Proposal for a Task Force of the
International Lithosphere Program (ILP) for 2026-2030

VOLCANOTECTONIC PROCESSES AND NEW TECHNOLOGIES: LITHOSPHERE INTERACTIONS FROM DEPTH TO THE SURFACE

Leaders: Alessandro Tibaldi (University of Milan Bicocca, Italy), Agust Gudmundsson (Royal Holloway University of London, UK), Federica Lanza (ETH Zürich, Swiss Seismological Service), Athanas S. Macheyeki (University of Dodoma, Tanzania), Thomas Walter (GFZ, Germany)

1 Introduction

This proposal represents a further, innovative step to improving the activities carried out by previous Task Force II. The scientific impact and the social-economic implications of the study of lithospheric processes leading to surface phenomena like volcanism and deformation, are of paramount importance. The society, in fact, is becoming more and more vulnerable to volcanic impacts, mainly due to the rapid demographic development and to modern society's energy dependency and infrastructure interdependencies (Wilson et al., 2014). The key to better understanding the volcanic threats posed to society is unravelling where magma originates in the lithosphere, how it evolves and opens its path towards the surface or arrests, how host rocks and the surface are deformed during magma upwelling, and how volcanoes react to magma intrusion. Volcanotectonics is a prominent, fairly recent theme in volcanology that focuses on all the physical processes that operate within, and beneath, a volcano (Gudmundsson et al., 2022). These processes and their interactions are extremely complex and their investigation cannot be undertaken by a single group of experts, as it requires a wide array of multidisciplinary studies that combine different skills, techniques and concepts. Efforts to integrate the various traditional disciplines are now quite common, although with inherent difficulties, but a new cutting-edge challenge is represented by the integration also with innovative disciplines and technologies, such as advanced remote-sensing platforms and sensors, Virtual Reality, machine learning and Artificial Intelligence. Progress in volcanotectonics by combining old and new approaches can contribute not only to addressing the related hazards more effectively (Tibaldi et al., 2005), but also to economic purposes such as improvements in the exploration of mineral deposits, and to a better understanding of the formation and dynamics of geothermal reservoirs. The proposed TF has its roots in the consolidated network of scientists from all over the world who have cooperated, under ILP's TF II umbrella, over the past 20 years (Cloething et al., 2012, 2018); besides, the present proposal aims to further expand this network in order to incorporate new, leading-edge techniques and foster the involvement of young researchers. Special efforts will also be made to involve senior and young researchers from countries currently underrepresented in the ILP community, such as Africa.

2 Objectives

This project focuses on the study of the processes that bring magma from the lithosphere to the surface. Shedding light on this topic requires an in-depth knowledge of the geometric development of the magma chamber and plumbing system, the material properties of magma and the surrounding lithospheric rocks, the associated stress fields, and their evolution. At the shallower levels, the local stress field can be influenced also by other factors, including topography, glacial load, volcano growth and shape. Gravity loading, magma overpressure, and plate tectonic forces, compete and interact with each other to influence the processes of magma evolution and migration.

With the purpose of putting together all the possible factors that guide magma migration through the lithosphere, it is necessary to promote the collaboration among scientists with different skills, from different schools and countries, capable of pursuing this goal with new forces and technologies. We wish to facilitate the blending between classical Earth Science approaches and emerging methodologies. More in specific the latter include, on the one side, cutting-edge technologies that enable a strong increase in the amount of data collected: i) higher resolution seismic sensors, such as the Distributed Acoustic Sensing (DAS), ii) remote-sensing platforms, such as Unmanned Aerial Vehicles (UAVs) carrying sensors capable of reaching a field resolution of 1 cm, iii) advanced photogrammetry and Structure from Motion, iv) advanced 3D software for numerical simulation, and v) free InSAR data, such as https://egms.land.copernicus.eu. On the other side, new approaches are necessary to use in the most efficient way these large amounts of data, including: vi) Immersive and Augmented Virtual Reality, vii) machine learning, and viii) Artificial Intelligence.

Although the connection between the discussed aspects is indisputable, their complexity makes it very difficult to address them jointly, unless by favouring the dialogue between various scientists with diverse skills and improving our TF multidisciplinary network. This will be done by contacting new scientists also outside the Earth Sciences s.s., proposing new joint national and international projects, organizing summers schools for young researchers, exchanging scientists among the various laboratories, proposing joint multidisciplinary sessions at national and international congresses, launching dedicated special issues of international scientific journals.

3 Key topics to be addressed

The action will focus on three main topics:

1) Research advancement. This will include the following topics, from the lithosphere to the surface: i) the mechanisms of magma-chamber rupture in relation with geodynamic stresses, and magma and host rock properties; ii) the processes of interaction between magma and the host rock within intermediate-upper parts of the plumbing system (upper crust); iii) the determination of the parameters that guide the structure and dynamics of the shallower part of the plumbing systems (first km of depth), including the effects of topographic load, glacial loading and unloading cycles (climate changes); iv) the study of the mechanisms that lead to either the arrest of ascending magma or to eruption; v) analyses of surface deformation induced by magma in different scenarios, including vertical vs lateral dyking propagation, external stresses, properties of rock layers and magma; vi) the influence of pre-existing fractures and dykes on new intrusions; vii) processes leading to vertical (caldera) and lateral (landslide) collapse of volcanoes; viii) the recognition of eruption precursors and improvement of monitoring actions. To contribute to these specific issues, our teams will integrated field and laboratory work. Field work includes classical approaches (mainly physical volcanology, structural geology, seismology, geophysical exploration, geodesy, geochronology and geochemistry) and innovative techniques (high resolution seismic surveys by Distributed

Acoustic Sensing, remote-sensing survey by means of different types of UAVs equipped with sensors working at different wavelengths of the electromagnetic spectrum). These works will be carried out in different parts of the world, spanning different geodynamic domains, at both eroded volcanic successions and active volcanoes. Laboratory work includes 2D and 3D numerical modelling of volcanotectonic processes, analogue modelling, elaboration of photogrammetric data by Structure from Motion, InSAR techniques, analyses of data in Immersive Virtual Reality, implementation of Augmented Virtual Reality, classification and analyses of big data by Machine Learning and Artificial Intelligence. A combination of all these approaches can lead to a major advancement in the understanding of magma and lithospheric dynamics.

2) Divulgation of ILP activities outside the TF. This will be achieved by: i) creating and updating a website dedicated to the TF, similarly to what has been done previously (e.g. https://ilptaskforce2.unimib.it/); ii) stimulating the realization of sessions linked to the themes of this TF, at national and international congresses and workshops; iii) promoting the preparation of special issues of international scientific journals linked to the themes of this TF.

3) Involvement of young researchers and developing countries. For the future of science, it is fundamental to attract young researchers and make them more prepared and competitive for facing the labour market request. This may be done also by organizing summer schools, such as those prepared in the previous TF II (e.g. https://etnadronevr.unimib.it/), and preparing submission of international projects. Special attention will be paid to involving young and senior researchers also from developing countries.

4 Relevance to ILP's main goals and themes

Processes such as tectonism, magmatism and volcanism are all topics classically investigated under ILP's umbrella. These also are among the main themes of both IUGG and IUGS. In the framework of the proposed TF, these major topics will be studied with emphasis on their inter-relations; key study locations will be selected from most continents, spanning all possible geodynamic settings. This will be developed by involving scientists from the explored countries, in collaboration with foreign colleagues, in the framework of a strongly internationally-oriented environment. These themes and approaches match ILP's, in that it "*seeks to elucidate the nature, dynamics, origin and evolution of the lithosphere through international, multidisciplinary geoscience research projects and coordinating committees*". Also, the objectives here proposed address practical problems that involve two of ILP's four main program themes, notably: *Contemporary Dynamics and Deep Processes*, and *Continental Lithosphere*. At the same time, this project will also foster mutual cooperation between IUGS, IUGG and IAVCEI. The expected benefits of the project are mostly scientific as they are related to basic research, but we foresee also significant societal benefits as the results obtained will be applied to improving our ability to forecast volcanic eruptions and, consequently, to reduce volcanic risks. This project is international, very interdisciplinary, and inter-institutional. It will promote basic and applied science, providing results of worldwide significance and applicability, with the focus of a better understanding of the internal processes beneath and within volcanoes so that, when combined with monitoring efforts, a more reliable prediction of the opening of new vents and eruptive fissures, reawakening of volcanoes, or caldera and lateral collapse at volcanic edifices, becomes possible.

5 Cooperation, structure and management

Project Leader, Prof. Alessandro Tibaldi, will be in charge of establishing cooperation across the whole network of scientists, and will coordinate research especially dealing with geological-structural aspects, analogue modelling, and magma-induced shallow deformation. Co-Leader Prof. Agust Gudmundsson will lead the group of scientists especially devoted to numerical modelling, and intrusive vs eruptive processes. Co-Leader Dr Federica Lanza will coordinate

researches on seismicity and geothermics. Co-Leader Prof. Athanas Macheyeki will coordinate researches on the structure and dynamics of rifts, volcanotectonics for mineral exploration, and relations with climate. Co-Leader Prof. Thomas Walter will coordinate researches especially dealing with UAV/satellite surveys, InSAR data, and geodesy.

6 Events, activities, and timeline

We propose a five-year TF project, during which the four coordinators will foster collaboration and exchange of ideas and data among the participants. Like in any other ILP project, the present one will promote networking tools, with particular emphasis on a number of thematic workshops on the different scientific topics dealt with by the project, training schools addressed to young researchers, short-term scientific missions, and dissemination activities. We envisage the following plan:

1st year: Start-up and video-meeting with the co-Leaders and selected participants (one for each of the main involved institutes). Data collection from key sites; analogue and numerical modelling of the various phenomena. Set up of a website dedicated to the project. Organization of sessions at the EUG and other int./nat. meetings. Preparation of joint research projects.

2nd year: Data collection; improvements to modelling. Meeting in Milan, or videomeeting, with co-Leaders of the TF for coordination and assessment of the advancements. Publication of results. Website updating. Organization of sessions at IAVCEI Scientific Assembly and EGU/other Earth Science meetings. Training school in summer. Preparation of joint research projects.

3rd year: Field data collection within an expanded international co-operation; improvements to modelling. Website updating. Organization of sessions at the EUG, AGU and other meetings. Preparation of interdisciplinary research projects.

4th year: Data collection and modelling within an expanded international cooperation. Publications, possibly also a special issue on an international journal. Updating and maintenance of the website. Session organisation at various meetings. Training school in summer. Preparation of interdisciplinary research projects.

5th year: Data collection and modelling within an expanded international cooperation. Updating and maintenance of the website. Concluding workshop possibly with the simultaneous presence of other Task Forces (a joint ILP-TF meeting).

7 Outreach

The previous TF II has had a long experience in outreach activities, with several articles published on newspapers, television interviews, and organization of public events aimed at Earth Science popularization. The Leaders of the present new TF have also experience in a number of outreach initiatives, including television interviews, documentaries, articles in newspapers, and popularisation activities on Youtube. In the present TF, we have already established a team who will take care of public outreach activities under the supervision of F. Pasquarè Mariotto, a Professor of Geo-environmental Hazard Communication at Insubria University.

8 Key partners within the planned TF

The involved participants are 69, with a good balance of female participants (30%), from 20 countries of North-America, South-America, Europe, Asia, Africa and Oceania. Young researchers are also involved in the order of 34%.

Participant	**Institution**	**Country**	**Group of work**	**Age**
Alessandro Tibaldi	University of Milan Bicocca	Italy		Senior
Thomas Walter	GFZ	Germany		Senior
Athanas S. Macheyeki	University of Dodoma	Tanzania		Senior

Agust Gudmundsson	The Royal Holloway University	UK	**Field structural geology and tectonics**	Senior
Federico Pasquaré M.	Insubria University	Italy		Senior
Alexandru Szakács	Sapientia University	Romania		Senior
Andrey Korzhenkov	Russian Academy of Sciences	Russia		Senior
Derek Rust	University of Portsmouth	UK		Senior
Deogratius Fredrick Isaka	Geological Survey of Tanzania	Tanzania		Young
Diego Jaldin	Universidad Católica del Norte	Chile		Young
Fabio Bonali	University of Milan Bicocca	Italy	**Analogue modelling**	Young
Valerio Acocella	Rome 3 University	Italy		Senior
Oliver Galland	Oslo University	Norway		Senior
B. Van Wyk de Vries	Université Auvergne Bl. Pascal	France		Senior
Joel Ruch	University of Geneva	Switzerland		Young
Fabio Bonali	University of Milan Bicocca	Italy	**Numerical modelling**	Young
Agust Gudmundsson	The Royal Holloway University	UK		Senior
Kyriaki Drymoni	JPL, NASA	USA		Young
Gilda Currenti	Istituto Naz. Geofisica	Italy		Senior
Virginie Pinel	Vulcanologia	France		Senior
Adelina Geyer	Sciences de la Terre CSIC	Spain		Young
Sofia Brando	University of Milan Bicocca	Italy		Young
Alessandro Luppino	University of Milan Bicocca	Italy		Young
Rosanna Corsaro	Istituto Naz. Geofi. Vulc.	Italy	**Petro-chemistry and rheology**	Senior
Alessandro Cavallo	University of Milan Bicocca	Italy		Senior
Rosario Esposito	University of Milan Bicocca	Italy		Senior
Paola Del Carlo	INGV-Pisa	Italy		Senior
Greg Waite	Michigan Tech. Univ.	USA	**Seismology**	Senior
Jurgen Neuberg	University of Leeds	UK		Senior
Andrea Rovida	INGV-Milan	Italy		Young
Andrey Koryenkov	Institute of Geology	Russia		Senior
Gulam Babayev	Geology Inst. of Azerbaijan	Azerbaijan		Senior
Federica Lanza	ETH Zurich	Switzerland		Young
Susanna Falsaperla	Istituto Naz. Geof. Vulc.	Italy		Senior
Maria Manousaki	Earthquake Plan. and Prot. Org.	Greece		Young
Otar Varazanashvili	Tbilisi State University	Georgia		Young
Nino Tsereteli	Tbilisi State University	Georgia		Senior
Nicola Piana Agostinetti	University Milan Bicocca	Italy	**Geophysics GPS**	Young
Fakhraddin Kadirov	Nat. Academy of Sciences	Azerbaijan		Senior
Joachim Gottsmann	University of Munich	Germany		Senior
Aleksey Smirnov	Michigan Tech. Univ.	USA		Senior
Simon Carn	Michigan Tech. Univ.	USA		Senior
Birgit Müller	Karlsruhe Ins. Technology	Germany		Senior
Victor Alania	Tbilisi State University	Georgia		Senior
Rafig Safarov	Geology Institute ANAS	Azerbaijan		Young
Samir Mammadov	Geology Institute ANAS	Azerbaijan		Young
Baraka Joseph Zabron	University of Dodoma	Tanzania		Young
Malcolm Whitworth	University of Portsmouth	UK	**Geological engineering**	Senior
Alexander Strom	Institute of Geology	Russia		Senior
John Gierke	Michigan Tech. Univ.	USA		Senior
Thomas Oommen	Michigan Tech. Univ.	USA		Senior
Paolo Oppizzi	Geolog.ch	Switzerland		Senior
Hans Havenith	University of Liege	Belgium		Senior
Tomas Panek	University of Ostrava	Czech Rep.		Senior
Armann Hoskuldsson	University of Iceland	Iceland	**Volcanol. and related hazard assessment**	Senior
Páll Einarsson	Haskoli Islands University	Iceland		Senior
Ásta Rut Hjartardóttir	Haskoli Islands University	Iceland		Young
Ioan Seghedi	Sapientia University	Romania		Senior
Luis Lara	SERNAGEOMIN	Chile		Senior
Lauren Schaefer	USGS	USA		Young
Mary Kisaka	University of Dodoma	Tanzania		Young
Federico Pasquaré M.	Insubria University	Italy	**Communi cation and**	Senior
B. Van Wyk de Vries	Université Auvergne Bl. Pascal	France		Senior

Thomas Walter Agust Gudmundsson	GFZ The Royal Holloway University	Germany UK	**outreach activities**	Senior Senior
Paraskevi Nomikou Aikaterini Karditsa Alessandra Savini	University of Athens Hellenic Oceanographers Ass. University of Milan Bicocca	Greece Greece Italy	**Marine tectonics & volcan.**	Senior Young Senior
V. Antoniou Dimitrios Papanikolaou Giuseppe Vizzari Mathias A. Macheyeki Stefania Bandini Danilo Reitano Ugo Becciani Fabio Bonali Filomena Solitro	University of Athens University of Athens University of Milan Bicocca University of Dodoma University of Milan Bicocca INGV Istituto Nazionale di Astrofisica University of Milan Bicocca Altecspace	Greece Greece Italy Tanzania Italy Italy Italy Italy Italy	**Virtual Reality-Drones A. I. Machine Learning**	Senior Senior Senior Young Senior Senior Senior Young Senior
Thomas Walter Bahruz Ahadov	GFZ Inst. Geology and Geophysics	Germany Azerbaijan	**Interfero metry**	Senior Young

Cited references

Cloetingh, S., Tibaldi, A., & Burov, E. (2012). Coupled Deep Earth and surface processes and their impact on geohazards. Global and Planetary Change, 90, 1-19.

Cloetingh, S., Matenco, L., Nader, F. H., Wijck de Vries, B. V., Tibaldi, A., & Dobrzhinetskaya, L. (2018). Editorial to the special Special Volume of Global and Planetary Change" Coupled Deep Earth and Surface Processes". Global and Planetary Change, 171, 1-1.

Gudmundsson, A., Drymoni, K., J. Browning, V. Acocella, F. Amelung, F. L. Bonali, A. Elshaafi, I. Galindo, N. Geshi, A. Geyer, M. J. Heap, Ö. Karaoğlu, S. Kusumoto, J. Marti, V. Pinel, A. Tibaldi, T. Thordarson & T.R. Walter (2022). Volcanotectonics: the tectonics and physics of volcanoes and their eruption mechanics. Bulletin of Volcanology, 84(8), 72.

Tibaldi, A., Lagmay, A. M. F. A., & Ponomareva, V. V. (2005). Effects of basement structural and stratigraphic heritages on volcano behaviour and implications for human activities (the UNESCO/IUGS/IGCP project 455). Episodes, 28(3), 158-170.

Wilson, G., Wilson, T. M., Deligne, N. I., & Cole, J. W. (2014). Volcanic hazard impacts to critical infrastructure: A review. Journal of Volcanology and Geothermal Research, 286, 148-182.

CV Task Force Leader
Prof. Alessandro TIBALDI, Ph.D.

Current position: Full Professor (since 2017) of "Structural geology", "Neotectonics and volcanotectonics", and "Volcano geology", University of Milan-Bicocca, Italy.

Contacts: Department of Earth and Environment Sciences, University of Milan-Bicocca, Milan, Italy; e-mail: alessandro.tibaldi@unimib.it, tel. 0039 0264482052; Web-site: http://www.geo.unimib.it/

Education: 1985 Msc Degree in Geological Sciences, University of Milan;
1990 PhD in Earth Sciences, University of Milan Bicocca;
1991 Post-PhD fellowship of National Institute of Geophysics, Rome, Italy.

Previous positions: 2010-2020 Ad-hoc Graduate Faculty, Michigan Technological University, USA;
2010-2017 Visiting Professor at Buffalo – New York State University, USA;
2008-2017 Erasmus Professor at Portsmouth University, United Kingdom;
2006-2007 Erasmus Professor at Brunel University, United Kingdom;
2000-2016 Associate Professor, University of Milan-Bicocca;
1993-1999 Researcher, University of Milan.

Bibliometric indicators – Publications: *h*-index 50 (Google Scholar), ***h*-index 41** (Scopus); **Papers on peer reviewed international journals**: 169; **Scientific books:** 4; **Chapters in Internat. Books & Encyclopedia**: 13.

Editorships: - Since 2019 **Associate Editor** of Bulletin of Volcanology;
- 2015-2023 **Associate Editor** of Frontier in Earth Sciences, Structural Geology and Tectonics;
- Since 2015 **Review Editor** of Frontier in Earth Sciences, Volcanology;
- 2012 **Guest Editor** (together with Sierd Cloetingh) of Journal Global and Planetary Change, Special issue: "From the lithosphere to the surface: processes, hazards and resources";
- 2006 **Guest Editor** (together with A.F.M. Lagmay) of Journal of Volcanology and Geothermal Research, Special issue: "Interaction Between Volcanoes and Their Basement".

Honors, Awards: - 2024 **"Mikheil Nodia Prize"** of the Georgian Academy of Sciences for the scientific contributions on the "Security of the Enguri Hydroelectric Power Plant in Georgia from Geohazards".
- 2007 **Elsevier Award** for the "2003-2007 most cited paper on Tectonophysics";
- 2000 "**A. Volta Award**" for Scientific Researches in European and extra-European mountain belts;
- 1999-2012 **Fellows** of the "Institute for Dynamics of Environment Processes", National Council of Researches;
- 1991 **"Edward A. Flinn Award"** of the International Lithosphere Program;
- 1988 **"M. Oxilia 1987-1988 Award on the Geology and Structure of the Alps**", Geol. Soc. Italy.

Patent: Deposited patent n. 102020000018367 of 2022 entitled "**Platform and Methods for Immersive Virtual Reality**" under the inventors A. Tibaldi, F. Bonali, U. Becciani, F. Vitello.

RESPONSIBILITIES

Coordination of Organizations

- Since 2015 Chairperson - Committee of National Representatives of International Lithosphere Program;
- 2005-07 Member of the Italian National Committee of coordination of all monitoring activities and Italian research projects on active volcanoes under the INGV – Civil Protection Agency agreement;
- 2005-07 Coordinator of all monitoring/researches at Stromboli and Panarea volcanoes, Civil Protection Agency;
- 2002-04 Vice-Director of University of Milan Bicocca Dating Center.

Coordinator/PI of Research Grants

2022-25 **NATO,** 2022-25 **MIUR-PRIN,** 2021-25 **ILP TFII**, 2019-22 **European Union**, 2018-20 **European Union** PEP, 2015-19 **ILP TFII**, 2016-17 **MIUR,** 2016 **European Space Agency**, 2015-18 **NATO**, 2013-15 **Nat. Progr. Antarctic Research,** 2013-14 **European Union** IPE, 2010-14 **ILP TFII**, 2009-14 **Transatlantic Project USA-EU Atlantis,** 2008-10 **NATO** – SfP, 2009 **MIUR – Internation. of Research,** 2006-07 **MIUR,** 2005-09 **ILP** TF II, 2003-05 **NATO-CLG,** 2003-04 **MIUR,** 2003-04 **National Civil Protection,** 2001-05 **Internat. Geol. Correlation Program,** 2001-04 **FIRB-MIUR,** 2000-07 **Nat. Group Volcanol**., 1998-02 **Nat. Geol. Survey-CNR,** 1996-2000 **CNR**.

CV Task Force co-Leader
Professor Agust Gudmundsson, PhD

CURRENT POSITION
Full professor, Chair of Structural Geology
Department of Earth Sciences, Royal Holloway University, UK

CONTACTS
Department of Earth Sciences, Royal Holloway University of London, UK,
email: Agust.Gudmundsson@rhul.ac.uk, Phone: +44 1784 276345

EDUCATION & PROFESSIONAL EXPERIENCES
I have an MSc in Structural Geology and Rock Mechanics from Imperial College London and a PhD in Tectonophysics from Imperial College London (University of London). Previously I was research professor of Volcanology at the Nordic Volcanological Institute, University of Iceland, then professor and Chair of Hydrogeology of Solid Rocks at the University of Bergen (Norway), and before I took up my present position, Head of Department and Chair of Structural Geology and Geodynamics at the University of Gottingen (Germany). I have worked much on the relations between seismotectonics, volcanotectonics, and associated hazards and risks, but also on landslides and renewable energy, particularly geothermal energy and solar energy. I have also participated in many European projects on seismic and volcanic risk.

I have published 3 books on geology. (1) Rock Fractures in Geological Processes (Cambridge University Press, 2011). (2) The Glorious Geology of Iceland's Golden Circle (Springer-Nature, 2017). (3) Volcanotectonics. Understanding the Structure, Deformation, and Dynamics of Volcanoes (Cambridge University Press, 2020). These books discuss the principles of rock-fracture formation, earthquakes, volcanic eruptions, and related hazard and the application the tectonic and volcanic principles to the understanding of geological processes, in Iceland and worldwide.
I have extensive experience in field studies of volcanoes, faults zones, and fluid-filled reservoirs of various types, as well as in analytical and numerical modelling of geological structures and processes. In particular, I have worked for many years on groundwater aquifers and geothermal reservoirs. In addition to my work on renewable energy sources, such as geothermal and solar energy, I have in recent years, in collaboration with colleagues at EPFL and University College London, explored the relations between various geometric aspects of the built environment (urban areas) and energy demand, CO2 emissions, air pollution and associated health issues.
I am a fellow of the Iceland Academy of Sciences and an elected member of Academia Europaea (the European Academy of Sciences, Humanities and Letters).

RESPONSIBILITIES
I was Chief Editor of the journal Frontiers in Structural Geology and Tectonics and Associate Editor of Terra Nova, and Bulletin of Volcanology for many years. Currently, I am on the editorial board of Frontiers in Volcanology, Scientific Reports, The Scientific World Journal, Geosciences, and Tectonophysics.
Reviewer for: Nature, Nature Geoscience, Science, Science Advances, Geology, Journal of Geophysical Research, Tectonics, G-cubed, Geophysical Research Letters, Earth and Planetary Science Letters, Bulletin of the Geological Society of America, International Journal of Earth Sciences, Journal of Structural Geology, Journal of Geodynamics, Pure and Applied Geophysics, Geophysical Journal International, Theoretical and Applied Fracture Mechanics, Journal of Geophysics and Engineering, International Journal of Geographical Information Science, Journal of African Earth Sciences, Sustainability, Engineering Fracture Mechanics, Computers & Geosciences, Geosphere, and others.
Reviewer of grant applications for: NERC, NSF, National Geographic, The Iceland Science Foundation, The Swiss National Science Foundation (SNSF), The French National Science Foundation (ANR), The Norwegian Science Foundation, AXA, and others.
Appointed advisor to the Scientific Advisory Board for Emergencies (SAGE), Government Office for Science, in connection with risks associated with the 2014-2015 Bardarbunga-Holuhraun eruption.
Frequently interviewed on radio, by newspapers, and on television in connection with volcanic eruptions and earthquakes, including the current eruptions (2025) on the Reykjanes Peninsula in Iceland.

CV Task Force co-Leader
Dr. Federica Lanza, PhD

Current position: Senior Researcher and Lecturer, Swiss Seismological Service (SED), ETH Zürich

Contacts: Swiss Seismological Service (SED), CH-8092, Zürich, Switzerland; Phone: +41 79 256 96 24;

Email: federica.lanza@sed.ethz.ch;

Education: 2009 B.Sc. Geology, University of Milan-Bicocca (Italy);
2012 M.Sc. Geology, University of Milan-Bicocca (Italy) & Michigan Technological University (USA);
2016 Ph.D. Geophysics, Michigan Technological University (USA)

Previous positions: 2017 - 2019 Post-doctoral Research Associate, University of Wisconsin-Madison, USA

Specialization: My research focus on the application of seismic tomography to image the structure of the Earth's crust at regional and local scales, in tectonic and volcanic settings. I am also involved in the improvement and development of methods for earthquake detection, localization, and analyzing source processes for both natural and induced seismicity with conventional networks and Distributed Acoustic Sensing.

Bibliometric indicators – Publications: h-index 13 (Google Scholar), h-index 11 (Scopus ID: 55623372300); Papers on peer-reviewed international journals: 30; Chapters in International Books: 2 (ORCID: https://orcid.org/0000-0002-8168-6766), Codes: simul2017 (Eberhart-Phillips et al., 2023: https://doi.org/10.5281/zenodo.5746047; Datasets: Seismic Network 9J (Lanza et al., 2024: https://doi.org/10.7914/9b36-1a85); Wave propagation Digital Twin Dataset (Ermert et al., 2025: https://doi.org/10.3929/ethz-b-000729650)

Editorship: 2022 - Associated Editor for Frontiers in Earth Science on the topic: "Earthquake Swarms and Complex Seismic Sequences in Tectonic and Volcanic Areas"

Honors, Awards
2023 - Italian habilitation for Associate Professorships, "ASN 04/A4: Geofisica"
2016 - Doctoral Finishing Fellowship (Michigan Tech University)
2012/2013 - Research Assistantship: Department of Geological and Mining Engineering and Sciences, MTU
2010 - INVOGE Scholarship (International Geological Masters in Volcanology and Geotechniques): EU-US ATLANTIS Programme, University of Milan-Bicocca
2008/2010 - Academic Merit Scholarship, University of Milan-Bicocca (awarded twice)

RESPONSIBILITIES
Coordinator/PI of Research Grants
12/2024 – present CETPartnership GEOTWINS (804,347 CHF): "Digital Twin Components for Deep Geothermal Energy Power and Heat Generation"
01/2023 - present SNSF project funding (375,864 CHF): "Anatomy and dynamics of volcanic systems: insights from a joint seismic tomography and seismicity analysis of Kīlauea Volcano"
12/2020 - 06/2024 GEOTHERMICA DEEP (2,651,828 CHF): Innovation for De-Risking Enhanced Geothermal Energy Projects

Collaborator of Research Grants:
06/2024 - present SNSF project funding (316,960 CHF): "EFFSIMMSI: Advancing Induced Earthquake Forecasting and Fracturing Dynamics via Innovative Scale-Invariant Seismic Monitoring and Multi-Sensor Integration"
06/2022 – 01/2024 VolcSAT (200,00 CHF): Advancing real-time seismic monitoring and lahar tracking at Santiaguito Volcano, Guatemala.

Membership of Scientific Societies: Member of European Geoscience Union (EGU); Member of American Geophysical Union (AGU); Member of Seismological Society of America (SSA), member of International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI).

CV Task Force co-Leader
Prof. Athanas Macheyeki, PhD

CURRENT POSITION
Associate Professor, Head of Department of Geology, University of Dodoma, Tanzania.

CONTACTS
Department of Geology, University of Dodoma, Email: asmacheyeki@yahoo.com and athanas.macheyeki@udom.ac.tz Cell: +255-783939704

EDUCATION
BSc. (University of Dar Es Salaam-Tanzania, 1996),
MSc. (University of the Western Cape-South Africa, 2003),
PhD (University of Ghent-Belgium, 2008).

SPECIALISATION
He focussed on researching the dynamics of the East African Rift System, including active tectonics, geochemistry, volcano collapse, and dyking. He has also been a consultant in the field of mineral exploration both in Tanzania and outside Tanzania.

PROFESSIONAL EXPERIENCES
Former Commissioner for the Mining Commission in Tanzania (2018-2021);
former Executive Secretary for the Tanzania Extractive Industries Transparency Initiative (TEIT, 2017-2018);
former Manager of Applied Geology - Geological Survey of Tanzania (2012-2014);
former Principal of the Mineral Resources Institute – Dodoma (2012);
Mineral Exploration Geologist for Kabanga Nickel Company Ltd;
Mineral Exploration Geologist for the Anglo-American Exploration Company (Tanzania, 1996-2001).

PUBLICATIONS
Several papers on peer reviewed international journals including Nature, Bulletin of the Geological Society of America, Journal of Structural Geology, and Heliyon. Two scientific books, namely i) Applied Geochemistry: Advances in Mineral Exploration Techniques (Macheyeki et al., 2020), Elsevier; and ii) The East African Rift System: Geodynamics and Natural Resource Potentials (Macheyeki and Kafumu, 2024), Elsevier.

HONORS, AWARDS
Developer of lithogeochemical ratios useful for Ni-Cu sulphide exploration (Macheyeki, 2011); the paper has been ranked 23rd out of top 25 hottest articles in the Journal of African Earth Sciences in September, 2011.
In 2014-2016, he won an internationally competitive position of Geology Expert for the Ministry of Natural Resources of Rwanda funded by World Bank.

INTERNATIONAL COLLABORATIONS
Since 2004, scientific collaboration with dozens of national and international scientists across the world particularly USA, Belgium, Kenya, Ethiopia, India, China and Malawi. Most of the collaborations were funded by various organizations such as the US National Science Foundation, Belgian Science Policy Action 1 program and IPPS, For instance,

CV Task Force co-Leader
Prof. Thomas R. WALTER, Ph.D.

Current position: Permanent staff and Head (since 2010) of research group "Volcano-tectonics and volcano-hazards" at GFZ Potsdam, **Professor** Apl. (since 2019) of "Volcano Remote Sensing and Geohazards",, University of Potsdam, Germany.

Address:
Section 2.1.: Physics of Earthquakes and Volcanoes, GFZ German Research Centre for Geosciences,, Telegrafenberg, 14473 Potsdam, Germany, Web presence: Personal webpage, Group webpage, Section webpage.

Education: 2011 Habilitation in Geophysics and Remote Sensing, University Potsdam, Germany.
2002 PhD in Geosciences (Volcanology and Geophysics), University Kiel, Germany.
1999 MSc in Geology, Univ. of Freiburg im Brsg., Germany.

Previous positions: 2015-2020 ERC consolidator group leader, VolCapse Group, GFZ Potsdam
2003-2008 Emmy Noether Young Investigator group leader; University of Miami and Potsdam
2003-2005 Postdoc, Centre for Advanced Remote Sensing (CSTARS), Miami, USA
2002-2003 Postdoc, Dept. of Volcanology, GEOMAR, Kiel. Germany
1999-2002 PhD student, Christian-Albrechts-University (CAU), Kiel. Germany

Bibliometric indicators – Publications: Google Scholar Profile, ORCID: 0000-0002-9925-4486, Scopus ID: 7102715022, ResearchGate Profile, Web of Science: h-index: 32, publications: 135, Citations: 3476, Google Scholar stats: h-index: 42, i10-index: 108, Citations: 5196, In the past 5 years: h-index: 31, i10-index: 97, Citations: 3103

Editorships: 2021 - Associate Editor for Frontiers in Volcanology
2019 - Associate Editor for Natural Hazards
2017 - Editor for Remote Sensing
2010- today Assessor for Funding Bodies: UK (NERC), US (NSF, NASA), EU (FP7 and H2020), ESA, German Research Foundation (DFG), Australian Research Council (ARC), and others

Other Services to the Scientific Community
2020- University **Faculty**, Natural Hazards and Remote sensing, University Potsdam, Germany.
2020 - **Chair** of the IUGG-IAVCEI Germany division
2019- **Deputy** of Helmholtz Institutional research program 2021-2027, POF4, GFZ Potsdam, Germany
2015 - **Speaker** Geosphere of the Helmholtz Alliance on Remote Sensing (EDA)
2014 - **Board** of the German Geophysical Union (DGG) and Chair of the AK Volcanology
2014 - **Initiator and lead** of the Physics of Volcanoes workshops (POV)
2008- Vice-chairman of the German Research Cluster for Georisk analysis at the GFZ
2007- Steering committee member: Supersites Initiative of the United Nations GEO program

Honors, Awards:
2024-2030 ERC Synergy PI, RottnRock project
2015-2020 ERC consolidator, VolCapse project
2007 Initiative and Networking Fund, Helmholtz Association
2007 Most cited author award Elsevier (J. Volcanol. Geoth. Res.).
2006 Hans – Cloos – Price, Young scientist price of the German Geological Union
2005 Emmy-Noether Fellowship, German Research Foundation DFG

Membership of Scientific Societies
Member of Professional Societies: American Geophysical Union (USA), Member of CEDIM – Centre for Disaster Management and Risk Reduction Technology, Member of DGG – German Geophysical Union, Member of IAVCEI – Int. Assoc. of Volcanology and Chemistry of the Earth's Interior, Member of EGU – European Geosciences Union, Member of AGU – American Geophysical Union, Member of GV – Geologische Vereinigung; Member of science team for satellite radar missions of the European Space Agency (ESA) and the German Aerospace Centre (DLR)