Christian Huber

CONTACT INFORMATION

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CITIZENSHIP

dual citizenship Switzerland, France.

Immigration status: J1 visa for postdoctoral scholars.

RESEARCH INTERESTS

My research focuses on geological fluid dynamics and its consequences for the rock record. I aim to tie together geochemical observations with dynamical processes. I am currently working for example on

- The effect of flow on the isotopic fractionation of calcium during calcite precipitation from a solution.
- Magma production in the upper mantle and lower crust, its storage in the crust and possible transport all the way to the surface (conduit and eruption dynamics).

EDUCATION

University of California, Berkeley, CA, USA.

PhD., Department of Earth and Planetary Science (May 2009)

- Thesis Topic: The importance of small-scale dynamics on large-scale magmatic processes
- Advisor: Professor Michael Manga
- Area of Study: Physical volcanology, geological fluid dynamics, multiphase flow in porous media.

University of Geneva, Switzerland.

B.S., Physics, October 2001 to July 2004

M.Sc., Earth Sciences, August 1998 to January 2001

- Thesis Topic: Array tracking of long-period events and tremor sources beneath Kilauea volcano, Hawaii.
- Advisor: Professor Michael Dungan, in collaboration with Dr. Bernard Chouet, USGS.

- Area of Study: Volcano-seismology.

B.S., Earth Sciences, October 1995 to July 1998

Grants and Awards

Paul Niggli Medal 2010, Swiss Society of Petrology and Mineralogy

Swiss National Science Foundation postdoctoral fellowship 2009, $43,000

Louderback award for Outstanding scholarship, Berkeley, 2009. $1,000

Esper Larsen Research Fund, 2008, for research in petrology. Project on homogenization of crystal-rich dacitic magma chambers. $19,756.

Academic Experience

Georgia Institute of Technology, Atlanta, GA,

Tenure-track faculty position **starting Summer 2011**

Grad student mentoring **Fall 2009**

- Organized and lectured a theoretical course on multiphase flows in porous media for a beginning graduate student.
- Assisted graduate students on fieldtrip to Mt St Helens.

University of California, Berkeley, Berkeley, CA USA

Lecturer **June 2009**

- Organizer and lecturer of a 4 days workshop on lattice Boltzmann numerical methods at the Department of Earth and Planetary Science, Berkeley. The workshop was attended by 20 participants (1 undergrad, 12 grad students, 6 postdocs and 1 faculty) and included a 2 to 3 hour long morning lecture and 3 hour long computer-assisted labs during afternoons.

Graduate Student **August 2005 to May 2009**

- Graduate Student Researcher 2005-May 2009

Teaching assistant at UC. Berkeley **March 2005 to May 2009**

- Teaching assistant, Spring 2008 and Spring 2007, EPS 108 Geodynamics (graduate and upper-division undergraduate class). Graded homeworks and prepared review sessions on linear algebra, tensor calculus, partial differential equations and geodynamics topics.
- Teaching assistant, Fall 2006, EPS 50 The planet Earth (lower-division undergraduate class). Lectured class on volcanology, ran two lab sessions, graded homeworks and assisted students during field trips.
- Mentored four undergraduate students on different research projects in the geophysical fluid dynamics lab.

Teaching Assistant-Geneva, Switzerland. **September 2004 to June 2005**

- Teaching assistant for undergraduate Geophysics class. Lectured and organized discussion sections, grading homeworks.

- Teaching assistant for introduction to computer science for geologists. Ran lab sections, graded homeworks.
- Assistant for week long topography-mapping field class (1st year undergraduate students).
- Responsible for the Mineralogy department website.
- Upgraded lecture notes for undergraduate Petrology class.

Undergraduate lab assistant, Geneva, Switzerland. **September 1997 to March 1998**

- Thin section laboratory assistant. Prepared thin sections, polished and double polished section for Mineralogy department.

Field assistant for USGS, San Juan volcanic field, Southern Colorado. **July 1997 to Sept. 1997**

- 11 weeks in the field to assist Peter Lipman (USGS) and Olivier Bachmann (then University of Geneva) mapping Oligocene volcanic deposits.

Publications

- *Submitted*
  - **Huber, C.**, Bachmann, O., and Dufek, J., Unzoned vs. zoned ignimbrites: a competition between recharge-induced stirring time and mush reactivation.
  - . Parmigiani, A., **Huber, C.**, Bachmann, O. and Chopard, B., Pore-scale mass and reactant transport in multiphase porous media flows, submitted to Journal of Fluid Mechanics.
  - Matthews, N., Pyle, D., Smith, V., Wilson, C. and **Huber, C.**, Quartz zoning and the pre-eruptive evolution of the 340 ka Whakamaru magma systems, New Zealand, submitted to Contributions to Mineralogy and Petrology.
  - Huber, C., Bachmann, O., Dufek, J., Thermo-mechanical reactivation of locked crystal mushes: melting-induced internal fracturation and assimilation processes in magmas, submitted to Earth and Planetary Science Letters.
  - Huber, C., Cassata, W., Renne, P., A lattice-Boltzman model for noble gas diffusion in solids Part 1: The importance of domain shape and diffusive anisotropy and implications for thermochronometry, submitted to Geochemica Cosmochmica Act.
  - Huber, C., Dufek, J., Chopard, B., An enthalpy-based method to implement Dirichlet boundary conditions in complex geometry, submitted to International Journal of Modern Physics C.
  - Huber, C., Parmigiani, A., Dufek, J., Breaking the equivalence between pressure and buoyancy-driven flows in porous media: the effect of tortuosity, submitted to Transport in Porous Media.
  - Huber, C., Parmigiani, A., Latt, J., Dufek, J., The control of surface tension in the flux of buoyant non-wetting phase through a saturated

porous media and the stability of fingering instabilities, submitted to Physica A.
- Dufek, J., and **Huber, C.**, Production and destruction of crust during crustal foundering, submitted to Nature Geosciences.

- *In press*

- **Huber, C.**, Dufek, J., and Karlstrom, L., Melt Generation and Magma Chamber Processes, submitted to Modeling volcanic processes: The physics and mathematics of volcanism, edited by S.A. Fagents, T.K.P. Gregg, and R.C. Lopez, Cambridge Univ Press.

- *In print*
  - **Huber, C.**, Bachmann, O., Dufek, J., The limitations of melting in the rejuvenation of silicic crystal mushes, 2010, to Journal of Volcanology and Geothermal Research, vol. 195, p. 97-105.
  - **Huber, C.**, Bachmann, O., and Manga, M., 2010, Two competing effects of volatiles on heat transfer in crystal-rich magmas: thermal insulation versus reactivation, submitted to Journal of Petrology, vol. 51, p. 847-867
  - **Huber, C.**, B. Chopard and M. Manga, 2010, A lattice Boltzmann model for coupled diffusion, Journal of Computational Physics, vol. 229, p. 79567976.
  - Watkins, J., DePaolo, D.J., **Huber, C.** and Ryerson, F.G., 2010, Liquid composition-dependence of calcium isotope fractionation during diffusion in molten silicates, Geochemica et Cosmochimica Acta.
  - **Huber, C.**, O. Bachmann and M. Manga, 2009, Homogenization processes in silicic magma chambers by stirring and latent heat buffering, Earth and Planetary Science Letters, Earth and Planetary Science Letters, vol. 283, 38-47.
  - Parmigiani, A., **C. Huber**, B. Chopard, J. Latt and O. Bachmann, 2009, Application of the Multi Distribution Function Lattice Boltzmann approach to thermal flows, Eur. Phys. J. Special Topics 171, 37-43.
  - **Huber, C.**, J. Watkins, and M. Manga, 2009, Steady shape for a bubble rising below an inclined wall at low Reynolds numbers, European Journal of Mechanics -B Fluids, vol 28(3), p. 405-410.
  - Watkins, J., M. Manga, **C. Huber**, and M. Martin, 2009, Diffusion-controlled spherulite growth in obsidian inferred from H2O concentration profiles, Contributions in Mineralogy and Petrology, vol. 157, p. 163-172.
  - **Huber, C.**, A. Parmigiani, B. Chopard, M. Manga and O. Bachmann, 2008, Lattice Boltzmann model for melting with natural convection, International Journal of Heat and Fluid Flow, vol. 29, 1469-1480.
  - Almendros, J., Chouet, B., Dawson, P., and **Huber, C.**, 2002, Mapping the Sources of the Seismic Wave Field at Kilauea Volcano, Hawaii, Using Data Recorded on Multiple Seismic Antennas, Bulletin of the Seismological Society of America; v. 92; no. 6; p. 2333-2351

Invited talks

- February 2011, Rice University.

- May 2010, Vanderbilt University.
- April 2010, SCRIPPS, University of California San Diego
- April 2010, Georgia Institute of Technology
- 02/15/2010, Oxford University, UK.
- 03/03/2009, Stanford University, USA, To what extent do bubble-scale dynamics control eruptions?.
- 03/02/2009, Stanford University, USA, Are magmatic flare-ups a consequence of crustal foundering?.
- 12/23/2008, University of Geneva, Switzerland, Magma chamber dynamics and the importance of crystalline mushes.
- 12/22/2008, University of Geneva, Switzerland, The role of flow on calcium isotopic fractionation during calcite precipitation.
- 11/19/2008, University of Oregon, Multiphase problems in magma chamber and volcanic conduits.
- 10/17/2008, Georgia Institute of Technology, Why are the most viscous magma the most homogeneous ?

Conference abstracts (2006-2009

- **C. Huber**, O. Bachmann and M. Manga, The importance of melting of a crystalline mush on the volatile transport from an underlying intrusion, Goldschmidt 2009.
- **C. Huber**, J. Dufek, A. Parmigiani and M. Manga, Effects of bubble coalescence and breakup on conduit dynamics, AGU 2008 .
- O. Bachmann, **C. Huber** and M. Manga, Homogenization processes in silicic magma chambers by stirring and latent heat buffering, AGU 2008 .
- **C. Huber** and J. Dufek, Production and destruction of crust during foundering, IAVCEI 2008 .
- A. Parmigiani, **C. Huber**, O. Bachmann and B. Chopard, A numerical model for gas-percolation in crystal-rich magmas based on the Lattice Boltzmann method, IAVCEI 2008.
- A. Parmigiani, **C. Huber**, B. Chopard and O. Bachmann, Magma chamber simulations with Multi-Distribution Function Lattice Boltzmann models, Discrete Simulation of Fluid Dynamics 2008.
- J. Dufek and **C. Huber** *Invited*, Multi-scale dynamics near the Moho: The role of mass and energy exchange between the crust, sub-continental lithosphere and asthenosphere in crustal development, AGU Fall 2007.

- O. Bachmann, A. Parmigiani, **C. Huber** and B. Chopard, 2D Lattice Boltzmann conduction-advection model with phase-change: Developing a new tool to assess melting-crystallization dynamics in magma chamber, AGU Fall 2007.
- **C. Huber**, M Manga and A. Parmigiani, Lattice Boltzmann model of lava lake convection and solidication, AGU Fall 2007.
- A. Parmigiani, B. Chopard, **C. Huber** and O. Bachmann, Investigating high Prandtl number fluid flow with a passive scalar approach thermal lattice Boltzmann model, Discrete Simulation of Fluid Dynamics 2007.
- A. Parmigiani, **C. Huber**, J. Latt, B. Chopard and O. Bachmann, 2D Lattice Boltzmann conduction-advection model with phase-change: A new tool to assess melting-crystallization dynamics in magma chamber, IUGG 2007 Perugia.

Collaborators

- Michael Manga, UC Berkeley, multiphase flow dynamics, magma chamber dynamics.
- Donald J. DePaolo, UC Berkeley, Calcium isotope fractionation during calcite precipitation.
- Olivier Bachmann, University of Washington, magma chamber dynamics, petrology of rhyodacitic deposits.
- Josef Dufek, Georgia Institute of Technology, melt production and extraction, mantle-crust coupling, conduit flows and eruption dynamics.
- Sawata Hier-Majumder, University of Maryland, melt production and extraction in lower mantle, ULVZ.
- Katherine Cashman, University of Oregon, volcanology, bubble flows in partially crystallized melts.
- Bastien Chopard, University of Geneva, computational fluid dynamics, statistical mechanics.
- Jonas Latt, EPFL, Switzerland, computational fluid dynamics, parallel algorithms.
- Wendy Mao, Stanford University, clathrate stability.
- Bruce Buffett, University of California, Berkeley, clathrate stability, geophysical fluid dynamics.
- Paul Renne, University of California, Berkeley, numerical modeling of Argon diffusion in crystals and step heating Argon loss.

Departmental Activities

- Co-organized the weekly seminars of the Department of Earth and Planetary Science, UC Berkeley, Spring 2008.
- Co-organized the students weekly seminars, Department of Earth and Planetary Science, UC Berkeley, Fall 2007.

Service

Reviewer for Journal of Geophysical Research and Physica D Nonlinear Phenomena, International Journal of Heat Transfer, International Journal of Heat and Mass Transfer, National Science Foundation (Hydrology and Petrology-Geochemistry, CAREER award).

Technical Skills

Programming: C, C++, Pascal, Delphi, Matlab.

Applications: LaTeX, BibTeX, gnuplot, Paraview, Adobe Illustrator, Microsoft Office, and other common productivity packages for Windows, OS X, and Linux platforms

Operating Systems: Microsoft Windows XP/2000, Apple OS X, Linux, Solaris, and other UNIX variants

Languages

English - fluent
French - mother tongue
German - good knowledge

Affiliation

American Geophysical Union
Geological Society of America

References

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