Giacomo **Titti**

Environmental Engineer, Ph.D.

GIS python developer

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Research activity

Junior Assistant Professor Rif. 7960 (PNRR) All. 15 - SSD GEO/05

Bologna, Italy

Alma Mater Studiourm - UNIBO — *March 2022 – now*

- Project title: Dynamic mapping of Natural and Climatic Hazards over the Infrastructure systems RETURN
- Research activity: landslide susceptibility assessment

External collaborator n.prot. 1206 Rep. 28 05/04/2022

Bologna, Italy

Alma Mater Studiourm - UNIBO — *June 2022 – September 2022*

- Project title: Analisi e monitoraggio dell'Integrità dei Rilevati Arginali dei fiumi appenninici – AMIRA
- Research activity: data collection, river bank profile delineation using QGIS software

Ph.D. in Engineering Geology SSD:GEO/05

Bologna, Italy

Alma Mater Studiourm - UNIBO — *November 2018 – January 2022*

- Thesis title: Landslide susceptibility in the Belt and Road initiative
  Research themes:
- Application and development of models to predict the spatial probability of natural hazards occurrence based on machine learning algorithms, classification algorithms and optimization algorithms (R/INLA, Scikit-learn/Python).
- Collection and analysis of multi-spectral satellite images (GEE/JavaScript)
- Development of GIS-based (QGIS, GRASS GIS, SAGA GIS) tools for spatial data analysis and management.
- Development of Decision Support Systems and Early Warning Systems (Matlab/Python)

Associate researcher n.prot. 3036 12/12/2019

Padova, Italy

Italian National Council of Research - IRPI — *January 2020 – February 2022*

- Project title: towards geoHazards rEsilient infRastruCtUre under changing cLimatES (HERCULES), H2020-MSCA-RISE-2017
- Research activity: Remote sensing analysis of landslides displacement patterns

Associate researcher n.prot. 3557 20/12/2018

Padova, Italy

Italian National Council of Research - IRPI — *December 2018 – December 2019*

- Project title: Sino-Italian Laboratory on Geological and Hydrological Hazards: The Belt and Road initiative,
- Research activity: Collection, analysis and management of data to evaluate the landslide susceptibility along the new silk road in collaboration with the Chinese Academy of Sciences. Development of tools for susceptibility assessment

Research fellowship n. IRPI 001 2017 PD 10/02/2017

Padova, Italy

Italian National Council of Research - IRPI — *April 2017 – October 2018*

- Project title: Sino-Italian Laboratory on Geological and Hydrological Hazards: The Belt and Road initiative,
- Research activity: Collection, analysis and management of data to evaluate the landslide susceptibility along the new silk road in collaboration with the Chinese Academy of Sciences

Research projects

National project: Accordo EX ART. 15 L. 241/90 Rep. 149/2021 with AIPO ' Analisi e monitoraggio dell'Integrità dei Rilevati Arginali dei fiumi appenninici – AMIRA' L241BORGATTI14921

Bologna, Italy

Alma Mater Studiourm - UNIBO, Agenzia Interregionale per il fiume Po - AIPO — *2021 – 2022*

Personal contribution

- Role: Remote sensing analyst, numerical modelling specialist
- Duties: Morphometric analysis of river banks of the Panaro river.
- Duration: 15 months

European project: towards geoHazards rEsilient infRastruCtUre under changing cLimatES (HERCULES), H2020-MSCA-RISE-2017 *Padova, Italy*

THE UNIVERSITY OF WARWICK (UWA), UNIVERSITY OF NEWCASTLE UPON TYNE (NCL), RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (AACHEN), CONSIGLIO NAZIONALE DELLE RICERCHE (CNR), UNIVERSITAET FUER BODENKULTUR WIEN (BOKU), ECOLE NATIONALE DES PONTS ET CHAUSSEES (ENPC), ACCADEMIA EUROPEA DI BOLZANO (EURAC), SARMAP SA (SARMAP), ARUP ITALIA SRL (ARUP), ITASCA CONSULTANTS GMBH (ITASCA), DARES TECHNOLOGY SL (DARES), COFFEY GEOTECHNICS LIMITED (COFFEY) *2017 – 2020*

Personal contribution

- Role: Remote sensing analyst
- Duties: Morphometric analysis of landslides.
- Duration: 4 years

National project: Affidamento delle attività di gestone, manutenzione, validazione e interpretazione dei dati relativamente al sistema di monitoraggio delle frane del Tessina e di Lamosano in Comune di Chies d'Alpago (BL)(DGR n.2096/2010) n.prot. 218128 of 25/05/2015 *Padova, Italy*

National Council of Research - IRPI, Regione Veneto *2019 – 2021*

Personal contribution

- Role: Remote sensing analyst
- Duties: Morphometric analysis of landslides based on GNSS and Total station monitoring systems.
- Duration: 3 years

National project: Modellazione geologico-strutturale e idrogeologica della rupe di San Leo (RN) - REP. 55/2017-PROT. 1119-19/04/2017 *Padova, Italy*

Alma Mater Studiourm - UNIBO, AGENZIA REGIONALE SICUREZZA TERRITORIALE E PROTEZIONE CIVILE SEDE ROMAGNA *2019 – 2021*

Personal contribution

- Role: Remote sensing analyst, numerical modelling specialist
- Duties: Cracks monitoring and prediction modelling.
- Duration: 2 years

International project: Sino-Italian Laboratory on Geological and Hydrological Hazards n.prot. 3721 on 21/11/2017 *Padova, Italy*

Consiglio Nazionale delle Ricerche - IRPI, Chinese Academy of Sciences - IMHE *2017 – 2019*

Personal contribution

- Role: Remote sensing analyst, numerical modelling specialist, susceptibility expert
- Duties: Data collection, data homogenization, data analysis for geo-hydrological hazard assessment along the corridors of the "Belt and Road Initiative"
- Duration: 2 years

Awards

Special mention at GIT - Geosciences Information Technologies 2021 for the oral presentation "Mapping landslide susceptibility using statistical models with a limited amount of data" (G. Titti, C. van Westen, L. Borgatti, A. Pasuto, L. Lombardo) with the motivation: for the open-source approach of your research and the spatial impact of the work presented

Teaching experience

Single lecture *Bologna, Italy*

Alma Mater Studiorum - UNIBO *May 25th 2022*

General information of the course

- Course: Laboratorio di Pedologia Applicata (98835 - 4 CFU)
- Course level: Second cycle degree programme (LM) in Planning and management of agro-territorial, forest and landscape

Personal contribution

- Lecture contents: Basic principles on risk. Basic principles on landslide susceptibility. Presentation and workshop on the SZ-plugin for QGIS software.
- Teaching load: 2 hrs
- Duties: course organization, development, and presentation

Academic tutoring and lecture

Bologna, Italy

Alma Mater Studiorum - UNIBO

October 2021 - January 2022

General information of the course

- Course: Geologia e Geologia applicata T (69724 - 9 CFU - SSD: GEO/05)
- Course level: First cycle degree programme (L) in Environmental Engineering (cod. 9198)

Personal contribution

- Lecture contents (4 hrs): Basic principles on risk. Basic principles on landslide susceptibility. Workshop on the software QGIS.
- Load: 30 hrs
- Duties: QGIS workshop development and presentation. Teaching assistant management and guidance. Final exam invigilation

Academic tutoring and lecture

Bologna, Italy

Alma Mater Studiorum - UNIBO

October 2020 - September 2021

General information of the course

- Course: Engineering Geology (73360 - 6 CFU - SSD: GEO/05) Module of Geotechnics and Geology
- Course level: Second cycle degree programme (LM) in Environmental Engineering

Personal contribution

- Lecture contents (4 hrs): Basic principles on risk. Basic principles on landslide susceptibility. Workshop on the software QGIS.
- Load: 30 hrs
- Duties: QGIS workshop development and presentation. Teaching assistant management and guidance. Final exam invigilation

Academic tutoring and lecture

Bologna, Italy

Alma Mater Studiorum - UNIBO

October 2019 - September 2020

General information of the course

- Course: Engineering Geology (72805 - 6 CFU - SSD: GEO/05)
- Course level: Second cycle degree programme (LM) in Civil Engineering

Personal contribution

- Lecture contents (4 hrs): Basic principles on risk. Basic principles on landslide susceptibility. Workshop on the software QGIS.
- Load: 30 hrs
- Duties: QGIS workshop development and presentation. Teaching assistant management and guidance. Final exam invigilation

Academic tutoring and lecture

Bologna, Italy

Alma Mater Studiorum - UNIBO

October 2018 - September 2019

General information of the course

- Course: Engineering Geology (35513 - 6 CFU - SSD: GEO/05)
- Course level: Second cycle degree programme (LM) in Civil Engineering

Personal contribution

- Lecture contents (4 hrs): Basic principles on risk. Basic principles on landslide susceptibility. Workshop on the software QGIS.
- Load: 30 hrs
- Duties: QGIS workshop development and presentation. Teaching assistant management and guidance. Final exam invigilation

Academic tutoring and lecture

Bologna, Italy

Alma Mater Studiorum - UNIBO

October 2018 - September 2019

General information of the course

- Course: Engineering Geology (73360 - 6 CFU - SSD: GEO/05) Module of Geotechnics and Geology
- Course level: Second cycle degree programme (LM) in Environmental Engineering

Personal contribution

- Lecture contents (4 hrs): Basic principles on risk. Basic principles on landslide susceptibility. Workshop on the software QGIS.
- Load: 30 hrs
- Duties: QGIS workshop development and presentation. Teaching assistant management and guidance. Final exam invigilation

Professional experience

GeoDataLab srls

Roma, Italy

GIS python developer

February 2022 – August 2023

- Algorithms and IT solutions development to automatize spatial analysis with GIS/python based platforms.
- Django front-end
- Analysis of multispectral satellite images
- Development of IT solutions and application to manage, storage and visualize spatial data for Governments and private companies based on Geonode/Mapstore/Geoserver.

BiResearch

Padova, Italy

Consultant engineer

January 2017 – December 2019

- activity: Technical and scientific consultant for project development

SIRAI

Marghera, Italy

Scholarship

November 2016 – January 2017

- activity: Installation and design of solutions for contaminated soil remediation P&T, SVE, AS, MPE, ISCO

Education

University of Padova — *Padova, Italy*

MSc in Environmental Engineering — *October 2013 – March 2016*

- Thesis: "*The Vehicle Routing Problem solved through Genetic Algorithms in the framework of the municipal solid waste collection and transport*"
- Final mark: 106/110

Universitá Politecnica delle Marche — *Ancona, Italy*

Bsc in Civil and Environmental Engineering — *October 2010 – October 2013*

- Thesis: "*Deattivazione di paste cementizie fotocatalitiche*"
- Final mark: 110/110 e lode

Seminars and schools

International training school on Silk Road Disaster Risk Reduction. **Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, Chengdu** (China), 30 June - 8 July 2019.

Methods for landslide hazard assessment at different scales and applications in environmental studies. **Università di Modena e Reggio Emilia, Modena** (Italy), 27-29 March 2019.

2017 Spring School on Frontier and Inter-disciplinary Sciences. **Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, Chengdu** (China), 7-12 May 2017.

Visiting period

ITC - University of Twente — *Enschede, Netherlands*

PhD Intern — *20 November 2022 - 26 November 2022*

- Project: Sino-Italian Laboratory on Geological and Hydrological Hazards: The Belt and Road initiative
- Duties: Preparation and dissemination of educational material for SRT, SZ-plugin and STGEE tools

Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences — *Beijing, China*

PhD Intern — *9 May 2019 - 29 June 2019*

- Project: Sino-Italian Laboratory on Geological and Hydrological Hazards: The Belt and Road initiative
- Duties: participation at the International training school on Silk Road Disaster Risk Reduction

Institute of Montain Hazards and Environment, Chinese Academy of Sciences — *Chengdu, China*

PhD Intern — *30 June - 8 July 2019*

- Project: Sino-Italian Laboratory on Geological and Hydrological Hazards: The Belt and Road initiative
- Duties: Data collection and interpretation

Institute of Montain Hazards and Environment, Chinese Academy of Sciences — *Chengdu, China*

CNR-IRPI Fellowship Intern — *4-12 September 2018*

- Project: Sino-Italian Laboratory on Geological and Hydrological Hazards: The Belt and Road initiative
- Duties: data collection and interpretation

Institute of Montain Hazards and Environment, Chinese Academy of Sciences — *Chengdu, China*

CNR-IRPI Fellowship Intern — *10-30 October 2017*

- Project: Sino-Italian Laboratory on Geological and Hydrological Hazards: The Belt and Road initiative
- Duties: participation at the 2017 Spring School on Frontier and Inter-disciplinary Sciences. Data collection and interpretation

Reviewing experience

Peer-reviewer for the following international journals:

2018 – now

- **ISPRS International Journal of Geo-Information** (MDPI)
- **Transactions in GIS** (Wiley)
- **Applied Sciences** (MDPI)
- **Landslides** (Springer)
- **Stochastic Environmental Research and Risk Assessment** (Springer)

Languages

Italian: Mother tongue; **English**: full proficiency

Programming skills

Advanced	Linux, Python, Matlab, R, CAD, GoogleEarthEngine, GIS (QGIS, SAGA-gis, GRASS), Office, LaTex, GIT
Intermediate	SQL, JavaScript, Geoserver, Mapstore, Geonode, Docker, Django, Scikit-Learn
Basic	C++, Yolo, OpenCV

Professional skills

- Optimization models
- Decision Support Systems
- Artificial Intelligence algorithms
- Evolutionary algorithms
- Risk assessment
- Spatial data mining
- Data Analysis
- Machine learning
- GIS analyst/developer

Peer-reviewed publications

1. **Titti, G.**, Nicola Napoli, G., Conoscenti, C., Lombardo, L., 2022. Cloud-based interactive susceptibility modeling of gully erosion in Google Earth Engine. International Journal of Applied Earth Observation and Geoinformation 10.1016/j.jag.2022.103089
2. Zou, Q., Cui, P., Zhang, Z., Sijimons, K., **Titti, G.**, Li, S., Jiang, H., 2022. A novel approach of multi-hazard integrated zonation on the ancient Silk Road. International Journal of Disaster Risk Reduction. 10.1016/j.ijdrr.2022.103325
3. **Titti, G.**, Sarretta, A., Lombardo, L., Crema, S., Pasuto, A. ,Borgatti, L., 2022 . Mapping susceptibility with open-source tools: a new plugin for QGIS. Frontiers in Earth Sciences. 10.3389/feart.2022.842425
4. **Titti, G.**, van Westen, C., Borgatti, L., Pasuto, A., Lombardo, L., 2021. When Enough Is Really Enough? On the Minimum Number of Landslides to Build Reliable Susceptibility Models. Geosciences. 10.3390/geosciences11110469
5. **Titti, G.**, Borgatti, L., Zou, Q., Cui, P., Pasuto, A., 2021. Landslide susceptibility in the Belt and Road Countries: continental step of a multi-scale approach. Environmental Earth Sciences. 10.1007/s12665-021-09910-1
6. **Titti, G.**, Bossi, G., Zhou, Gordon, G.D., Marcato, G., Pasuto, A., 2020. Backward automatic calibration for three-dimensional landslide models. Geoscience Frontiers. 10.1016/j.gsf.2020.03.011
7. **Titti, G.**, Mantovani, M., Bossi, G., 2020. Detecting change of patterns in landslide displacements using machine learning, an example application. Contribution in: Understanding and Reducing Landslide Disaster Risk, Sassa, K., Takara, K. Springer. 10.1007/978-3-030-60713-5_23
8. Mantovani, M., Bossi, G., Marcato, G., Schenato, L., Tedesco, G., **Titti, G.**, Pasuto, A., 2019. *New Perspectives in Landslide Displacement Detection Using Sentinel-1 Datasets*. Remote Sensing, 11 (2135). 10.3390/rs11182135
9. **Titti, G.**, Turchetto, J., Salemi, G., 2018. *Genetic algorithms based road analysis in Cappadocia, Turkey*. Rendiconti Online della Società Geologica Italiana. 10.3301/ROL.2018.54
10. Lei, Y., Cui, P., Deep Regmi, A., Murray, V., Pasuto, A., **Titti, G.**, Shafique, M., Priyadarshana, D. G. T., 2018. *An International Program on Silk Road Disaster Risk Reduction – a Belt and Road Initiative, 2016-2020*. Journal of Mountain Science, 15 (7), pp. 1383-1396. 10.1007/s11629-018-4842-4

Software publications

1. **Titti, G.**, Nicola Napoli, G., & Lombardo, L., 2022. giactitti/STGEE: STGEE v1.1 (v1.1). Zenodo. 10.5281/zenodo.6471966
2. **Titti, G.** & Lombardo, L. (2022). giactitti/SRT: SRT v1.0 (v1.0). Zenodo. 10.5281/zenodo.5948592
3. **Titti, G.**, Sarretta, A., Lombardo, L., 2021. CNR-IRPI-Padova/SZ: SZ plugin v1.0. Zenodo 10.5281/zenodo.5693351
4. **Titti, G.**, Bossi, G., 2020. CNR-IRPI-Padova/SPS: SPS v0.1. Zenodo. 10.5281/zenodo.3601172
5. Crema, S., **Titti, G.**, Sarretta, A., Mantovani, M., 2020. CNR-IRPI-Padova/P-SARRET: P-SARRET v0.1. Zenodo. 10.5281/zenodo.3600250

Abstract publications

1. **Titti, G.**, Borgatti, L., Zou, Q., Cui, P., Pasuto, A., 2019. *Small-scale landslide susceptibility assessment. The case study of the Silk Road Disaster Risk Reduction*. In: TERRAENVISION Abstracts, Vol. 2, TNV2019-TOOLS-2049, 2019, TERRAenVISION 2019.
2. **Titti, G.**, Zou, Q., Borgatti, L., Cui, P., Pasuto, A., 2019. Multi-scale landslide susceptibility assessment for Silk Road Disaster Risk Reduction. In: Geophysical Research Abstracts, Vol. 21, EGU2019-12819, 2019, EGU General Assembly 2019
3. Bossi, G., **Titti, G.**, Marcato, G., Pasuto, A., 2019. Semi-Automatic System For Backward Determination Of Landslide Soil Parameters. In: Geophysical Research Abstracts, Vol. 21, EGU2019-12819, 2019, EGU General Assembly 2019
4. Turchetto, J., Titti, G., 2018. Where should i go? genetic algorithms and the routes of roman-byzantine cappadocia (central anatolia). In: Building Bridges, Abstract book of the 23rd Annual Meeting of the European Association of Archaeologists 2017. Maastricht 2017. p 510. ISBN: 9789057992858

Presentations (oral and poster) at international conferences

1. **Titti, G.**, Lombardo, L. Unified spatial prediction solutions: a step towards a joint data-management & modeling framework within the same computing environments (QGIS or Google Earth Engine). Launch talk, 24 November 2022, ITC-University of Twente, Enschede, Netherlands. (Oral presentation, presenter: Titti)

2. **Titti, G.**. Multi-scale landslide "susceptibility assessment along the transportation corridors of the new Silk Road. Consortium Plenary Meeting and Project Workshop, Resilient Infrastructures for Tomorrow's Hazards, HERCULES 21 July - 22 July 2021, San Servolo, Venezia, Italy. (Oral presentation, presenter: Titti)
3. **Titti, G.**, Borgatti, L., Zou, Q., Cui, P., Pasuto, A. Small-scale landslide susceptibility assessment. The case study of the Silk Road Disaster Risk Reduction. TERRAenVISION 2-7 September 2019, Barcelona. (Oral presentation, presenter: Titti)
4. **Titti, G.**, Zou, Q., Borgatti, L., Cui, P., Pasuto, A. Landslide susceptibility assessment along the Silk Road Economic Belt. International Conference on Silk-Road Disaster Risk Reduction and Sustainable Development 11-12 May 2019, Beijing. (Oral presentation, presenter: Pasuto)
5. **Titti, G.**, Zou, Q., Borgatti, L., Cui, P., Pasuto, A. Multi-scale landslide susceptibility assessment for Silk Road Disaster RiskReduction. EGU General Assembly 2019, Vienna. (Poster presentation)
6. Bossi, G., **Titti, G.**, Marcato, G., Pasuto, A. Semi-Automatic System For Backward Determination Of Landslide Soil Parameters. EGU General Assembly 2019, Vienna. (Oral presentation, presenter: Bossi)
7. Bossi, G., Mantovani, M., **Titti, G.**, Crema, S., Schenato, L., Cavalli, M., Marcato, G., Frigerio, S., Pasuto, A. Agglomerative Hierarchical Cluster Analysis to Control and Characterize the Displacements of the Source Area of a Large Debris Flow. 5th International Debris Flow Workshop. & Symposium on Silk Roads Disaster Mitigation, November 5-7, 2018, Beijing, China. (Oral presentation, presenter: Bossi)
8. Turchetto, J., **Titti, G.** Where should i go? genetic algorithms and the routes of roman-byzantine cappadocia (central anatolia). Annual Meeting of the European Association of Archaeologists 2017. Maastricht (Netherlands). (Oral presentation, presenter: Turchetto)

Presentations (oral and poster) at national conferences

1. **Titti, G.**, Van Westen, C., Borgatti, L., Pasuto, A., Lombardo, L. Mapping landslide susceptibility using statistical models with a limited amount of data". GIT - Geosciences Information Technologies 2021. 20-21 December 2021, Ripatransone, Italy. (Presentazione orale, presentatore: Titti)
2. **Titti, G.**, Borgatti, L., Pasuto, A. Suscettibilità da frana a piccola scala. Il caso studio della nuova via della seta. 7° Congresso Nazionale AIGA. 23-25 September 2021, Lecco. (Poster presentation)
3. **Titti, G.**, Sarretta, A., Crema, S., Pasuto, A., Borgatti, L. Sviluppo e applicazione del Weight of Evidence plugin per il supporto della pianificazione territoriale. FOSS4G-IT 18-22 February 2020, Torino. (Oral presentation, presenter: Sarretta)
4. **Titti, G.** The Three Phase Algorithm for municipal solid waste collection and transport. An open-source solution for geospatial routing. FOSS4G-IT. Padova, 20-24 febbraio 2019. (Poster presentation)
5. **Titti, G.**, Marcato, G., Bossi, G. Determinazione in back-analysis dei parametri caratteristici delle terre per la modellizzazione delle frane. XIII Convegno Nazionale "GIT - Geosciences and Information Technologies". Sarzana (SP), 11-13 giugno 2018. (Oral presentation, presenter: Bossi)
6. **Titti, G.**, Turchetto, J. Genetic algorithms based road network in Cappadocia, Turkey. A GIS post-dictive approach. XII Convegno Nazionale "GIT - Geosciences and Information Technologies". Gavorrano (GR), 12-14 giugno 2017. (Poster presentation)

Graduate thesis

1. **Titti, G.**, 2022. Landslide susceptibility in the Belt and Road Initiative. PhD thesis, University of Bologna, Bologna, Italy. 10.48676/unibo/amsdottorato/10341
2. **Titti, G.**, 2016. The Vehicle Routing Problem solved through Genetic Algorithms in the framework of the municipal solid waste collection and transport. M.Sc thesis, University of Padova, Padova, Italy

Published dataset

1. Titti, G., Lombardo, L., Van Westen, C., 2022. Landslide susceptibility of Tajikistan: covariates and landslides probability of occurrence. PANGAEA, 10.1594/PANGAEA.940239

Tutorials

1. SZ-plugin - How to do susceptibility in QGIS, link: https://www.youtube.com/watch?v=XpsiCkVF11s