

Progress Report of ICL Network

1. Title of Network:

Landslides and Cultural & Natural Heritage Network

2. Name of Coordinator

Vit Vilimek (vilimek@natur.cuni.cz); **Daniele Spizzichino** (daniele.spizzichino@isprambiente.it)

3. List of member organizations

Italian Institute for Environmental Protection and Research (ISPRA).

**UNESCO Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards,
University of Florence.**

Charles University Faculty of science – Department of Physical Geography and Geoecology

4. Progress report of activities

The recent activities implemented by the network are listed below:

a) WLF5 (2021) – support to the organization of the Session **1.3 Landslides at UNESCO designates sites and contribution from WMO, FAO, IRDR.** - Convener: Qunli Han & Vít Vilímek. (10 oral contributions).

b) WLF6 (2023) - support to the organization of the Session **1.7: Cultural heritage threatened by landslides: from earth observation and in situ investigation to sustainable mitigation measures.** (CONVENERS: Claudio Margottini, William Frodella, Daniele Spizzichino, Nacho Gallego Revilla, Stefano Morelli, Roberta Boni, Rosa María Mateos Ruiz (11 oral contributions). International Scientific Committee (Vit Vilimek) and Local Organize Committee (Daniele Spizzichino).

2024 ICL-KLC Conference 4-7 November 2024 network meeting

5. Plan of future activities

Support the implementation of WLF7 (2026) and specific thematic session on network topics. More in detail, a specific session has been proposed in the Theme 2 “Remote sensing, site investigation, monitoring and early warning” - Coordinators: Maneesha Vinodini Ramesh, Veronica Tofani, Jan Klimeš. The proposed title is: *Monitoring Landslide Dynamics at Cultural Heritage Sites: From Investigations to Early Warning Plans and Sustainable Mitigation Strategies* and the proposed conveners are Conveners:

- Stefano Morelli, Department of Pure and Applied Sciences, University of Urbino, Italy

- Claudio Margottini UNESCO Chair UNIFI, ICOMOS
- Daniele Spizzichino, ISPRA Geological Survey of Italy, UNESCO Chair UNIFI, ICOMOS
- Luhui Li, Chinese Academy of Science, Beijing, China,

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

Klimeš J., Vilímek V. (2005, in print): Thirty years of landslide research in the Peruvian Andes – from hazard assessment to participative landslide risk reduction. In: Book-series P-LRT, Vol. 4, Issue 2, Springer.

Masini, N., Romano, G., Sieczkowska, D. et al. Non invasive subsurface imaging to investigate the site evolution of Machu Picchu. Sci Rep 13, 16035 (2023). <https://doi.org/10.1038/s41598-023-43361-x>

Tommaso Beni, Lorenzo Nava, Giovanni Gigli, William Frodella, Filippo Catani, Nicola Casagli, José Ignacio Gallego, Claudio Margottini, Daniele Spizzichino, Classification of rock slope cavernous weathering on UAV photogrammetric point clouds: The example of Hegra (UNESCO World Heritage Site, Kingdom of Saudi Arabia), Engineering Geology, Volume 325, 2023, 107286, ISSN 0013-7952, <https://doi.org/10.1016/j.enggeo.2023.107286>.

Beni, T., Boldini, D., Crosta, G.B. et al. Rock instabilities at the archaeological site of Dadan (Kingdom of Saudi Arabia). Landslides 20, 2455–2478 (2023). <https://doi.org/10.1007/s10346-023-02122-7>

Jon Ander Clemente, Jesus A. Uriarte, Daniele Spizzichino, Francesco Faccini, Tomás Morales, Rockfall hazard mitigation in coastal environments using dune protection: A nature-based solution case on Barinatxe beach (Basque Coast, northern Spain) Engineering Geology, Volume 314, 2023, 107014, ISSN 0013-7952, <https://doi.org/10.1016/j.enggeo.2023.107014>. (<https://www.sciencedirect.com/science/article/pii/S0013795223000315>).

Clemente, J.A., Spizzichino, D., Leoni, G. et al. Rockfall susceptibility analysis through 3D simulations in marine protected areas of the Portofino coastline: case studies of San Fruttuoso and Paraggi bays. Bull Eng Geol Environ 82, 122 (2023). <https://doi.org/10.1007/s10064-023-03133-3>.

Spizzichino, D. et al. (2023). Slope Instability Induced by Climate Changes on the UNESCO Etruscan Necropolis of Monterozzi (Tarquinia, Italy). In: El-Qady, G.M., Margottini, C. (eds) Sustainable Conservation of UNESCO and Other Heritage Sites Through Proactive Geosciences. Springer Geology. Springer, Cham. https://doi.org/10.1007/978-3-031-13810-2_9

Spizzichino, D. et al. (2023). Geotechnical Design and Mitigation Measures for the Conservation of Akapana Pyramid in the Tiwanaku Archaeological Site (Bolivia). In: El-Qady, G.M., Margottini, C. (eds) Sustainable Conservation of UNESCO and Other Heritage Sites Through Proactive Geosciences. Springer Geology. Springer, Cham. https://doi.org/10.1007/978-3-031-13810-2_2

Margottini, C., Spizzichino, D., Pandolfi, O. (2023). Landslide Mitigation Measures for the Conservation of the Archaeological Site of Mata Ngarau, Orongo Village (Easter Island-Chile). In: El-Qady, G.M., Margottini, C. (eds) Sustainable Conservation of UNESCO and Other Heritage Sites Through Proactive Geosciences. Springer Geology. Springer, Cham. https://doi.org/10.1007/978-3-031-13810-2_1.

J.A. Fernández-Merodo, R.M. Mateos, J.C. García-Davalillo, J.M. Azañón, C. Novo, R. Castellanza, D. Spizzichino, C. Margottini (2022). Multi-scale stability analysis at San Pedro Cliff in the Alhambra Cultural Heritage. In Geotechnical Engineering for the Preservation of Monuments and Historic Sites III, Lancellotta, Viggiani, Flora, de Silva & Mele. 1193-1205.

Gallego J.I., Margottini C., Spizzichino D., Boldini D., Abul J.K. (2022): “Geomorphological processes and rock slope instabilities affecting the AlUla archaeological region”. In Geotechnical Engineering for the Preservation of Monuments and Historic Sites III, Lancellotta, Viggiani, Flora, de Silva & Mele eds, 456-466.

Domej, G., Previtali, M., Castellanza, R., Spizzichino, D., Crosta, G., Villa, A., et al. (2022). High-Resolution 3D FEM Stability Analysis of the Sabereebi Cave Monastery, Georgia. *ROCK MECHANICS AND ROCK ENGINEERING*, 55(8), 5139-5162 [10.1007/s00603-022-02858-z].

Frodella, W., Rosi, A., Spizzichino, D. et al. Integrated approach for landslide hazard assessment in the High City of Antananarivo, Madagascar (UNESCO tentative site). *Landslides* 19, 2685–2709 (2022). <https://doi.org/10.1007/s10346-022-01933-4>.

Margottini C., Spizzichino D. (2021) Traditional Knowledge and Local Expertise in Landslide Risk Mitigation of World Heritages Sites. In: Sassa K., Mikoš M., Sassa S., Bobrowsky P.T., Takara K., Dang K. (eds) *Understanding and Reducing Landslide Disaster Risk*. WLF 2020. ICL Contribution to Landslide Disaster Risk Reduction. Springer, Cham. https://doi.org/10.1007/978-3-030-60196-6_34

Vilímek V., Wang F., Strom A., Sassa K., Bobrowsky P., Takara K. eds. (2021): *Understanding and Reducing Landslide Disaster Risk Reduction*. *Catastrophic Landslides and Frontiers of Landslide Science*, Springer. Vol. 5, 427 pp.

Frodella W., Spizzichino D., Ciampalini A., Ascanio R., Margottini C., Casagli N. (2021) Shallow Landslide Susceptibility Assessment in the High City of Antananarivo (Madagascar). In: Sassa K., Mikoš M., Sassa S., Bobrowsky P.T., Takara K., Dang K. (eds) *Understanding and Reducing Landslide Disaster Risk*. WLF 2020. ICL Contribution to Landslide Disaster Risk Reduction. Springer, Cham. https://doi.org/10.1007/978-3-030-60196-6_37.

Frodella W. Spizzichino D., Gigli G., Elashvili M., Margottini C., Villa A., Frattini P., Crosta G., Casagli N. (2021) Integrating Kinematic Analysis and Infrared Thermography for Instability Processes Assessment in the Rupestrian Monastery Complex of David Gareja (Georgia). In: Sassa K., Mikoš M., Sassa S., Bobrowsky P.T., Takara K., Dang K. (eds) *Understanding and Reducing Landslide Disaster Risk*. WLF 2020. ICL Contribution to Landslide Disaster Risk Reduction. Springer, Cham. https://doi.org/10.1007/978-3-030-60196-6_36.

Vilímek V., Klimeš J., Tito Mamani R.V., Bastante Abuhadba J., Astete Victoria F., Champi Monterroso P.Z., (2020): Contribution of the collaborative effort of the Czech WCoE to landslide risk reduction at the Machupicchu, Peru. *Landslides*. 17, 8, 2683-2688, 10.1007/s10346-020-01509-0

Mateos, R.M., Ezquerro, P., Azañón, J.M., D. Spizzichino et al. *Landslides* (2018) Coastal lateral spreading in the world heritage site of the Tramuntana Range (Majorca, Spain). The use of PSInSAR monitoring to identify vulnerability. 15: 797. <https://doi.org/10.1007/s10346-018-0949-5>.

Boldini, D., Guido, G.L., Margottini, C. And Spizzichino D. Stability Analysis of a Large-Volume Block in the Historical Rock-Cut City of Vardzia (Georgia). *Rock Mech Rock Eng* (2017). <https://doi.org/10.1007/s00603-017-1299-7>.

Margottini C., Bobrowsky P., Gigli G., Ruther H., Spizzichino D., Vlcko J. (2017) Rupestrian World Heritage Sites: Instability Investigation and Sustainable Mitigation Open image in new window. In: Sassa K., Mikoš M., Yin Y. (eds) *Advancing Culture of Living with Landslides*. WLF 2017. Springer, Cham.

Note:

Please fill and submit this form by **1 November 2025** to **ICL Network** <icl-network@landslides.org>

Less than 3 printed pages.

Activities are recommended to be submitted to the ICL Open Access Book Series “Progress in Landslide Research and Technology (P-LRT)” to globally promote the understanding and reduction of landslide disaster risk, as well as to address the 2030 Agenda Sustainable Development Goals.