

**CURRICULUM VITAE ET STUDIORUM**  
**MAURIZIO PETRELLI (PhD)**

**PERSONAL DATA**

*name:* Maurizio Petrelli  
*address:* piazza dell'Università, 1 - 06123, Perugia (IT)  
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*current position:* Researcher (tenure track), University of Perugia



**RESUME**

Maurizio Petrelli works as researcher in petrology and volcanology at the Department of Physics and Geology, University of Perugia. In 2001, he graduated with honour in Geology at the University of Perugia. In February 2006, he got a PhD discussing a thesis titled “Non-Linear Dynamics in Magma Interaction Processes: Implications for Timescale of Magma Hybridization.” This work received an award from the Società Italiana di Mineralogia e Petrologia (SIMP) for the best PhD Thesis in Petrology for the year 2006. Since 2002, he has carried out an intense laboratory work focused on the development of analytical protocols for geochemical analysis by Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS). Currently, he is the scientific manager of the LA-ICP-MS laboratory of the Department of Physics and Geology, University of Perugia. Current studies are focused on the petrological, volcanological and geochemical characterization of magmatic systems with particular emphasis on time-scales estimates of magmatic processes. To do that, he combines the use of numerical simulations, experimental petrology and the study of natural samples. Since 2016, he has developed a new research group at the Department of Physics and Geology, University of Perugia focused on the application of Machine Learning techniques to petrological and volcanological studies.

## NUMBER OF PUBLICATIONS, H-INDEX

76, 16 – SCOPUS (<https://goo.gl/su2PJ9>)

## EDUCATION AND HABILITATIONS

April 2017 – **Habilitation to the role of Associate Professor in the Italian Universities** – Italian “Ministero dell'Istruzione dell'Università e della Ricerca (MIUR)”

February 2006 – **Ph.D. Degree in Earth Sciences** – University of Perugia, Italy

*Thesis:* “Transition to chaos and implications for time-scales of magma hybridization during mixing processes in magma chambers”. *Supervisor:* Prof. G. Poli

July 2001 – **Master Degree in Geology** – University of Perugia, Italy – 110/110 cum laude

*Thesis:* “Determination of travertine provenance from ancient buildings using self-organizing maps and fuzzy logic”. *Supervisor:* Prof. G. Poli

## PROFESSIONAL APPOINTMENTS

Dec 2018 – now

University of Perugia: **Researcher, tenure track (3 years)**

*Scientific Activities:* petrological, volcanological and geochemical characterization of magmatic systems with particular emphasis on time-scales estimates of magmatic processes. Application of Machine Learning techniques to petrological and volcanological studies.

Aug 2015 – now

Istituto Nazionale di Fisica Nucleare (INFN): **Scientific Association**

*Scientific Activities:* Petrological and geochemical study of meteorite samples to unravel their origin and evolution.

Aug 2014 – Dec 2018

University of Perugia: **Researcher, fixed term (3 + 2 years)**

*Scientific Activities:* Unravel the evolution and time-scales of magmatic systems by combining numerical simulations, experimental petrology and the study of natural samples. These studies are in the framework of the CHRONOS ERC project (PI, Diego Perugini).

Nov 2009 – Aug 2014 University of Perugia: **Post-Doc, Contract Researcher - Collaborator**  
*Scientific Activities:* Study of the evolution and time-scales of magmatic systems by numerical simulations and micro-analytical geochemical determinations.

Nov 2005 – Nov 2009 University of Perugia: **Post Doc Fellow**  
*Scientific Activities:* Study of trace elements mobility in igneous systems experiencing magmatic interaction between compositional heterogeneous magmas. Petrological and geochronological study of early Paleozoic Ross–Delamerian Orogen (Morozumi Range, Antarctica).

Dec 2003 – Jan 2004 ENEA: **Contract Researcher:** XIX Italian Antarctic Expedition  
*Scientific Activities:* Study of the magma mixing process in the Northern Foothills and Dry Valleys (Victoria Land) areas.

Nov 2001 – Nov 2005 University of Perugia: **PhD student**  
*Ph.D. Project:* “Transition to chaos and implications for time-scales of magma hybridization during mixing processes in magma chambers”.

#### **DEVELOPMENT OF ANALYTICAL FACILITIES**

Nov 2002 – Now University of Perugia: **Development of the LA-ICP-MS Laboratory**  
*Laboratory Activities:* Development of the Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) laboratory. In 2001, he started the development of the LA-ICP-MS laboratory at the Department of Geology, University of Perugia. Since 2002, he successfully run the LA-ICP-MS with activities that includes the maintenance of the instrumentations, the development of analytical protocols, the analysis of natural and experimental samples, and the support of external users during the analysis. Currently, the LA-ICP-MS lab in Perugia hosts two LA-ICP-MS systems and it is actively involved in several scientific projects.

## **PROGRAMMING SKILLS**

Proficient in Python and Ms Visual Basic programming. Familiar with general purpose scientific tools (e.g., Matlab and Origin) and specific programs for geochemical and petrologic purposes (e.g., GCDkit, MELTS, rhyoliteMELTS, alphaMELTS and MagmaSat). Developer of the Petrograph software aimed to the visualization and the modelling of petrologic and geochemical data. Basic knowledge of lua and C programming.

## **TEACHING ACTIVITY**

2019 – 2020 University of Perugia, Master degree in Geological Sciences and Technologies. Teaching course in “Introduction to experimental petro-volcanology”.

2019 – 2020 University of Perugia, Master degree in Geological Sciences and Technologies. Teaching course in “Mathematical methods in Earth Sciences”.

2018 – 2019 University of Perugia, Master degree in Geological Sciences and Technologies. Teaching course in “Data analysis and data interpretation in geological sciences”.

2017 – 2018 University of Perugia, Master degree in Geological Sciences and Technologies. Teaching course in “Data analysis and data interpretation in geological sciences”.

2015 – 2016 University of Perugia, Master degree in Geological Sciences and Technologies. Teaching course in “Igneous Petrology”.

## **AWARDS**

2016 - Microsoft Azure Research Award (CRM:0518576), Microsoft Corporation.

2006 – *PhD Thesis Award*: Società Italiana di Mineralogia e Petrografia (SIMP).

2002 – *Master Thesis Award*: Associazione “per un sorriso Monica De Carlo” – ONLUS.

## RECENT FUNDINGS

2019 - now                      *Project title*: "ENGAGE: machinE learNinG Applications for Geological problEms"  
*Funding Scheme*: "University of Perugia, base research funding"  
*Role*: **Principal Investigator**

2016 - 2017                      *Project title*: "Machine learning applications for the study of high dimensional petrological problems"  
*Funding Scheme*: "Microsoft Azure for Research Award"  
*Role*: **Principal Investigator**

2016 - 2017                      *Project title*: "CHALLENGE: Coupling machIne leArning, Leading anaLytical mEthods aNd larGe gEochemical datasets in tephra studies"  
*Funding Scheme*: "University of Perugia, base research funding"  
*Role*: **Principal Investigator**

2014 - 2018                      *Project title*: CHRONOS – A geochemical clock to measure timescales of volcanic eruptions  
*Funding Scheme*: ERC Consolidator Grant 2013  
*Role*: **Researcher in the main research unit**

## COMMUNITY INVOLVEMENT

2015 – 2020                      American Mineralogist, **Guest Associate Editor** for the special collection entitled “Dynamics of Magmatic Processes”.

Jun 2020                          **Organizer** of a thematic session at the Goldschmidt 2020 in Virtual mode: "Constraining Petrological and Geochemical Variations in Magmas to Capture the Evolution of Volcanoes over Space and Time".

May 2020                          **Organizer** of a thematic session at the EGU General Assembly in Virtual

mode: "The Dynamics of Magmatic Plumbing System".

- Apr 2019                    **Organizer** of a thematic session at the EGU General Assembly in Vienna (Austria): "Rates, timescales and mechanisms of magmatic and volcanic processes: from mantle source to emplacement or eruption".
- Dec 2018                    **Organizer** of a thematic session at the AGU Fall Meeting in Washington DC (USA): "Origin and Timescales of Magmatic Systems: Discussing Ages, Rates, Transport, and Storage Processes of Magmas from the Source to Emplacement or Eruption".
- Dec 2017                    **Organizer** of a thematic session at the AGU Fall Meeting in New Orleans (USA): "Processes of Magma Crystallization from Depth to Surface".
- Nov 2016                    **Organizer** of a thematic session at the Cities on Volcanoes 9 in Puerto Varas (Chile): "Mind the Gap! Techniques to overcome multi-scale issues in geological and geomorphic processes".
- Jun 2016 - now            **Organizer** of the international workshop entitled "Application of Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) to Earth Sciences" in Perugia.
- Apr 2016                    **Organizer** of a thematic session at the 2016 European Geosciences Union General Assembly in Vienna (Austria): " Mind the Gap! Techniques to overcome multi-scale issues in geological and geomorphic processes".
- Aug 2015                    **Organizer** of a thematic session at the 2015 Goldschmidt conference in Prague (Czech Republic): "Dynamics of Magmatic Processes: From Magma Mixing to Crystal Residence Time".

## SELECTED SCIENTIFIC PUBLICATIONS

Please refer to my Scopus record for the complete list of publications (<https://goo.gl/su2PJ9>)

1. **Petrelli M.**, Zellmer G.F., (in press). Rates and Timescales of Magma Transfer, Storage, Emplacement, and Eruption. In Dynamic Magma Evolution (Francesco Vetere Editor), Geophysical Monograph Series, 254, American Geophysical Union and Wiley.
2. **Petrelli M.**, El Omari K., Spina L., Le Guer, Y., La Spina G., Perugini D., 2018. Timescales of water accumulation in magmas and implications for short warning times of explosive eruptions. *Nature Communications*, doi: 10.1038/s41467-018-02987-6
3. **Petrelli M.**, Bizzarri R., Morgavi D., Baldanza A., Perugini D., 2017. Combining machine learning techniques, microanalyses and large geochemical datasets for tephrochronological studies in complex volcanic areas: New age constraints for the Pleistocene magmatism of central Italy. *Quaternary Geochronology*, doi: 10.1016/j.quageo.2016.12.003
4. **Petrelli M.**, Perugini D., 2016. Solving petrological problems through machine learning: the study case of tectonic discrimination using geochemical and isotopic data. *Contributions to Mineralogy and Petrology*, doi: 10.1007/s00410-016-1292-2
5. **Petrelli M.**, El Omari K., Le Guer Y., Perugini D., 2016. Effects of chaotic advection on the timescales of cooling and crystallization of magma bodies at mid crustal levels. *Geochemistry, Geophysics, Geosystems*, doi: 10.1002/2015GC006109
6. **Petrelli, M.**, Perugini, D., Poli, G., 2011. Transition to chaos and implications for time-scales of magma hybridization during mixing processes in magma chambers. *Lithos* 125, 211-22

Perugia, 26/06/2020

Sincerely

Maurizio Petrelli

