



DIPARTIMENTO DI STRUTTURE PER L'INGEGNERIA E L'ARCHITETTURA
CORSO DI DOTTORATO DI RICERCA IN
INGEGNERIA STRUTTURALE GEOTECNICA E RISCHIO SISMICO

XXXVI CICLO

Il sottoscritto prof. **Gianfranco URCIUOLI**

(PO ■ PA □ RU □ RTD □) afferente al Dipartimento di Ingegneria
Civile, Edile e Ambientale (DICEA) S.S.D. **ICAR/07 Geotecnica**

CHIEDE

di essere inserito tra i possibili tutor di studenti di dottorato per il XXXVI ciclo.

1. Curriculum sintetico del proponente (max 500 parole)

Actual position.

Full professor at the University of Naples Federico II; Scientific Disciplinary Sector ICAR/07 (08/B1) - Geotechnics.

Main research topics

He carried out both experimental and theoretical-numerical researches at the Department of Civil, Architectural and Environmental Engineering of the University of Naples Federico II on geotechnical issues that, since the beginning of his academic career, marked his scientific profile : i) monitoring of slopes and of hydro-mechanical variables influencing slope stability; ii) slope stability analysis, applied in particular to flowslides in pyroclastic soils and to earthflows in flysch formations; iii) theoretical-numerical analysis of slope stabilization works and of their mechanical behaviour; iv) monitoring of stabilized slopes and evaluation of effectiveness of adopted control works; v) laboratory experimentation, consisting of test campaigns on saturated structurally complex soils and partially saturated volcanic soils.

He then undertook a research on the initiation of flowslides in pyroclastic soils, turning on a wide experimental laboratory activity on partially saturated soils. Later, he undertook studies characterized by a major impact on social community, such as: i) early warning systems for the management of areas threatened by landslide risk for human life and ii) innovative control works for slope stabilization, including vegetation, highlighting the plant and grass abilities to modify pore pressure regime in the subsoil (due to the transpiration) and to improve soil mechanical behaviour (due to the reinforcement action exerted by the roots). Recently, alongside the research line on the initiation of flowslides, which represents the core of his activities, he turned on a wide experimentation on geotechnical innovative materials, destined for fills and earthworks. These materials, which provide for the reuse of excavated soils otherwise destined to dump, are made with small amounts of binder and are characterized by a high mechanical performance and a low unit weight (due to the addition of organic foaming agents during their formation process).



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Scientific Production

He is the author or co-author of 167 scientific products registered on the website www.iris.unina.it (Cineca); these products concern topics described in the previous paragraph.

International relationships

UNIVERSITY OF STRATHCLYDE (UK), ECOLE POLYTECHNIQUE FEDERAL DE LAUSANNE (CH), UNIVERSITAT POLITECNICA DE CATALUNYA (ES), ECOLE NATIONALE DES PONTS ET CHAUSSEES (FR), NANJING UNIVERSITY (CN), UNIVERSITY OF GLASGOW (UK), UNIVERSITE DE PAU ET DES PAYS DE L'ADOUR (FR), UNIVERSITY OF DURHAM (UK), INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE (FR), TECHNISCHE UNIVERSITEIT DELFT (NL), CENTER DE COOPERATION INTERNATIONAL EN RECHERCHE AGRONOMIQUE POUR LE DEVELOPPEMENT (FR), CENTER INTERNACIONAL DE METODES NUMERICAS EN INGENIERIA (ES).

Other tasks

Head of the CIMA center (Center for innovation in environmental monitoring) by AMRA. for three consecutive years.

2017-18 Coordinator of the II level Master course at the University of Naples Federico II in "Geotechnics for infrastructures".

2018 Co-chairman of the scientific committee of IWL-2018: "RAINFALL-INDUCED LANDSLIDES. NOW-CASTING FOR EARLY WARNING".

2. Dottorandi dei quali il proponente è stato tutor nell'ultimo triennio

n. <u>4</u>	<i>specificare tipologia di borsa: ateneo, pon, por, senza borsa, ecc.</i> <i>Allievo: Domenico De Sarno. Dottorato di ricerca in Ingegneria Strutturale, Geotecnica e Rischio</i>
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	<p><i>sismico. 31° Ciclo. Borsa di Ateneo. Titolo conseguito nel 2019.</i></p> <p><i>Allieva: Ana Sofia Rodrigues Afonso Dias. Dottorato di ricerca in Ingegneria Strutturale, Geotecnica e Rischio sismico. 31° Ciclo. Borsa: H2020 Marie Curie "TERRE project". Titolo conseguito nel 2019.</i></p> <p><i>Allievo: Emmanuel Salifu. Dottorato di ricerca in Ingegneria Strutturale, Geotecnica e Rischio sismico. 31° Ciclo. Borsa: H2020 Borsa Curie "TERRE project". Titolo conseguito nel 2019.</i></p> <p><i>Allieva: Marialaura Tartaglia. Dottorato di ricerca in Ingegneria Strutturale, Geotecnica e Rischio sismico. 34° Ciclo. Sena borsa. In corso.</i></p>
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<p>3. Titolo della ricerca proposta</p>
<p>Sustainable approach for landslide risk mitigation</p>

<p>4. Area tematica</p>
<p>Ingegneria Geotecnica <input checked="" type="checkbox"/></p> <p>Ingegneria Strutturale <input type="checkbox"/></p> <p>Rischio Sismico <input type="checkbox"/></p>

<p>5. Sintesi del progetto di ricerca (max 500 parole. Stato dell'arte, obiettivi e breve programma previsto per le attività e)</p>
<p>The Green New Deal is an European resolution that lays out a grand plan for tackling climate change. The goal of the Green New Deal is to reduce greenhouse gas emissions in order to avoid the worst consequences of climate change. .Civil engineering can make an important contribution by developing control works for natural risk reduction inspired by sustainability.</p> <p>A widespread use of appropriate plant species can significantly improve the stability conditions of large areas occupied by both clayey and pyroclastic deposits, mainly where shallow landslides are to be expected. In this project the role of vegetation will be studied:</p> <ul style="list-style-type: none"> • from a mechanical point of view, investigating soil reinforcement provided by roots and by the physical-chemical transformation of the soil system due to vegetation; • from an hydrological point of view, considering rain interception and transpiration in relation to the life cycle of plants.



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A second module of the project will aim at defining the analysis and design models of sustainable mitigation works most useful in the two considered geological contexts:

- active micro-interventions (topographic reshaping, surface drainage, carefully positioned small control works and drainages) to be carried out for shallow landslides in pyroclastic soils once the triggering zones, consisting of critical stratigraphic and/or topographic features, have been reliably identified; to this aim, the innovative nature of the project lies in the development of a new methodology based on lidar surveys and 3d tomography to investigate topography and subsurface features;
- interventions that exploit the physico-chemical properties of fine-grained soils, to be used on clay slopes at territorial scale; they consist of sustainable chemical treatments modifying the soil properties and innovative shallow to medium depth drainages.

To manage residual risk, innovative forecasting and early warning systems (EWS) will be developed. In the context of current scientific knowledge, EWSs represent the main strategy to safeguard people living in areas exposed to landslide risk. These systems will be based on the monitoring of:

- event precursors, primarily considering meteorological factors and the hydraulic response of the slope for weather-induced fast-moving landslides, with special reference to pyroclastic soils for which event indicators are less effective;
- event indicators, mainly considering the ground displacements that precede or follow the failure stage, very useful in all clayey contexts.

To maximize the social impact of the research, the project will end with the development of a toolbox, comprising all the project innovative findings as well as conventional measures adopted for slope stability for the considered phenomena. The community, and in particular the technical one, is expected to use the toolbox as an instrument to rationally choose among landslide mitigation solutions for the problem at hand.



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6. Eventuali pubblicazioni del tutor sul tema di ricerca (max 10)

- Urciuoli G., Pirone M., Picarelli L. (2019). Considerations on the mechanics of failure of the infinite slope. *Computers and Geotechnics*. Vol. 107, pp. 68-79.
- Aloi F., Pirone M., Urciuoli G. (2019). Numerical investigation of small- and medium-diameter drain wells to stabilise deep landslides. *Acta Geotechnica*. Vol. 14, pp.1065–1080.
- Santo A., Di Crescenzo G., Forte G., Papa R., Pirone M., Urciuoli G. (2018). Flow-type landslides in pyroclastic soils on flysch bedrock in southern Italy: the Bosco de' Preti case study. *Landslides*. Vol. 15 (1), 8, pp. 63-82.
- Dias A. S., Pirone M., Urciuoli G. (2017). Review on Types of Root Failures in Shallow Landslides, *Advancing Culture of Living with Landslides*. WLF-04, vol. II pp. 633-640.
- Dias A. S., Pirone M., Urciuoli G. (2017). Review on the Methods for Evaluation of Root Reinforcement in Shallow Landslides, *Advancing Culture of Living with Landslides*. WLF-04, vol. II, pp. 641-648.
- Urciuoli G., Comegna L., Di Maio C., Picarelli L. (2016). The Basento Valley a natural laboratory to understand the mechanics of earthflows. *Rivista Italiana di Geotecnica*, vol. 5(1), pp. 71-9[2-s2.0-84973661504]
- Urciuoli G., Pirone M., Comegna L., Picarelli L. (2016). Long term investigations on the pore pressure regime in saturated and unsaturated sloping soils. *Engineering Geology*, vol. 212, pp. 98-111[2-s2.0-84982166313]
- Pirone M., Papa R., Nicotera M.V., Urciuoli G. (2015). In situ monitoring of the groundwater field in an unsaturated pyroclastic slope for slope stability evaluation. *Landslides*, vol. 12(2), pp. 259-276 [2-s2.0-84926278558]

7. Eventuali progetti di ricerca finanziati in cui l'attività si inserisce

- PON 2002-05. "Specialized Center on landslides": Industrial research project "An advanced Telecommunication and Information Technology platform to offer engineering services in Environmental field" - PETIT-OSA. Cost of the project: 408500 euros.
- PON 2002-05. "Specialized Center on landslides": Pre-competitive development project "An advanced Telecommunication and Information Technology platform to offer engineering services in the Environmental field" - PETIT-OSA. Cost of the project: 221900 euros.
- PRIN 2006. Responsible for the Research Unit at the University of Naples Federico II. Title of the research: "Test sites for the forecasting of the initiation of flowslides in pyroclastic soils". Cost of the project carried out by the R.U.: 75000 euros.
- GREAT - FP7 People 2013 - Irses FP7 project number 612665. Responsible for the Research Unit at the University of Naples Federico II. Title of the research: "Geotechnical and geological responses to climate change: Exchanging approaches and technologies on a world-wide scale". Cost of the project carried out by the R.U.: 63000 euros.
- TERRE - H2020 - MSCA - ITN 2015; H2020 project number 675762. Responsible for the



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Research Unit at the University of Naples Federico II. Title of the research: "Training Engineers and Researchers to rethink geotechnical engineering for a low carbon future". Cost of the project carried out by the R.U.: 258061 euros.

• PRIN 2015. Responsible for Research Unit at the University of Naples Federico II. Research title: "Innovative monitoring and design strategies for sustainable lands risk mitigation." Cost of the project carried out by the R.U.: 59445 euro.

He was also the Head of the CIMA center (Center for innovation in environmental monitoring) by AMRA, which for three consecutive years was funded by the Campania Region with about 200000 euros per year.

8. Eventuali fondi disponibili a supporto dell'attività del dottorando (escluso finanziamento borse)

PON 2017

**PROGETTI DI RICERCA INDUSTRIALE E SVILUPPO SPERIMENTALE NELLE 12
AREE DI SPECIALIZZAZIONE INDIVIDUATE DAL PNR 2015-2020
MIUR.AOODPFSR.REGISTRO DECRETI.0001735.13-07-2017**

9. Informazioni relative ad un periodo di ricerca all'estero (minimo tre mesi) previsto per il dottorando (*indicare Università/ente di ricerca e docente/ricercatore di riferimento con indirizzo mail*) (max 300 parole)

Università Strathclyde Glasgow

Prof. Alessandro Tarantino

alessandro.tarantino@strath.ac.uk

10. Eventuali collaborazioni con imprese/aziende sul tema di ricerca (max 300 parole)

Terre Leggere s.r.l. via Moccia 10 Avellino

UNIVERSITA' DEGLI STUDI DI NAPOLI FEDERICO II



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Napoli, 14 febbraio 2020_____

FIRMA

A handwritten signature in black ink, reading "Gianfranco Cremonesi".

Il presente modulo va compilato in ogni sua parte ed inviato all'indirizzo di posta elettronica phd.dist@unina.it entro e non oltre **venerdì 14/02/2020**.