

CURRICULUM VITAE ET STUDIORUM: Dr. Silvia Mittempergher



Personal data: Born in Trento on the 5. May 1982

Present Position: Associated Professor

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EDUCATION

- **April 2012** Ph. D. in Earth Sciences at the University of Padova and at the University of Grenoble with a thesis entitled 'Physico-chemical processes in seismogenic faults: active and exhumed examples ' under the supervision of Prof. G. Di Toro and Prof. J.P. Gratier
- **December 2006** Degree in Geology and Technical Geology (cum laude) at the University of Padova with a thesis entitled 'Effects of fluids on the seismicity of a fault. Study of exhumed structures in the northern Adamello (Southern Alps, Italy)', under the supervision of Prof. G. Pennacchioni and Prof. G. Di Toro

PREVIOUS POSITIONS

- **From November 2019 to November 2022.** Tenure track researcher (RTDb) at the University of Modena and Reggio Emilia
- **From April 2017 to November 2019.** Postdoctoral position at Milano Bicocca University. Project: 'Structural evolution of fractured reservoirs: analysis and modelling', supervisor Prof. A. Bistacchi
- **From March 2016 to February 2017.** Postdoctoral position at the University of Torino. Project: 'The role of clay minerals in the mechanics of shallow megathrusts'. Supervisor Prof. A. Festa
- **From April 2014 to March 2015.** Postdoctoral position at the University of Modena and Reggio Emilia. Project: 'Mechanical properties of the shallow part of the megathrusts'. Supervisor: Prof. F. Remitti
- **From April 2012 to May 2013.** Postdoctoral position at the University of Padova. Project: 'Field, isotopical, geochemical, mineralogical and microstructural studies of exhumed seismic fault zones'. Supervisor Prof. G. Di Toro

MEMBERSHIPS AND APPOINTMENTS

- Member of the Structural Geology Group (GIGS) of the Italian Geological Society.
- Member of the Doctorate School 'Models and methods for material and environmental sciences' of the University of Modena and Reggio Emilia (from the academic year 2021/2022)

ACADEMIC DUTIES

- Secretary of the Degree Courses in 'Geological Sciences' and 'Geosciences, Georisks and Georesources' (November 2021 to present)

ORGANISATION OF SCIENTIFIC MEETINGS

- Organizer of the workshop 'Physico- chemical processes in seismic faults', Geosciences Department, University of Padova (2010)
- Organizer of the school 'Introduzione al rilevamento 3D mediante telerilevamento multisorgente per applicazioni geologiche, strutturali, geologico-tecniche ed ambientali', SIMP – SGI meeting 2018, Catania

- Organizer of the 2019 seminars “The role of pressure solution in the ductility of the upper crust”, given by J. P. Gratier (University of Grenoble) at the Milano Bicocca University

FUNDING AND PROJECTS

- 2019 – 2022: DEEPWATER-CE, structural investigations on the karst aquifer of the Vis Island, Croatia. Interreg Central Europe to S. Borović, Croatian Geological Survey. Collaboration.
- 2016-2018: SEFRAC: nuovi strumenti per la predizione dello stato di fratturazione nel sottosuolo, propedeutici a stime dei parametri idraulici nei reservoirs fratturati; funded by Eni Spa to A. Bistacchi, UniMIB. Team member.
- 2014 – 2015: PRIN 2010: Birth and death of oceanic basins: geodynamic processes from rifting to continental collision in Mediterranean and circum-Mediterranean orogens. PI: G. Capponi. Team member.
- 2009 – 2011: Microstructural analyses of gouge from the San Andreas Fault Observatory at Depth (SAFOD) borehole in relation to brittle fault mechanics: A collaborative study. NSF grant to J. Hadizadeh, University of Louisville, KY, USA. Team member.
- 2008-2013: USEMS: Uncovering the secrets of an earthquake: multidisciplinary study of physico-chemical processes during the seismic cycle, FP7 ERC 2007 Starting Grant to G. Di Toro, UniPD and INGV. Team member.
- 2008-2012: Revealing the secrets of an earthquake: physico-chemical constraints from a multidisciplinary study of exhumed faults. CARIPARO Excellence Project to G. Pennacchioni, UniPD. Team member.

ACTIVITIES IN REFERRED SCIENTIFIC JOURNALS.

- Reviewer for Journal of Geophysical Research, Journal of Structural Geology, Geology, Island Arc, Geosciences, Journal of the Geological Society of London, Remote Sensing, Earth-Science Reviews, Tectonophysics, Scientific Reports, Italian Journal of Geology, Solid Earth, Marine and Petroleum Geology
- Guest Editor for the Special Volume ‘Chemico-physical processes in seismogenic faults’, Journal of Structural Geology 38, 2012.

SELECTED INVITED PRESENTATIONS

- Keynote speaker at the 2019 Italian Geological Society Meeting: Mitterpergher S., From aseismic to seismic slip in exhumed seismogenic sources: insights from geochemical and microstructural studies of pseudotachylite bearing faults in the Adamello massif
- Seminar at the IPGP, Paris, 2018. Fault slip mechanisms in seismogenic faults from field and microstructural studies.
- Seminar at the ETH Zürich 2018. Fault slip mechanisms in seismogenic faults from field and microstructural studies.

AWARDS

- **2014:** ‘Giuseppe and Paolo Gatto Prize’ of the Accademia Nazionale dei Lincei for innovative petrologic studies on the faults of the Adamello Massif.
- **2017:** National Scientific Enabling (ASN) for the position of Associated professor (seconda fascia) in the sector 04A2, SSD GEO/03 – Structural geology

SUPERVISION OF PhD STUDENTS AND POSTDOCTORAL FELLOWS

- **2021-2023.** Supervisor of one Ph.D. Student, Dr. G. Freda working on a thesis entitled ‘Fluid mobility in fractured carbonates from geological analogues of reservoirs: implications for CO2 storage’. PhD School M3ES at University of Modena and Reggio Emilia

- **2016-2019.** Co-supervisor of one Ph.D. Student, Dr. A. Cerchiari working on a thesis entitled ‘Deformation processes of shallow subduction megathrusts: insights from field and microstructural analysis’. Supervisor: Prof. F. Remitti, PhD School M3ES at University of Modena and Reggio Emilia

TEACHING ACTIVITIES

- 2021 and 2022 – Lecturer of STRUCTURAL GEOLOGY (30% of the course) for the bachelor’s degree course in Geological Sciences, SEISMIC SOURCES AND SEISMIC ZONATION (50% of the course) and FIELD MAPPING (20% of the course) for the master’s degree course in Geosciences, Geohazard and Geo-resources of the University of Modena and Reggio Emilia.
- 2020 – Lecturer of STRUCTURAL GEOLOGY (30% of the course) for the bachelor’s degree course in Geological Sciences and SEISMIC SOURCES AND SEISMIC ZONATION (50% of the course) for the master’s degree course in Geosciences, Geohazard and Geo-resources of the University of Modena and Reggio Emilia.
- 2016 - Lecturer of STRUCTURAL GEOLOGY AND TECTONICS (100% of the course) for the bachelor’s degree course in Geological Sciences of the University of Modena and Reggio Emilia
- 2015 - Lecturer of ROCK MECHANICS (50% of the course) for the master’s degree course in Geology and technical geology of the University of Padova
- 2007 – 2011 – Teaching assistant for several FIELD MAPPING courses at the Padova University

BRIEF DESCRIPTION OF THE RESEARCH ACTIVITY

My research interests include:

- Deformation processes in natural seismogenic faults from field, geochemical and microstructural studies.
- Structural analysis, statistical distribution of fractures and fluid flow in fractured carbonates in different geodynamic contexts.

BIBLIOMETRIC INDICATORS AND SCIENTIFIC PRODUCTION

Total number of publications in scientific journals: 28 (WoS), 28 (Scopus)

Total number of book chapters: 2

Total number of other publications: 3

Total number of citations: 477 (WoS), 487 (Scopus)

h-index: 13 (WoS, Scopus)

LIST OF SCIENTIFIC PUBLICATIONS ON INTERNATIONAL JOURNALS WITH IF.

1. Patekar, M, Bašić, M., Pola, M., Kosović, I., Terzić, J., Lucca, A., Mittempergher, S., Berio, L. R., Borović, S. (2022). Multidisciplinary investigations of a karst reservoir for managed aquifer recharge applications on the island of Vis (Croatia) *Acque Sotterranee - Italian Journal of Groundwater* DOI: [10.7343/as-2022-557](https://doi.org/10.7343/as-2022-557)
2. Berio, L.R., Mittempergher, S., Storti, F., Bernasconi, S.M., Cipriani, A., Lugli, F., Balsamo, F. (2022). Open-closed-open paleofluid system conditions recorded in the tectonic vein networks of the Parmelan anticline (Bornes Massif, France). *Journal of the Geological Society of London*. <https://doi.org/10.1144/jgs2021-117>
3. Mittempergher, S., Zanchetta, S., Caldiroli, F., Zanchi, A., Bistacchi, A., Hanchar, J.M., Villa, I.M. (2022). The timescale of solid-state deformation in the Northern Adamello igneous intrusive suite. *Journal of the Geological Society*, DOI: <https://doi.org/10.1144/jgs2021-101>
4. Berio, L.R., Storti, F., Balsamo, F., Mittempergher, S., Bistacchi, A., Meda, M. (2021). Structural Evolution of the Parmelan Anticline (Bornes Massif, France): Recording the Role of

- Structural Inheritance and Stress Field Changes on the Finite Deformation Pattern. *Tectonics*, 40(11), e2021TC006913 DOI:10.1029/2021TC006913
5. Gomila, R, Fondriest, M., Jensen, E., Spagnuolo, E., Masoch, S., Mitchell, T. M., Magnarini, G., Bistacchi, A., Mittempergher, S., Faulkner, D., Cembrano, J., Di Toro G. (2021). Frictional melting in fluid-rich faults: Field and experimental evidence from the Bolfín Fault Zone (Chile). *Geochemistry, Geophysics, Geosystems*, 22(7), e2021GC009743. DOI: 10.1029/2021GC009743
 6. Mittempergher, S., Zanchi, A., Zanchetta, S., Fumagalli, M., Gukov, K., Bistacchi, A. (2021). Fault reactivation and propagation in the northern Adamello pluton: The structure and kinematics of a kilometre-scale seismogenic source. *Tectonophysics*, 806, art. no. 228790. DOI: 10.1016/j.tecto.2021.228790
 7. Bistacchi, A., Mittempergher, S., Martinelli, M., Storti, F. (2020). On a new robust workflow for the statistical and spatial analysis of fracture data collected with scanlines (or the importance of stationarity). *Solid Earth* 11, 2535-2547. DOI: 10.5194/se-11-2535-2020
 8. Martinelli, M., Bistacchi, A., Bonneau, F., Balsamo, F., Mittempergher, S., Caumon, G., Meda, M. (2020). Damage zone characterization combining scan-line and scan-area analysis on a km-scale Digital Outcrop Model: the Qala Fault (Gozo). *Journal of Structural Geology* 140, 104 – 144. DOI: 10.1016/j.jsg.2020.104144
 9. Cerchiari, A., Remitti, F., Cipriani, A., Mittempergher, S., Festa, A., Lugli, F. (2020). Cyclical variations of fluid sources and stress state in a shallow megathrust-zone mélange. *Journal of the Geological Society* 177, 647-659. DOI: 10.1144/jgs2019-072
 10. Mittempergher, S., Succo, A., Bistacchi, A., Storti, F., Bruna, P.O., Meda, M. (2019). Geological and structural map of the southeastern Pag Island, Croatia: field constraints on the Cretaceous - Eocene evolution of the Dinarides foreland. *Geological field Trips and Maps Volume 11 (2.4)*, 1 – 19. <https://doi.org/10.3301/GFT.2019.06>
 11. Persico, D., Succo, A., Mittempergher, S., Storti, F., Piccinini, E., Villa, G. (2019). Calcareous nannofossil biostratigraphy of the External Dinarides flysch (Vrč'ic-Staravasa Pag Island, Croatia): A key to an Eocene tectono-stratigraphic and paleoenvironmental interpretation. *Geological Journal*. 2019;1–14. <https://doi.org/10.1002/gj.3673>
 12. Festa, A., Dilek, Y., Mittempergher, S., Ogata, K., Pini, G. A., Remitti, F. (2018). Does subduction of mass transport deposits (MTDs) control seismic behavior of shallow-level megathrusts at convergent margins? *Gondwana Research* 60, 186-193. doi:10.1016/j.gr.2018.05.002.
 13. Mittempergher, S., Cerchiari, A., Remitti, F., Festa, A. (2017). From soft sediment to fluid assisted faulting at the base of the Sestola Vidiciatico tectonic Unit in the Northern Apennines (Italy). *Geological Magazine*, 155 (THEMATIC ISSUE: Birth and Death of Oceanic Basins), 438-450. doi: 10.1017/S0016756817000668.
 14. Aretusini, S., Mittempergher, S., Plümper, O., Spagnuolo, E., Gualtieri, A. F., Di Toro, G. (2017). Production of nanoparticles during experimental deformation of smectite and implications for seismic slip. *Earth and Planetary Science Letters* 463, pp. 221-231. DOI: 10.1016/j.epsl.2017.01.048.
 15. Remitti, F., Smith, S. A. F., Mittempergher, S., Gualtieri, A. F., Di Toro, G. (2015). Frictional properties of fault zone gouges from the J-FAST drilling project (Mw 9.0 2011 Tohoku-Oki earthquake). *Geophysical Research Letters*, 42 (8), pp. 2691-2699. DOI: 10.1002/2015GL063507.
 16. Mittempergher, S., Dallai, L., Pennacchioni, G., Renard, F., Di Toro, G. (2014). Origin of hydrous fluids at seismogenic depth: Constraints from natural and experimental fault rocks. *Earth and Planetary Science Letters*, 385, pp. 97-109. DOI: 10.1016/j.epsl.2013.10.027.

17. Smith, S.A.F., Bistacchi, A., Mitchell, T. M., Mittempergher, S., Di Toro, G. (2013). The structure of an exhumed intraplate seismogenic fault in crystalline basement. *Tectonophysics*, 599, pp. 29-44. DOI: 10.1016/j.tecto.2013.03.031.
18. Fondriest, M., Smith, S. A. F., Di Toro, G., Zampieri, D., Mittempergher, S. (2012). Fault zone structure and seismic slip localization in dolostones, an example from the Southern Alps, Italy. *Journal of Structural Geology*, 45, pp. 52-67. DOI: 10.1016/j.jsg.2012.06.014.
19. Hadizadeh, J., Mittempergher, S., Gratier, J.-P., Renard, F., Di Toro, G., Richard, J., Babaie, H. A. (2012). A microstructural study of fault rocks from the SAFOD: Implications for the deformation mechanisms and strength of the creeping segment of the San Andreas Fault. *Journal of Structural Geology*, 42, pp. 246-260. DOI: 10.1016/j.jsg.2012.04.011.
20. Di Toro, G., Mittempergher, S., Ferri, F., Mitchell, T. M., Pennacchioni, G. (2012). The contribution of structural geology, experimental rock deformation and numerical modelling to an improved understanding of the seismic cycle. Preface to the Special Volume "Physico-chemical processes in seismic faults". *Journal of Structural Geology*, 38, pp. 3-10. DOI: 10.1016/j.jsg.2012.01.025.
21. Gratier, J.-P., Richard, J., Renard, F., Mittempergher, S., Doan, M.-L., Di Toro, G., Hadizadeh, J., Boullier, A.-M. (2011). Aseismic sliding of active faults by pressure solution creep: Evidence from the San Andreas fault observatory at Depth. *Geology*, 39 (12), pp. 1131-1134. DOI: 10.1130/G32073.1.
22. Mittempergher, S., Di Toro, G., Gratier, J.-P., Hadizadeh, J., Smith, S. A. F., Spiess, R. (2011). Evidence of transient increases of fluid pressure in SAFOD phase III cores. *Geophysical Research Letters*, 38 (3), L03301. DOI: 10.1029/2010GL046129.
23. Nestola, F., Mittempergher, S., Di Toro, G., Zorzi, F., Pedron, D. (2010). Evidence of dmisteinbergite (hexagonal form of $\text{CaAl}_2\text{Si}_2\text{O}_8$) in pseudotachylyte: A tool to constrain the thermal history of a seismic event. *American Mineralogist*, 95 (2-3), pp. 405-409. DOI: 10.2138/am.2010.3393.
24. Mittempergher, S., Pennacchioni, G., Di Toro, G. (2009). The effects of fault orientation and fluid infiltration on fault rock assemblages at seismogenic depths. *Journal of Structural Geology*, 31 (12), pp. 1511-1524. DOI: 10.1016/j.jsg.2009.09.003.

BOOK CHAPTERS AND MANUSCRIPTS IN JOURNALS WITHOUT IF.

1. Bistacchi, A., Mittempergher, S., Martinelli, M. (2022). Digital Outcrop Model reconstruction and interpretation. In: *3D Digital Geological Models: From Terrestrial Outcrops to Planetary Surfaces*, First Edition. Edited by Andrea Bistacchi, Matteo Massironi, and Sophie Viseur. © 2022 John Wiley & Sons, Inc.
2. Mittempergher, S., Bistacchi, A. (2022). Image Analysis Algorithms for Semiautomatic Lineament Detection in Geological Outcrops In: *3D Digital Geological Models: From Terrestrial Outcrops to Planetary Surfaces*, First Edition. Edited by Andrea Bistacchi, Matteo Massironi, and Sophie Viseur. © 2022 John Wiley & Sons, Inc.
3. Meda, M., Martinelli, M., Bistacchi, A., Mittempergher, S., Berio, L., Balsamo, F., Succo, A., Storti, F. (2019). 3D multi-scale characterization and modeling of three fractured carbonatic outcrop analogues: Pag Croatia, Parmelan France, Gozo Maltese Islands. *Society of Petroleum Engineers - Abu Dhabi International Petroleum Exhibition and Conference 2019, ADIP 2019*
4. Bistacchi, A., Griffith, W.A., Spagnuolo, E., Nielsen, S., Di Toro, G., Smith, S.A., Jones, R., Mittempergher, S. (2012). Fault roughness evolution with seismogenic slip in the Gole Larghe

- fault zone: 3D imaging, spectral analysis and forward modeling. *Rendiconti Online Società Geologica Italiana*, 22, pp. 18-19.
5. Mitterpergher, S., Dallai, L., Di Toro, G., Pennacchioni, G. (2009). Involvement of pore fluids in frictional melting from stable isotopes study of pseudotachylytes. *Rendiconti Online Società Geologica Italiana*, 5, pp. 139-141.
 6. Mitterpergher, S., Di Toro, G., Pennacchioni, G. (2007). Effects of fluids on the seismicity of a fault. Analysis of exhumed structures in the Northern Adamello (Southern Alps, Italy). *Rendiconti della Società Geologica Italiana*, 4, pp. 268-269.

Updated on 24/11/2022