

# *Curriculum Vitae et Studiorum*

**Barbara Marchesini**

## **EDUCATION:**

### Ph.D.

From 01/11/2016 to 20/03/2020

University of Bologna

Department of Biological, Geological, and Environmental Sciences

Thesis Title: “The role of fluids on strain localization at the base of the seismogenic crust: A case study from the Olkiluoto deep nuclear waste repository, southwestern Finland.”

Supervisors: Prof. Giulio Viola and Dr. Paolo Garofalo.

From 07/01/2019 to 08/02/2019: visiting student at the School of Geography, Earth and Environmental Sciences of the University of Plymouth, UK. Name of the project: “Electron backscatter diffraction on hydrothermal pyrite”. Supervisor: Prof. Luca Menegon.

From 01/09/2018 to 03/12/2018: visiting student at the Laboratory of Inorganic Chemistry (ETH Zürich). Name of the project: “Trace element characterization and compositional mapping of pyrite”. Marco Polo scholarship. Supervisor: Dr. Bodo Hattendorf.

29/04/2016 Master Degree in Geological science and technology at the University of Perugia (Italy) with the grade of 110/110 summa cum laude (honours).

Thesis Title: “Structural analysis of the Middle Vigi Valley (Sellano and Postignano areas, Umbria-Italy)”. Supervisor: Prof. Massimiliano Rinaldo Barchi.

From Feb. to June/2015 Visiting student at the University of Barcelona (Universitat de Barcelona), Spain. Erasmus+ exchange program.

18/10/2013 Bachelor’s Degree in Geological Science, at the University of Perugia (Italy) with the grade 105/110. Thesis title: “X-ray microtomography of tourmaline nodules in granitoid rocks: fractal analysis and petrologic implications”. Supervisor: Prof. Diego Perugini.

March-May 2013 Internship at Agenzia Regionale per la Protezione Ambientale (ARPA UMBRIA). Project name: Groundwater monitoring of pollution due to chlorinated solvents.

## LANGUAGE SKILLS:

**Italian:** Native language

**English:** Fluent

**Spanish:** Good knowledge

**Catalan:** Limited

**French:** Limited

## SKILLS

I have experience with the following techniques:

- Field mapping and structural analysis, softwares for structural analysis (FaultKin, Stereonet 9, Win\_Tensor)
- Micro-tomography, image analysis (ImageJ/Fiji), fractal analysis.
- QGIS.
- Petrographic and microstructural analysis with transmitted and reflected light.
- Fluid inclusion analysis (petrography, microthermometry, micro-Raman), software for computation of fluid inclusions (Fluids, HokieFlincs Excel spreadsheet).
- Mineral-pair geothermometers (quartz-chlorite and sphalerite-stannite) and Carbonaceous Material geothermometry.
- Raman analysis.
- Electron Probe Microanalysis.
- Laser Ablation Inductively Coupled Plasma Time-of-Flight Mass Spectrometry.
- Scanning Electron Microprobe (SEM) and Electron backscattered diffraction (EBSD) analysis.
- Cathodoluminescence.
- Fluid pressure estimation from aspect-ratio analysis of fractures.

## *Publications*

**Marchesini, B.**, Garofalo, P. S., Menegon, L., Mattila, J., & Viola, G. (2019). Fluid-mediated, brittle–ductile deformation at seismogenic depth–Part 1: Fluid record and deformation history of fault veins in a nuclear waste repository (Olkiluoto Island, Finland). *Solid Earth*, 10, 809–838, 2019).

Prando F., Menegon L., Anderson M. W., **Marchesini B.**, Mattila, J. and Viola, G. Fluid-mediated, brittle-ductile deformation at seismogenic depth: Part II – Stress history and fluid pressure variations in a shear zone in a nuclear waste repository (Olkiluoto Island, Finland). *Solid Earth*, 11, 489–511, 2020, <https://doi.org/10.5194/se-11-489-2020>.

Valentini L., **Marchesini B.**, Parisatto M., Perugini D., Artioli G. (2015). Non-invasive assessment of the formation of tourmaline nodules by X-ray microtomography and computer modelling. *American Mineralogist* (IF 2.6), Volume 100, Issue 2-3, pp. 341-668, <https://doi.org/10.2138/am-2015-4987>.

### *Presented Abstracts*

**Marchesini B.**, Viola G., Menegon L., Mattila J., Schwarz G., Hattendorf B., and Günther D. The role of fluids on strain localization at seismogenic depth: a case study from brittle-ductile faults from Olkiluoto Island, SW Finland. EGU 2020: Sharing Geoscience Online, 03-08 May 2020.

**Marchesini B.**, Viola G., Menegon L., Mattila J., Schwarz G., Hattendorf B., Günther D. The role of fluids on strain localization at seismogenic depth: a case study from brittle-ductile faults from Olkiluoto island, SW Finland. The Royal Society Meeting: “Understanding earthquakes using the geological record”, 17-18 February 2020, London (UK).

**Marchesini B.**, Garofalo P.S., Menegon L., Mattila J. and Viola G. Fluid-mediated, brittle-ductile cyclicity at seismogenic depth: Fluid record and deformation history of a fault system of the Svecofennian basement in SW Finland. Congresso Congiunto SIMP-SGI-SOGEI, 16-19 September 2019, Parma, Italy.

**Marchesini B.**, Menegon L., Prando F., Keresztes Schmidt P., Garofalo P.S., Schwarz G., Hattendorf B., Günther D., Mattila J. & Viola G. Evidence of low-temperature plasticity in naturally deformed pyrite: a LA-ICP-TOFMS-EBSD combined approach (Olkiluoto Island, Finland). Congresso Congiunto SIMP-SGI-SOGEI, 16-19 September 2019, Parma, Italy

**Marchesini B.**, Menegon L., Prando F., Schmidt P.K., Garofalo P.S., Schwarz G., Hattendorf B., Günther D., Mattila J. & Viola G. Evidence of incipient plasticity in hydrothermal pyrite. Deformation, Rheology and Tectonics (DRT), 11-14 June 2019, Tübingen, Germany.

Menegon, L., **Marchesini, B.**, Prando F., Garofalo, P.S., Viola, G., Anderson, M. and Mattila, J. Brittle-viscous oscillations and different slip behaviours in a conjugate set of strike-slip faults. EGU General Assembly 2018, 8-13 April 2018, Vienna, Austria.

**Marchesini, B.**, Garofalo, P. S., Mattila, J., Menegon L. and Viola, G. Fluid-mediated, brittle-viscous deformation cycles at the brittle-ductile transition. Tectonic Studies Group (TSG) and Metamorphic Studies Group (MSG) 2018, 3-5 January 2018, Plymouth (UK).

**Marchesini, B.**, Garofalo P.S., Viola G., Mattila J., Menegon, L. A natural example of fluid-mediated brittle-ductile cyclicity in quartz veins from Olkiluoto island, SW Finland. EGU General Assembly 2017, 23-28 April 2017, Vienna (Austria)

**Marchesini B.**, Perugini, D., Valentini, L. X-ray tomography of tourmaline nodules in granitoid rocks: fractal analysis and petrological implications. VI International Conference on Fractals and Dynamic Systems in Geoscience, 30 September– 02 October 2013, Perugia, Italy.

### *Attended Conferences*

- EGU 2020: Sharing Geoscience Online, 03<sup>rd</sup>-08<sup>th</sup> May 2020.
- The Royal Society Meeting: “Understanding earthquakes using the geological record”, 17<sup>th</sup> - 18<sup>th</sup> February 2020, London, UK.
- Congresso Congiunto SIMP-SGI-SOGEI, 16<sup>th</sup> -19<sup>th</sup> September 2019, Parma, Italy.
- Deformation, Rheology and Tectonics, 11<sup>th</sup>-14<sup>th</sup> June 2019, Tübingen, Germany.
- Tectonic Studies Group (TSG) and Metamorphic Studies Group (MSG) 2018, January 3<sup>rd</sup>-5<sup>th</sup> 2018, Plymouth, UK.
- EGU General Assembly 2017, April 23<sup>rd</sup>-28<sup>th</sup> 2017, Vienna, Austria.
- Tectonic Studies Group meeting 06<sup>th</sup> -08<sup>th</sup> Jan. 2016, London, UK.
- VI International Conference on Fractals and Dynamic Systems in Geosciences meeting. 26<sup>th</sup> September- 02<sup>nd</sup> Oct. 2013, Perugia, Italy.

### *Attended courses and workshops:*

- Internation Winter School “Thermal history of basin-source systems: techniques, modelling and applications”, 10<sup>th</sup> -15<sup>th</sup> February 2020, University of Pavia, Italy.
- “Microtectonics Course” held by Prof. Cees Passchier, 18<sup>th</sup>-21<sup>st</sup> February 2019, University of Mainz, Germany.
- Short course: “Fault rock microstructures” by Prof. Renée Heilbronner, 11<sup>th</sup>-12<sup>th</sup> December 2017, University of Parma, Italy.

- Fourth EGU Summer School 2017:” Structural analysis of crystalline rocks”, Nevessee Area, South Tirol), August 25<sup>th</sup> –31<sup>st</sup> 2017.
- Field course: Field trip across the Western Alps “escursione geologica attraverso le Alpi Occidentali”, June 26<sup>th</sup> -30<sup>th</sup> 2017, Valle d’Aosta.
- Fluid inclusion short course, May 3<sup>rd</sup>-5<sup>th</sup> 2017, Montanuniversity Leoben, Austria.
- “Raman spectroscopy applied to Earth, environmental and chemical sciences”, January 25<sup>th</sup>-27<sup>th</sup> 2017, held by University of Torino and University of Milano Bicocca, Italy.
- Short course on Geochemistry of hydrothermal fluids 30<sup>th</sup> May – 01<sup>st</sup> June 2016, University of Perugia (Italy).
- First international short course on “Application of Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) to Earth Sciences” 25<sup>th</sup>-27<sup>th</sup> May 2016, Perugia (Italy).
- Microtectonics Workshop 06<sup>th</sup> January 2016, Birkbeck University London, UK by Professor Cees Paschier (Johannes Gutenberg University of Mainz).

### *Travel Grants and Awards*

- TSG Conference Bursary 2020.
- Marco Polo scholarship 2018, held by the University of Bologna.
- Erasmus+ 2014/2015 scholarship, University of Perugia.

### **TEACHING ACTIVITIES:**

- Seminar: “Fluid overpressure as key factor steering strain localization: a case study from wet brittle ductile faults in the Finnish deep nuclear waste repository (Olkiluoto Island, SW Finland)”, 5<sup>th</sup> December 2019, Department of Physics and Geology, University of Perugia (Italy).
- Lesson: “The role of fluids on faulting and strain localization in the lithosphere: an overview”, lesson within the Tectonics and Geodynamics class held by Prof. Giulio Viola and by Dr. Gianluca Vignaroli at the University of Bologna. 13<sup>th</sup> November 2019, Department of Biological, Geological and Environmental Sciences, University of Bologna (Italy).