

Federico Agliardi, PhD

Associate Professor of Engineering Geology

Department of Earth and Environmental Sciences
University of Milano–Bicocca
Piazza della Scienza 4, 20126 Milano, Italy
Email: federico.agliardi@unimib.it
ORCID: 0000-0002-2498-4505
Google Scholar: <https://scholar.google.com/citations?user=7KcRzoYAAAAJ>

EDUCATION

PhD in Earth Sciences, February 2003

University of Milan, Italy

Dissertation: *Rockfalls: 3D numerical modelling and hazard assessment* Final grade: Excellent

MSc in Geological Sciences (equivalent to Italian 5-years “Laurea”), July 1999

University of Milan, Italy

Thesis: *Geological, geomorphological, geomechanical and numerical characterization of deep-seated gravitational slope deformations and large rockslides in Valfurva.* Final grade: 110/110 cum laude

APPOINTMENTS AND POSITIONS

Associate Professor of Engineering Geology, University of Milano–Bicocca, Italy (2016–present)

Responsibilities: *research, teaching, service, public engagement, degree program coordination*

Assistant Professor (tenured, Italian “Ricercatore Universitario”), University of Milano–Bicocca (2007–2016)

Responsibilities: *research, teaching, service*

Professional Engineering Geologist, Private sector (2003–2007)

Responsibilities: *site investigation, mapping, modelling, adjunct university teaching / research*

RESEARCH EXPERIENCE

Research topics

I study the interactions between geological structure, the hydro-mechanical behaviour of geomaterials, and slope instability processes, with a focus on their geomorphological, geohazard, and engineering implications. To this end, I integrate field and laboratory data with remote sensing (optical, InSAR, IRT, LiDAR), numerical modelling, and artificial intelligence within a multidisciplinary framework.

Over the past 25 years, I have contributed significantly to advancing the theoretical and practical understanding of slow rock slope deformations and large landslides, the physics of slow-to-fast transitions in slopes, and the development of 3D rockfall modelling and risk assessment methods.

My research also includes: slope monitoring using multi-platform, multi-frequency radar interferometry (InSAR); multi-sensor characterization of fractured media; numerical modelling of slope and underground stability; alpine geomorphology.

Research projects

As Principal Investigator

- Rockfall runout modeling in Yosemite National Park, California, USA. Funded by US Geological Survey – Sacramento Acquisition Branch, research grant G21AC10539 (2021-ongoing)
- MIRAGE – Mass movement Investigation and prediction through Remote sensing and Artificial IntelliGEnce. PRIN22 project, funded by EU-Next Generation Europe, Project 2022X539XM (2023–ongoing). mirage.disat.unimib.it
- Slow2Fast - Long-term activity, damage and collapse potential of large slow-moving landslides in rock in Lombardia. Funded by Fondazione Cariplò Grant 2016-0757 (2017-2021). slow2fast.unimib.it
- Other: 10 research and service projects hosted or funded by the University of Milano-Bicocca (2011-present)

As co-investigator

- MODULATE: MONitoring LanDslides with mUltiplatform L-Band rAdar TEchniques. ESA (European Space Agency) Contract 4000143903/24/I-DT-bgh (2024-2025). eo4society.esa.int/projects/modulate/
- MUSA: Multilayered Urban Sustainability Action. Spoke 1 “Urban regeneration” (Urban Heat Island in Milano). Funded by EU-Next Generation Europe under PNRR actions (2023-2026). <https://musascarl.it/en/musa-urban-en/>
- 3 EU Framework Programmes FP5-FP7 (DAMOCLES, LESSLOSS, SAFELAND), 2000-2011
- 2 INTERREG (IIC and IVA) projects on landslide hazard and risk (FALAISES 2000-2011, MASSMOVE 2009-2011)
- 1 ASI (Italian Space Agency) project: “MORFEO-MONitoraggio e Rischio da Frana mediante dati EO”
- 6 national projects (COFIN, PRIN) on landslide hazard assessment under climate and urban forcing (2000-2021)
- @RockHoRiZon, Advanced tools for rockfall hazard/risk zonation at regional scale. Funded by Cariplò (2017-2020)

Visiting

- visiting at the Granada University (Spain) and fieldwork in Sierra Nevada (October 2022)
- visiting at research institutions and fieldwork in Southern Taiwan (October 2019)
- visiting researcher at the Rock Mechanics and Physics Laboratory of the British Geological Survey (Keyworth, Nottingham, UK; Jun 2013–Oct 2014, different periods)

TEACHING EXPERIENCE

Courses

- Lecturer for over 50 undergraduate and graduate courses in Engineering Geology since 2003
- Current: Geological field mapping (BSc); Engineering Geological Site Investigation (MSc); Slope Instability (MSc)
- Past: Introduction to Geo-environmental risks (BSc); Geological risk assessment (MSc); Engineering geomorphology and slope stability (MSc, *pro parte*), Applied numerical modelling (MSc, *pro parte*), Slope stability lab (MSc)
- PhD course: Advanced characterization of fractured media by field and point cloud data for geological and engineering applications. PhD program in Chemical, Geological and Environmental Sciences (since 2018)
- Postgraduate course: Management of water resources in the international cooperation. Co-lecturer (2012-2019)
- Advanced course: Alpine Rock Slope failures. Teaching assignment by the Czech Geological Survey (June 2012)
- Advanced course: Land planning in high-risk areas. Funded by Italian Ministry of Environment. Co-lecturer (2011)
- Postgraduate course: Land use and Water Management in Developing Countries. Co-lecturer (2008-2010)

Supervision

- Supervisor of 4 PhD students, 4 postdoctoral researchers, 40+ MSc theses and 15+ BSc theses at UNIMIB
- TREAD: daTa and pRocesses in sEismic hAzarD”. HORIZON-MSCA-2021-DN-01 Marie Slodowska-Curie Doctoral Networks 2021, Project 101072699. Co-supervisor of 1 PhD (2023-ongoing)
- CLARASAR: Characterising multi-stage landslide activity rates with synthetic aperture radar satellite data. HORIZON-MSCA-2022-PF-01 Marie Slodowska-Curie Postdoctoral Fellowships 2022) Scientific supervisor (2023-2025)
- Member of supervisory or evaluation boards of 11 PhD students at other Italian and foreign universities (ETH Zurich, BOKU Vienna; RTWH Aachen, Univ. of Bern, Bologna, Lausanne, Lorraine, Padova, Strasbourg, Wuhan)

ACADEMIC AND COMMUNITY SERVICES

Institutional service

- Coordinator, BSc and MSc Degree Programs in Geological Sciences and Geotechnologies (“Presidente del Consiglio di Coordinamento Didattico di Scienze della Terra”), appointed by Rector, University of Milano–Bicocca (since 2022)
- Coordinator of Geological Sciences curriculum of the PhD program in Chemical, Geological and Environmental Sciences, University of Milano-Bicocca (2022-2024)
- Member, PhD Program Committees, University of Milano–Bicocca (since 2008)
- co-founder and partner of EG4Risk, a spin-out company of the University of Milano-Bicocca (2018-2022)
- Scientific Board Member of the research centre GEMMA (Geo Environmental Measuring and Monitoring from multiple pLATforms), University of Milano-Bicocca (2018-2022)
- UNIMIB responsible for Geoscience in the Scientific Degrees National Project (PLS), funded by the Italian Ministry of University and Research (2015-2022)

Organization of scientific meetings

- Convener or co-convener of over 35 scientific sessions at international conferences (EGU, AGU, IAEG, WLF)
- Scientific committee member for international conferences (RocExs 2011; Slope Tectonics 2,3,4,5)
- Organizing committee member (RocExs 2014, 6th World Landslide Forum 2023)

Editorial services

- Editorial Board Member, Geosciences, MDPI (since 2021)
- Associate Editor of the Italian Journal of Geosciences, SGI (2018-2020)
- Reviewer for 25+ international journals and conference committees
- Evaluator of research proposals (e.g. Swiss National Science Foundation, Fondazione Cariplo)

Community services

Scout Group of Treviglio (1987-1998)

- Active involvement in scouting programs
- Fundraising and self-financing activities
- Volunteer service supporting individuals with disabilities
- Community service and leadership responsibilities within the scout group

AWARDS AND HONORS

- National Scientific Habilitation to Full Professorship in Engineering Geology (2018, valid until 2030)
- Best Paper Award, International Symposium on Landslides, Naples, 2016

PROFESSIONAL MEMBERSHIPS

- Chartered Geologist, Register of Professional Geologist of Lombardy, Italy (2001-present)
- Scientific societies: American Geophysical Union (AGU); European Geosciences Union (EGU); International Association for Engineering Geology and the Environment (IAEG); Società Geologica Italiana (SGI); Associazione Italiana di Geologia Applicata e Ambientale (AIGAA)

LANGUAGE SKILLS

Italian: Native; English: Advanced (CEFR C1)

PUBLICATIONS AND PRESENTATIONS

- 48 journal articles
- 24 book chapters
- 9 conference proceedings
- 30 invited/keynote talks and seminars
- Over 100 conference presentations (oral and poster)

Bibliometric indicators

(Google Scholar, last accessed: 28 December 2025): h-index: 33, citations: 8437, i10-index: 52

50 most relevant peer-reviewed publications

- 1) Strozzi T, Jones N, Agliardi F, De Pedrini A, Frey O, Bernhard P, Caduff R, Ambrosi C, Manconi, A. (2025). Monitoring the displacement of large alpine rock slope instabilities with L-band SAR interferometric techniques. *EGUsphere*, 2025, 1-37 (preprint)
- 2) Casiraghi S, Benedetti G, Bertacchi D, Mittempergher S, Agliardi F, Monopoli B, La Valle F, Martinelli M, Bigoni F, Albertini C, Bistacchi A (2025). An integrated workflow for parametrization of fracture network geometry in digital outcrop models. *Solid Earth*, 16(11), 1351-1382
- 3) Agliardi F, Crippa C, Codara D, Franzosi F (2025). Rapid regional assessment of rock glacier activity based on DInSAR wrapped-phase signal. *The Cryosphere*, 19(10), 5003-5021
- 4) Ren T, Gong W, Agliardi F, Gao L, Xiang X (2025). A style-Pix2Pix GAN framework for data augmentation in landslide semantic segmentation. *Landslides*, 23, 263–273.
- 5) Gerstner R, Maschler A, Schneider-Muntau B, Agliardi F, Avian M, Frießenbichler M, Zangerl C (2025). The critical role of fracture propagation in the evolution of extensive, structurally preconditioned rockslides. *Engineering Geology*, 108359
- 6) Lanfranconi C, Frattini P, Agliardi F, Stock GM, Collins BD, Crosta G (2024). Field evidence and indicators of rockfall fragmentation and implications for mobility. *Engineering Geology*, 341, 107704
- 7) Jaboyedoff M, Bu F, Chalé A, Choanji T, Derron MH, Fei L, Liu C, Wolff C, Agliardi F, Hantz D, Lukacik H, Krkač M (2024). Toward the assessment of the rockfall sources hazard failure using 3D point clouds and remote sensing techniques. In *New Challenges in Rock Mechanics and Rock Engineering*, 39-60. CRC
- 8) Franzosi F, Crippa C, Derron MH, Jaboyedoff M, Agliardi F (2023). Slope-Scale Remote Mapping of Rock Mass Fracturing by Modeling Cooling Trends Derived from Infrared Thermography. *Remote Sensing*, 15(18), 4525
- 9) Franzosi F, Casiraghi S, Colombo R, Crippa C, Agliardi F (2023). Quantitative Evaluation of the Fracturing State of Crystalline Rocks Using Infrared Thermography. *Rock Mechanics and Rock Engineering*, 1-19
- 10) Pánek T, Břežný M, Smedley R, Winocur D, Schönfeldt E, Agliardi F, Fenn K (2023). The largest rock avalanches in Patagonia: Timing and relation to Patagonian Ice Sheet retreat. *Quaternary Science Reviews*, 302, 107962
- 11) Agliardi F, Crippa C (2022). Deep-Seated Gravitational Slope Deformations. In: Shroder JJF (ed), *Treatise on Geomorphology*, 2nd edition. vol. 5, p. 183-199, Elsevier
- 12) Crippa C, Agliardi F (2021). Practical Estimation of Landslide Kinematics Using PSI Data. *Geosciences*, 11(5), 214
- 13) Crippa C, Valbusci E, Frattini P, Crosta GB, Spreafico MC, Agliardi F (2021). Semi-automated regional classification of the style of activity of slow rock-slope deformations using PS InSAR and SqueeSAR velocity data. *Landslides*, 18(7), 2445-2463
- 14) Spreafico MC, Sternai P, Agliardi F (2021). Paraglacial rock-slope deformations: sudden or delayed response? Insights from an integrated numerical modelling approach. *Landslides*, 18, 1311–1326
- 15) Crippa C, Franzosi F, Zonca M, Manconi A, Crosta GB, Dei Cas L, Agliardi F (2020). Unraveling spatial and temporal heterogeneities of very slow rock-slope deformations with targeted DInSAR analyses. *Remote Sensing* 12(8), 1329
- 16) Agliardi F, Scuderi MM, Fusi N, Collettini C (2020). Slow-to-fast transition of giant creeping rockslides modulated by undrained loading in basal shear zones. *Nature Communications* 11, 1352
- 17) Agliardi F, Riva F, Barbarano M, Zanchetta S, Scotti R, Zanchi A (2019). Effects of tectonic structures and long-term seismicity on paraglacial giant slope deformations: Piz Dora (Switzerland). *Engineering Geology* 263, 105353
- 18) Norini G, Agliardi F, Crosta G, Groppelli G, Zuluaga MC (2019) Structure of the Colima Volcanic Complex: Origin and Behaviour of Active Fault Systems in the Edifice. In: Varley N., Connor C., Komorowski JC. (eds) *Volcán de Colima. Active Volcanoes of the World*. Springer, pp 27-54

- 19) Riva F, Agliardi F, Amitrano D, Crosta GB (2018). Damage-based time-dependent modelling of paraglacial to postglacial progressive failure of large rock slopes. *Journal of Geophysical Research: Earth Surface*, 122 (1), 124-141
- 20) Agliardi F, Dobbs MR, Zanchetta S, Vinciguerra S (2017). Folded fabric tunes rock deformation and failure mode in the upper crust. *Scientific Reports*, 7(1), 15290
- 21) Crosta GB, Agliardi F, Rivolta C, Alberti S, Dei Cas L (2017). Long-term evolution and early warning strategies for complex rockslides by real-time monitoring. *Landslides*, 14, 5, 1615–1632
- 22) De Franco R, Caielli G, Villa A, Agliardi F, Franchino F (2016). Ground-penetrating radar refraction imaging with stacked refraction convolution section method. *Geophysics*, 81(5), H33-H45
- 23) Agliardi F, Sapigni M, Crosta, GB (2016). Rock Mass Characterization by High-Resolution Sonic and GSI Borehole Logging. *Rock Mechanics and Rock Engineering*, 49(11), 4303-43
- 24) Cloutier C, Agliardi F, Crosta GB, Frattini P, Froese C, Jaboyedoff M, Locat J, Michoud C, Marui H (2015). The First International Workshop on Warning Criteria for Active Slides: technical issues, problems and solutions for managing early warning systems. *Landslides*, 12, 205-212
- 25) Agliardi F, Zanchetta S, Crosta GB (2014). Fabric controls on the brittle failure of folded gneiss and schist. *Tectonophysics*, 637, 150-162
- 26) Wang X, Frattini P, Crosta GB, Zhang L, Agliardi F, Lari S, Yang Z (2014). Uncertainty assessment in quantitative rockfall risk assessment. *Landslides*, 11, 4, 711-722
- 27) Crosta G, di Prisco C, Frattini P, Frigerio G, Castellanza R, Agliardi F (2014). Chasing a complete understanding of the triggering mechanisms of a large rapidly evolving rockslide. *Landslides*, 11(5), 747-764
- 28) Corominas J, van Westen C, Frattini P, Cascini L, Malet JP, Fotopoulou S, Catani F, Van Den Eeckhaut M, Mavrouli O, Agliardi F, Ptilikakis K, Winter MG, Pastor M, Ferlisi S, Tofani V, Hervás J, Smith JT (2014). Recommendations for the quantitative analysis of landslide risk. *Bulletin of Engineering Geology and the Environment*, 73, 2, 209-263
- 29) Agliardi F, Crosta GB, Meloni F, Valle C, Rivolta C (2013). Structurally-controlled instability, damage and slope failure in a porphyry rock mass. *Tectonophysics*, 605, 34-47
- 30) Agliardi F, Crosta GB, Frattini P, Malusà MG (2013). Giant non-catastrophic landslides and the long-term exhumation of the European Alps. *Earth and Planetary Science Letters*, 365, 263-274
- 31) Crosta GB, Frattini P, Agliardi F (2013). Deep seated gravitational slope deformations in the European Alps. *Tectonophysics*, 605, 13-33
- 32) Wang X, Zhang L, Wang S, Agliardi F, Frattini P, Crosta G, Yang Z (2012). Field investigation and rockfall hazard zonation at the Shijing Mountains Sutra caves cultural heritage (China). *Environ. Earth Sciences*, 66(7), 1897-1908
- 33) Frattini P, Crosta G, Lari S, Agliardi F (2012). Probabilistic Rockfall Hazard Analysis (PRHA). In: E. Eberhardt, C. Froese, A.K. Turner, S. Leroueil (Eds.), *Landslides and Engineered Slopes: Protecting Society through improved understanding*. CRC Press / Balkema, 2, 1145-1151. ISBN: 978-0-415-63303-1
- 34) Agliardi F, Crosta GB, Frattini P (2012). Slow rock slope deformation. In: *Landslides: Types, Mechanisms and Modeling*, ed. John J. Clague and Douglas Stead. Cambridge University Press, 207-221. ISBN-13: 9781107002067
- 35) Frattini P, Crosta GB, Agliardi F (2012). Rockfall characterisation and modeling. In: *Landslides: Types, Mechanisms and Modeling*, ed. JJ. Clague and D. Stead. Cambridge University Press, 267-281. ISBN-13: 9781107002067
- 36) Volkwein A, Schellenberg K, Labroue V, Agliardi F, Berger F, Bourrier F, Dorren LKA, Gerber W, Jaboyedoff, M (2011). Rockfall characterization and structural protection - a review. *NHESS*, 11, 2617-2651
- 37) Jarman D, Agliardi F, Crosta G (2011). Megafans and outsize fans from catastrophic rock slope failures in alpine glacial troughs: Malser Haide and the Venosta cluster, Italy. In: Jaboyedoff, M. (ed.) *Slope Tectonics*. Geological Society, London, Special Publication 351, 253-277. ISBN 978-1-86239-324-0
- 38) Norini G, Capra L, Groppelli G, Agliardi F, Pola A, Cortes A (2010), Structural architecture of the Colima Volcanic Complex, *Journal of Geophysical Research*, 115, B12209
- 39) Agliardi F, Crosta GB, Frattini P (2009). Integrating rockfall risk assessment and countermeasure design by 3D modelling techniques. *NHESS*, 9, 1059–1073
- 40) Agliardi F, Zanchi A, Crosta G (2009). Tectonic vs. gravitational morphostructures in the central Eastern Alps (Italy): constraints on the recent evolution of the mountain range. *Tectonophysics*, 474, 250–270
- 41) Agliardi F, Crosta G, Zanchi A., Ravazzi C (2009). Onset and timing of deep-seated gravitational slope deformations in the eastern Alps, Italy. *Geomorphology*, 103. 113–129
- 42) Frattini P, Crosta G, Carrara A, Agliardi F (2008). Assessment of rockfall susceptibility by integrating statistical and physically based approaches. *Geomorphology*, 94, 419-437
- 43) Baron I, Agliardi F, Ambrosi C, Crosta GB (2005). Numerical analysis of deep-seated mass movements in the Magura Nappe; Flysch Belt of the Western Carpathians (Czech Republic). *NHESS*, 5, 367-374

- 44) Crosta GB, Agliardi F (2004). Parametric evaluation of 3D dispersion of rockfall trajectories. *NHESS*, 4, 583-598
- 45) Crosta GB, Agliardi F (2003). A methodology for physically based rockfall hazard assessment. *Natural Hazards and Earth System Sciences*, 3, 407-422
- 46) Agliardi F, Crosta GB (2003). High resolution three-dimensional numerical modelling of rockfalls. *International Journal of Rock Mechanics and Mining Sciences*, 40/4, 455-471
- 47) Crosta GB, Agliardi F (2003). Failure forecast for large rock slides by surface displacement measurements. *Canadian Geotechnical Journal*, 40, 1, 176-191
- 48) Crosta GB, Agliardi F (2002). How to obtain alert velocity thresholds for large rockslides. *Physics and Chemistry of the Earth, Parts A/B/C*, 27 (36), 1557-1565
- 49) Guzzetti F, Crosta G, Detti R, Agliardi F (2002). STONE: a computer program for the three-dimensional simulation of rock-falls. *Computers & Geosciences*, 28 (9), 1079-1093
- 50) Agliardi F, Crosta G, Zanchi A (2001). Structural constraints on deep-seated slope deformation kinematics. *Engineering Geology*, 59 (1-2), 83-102

Complete publication lists

<https://boa.unimib.it/simple-search?query=federico+agliardi>

<https://scholar.google.com/citations?user=7KcRzoYAAAJ&hl=en>

<https://www.researchgate.net/profile/Federico-Agliardi>

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