect of surface opal precipitation. Goldschmidt Conference 2022. Honolulu HI, USA.
- 2022 Gonzalez, J.*, Peña, M., **Perez-Fodich, A.**, Pfeiffer, M. The strontium isotopic composition of the Mesozoic sedimentary formations of the Southern Central Andes (33°-34°S). XII South America Symposium on Isotope Geology. Santiago, Chile.
- 2020 **Perez-Fodich, A.**, Derry, L.A. The Convolution of Time and Weathering Intensity on the Fate of Runoff-To-Groundwater Partitioning in the Island of Hawai'i . Goldschmidt Conference 2020. Virtual, Global.
- 2019 **Perez-Fodich, A.**, Derry, L. A., Aguirre, A. A. Depleted Ge/Si groundwater ratios and a thermodynamic model for equilibrium fractionation in natural systems. AGU Fall Meeting 2019. San Francisco CA, USA.
- 2019 **Perez-Fodich, A.**, Derry, L. A. Modeling Ge/Si weathering signatures using thermodynamic data for synthetic germanium minerals. Goldschmidt Conference 2019. Barcelona, Spain.
- 2019 **Perez-Fodich, A.** Organic acids and high soil CO₂ drive intense chemical weathering of Hawaiian basalts: Insights from reactive transport models. Congrès des Doctorants 2019. Institut de Physique du Globe de Paris, Paris, France.
- 2018 **Perez-Fodich, A.**, Derry, L. A. Tracking Fe-oxidation in spheroidal weathering of basalts. Goldschmidt Conference 2018. Boston MA, USA.
- 2017 **Perez-Fodich, A.**, Derry, L. A. Extreme basalt weathering results from high soil CO₂, unsaturated conditions and organic acids. Goldschmidt Conference 2017. Paris, France.
- 2017 **Perez-Fodich, A.** Intense basalt weathering: high soil CO₂, unsaturated conditions and organic acids. Critical Zone Observatories All Hands Meeting 2017. Arlington VA, USA.
- 2016 **Perez-Fodich, A.**, Walter, M. T., Derry, L. A. Understanding the roles of ligand promoted dissolution, water column saturation and hydrological properties on intense basalt weathering using reactive transport and watershed-scale hydrologic modeling. AGU Fall Meeting 2016. San Francisco CA, USA.
- 2013 **Perez Fodich, A.**, Alvarez, F., Snyder, G.T., Schoenberg, R., Reich, M. The Role of Groundwater in the Formation of the Giant Nitrate Deposits of Atacama: Iodine-129 and Stable Chromium Isotopic Evidence. Goldschmidt Conference 2013. Florence, Italy.
- 2012 **Perez Fodich, A.**, Alvarez, F., Reich, M., Snyder, G., Schoenberg, R., Vargas, G., Palacios, C. The origin of the nitrate ore fields from the Atacama Desert revisited:

New insights from the iodine-129 and stable chromium isotopic systems. XIII
Congreso Geológico Chileno, Antofagasta, Chile.

AWARDS AND HONORS

2017 Goldschmidt Merit Student Travel Grant. Geochemical Society
2016 Fall Meeting Student Travel Grant. America Geophysical Union
2007 Outstanding Student FCFM University of Chile
2006 Outstanding Student FCFM University of Chile
2005 Irma Salas Merit Scholarship

RESEARCH EXPERIENCE

2023–Present Co-Investigator FONDEF IDeA (ANID ID23I10167), University of Chile, Santiago, Chile.

2023–Present Research Associate at Anillo WEF-Chile (ANID ATE220029), University of Chile, Santiago, Chile.

2023–Present Investigator FONDECYT Regular (ANID 1230161), University of Chile, Santiago, Chile.

2022–Present Co-Investigator FONDECYT Postdoctorado (ANID 3220318), University of Chile, Santiago, Chile.

2021–2022 Research Associate at Laboratorio Natural Montañas de los Andes del Sur de Chile (ANID NODOSLN000:), University of Chile, Santiago, Chile.

2020–Present Principal Investigator FONDECYT Iniciación (ANID 11200656), University of Chile, Santiago, Chile.

2020–Present Research Associate at Andean Geothermal Center of Excellence (FONDAP 15090013), University of Chile, Santiago, Chile.

2020–2021 International Collaborator at Deep EarthShape Project (DFG-SPP 1803). German Science Foundation. Germany–Chile.

2018–2019 Institut de Physique du Globe de Paris (IPGP) Visiting Student Researcher
Long-term research stay at the Geochemistry of External Envelopes (G2E) group.
Principal Investigator: Dr. Jérôme Gaillardet. Paris, France.

2014–2019 Cornell University PhD Student
Graduate researcher in the Department of Earth and Atmospheric Sciences
Principal Investigator: Dr. Louis Derry. Ithaca NY, USA.

2012 Universität Tübingen Short-term Student Researcher

Short-term research at the Isotope Geochemistry Laboratory
Principal Investigator: Prof. Ronny Schönberg. Tübingen, Germany.

- 2012 Rice University Short-term Student Researcher
Short-term research at the Marine Geochemistry Laboratory
Principal Investigator: Dr. Glen Snyder. Houston TX, USA.
- 2011 Catholic University of the North Short-term Student Researcher
Short-term research at the Fluid Inclusion Laboratory.
Principal Investigator: Dr. Eduardo Campos. Antofagasta, Chile.
- 2011–2013 University of Chile Master Student
Research assistant in the Department of Geology for FONDECYT Grant 1100014.
Principal Investigator: Dr. Martin Reich. Santiago, Chile.

PROFESSIONAL SERVICE

- 2023 Convener at XVI Chilean Geological Congress
- 2023 Reviewer for Fulbright BIO Fellowship Program
- 2022–Present Reviewer for ANID PhD and MSc Fellowship Program
- 2022 Field guide for Goldschmidt Conference 2022 Northeast Big Island Hawaii Soils
Fieldtrip. Waikoloa Village HI, USA.
- 2022 Reviewer for *Geochimica et Cosmochimica Acta* (2), *Andean Geology* (1)
- 2021 Reviewer for *Applied Geochemistry* (1), *Geochimica et Cosmochimica Acta* (1),
Water Resources Research (1)
- 2020 Reviewer for *Geochimica et Cosmochimica Acta* (1), *American Journal of Science*
(2), *Chemical Geology* (1), *Environmental Pollution* (1), *G-cubed* (2)
- 2020 Convener at Goldschmidt Conference
- 2019 Reviewer for *Chemical Geology* (1), *CATENA Regional* (1), *Ecological Modeling* (1)

CURRENT STUDENTS AND POSTDOCS

Marcos Macchioli	Fondecyt Postdoctoral Fellow (2022–2025)
Valeria Bustamante	MSc Geology (2021–2023)
Gabriel Arce	Honors BSc Geology (2023)

FORMER STUDENTS

Amanda Peña	MSc Geology (2023)
Agustín Soto	Honors BSc Geology (2022)
Javiera González	Honors BSc Geology (2022)
Lorena Olivares	Honors BSc Geology (2021)

Co-advised students

Catalina Saldías	Honors BSc Geology (2023) (Universidad Austral)
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Ismael Contreras	Honors BSc Geology (2022)
Roberto Ulloa	Honors BSc Geology (2022) (Universidad Austral)
Vicente Méndez	Honors BSc Geology (2021)

TEACHING EXPERIENCE

Main Instructor

2022	Principles of Biogeochemistry. Department of Geology, University of Chile.
2020–2023	Thermodynamics and Fluid Mechanics in Geological Processes. Department of Geology, University of Chile.
2020–2022	Introduction to Geology. Department of Geology, University of Chile.

Workshop/Diploma Instructor

2023	Environmental and Territorial Assessment of Soil Resources, Department of Soil and Engineering, University of Chile.
2020–2023	Applied Hydrogeology in Mining and Environmental Problems, Department of Geology, University of Chile.

Teaching Assistant

2012	Geochemistry. Dept. of Geology, University of Chile.
2011	Geology of Chile. Dept. of Geology, University of Chile.
2010–2011	Field Geology I. Dept. of Geology, University of Chile.
2009–2010	Stratigraphy and Paleontology. Dept. of Geology, University of Chile.

SERVICE AND OUTREACH

2022	Department Search Committee for a Journalist
2022–Present	Panelist for “Rocadictos” podcast at Radio Universidad de Chile, FM 102.5
2022	Goldschmidt Conference 2022 Northeast Big Island Hawaii Soils Fieldtrip. Waikoloa Village HI, USA.
2021	External reviewer for MSc. in Meteorology and Climatology, Dept. of Geophysics, University of Chile.
2019	Seminar Chair for Cornell Cross-Scale Biogeochemistry and Environmental Science Seminar Series (BESS).
2018	Seminar Chair for Cornell Cross-Scale Biogeochemistry and Environmental Science Seminar Series (BESS).
2018	Faculty Liaison for Snee Graduate Organization. Cornell University.
2012	Graduate Faculty Liaison for FCFM Faculty Council. University of Chile.

ANALYTICAL TECHNIQUES

ICP-MS Thermo Element 2 + hydride generator (i.e., HGX-200, or custom)
ICP-OES Spectro Blue.
General inorganic geochemistry clean laboratory procedures.
Sample purification for isotope preparation: $^{30}\delta\text{Si}$, $^{53}\delta\text{Cr}$, I^{129} .
Fluid-inclusion T-X measurements Linkam TS 1500.

SOFTWARE AND PROGRAMMING SKILLS

Geochemical Software: CrunchFlow (Advanced), Geochemist Workbench (Advanced), PhreeqC (Intermediate).
Programming Languages: Matlab (Intermediate), R (Basic), Bash script (Basic).

LANGUAGES

English: Fluent (C2)
Spanish: Native
French: Oral/Reading Intermediate (B1). Writing Basic (A2).
Croatian/Russian: Elementary (A1), can read with dictionary.

SHORT COURSE/WORKSHOPS

2021 Goldschmidt Conference Educational Approaches for Reactive Transport 3-day Workshop. Virtual.
2019 AGU SCIWS19: Toward an International Critical Zone Network-of-Networks for the Next Generation through Shared Science, Tools, Data and Philosophy, San Francisco CA, USA.
2019 MSA Short Course: Reactive Transport in Natural and Engineered Systems, Barcelona, Spain.
2018 Critical Zone Ecosystem Dynamics Summer Course. Gran Paradiso, Italy.
2016 Tutorial Community Land Model v.5. NCAR, Boulder CO, USA.

SOCIETY MEMBERSHIPS

Geochemical Society (member since 2011)
European Association of Geochemistry (member since 2011)
International Association of Geochemistry (member since 2018)
American Geophysical Union (member since 2012)

INDUSTRY EXPERIENCE

2013-2014 Mid-term Production Geologist
Derk Engineering and Geology for CODELCO. Radomiro Tomic Mine, Chile.

REFERENCES

Louis Derry
Cornell University
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derry@cornell.edu
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University of Chile
Department of Geology
Plaza Ercilla 803, Santiago, Chile
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Jérôme Gaillardet
Institut de Physique du Globe de Paris
Laboratoire de Géochimie des Enveloppes Externes
1 Rue Jussieu, 75238, Paris, France
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Ronny Schönberg
Universität Tübingen
Isotope Geochemistry Laboratory
Wilhelmstrasse 56, 72074, Tübingen, Germany
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