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Progress Report of ICL Network

1. Title of Network

Italian ICL Network

2. Name of Coordinator (Affiliation and email)

Mario Parise

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3. List of member organizations

ICL Full Members

- **UNESCO Chair on Prevention and Sustainable Management of Geo-hydrological hazards, University of Florence (UNESCO Chair – UNIFI)** Board member: Nicola Casagli, Alternative board member: Veronica Tofani.
- **Research Institute for geo-hydrological protection - Italian National Research Council (CNR-IRPI)** Board member: Paola Reichenbach, Alternative board member: Maria Teresa Brunetti
- **Italian Institute of Environmental Protection and Research (ISPRA)**
Board member: Daniele Spizzichino, Alternative board member: Carla Iadanza
- **Laboratory of Environmental Cartography and Hydraulic and Geological Modeling - University of Calabria (CAMILab-UNICAL)** Board member: Giovanna Capparelli
- **Research Center on Prediction, Prevention and Mitigation of Geological Risks - University of Roma la Sapienza (CERI-UNIROMA1)**
Board member: Francesca Bozzano, Alternative board member: Carlo Esposito
- **Department of Earth and Geo-Environmental Sciences - University of Bari Aldo Moro (DiSTeGeo-UNIBA)**
Board member: Mario Parise, Alternative board member: Piernicola Lollino
- **National Institute of Oceanography and Applied Geophysics (OGS)**
Board member: Antonella Peresan, Alternative board member: David Zuliani

ICL Associates

- **Department of Engineering and Architecture - University of Parma (DIA-UNIPR)**
Representative Andrea Segalini

- **Department of Science and Technologies - University of Sannio (DST-UNISANNIO)**
Representative: Paola Revellino
- **Geotechnical Engineering Group - University of Salerno (GEG-UNISA)**
Representative: Michele Calvello
- **Department of Engineering and Geology - University G. D'Annunzio Chieti-Pescara (INGEO-UNICH)** Representative: Nicola Sciarra
- **Department of Earth and Environmental Sciences – University of Pavia**
Representative: Claudia Meisina
- **Federico II University of Naples – Department of Earth, Environmental and Resource Sciences** Representative: Domenico Calcaterra
- **University of Urbino “Carlo Bo”, Department of Pure and Applied Sciences (DiSPeA)** Representative: Stefano Morelli

4. Progress report of activities

The Italian ICL Network has co-organized the 6th World Landslide Forum “Landslides Science for sustainable development” (WLF6), held from November 14 to 17, 2023 in Florence at the Palazzo dei Congressi. The WLF6 was focused on landslide science for sustainable development as a contribution to the Kyoto 2020 Commitment for global promotion of understanding and reducing landslide disaster risk (KLC2020).

The Forum provided a platform for fruitful collaboration between landslide researchers and stakeholders to define common priority actions for landslide risk reduction at the global level. The Forum addressed key aspects related to landslide analysis, landslide monitoring and early warning, landslide modeling, landslide hazard and risk assessment, mitigation techniques, landslide triggering mechanism and climate change. The 6th World Landslide Forum was attended by a broad international audience interested in landslide disaster risk reduction: research and academic institutions; UN organizations; EU institutions and agencies; national governments and local authorities; non-governmental organizations with an interest in disaster risk reduction; international and national civil protection and disaster relief organizations and agencies; and the private sector engaged in research, development and practical application of landslide risk reduction technologies and solutions. In particular, the WLF6 was attended by more than 1200 participants from 61 countries. 853 abstracts were accepted, with 643 oral presentations and 210 e-posters. During the Forum 2 plenary sessions, 48 scientific parallel sessions, and 10 workshops/side events were organized. The 6th World Landslide Forum was awarded the Medal of the President of the Italian Republic, that is attributed to events of great scientific and cultural importance.

Members of the Italian ICL network are coordinating ongoing IPL projects or have coordinated recently terminated IPL projects.

Here below the list of ongoing projects:

- IPL-221 PS continuous streaming for landslide monitoring and mapping. *Leader: Federico Raspini*
- IPL-237 The role of time-dependent rock mass deformations and landscape evolution rates as predisposing factors for massive rock slope failures. *Leader Carlo Esposito*
- IPL-248 Innovation in slow-moving landslide risk assessment of roads and urban sites by combining multi-sensor multi-source monitoring data. *Leader: Dario Peduto*
- IPL-258 Slope stability in vineyards with different management practices (Acronym: WINESLIDES). *Leader: Filippo Catani*
- IPL-259 Landslide Risk assessment in AIUla Archaeological sites – Kingdom of Saudi Arabia. *Leader: Claudio Margottini*
- IPL-260 Landslide Risk assessment in the High City of Antananarivo. *Leader: William Frodella*

List of terminated projects:

- IPL-196 Development and applications of a multi-sensors drone for geohazards monitoring and mapping. *Leader: Veronica Tofani*
- IPL-235 EO4GEO – Towards an innovative strategy for skills development and capacity building in the space geo-information sector supporting Copernicus User Uptake. *Leader: Luca Guerrieri e Daniele Spizzichino*
- IPL-245 Laboratory physical modeling of rainfall, slope deformation and landslides triggering. *Leader: Giovanna Capparelli*
- IPL-236 A multiparametric field laboratory for the investigation on the relationship between material behavior and morphodynamic of landslides. *Leader: Andrea Segalini*
- IPL-252 Landslide monitoring with cost-effective GNSS devices and development of a new equipment (LZER0) for real-time applications. *Leader: David Zuliani*

5. Plan of future activities

The Italian ICL Network on Landslides aims at improving the national networking activities through a national collaborative work within the landslide research community by means of new multi-lateral scientific projects, shared capacity building strategies and transfer of knowledge for the dissemination of science related to landslides. The Network is presently contributing to the implementation of the Kyoto Landslide Commitment (KLC2020) at a national level, and most of its partners are actively working during these years at national projects related to the National Plan of Recovery and Resilience (PNRR), covering issues related to slope instability and landslides.

For the next years, the planned activities of the Italian ICL network will be:

- enhancing the level of national cooperation within the landslide scientific community by improving scientific networking and an effective transfer of knowledge (through support of student mobility and academic staff exchange, and by means of international master's Degree, Joint PhD Programs and the LARAM International Summer School);
- creating a dedicated Italian ICL Network Web page for dissemination purposes;
- managing jointly equipped experimental sites and laboratory devices;

- organizing an internal annual meeting of the Italian Network;
- developing effective procedures to support risk reduction and emergency management policies in the framework of regional/national interconnected systems between the scientific community and stakeholders, end-users, administration personnel and land use planners;
- contributing to the international policies on disaster risk reduction by developing e-learning modules addressed at empowering technical stakeholders and end-users, with the final goal to reduce the geo-hydrological disaster risk;
- promoting and realizing multi-lateral partnerships for the development of projects focusing on innovative early warning technologies, forecasting, prevention and mitigation of geo-hydrological hazards in a climate change context in the Mediterranean area (also through IPL projects in synergy with ICL partners from other countries);
- promoting the increase in knowledge on cultural heritage sites affected by geo-hydrological hazards, and protecting them in the framework of mitigation and conservation strategies;
- contributing to the ICL activities through the active involvement in the organization of the next 7th World Landslide Forum;
- publishing the main network scientific results through dedicated paper categories (ICL/IPL activities, News/Kyoto Commitment) on the journal Landslides and on the ICL Open access book series Progress in Landslide Research and Technology.

6. Publication (ICL Journal Landslides, ICL Book Series, etc.)

2023

Beni et al. (2023), *Rock instabilities at the archaeological site of Dadan (Kingdom of Saudi Arabia)*. Landslides 20, 2455–2478.

Bernat Gazibara et al. (2023), *Application of LAND-SUITE for landslide susceptibility modelling using difference mapping units. A case study in Croatia*. Progress in Landslide Research and Technology, Volume 2 Issue 2.

Bornaetxea et al. (2023), *Zonation of landslide susceptibility in the Gipuzkoa province (Spain): an application of LAND-SUITE*. Progress in Landslide Research and Technology, Volume 2 Issue 1.

Casagli N. et al (2023) *The Sixth World Landslide Forum (WLF6): call for abstracts*. Landslides 20, 707-716

Casagli N. et al (2023) *Advanced Technologies for Landslides—ATLaS (WCoE 2020–2023)*. Progress in Landslide Research and Technology, Volume 1 Issue 1, 267-275

Confuorto P. et al. (2023) *Sentinel-1 P-SBAS data for the update of the state of activity of national landslide inventory maps*. Landslides 20, 1083-1097.

Di Napoli et al. (2023), *Multitemporal relative landslide exposure and risk analysis for the sustainable development of rapidly growing cities*. Landslides, 20(9), 1781-1795.

Di Perna et al. (2023), *Modelling of Landslide-Structure Interaction (LSI) Through Material Point Method (MPM)*. In: Alcántara-Ayala, I., et al. Progress in Landslide Research and Technology, Vol. 2 Issue 1. https://link.springer.com/chapter/10.1007/978-3-031-39012-8_6

Di Traglia F. et al. (2023) *Assessing flank instability of Stromboli volcano (Italy) by reappraising the 30 December 2002 tsunamigenic landslides*. Landslides, 20, 1363-1380

Donnini et al. (2023), *Landslides triggered by an extraordinary rainfall event in Central Italy on September 15, 2022*. Landslides 20,

2199–2211. <https://doi.org/10.1007/s10346-023-02109-4>

Espósito et al. (2023), *From theory to practice: optimisation of available information for landslide hazard assessment in Rome relying on official, fragmented data sources*. *Landslides* 20, 2055 – 2073. <https://doi.org/10.1007/s10346-023-02095-7>

Frodella et al. (2023) *Assessing Landslide Hazard in the High City of Antananarivo, Madagascar (UNESCO Tentative Site*. Volume 2 Issue 2, 361-371

Frodella et al. (2023) *Protection and Conservation of Georgian Ruprestrian Cultural Heritage Sites: A Review*. Volume 2 Issue 1, 307-320

Gariano et al. (2023), *Challenges in defining frequentist rainfall thresholds to be implemented in a landslide early warning system in India*. *Progress in Landslide Research and Techn.*, Vol. 1 Issue 1.

Pedretti et al. (2023), *InterpolatiON of InSAR Time series for the dEtection of ground deforMatiOn eVEnts (ONtheMOVE): application to slow-moving landslides*. *Landslides* 20, 1797–1813. <https://doi.org/10.1007/s10346-023-02073-z>

Poggi F. et al (2023) *Spatial and Temporal Characterization of Landslide Deformation Pattern with Sentinel-1*. Volume 2 Issue 1, 321-329

Romeo et al. (2023), *Investigation and preliminary assessment of the Casamicciola landslide in the island of Ischia (Italy) on November 26, 2022*. *Landslides* 20, 1265–1276.

Segoni S. et al. (2023) *A prototype landslide early warning system in Rize (Turkey): analyzing recent impacts to design a safer future*. *Landslides* 20, 683-694.

Tofani et al. (2023) *Physically-Based Regional Landslide Forecasting Modelling: Model Set-up and Validation*. *Progress in Landslide Research and Technology*, Volume 2 Issue 2, 127-135

Valentino et al. (2023), *Training on the topic of landslides and slope stability in Rwanda: a Summer School in the framework of the Erasmus + EnRHed project*. *Landslides* 20, 223–228.

Vivaldi et al. (2023), *Airborne combined photogrammetry—infrared thermography applied to landslide remote monitoring*. *Landslides* 20, 297–313 (2023). <https://doi.org/10.1007/s10346-022-01970-z>

2024

Alvioli et al. (2024), *A scenario-based approach for immediate post-earthquake rockfall impact assessment*. *Landslides*, 21, 1-16. DOI: 10.1007/s10346-023-02127-2.

Carlà T. et al. (2024) *Real-time detection and management of rockfall hazards by ground-based Doppler radar*. *Landslides*, 21, 155-163

Casagli N. et al. (2024) *The Sixth World Landslide Forum (WLF6), Florence, 2023*. *Landslides*, 21, 1161-1172

Cignetti et al. (2024). *Impacts on mountain settlements of a large slow rock-slope deformation: a multi-temporal and multi-source investigation*. *Landslides*, 21, 327-337.

Crescenzo et al. (2024), *Evaluating the performance of propagation models of flow-like landslides at regional scale*. *Landslides* 21, 229–243. <https://link.springer.com/article/10.1007/s10346-023-02162-z>

Cuomo et al. (2024), *Possible remediation of impact-loading debris avalanches via fine long rooted grass: an experimental and material point method (MPM) analysis*. *Landslides* 21, 679–696. <https://link.springer.com/article/10.1007/s10346-023-02178-5>

Delchiaro et al. (2024), *The role of long-term preparatory factors in mass rock creep deforming slopes: insights from the Zagros Mts. belt (Iran)*. *Landslides* 21, 1735–1755. <https://doi.org/10.1007/s10346-024-02252-6>

Fiorucci et al. (2024), *A web-GIS for the analysis of scientific literature on earthquake-triggered landslides*. *Progress in Landslide Research and Technology*, Volume 3 Issue 2.

Guerriero et al. (2024), *Reduced complexity debris flow/flood hazard assessment at the southwestern slope of Mt. Omo, L'Aquila municipality, central Italy*. *Landslides*, 21(1), 183-195.

- Guzzetti et al. (2024), *Independent demonstration of a deep-learning system for rainfall-induced landslide forecasting*. *Landslides*, 21, 2171–2178. DOI 10.1007/s10346-024-02294-w
- Guzzetti et al. (2024). *Landslide predictions through combined rainfall threshold models*. *Landslides*, DOI 10.1007/s10346-024-02340-7
- Nardini O. et al (2024) *Integration of satellite SAR and optical acquisitions for the characterization of the Lake Sarez landslides in Tajikistan*. *Landslides*, 21, 1385-1401
- Nocentini N. et al (2024) *Optimization of rainfall thresholds for landslide early warning through false alarm reduction and a multi-source validation*. *Landslides*, 21, 557-571
- Nocentini N. et al (2024) *Regional-scale spatiotemporal landslide probability assessment through machine learning and potential applications for operational warning systems: a case study in Kvam (Norway)* *Landslides*, 21, 1-19
- Peresan et al. (2024), *An approach to rockfall hazard scenarios based on earthquake ground motion*. In: B. Abolmasov et al. Eds. *Progress in Landslide Research and Technology*, Volume 3 Issue 2. ICL Book Series, Springer.
- Sannino et al. (2024), *Implementation of a slope stability method in the CRITERIA-1D agro-hydrological modeling scheme*. *Landslides* <https://doi.org/10.1007/s10346-024-02313-w>
- Wu et al. (2024), *A global-scale applicable framework of landslide dam formation susceptibility*. *Landslides* 21, 2399 – 2416. <https://doi.org/10.1007/s10346-024-02306-9>
- Zeng et al. (2024), *Double-index rainfall warning and probabilistic physically based model for fast-moving landslide hazard analysis in subtropical-typhoon area*. *Landslides* 21, 753–773. <https://link.springer.com/article/10.1007/s10346-023-02187-4>