

CURRICULUM VITAE (13/03/2022)
MANUELE FACCENDA

Dipartimento di Geoscienze
Università di Padova
Padova, 35131, Italy
E-mail: manuele.faccenda@unipd.it
Tel: +39 0498279159

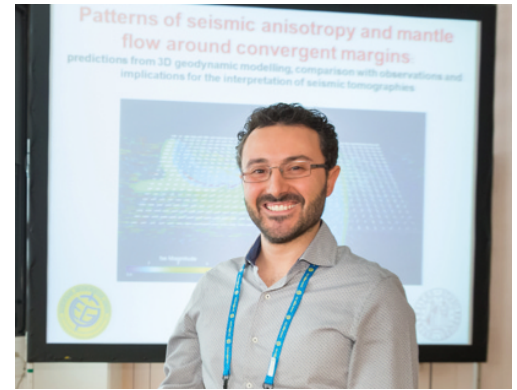
[Personal website](#), [NEWTON project website](#), [Google Scholar](#)

Research unique identifier(s):

ORCID: <https://orcid.org/0000-0001-7717-5931>

Scopus ID: 24334746900

Researcher ID: N-6806-2017



EDUCATION

2006-2010: PhD Geophysics, ETH Zürich, Switzerland, awarded on 29/01/2010 (Supervisor: Prof. Taras V. Gerya)

2000-2005: M.Sci. *cum laude* Earth Sciences, Università di Perugia, Italy, 2005

ACADEMIC APPOINTMENTS & FELLOWSHIPS

2019: Italian National Habilitation to the university professorship, Full Professor level (Academic field: (04/A4) Geophysics) awarded by the Italian Ministry of Education, University and Research.

2018: Italian National Habilitation to the university professorship, Associate Professor level (Academic field: (04/A1) Geochemistry, Mineralogy, Petrology, Vulcanology, Georesources and Applications) awarded by the Italian Ministry of Education, University and Research.

2018-present - Associate Professor, Università di Padova, Italy

2012-2018 - Assistant Professor, Università di Padova, Italy

2012-2014 - Adjunct Fellow, Monash University, Australia

2009-2012 - Postdoctoral Fellow, Monash University, Australia

VISITING APPOINTMENTS

March-April 2017– University College London (UCL) (Prof. Ana Ferreira, Prof. John Brodholt)

March-April 2014 - Monash University, Australia (Prof. Fabio Capitanio)

RESEARCH

Numerical modeling of geological and geophysical processes characterizing plate margins and their interactions across scales. The research activities include multidisciplinary topics such as mantle convection, mechanical and seismic anisotropy of deformed rocks, formation of orogens and oceanic basins metamorphism in collisional and subduction settings, lithospheric faulting, fluid migration in porous rocks, deep seismicity. More recently, the research activity has been dedicated to the development of a new methodology based on the coupling between geodynamic and seismological modeling able to improve our understanding the Earth's internal structure.

TEACHING

2013 – present: Numerical Modeling in Geosciences.

2016 - present: Fisica Terrestre (Geophysics)

2020 - present: Numerical Methods in Geosciences.

2012 – 2015 - Macroscopic rock analysis

COMMUNITY SERVICE

Conference session organization:

DI002: Advances in understanding Earth's dynamic processes using seismic anisotropy (AGU Fall Meeting, 2017, 2018).

GD7.2: Anisotropy from crust to core: observations, models and implications (EGU General Assembly, 2016-2022)

T017: Fluids and Hydrous Phases in Subduction Zones (AGU Fall Meeting, 2012)

Workshop organization:

Main organizer of 2019 Ada Lovelace Workshop on Modelling Mantle and Lithosphere Dynamics (25-30 August 2019, Certosa di Pontignano, Siena, Italy)

COMMISSION OF TRUST

Journals: Science, Nature Geoscience, Nature Commun., EPSL, Tectonophys., G-Cubed, JGR–Solid Earth, Marine and Petroleum Geology, Solid Earth, Terra Nova, J. Geodynamics.

Funding Agencies: NSF (USA), ANR (2019); ERC- StG (2020, 2021).

Member of the PhD defense panel: Keith Magali (Lyon Uni., 2020); Ben Mather (Monash Uni., 2021).

Guest Editor for the special volume “ Subduction and Collision Dynamics of Tectonic Plates “ in *Frontiers in Earth Science* (2021 -)

Member of the UGI (Unione Geofisica Italiana) **Directive Council** (2021 -)

FUNDING HISTORY

2018-2023 - ERC StG 758199 NEWTON, Euro 1,466,030.

2012-2015 - Progetto di Ateneo, Università di Padova, Italy, Euro 44,000

2009-2010 - Swiss National Science Foundation Post-doctoral Fellowship PBEZP2-126187, CHF 44,000

AWARDS

2015 –Arne-Richter Award for Outstanding Young Scientist, European Geoscience Union.

2013 - Flinn-Hart Award for Outstanding Young Scientist’s contributions to the Solid Earth Sciences, International Lithosphere Program, Vienna, Austria.

2008 - Outstanding Student Paper Award, AGU Fall Meeting, San Francisco, USA

UNDERGRADUATE AND GRADUATE TEACHING RESPONSIBILITIES

2015 – present – Geophysics (Undergrad.)

2014 – present - Introduction to structure and dynamics of the Earth (Undergrad.)

2014 – 2015 - Introduction to Geosciences (at ENSTP – Yaoundè, Cameroon) (Undergrad.)

2013 – present - Numerical modelling in geoscience (Grad.)

2012 – 2015 - Macroscopic rock analysis (Undergrad.)

STUDENTS SUPERVISION

Fedrizzi Giulia, *Numerical simulations of strain-induced LPO development in plagioclase crystal aggregates*, BSc, 2016

Viscolani Andrea, *Numerical modelling of viscous shear instabilities*, BSc, 2016

Sturgeon William, *Investigating radial anisotropy in the upper lower mantle around subduction zones*, MSc, 2016 (UCL, co-supervision with Prof. Ana Ferreira)

Piccolo Andrea, *Exhumation mechanisms during continental collision*, MSc, 2014-2015

Dal Zilio Luca, *Continental drift induced by subduction*, MSc, 2014

PhD STUDENTS SUPERVISION

Rappisi Francesco, *Micro- and macro-scale modelling of convergent margins* (2018-2021)

Lo Bue Rosalia, *Numerical modelling of convergent margins with the adjoint method* (2018-2021)

Jun Ren, *The deep carbon cycle and intraplate magmatism* (2021-2024)

PUBLICATION OVERVIEW

I have author and coauthor of **43 scientific articles** (38 without the PhD supervisor as a co-author), including **4 review papers**, that have been cited 1555 times (Scopus; h-index = 20); 1526 times (ISI Web of Knowledge; h-index = 20); 1965 times (Scholar, h-index = 22); as of 13 March 2022. I have also regularly presented my scientific results at international conferences (e.g., AGU, EGU, IGC, IUGG, Goldschmidt, **> 80 abstracts**), where I gave **17 invited oral presentations**, and several departmental seminars (e.g., Uni. Bristol, Ludwig-Maximilians-Universität, ETH-Zürich,

PEER-REVIEWED PUBLICATIONS

(* selected research spotlight; ** journal IF > 10, *** Review article)

- 1) Toffol, G., Yang, J., Pennacchioni, G., **Faccenda, M.**, Scambelluri, M. *How to quake a subducting dry slab at intermediate depths: Inferences from numerical modelling*. Earth Planet. Sci. Lett. 578, 117289, <https://doi.org/10.1016/j.epsl.2021.117289> (2022).
- 2) *De Montserrat, A., **Faccenda, M.**, Pennacchioni, G. *Extrinsic Anisotropy of Two-Phase Newtonian Aggregates: Fabric Characterization and Parameterization*. J. Geophys. Res. 126, e2021JB022232. <https://doi.org/10.1029/2021JB022232> (2021). [AGU Instagram Post](#).
- 3) Lo Bue, R., **Faccenda, M.**, Yang, J. *The role of Adria Plate Lithospheric Structures on the Recent Dynamics of the Central Mediterranean Region*. J. Geophys. Res. 126, e2021JB022377. <https://doi.org/10.1029/2021JB022377> (2021).
- 4) Lee, H., Bezada, M. J., **Faccenda, M.** Can sub-slab low-velocity anomalies be an artifact caused by anisotropy? A case study from the Alboran slab area in the western Mediterranean. *Tectonophysics*. 819, 229080 (2021).
- 5) VanderBeek, B. P., **Faccenda, M.** *Imaging upper mantle anisotropy with teleseismic P-wave delay: insights from tomographic reconstructions of subduction simulations*. Geophys. J. Int. 225 (3), 2097-2119, <https://doi.org/10.1093/gji/ggab081> (2021).
- 6) ***Hansen, L. N., **Faccenda, M.**, Warren, J. M. *A review of the mechanism generating seismic anisotropy in the upper mantle*. Phys. Earth Planet. Int. 313, 106662, <https://doi.org/10.1016/j.pepi.2021.106662> (2021).
- 7) Petrescu, L., Pondrelli, S., Salimbeni, S., **Faccenda, M.** *Mantle flow below the central and greater Alpine region: insights from SKS anisotropy analysis at AlpArray and permanent stations*. Solid Earth 11, 4, 1275-1290, <https://doi.org/10.5194/se-11-1275-2020> (2020).
- 8) ***Brovarone, A.V., Butch, C.J., Ciappa, A., Cleaves, H.J. II, Elmaleh, A., **Faccenda, M.**, Feineman, M., Hermann, J., Nestola, F., Cordone, A., Giovannelli, D. *Let there be water: how hydration/dehydration reactions accompany key Earth and life processes*. Am. Mineral. 105, 8, 1152-1160, <https://doi.org/10.2138/am-2020-7380> (2020).
- 9) Pennacchioni, G., Scambelluri, M., Bestmann, M., Notini, L., Nimis, P., Plümper, O., **Faccenda, M.**, Nestola, F. *Record of intermediate-depth subduction seismicity in a dry slab from an exhumed ophiolite*. Earth Planet. Sci. Lett. 548, 116490, <https://doi.org/10.1016/j.epsl.2020.116490> (2020).
- 10) Confal, J. M., Bezada, M. J., Eken, T., **Faccenda, M.**, Saygin, E., Taymaz, T. *Influence of upper mantle anisotropy on isotropic P-wave tomography images obtained in the Eastern Mediterranean region*. J. Geophys. Res. 125, 8, <https://dx.doi.org/10.1029/2019JB018559> (2020).
- 11) **Yang, J., **Faccenda, M.** *Intraplate volcanism originating from upwelling hydrous transition zone*. Nature 579, 88-91, <https://doi.org/10.1038/s41586-020-2045-y> (2020).
- 12) Yang, J., Lu, G., Liu, T., Li, Y., Wang, K., Wang, X., Sun, B., **Faccenda, M.**, Zhao, L. *Amagmatic subduction produced by mantle serpentinization and oceanic crust delamination*. Geophys. Res. Lett. 47, 9, e2019GL086257. <https://doi.org/10.1029/2019GL086257> (2020).
- 13) Peng, C.-C., Kuo, B.-Y., **Faccenda, M.**, Chiao, L.-Y. *Mantle flow entrained by the Hindu-Kush continental subduction inferred from source-side seismic anisotropy*. Earth Planet. Sci. Lett. 530, 115905, <https://doi.org/10.1016/j.epsl.2019.115905> (2020).
- 14) Murri, M. Domeneghetti, M.C., [...], **Faccenda, M.**, Alvaro, M. *Cooling history and emplacement of a pyroxenitic lava as proxy for understanding Martian lava flows*. Sci. Rep. 9(1), 17501, <https://doi.org/10.1038/s41598-019-53142-0> (2019).
- 15) Chen, L., **Faccenda, M.** *Subduction-induced upwelling of a hydrous Transition zone: Implications for the Cenozoic magmatism in Northeast China*. J. Geophys. Res. 124(11), 11489-11504, <https://doi.org/10.1029/2019JB018133> (2019).
- 16) Sturgeon W., Ferreira, A.M.G., **Faccenda, M.**, Chang, S.-J., Schardong, L. *On the origin of radial anisotropy near subducted slabs in the midmantle*. Geochem. Geophys. Geosys. 20 (11), 5105-5125, <https://doi.org/10.1029/2019GC008462> (2019).
- 17) Cheng, Z., Ding, W., **Faccenda, M.**, [...] *Geodynamic effects of subducted seamount at the Manila Trench: Insights from numerical modeling*. Tectonophysics. 764, 46-61, <https://doi.org/10.1016/j.tecto.2019.05.011> (2019).

- 18) **Ferreira, A.M.G., **Faccenda, M.**, Sturgeon, W., Chang, S.-J., Schardong, L. *Ubiquitous lower-mantle anisotropy beneath subduction zone*. Nat. Geo. 12, 301-306, <https://doi.org/10.1038/s41561-019-0325-7> (2019)
- 19) ***Faccenda, M.**, Ferreira, A.M.G., Tisato, N., Lithgow-Bertelloni, C., Stixrude, L., Pennacchioni, G. *Extrinsic anisotropy in a compositionally heterogeneous mantle*. J. Geophys. Res. 124, <https://doi.org/10.1029/2018JB016482> (2019). [Editor Highlight](#).
- 20) Zhou, Q., Hu, J., Liu, L., Chaparro, T., Stegman, D. R., **Faccenda, M.** *Western U.S. seismic anisotropy revealing complex mantle dynamics*. Earth and Planet. Sci. Lett. 500, 156-167, <https://doi.org/10.1016/j.epsl.2018.08.015> (2018).
- 21) Confal, J.M., **Faccenda, M.**, Eken, T., Taymaz, T. *Numerical simulation of 3-D mantle flow evolution in subduction environments in relations to seismic anisotropy beneath the eastern Mediterranean region*. Earth and Planet. Sci. Lett. 497, 50-61, <https://doi.org/10.1016/j.epsl.2018.06.005> (2018).
- 22) Papa, S., Pennacchioni, G., Angel, R. J., **Faccenda, M.** *The fate of garnet during (deep-seated) coseismic frictional heating: The role of thermal shock*. Geology 46(5), 471-474, <https://doi.org/10.1130/G40077.1> (2018).
- 23) **Hu, J., Liu, L., **Faccenda, M.**, Zhou, Q., Fisher, K. M., Marshak, S., Lundstrom, C. *Modification of Western Gondwana craton by plume-lithosphere interaction*. Nat. Geo. 11, 203-210, <https://doi.org/10.1038/s41561-018-0064-1> (2018).
- 24) Piccolo, A., **Faccenda, M.**, Carosi, R., Montomoli, C., Visonà, D. *Crustal strength control on structures and metamorphism in collisional orogens*. Tectonophys., 746, 470-492, <https://doi.org/10.1016/j.tecto.2017.09.018> (2018).
- 25) Dal Zilio, L., **Faccenda, M.**, Capitanio, F. A. *The role of deep subduction in supercontinent breakup*. Tectonophys., 746, 312-324, <https://doi.org/10.1016/j.tecto.2017.03.006> (2018).
- 26) Hu, J., **Faccenda, M.**, Liu, L. *Subduction-controlled mantle flow and seismic anisotropy in South America*. Earth and Planet. Sci. Lett. 470, 13-24, <https://doi.org/10.1016/j.epsl.2017.04.027> (2017).
- 27) Spiess, R., Dibona, R., **Faccenda, M.**, Mattioli, M., Renzulli, A. *Mylonitic gabbro nodules of Stromboli (southern Italy): Microstructural evidence of high-temperature deformation of cumulates during the evolution of the magmatic crustal roots of an active volcano*. Special Papers of the Geol. Soc. of Am. 526, 89-105, [https://doi.org/10.1130/2017.2526\(05\)](https://doi.org/10.1130/2017.2526(05)) (2017).
- 28) *****Faccenda, M.** and Dal Zilio, L. *The role of solid-solid phase transitions in mantle convection*. Lithos 268-271, 198-224, <https://doi.org/10.1016/j.lithos.2016.11.007> (2017)
- 29) *Bezada, M., **Faccenda, M.**, Toomey, D. R. *Representing anisotropic subduction zones with isotropic velocity models: A characterization of the problem and some steps on a possible path forward*. Geochem. Geophys. Geosyst., <https://doi.org/10.1002/2016GC006507> (2016). [Eos Research Spotlight](#).
- 30) **Chang, S.-J., A.M.G. Ferreira, **M. Faccenda**. *Upper- and mid-mantle interaction between the Samoan plume and the Tonga-Kermadec slabs*. Nat. Commun., 7:10799, <https://doi.org/10.1038/ncomms10799> (2016).
- 31) *****Faccenda M.** *Water in the slab: a trilogy*. Tectonophys. 614, 1-30, <https://doi.org/10.1016/j.tecto.2013.12.020> (2014).
- 32) **Faccenda M.** *Mid mantle seismic anisotropy around subduction zones*. Phys. Earth Planet. Int. 227, 1-19, <https://doi.org/10.1016/j.pepi.2013.11.015> (2014).
- 33) **Faccenda M.** and Capitanio, F. A. *Seismic anisotropy around subduction zones: insights from three-dimensional modeling of upper mantle deformation and SKS splitting calculations*. Geochem. Geophys. Geosyst., <https://doi.org/10.1002/ggge.20055> (2013).
- 34) Eberarth-Phillips, D., Reyners, M., **Faccenda, M.**, Naliboff, J. *Along-strike variation in subducting plate seismicity and mantle wedge attenuation related to fluid release beneath the North Island, New Zealand*. Phys. Earth Planet. Int. 225, 12-27, <https://doi.org/10.1016/j.pepi.2013.10.002> (2013).
- 35) Capitanio, F. A. and **Faccenda, M.** *Complex mantle flow around heterogeneous subducting oceanic plates*. Earth Planet. Sci. Lett., 353-354, 29-37, <https://doi.org/10.1016/j.epsl.2012.07.042> (2012).
- 36) **Faccenda M.** and Capitanio, F. A. *Development of mantle seismic anisotropy during subduction-induced 3D flow*. Geophys. Res. Lett., 39, <https://doi.org/10.1029/2012GL051988> (2012).
- 37) ***Faccenda M.**, Gerya, T. V., Mancktelow, N. S. and Moresi, L. *Fluid flow during slab unbending and dehydration: Implications for intermediate-depth seismicity, slab weakening and deep water recycling*, Geochem. Geophys. Geosyst., 13, Q01010, <https://doi.org/10.1029/2011GC003860> (2012). [Eos Research Spotlight](#).
- 38) **Faccenda M.**, Mancktelow, N. S. *Fluid flow during unbending: implications for slab hydration, intermediate-depth earthquakes*

- and deep fluid subduction. *Tectonophys.* 494, 149-154, <https://doi.org/10.1016/j.tecto.2010.08.002> (2010).
- 39) **Faccenda M.**, Gerya, T.V., Burlini L. *Deep slab hydration induced by bending-related variation of the tectonic pressure.* *Nat. Geosci.* 2, 790-793, <https://doi.org/10.1038/ngeo656> (2009).
- 40) **Faccenda M.**, Minelli G., Gerya T.V. *Coupled and decoupled regimes of continental collision: Numerical modelling.* *Earth Plant. Sci. Lett.* 278, 3-4, 337-349, <https://doi.org/10.1016/j.epsl.2008.12.021> (2009).
- 41) **Faccenda M.**, Burlini L., Gerya T.V., Mainprice D. *Fault-induced seismic anisotropy by hydration in subducting oceanic plates.* *Nature* 455, 1097-1100, <https://doi.org/10.1038/nature07376> (2008).
- 42) **Faccenda M.**, Gerya, T.V., Chakraborty, S. *Styles of post-subduction collisional orogeny: Influence of convergence velocity, crustal rheology and radiogenic heat production.* *Lithos* 103, issue 1-2, pp. 257-287, <https://doi.org/10.1016/j.lithos.2007.09.009> (2008).
- 43) **Faccenda M.**, Bressan G., Burlini L. *Seismic properties of the upper crust in the central Friuli area (northeastern Italy) based on petrophysical data.* *Tectonophys.* 445, 210-226, <https://doi.org/10.1016/j.tecto.2007.08.004> (2007).

INVITED CONFERENCE PRESENTATIONS

- 1) **Faccenda, M.** and VanDerBeek, B., 2021, **INVITED LECTURE.** Title: *Mantle dynamics and structure from coupled geodynamic and seismological modelling.* AGU Fall Meeting, New Orleans, USA.
- 2) **Faccenda, M.**, 2019, **INVITED LECTURE.** Title: *Mantle dynamics and structure from coupled geodynamic and seismological modelling.* EGU General Assembly, Vienna, Austria.
- 3) **Faccenda, M.**, 2018, **INVITED LECTURE.** Title: *Subduction zone dynamics and structure from coupled geodynamic and seismological modelling.* 32nd IUGG Conference on Mathematical Geophysics, Nizhny Novgorod, Russia.
- 4) **Faccenda, M.**, 2017, **INVITED LECTURE.** Title: *Subduction zone dynamics and structure from coupled geodynamic and seismological modelling.* XV International Workshop on Modelling Mantle and Lithosphere Dynamics, Putten, Netherlands.
- 5) **Faccenda, M.**, 2017, **INVITED LECTURE.** Title: *Patterns of seismic anisotropy in the mid-mantle around subduction zones: predictions from 3D geodynamic modelling.* Big Transition Zone: Below and Beyond, University College London, UK.
- 6) **Faccenda, M.**, 2017, **INVITED LECTURE.** Title: *Subduction zone dynamics and structure from coupled geodynamic and seismological modelling.* EGU General Assembly, Vienna, Austria.
- 7) **Faccenda, M.**, 2016, **INVITED LECTURE.** Title: *Petrological numerical modelling of the convective Earth.* GNM school on: Modeling the mineralogical world: how and why. Rome, Italy
- 8) **Faccenda, M.**, 2016, **INVITED LECTURE.** Title: *Hydration and dehydration of oceanic plates at subduction zones.* JpGU Meeting, Japan
- 9) **Faccenda, M.**, 2016, **INVITED LECTURE.** Title: *Visco-elasto-plastic deformation and hydration of oceanic plates at trench-rise systems.* JpGU Meeting, Japan
- 10) **Faccenda, M.**, 2015, **INVITED LECTURE.** Title: *Combined micro and macro geodynamic modelling of mantle flow: methods, potentialities and limits.* AGU Fall Meeting, San Francisco, USA.
- 11) **Faccenda, M.**, 2015 **ARNE-RICHTER AWARD MEDAL LECTURE.** Title: *Patterns of seismic anisotropy and mantle flow around convergent margins: predictions from 3D geodynamic modelling, comparison with observations and implications for the interpretation of seismic tomographies.* EGU General Assembly, Vienna, Austria.
- 12) **Faccenda, M.**, 2015, **INVITED LECTURE.** Title: *The role of phase transitions at subduction zones.* EGU General Assembly, Vienna, Austria.
- 13) **Faccenda, M.**, 2014, **INVITED LECTURE,** Title: *Water in the oceanic lithosphere: a trilogy.* Congresso SGI-SIMP, Milano, Italy
- 14) **Faccenda, M.**, 2013, **INVITED LECTURE,** Title: *Numerical modelling of metamorphic and igneous processes in geodynamics: the role of phase diagrams.* PhD school on: Build-up of petrological phase diagrams. S. Margherita, Italy.
- 15) **Faccenda, M.** and Capitanio, F. A., 2012, **INVITED LECTURE.** Title: *Development of seismic anisotropy during subduction/induced 3D mantle flow.* AGU Fall Meeting, San Francisco, USA.
- 16) **Faccenda, M.**, et al., 2009, **INVITED LECTURE.** Title: *Mechanisms of deep slab hydration and related geodynamical processes.* Goldschmidt conference, Davos, Switzerland.
- 17) **Faccenda, M.**, et al., 2008, **INVITED LECTURE.** Title: *Continental Crust Recycling at Collision Zones: Insights from Numerical Modeling and Observations.* AGU Fall Meeting, San Francisco, USA.