

Marco M. Scuderi - Curriculum Vitae

Education:

2014 Ph.D. in Rock Physics at the Pennsylvania State University under the supervision of Prof. Chris Marone. I was awarded of my Ph.D. on 12th of June 2014 for a thesis entitled: “Mechanical properties of the seismogenic zone”.

2009 Master of Science in *Geological Resources and Hazard* at the University of Perugia under the supervision of Prof. C. Collettini and co-supervision of Dr. A. Niemeijer (Utrecht University). Thesis entitled: “Frictional properties and slip stability of active faults within carbonate–evaporite sequences: The role of dolomite and anhydrite” with the final score of 110/110 and honors.

2007 Bachelor of Science in Geological Sciences at the University of Perugia with the final grade of 102/110.

Research/Professional Experience:

2017 – Present Post-Doctoral research fellow sponsored by TOTAL with a project entitled “Fault zone permeability and leakage” with the supervision of Dr. C. Wibberley (TOTAL) and Prof. C. Collettini (La Sapienza University of Rome).

2015 – 2017 EU Horizon 2020 Marie Sklodowska-Curie Actions Individual Fellow, grant No. 656676 FEAT (The role of Fluid pressure in EArthquake Triggering).

2014 – 2015 Post-Doctoral research fellow at La Sapienza University of Rome under the supervision of Prof. Cristiano Collettini.

Grants and Fellowships:

2017 “Fault zone permeability and structure” TOTAL research funding in collaboration with Dr. Chris Wibberley (90k euros)

2015 European Union’s Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie Individual Fellow. Grant agreement No. 656676 “The role of Fluid pressure in EArthquake Triggering” (FEAT) (180k euros)

Awards:

2018 EMRP (Earth Magnetism and Rock Physics) Division Outstanding Early Career Scientist Award of the European Geosciences Union (EGU).

Teaching Experience:

2016-2017 LabToGo Laboratory teaching activities with high school programs (link [here](#)).

2015-2017 Instructor for the course “Physics of Rocks”, at “La Sapienza” University of Rome, Italy.

2013-2014 Teaching Assistant / Laboratory Instructor for the course “Physical Processes in Geology” (GEOSC203), Pennsylvania State University (USA).

Advising:

2017 co-advisor for the Master Thesis of Matteo Manzi entitled “Characterization of the mechanical properties along a carbonate-bearing landslide” that graduated with the final grade of 110/110 *cum laude*.

2016 co-advisor for the Master Thesis of Marco Mercuri entitled “Experimental characterization of the semi-brittle behavior of calcite: insights from mechanical and acoustic data” that graduated with the final grade of 110/110 *cum laude*.

2016 co-advisor of Bachelor Thesis of Giulia Felli entitled “Microstructural evolution of a laboratory fault during slow fault slip”.

2016 co-advisor of Bachelor Thesis of Marika Fedele entitled “Slip characterization of an experimental fault under a wide range of boundary conditions”.

Training Courses:

2013 Scanning Electron Microscope (SEM) training course at the Pennsylvania State University.

2012 ICDP, Continental Scientific Drilling, training course at the Geocenter KTB in Windischeschenbach, Germany. Fundamental of drilling technology, Cores and Cuttings sampling and analysis, Downhole logging basics, Applied downhole measurements, Seismic downhole measurements, Data management.

Additional/complementary skills:

Computer programming: C/Unix/Python (advanced), MATLAB (intermediate), Arduino (basic), Lab View (basic).

Languages: Italian (native), English (native level)

Technical drawings: Adobe Illustrator (advanced), CAD (basic)

Microstructural analysis: ImageJ (intermediate)

Membership of scientific societies:

2011 – current Member, Research Network “*American Geophysical Union*” (AGU)

2014 – current Member, Research Network “*European Geoscience Union*” (EGU)

2015 – current Member of the Marie-Curie Alumni Association

Abstract of selected scientific meeting oral presentations:

- 2018** American Geophysical Union (AGU) general assembly. (Invited talk) Scuderi M.M. The role of fabric and normal stress on the mechanics of slow-slip. Washington DC, USA.
- 2018** European Seismological Commission (ESC). (Invited talk) Fluid driven fault slip of experimental faults subjected to fluid pressure stimulation: carbonates vs. shales. Valletta, Malta.
- 2018** European Geoscience Union (EGU) general assembly Scuderi M.M. Fluid driven fault slip of experimental faults subjected to fluid pressure stimulation: carbonates vs. shales. Vienna, Austria.
- 2017** School of earthquakes: nucleation, triggering, rupture and relations with aseismic processes. Scuderi et al., The effect of fluid injection on an experimental fault and its role on frictional stability and earthquake triggering. Cargese, France.
- 2017** IAG-IASPEI, (Invited talk) Scuderi et al., Laboratory observations of slow stick-slip: implications for slow earthquakes and the spectrum of fault slip behavior. Kobe, Japan.
- 2017** European Geoscience Union (EGU) General Assembly, Scuderi et al., Fluid-injection and the mechanics of frictional stability of shale-bearing faults. Vienna, Austria.
- 2016** European Geoscience Union (EGU) General assembly, Scuderi et al., The role of fluid pressure in fault creep vs. frictional instability: insights from rock deformation experiments on carbonates. Vienna, Austria.
- 2016** European Geoscience Union (EGU) General Assembly, Scuderi et al., Precursor to failure extend across the transition from slow to fast laboratory earthquakes. Vienna, Austria.
- 2016** Italian Geological Society, Scuderi et al., The role of fluid pressure in fault creep vs. frictional instability: insights from rock deformation experiments on carbonates. Naples, Italy.
- 2016** American Geophysical Union (AGU) Fall Meeting, Scuderi et al. The effect of

fluid pressure on an experimental fault and its role on frictional stability and earthquake triggering. San Francisco, USA.

- 2015** European Geoscience Union (EGU) General Assembly, Scuderi et al., Mechanical and acoustic signature of slow earthquakes on an experimental fault.

Organization of Session at international meeting:

- 2018** EGU (European Geoscience Union) convener of the session “*Understanding fluid driven rupture, from natural earthquakes to reservoirs induced seismicity*”

Public Dissemination:

- 2016** “Seismic slowdowns could warn of impending earthquakes”. Article on the scientific magazine Smithsonian (link [here](#)).
- 2016** “A FEAT of earthquake research”. European Union portal under success stories (link [here](#)).

Publication Record:

From 2013, 25 publications (1 in *Nature Geoscience*, 1 in *Nature Communication*, 1 in *Nature Scientific Reports* and 1 in *Geology*) all published in ISI journals. Total citations 291, h-index 10 (source Scopus August 2018).

Selected Publications on ISI Journals (from newer to older):

- [\(25\)](#) Orellana, L. F., Scuderi, M. M., Collettini, C., & Violay, M. (2018). Do scaly clays control seismicity on faulted shale rocks? *Earth and Planetary Science Letters*, 488, 59–67. <http://doi.org/10.1016/j.epsl.2018.01.027>
- [\(24\)](#) Mercuri, M., **Scuderi, M.M.**, Tesei, T., Carminati, E., Collettini, C., (2018) Strength evolution of simulated carbonate-bearing faults: The role of normal stress and slip velocity, *Journal of Structural Geology*, doi: 10.1016/j.jsg.2017.12.017.
- [\(23\)](#) Orellana, L.F., **Scuderi, M.M.**, Collettini, C., Violay, M., (2018). Frictional Properties of Opalinus Clay: Implications for Nuclear Waste Storage. *J. Geophys. Res. Solid Earth*. 123. doi:10.1002/2017JB014931
- [\(22\)](#) **Scuderi, M.M.**, Collettini, C., Marone, C., (2017). Frictional stability and earthquake triggering during fluid pressure stimulation of an experimental fault. *Earth and Planetary Science Letters*. 477. doi: 10.1016/j.epsl.2017.08.009.

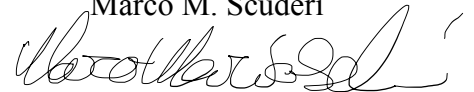
- [\(21\)](#) Trippetta, F., B.M., Carpenter, S., Mollo, **M.M.**, **Scuderi**, P., Scarlato, C., Collettini, (2017). Physical and Transport Property Variations Within Carbonate-Bearing Fault Zones: Insights From the Monte Maggio Fault (Central Italy), *Geochemistry, Geophysics, Geosystems*, doi: 10.1002/2017GC007097.
- [\(20\)](#) **Scuderi, M. M.**, C. Collettini, C. Viti, E. Tinti, and C. Marone (2017), Evolution of shear fabric in granular fault gouge from stable sliding to stick slip and implications for fault slip mode, *Geology*, doi: 10.1130/G39033.1.
- [\(19\)](#) Tesei, T., B. M. Carpenter, C. Giorgetti, **M. M. Scuderi**, A. Sagy, P. Scarlato, and C. Collettini (2017), Friction and scale-dependent deformation processes of large experimental carbonate faults, *Journal of Structural Geology*, 100, 12–23, doi:10.1016/j.jsg.2017.05.008.
- [\(18\)](#) **Scuderi, M. M.**, C. Marone, E. Tinti, G. Di Stefano, and C. Collettini (2016), Precursory changes in seismic velocity for the spectrum of earthquake failure modes, *Nature Geoscience*, 9, doi: 10.1038/NGEO2775.
- [\(17\)](#) Tinti, E., **M. M. Scuderi**, L. Scognamiglio, G. Di Stefano, C. Marone, and C. Collettini (2016), On the evolution of elastic properties during laboratory stick-slip experiments spanning the transition from slow slip to dynamic rupture, *Journal of Geophysical Research: Solid Earth*, 121, doi: 10.1002/2016JB013545.
- [\(16\)](#) Giorgetti, C., C. Collettini, **M. M. Scuderi**, M. R. Barchi, and T. Tesei (2016), Fault geometry and mechanics of marly carbonate multilayers: An integrated field and laboratory study from the Northern Apennines, Italy, *Journal of Structural Geology*, 93, doi:10.1016/j.jsg.2016.10.001.
- [\(15\)](#) Wojatschke, J., **M. M. Scuderi**, L. N. Warr, B. M. Carpenter, and D. Saffer (2016), Experimental constraints on the relationship between clay abundance , clay fabric and frictional behavior for the Central Deforming Zone of the San Andreas Fault, *Geochemistry, Geophysics, Geosystems*, 17, doi:10.1002/2016GC006500.
- [\(14\)](#) **Scuderi, M. M.**, and C. Collettini (2016), The role of fluid pressure in induced vs. triggered seismicity: insights from rock deformation experiments on carbonates, *Nature Scientific Report*, 6, doi: 10.1038/srep24852.
- [\(13\)](#) Leeman, J. R., D. M. Saffer, **M. M. Scuderi**, and C. Marone (2016), Laboratory observations of slow earthquakes and the spectrum of tectonic fault slip modes, *Nature Communication*, 7, doi:10.1038/ncomms11104.
- [\(12\)](#) Rivière, J., L. Pimienta, **M.M. Scuderi**, T. Candela, P. Shokouhi, J. Fortin, A. Schubnel, C. Marone, and P. A. Johnson (2016), Frequency , pressure , and strain dependence of nonlinear elasticity in Berea Sandstone, *Geophysical Research Letters*, 43, doi: 10.1002/2016GL068061.

- [\(11\)](#) Johnson, P. A., J. Carmeliet, H. M. Savage, **M.M. Scuderi**, B. M. Carpenter, R. A. Guyer, E. G. Daub, and C. Marone (2016), Dynamically triggered slip leading to sustained fault gouge weakening under laboratory shear conditions, *Geophysical Research Letters*, 42, doi: 10.1002/2015GL067056.
- [\(10\)](#) **Scuderi, M. M.**, B. M. Carpenter, P. A. Johnson, and C. Marone (2015), Poromechanics of stick-slip frictional sliding and strength recovery on tectonic faults, *Journal of Geophysical Research: Solid Earth*, 120, doi: 10.1002/2015JB011983.
- [\(9\)](#) Leeman, J., **M. M. Scuderi**, C. Marone, and D. M. Saffer (2015), Stiffness evolution of granular layers and the origin of repetitive, slow, stick-slip frictional sliding, *Granular Matter*, 17, doi: 10.1007/s10035-015-0565-1.
- [\(8\)](#) **Scuderi, M. M.**, H. Kitajima, B. M. Carpenter, D. Saffer, and C. Marone (2015), Evolution of permeability across the transition from brittle failure to cataclastic flow in porous siltstone, *Geochemistry, Geophysics, Geosystems*, 16, doi:10.1002/2015GC005932.
- [\(7\)](#) **Scuderi, M. M.**, B. M. Carpenter, and C. Marone (2014), Physicochemical processes of frictional healing: Effects of water on stick-slip stress drop and friction of granular fault gouge, *Journal of Geophysical Research: Solid Earth*, 119, doi:10.1002/2013JB010641
- [\(6\)](#) Carpenter, B. M., **M. M. Scuderi**, C. Collettini, and C. Marone (2014), Frictional heterogeneities on carbonate-bearing normal faults: Insights from the Monte Maggio Fault, Italy, *Journal of Geophysical Research: Solid Earth*, 119, doi:10.1002/2014JB011337.
- [\(5\)](#) Leeman, J. R., **M. M. Scuderi**, C. Marone, D. M. Saffer, and T. Shinbrot (2014), On the origin and evolution of electrical signals during frictional stick slip in sheared granular material, *Journal of Geophysical Research: Solid Earth*, 119, doi:10.1002/2013JB010793.
- [\(4\)](#) Johnson, P. A., B. Ferdowsi, B. M. Kaproth, **M.M. Scuderi**, M. Griffa, J. Carmeliet, R. a. Guyer, P.-Y. Le Bas, D. T. Trugman, and C. Marone (2013), Acoustic emission and microslip precursors to stick-slip failure in sheared granular material, *Geophysical Research Letters*, 40, doi:10.1002/2013GL057848.
- [\(3\)](#) Riviere, J., Candela, T., **Suderi, M.M.**, Marone C., Guyer, R., and P. Johnson (2013) Dynamic acousto-elasticity in Berea sandstone: Influence of the strain rate. *Journal of Acoustical Society of America*, 134, doi: 10.1121/1.4831394.
- [\(2\)](#) **Scuderi, M. M.**, A. R. Niemeijer, C. Collettini, and C. Marone (2013), Frictional properties and slip stability of active faults within carbonate–evaporite sequences:

The role of dolomite and anhydrite, *Earth and Planetary Science Letter*, 369-370, doi:10.1016/j.epsl.2013.03.024.

- [\(1\)](#) Zoet, L. K., B. Carpenter, **M.M. Scuderi**, R. B. Alley, S. Anandkrishnan, C. Marone, and M. Jackson (2013), The effects of entrained debris on the basal sliding stability of a glacier, *Journal of Geophysical Research: Earth Surface*, 118, doi:10.1002/jgrf.20052

Marco M. Scuderi

A handwritten signature in black ink, appearing to read 'Marco M. Scuderi', written in a cursive style.