

Carrara Alexandre

Borned May, 18th, 1991, in Creil, France

The Magmas and Volcanoes Laboratory – University of Clermont-Auvergne
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Professional Experiences:

- 2022 – present** Postdoctoral Research fellow
The Magmas and Volcanoes Laboratory – University of Clermont-Auvergne
Campus Universitaire des Cézeaux , Aubiere, 63178, France
Study of the acoustical properties of mush
- 2020 – 2022** Postdoctoral Research associate
Department of Earth and Space Sciences – University of Washington
4000 15th Ave NE, Seattle, WA 98195, United States
Numerical modeling of magmatic processes with non-spherical particles
- 2020** Visiting researcher (2 months, January – March)
Departamento de Geociencias – Universidad de los Andes
Cra 1 No 18A-12, Bogotá, Colombia
Numerical modeling of seismic wave propagation in magmatic reservoirs
- 2016-2019** Ph.D. student at ISTerre Chambéry on modeling magmatic reservoir processes and the study of the acoustic properties of magmas – University of Savoie Mont Blanc, Chambéry, France.
- 2016** Intern at Isterre on the study the deformation of volcano edifices using satellite data (Radar, optical)– University of Savoie Mont Blanc, Chambéry, France.
- 2015** Intern at Isterre on the study of the ascent of magma from the reservoir to the surface using numerical modeling– University of Savoie Mont Blanc, Chambéry, France.

Education:

- 2019** PhD in Earth Sciences – Solid Earth, University of Grenoble, Grenoble, France
Dissertation title: *Numerical modeling of the physical processes causing the reawakening of a magmatic chamber and of the associated geophysical signals*
Supervisors: Dr. Alain Burgisser and Dr. Philippe Lesage
- 2016** MSc in Earth Sciences – Solid Earth with high honors, University of Grenoble, Grenoble, France
Dissertation title: *Study of recent Colima volcano eruptive activity based on new SAR data from Sentinel-1A satellite*. Supervisor: Dr. Virginie Pinel
- 2014** Bachelor degree in Earth Sciences – University of Aix-Marseille, Marseille, France

Publications:

Published:

- Carrara, A.**, Lesage, P., Burgisser, A., Annen, C., Bergantz, G.W., 2022, The dispersive velocity of compressional waves in magmatic suspensions. *Geophysical Journal International*. doi.org/10.1093/gji/ggab432
- Breard E. C. P., Dufek J., Fullard L., **Carrara A.**, 2020, The basal friction coefficient of granular flows with and without excess pore pressure: implications for pyroclastic density currents, water-rich debris flows, rock and submarine avalanches. *Journal of Geophysical Research Solid Earth*, 549, 116539. <https://doi.org/10.1029/2020JB020203>
- Carrara, A.**, Burgisser, A., Bergantz, G.W., 2020. The architecture of intrusions in magmatic mush, *Earth and Planetary Science Letters*, 549, 116539. <https://doi.org/10.1016/j.epsl.2020.116539>
- Burgisser, A., **Carrara, A.**, Annen, C., 2020. Numerical simulations of magmatic enclave deformation. *Journal of Volcanology and Geothermal Research*, 392, 106790. <https://doi.org/10.1016/j.jvolgeores.2020.106790>
- Carrara, A.**, Burgisser, A., Bergantz, G.W., 2019. Lubrication effects on magmatic mush dynamics. *Journal of Volcanology and Geothermal Research*, 380, 19–30. doi.org/10.1016/j.jvolgeores.2019.05.008
- Carrara, A.**, Pinel, V., Bascou, P., Chaljub, E., De la Cruz-Reyna, S., 2019. Post-emplacement dynamics of andesitic lava flows at Volcán de Colima, Mexico, revealed by radar and optical remote sensing data. *Journal of Volcanology and Geothermal Research*, 381, 1–15. doi:10.1006/j.jvolgeores.2019.05.019
- Lesage P., **Carrara A.**, Pinel V., Arámbula-Mendoza R., 2018, Absence of detectable precursory deformation and velocity variation before the large dome collapse of July 2015 at Volcán de Colima, Mexico. *Front. Earth Sci.*, 6:93. doi:10.3389/feart.2018.00093
- Pinel V., **Carrara A.**, Maccaferri F., Rivalta E., Corbi F., 2017, A two-step model for dynamical dike propagation in two-dimensions: Application to the 2001 July Etna eruption, *Journal of Geophysical Research: Solid Earth*, 122(2), 1107–1125.

Other communications:

Invited talks:

- Carrara, A.**, Burgisser, A., Bergantz, G.W., 2020. The architecture of intrusions in magmatic mush, Department of civil engineering, Universidad de los Andes, Bogotá, Colombia. 02/28/2020.
- Carrara, A.**, Burgisser, A., Bergantz, G.W., 2020. The architecture of intrusions in magmatic mush, Department of Earth science, Universidad de los Andes, Bogotá, Colombia. 02/19/2020.
- Carrara, A.**, 2021. CFD-DEM modeling of magmatic reservoir dynamics, Laboratoire Magma Volcans, Aubière, France. 11/24/2021.
- Carrara, A.**, 2022. The influence of crystal shape on ordering in magmatic mush, ETHZ, Zürich, Switzerland. 03/30/2022.

Presentation in international conferences or workshops:

- IAVCEI 2017 (Portland, OR, USA), AGU 2018 (Washington DC, USA), CIDER summer program (Berkeley, 2019), EGU 2020 (Remote), AGU 2021 (New Orleans, LA, USA)

Outreach:

Carrara, A., 2022. Comment les réservoirs magmatiques se remplissent t'ils ? (in french), Le rayon <https://jeunes.sfpnet.fr/2022/11/08/comment-les-reservoirs-magmatiques-se-remplissent-ils/>

Teaching:

Geological mapping – Master degree – University Savoie Mont Blanc – 2017 – 16h of classes

Scientific programming – Bachelor degree – University Savoie Mont Blanc – 2018 – 20h

Numerical modeling – Bachelor degree – University Savoie Mont Blanc – 2018 & 2019 – 8h

Applied mathematics – Bachelor degree – University Savoie Mont Blanc – 2019 – 12h

Advised 11 undergraduate students during their numerical modeling projects (heat and wave propagation forward modeling) – 2018 & 2019 – ~24h

Grants and Awards:

MERB scholarship (100k€): French research minister scholarship funds for financial support during my PhD

AO7bis – Labex OSUG for student International mobility (2500€)

Two student international mobility grants from the doctoral school TUE (both 1000€)

Prix Géophysique 2021 (best thesis award) from the CNFGG (French National Comity of Geodesy and Geophysics)

Skills:

I am familiar with the Discrete Elements Method (DEM), Finite Volumes Method (FVM), Finite Elements Method (FEM), and Finite Differences Method (FDM).

I use or used the following softwares and codes: MFIX, SPECFEM 2D-3D, Gmsh, LMGC90, MIGFLOW, MELTS, QGIS, COMSOL, ENVI, GoCAD, Paraview, Visit, Imagej, Maxima.

I use the following programming languages: Python, Fortran, C, Matlab/Scipy, HTML/CSS.

References:

Alain Burgisser, CNRS, University of Savoie Mont Blanc. Contact: alain.burgisser@univ-smb.fr

George Bergantz, University of Washington. Contact: bergantz@uw.edu

Virginie Pinel, IRD, University of Savoie Mont Blanc. Contact: virginie.pinel@univ-smb.fr