Carrara Alexandre

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

The Magmas and Volcanoes Laboratory – University of Clermont-Auvergne
Campus Universitaire des Cézeaux 6 Avenue Blaise Pascal TSA 60026, Aubiere, 63178, France

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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 – Marsh)
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 Chambery on modeling magmatic reservoir processes and the study of the acoustic properties of magmas – University of Savoie Mont Blanc, Chambery, France.

2016 Intern at Isterre on the study the deformation of volcano edifices using satellite data (Radar, optical)– University of Savoie Mont Blanc, Chambery, 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, Chambery, 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-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