

Sara Polanco

Lecturer | Fulbright Scholar
School of Geosciences, The University of Sydney
sara.moronpolanco@sydney.edu.au | T: @SaraMgeo

EDUCATION

- 2012-2016 Ph.D. Geology. **The University of Adelaide, Adelaide, Australia**
Understanding the origin and controls on the development of anabranching rivers
Dean's Commendation for Doctoral Thesis Excellence
Advisors: Doug Edmonds (Indiana University), Kathryn Amos and Bruce Ainsworth.
- 2009-2011 M. Sc Geology. **University of Minnesota, Twin Cities, USA**
Paleosol carbon isotope stratigraphy and rock magnetic record of climate change across the Paleocene-Eocene boundary in the Bogota Basin, Colombia.
Advisors: David Fox and Joshua Feinberg
- 2002-2007 B. Sc. Geology. **National University of Colombia, Colombia**

APPOINTMENTS

- 2022- Present **Lecturer (Level B). The University of Sydney, NSW, Australia**
Research and Teaching position (40:40:20). Courses taught: Engineering Geology (GEOL1501), Earth Science: Past and Future of our Planet (GEOS1003), Field Geology in the Digital Age (GEOS3008)
- 2021-2022 **Fulbright Future Scholar. California Institute of Technology**
Decoding the formation and evolution of trans-North American source-to-sink systems. Host: gurnis@caltech.edu
- 2019- 2021 **Research Fellow (Level B) ARC Basin Genesis Hub. The University of Sydney, NSW, Australia**
Research (60%) and industry engagement (40%) position for a \$5.4M dollar project to develop and apply cutting-edge numerical modelling tools to better understand the formation of landscapes and sedimentary basins. Supervisor: Prof. Dietmar Müller dietmar.muller@sydney.edu.au
- 2016- 2020 **Research Associate - ARC Basin Genesis Hub. The University of Melbourne, VIC, Australia**
Due to my capacity to facilitate research collaboration I was given a joint appointment between the two main nodes of the ARC Basin Genesis Hub at the University of Melbourne and the University of Sydney. Supervisor: Prof. Louis Moresi louis.Moresi@anu.edu.au
- 2007-2009 **Field campaign leader and Research Geologist. Smithsonian Tropical Research Institute, US**
\$1M dollar project aiming to understanding how and when North America and South America merged to form the Americas that we know today. Supervisor: Dr. Carlos Jaramillo jaramillo@si.edu
- 2007 **Exploration Geologist. El Cerrejón, Joint Venture Glencore, BHP, AngloAmerican**
Designed a program to improve efficiency of core logging and to determine the relationship between stratigraphic markers and economically significant coal seams.

AWARDS

- 2022 Nominated, Vice-Chancellor's awards for Outstanding Educational Engagement and Innovation.
- 2021-2022 Fulbright Future Scholar at the California Institute of Technology - Caltech.
- 2021 Finalist, New South Wells Tall Poppy Science Awards
- 2017 Finalist, the Peer Prize for Women in Science. Australia-wide competition awarded by Thinkable for best science communication.
- 2016 The Faculty of Engineering Dean's Commendation for Doctoral Thesis Excellence, U. of Adelaide
- 2014 Chevron postgraduate research student award for outstanding research output, U. of Adelaide.
- 2014 Best poster presentation awarded by the Society for Sedimentary Geology (USA). Annual Convention and Exhibition of the American Assoc. of Petroleum Geologist, Houston, Texas, USA.
- 2012-2015 International Postgraduate Research Scholarship (IPRS), University of Adelaide
- 2010 Tibor and Olga Zoltai Scholarship, Outstanding graduate student. University of Minnesota, USA.
- 2004 Scholarship for outstanding undergraduate student, National University of Colombia.

RESEARCH FUNDING

During my career I have been awarded approximately \$1M AUD in competitive research funding. This list does not include scholarships. I have been the **lead** investigator in all the projects detailed below.

- 2022-2023 \$300,000 Interactive atlas of the Earth's evolution: linking the deep Earth with the hydrosphere. AuScope <https://www.auscope.org.au/>
- 2021-2022 \$ 60,000 The long-term drivers of river evolution: implications for human habitation. Future Fulbright Scholar hosted at the California Institute of Technology – Caltech
- 2022-2024 \$30,000 Wave tank experiments to understand olivine sorting and aid CO2 sequestration. USA-based start-up company VESTA <https://www.vesta.earth/>
- 2021-2022 \$20,000 Harnessing the power of the oceans to remove excess CO₂ from the atmosphere. Competitively awarded supercomputer time by the Sydney Informatics Hub allocation scheme through Sydney University grant LEIF grant National Computational Infrastructure project mw52, equivalent to \$20,000 NCI.
- 2020-2022 \$390,000 International Ocean Discovery Project Expedition 387 “Amazon Margin”. Australian and New Zealand International Ocean Discovery Program Consortium. The grant value represents the cost my participation, travel costs and post-expedition funding. Selected as the Australia/New Zealand representative on the expedition to investigate the origin and evolution of the largest river catchment on Earth.
- 2017-2018 \$40,000 Reconstructing the formation of a Gondwanan mega-river-delta. Early Career Researcher Grant. University of Melbourne.
- 2017-2018 \$8,000 Understanding long-term geological controls on deltaic deposits: linking numerical models and data. Early Career Researcher Global Mobility Grant Scheme. University of Melbourne.
- 2017-2018 \$5,000 34th International Geological Congress Travel Grant Scheme for Early-Career Australian and New Zealand Geoscientists. Australian Academy of Science (AAS).
- 2013-2016 \$100,000. The Magdalena River: an end member of anabranching rivers. Project funded by Chevron Australia Pty Ltd.

TEACHING EXPERIENCE

2019-Present Lecturer. The University of Sydney, Australia

Delivered lectures and practicals, created content and marked assignments for the following **12-week courses**

- Engineering Geology (GEOL1501)
- Earth Science: Past and Future of our Planet (GEOS1003)
- Field Geology in the Digital Age (GEOS3008) - Block mode

Delivered guest lectures, created content and marked assignments for the following courses

- Python for Geoscientists (GEOS 4101)
- Sedimentary and Environmental Geology (GEOS3103).

2018 Teaching instructor Graduate-level course. The University of Kansas, KS, USA

Intensive 10-day course about the tectonics and sedimentation in the Andes Mountains, Argentina. (GEOL791)

2012-2013 Teaching assistant- Field geology courses. The University of Adelaide, Australia

Assisted students to conduct geologic mapping and interpret stratigraphic sequences for the following 10-day intensive courses:

- Structural Geology II (GEO 2501) 2013- Flinders Ranges,
- Petroleum Systems and Basin Evaluation (PETROENG 4013) 2013- Amadeus Basin

2009-2011 Teaching assistant. University of Minnesota, Twin Cities, MN, USA

Delivered short lectures, led practicals, marked weekly assignments and exams for the following **16-week courses**

- Earth's History (GEO1007) Fall 2011 & Physical Geology (GEO1001) Fall 2009
- Sedimentology and Stratigraphy (GEO4602) Spring 2010, 2011
- Field Geology (GEO3911) Summer 2010, 2011

POSTGRADUATE SUPERVISION

2018- present **MPhil and PhD co-supervisor**

- PhD candidate Andrés Rodríguez. Co-supervisor Prof. Louis Moresi
- MPhil candidate Matt Boyd. Co-supervisor Dr. Tristan Salles.

2015 **B. Sc. Senior thesis co-supervisor, Los Andes University, Colombia**

Tracking the evolution of an avulsion event in the tropical Magdalena River- Manuel Ariza

2014 **B. Sc. Senior thesis co-supervisor, The University of Adelaide**

Dryland Fluvial Reservoir Analogues: A Description of Lithofacies and Deposit Geometries for a System with Varying Planform Morphology- Sandra Mann and Carolina Wadey

VISITING SCIENTIST AT OTHER INSTITUTIONS

2018 The University of Kansas 8-week visit to Prof. Mike Blum's research group.

2014 The University of Indiana- Bloomington 6-week visit to Assoc. Prof Doug Edmonds' research group.

INVITED ORAL PRESENTATIONS

My esteem nationally and internationally is reflected in invitations to present my research at international forums. I have given 10 invited and/or fully funded talks and I have presented at over 20 international and national conferences and workshops throughout my career.

2022 SeismoLab Seminar California Institute of Technology

2021 World Large River and Delta Systems Source-to-Sink Online Webinar Series- North Carolina State University, USA

2021 United States Geological Survey. Geology, Energy, and Minerals Science Center, USA

2020 Technical luncheon, Chevron- Houston – 135 attendees

Understanding basin formation and evolution across scales: insights from numerical models

2019 Departmental seminar, The University of Sydney.

2018 Departmental Colloquium, Kansas University, USA

2017 Technical luncheon, Petroleum Exploration Society of Australia and Geoscience Australia, ACT Branch, Australia.

2017 Invited presentation, Petroleum Exploration Society of Australia, VIC/TAS Branch, Australia.

2017 Technical luncheon, Woodside Energy, Perth Australia

2014 Departmental Seminar, Los Andes University, Bogotá, Colombia.

2011 Invited presentation Annual Meeting of the Geological Society of America, Minneapolis, USA.

LEADERSHIP, CAPACITY BUILDING AND INDUSTRY ENGAGEMENT

During my scientific career, I have worked on multimillion-dollar projects (ARC Basin Genesis Hub >AUD\$5.4M, Smithsonian, The Panamá Geology Project >US\$1M) involving multidisciplinary teams from industry, academia and government agencies. I have supervised two HDR and three honours students and 30 research assistants and technical staff. In my role as scientific manager of the ARC Industry Transformation Basin Genesis Hub (>AUD\$5.4M, 2016-2021) I combined my vision and the BGH's philosophy of open-source software to lead the strategic and operational development of a digital atlas of geological numerical models. This enabled field-based scientists, educators, industry and other stakeholders to better understand the formation and evolution of landscapes and sedimentary basins, where water and critical mineral resources are hosted.

SERVICE ACTIVITIES

2019-2024 Australian correspondent for the International Association of Sedimentologists

2023 Session co-convener European Geoscience Union General Assembly, session ESSI3.2

2021-2023 Scientific Committee member Australian and New Zealand International Ocean Discovery Program Consortium

2021 Session co-convener American Geoscience Union General Assembly, session EP25

2019-2022 Committee member of the Geological Society of Australia Sedimentology Special Interest Group

- 2018-2021 Scientific manager and Stream leader North West Shelf. ARC- Basin Genesis Hub 5.4M dollar project. Involved engagement and collaboration with industry partners such as Chevron Pty Ltd and government agencies such as Geoscience Australia as well as reporting to the ARC.
- 2021 Session convener Australian Geoscience Council Convention. Crust, surface and cosmos.
- 2019 Session convener European Geoscience Union General Assembly, session SSP3.4 and co-convener session TS6.5/GD5.8/GMPV7.9, Austria.
- 2018 Session convener Australian Geoscience Council Convention, session 1.2.1
- 2018-2019 Committee member Women in Science Network. The University of Melbourne.
- 2018-2019 Committee member Earth Science Research and Industry. The University of Melbourne.
- 2017 International observer for the Grad-Cohort Workshop- Computer Research Association for women, USA

JOURNAL AND PROPOSAL REFEREEING

I am invited to act as a regular reviewer for a range of geoscience journals including:

Basin Research, Earth Surface Processes and Landforms, Geophysical Research Letters, Journal of Sedimentary Research, Tectonophysics, Gondwana Research, the Australian Journal of Earth Sciences and the Journal of South American Earth Sciences.

I have also been invited as a proposal reviewer for:

- Australian and New Zealand International Ocean Discovery Program Consortium Legacy Analytical Funding scheme
- The Sedimentary Geology & Paleobiology Program National Science Foundation, USA
- The Research Council KU Leuven, Belgium.

OUTREACH, POLICY AND STAKEHOLDER ENGAGEMENT

- 2022 Interview in Forbes “Software Is Unlocking The Mystery Of Why Rivers Change”
<https://www.forbes.com/sites/andrewwright/2022/12/18/software-is-unlocking-the-mystery-of-why-rivers-change/?sh=30975bc17355>
- 2021 Science meets Parliament. Representing AuScope. Meeting with MP Dr Anne Webster to discuss water security and how digital deep-time exploration tools are key for a low-emissions economy
- 2020 Contributor for AuScope’s 10-year Strategy plan and 5-year Investment plan. AuScope is funded by the Australian Government through the National Collaborative Research Infrastructure Strategy. <https://www.auscope.org.au/strategy>
- 2019 Panelist for the Geo Ministerial Summit, Canberra, Australia
 The Summit explored how Earth observation data is a core input to strategic decision making and key to day-to-day economic, environmental and development decisions. The event included organizations such as the United Nations Science-Policy-Business Forum on the Environment.
<https://www.auscope.org.au/news-features/geo-week-19>

PEER-REVIEWED PUBLICATIONS

Total of 1275 citations, h-index 13 from Google Scholar

<https://scholar.google.com.au/citations?user=oADtGxAAAAAJ&hl=en>

<https://orcid.org/0000-0002-1270-4377>

My field-weighted citation impact is three times the global average and 80% of my publications are in the top 10% most-cited journals.

I previously used **Morón** as my last name for my publications

Original refereed publications

*Denotes student

- Polanco, S.**, Blum, M., Salles, T., Frederick, B. C., Farrington, R., Ding, X., Mather, B., Mallard, C., and Moresi, L. *accepted pending minor revisions*. The flexural isostatic response of climatically driven sea-level changes on continental-scale deltas, *EGUsphere*. <https://doi.org/10.5194/egusphere-2023-53>.
1. Blum, M., Rahn, D., Frederick, B., **Polanco, S.** 2023 Land Loss in the Mississippi River Delta: Role of Subsidence, Global Sea-Level Rise, and Coupled Atmospheric and Oceanographic Processes. *Global and Planetary Change*. <https://doi.org/10.1016/j.gloplacha.2023.104048>
 2. Rodríguez Corcho*, A. F., **Polanco S.**, R. Farrington, R. Beucher, L. Moresi, and C. Montes. 2022. The role of lithospheric-deep mantle interactions on the style and stress evolution of arc-continent collision, *Geochemistry, Geophysics, Geosystems*, e2022GC010386.
 3. **Morón, S.**, Kohn, P. B., Beucher, R., Mackintosh, V., Cawood, P. A., Moresi, L., Gallagher, S. J., 2020 Denuding a Craton: Thermochronology Record of Phanerozoic Unroofing from the Pilbara Craton, Australia, *Tectonics*. doi: 10.1029/2019TC005988
 4. **Morón, S.**, Cawood, P. A., Haines, P. W., Gallagher, S. J., Zahirovic, S., Lewis C. J., Moresi, L. 2019, Gondwanan Long-Lived Supercontinental-Scale River System, *Geology*. <https://doi.org/10.1130/G45915.1>
 5. Beucher R, Moresi L, Giordani J, Mansour J, Sandiford D, Farrington R, Mondy L, Mallard C, Rey P, Duclaux G, Kaluza O, Laik A, **Morón S**, 2019 UWGeodynamics: A teaching and research tool for numerical geodynamic modelling. *Journal of Open Source Software*, 4(36), 1136 <https://doi.org/10.21105/joss.01136>
 6. Müller, D., Rey, P., Beucher, R., Cannon, J., Rohitash, C., Mallard, C., **Morón, S.**, Zahirovic, S. 2018 Education matters: The ARC Basin GENESIS Hub—connecting solid Earth evolution to sedimentary basins: *Preview*, v. 2018, no. 195, p. 27-32.
 7. **Morón, S.**, Amos, K., 2018, Downstream grain-size changes associated with a transition from single channel to anabranching. *Journal of Sedimentology*. doi: 10.1111/sed.12439
 8. **Morón, S.**, Amos, K., Edmonds, D. A., Payenberg, T., Sun X., Thyer, M., 2017, Avulsion triggering by El Niño-Southern Oscillation and tectonic forcing on the tropical Magdalena River, Colombia. *Geological Society of America Bulletin*, doi: 10.1130/B31580.1
 9. **Morón, S.**, Edmonds, D. A., Amos, K., 2017, The role of floodplain width and alluvial bar growth as a precursor for the formation of anabranching rivers, *Geomorphology*, 278, p. 78-90.
 10. Counts J. W., Rarity F., Ainsworth R. B., Amos K. J., Lane T., **Morón S.**, Trainor, J., Valenti C., Nanson R., 2016, Sedimentological interpretation of an Ediacaran delta: Bonney sandstone, South Australia. *Australian Journal of Earth Sciences*, p. 1-17.
 11. **Morón, S.** Amos, K., Mann, S., 2014, Fluvial reservoirs in dryland endorheic basins: the Lake Eyre Basin as a world-class modern analogue: *Australian Petroleum Production Exploration Association Journal*, v. 54, p. 119-133.
 12. **Morón, S.**, D. Fox, J. Feinberg, C. Jaramillo, G. Bayona, C. Montes, and J. Bloch, 2013, Climate change during the Early Paleogene in the Bogotá Basin (Colombia) inferred from paleosol carbon isotope stratigraphy, major oxides, and environmental magnetism, *Palaeogeography, Palaeoclimatology, Palaeoecology* 388, 115-127.

13. Montes, C., Bayona, G., Cardona, A., Buchs, D.M., Silva, C.A., **Morón**, S.E., Hoyos, N., Ramirez, D.A., Jaramillo, C., and Valencia, V. 2012 Arc-Continent Collision and Orocline Formation: Closing of the Central American Seaway. *Journal of Geophysical Research* 117.
14. Montes, C., Cardona, A., MacFadden, R., **Morón**, S.E., Silva, C.A., Restrepo-Moreno, S., Ramirez, D.A., Wilson, J., Farris, D., Bayona, G.A., Jaramillo, C., Valencia, V., and Flores, J.A. 2012 Evidence for middle Eocene and younger emergence in Central Panama: implications for Isthmus closure. *Geological Society of America Bulletin*: 124 (5-6), 780-799.
15. Jaramillo, C., Ochoa, D., Contreras, L., Pagani, M., Carvajal-Ortiz, H., Pratt, L.M., Krishnan, S., Cardona, A., Romero, M., Quiroz, L., Rodriguez, G., Rueda, M., De la Parra, F., **Morón**, S. Green, W., Bayona, G., Montes, C., Quintero, O., Ramirez, R., Mora, G., Schouten, S., Bermudez, H., Navarrete, R., Parra, F., Alvarán, M., Osorno, J., Crowley, J. L., Valencia, V., and Vervoort, J.,. 2010 Effects of Rapid Global Warming at the Paleocene-Eocene Boundary on Neotropical Vegetation: *Science* 330: 957-961.
16. MacFadden, B.J., Kirby, M.X., Rincon, A., Montes, C., **Morón**, S., Strong, N., Montes, C. 2010 Extinct Peccary “Cynorca” occidentale (Tayasuidae) from the Miocene of Panama and Correlations to North America. *Journal of Vertebrate Paleontology* 84: 288-298.

Book chapters

17. **Morón**, S., Cawood, P. A., Haines, P. W., Gallagher, S. J., Zahirovic, S., Lewis C. J., Moresi, L. 2019 Paleozoic to Triassic continental-scale sediment provenance of the Canning, Officer and Northern Carnarvon Basins, Western Australia. *The Sedimentary Basins of Western Australia* V.
18. Jaramillo, C., Moreno, E., Ramirez, V., da Silva, S., Barrera, Atria, Barrera Adhara, **Morón**, S., Herrera, F., Escobar, J. Koll, R., Manchester, S. and Hoyos, N. 2014, Palynological record of the last 20 Million years in Panama. In: Stevens, W. D., Montiel, O. M. and Raven, P., *Paleobotany and Biogeography: A Festschrift for Alan Graham in His 80th Year*. St. Louis: Missouri Botanical Garden Press, pp.134-251.

Full published peer-reviewed conference proceedings

19. Boyd, M.,* Salles, T., **Polanco**, S. Landscape and basin evolution modelling elucidates sediment supply and accommodation relationships in the Cretaceous Crayfish Sub-group of the Otway Basin. v. 2023. <https://www.tandfonline.com/doi/full/10.1080/14432471.2023.2175588>
20. **Morón**, S., Salles, T., Gallagher, S., and Moresi, L., 2018 The effect of flexural isostasy on delta architecture: implications for the Mungaroo Formation: *Australian Society of Exploration Geophysicist Extended Abstracts*, v. 2018, no. 1, p. 1-7.
21. Beucher, R., **Morón**, S., Moresi, L., Salles, T., Rey, P., Brocard, G., and Farrington, R., 2018 The Structural Evolution of the North West Shelf: a Thermomechanical Modeling Approach Using Stratified Lithospheric Rheologies and Surface Processes: *Australian Society of Exploration Geophysicist Extended Abstracts*, v. 2018, no. 1, p. 1-5.

Numerical modeling outputs

22. **Morón**, S; Azam, D; Mather, B; Byrne, R; Chin, M; Sadeghi, B; Beucher, R.; Moresi, L.; Giordani, J.; D.; Farrington, R.; L.; Mallard, C.; Rey, P.; Muller, D 2020, ‘Interactive atlas of basin evolution: linking the solid Earth with the hydrosphere <https://atlas.bgh.org.au/>
23. **Morón**, S., Blum, M., Salles, T., Frederick, B. C., Farrington, R, Ding, X., Mallard, C., Mather, B., Gallagher, S. J., Moresi, L. 2020 The cyclic response of flexural isostasy to climatically driven sea-level changes on continental-scale deltas <https://zenodo.org/record/4035164>.