

Veleda Astarte Paiva Muller, Ph.D. (she/her)

Postdoctoral Researcher, Department of Geosciences, University of Arizona, Tucson, USA

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EDUCATION

Ph.D. 10/2019-05/2023	Department of Earth and Environmental Sciences, University of Milano-Bicocca (UNIMIB), Italy Thesis: <i>Unraveling coupled surface-deep Earth processes in the Southern and Patagonian Andes through numerical modeling constrained by integrated datasets</i> Supervisor: Pietro Sternai. Awarded with the title of ‘Doctor Europaeus’
Ph.D. exchange 05/2021-06/2022	Institute des Sciences de la Terre (ISTerre), Université Grenoble Alpes, France Supervisors: Christian Sue, Pierre Valla. Funded by the Erasmus+ Program
M.Sc. 04/2017-05/2019	Department of Geology, Federal University of Paraná (UFPR), Brazil Thesis: <i>The Rocas Verdes Basin evolution at latitudes 52-54°S, Southern Patagonia: from its opening to the accretionary emplacement of the Sarmiento ophiolites and development of the Magallanes fold and thrust belt</i> Supervisors: Leonardo Fadel Cury, Mauricio Calderón
M.Sc. exchange 08/2018-11/2018	Department of Geology, Universidad Andrés Bello, Chile Supervisor: Mauricio Calderón, Funded by the ‘Microbial Project’, CAPES/PETROBRAS (Brazil)
B.Sc. 04/2011-04/2017	Department of Geology, UFPR, Brazil Thesis: <i>Geologic cross-section of the southern region of Perau, city of Adrianópolis: structural and metamorphic characterization in the study of tectonic phases</i> Supervisor: Leonardo Fadel Cury
B.Sc. exchange 09/2014-09/2015	Department of Geology, University of Salamanca, Spain Funded by the ‘Science without Borders Program’ CNPq (Brazil)

RESEARCH POSITIONS

11/2023-present	Postdoctoral Researcher, Department of Geosciences, University of Arizona, USA. Funding: TANGO ‘TransANdean Great Orogeny’ NSF grant 2020627. Principal Investigators: Susan Beck, Barbara Carrapa, Peter DeCelles
05/2023-11/202	Research Assistant, UNIMIB, Italy. Funding: MATRICs ‘Magmatic Triggering of Cenozoic Climate Cooling’ Fondazione CDP grant 2022-1546_001. Principal Investigators: Pietro Sternai, Rosario Esposito
04/2017-05/2019	Research Assistant, LAMIR Institute, UFPR, Brazil. Funding: ‘Microbial Project’ CAPES/PETROBRAS grant 2016/00141–1. Principal Investigators: Anelize Bahniuk, Leonardo F. Cury
04/2017-05/2019	Research Assistant, CONYCET, Chile. Funding: ‘Tectonic evolution of Middle Jurassic to Early Cretaceous Chilean ophiolites’ FONDECYT grant 1161818. Principal Investigator: Mauricio Calderón
08/2012-09/2014	Research Assistant, Department of Geology, UFPR, Brazil. Funding: ‘Structures of basement rocks and their influence to the Paraná and Amazonas Paleozoic sedimentary basins’ CNPq. Principal Investigator: Carlos Eduardo de M. Barros

PUBLICATIONS

Ostorero L., Esposito R., Bouilhol P., Ballato P., **Muller V.A.P.**, Frezzotti M.L., Sternai P. (2025). Iranian Neo-Tethyan magmas as a significant CO₂ source during the Middle Eocene Climate Optimum. *Lithos* (in-review, submitted May 2025).

Muller V.A.P., Sue C., Valla P., Sternai P., Simon-Labrie T., Gautheron C., Cuffey K.M., Grujic D., Bernet M., Martinod J., Ghiglione M., Herman F., Reiners P., Shuster D., Willett, C., Baumgartner L.,

and Braun J. (2024). Geodynamic and climatic forcing on late-Cenozoic exhumation of the Southern Patagonian Andes (Fitz Roy and Torres del Paine massifs). *Tectonics*, 43(7), e2023TC007914, doi.org/10.1029/2023TC007914

Muller V.A.P., Sternai P., and Sue C. (2024). Fast uplift in the southern Patagonian Andes due to long-and short-term deglaciation and the asthenospheric window underneath. *Solid Earth*, 15(4), 387-404, doi.org/10.5194/se-15-387-2024

Cloetingh S., Sternai P., Koptev A., Ehlers T.A., Gerya T., Kovács I., Oerlemans J., Beekman F., Lavallée Y., Dingwell D., Békési E., Porkoláb K., Tesauro M., Lavecchia A., Botsyun S., **Muller V.**, Roure F., Serpelloni E., Matenco L., Castelltort S., Giovannelli D., Brovarone A.V., Malaspina N., Coletti G., Valla P., and Limberger J. (2023). Coupled surface to deep Earth processes: Perspectives from TOPO-EUROPE with an emphasis on climate-and energy-related societal challenges. *Global and Planetary Change*, 104140, doi.org/10.1016/j.gloplacha.2023.104140

Muller V.A.P., Sternai P., Sue C., Simon-Labrie T., and Valla P.G. (2022). Climatic control on the location of continental volcanic arcs. *Scientific Reports* 12, 22167, doi.org/10.1038/s41598-022-26158-2

Muller V.A.P., Calderón M., Fosdick J.C., Ghiglione M.C., Cury L.F., Massonne H.-J., Fanning M.C., Warren C.J., Ramírez de Arellano C., and Sternai P. (2021). The closure of the Rocas Verdes Basin and early tectono-metamorphic evolution of the Magallanes Fold-and-Thrust Belt, southern Patagonian Andes (52–54 °S). *Tectonophysics* 798, 228686, doi.org/10.1016/j.tecto.2020.228686

Sternai P., **Muller V.A.P.**, Jolivet L., Garzanti E., Corti G., Pasquero C., Sembroni A., and Faccenna C. (2021). Effects of asthenospheric flow and orographic precipitation on continental rifting. *Tectonophysics* 820, 229120, doi.org/10.1016/j.tecto.2021.229120

CONFERENCE PAPERS

Muller V.A.P. (2025) How did the crust thicken in the Central and Southern Andes? Insights from geodynamic modeling. Workshop of the TANGO Project, Tucson AZ, USA, 22-25 Apr. 2025.

Muller V.A.P., Carrapa B., Thomson S., DeCelles P.G., Howlett C.J., Ronemus C. (2025). Dating the exhumation of the orographic barrier and deformation sequence of the Eastern Cordillera (25 °S), northwestern Argentina. GeoDaze 2025, Tucson AZ, USA, 27-29 Mar. 2025.

Padilla M., Ong I., Frenia L., McCraine W., Dhar N., Basler L., Foley A., Mascareno A., **Muller V.**, Ibañez-Mejia M. (2025). Timing and intensity of high-grade metamorphism in Adirondack Highlands Metagabbros. GeoDaze 2025, Tucson AZ, USA, 27-29 Mar. 2025.

Spiewak M., Wuertemburg A., Aqeel H., Doig P., Martin G., Obie R., Stevens J., Soto A., Ibañez-Mejia M., **Muller V.** (2025). Investigating the Grenville Orogeny in the Adirondack Lowlands in Northwest New York. GeoDaze 2025, Tucson AZ, USA, 27-29 Mar. 2025.

Muller V.A.P., Carrapa B., Beck S.L., Curie C., DeCelles P., Sternai P., Leon-Rios S., Comte D., and Porter R.C. (2024). Tectonic shortening vs. mantle dynamic control on the topography and foreland basin subsidence of the Central and Southern Andes using numerical modeling. *AGU24*, Washington D.C., USA, 9-13 Dec. 2024, agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1626819

Beck S.L., Bradford J., Mahanti S.S., Howlett C., Ronemus C., Bowman E., Kiser E., Porter R.C., Comte D., Roecker S.W., Leon-Rios S., Saez M., Ortiz G., Orosco L., Carrapa B., DeCelles P.G., Ducea M., Tauber S., Fernandez M., Trad S., Navarro-Aranguiz A.P., Reyes-Wagner V., Rodriguez E.E., Currie C., **Muller V.**, Albarracin F., Maharaj A., Dunham A., Giambiagi L., Fuentes F., Tunik M., Alonso R.N., Viramonte J.G., Peralta C., and Aguiar M. (2024). The Tale of Two Mountain Belts along the Andes in South America. *AGU24*, Washington D.C., U.S.A., 9-13 Dec. 2024 agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1633574

Ronemus C., Suriana J., Howlett C.J., and **Muller V.A.P.** (2024). The nature of unconformities in the southern Central Andean foreland basin: Constraints from newly described Eocene–Miocene deposits at ~31.75 °S. *XIX Reunión de Tectónica*, San Juan, Argentina, 12 – 14 Jun 2024

Ostorero L., Sternai P., Esposito R., Bouilhol P., **Muller V.**, Malaspina N., Tumiatì S., Ballato P., Zhang Z., Ji W.-Q., Dai J., and Frezzotti M.L. (2024). Quantification of the pre-eruptive CO₂ budget of Neo-Tethyan magmas and their forcing on Early Cenozoic global climate, *EGU General Assembly 2024*, Vienna, Austria, 14–19 Apr 2024, EGU24-777, doi.org/10.5194/egusphere-egu24-777

Muller V.A.P., Sternai P., Sue C., Valla P., Simon-Labric T., Gautheron C., Cuffey K., Grujic D., Bernet M., Ghiglione M., Herman F., and Braun J. (2023). Asthenospheric upwelling and glacial cycles forcing the uplift and exhumation of the Patagonian Andes: short and long-term effects. *TOPO-EUROPE workshop 2023*, Sopron, Hungary, 28–30 Sep 2023

Muller V.A.P., Sternai P., Sue C., Valla P., and Simon-Labric T. (2023). Climatic control on the location of continental volcanic arcs. *EGU General Assembly 2023*, Vienna, Austria, 24–28 Apr 2023, EGU23-288, doi.org/10.5194/egusphere-egu23-288

Muller V.A.P., Sue C., Valla P., Sternai P., Simon-Labric T., Baumgartner L., Gautheron C., Grujic D., and Shuster D. (2022). Exhumation response to climate and geodynamic forcing in the Southern Patagonian Andes and analogies with the Western Alps. *6th AlpArray & 4DMB Scientific Meeting*, Prague, Czech Republic, 12–14 Oct 2022

Muller V.A.P., Sue C., Valla P., Sternai P., Simon-Labric T., Martinod J., Ghiglione M., Baumgartner L., Herman F., Reiners P., Gautheron C., Grujic D., Shuster D., and Braun J. (2022). Exhumation response to climate and tectonic forcing in the southern Patagonian Andes (Torres del Paine and Fitz Roy plutonic complexes). *15th Emile Argand Conference on Alpine Geological Studies*, Ljubljana, Slovenia, 12–14 Sep 2022, doi.org/10.5194/egusphere-alpshop2022-4

Muller V.A.P., Sue C., Valla P., Sternai P., Simon-Labric T., Martinod J., Ghiglione M., Baumgartner L., Herman F., Reiners P., Gautheron C., Grujic D., Shuster D., and Braun J. (2022). Exhumation signals and forcing mechanisms in the Southern Patagonian Andes (Torres del Paine and Fitz Roy plutonic complexes). *EGU General Assembly 2022*, Vienna, Austria, 23–27 May 2022, EGU22-226, doi.org/10.5194/egusphere-egu22-226

Muller V.A.P., Calderón M., Cury L., Sternai P., and Sue C. (2022). Geochemistry of igneous rocks from Seno Cóndor and Canal Gajardo, Southern Patagonia (52.5–53.5°S): Rocas Verdes Ophiolites or not? *XXI Congreso Geológico Argentino*, Puerto Madryn, Argentina, 14–18 Mar 2022

Muller V.A.P., Sternai P., and Sue C. (2021). Latitudinal climate gradient co-determine the location of the Southern Andes volcanic arc. *Réunion des Sciences de la Terre*, Lyon, France, 01–05 Nov 2021

Muller V.A.P., Calderón M., Fosdick J., Ghiglione M., Warren C., Massonne H.-J., Fanning M., Cury L., Sternai P., and Ramírez de Arellano C. (2021). The Eastern Tobífera Thrust: an important accommodation structure for the closure of the Rocas Verdes Basin, Patagonian Andes (52–54° S). *Réunion des Sciences de la Terre*, Lyon, France, 01–05 Nov 2021

Sternai P., Corti G., Garzanti E., and **Muller V.A.P.** (2021). Orographic precipitations control the structural and magmatic evolution of continental rifts: the East African Rift System. *Réunion des Sciences de la Terre*, Lyon, France, 01–05 Nov 2021

Muller V.A.P., Sternai P., and Sue C. (2021). Climatic control on the Southern Andean volcanic arc location. *EGU General Assembly 2021*, online, 19–30 Apr 2021, EGU21-591, doi.org/10.5194/egusphere-egu21-591

Muller V.A.P., Sternai P., and Sue C. (2021). The role of the asthenospheric window and deglaciation on the present-day uplift of the southern Patagonian Andes. *90° Congresso della Società Geologica Italiana*, Trieste, Italy, 13–17 Sep 2021

Muller V.A.P., Calderón M., and Cury L.F. (2018). Low grade metamorphism and deformation in the suture of the Rocas Verdes Basin at Seno Otway and Seno Skyring region, Southern Patagonian Andes (52–54°S). *XV Congreso Geológico Chileno*, Concepción, Chile, 18–23 Nov 2018, doi.org/10.13140/RG.2.2.22094.20809

Calderón M., Ramírez de Arellano C., Fosdick J., Ghiglione M., Stevens Goddard A., **Muller V.A.P.**, Torres F., and Rojo D. (2018). New field and petrological constraints on the tectonic emplacement of

ophiolites in southern Patagonia (52.5-53.5°S). *XV Congreso Geológico Chileno*, Concepción, Chile, 18–23 Nov 2018

Muller V.A.P., Calderón M., and Cury L.F. (2018). Hinterland development of Magallanes fold and thrust belt: brittle-ductile deformation during the closure of the Rocas Verdes Basin in Southern Patagonia. *49° Congresso Brasileiro de Geologia*, Rio de Janeiro, Brazil, 20–24 Aug 2018

Dias I., **Muller V.A.P.**, Titon B.G., and Bahniuk A. (2018). Precipitação de argilominerais em lagoas alcalinas no leste da Baixa Nhecolândia – Pantanal Sul-Mato-Grossense. *49° Congresso Brasileiro de Geologia*, Rio de Janeiro, Brazil, 20–24 Aug 2018

Muller V.A.P., Cury L.F., and Fedalto G. (2016). Caracterização Estrutural e Metamórfica da porção sul da região do Perau, Adrianópolis (PR): estudo das fases de deformação no contexto geotectônico regional. *48° Congresso Brasileiro de Geologia*, Porto Alegre, Brazil, 9–13 Oct 2016

Muller V.A.P., Barros C.E.M., and Pinto-Coelho C.V. (2014). Petrografia e Litogeoquímica dos ortognaisses da Pedreira Central, Campo Largo – PR : representantes do Complexo Atuba na Microplaca Curitiba. *47° Congresso Brasileiro de Geologia*, Salvador, Brazil, 21 – 26 Sep 2014

SUMMER SCHOOLS AND SHORT COURSES

- 06/2025 Teaching Structural Geology using linear algebra and computing, University of Winsconsin, WA, USA
- 06/2025 Application of StraboSpot in the field, Duluth – Minnesota, University of Winsconsin, WA, USA
- 06/2025 Geometric Statistics for Geologists, University of Winsconsin, WA, USA
- 10/2024 Basin analysis of the foreland region and the Sevier Fold-and-Thrust Belt, Utah, USA
- 10/2023 Dynamics and Sedimentary Systems of Collisional Zones, Pavia, Italy
- 07/2022 Young Researchers School in Structural Geology and Tectonics (YORSGET), Sicily, Italy
- 10/2021 MEREMA Summer School on Mantle Dynamics, Liguria, Italy
- 09/2021 DEPTHs: Summer school on subduction forearc dynamics, Western Alps, Italy
- 06/2021 Neotectonics in the Massif des Aiguilles Rouges, Chamonix-Mont-Blanc, France
- 08/2018 3D Seismic Interpretation, Curitiba, Brazil
- 10/2016 Compressive Tectonics at shallow crustal levels, Porto Alegre, Brazil
- 09/2016 Deformation, Strain and Shear Zones, Curitiba, Brazil
- 10/2015 Microstructure and Deformed Rocks, Curitiba, Brazil
- 07/2015 Laboratory Analysis of residual urban waters, Salamanca, Spain
- 07/2011 Geomorphology in the Karst, University of Ponta Grossa, Brazil

RESEARCH FIELD WORK

- 03/2024 **Northwestern Argentina:** Altiplano-Puna Plateau, Eastern Cordillera, Sierras Pampeanas, and Manantiales Basin, Central Andes, TANGO Project, University of Arizona. Rock sampling, structural geology, and stratigraphy
- 06/2021 **French Alps:** Massif des Écrins and Massif du Queyras, ISTERre, UGA. GPS installation.
- 09/2021 **Western Sicily:** Messinian Salinity Crisis sedimentary sequence in Eraclea Minoa, Italy, MATRICs Project, UNIMIB. Rock sampling, structural geology, and stratigraphy
- 11/2018, **Torres del Paine National Park:** Late Cretaceous units of the Magallanes foreland Basin
- 10/2017 and Quaternary lake carbonates at Lago Sarmiento and Laguna Amarga; **Pali-Aike Volcanic Field:** Laguna Timone, Chilean Patagonian Andes, Microbial Project, LAMIR (two trips) Institute. Rock and water sampling, structural geology, and stratigraphy
- 10/2017 **Magellan Strait, Seno Otway, and Seno Skyring, Chilean Patagonia:** Cretaceous Magallanes fold-and-thrust belt and South Patagonian Batholith, CONYCET. Rock sampling, structural geology, petrology, and stratigraphy
- 2015-2016 **Southern Ribeira Belt:** Proterozoic Perau Complex and Capiiru Fm., South Brazil, LAMIR Institute. Rock sampling, structural geology, petrology, and stratigraphy

TEACHING

- 2025-Present **‘GEOS 496-596 Hands-on Geochronology’** co-teaching with Prof. Mauricio Ibañez-Mejia, Undergraduate and Graduate level, Dept. of Geosciences, University of Arizona, USA. 1 semester (spring) including a **‘Teaching as Research’** project about timing and thermobarometric conditions during the Grenville orogeny in northeastern USA.
- 2024-present Participation in the **Faculty Learning Community and CIRTl** (Center for the Integration of Research, Teaching, and Learning) **Postdoc Pathways Program**, University of Arizona, USA
- 2024 Completion of the 8 weeks course **‘An Introduction to Evidence-Based Undergraduate STEM Teaching’** as part of the CIRTl Postdoc Pathways Program. Certificate of conclusion **‘Fall 2024 Faculty Learning Community’**, University of Arizona, USA
- 2021-2022 **Introduction to Petrography**, Bachelor in Geology, UNIMIB, Italy, 2 semesters. Responsible Prof. Nadia Malaspina
- 2022 **Field Geology and Mapping**, Bachelor in Geology, UNIMIB, Italy, 1 semester. Responsible Prof. Pietro Sternai
- 2018 **Metamorphic Petrology**, Bachelor in Geology, UFPR, Brazil, 1 semester. Responsible Prof. Carlos Eduardo de M. Barros
- 2019 **Geologic Sections using the software Adobe Illustrator**, Geology Week, UFPR, Brazil
- 2016 **Photoshop for Geology**, PET Geologia, UFPR, Brazil

OUTREACH

- 06/2024-present Co-chair of the working group 4 (outreach) of the **COST Action ‘Pan-European Biogeodynamics network (EUROBIG)’**. Promote the development of Biogeodynamics as a discipline in Europe and worldwide
- 08/2019 **GEOSURF Project**, UFPR, Brazil. Climbing guiding to undergraduate students to promote the link between Geology and outdoor sports
- 05/2012–08/2014 **Tutorial Education Program, Project Rock over Rock: constructing the knowledge in Geosciences**, UFPR, Brazil. Promotion of Geosciences to elementary, middle and high school students; organization of the ‘Geology week’ at UFPR; participation in outreach conferences; discussions among geology, geography and engineering students.

ACADEMIC SERVICE

- 2025 Convening session T216 ‘Exploring Feedbacks Between Tectonics and Climate on Lithospheric Evolution Using Multidisciplinary Approaches’, *GSA Connects 2025* (call for abstracts in progress)
- 2025 Peer review to *Global and Planetary Change*
- 2024 Chair of session ‘T51B From the Surface to the Mantle: Integrating Geophysical, Seismological, and Tectonics Perspectives Along the South American Margin I Poster’ *AGU24*, Washington D.C. 9-13 December 2024
- 2024 Chair of session ‘T53D From the Surface to the Mantle: Integrating Geophysical, Seismological, and Tectonics Perspectives Along the South American Margin II Oral’ *AGU24*, Washington D.C. 9-13 December 2024
- 2024 Peer review to *Tectonics*
- 2024 Peer review to *EGU Solid Earth*
- 2024 Peer review to *Evolving Earth*
- 2024 Peer review to *Geosphere*
- 2023 Peer review to *Lithos*
- 2023 Peer review to *Journal of the Geological Society*
- 2019 Directorship of the *UFPR AAPG Student Chapter*, Curitiba, Brazil

INTERNSHIPS

- 2015-2016 Company **Fugro In Situ Geotecnia**, Curitiba, Brazil. Geotechnical characterization of rock boreholes, Standard Penetration Test, Piezocone Penetration Test.

2015 **Center of Research and Technologic Development of Water**, Salamanca, Spain.
Water geochemical characterization from rivers of the Salamanca Province, Spain.

SOFTWARE SKILLS

Bash interface	Connection to High Performance Computers via SSH commands
MATLAB	Equation's solving, thermo-mechanical models, data analysis
ArcGIS	Generation of maps and satellite images
QTQt/HeFTy	Thermal modeling of thermochronology data
PERPLE_X	Thermodynamic modeling for metamorphic petrology
OpenStereo	Data analysis for structural geology
Illustrator	Vectorial drawing, elaboration of cross-sections
Photoshop	Image edition and RAW treatment
Office package	Excel, Word, PowerPoint

LANGUAGES

English	Fluent speaking and writing, C1 Erasmus assessment, 2022
Spanish	Fluent speaking and writing, B2 DELE, 2017
French	Advanced speaking and writing, B1 CUEF de Grenoble UGA, 2021
Italian	Fluent speaking and writing
Portuguese	Native Brazilian Portuguese

OTHER SKILLS

Alpinism and Rock Climbing

2023	Course of traditional rock climbing, CREPS, France
2022	Course of ice climbing, University of Grenoble Alps, France
2022	Course of aid climbing, Club Alpin Français
2021	Course of winter alpinism, Clube Alpino Italiano, Italy
2017-2019	Directorship of the Paraná Federation of Mountaineering (FEPAM), Brazil

Scouts

2003-2014	Union of Brazilian Scouts (Brazil), Member of the São Gaspar Bertoni Scout Group with leadership roles
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