

Dr. Carolina Munoz-Saez

Assistant Professor
Nevada Bureau of Mines and Geology
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Research Interest

Geological processes involving fluids, including problems in hydrothermal, hydrogeology, volcanology, life in extreme environments, quaternary deposits and paleoclimate.

Education

Ph.D., Earth and Planetary Science, University of California, Berkeley, CA 2016
Dynamics of geyser systems, El Tatio, Atacama, Chile (Advisor: Prof. Michael Manga)
M.S., Geology, University of Chile, Santiago, Chile 2007
Analog models of the influence of sedimentation in tectonic inversion: Applications over Cenozoic formations Abanico and Farellones (33°-36°S), Central Chile” (Advisor: Prof. Luisa Pinto).
B.S., Geology, University of Chile, Santiago, Chile 2005

Work Experience

LDEO, Columbia University and City College of New York 2020 – 2021
Postdoctoral Researcher
CEGA Institute, University of Chile 2017 – 2020
Postdoctoral Researcher (7 months maternity leave: April 2018 -October 2018)
Punta del Cobre Mining Company, Chile 2009 – 2010
Project Geologist: Field exploration, mapping and drilling of ore deposits
GEOVECTRA Mining Consultants, Chile 2008 – 2009
Project Geologist: Field exploration, mapping and drilling of ore deposits
Fundación Chile - BGR Germany, Geothermal project 2005 – 2007
Project geologist: Geothermal exploration and energy efficiency

Grants and Awards

Climate Center Grant, LDEO, Columbia University 2020 – 2021
America Association for University Woman Postdoctoral Fellowship 2020 – 2021
Conicyt - Chile: 4-year Research Grant 2020 – 2024
The optimal geologic conditions that form high enthalpy, metal- rich volcanic-hydrothermal systems in the Andes: Thermodynamic and mechanical numerical approach. Puyehue-Cordon Caulle and Sollipulli Volcanoes.
Conicyt – Chile: 3-year Postdoctoral Fellowship (extended for maternity leave) 2017 – 2020
Study of geysers dynamics, underground geometry, and sinter deposits: El Tatio geothermal field, Atacama Desert.
Louderback PhD Thesis Award, UC Berkeley 2016
Center for Latin American Studies: 1-year Research Grant, UC Berkeley 2014 – 2015
Fulbright Ph.D. Fellowship 2010 – 2014
Highest Distinction Graduation Award, University of Chile. 2007

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Amerique Latine Fellowship Award, University Paul Sabatier, Toulouse, France **2004**

Invited Talks

LDEO, Columbia University, Geochemistry Seminar **2021**
University of Nevada, Reno, GSE Department Seminar **2020**
American Natural History Museum (AMNH), EPS Seminar **2020**
Institute de Physique du Globe de Paris (IPGP), Silica workshop **2019**
LDEO, Columbia University, MGG/SGT Seminar **2019**
Cornell University, EAS Department Seminar **2019**
Sonoma State University, Geology Department Seminar **2018**
University of California Los Angeles, EPS Department Seminar **2017**
Colegio de Geólogos de Chile, Seminar **2016**

Teaching experience

College University of New York **Spring 2021**

Earth Systems, EAS-717: discussion session for 1st year graduate students 2 hours per week

University of California, Berkeley: Graduate Student Instructor **2012, 2013, 2015**

EPS 50, The Planet Earth: Course covered major subjects in geology, geophysics, geochemistry, hydrology, geomorphology, natural hazards, and earth resources. Leading weekly three hours of lab section for 20 undergraduate students, office hours, fieldwork and grading.

University of Chile: Graduate Student Instructor **2003-2005**

Andean Structural Geology: Course covered most tectonic events occurred in the west margin of the Chilean and South American Andes, including the development and migration of the volcanic arc from the beginning of the subduction in the Jurassic to the present time.

Sedimentology and stratigraphy: Course covered most of sedimentary rock, structures, and environments. Field component included mapping, stratigraphic measurements, geological cross sections, stratigraphic column and correlations.

General Geology: Course covered major subjects in geology, geophysics, geochemistry, hydrology, geomorphology, and earth resources.

Mineralogy: Course covered major groups of silicate minerals forming rocks, including the study of the chemistry, microscopy, and optical properties.

Paleontology: Course covered most of invertebrates and marine fossil record discovered in the Chilean Andes, environments, morphology, speciation and evolution.

List of Publications

Montecinos-Cuadros, D., Diaz, D., Yogeshwar, P., **Munoz-Saez**, C. Characterization of the shallow structure of El Tatio geothermal field in the Central Andes, Chile using transient electromagnetics (2021). Journal of Volcanology and Geothermal Research <https://doi.org/10.1016/j.jvolgeores.2021.107198>.

Reed, M.H., **C. Munoz-Saez**, S. Hajimirza, S.-M. Wu, A. Barth, T. Girona, M. Rasht-Behesht, E.B. white, M.S. Karplus, S. Hurwitz and M. Manga (2021) The 2018 reawakening of Steamboat, Yellowstone National Park, the world's tallest geyser, Proceedings of the National Academy of Sciences, vol. 118, e2020943118.

Munoz-Saez, C., Perez-Nunez, C., Martini, S., Vargas-Barrera, A., Reich, M., Morata, D., and Manga, M., 2020. The Alpehue geyser field, Sollipulli Volcano, Chile. Journal of Volcanology and Geothermal Research. doi.org/10.1016/j.jvolgeores.2020.107065.

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- Wilmeth, D., Nabhan, S., Myers K., Slagter S., Lalonde, S., Sansjofre, P., Homann, M., Konhauser, K., **Munoz-Saez, C.**, Van Zuilen, M. 2020. Depositional evolution of an extinct sinter mound from source to outflow, El Tatio, Chile. *Sedimentary Geology*
- Munoz-Saez, C.**, Manga, M., Hurwitz, S., Slagter, S., Churchill, D.M., Reich, M., Damby, D. and Morata, D., 2020. Radiocarbon dating of silica sinter and postglacial hydrothermal activity in the El Tatio geyser field. *Geophysical Research Letters*, p.e 2020GL087908.
- Gong, J., Myers, K., **Munoz-Saez, C.**, Homann, M., Wirth, R., Schreiber, A., Van Zuilen, M., 2020. Formation and Preservation of Microbial Palisade Fabric in Silica Deposits from El Tatio, Chile. *Astrobiology*. DOI: 10.1089/ast.2019.2025
- Slagter, S., Reich, M., **Munoz-Saez, C.**, Southon, J., Morata, D., Barra, F., Gong, J., Skok, J. R., 2019. Environmental controls on silica sinter formation revealed by radiocarbon dating. *Geology*, 47(4), 330-334.
- Ardid, A., Vera, E., Kelly, C., Manga, M., **Munoz-Saez, C.**, Maksymowicz, A., Ortega-Culaciati, F., 2019. Geometry of geyser plumbing inferred from ground deformation. *Journal of Geophysical Research*. doi.org/10.1029/2018JB016454.
- Munoz-Saez, C.**, Manga, M. and Hurwitz, S., 2018. Hydrothermal discharge from the El Tatio basin, Atacama, Chile. *Journal of Volcanology and Geothermal Research*, 361, pp.25-35.
- Namiki, A., Ueno, Y., Hurwitz, S., Manga, M., **Munoz-Saez, C.**, and Murphy, F., 2016. An experimental study of the role of subsurface plumbing on geothermal discharge. *Geochem. Geophys. Geosyst.* doi:10.1002/2016GC006472
- Munoz-Saez, C.**, Saltiel, S., Manga, M., Nguyen, C. and Gonnermann, H., 2016. Physical and hydraulic properties of modern sinter deposits: El Tatio, Atacama. *Journal of Volcanology and Geothermal Research*, 325, pp.156-168.
- Munoz-Saez, C.**, A. Namiki, and M. Manga, 2015. Geyser eruption intervals and interactions: examples from El Tatio, Atacama, Chile, *Journal of Geophysical Research*, vol. 120, doi: 10.1002/2015JB012364
- Munoz-Saez, C.**, Manga, M., Hurwitz, S., Rudolph, M., Namiki, A., Wang, C., 2015. Dynamics within geyser conduits, and sensitivity to environmental perturbations: Insights from a periodic geyser in the El Tatio geyser field, Atacama Desert, Chile. *Journal of Volcanology and Geothermal Research*, doi:10.1016/j.jvolgeores.2015.01.002.
- Namiki, A., **Munoz-Saez, C.**, Manga, M., 2014. El Cobreloa: A geyser with two distinct eruption styles. *Journal of Geophysical Research*, 119, doi:10.1002/2014JB11009.
- Adelstein, E., Tran A., **Munoz-Saez, C.**, Shteinberg, A., Manga, M., 2014. Geyser preplay and eruption in a laboratory model with a bubble trap. *Journal of Volcanology and Geothermal Research*, vol. 285, 129-135.
- Munoz-Saez, C.**, Pinto L, Charrier R, Nalpas T, 2014. Influence of depositional load on the development of a shortcut fault system during the inversion of an extensional basin: The Eocene-Oligocene Abanico Basin case, central Chile Andes (33°-35°S). *Andean Geology*, Vol 41, No 1.
- Pinto L., **Munoz-Saez, C.**, Nalpas T., Charrier R., 2010. Role of sedimentation during basin inversion in analogue modeling. *Journal of Structural Geology*, vol. 32, Issue 4, pp. 554–565.
- Olivier Ph., Gleizes G., Paquette J.L., **Munoz-Saez, C.**, 2008. Structure and U-Pb dating of the Saint-Arnac pluton and the Ansignan charnockite (Agly massif): a cross section from the upper to the middle crust of the Variscan Eastern Pyrenees. *Journal of Geological Society*, London; vol. 165; pp. 141-152.