CURRICULUM VITAE

PERSONAL INFORMATION

Full name: Federica Torrisi
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Current Position: Ph.D. Student at the Department of Electrical Electronic and Computer Engineering (DIEEI) of the University of Catania, associated with the National Institute of Geophysics and Volcanology (INGV) of Catania.
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RESEARCH INTERESTS

My research interests are in the area of the satellite remote sensing for the volcano monitoring. In particular, I am interested in the development of Artificial Intelligence techniques for volcanic cloud monitoring and forecasting using multispetral satellite data. I am also interested in the monitoring of volcanic thermal anomalies associated with active lava flows.

Researcher unique identifiers: ORCID ID 0000-0002-7066-6508 (https://orcid.org/0000-0002-7066-6508)
Bibliometric Indicators: SCOPUS: h-index 6, citations 74; Google Scholar: h-index 6, citations 83

EDUCATION AND TRAINING

2020 – today   *INGV of Catania – University of Catania, Italy*

PhD in Systems, Electrical, Computer Science and Telecommunication Engineering

<u>Summer Schools:</u> 7° International Training School on "Convective and Volcanic Clouds (CVC) detection, monitoring and modelling" (2022), 6° International Training School on "Convective and Volcanic Clouds (CVC) detection, monitoring and modelling" (2021), "TAI4ES Summer School" (2021).

<u>Courses:</u> Machine Learning, Deep Learning, Remote Sensing Image Acquisition Analysis and Applications, Physics of Volcanism, Satellite Observations and Tools for Fire Risk, Detection and Analysis, Google Earth Engine Applications for Land Monitoring, Volcanic Hazards, WebGIS Base & Geodatabase (PostGIS).

2023 - 2024   *University of Alaska Fairbanks, Fairbanks (USA)*

Fulbright Visiting Student Researcher

<u>Research Project:</u> "Characterizaton of Volcanic Clouds Components using Machine Learning Techniques and Satellite Infrared Images".

2021   *University of Catania, Italy*

Professional qualification as industrial engineer (Section A)

2018 – 2020   *University of Catania, Italy*

MSc Automation Engineering and Control of Complex Systems (grade: 110/110 cum laude)

<u>Thesis:</u> Optical approaches for investigation of microparticles flow, supervisor: Prof. Bucolo

<u>Courses:</u> Modeling and control of electromechanical systems, Microelectronics, Robust control, Sensor and advanced measurement systems, Biomedical system and control, Model and simulation of mechanical system, Autonomous Robotic Systems Programming and Laboratory Experiences, Process Modeling and Control, Simulation of Industrial and Logistic Systems, Robotics, Complex Adaptive Systems and Biorobotics.

2020   *Universitat Politècnica de Catalunya, Spain*

Erasmus Plus

<u>Research Project:</u> "Characterization of speckle patterns generated by a semiconductor laser with optical feedback for speckle reduction".

<u>Courses:</u> Simulation of Industrial and Logistic Systems.

2015 – 2018   *University of Catania, Italy*

Bachelor Degree in Computer Science Engineering (grade: 110/110 cum laude)

<u>Thesis:</u> Adaptive Algorithms for consensus and synchronization, supervisor: Prof. Frasca

<u>Courses:</u> Mathematical Analysis I, Chemistry, Engineering Economics, Linear Algebra and Geometry, Physics I, Foundations of Computer Science, Physics II, Operating Systems, Mathematical Analysis II, Objected Oriented Programming, Basic Electrical Engineering (Electrotechnics), Automatics, Signal theory, Technical Physics, Computer Architecture, Electronics, Internet Architecture and Web Programming, Computer Architecture and Mobile Systems Lab, Database and information systems, Enterprise Startup and Business Models, Digital Communications.

PARTICIPATION IN RESEARCH PROJECT

2012 - 2024	Programma di ricerca internazionale: **ATHOS (Advanced Tools and metHods for cOmputational fluid dynamicS)** - Coordinated by TechnoLab, Etna Volcano Observatory (EVO), 2012-2024 (OB.FU. 867.010).
2020 - 2025	Progetto strategico del dipartimento Vulcani dell'INGV: FIRST (ForecastIng eRuptive activity at Stromboli volcano: Timing, eruptive style, size, intensity, and duration), 2020-2025 (OB.FU. 9999.601).
2023-2025	Progetto istituzionale INGV finanziato dal MUR: Pianeta Dinamico VT_ORME (ObseRvation, Measurement and modelling of Eruptive processes), 2023-2025 (OB.FU. 1020.010).
2023 - 2027	Programma di ricerca INGV finanziato dal MUR: ROSE (Reinforcement of the Observational Systems of the Earth) 2023-2027, (OB.FU. 1215.010).

SCHOLARSHIP AWARDS

2023	Fulbright Visiting Student Researcher grant
2022	Award "Scientific Communication in Geophysics to the 107° National Conference of Italian Physica Society" for the project "Retrieval of volcanic ash cloud properties using msg-seviri and machine learning techniques"
2020	Erasmus Plus at Universitat Politècnica de Catalunya

ASSOCIATIONS

2021 – 2022	Società Italiana di Fisica (SIF)	2021-2023	American Geophysical Union (AGU)
2024	European Geosciences Union (EGU)		

PROFESSIONAL WORK EXPERIENCE

2021 - 2023	University of Catania & INGV – Teaching of the course "Technologies for Forecasting Volcanic Hazards"
2021 - 2022	University of Catania - Tutor for the course "Laboratory of Sensors and Sensing Systems" and "Teoria dei Sistemi"
2019 - 2020	University of Catania - Tutor Junior at the Department of Electrical Electronic and Computer Engineering

INSTITUTIONAL SERVICE

2023	Chair of the session "Forecasting Volcanic Hazards: From Monitoring to Modeling" during the AGU 2023 Fall Meeting, San Francisco, CA, 11-15 December 2023.
2021	Co-Chair of the session "Volcano Hazard Monitoring From Space Using Statistical Methods and Machine Learning" during the AGU 2021 Fall Meeting, New Orleans, LA & Virtual, 13-17 December 2021.

TECHNICAL SKILLS

IT Skills

Operationg systems: Windows, Linux

Programming languages: C, Python, Java, JavaScript, PHP, SQL

Software: Office, Matlab, Simulink, QGIS, SNAP,
Google Earth Engine, MySQL, LabView, MultiSim,

Web Site creation: HTML, CSS

Languages

Italian: Native

English: Level C1, certified by IELTS certificate
with 7 overall score obtained in 21/01/2023

CONFERENCES

Oral presentations

1. "Radiative heat power derived from Sentinel-3 SLSTR, MODIS and VIIRS during December 2020 – March 2021 lava fountains at Etna volcano", 4° Conferenza "A. Rittmann" Giovani Ricercatori, 6-9 April 2021, Virtual.
2. "Retrieval of volcanic ash cloud properties using MSG-SEVIRI and machine learning techniques", 107° Congresso Nazionale Società Italiana di Fisica, 13-17 September 2021, Virtual.
3. "Towards an automatic generalized machine learning approach to map lava flows", 17° IEEE International Workshop on CNNA, 29-30 September 2021, Catania, Italy.
4. "Forecasting of thermal behavior of lava fountains with the synergic use of multi-sensor satellite data". 108° Congresso Nazionale SIF 2022, 12-16 September 2022, Milano, Italy.
5. "Tracking volcanic clouds using machine learning techniques: the 2020-2022 Mt. Etna paroxysms". 5° Conferenza A. Rittmann, 29 September – 1 October 2022, Catania, Italy.
6. "Innovative computing methods for volcanic cloud monitoring from space". 1st Satellite Observations of Volcanic Clouds Conference (SOVCC), online, 7-9 June 2023.
7. "Innovative Computing Methods for Volcanic Cloud Monitoring from Space". 2° Technical Workshop COS, INGV-Roma & online, 27-28 June 2023.

8. "Deep learning techniques for monitoring volcanic ash clouds from space". International Union of Geodesy and Geophysics (IUGG), Berlino Germany, Italy, 12-19 July 2023.

Poster presentations

1. "Detecting Volcanic Ash Plume Components from Space using Machine Learning Techniques". AGU 2021 Fall Meeting, New Orleans, LA & Virtual, 13-17 December 2021.
2. "Near-Real Time Artificial Intelligence Approach for Volcanic Eruptions Monitoring using SEVIRI Earth Observation Data". ESA Living Planet Symposium 2022, Bonn, Germany, 23-27 May 2022.
3. "Machine Learning Approacches for Volcanic Clouds Characterization". Convective and Volcanic Clouds (CVC) training school 2022, Nicolosi, Italy, 5-13 September 2022.
4. "Earth Observations and Artificial Intelligence techniques to monitor volcanic clouds". International Workshop on High-Resolution Thermal EO, Frascati (Rome), Italy, 10-12 May 2023.
5. "A Deep Convolutional Neural Network for Satellite Monitoring of Volcanic Clouds". AGU 2023 Fall Meeting, San Francisco, CA, 11-15 December 2023.

SCIENTIFIC PUBLICATIONS

1. **Torrisi, F.**, Cariello, S., Corradino, C., & Del Negro, C. (2024). Enhancing detection of volcanic ash clouds from space with convolutional neural networks. Journal of Volcanology and Geothermal Research, 108046.
2. Cariello, S., Corradino, C., **Torrisi, F**., & Del Negro, C. (2023). Cascading machine learning to monitor volcanic thermal activity using orbital infrared data: from Detection to Quantitative evaluation. Remote Sensing, 16(1), 171.
3. Amato, E., Corradino, C., **Torrisi, F.**, & Del Negro, C. (2023). Spectral analysis of lava flows: Temporal and physicochemical effects. Il nuovo cimento C, 46.
4. Amato, E., Corradino, C., **Torrisi, F.**, & Del Negro, C. (2023). A Deep Convolutional Neural Network for Detecting Volcanic Thermal Anomalies from Satellite Images". Remote Sensing, 15(15), 3718.
5. **Torrisi, F.**, Stella, G., Guarino, F., & Bucolo, M. (2023). Cell counting and velocity algorithms for hydrodynamic study of unsteady biological flows in micro-channels. Biomicrofluidics 17, 014105.
6. **Torrisi, F.**, Amato, E., Corradino, C., Mangiagli, S., & Del Negro, C. (2022). Characterization of Volcanic Cloud Components Using Machine Learning Techniques and SEVIRI Infrared Images. Sensors, 22(20), 7712.
7. **Torrisi, F.**, Amato, E., Corradino, C., & Del Negro, C. (2022). The FastVRP automatic platform for the thermal monitoring of volcanic activity using VIIRS and SLSTR sensors. ANNALS OF GEOPHYSICS, 65(6).
8. Corradino, C., Amato, E., **Torrisi, F.**, & Del Negro, C. (2022). Data-Driven Random Forest Models for Detecting Volcanic Hot Spots in Sentinel-2 MSI Images. Remote Sensing, 14(17), 4370.
9. Calvari, S., Di Traglia, F., Ganci, G., ... & Belviso, P. (2022). Multi-parametric study of an eruptive phase comprising unrest, major explosions, crater failure, pyroclastic density currents and lava flows: Stromboli volcano, 1 December 2020–30 June 2021. Frontiers in Earth Science.
10. Del Negro, C., Amato, E., **Torrisi, F.**, Corradino, C., Bucolo, M., & Fortuna, L. (2022, June). Support Vector Machine for volcano hazard monitoring from space at Mount Etna. In 2022 IEEE 21st Mediterranean Electrotechnical Conference (MELECON) (pp. 627-631). IEEE.
11. **Torrisi, F.** (2022). Automatic detection of volcanic ash clouds using MSG-SEVIRI satellite data and machine learning techniques. Il nuovo cimento C, 45(4), 1-10. (Premio Migliore Comunicazione SIF 2021 - Sezione Geofisica e fisica dell'ambiente)
12. Corradino, C., Amato, E., **Torrisi, F.**, Calvari, S., & Del Negro, C. (2021). Classifying Major Explosions and Paroxysms at Stromboli Volcano (Italy) from Space. Remote Sensing, 13(20), 4080.
13. Amato, E., Corradino, C., **Torrisi, F.**, & Del Negro, C. (2021, October). Mapping lava flows at Etna Volcano using Google Earth Engine, open-access satellite data, and machine learning. In 2021 International Conference on Electrical, Computer, Communications and Mechatronics Engineering (ICECCME) (pp. 1-6). IEEE.
14. Corradino, C., Amato, E., **Torrisi, F.**, & Del Negro, C. Towards an automatic generalized machine learning approach to map lava flows. In 2021 17th International Workshop on Cellular Nanoscale Networks and their Applications (CNNA) (pp. 1-4). IEEE.

I hereby authorize the use of my personal data in compliance with the Italian Legislative Decree 196/2003 and Article 13 GDPR (Regulation EU No 2016/679)
Date: Catania, 14 March 2024

Federica Torrisi