

UNESCO CHAIR/UNITWIN NETWORK PROGRESS REPORT FORM

Title of the Chair/Network:	UNITWIN-UNESCO/KU/ICL Landslide, Earthquake and Water-related Disaster Risk Management for Society and the Environment Cooperation Programme
Host Institution:	The Disaster Prevention Research Institute, Kyoto University and the International Consortium on Landslides
Date of establishment of Chair/Network: <i>(mm, yyyy)</i>	UNITWIN-UNESCO/KU/ICL Landslide Risk Mitigation for Society and the Environment Cooperation Programme established in March 2003, revised in November 2010, and further revised to the current title in March 2019
Period of activity under report: <i>(mm, yyyy - mm, yyyy)</i>	1 November 2020 to 31 October 2022
Report established by: <i>(name, position)</i>	Kyoji Sassa, Secretary General of the International Consortium on Landslides, and Ryosuke Uzuoka (Professor) and Kaoru Takara (Specially appointed professor) of the Disaster Prevention Research Institute, Kyoto University

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1. Executive Summary:

Major outcomes, results and impact of the Chair, including on national policies, in relation to its objectives as stated in Article 2 of the Chair Agreement (between the Institution and UNESCO)

(Not exceeding 300 words)

1. **Landslides-Journal of the International Consortium on Landslides**, 24 issues (7,900 pages) have been published from November 2020 to October 2022 under the cooperation of this network and ICL supporting organizations. The 2021 Journal Impact Factor was 6.153, it was No.4 rank among 41 journals in the field of Engineering, Geological of the Impact Factors.
2. **Kyoto Landslide Commitment 2020**
The Kyoto Landslide Commitment 2020 for global promotion of understanding and reducing landslide disaster risk (KLC2020) was proposed by the ICL and the Network and launched on 5 November 2020 during the 2020 ICL-IPL Online/virtual conference in Kyoto, Japan. Representatives from 90 organizations including David Malone, UN Under-Secretary-General, Miguel Clusener-Godt, Director, Division of Ecological and Earth Sciences, and UNESCO, Juichi Yamagiwa, President of Kyoto University signed it.
3. **The Fifth World Landslide Forum (WLF5)** was organized in the hybrid mode with onsite, online presentations from 2 to 6 November 2021 in Kyoto, Japan. A total of 525 persons from 46 countries/regions, five United Nations Organizations and three global scientific organizations joined WLF5. A High-level panel discussion “Review of KLC2020 and the way forward” was organized on 3 November 2021.

4. **Launching Declaration** of the ICL Open Access Book Series “Progress in Landslide Research and Technology (*P-LRT*)” for the Kyoto Landslide Commitment 2020 was adopted by the panelists and participants of WLF5 at the end of this session. Then, the founding issues (Vol.1, No.1 and Vol.1, No.2) have been edited, two issues will be published both online and in print by December 2022.
5. **65 projects of the International Programme on Landslides (IPL)**: a programme of ICL for landslide disaster risk reduction are implemented in 19 countries. 14 new projects were proposed and adopted in 2022.
6. **19 World Centres of Excellence** on Landslide Risk Reduction 2020-2023 were identified at the 2020 ICL-IPL Conference on 2 November 2020. Those are working for the thematic network and regional network of ICL as the core of ICL and the UNITWIN network.
7. **A new SATREPS** (Science and Technology Research Partnership for Sustainable Development) project “Development of Early Warning Technology of Rain-Induced Rapid and Long-Travelling Landslides in Sri Lanka” has been started from 2019 to 2025 by six ICL members in Japan and Sri Lanka which was planned in the framework of the ISDR-ICL Sendai Partnerships 2015-2025.

2. Activities:

Overview of activities undertaken by the Chair during the reporting period

UNITWIN network includes Kyoto University, ICL headquarters, and 60 ICL full-member organizations and 19 ICL associates, 12 supporters and 20 KLC2020 official promoters.

Any person is invited to contribute their activities to the International Journal “*Landslides*” in 6 categories (Review papers, Original papers, Recent Landslides, Technical Notes, Landslide News and News/Kyoto Commitment. The contribution fee is free. Any person is invited to contribute to the open access book series “Progress in Landslide Research and Technology (*P-LRT*)” in 7 categories (Original articles, Review articles, ICL landslide lessons, IPL/WCoE/Kyoto Commitment activities, Teaching tools with online extras, Technical note & Case studies, World Landslide Reports). Anybody can access and download all articles of *P-LRT* free of charge.

Both publications are the core of UNITWIN-UNESCO/KU/ICL Landslide, Earthquake and Water-related Disaster Risk Management for Society and the Environment Cooperation Programme. Activities of this UNITWIN network have been published in the monthly Journal “*Landslides*” since 2004 and are being published in the twice-yearly open access book series “Progress in Landslide Research and Technology” from 2022.

Other activities taken by the UNITWIN Network are reported as below.

a) Education/Training/Research

i) Education leading to Certificate

Twenty (20) Ph.D. were awarded as the UNITWIN education/training/research in the reporting period 2020.11-2022.10.

One hundred fifty-three (153) Master’s degrees were awarded as the UNITWIN education/training/research in the reporting period 2020.11-2022.10.

- 3 PhD were awarded at Kyoto University, Japan
- 5 PhD, 32 Masters in Geological Sciences and technologies, 15 Master Theses in Civil Engineering and in Environmental Engineering, and 8 in Geoengineering were awarded at the UNESCO CHAIR on Prevention and Sustainable Management of Geo-hydrological Hazards of the University of Florence. The UNESCO Chair continued to propose the International Academic Master’s Degree (totally in the English language) on “Geoengineering” focused training the experts on the prevention, management and mitigation of geo-hydrological risks. The Master

started in the academic year 2017/2018 (<https://www.ing-gem.unifi.it>)

- 3 Ph.D. and 17 Masters in Engineering were awarded at UL FGG, Ljubljana, Slovenia. Two generations of students of the ERASMUS+ Master Studies in Flood Risk Management had lectures at UL FGG in Socio-economic Assessment of Flood Protection and in Spatial Planning for Flood Protection.
- 6 PhDs, 61 Masters were awarded at Charles University, Prague, Czech Republic
- Amrita Vishwa Vidyapeetham: The master's program, M.Tech in Geoinformatics and Earth Observation has provided admissions during the academic year 2020-21, 2021-2022 and 2022-2023. Six students from the class of 2020 were given research internships, including research internships at Lawrence Berkeley National Laboratory, Technische Universität Braunschweig, and the University of Twente. Students from the 2021 batch are pursuing their second year in this course out of which six students received international internships and from the 2022 batch, eight students are pursuing their first year.

A total of ten PhD students are pursuing their PhD program in the thematic area of climate change and disaster management. Each of them is working in the communities that have been encountering the problem of landslides and multi-hazards.

A PhD thesis written by Ms. Hemalatha titled as, "An Automated Learning System for Monitoring and Forecasting Rainfall-Induced Landslides" was awarded during this period.

In collaboration with the British Geological Survey, Amrita offered a 2-credit course on "Goelectrical characterisation and monitoring methods" from January to May 2021 which was successfully completed by 25 students. This course helped in capacity building at Amrita to process subsurface information obtained by ERT.

As part of the "Live in Labs®" program by Amrita Vishwa Vidyapeetham, seven B.Tech (Bachelor in Technology) students from Amrita School of engineering, had worked in communities of Munnar, Western Ghats, to understand the perception of risk that people are having during monsoon and develop a human-centric approach to reflect on major problems in Munnar. The insights from their study will be utilized in enhancing Amrita's system for landslide monitoring and early warning that are already deployed in Munnar, Kerala. The study was conducted during the period from July - December 2021. As part of this study students conducted interviews with communities in Munnar to assess the community resilience.

Another set of B.Tech students performed their final year internship on a sub theme of Amrita's Landslide Early Warning System. They are working on developing a prototype on "Integrating heterogeneous energy to increase the reliability of rain gauge station".

- 1 PhD 12 Master's degrees were awarded at National Central University, Chinese Taipei.
- 1 PhD, 7 Master's degrees were awarded at UNIZG-RGNF (Croatian Landslide Group), Croatia.
- 1 PhD was awarded at UNIRI-GF (Croatian Landslide Group), Croatia.
- 1 Master was awarded at Shimane University, Japan.

ii) Training (short term)

Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence

- Webinar: "Satellite radar monitoring of soil deformations in the Aosta Valley region", organized in collaboration with the Order of Geologists of the Aosta Valley and the Geological Activities Structure of the Autonomous Region of the Aosta Valley, November 24, 2020;
- Webinar: "Prevention systems and models of responsibility in the management of natural risks", organized by the Department of Law of the University of Ferrara (Criminal Chamber of Ferrara), in collaboration with the Chair, the Department of Civil Protection, with the patronage of the University of Ferrara, Forensic Foundation of Ferrara, National Institute of Geophysics and Volcanology, Center, CIMA Foundation, National Institute of Oceanography, February 5, 2021;
- Webinar: "Satellite Radar Monitoring of the deformations of the land of the Veneto Region", organized by the Order of Geologists of the Veneto, in collaboration with the Chair, the Protection and Security of the Territory, Soil Defense Department - U.O. Geology of the Veneto

Region, April 21-28, 2021;

- 1st Piero Gazzola summer school on rock mechanics applied to CH conservation and protection. (<http://eng.cu.edu.eg/en/researchprojects/>). Organized jointly by Cairo University, Academy of Science and Technology, Egypt, Sapienza University of Rome, the Italian Institute for Culture in Cairo and the Chair, Cairo 14-21 May 2022.
- LARAM (LAndslide Risk Assessment and Mitigation) International School 2021. September 6-17, 2021. Online school.
- LARAM (LAndslide Risk Assessment and Mitigation) International School 2022. September 5-16, 2022. Salerno (Italy).

UNESCO Chair: Geoenvironmental Disaster Reduction in Shimane University, ICGdR:

- UNESCO Chair 2021 Field School on Geoenvironmental Disaster Reduction in Shimane University, Japan. 6-13 March 2021; Online, Shimane University, Japan
- UNESCO Chair 2020 Field School on Geoenvironmental Disaster Reduction in Shimane University, Japan. 10-15 February 2020; Venue: Matsue Campus, Shimane University, Japan

National Central University, Chinese Taipei

- Course: A course on landslides is started during the academic year 2020. This course is designed based on theoretical slope stability analysis, so that the students' investigation of the soil and rock slope, planning, analysis, monitoring, treatment countermeasures Theory and Applications, consistency of understanding.

Amrita Vishwa Vidyapeetham:

- Training sessions and community engagement programs were held to spread awareness on Landslide disaster risk, precursors, landslide early system and its functionalities etc. in Chandmari, Sikkim, India on 2nd December-2021. and on 18 July 2022
- ERT, GPR and Seismic training: Amrita University has procured the high-end geophysical equipment for research and training. The training was conducted in two phases. Phase I was held on 9th -10th March and Phase II was conducted between 22nd Aug 2022 to 27th Aug 2022. Senior Geophysicists Rajender, L D Mahapatra conducted the training who have more than 20 years of experience in electrical resistivity tomography (ERT), seismic and GPR survey across the globe.
- Virtual and on-field training on tracking landslides has been conducted in 2021-2022 with several officials from State disaster Management Authorities, The App has been developed for the landslide data collection by Amrita (available in playstore at https://play.google.com/store/apps/details?id=edu.awna.amrita.mht&hl=en_GB) for the validation of EWS.
- Amrita School for Sustainable Development and Amrita Center for Wireless Networks has developed short term programs and utilized those to train the community members in landslide risk reduction in the month of May and June 2022

Croatian Landslide Group

- 5th Regional Symposium on Landslides in Adriatic Balkan Region, Faculty of Civil Engineering University of Rijeka, 23-26 March 2022, held as a hybrid Symposium, 85 participants from 13 countries.
- 1st Workshop on Landslide Physical and Numerical Modelling, Faculty of Civil Engineering University of Rijeka, 23 March 2022, held as a hybrid Workshop, 55 participants from 7 countries.
- 1^{2nd} Workshop on Landslide Physical and Numerical Modelling, Faculty of Civil Engineering University of Rijeka, 30 August 2022, held as a Hybrid Workshop, 31 participants from 6 countries.

iii) Research

Research is the main activity of this UNITWIN Network. At the suggestion of 6 participants from UNESCO at the ICL foundation meeting in January 2002, the International Programme on Landslides (IPL) was established within the frame of the UNESCO Chair/UNITWIN programme at the same time of ICL foundation in 2002. The core of Research activities in the UNITWIN Programme is IPL projects. Currently 65 IPL projects are conducted in 19 countries. 19 Word Centres of Excellence on Landslide Risk Reduction 2020-2023 are working for landslide disaster risk reduction in 17 countries.

A new research project is the SATREPS (Science and Technology Research Partnership for Sustainable Development) project “Development of early warning technology of rain-induced rapid and long-travelling landslides in Sri Lanka which is funded by JICA (Japan International Cooperation Agency) and JST (Japan Science and Technology Agency) in 2019-2025. The International Consortium on Landslides and one of the UNITWIN programme partners “National Building Research Organization of Sri Lanka” are the main partners in Japan and Sri Lanka.

b) Conference/Meetings

The Kyoto Landslide Commitment 2020 for global promotion of understanding and reducing landslide disaster risk (KLC2020) was proposed by the ICL and the Network and launched on 5 November 2020 during the Fifth World Landslide Forum (WLF5) in Kyoto, Japan. Due to Covid-19 pandemic, WLF5 was postponed for one year. However, ICL, ICL supporting organizations, and this UNITWIN Network prepared to start KLC2020 activities. This cannot be postponed. Then, the 2020 ICL-IPL Online/virtual conference was organized in Kyoto, Japan on 2-6 November 2020 in Kyoto, Japan. By the day, 90 organizations agreed and signed this commitment. The signatories included David Malone, UN Under-Secretary-General/Rector of UNU as chair of the KLC2020 General Conference, Kyoji Sassa as the Secretary General of KLC2022 Secretariat, President of ICL, Secretary General of WMO, and other global and international and national stakeholders.

WLF5 was organized in the hybrid mode (onsite, online, and pre-recorded) on 2-6 November 2021 in Kyoto, Japan. Participants of WLF5 are a total of 525 persons from 46 countries/regions, three global scientific organizations (IUGG, IUGS, and WFEO), and five United Nations Organizations (FAO, UNDRR, UNESCO, UNU, and WMO). The maximum number of participants was 215 from Japan. A large number of participants from other countries/regions was 47 from Italy, 45 from China, 21 from USA, 16 from Czech Republic, and 10 from UK, India, Indonesia, and Chinese Taipei. The number of onsite participants from Japan was 154.

During this conference, A high-level panel discussion “Review of KLC2020 and the way forward” on 3 November 2021 was organized. At the end of the panel discussion, the launching declaration of the ICL open access book series for KLC2020 was adopted in order to establish a new stable and global platform promoting “Kyoto 2020 Commitment until 2030 and beyond. Thereafter, an international team of advisory members for KLC2020, managing committee members, scientific and technical editors, and KLC 2020 official promoters who promote the Kyoto Landslide Commitment 2020 and provide financial support for KLC the Open Access Book Series “Progress in Landslide Research and Technology” has been established. This book series is planned to be published two times / year. We have finished collecting articles and editing all articles of the two founding issues (Vol.1, No.1 and No.2), those will be published within 2022. Now two books are in the production stage

Other Conference/Meetings organized or presented by UNITWIN Network members are the followings.

Kyoto University

- 15th World Congress on Computational Mechanics & 8th Asian Pacific Congress on Computational Mechanics, online, July 31 – August 5, 2022
- 4th International Conference on Performance-based Design in Earthquake Geotechnical Engineering, online, July 15 - 17, 2022
- 20th International Conference on Soil Mechanics and Geotechnical Engineering, online, May 01 – 05, 2022

- 3rd International Symposium on Risk Assessment and Sustainable Stability Design of Slopes, Sendai, Japan, March 18-21, 2022
- Asian Conference on Physical Modelling in Geotechnics, online, November 18 – 19, 2021
- The Fifth World Landslide Forum, Kyoto Japan, November 02 – 06, 2021
- 6th International Conference on Engineering Geophysics, Online, October 25 – 28, 2021
- 17th World Conference on Earthquake Engineering, Sendai, Japan, September 27 – October 2, 2021
- COUPLED 2021, online, June 13 – 16, 2021

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- 5th World Forum on landslides (WLF5), which due to the COVID-19 pandemic was held in mixed virtual and in presence-mode from November 2-6, 2021, in Kyoto (Japan). In particular, the UNESCO Chair coordinated the activities of Theme 3: Monitoring and early warning of landslides.
- Conference "Geo-spatial observation of the earth. Satellites, scientific instruments and technologies made in Italy in orbit for the control of the territory and the reduction of natural risks ", organized by Earth Technology Expo, Firenze, October 14th, 2021
- International Conference Daylighting Rivers: Inquiry Based Learning for Civic Ecology, Final conference of the ERASMUS+ project "Daylighting Rivers", 1-2 December 2020.

UNESCO CHAIR: Water-related Disaster Risk Reduction at University of Ljubljana

- EGU Annual General Assembly meetings in Vienna, Austria in April, 2021 & May, 2022.
- 14th INTERPRAEVENT Congress in Bergen, Norway in May 31–June 2, 2021.
- 29th IHP UNESCO Danube River Basin Conference in Brno, Czech Republic in September 6-8, 2021.
- TKZ 2021 XIX technical dam control international conference, safety of dams on tailing storage facilities and other hydraulic structures, 7 – 10 September 2021, online, hosted by Warsaw University of Technology.
- The Future of Rivers by Maria Pons (World Bank Group, October 26, 2021, hosted by ICOLD YEF, INCOLD, World bank, MOZCOLD, online.
- 5th World Landslide Forum in Kyoto, Japan in November 2 – 6, 2021.
- ICOLD Symposium on Sustainable development of dams and river basins and APG Symposium in Water and dams, 24 – 27 February 2022, online, hosted by INCOLD; New Delhi.
- 5th Regional Symposium on Landslides in the Adriatic-Balkan Region (5th ReSyLAB), Rijeka, Croatia, March 23 – 26, 2022.
- Decommissioning and replacement of an arch-gravity dam by a new adjacent double curvature arch dam, March 30, 2022, hosted by ICOLD YEF, SWISSCOD-YP, SANCOLD-YPF, MOZCOD, online.
- 16th International Benchmark Workshop on Numerical Analysis of Dams, 5 – 6 April 2022, hosted online by UL FGG.
- Tackling challenges for dam risk governance: safety management and climate change, May 17, 2022, hosted by ICOLD YEF, MOZCOD, SPANCOLD, online.
- 27th ICOLD Congress and 90th Annual ICOLD Meeting, Sharing Water: Multi-Purpose of Reservoirs and Innovations, Marseille, France, May 27 – 3 June, 2022.
- IAHS 2022 congress in June 2022, Montpellier, France.
- IAHR World Congress, Granada, Spain (19 – 24 June 2022).
- ESDAC soil erosion workshop in June 2022, virtual.
- Terraenvision Congress in June 2022, Netherlands.
- IAHR World Congress, Granada, Spain (19 – 24 June 2022).

- Online webinar: Hydro-Climatology Implications on Dam Safety, July 15, 2022, hosted by ICOLD YEF, INCOLD, ITCOLD YEF, online.
- BORIS Project: Cross BOrder RISK assessment for increased prevention and preparedness in Europe; 19 – 20 September, 2022, meeting and national workshop organized at the University of Ljubljana.
- BioHydro 2022 conference on “Plants’ role in the hydrological cycle”, Krakow, Poland (6–9 September 2022).
- 1st RESILabex workshop in Udine, Italy, in October 24 – 25, 2022.
- 1st Regional meeting of the UNESCO science-related chairs and centers for South East Europe and the Mediterranean in Venice, Italy, in October 26-28, 2022.

UNESCO Chair: Geoenvironmental Disaster Reduction in Shimane University, ICGdR

- The 19th international symposium on geo-disaster reduction/high-level academic forum on disaster mitigation and integrated risk defense on the Plateau, 12–15 July 2021, Xining, China
- The 18th International Symposium on Geo-disaster Reduction and the 4th Gu Dezhen Lecture, 20–22 November 2020, Beijing, China

Amrita Vishwa Vidyapeetham

- Amrita Center for Wireless Networks and Applications professors, Dr. Rekha Prabha and Dr. Maneesha Vinodini Ramesh have been granted a patent for "Adaptive Energy Management System and Method for Real Time Landslide Detection," with the patent number 369608 for their invention. Amrita Center for Wireless Networks and Applications (AmritaWNA) has been working on real-time landslide detection and has its deployment in two sites (Munnar, Idukki in Western Ghats and at Chandmari, Sikkim in the Himalayas). This patent is an invention from the AmritaWNA team that allows an improved lifetime of the network due to the implementation of this adaptive energy management scheme.
- Amrita provost, Dr. Maneesha Ramesh was an invited speaker and participated at the LANDSLIP: International Knowledge Sharing Webinar on May 17, 2022. At this event, Dr. Maneesha Ramesh addressed Amrita's work sharing LANDSLIP aims, objectives, high-level outputs as captured in knowledge products and the perspective of impact. Amrita researcher, Mr. Ramesh Guntha also shared landslide data perspectives at this webinar. LANDSLIP (Landslide Multi-Hazard Risk Assessment, Preparedness and Early Warning in South Asia: Integrating Meteorology, Landscape and Society) is a UKRI NERC/FCDO-funded research project under their SHEAR programme, implemented from November 2016 to June 2022. The event was organized by The LANDSLIP Consortium Partners from the UK, Italy and India including King's College London, British Geological Survey, UK MET office, New Castle University in the UK, Consiglio Nazionale delle Ricerche, Italy, Geological Survey of India, Amrita Vishwa Vidyapeetham, India and Practical Action UK and India.
- Jeffrey D Sachs scholarship for sustainable development 2022, the first to be bestowed in the name of Jeffrey Sachs, was awarded to Nitin Kumar M, an Amrita PhD student working on “Building landslide Resilient community”
- Our Provost, Dr. Maneesha Ramesh and Ms. Sindhu Manoj of the Amrita Center for International Programs visited Nepal and met with the Minister of Education, Science and Technology, Hon. Shri Devendra Paudel and Dr. Khul Prasad Khanal, the undersecretary at the Ministry of Education, Science and Technology, Government of Nepal at Kathmandu on December 20, 2021. The Amrita team also had a meeting with Shri. Man Bahadur Khadka, Director General, Department of Forests and Soil Conservation, Ministry of Forests and Soil Conservation, Nepal. Earlier the team had met a delegation at the Tribhuvan University of Nepal and had a meeting with the Dean and colleagues there. Dr. Maneesha presented insights from the landslide early warning deployment in India by Amrita to Nepal officials who also face catastrophic landslide events every year.
- An Amrita team visited the Ministry of Earth Sciences and met with Dr. M. Ravichandran, Secretary, Ministry of Earth Sciences (MoES), Government of India on December 8, 2021. The Amrita Team led by Dr. Maneesha Ramesh, Provost, presented the University's efforts in disaster

management and about the deployed landslide system in the Western Ghats (Munnar) and in Himalayas (Sikkim) to predict and detect landslides. The meeting also forested discussions on future road maps for the nation in Landslide early warning, through the Memorandum of Understanding (MoU) with the India Meteorological Department (IMD), Ministry of Earth Sciences on Climate Change Risk Assessment Modeling and Multi-hazard Management.

- Nov 2021, The hills of Tirumala experienced heavy rainfall leading to numerous rock falls and debris slides. As part of the ICL/ IPL activities, a Scientific team led by Dr. Maneesha, Provost from our Amrita Center for Wireless Networks and Applications was immediately sent to inspect the landslides on Tirumala Ghat Road. The team led by Prof. Maneesha Sudheer included Dr. Nirmala Vasudevan, Dr. Sudhesh Wadhawan, Mr. Nitin Kumar, Mr. Balmukund Singh, Mr. Sibu Natesan, Tirumala Tirupati Devasthanams (TTD) DFO Srinivasu Reddy, EE Surendranath Reddy, and other officials from the Department of Strategic Initiatives, Research and Innovations at Amrita Vishwa Vidyapeetham. In collaboration with Tirumala Tirupati Devasthanams (TTD) the team visited various locations and a scientific report was prepared and submitted followed by a presentation.
- As part of detailed investigations, geoscientific data is collected and a detailed report titled “Assessment of Tirumala Hills Rockfall, Rock-cum-Debris Slides and proposed Early Warning System” is prepared which was submitted to the TTD for further action
- The Karnataka State Natural Disaster Monitoring Center (KSNDMC), Bengaluru invited Amrita Landslide team to study landslides hazards in Kodagu district and suggest mitigation & early warning of landslides in Karnataka besides their ongoing activities on monitoring of natural hazards on different scales. Date of visit: 30th May to 3rd June 2022 Team from Amrita included Dr. Maneesha Vinodini Ramesh, Provost. , Dr. Sudesh Kumar Wadhawan, Adjunct Professor, . Sudha Arlikatti, Associate Professor, Mr. M. Nitin Kumar , Research Associate, Mr. Balmukund Singh, Mr. Arun Kumar. Team from Government of Karnataka include: Dr. Ramesh Dikpal, KSNDMC; Bengaluru, Mr. Anannaya Vasudev, District Disaster Professional Officer; Kodagu district, Coorg , Mr. Abhinav, KSNDMC; Bengaluru, Mr. Rahul, Geologist DMG, Kodagu/ Virajpet, Govt of Karnataka. The study was followed by a presentation and report to the Government of Karnataka which further led to formulation of MoU between two bodies for deployment of early warning systems in selected locations of Karnataka state.
- As part of the ICL/ IPL activities, a Scientific team led by Dr. Maneesha, Provost from our Amrita Center for Wireless Networks and Applications was sent to the multi hazard affected areas of Kottayam and Idukki districts of Kerala in November, 2021. These areas have experienced landslides and floods in the month of Aug, 2021. Detailed catchment level analysis based on the data collected during the field work was performed and reports were submitted to district administration with suggestive measures.
- Dr. Maneesha, Provost presented landslide work to Uttarakhand State Disaster Management Authority on 26th September 2022. The presentation covered the AI Enabled IoT System for Reliable multiscale landslide early warning which showcased the successful case study of Sikkim and Munnar deployment. The discussion further elaborated the requirements of Uttarakhand state and a proposal for drafting and MoU confirmed.
- Dr. Maneesha, Provost presented landslide work to Arunachal Pradesh State Disaster Management Authority on 18th September 2022. The presentation covered the AI Enabled IoT System for Reliable multiscale landslide early warning which showcased the successful case study of Sikkim and Munnar deployment. The discussion further elaborated the requirements of Uttarakhand state and a proposal for drafting MoU.
- Dr. Maneesha, Provost presented landslide work to Mizoram State Disaster Management Authority on 22nd September 2022. The presentation covered the AI Enabled IoT System for Reliable multiscale landslide early warning which showcased the successful case study of Sikkim and Munnar deployment. The discussion further elaborated the requirements of Uttarakhand state and a proposal for drafting MoU.
- At the 5th World Landslide Forum in Kyoto, Japan, held this November 2-6, 2021, the International Programme on Landslides (IPL) awarded the title “World Center of Excellence on Landslide Risk Reduction (WCoEs)” 2nd time to recognise of the University’s contribution towards landslide risk reduction. The University will hold the title till 2023. The vision of our

“World Centre of Excellence on Landslide Risk Reduction (WCoEs)” is “Disaster Risk Reduction Through Real-Time Landslide Monitoring and Early Warning Systems Integrated with Co-designing and Community Engagement Programs”. The sub objectives of the WCoE will include: Development of Low Cost Deep Earth Probes and Intelligent Wireless Probes with Edge Computing for Enhanced Monitoring, Development of IoT Framework for Large Scale Monitoring of Landslides, Decision Models using Machine Learning and Artificial Intelligence, Adaptive Multi scale Warning Models, and Enhancing Community Resilience through Multiple Techniques & Approaches.

- A comprehensive report was submitted on 20th April 2022 to Sikkim State disaster Management authority to suggest the mitigation measures in Chandmari Landslide based on the site observations and in-situ sensors data from Amrita Landslide early warning deployment site.
- A new Community Based Disaster Resilience project have been initiated in collaboration with Prof. Ian Davis on 21 February 2022. Dr. Ian, originally an architect, has worked in Disaster Risk and Recovery Management since 1972 , when he embarked on PhD research in the Development Planning Unit (DPU) of UCL. The project focuses on communities affected by landslides and other natural hazards in Sikkim and Kerala.
- Amrita Vishwa Vidyapeetham signed an MoU with India Meteorological Department For Climate Change Risk Assessment, Modeling and Multi Hazard Management.
- Amrita Vishwa Vidyapeetham signed an MoU with Indian National Centre for Ocean Information Services (INCOIS) on 09-06-2022. Through this MoU Amrita jointly launches a program called ‘Tsunami Ready’ for the Alappad Grama Panchayath. Tsunami Ready is a community performance-based programme initiated by the Intergovernmental Oceanographic Commission (IOC) of UNESCO to promote tsunami preparedness through active collaboration of public, community leaders, and national and local emergency management agencies. The main objective of this programme is to improve coastal community's preparedness for tsunami emergencies, to minimize the loss of life and property and to ensure a structural and systematic approach in building community preparedness through fulfilling the best-practice indicators (11 Nos) set by the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS) of UNESCO-IOC. The program is presided by Dr. Maneesha V Ramesh, Provost- Amrita Vishwa Vidyapeetham and T. Srinivasa Kumar, Director, INCOIS- Hyderabad is the Chief Guest. Anong with distinguished guests include Sri. Ullas Unni, President, Alappad Grama Panchayath, Members of the Panchayats and the representatives of Amritasree Self Help Groups.
- Amrita Vishwa Vidyapeetham signed an MoU with India Meteorological Department For Establishing Center for Geoinformatics and Spatial Mapping, Analysis & Modeling, Establishing Center for Spatial Geoinformatics & Earth Observation, Geoinformation, Spatial Analytics and Remote Sensing Center under the aegis of Amrita School for Sustainable Development and Amrita Center for Wireless Networks and Applications. on Nov 1, 2020
- Dr. Maneesha V Ramesh, Provost had meetings with Kerala State Disaster Management Authority (KSDMA) and Naval Physical and Oceanographic Laboratory (NPOL) in November- December 2021 for development of low cost acoustic sensors to be used in detecting landslides. This was followed by site visits to Munnar where field deployment of such sensors were explored.

National Central University, Chinese Taipei

- Conference: Host of 2022 Rock Engineering and Engineering Geology Symposium in Taiwan. 5~6 May, 2022.
- Conference: 2021 WLF5. Paper: Three-Dimensional Simulation on the Rockslide and Mudslide Generated Tsunamis & The Development of TDR-integrated landslide Early Warning System & Centrifuge Modeling on Slope Failure Behaviors Caused by Gravity, Earthquake and Rainfall & Rock slope simulation employing centrifuge and DEM modeling. & Stochastic modeling of displacement uncertainty for heterogeneous porous media & Flank failure of the volcanic Turtle Island in the southernmost Okinawa Trough & Submarine landslide: A case study from the southwestern of Taiwan offshore.
- Conference: 2021~2022 AOGS IG session: Identification, Mapping, Monitoring and Forecasting of Landslide and Erosion Processes. Paper: Fusion of Optical and Thermal Imagery Monitoring

for a Long-term Stability Application to Slopes. & Construct a 3D Geological Model of the Dalun Mountain & The Parametric Study of PS-InSAR for Landslide Monitoring – Ali Mt. Case.

Institute of Geography, National Autonomous University of Mexico

- Forum: Integrated Disaster Risk Management from a Human Rights Approach, Mexico City Human Rights Commission, Mexico City, 2019, 2019/10/10-11
- First Multi-Sectoral Conference towards Integrated Disaster Risk Management in Mexico: Building a National Public Policy, Mexico City 2019, 2019/10/21-25
- Public Policies, ARISE MX Regional Forum “Resilience for all: the importance of understanding risk, Mexico City 2019, 2019/10/29-30

Croatian Landslide Group

- 5th Regional Symposium on Landslides in Adriatic Balkan Region, Faculty of Civil Engineering University of Rijeka, 23-26 March 2022, held as a hybrid Symposium, 85 participants from 13 countries.
- 10th International Conference on Physical Modelling in Geotechnics (ICPMG), Daejeon, South Korea, 19-23 September 2022.
- 20th International Conference on Soil Mechanics and Geotechnical Engineering (ICSMGE), Sydney, Australia, 01-05 May 2022

c) Interuniversity Exchange.

Within 60 ICL full member organizations from 29 countries, and 20 associate members from 10 countries, and 12 supporters from three countries, 20 KLC2020 official promoters from 5 international organizations, one government organization and 5 universities and 9 companies. Those member organizations have conducted the interuniversity exchanges through ICL-IPL-KLC annual conference in 2020, 2021 and 2022 (in coming November 2022) and collecting and editing articles for the open access book series (Vol.1, No.1 and No.2 and starting Vol.2, No.1 from September 2022).

ICL Headquarters:

- Visiting students
- Luqi Wang, PhD student in China University of Geosciences (Wuhan) has been invited to ICL headquarters in Kyoto, by the Chinese Scholarship Council visited from November 11th, 2019 to November 10th 2020.
- Yuxin Li, Ph.D student in Faculty of Geographical Science, Beijing Normal University, China has been invited to ICL headquarters in Kyoto, by the Chinese Scholarship Council from October 2022 for one year.

As a part of SATREPS Project-Development of Early Warning Technology of Rain-Induced Rapid and Long-Travelling Landslides in Sri Lanka- between National Buiding Research Organisation (Sri Lanka) and ICL (2019-2025), 6 members of NBRO have been invited to obtain Ph.D or Master’s degree in Japan.

- Sanchitha Jayakody has been invited to a Doctor Course at Kyoto University by the Japan International Cooperation Agency (JICA) scholarships from 2020 to 2023
- Imaya Ariyaratna has been invited to a Doctor Course at Kochi University by the Japan International Cooperation Agency (JICA) scholarships from 2020 to 2023
- Danushka Jayathilaka has been invited to a Doctor Course at the University of Tokyo by the Japan International Cooperation Agency (JICA) scholarships from 2021 to 2024
- Sandaruwan Karunaratne has been invited to a Doctor Course at Yamanashi University by the Japanese Government scholarships from 2021 to 2024
- Anuththaara Bandara has been invited to a Master's Course at Tokyo Institute of Technology by the Japan International Cooperation Agency (JICA) scholarships from 2022 to 2024
- Sajith Bandaranayake has been invited to a Master's Course at Yamanashi University by the SATREPS-ICL fund scholarships from 2022 to 2024

Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence

- 4 visiting students:
- 1) Visiting MsC students
Tea Munchava (MsC candidate)
Thesis title: “Complex study of geomechanical hazards of rock cut monuments using ground-based radar interferometry”
Ilia State University (Tbilisi, Georgia)
Tutor: Prof. Mikheil Elashvili
- 3) Visiting PhD students
- Ting Xiao
Thesis title: Application of multiple monitoring data in geohazard research of the three Gorges reservoir area
China University of Geoscience, Wuhan (China)
Tutor: Yin Kunlong
- Shuhao Liu (CUG, Wuhan, China)
Thesis title: Landslide risk assessment in electric transmission site area
China University of Geoscience, Wuhan (China)
Tutor: Yin Kunlong
- Xin Liang (CUG, Wuhan, China)
Thesis title: Research of sophisticated landslide assessment and meteorological warning
China University of Geoscience, Wuhan (China)
Tutor: Yin Kunlong

UNESCO Chair on Water-related Disaster Risk Reduction, University of Ljubljana

- Annually master students from the Erasmus-Mundus Flood Risk Management Master Program are attending courses at University of Ljubljana, hosted by the UNESCO Chair on WRDRR.
- Invited lecture was given within Doctoral Seminar series in doctoral study program in Built Environment by Professor Binod Tiwari (California State University, Fullerton) in August 2022.
- Petroselli Andrea (Professor and researcher) from Tuscia University, Italy) visited UL in May, 2022 within the framework of the Erasmus+ Programme - Staff Mobility for Training at the University of Ljubljana (UL), Faculty of Civil and Geodetic Engineering (FGG).
- Sezen Cenk (Postdoctoral researcher) from Ondokuz Mayıs University visited UL for 3 months in 2022 within the framework of the Erasmus+ Programme - Student Mobility for Training at the University of Ljubljana (UL), Faculty of Civil and Geodetic Engineering (FGG).
- Yasser Ghafoori (PhD student) from Afghanistan, Tamara Kuzmanić (PhD student) from Croatia, and Mark Bryan Alivio (PhD student) from the Philippines are working on their PhD theses.
- Dr Nejc Bezak spent 3 months in 2022 as sabbatical leave at University of Rijeka, Faculty of Civil and Geodetic Engineering.
- Dr Simon Rusjan spent 3 months in 2021 as sabbatical leave at Technical University of Graz, Faculty of Civil Engineering.
- Martina Kovačević from the University of Zagreb visited UL in June 2021.
- Adam Krajewski from the Warsaw University of Life Science visited UL in September, 2021.

Charles University has Interuniversity Exchange with 31 universities

- Heidelberg University (Germany)
- Johannes Gutenberg University Mainz (Germany)
- University of Stuttgart (Germany)
- University of Strasbourg (France)
- University of Cagliari (Italy)
- Adam Mickiewicz University in Poznań (Poland)
- University of Sheffield (UK)
- University of Camerino (Italy)

- University of Malta (Malta)
- Free University of Berlin (Germany)
- University of Tuebingen (Germany)
- Dresden University of Technology (Germany)
- University of Seville (Spain)
- University of Lausanne (Switzerland)
- Maynooth University (Ireland)
- University of Bonn (Germany)
- Freiberg University of Mining and Technology (Germany)
- Technical University of Munich (Germany)
- University of Florence (Italy)
- Trinity College Dublin (Ireland)
- University of Pécs (Hungary)
- Humboldt University of Berlin (Germany)
- University of Santiago de Compostela (Spain)
- University of Lisboa (Portugal)
- University of Pavia (Italy)
- University of Göttingen (Germany)
- University of Helsinki (Finland)
- Pavol Jozef Šafárik University in Košice (Slovakia)
- University of Leicester (UK)
- University of Leuven (Belgium)
- University of Ulster (UK)
- University of Basilicata (Italy)
- University of Campania (Italy)
- University of Twente (Netherlands)
- Istanbul Technical University (Turkey)
- University of St. Andrews (UK)

Amrita Vishwa Vidyapeetham:

- One PhD student has been selected to visit University of Trento, Italy
- Six M.tech students from Geoinformatics and Earth Observations are selected for pursuing their masters level project in Lawrence Berkeley National Laboratory (LBNL), Technical University of Munich (TUM) , and ITC Faculty Geo-Information Science and Earth Observation respectively as part of student exchange activities with the respective universities.

Northeast Forestry University, China

- Programme of video-meeting about scientific and educational cooperation between the institute of cold regions science and engineering of Northeast Forestry University (China) and The technical institute (branch) North-Eastern Federal University (Russia) . 2021/10/29.

Croatian Landslide Group

- Joint Research, Assist. Professor Bezak Nejc from University of Ljubljana, Slovenia, 3 months from 01 June to 31 August 2022.

Institute of Rock Structure and Mechanics, Czech Academy of Sciences:

- Joint PhD supervision of Mariana Correas Gonzalez of the Argentinian Institute of Nivology, Glaciology and Environmental Sciences, Mendoza – CONICET, Argentina and Institute of Rock Structures and Mechanics, The Czech Academy of Sciences, Czech Republic.

d) Publications/Multimedia Materials

Refer to the attached list (pages: 45-71)

e) Cooperation with UNESCO Headquarters, Field Offices

ICL was founded by UNESCO-Kyoto University Joint symposium (IGCP-425 Landslide Hazard Assessment and Cultural Heritage) in 2002. IPL (International Programme on Landslides) was founded as a landslide version of IGCP together with the IPL Global Promotion Committee for the management of all IPL matter in 2006. Based on the Kyoto Landslide Commitment 2020, the IPL Global Promotion Committee was changed to the Global Promotion Committee of the International Programme on Landslides and Kyoto Landslide Commitment 2020 in 2021.

Chair: Matjaz Mikos (University of Ljubljana, Slovenia), Co-Chairs: Qunli Han (Integrated Research on Disaster Risk), Soichiro Yasukawa (UNESCO Disaster Risk Reduction Unit), Hisroshi Kiatazato (IUGS Treasurer), John Labreque (Chair of IUGG Georisk Commission)

Ms Shamila Nair-Bedouelle, Assistant Director-General for Natural Sciences supported the International Journal *Landslides* as an advisory member of the Journal management committee. She wrote her Foreword from UNESCO for the 6 volumes of full color books 'Understanding and Reducing Landslide Disaster Risk' for the Fifth World Landslide Forum (WLF5). She presented a opening greeting in the Fifth World Landslide Forum (WLF5) in November 2021, and her message with video was published in the founding issue of the open access book series 'Progress in Landslide Research and Technology' in 2022.

Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence

- The Chair, as a member of ICL, has been signatory of the Kyoto 2020 Commitment, which is devoted to promote global landslide disaster risk reduction, as a contribution to the International Strategy for Disaster Reduction, the Sendai Partnership 2015-2025, the 2030 Agenda for Sustainable Development, the New Urban Agenda and the Paris Climate Agreement. The Kyoto 2020 Commitment for global promotion of understanding and reducing landslide disaster risk was signed by 90 signatories (including the Chair, UNESCO, UNU, IRDR, WFEO, GRF Davos, IGS, UNESCO Chair, Italian Department of Civil Protection). The Chair in particular, will contribute to some priority actions of Kyoto 2020 Commitment:
- Action 1: Promote the development of people-centered early warning technology for landslides with increased precision and reliable prediction both in time and location, especially in a changing climate context.
- Action 2: Advance hazard and vulnerability mapping, including vulnerability and risk assessment with increased precision, as well as reliability as part of multi-hazard risk identification and management.
- Action 3: Improve the technologies for monitoring, testing, analyzing, simulating, and effective early warning for landslides suitable for specific regions considering natural, cultural and financial aspects.
- Action 6: Investigate the effect of climate change on rainfall-induced landslides and promote the development of effective rainfall forecasting models to provide earlier warning and evacuation especially in developing countries
- Action 9: Foster new initiatives to study research frontiers in understanding and reducing landslide disaster risk by promoting joint efforts by researchers, policy makers and funding agencies.
- The Chair participated to the UNESCO Chair initiative "Dialogues of the UNESCO Chairs: a laboratory of ideas for the upcoming future." This series of webinars was held in a virtual mode from June to October 2021. These meeting represented the synthesis of a year of discussion and dialogue between the Italian UNESCO Chairs engaged in the development of education and knowledge in relation to global environmental and social challenges, and for the achievement of the sustainable development goals of the 2030 Agenda of the United Nations. To this end, the Italian UNESCO Chairs are working to provide a laboratory of ideas and knowledge for future generations, implement a transdisciplinary and transnational educational approach, contribute to introducing the environmental challenge in school and university education, develop tools for sharing and dissemination, of knowledge acting as bridges between the academic world, civil

society and political decision-makers.

Amrita Vishwa Vidyapeetham:

- Hon. Prime Minister of India Shri Narendra Modi launched Amrita Hospital Faridabad alongside Amma, Sri Mata Amritanandamayi, Hon. Haryana CM Shri Manohar Lal Khattar and Hon. Governor Shri Bandaru Dattatreya. In this event Amrita Landslide project was also displayed as one of key research at Amrita
- The National workshop on Landslide was conducted by the National Disaster Management Authority (NDMA). Dr. Maneesha showcased an Indian case study focusing on challenges in landslide early warnings and way forward.
- Ms. Mira Shivani, S2 M Tech Geoinformatics and Earth Observations student (2021-23 batch), participated in the Geo-innovation challenge in April 2022, organized by the Department of Earth and Space Science, Indian Institute of Space Science and Technology, Thiruvananthapuram, Kerala, India. Mira presented Landslide mapping combining high-resolution ground data with multispectral images utilizing convolution neural network and geospatial modeling.
- Dr. Sudesh Kumar Wadhawan, Adjunct professor, Amrita presented on “Causative factors of landslides 2019: Case study in Malappuram and Wayanad, districts of Kerala, India” in the 5WLF - 2020, Japan on 6 Nov 2021
- Sudesh Kumar Wadhawan, Adjunct professor, Amrita presented on “Basin-wide Approach to Landslide Hazards Assessment and Deployment of Early Warning System in Sub-Basins of River Rora Chu, part of Gangtok region, East Sikkim Himalaya” at Wadia Institute of Himalayan Geology in Feb 2021. Dr. Wadhawan also had several discussions on landslides issues at Uttarakhand.

Institute of Geography, National Autonomous University of Mexico

- International Geoscience Programme Council, IGCP, UNESCO, Scientific Board Member, Geohazards (Irasema Alcántara-Ayala).

f) Other

Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence:

- The UNESCO Chair of the University of Firenze since 2008 is recognized as World Centre of Excellence (WCoE) on landslide risk reduction by the Global Promotion Committee of the International Programme on Landslides (IPL/GPC); this triennial achievement was confirmed in 2011, 2014, 2017 and for the last triennium 2020-2023.
- The Earth Sciences Department of the University of Firenze (UNIFI) is the official Centre of Competence of the Italian Civil Protection for Remote Sensing and Geohazards (Directive of the Italian Prime Minister of 27 February 2004; Decree of the Head of the Italian National Civil Protection Department no. 252 of 26 January 2005); this achievement was confirmed five consecutive times: in 2007, 2011, 2014, 2017, 2020 respectively. A further confirmation was achieved for the biennium 2021-2022.
- During the 14th session of International Program on Landslides (IPL) Global Committee, Paris, UNESCO headquarters, on September 19th 2019, the Deputy Chairholder Prof. Nicola Casagli was nominated President of the ICL, while Prof. Veronica Tofani, Programm Coordinatoor of the Chair, has been elected vice president, both for the next mandate (2021-2023).

UNESCO CHAIR: Water-related Disaster Risk Reduction at University of Ljubljana:

- The Faculty of Civil and Geodetic Engineering, University of Ljubljana, hosting UNESCO Chair, is recognized as the World Centre of Excellence (WCoE) in Landslide Risk Reduction for 3 years (2020-2023) – ever since the first recognition in 2008.
- The Chair holder was elected to the Chairman of the Global Promotion Committee of the

International Programme on Landslides and the 2020 Kyoto Landslide Commitment (GPC/IPL-KLC) (starting January 1, 2022).

- The Faculty of Civil and Geodetic Engineering, University of Ljubljana is hosting the Slovenian National Committee of the UNESCO Intergovernmental Hydrological Program (IHP) (since 2019).
- The UNESCO Chair associate Dr Nejc Bezak was awarded Danubius Young Scientist Award 2021 for his excellent contributions in the field of hydrology by the Austrian Federal Ministry for Education, Science and Research (BMBFW) and the Institute for the Danube Region and Central Europe (IDM). Virtual ceremony, November 2021.
- The UNESCO Chair associate Dr Klaudija Lebar (b. Sapač) was awarded for her contributions in the field of hydrology by the Slovenian Association for Geophysics and Geodesy. Ljubljana, January 2022.
- Dr Mateja Klun was during the 27th ICOLD Congress elected as Chairperson of ICOLD Technical Committee ZX2, Young Engineers, June, 2022.
- Dr Nejc Bezak was elected as EUTOPIA Young Leaders Academy and received award from the University of Ljubljana for teaching and research achievements.

Amrita Vishwa Vidyapeetham:

- UNESCO Chair for Experiential Learning for Sustainable Innovation & Development: The United Nations awarded Amrita Vishwa Vidyapeetham its second UNESCO Chair – UNESCO Chair for Experiential Learning for Sustainable Innovation & Development. Through this new Chair, the university has been engaged in developing a comprehensive framework for academic engagement to build sustainable communities by designing a curriculum based on experiential learning. This curriculum has been enabling the academic community to acquire the knowledge, skills, attitudes and values necessary to implement sustainable solutions among vulnerable and rural communities during the period of 1 November 2020 to 31 October 2022 through activities such as weekly research seminars, workshops etc.

Croatian Landslide Group

- The Faculty of Civil Engineering, University of Rijeka and Faculty of Mining, Geology and Petroleum Engineering as Croatian Landslide Group, is recognized as the World Centre of Excellence (WCoE) in Landslide Risk Reduction for the period 2020-2023
- The Faculty of Civil Engineering, University of Rijeka and Faculty of Mining, Geology and Petroleum Engineering as Croatian Landslide Group organized 5th Regional Symposium in Adriatic Balkan region as a main activity of Adriatic-Balkan Network (ABN) of ICL in Rijeka, Croatia, 23-26 March 2022.

a) Education/Training/Research

(key education programmes and training delivered and research undertaken by the Chair during the reporting period, target group and geographical coverage)

<p>i) Education (leading to certificate)</p>	<p><u>Education leading to Ph. D</u></p> <p><i>Kyoto University (3 PhD):</i> Adapa Gautham Date obtained PhD: September 24, 2021 Field: Civil Engineering Institution: Graduate School of Engineering, Kyoto University Thesis title: Seismic response of embankment dams with different upstream conditions</p> <p>Anurag Sahare Date obtained PhD: September 24, 2021</p>
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<p>Field: Civil Engineering Institution: Graduate School of Engineering, Kyoto University Thesis title: Kinematic and inertial loading-based seismic assessment of pile foundations in liquefiable soil</p> <p>Xu Jiawei Date obtained PhD: September 24, 2021 Field: Civil Engineering Institution: Graduate School of Engineering, Kyoto University Thesis title: Evaluation of seepage and deformation of unsaturated slopes during post-shaking rainfall</p> <p><i>Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence (5 PhD)</i></p> <p><i>Ph.D thesis in Earth Sciences</i></p> <ul style="list-style-type: none"> • “Geo-environmental risk analysis for a sustainable local territorial management”. Candidate: Agnese Turchi. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti. Co-tutor: Dr. Federico Di Traglia • "Land monitoring through optical and radar remote sensing". Candidate: Tania Luti. Department of Earth Sciences, University of Florence. Tutor: Prof. Nicola Casagli • “Permafrost Deformation Monitoring and Interpretation Using InSAR Technique in Northeastern China and Aosta Valley Region, Italy”. Candidate: Monan Shan. Department of Earth Sciences, University of Florence. Tutor: Prof. Nicola Casagli • “Regional scale satellite monitoring for hydrogeological risks reduction”. Candidate: Roberto Montalti. Department of Earth Sciences, University of Florence. Tutor: Prof. Filippo Catani <p><i>PhD Thesis in the International Doctorate in Civil and Environmental Engineering</i></p> <ul style="list-style-type: none"> • “Large Wood dynamics in sharp river bends: experimental and numerical investigations”. Candidate: Lorenzo Innocenti. XXXIII Cycle – Co-tutoring with TU Braunschweig. Department of Civil and Environmental Engineering. Tutors: Prof Luca Solari <p><i>University of Ljubljana, Ljubljana, Slovenia (3 PhD):</i> Andrej Vidmar – PhD School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: Calibration of semi-distributed hydrological models Date of Certification: January 2021</p> <p>Klaudija Lebar – PhD School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: Influence of hydrometeorological and vegetation conditions on the dynamics of nitrate flushing Date of Certification: November 2021</p> <p>Matej Radinja – PhD School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: Automated modelling and design of urban stormwater control measures Date of Certification: June 2022</p> <p><i>Charles University, Prague, Czech Republic (6 PhD, examples with direct relation to landslides):</i> Gvoždíková P. – PhD</p>

<p>Title: Relationship among moisture flux anomalies, extreme precipitation, and floods in central Europe Date of Certificate : 25.3.2021</p> <p>Stemberk J. - PhD Title: Valley evolution of the Kladská Bělá river Date of Certificate : 1.12.2021</p> <p>Roháč J. – PhD Title: Experimental investigation of shear strength of soils from the Dobkovičky landslide Date of Certificate: 24.06.2021</p> <p><i>Amrita Vishwa Vidyapeetham:</i> PhD in Sustainable Development: The program on PhD in Sustainable Development took admission for 10 PhD students in the 2021 batch. PHD in Earth Science: 3 Students took admission in PhD in Earth Science.</p> <p><i>Croatian Landslide Group</i> <i>University of Rijeka, Rijeka, Croatia (1 PhD):</i> Dalibor Udovič – PhD School: Faculty of Civil Engineering, University of Rijeka, Rijeka, Croatia Title: Rockfall Risk Identification in Carbonate Rock Masses along the Transport Routes in Republic of Croatia Date of Certification: 19 July 2022</p> <p><i>University of Zagreb, Zagreb, Croatia (1 PhD):</i> Marin Sečanjanj – PhD School: Faculty of Civil Engineering, University of Zagreb, Zagreb, Croatia Title: Quantitative rockfall susceptibility assessment by integrating kinematic and statistical analyses Date of Certification: 06 Novemebr 2021</p> <p><i>Northeast Forestry University, China (1 PhD):</i> Zhichao Xu – PhD School: Faculty of Engineering technology, <i>Northeast Forestry University, China</i> Title: Study on the Influence of Geologic Methane Emission on Wildfire and Surface Deformation in Xiaoxing'anling Permafrost Region Date of Certification: 2022</p> <p><u>Education leading to Master’s Degree</u></p> <p><i>Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence:</i> <u>Education leading to Master’s Degree (55 MSc)</u></p> <p><i>Master Thesis in Geological sciences and technologies:</i></p> <ul style="list-style-type: none"> • " Techniques for analyzing the susceptibility to detachment of stone fragments in the masonry of Palazzo Medici-Riccardi and Palazzo Pitti”. Candidate: Ermanno Massini. Department of Earth Science, University of Florence. Tutor: Emanuele Intrieri. Co-tutor: Pierluigi Confuorto • “Wildfire-affected area analysis and detection methods”. Candidate: Martina Di Natale. Department of Earth Sciences, University of Florence. Tutor: Prof. Sandro Moretti.

- Co-tutor: Dr. William Frodella
- “Specific risk assessment for rapid landslides in the Valle D’Aosta”. Candidate Antonella Marinelli. Department of Earth Sciences, University of Florence. Tutor: Prof. Nicola Casagli
- “Meteorological modeling for the optimization of landslide risk scenario forecasting systems”. Candidate: Daniel Gialdini. Department of Earth Sciences, University of Florence. Relatore: Ascanio Rosi
- “Mitigation of the falling rocks risk along a motorway section”. Candidate: Federico Berlincioni. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-tutor: Dr. Luca Lombardi
- “Analysis and monitoring of the deformation phenomena affecting the centre of Pomarico (MT)”. Candidate: Agnese Innocenti. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Dott. Masimiliano Nocentini
- “Evaluating the Quincinetto rockslide hazard through multiparametric analysis”. Candidate: Flavia Febo. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutor: Dott. Tommaso Carlà
- “Runout models and real time monitoring integration for Ruinon landslide alerting on the SP29”. Candidate: Di Carlo Rosario Dario. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Dott. Tommaso Carlà
- “Analysis of LiDAR and photogrammetric data for the creation of hazard maps on natural walls equipped for sport climbing”. Candidate: Tommaso Beni. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli
- “Integration of modeling runout and monitoring using Doppler radar for the definition of Ruinon landslide’s rockfall risk scenarios”. Candidate: Roberto Rossi. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Dott. Tommaso Carlà, Dott. Massimiliano Nocentini
- “Experimentation of low cost GNSS networks aimed at monitoring landslides”. Candidate: Alessio Gatto. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Massimiliano Nocentini, Dott. Luca Innocenti
- “Mobile lidar surveys for hydrogeological risk evaluation and mitigation”. Candidate: Flavia Serafini. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Dott.ssa Elena Benedetta Masi
- “Numerical modelling of the Quincinetto rockslide”. Candidate: Giacono Ciabatti. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutor: Dott. Tommaso Carlà
- “Analysis of risk scenarios of Perarolo di Cadore landslide”. Candidate: Francesca Adreani. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Prof. Filippo Catani
- “Monitoring systems for landslide hazard scenario assessment at rupestrian cultural heritage sites in Georgia”. Candidate: Isabella Frullini. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. William Frodella, Dott. Daniele Spizzichino
- “Wildfire assessment: from field surveys to drone and satellite platform analysis. Implications on soil erosion and slope instability”. Candidate: Giacomo Lazzeri. Department of Earth Sciences, University of Florence. Tutor: Prof. Sandro Moretti. Co-tutors : Dr. William Frodella, Dr. Guglielmo Rossi
- “3D analysis of the kinematic mechanisms of instability affecting the monastery of Vardzia (Georgia)”. Candidate : Francesco Facchini. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-tutor: Dr. William Frodella
- “Spatial and temporal characterization of subsidence in the Municipality of Montemurlo (PO)”. Candidate: Lorenzo Bini. Department of Earth Sciences,

University of Florence. Tutor: Prof. Federico Raspini

- “Analysis of satellite radar monitoring data of soil deformations in the Veneto Region”. Candidate: Rebecca Mani. Department of Earth Sciences, University of Florence. Tutor: Prof. Federico Raspini
- “Definition and validation of the vulnerability from slow kinematic landslides in Italy”. Candidate: Francesco Poggi. Department of Earth Sciences, University of Florence. Tutor: Prof. Federico Raspini
- “Use of maximum entropy algorithms for the assessment of sinkhole susceptibility and risk in the Guidonia-Bagni di Tivoli plain”. Candidate: Paolo Sbarra. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti
- “Experimentation of methodologies for the definition of the risk deriving from collapses in the Valle d'Aosta region”. Candidate: Camilla Medici. Department of Earth Sciences, University of Florence. Tutor: Prof. Silvia Bianchini
- Multitemporal analysis and modeling of the water table in the Municipality of Florence”. Candidate: Filippo Battaglini. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti.
- “Hydrogeological numerical modeling for the design of an open circuit geothermal plant”. Candidate: Tommaso Casati. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti.
- “Rapid Mapping of Landslides Using Deep-learning with Optical Data and SAR”. Candidate: Lorenzo Nava. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti.
- “Analysis and modeling of filtration conditions and stability of embankment sections along the Florentine stretch of the Arno River”. Candidate: Gabriele Fibbi. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti.
- “GB-InSAR technology applied to sinkhole risk assessment: the case of Camaiore”. Candidate: Samuele Gregolon. Department of Earth Sciences, University of Florence. Tutor: Prof. Emanuele Intrieri
- “Quantitative assessment of the risk of slow kinematic landslides in the Arno river basin”. Candidate: Francesco Caleca. Department of Earth Sciences, University of Florence. Tutor: Prof. Filippo Catani.
- “Modeling of risk scenarios relating to the instability of the slopes aimed at improving the operational forecast of landslides”. Candidate: Greta Morreale. Department of Earth Sciences, University of Florence. Tutor: Dr. Samuele Segoni. Co-tutor : Dr. Veronica Tofani
- “Development of a system of thresholds for triggering pluvial landslides induced in Tuscany”. Candidate: Francesco Barbadori. Department of Earth Sciences, University of Florence Tutor: Dr. Samuele Segoni. Co-tutor : Dr. Ascanio Rosi
- “Definition through geophysical measurements of the thickness of the roofs for the purpose of slope stability”. Candidate: Andrea Stefano Giachetti. Department of Earth Sciences, University of Florence. Tutor: Dr. Samuele Segoni. Co-tutor : Dr. Veronica Pazzi
- “Multi-criterion parameterization of the geotechnical properties of soils in the territory of the Metropolitan City of Florence for the distributed and physically based modeling of the triggering of surface landslides”. Candidate: Nocentini Nicola. Department of Earth Sciences, University of Florence. Tutors: Dr. Samuele Segoni. Co-Tutors: Dr. Ascanio Rosi, Dr. Elena Masi

Master Theses in Civil Engineering and in Environmental Engineering

- “Geospatial Analysis of Water Consumption in Tuscany”. Candidate: Claudia De Lucia. Tutor: Prof. Chiara Arrighi. Co-tutors: Prof. Fabio Castelli
- “Validation of Sentinel-I soil moisture data for the purpose of Tuscany’s water balance”. Candidate: Giacomo Abrardo. Tutor: Prof. Fabio Castelli. Co-tutors: Prof. Chiara Arrighi

- “Analysis of risk scenarios induced by embankment breakages of Pistoiese Ombrone river”. Candidate: Scopetani Lorenzo. Tutor: Simona Francalanci. Co-tutors: Prof Enio Paris, Ingg. Leonardo Faggioli and Jacopo Guerrini
- “Levane dam raising: experimental and numerical study of flow processes”. Candidate: Morozzi Stefano. Tutor: Prof. Enio Paris. Co-tutors: Simona Francalanci, Sara Gabbrielli
- “Hydrological and hydraulic modeling of the Intermunicipal Structural Plan (PSI) of Valtiberina”. Candidate: Tosi Alessandro. Tutor: Simona Francalanci. Co-tutors: Prof. Enrica Caporali, Ing. Simone Galardini
- “Two-dimensional hydraulic modeling of woody debris transport in the urban reach of the Arno river in Florence”. Candidate: Iannuzzi Ivan. Tutor: Simona Francalanci. Co-tutors: Massimo Rinaldi, Enrico Stefanini, Lorenzo Innocenti
- “Experimentation on the physical model of drainage and dissipation works of Cepparello dam” Candidate: Cioni Filippo. Tutor: Simona Francalanci. Co-tutors: Proff. Luca Solari, Enio Paris, Ing. Lorenzo Lotti
- “Sediment transport of the Arno river in the urban reach of Florence”. Candidate: Niccolò Bertini. Tutor: Prof. Luca Solari. Co-tutors: Simona Francalanci, Enio Paris, Lorenzo Innocenti
- “Feasibility analysis of the implementation of Nature Based Solutions in presence of urban constraints in the district 5 of Florence”. Candidate: Martina Tonola. Tutor: prof. Enrica Caporali. Co-tutor: Prof. Chiara Arrighi, Dott. Tiziana Pileggi, Eng. Simona Cioli
- “Application of sustainable urban drainage systems for the mitigation of the pluvial flood risk in the Municipality of Florence”. Candidate: Damiano Giannelli. Tutor: prof. Enrica Caporali. Co-tutor: prof. Luca Solari, Eng. Matteo Isola, Eng. Simona Cioli
- “Early warning rainfall thresholds in small river basins through a distributed hydrological model”. Candidate: Simone Celima. Tutor: prof. Enrica Caporali. Co-tutor: prof. Chiara Arrighi, eng. Marco Lompi
- “Pluvial floods mitigation using LID-Low Impact Development technologies: a case study in Novoli (Florence)”. Candidate: Alessio Lenzini. Tutor: prof. Enrica Caporali. Co-tutor: prof. Luca Solari, Eng. Simona Cioli, Eng. Matteo Isola
- “Evaluation of Sustainable urban Drainage Systems (SuDS) role in run-off reduction: the case study of Florence (Italy)”. Candidate: Lisa Boccini. Tutor: prof. Enrica Caporali. Co-tutor: Prof. Chiara Arrighi, Eng. Matteo Pampaloni
- “Hydrological and hydraulic reevaluation of the earth dam spillway of Montalto Castle on Ambra River”. Candidate: Alessia Guerrini. Tutor: prof. Enrica Caporali. Co-tutor: prof. Luca Solari, Eng. Remo Chiarini, Eng. Serenza Ciofini
- Analysis of the instability processes in the archaeological area of the necropolis of Norchia and design of a mitigation intervention Candidate Sofia Loreti: DICAM – Department of Civil, Chemistry, Environmental and Material Engineering, University of Bologna. Tutors: prof. Daniela Boldini. Co-Tutor: Daniele Spizzichino

Master Theses in Geoengineering

- “Flood exposure of environmental assets”. Candidate: Gabriele Bertoli. Tutor: Prof. Chiara Arrighi. Co-tutors: Prof. Enrica Caporali
- “Best siting of Water Harvesting (WH) structures using GIS-based Multi-Criteria Analysis in Uttarakhand, India”. Candidate: Rajeshwari Bhookya. Tutor: prof. Giulio Castelli. Co-tutors: prof. Enrica Caporali
- “High-resolution analysis of soil moisture response along a steep forested hillslope” Candidate: Manogna Pachavai. Tutor: prof. Daniele Penna. Co-tutors: prof. Enrica Caporali
- “Impact of climate change scenarios on the hydrological ecosystem services of the upper Arno river basin”. Candidate: Jerome El Jeitany i. Tutor: prof. Enrica Caporali. Co-tutors: prof. Elena Bresci, Eng. Tommaso Pacetti

- “Modelling slope instability in the High City of Antananarivo (UNESCO Tentative site, Madagascar)”. Candidate: Gianluca Brocca. Tutor: Prof. Veronica Tofani. Co-tutors: Dr. Federico Di Traglia, Dr. William Frodella
- “Assessing the shallow and deep-seated instability of the NW flank of the Stromboli Volcano with Limit Equilibrium analysis”. Candidate: Luca Cassanego. Tutor: Prof. Veronica Tofani. Co-tutors: Federico Di Traglia, Lorenzo Borselli
- “The role of precipitation and groundwater levels in slope displacement patterns: the case study of Castagnola landslide (La Spezia, Italy)”. Candidate: Elisa Leotta. Tutors: Prof. Veronica Tofani. Co-Tutor: Prof. Sandro Moretti, Dr. Luca Tanteri
- “Assessment of landslide dam hazard at basin scale through geomorphic analysis and remote sensing data”. Candidate: Giulia Begliomini. Tutors: Prof. Veronica Tofani. Co-tutor: Prof. Simona Francalanci, Dr. Carlo Tacconi Stefanelli

University of Ljubljana, Ljubljana, Slovenia (17 Masters):

Agata Serwinska – MEng

School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia

Title: Use of the Rainfall Compound Analysis in the Process of the Design Discharge Estimation in Slovenia.

Date of Certification: 2022

Jasna Donevska – MEng

School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia

Title: Uncertainty Assessment of Flood Hazard Mapping.

Date of Certification: 2022

Filmon Ghebremichael – MEng

School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia

Title: Impact of Climate Induced Change in Flood Characteristics on Flood Damage.

Date of Certification: 2022

Pavan Kumar Yeditha – MEng

School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia

Title: Modelling the Impacts of Reservoir operation on River Floods: A case Study of Cauvery Basin in India.

Date of Certification: 2022

Magdalena Tasevska – MEng

School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia

Title: Earthquake and wave induced liquefaction - Case study Amantea (Calabria, Italy)

Date of Certification: 2022

Urška Maček – MEng

School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia

Title: The evaluation of the applicability of direct rainfall methods for determining flood areas.

Date of Certification: 2022

Mark Bryan Alivio – MEng

School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia

Title: The evaluation of flood damage caused by rising sea levels

Date of Certification: 2021

Steven Brazda – MEng

School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia

<p>Title: The snowmelt floods in relation to compound drivers in North America and Europe Date of Certification: 2021</p> <p>Marcos Julien Alexopoulos – MEng School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: The use of the reanalysis products for the hydrological rainfall-runoff modelling: Slovenian case studies Date of Certification: 2021</p> <p>David Krznar – MEng School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: The hydrological analysis of floods for the Krka River catchment Date of Certification: 2021</p> <p>Luka Drole – MEng School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: The conceptual design of renaturalization of a section of Ljubljanica river Date of Certification: 2021</p> <p>Matej Mešl – MEng School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: The impact of the nature based solutions for erosion hazard reduction in flood prone areas Date of Certification: 2021</p> <p>Jerneja Čehovin – MEng School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: The implementation of wave generator for determining wave characteristics and run-up on a sloped beach Date of Certification: 2021</p> <p>Anamarija Plestenjak – MEng School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: Maintenance and reconstruction of weirs on the case of Kamniška Bistrica Date of Certification: 2021</p> <p>Gregor Ivnik Dujovič – MEng School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: A plan for remediating the consequences of torrential flooding of the Tržiška Bistrica River between Slap and Jelendol Date of Certification: 2021</p> <p>Matevž Piry – MEng School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: Analysis of design discharge considering uncertainty Date of Certification: 2020</p> <p>Anita Zore – MEng School: Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia Title: The influence of rainfall interception on the soil erosion Date of Certification: 2020</p> <p><i>Charles University, Czech Republic (62 Master – examples with direct relation to landslides):</i></p>
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<p>Vláčilová K. - bachelor's degree: Integration of drainage measures in stream restoration projects. Application in the catchment area of the Klišský Brook.</p> <p>Balkhausen M. - bachelor's degree: Retreat of mountain glaciers from the Little Ice Age maxima in western Canada</p> <p>Břežná T. - bachelor's degree: Analysis of tourism in the archaeological site of Machu Picchu</p> <p>Lehký M - bachelor's degree: Asymmetry of valley slopes as an indicator of permafrost degradation</p> <p>Michalovič P. - Master's degree: Geomorphological development of the Prague area in the Quaternary as an essential phenomenon of structure and intensity of recent morphogenetic processes</p> <p>Draxlerová P. - Master's degree : Morphology, built and dynamics of selected blockfields at the Šumava Mts.</p> <p>Crhová L. - Master's degree: Long-term precipitation changes in Europe in different data sources</p> <p>Vilimová A. – Master's degree: Strength for short-term stability of unsaturated fine-grained soil with low plasticity</p> <p><i>National Central University, Chinese Taipei (1 PhD, 12 Master):</i></p> <p>Thi-Hong-Nhi Vuong (2022) Development and Application of Discontinuous Bi-Viscous Model to Mudslides, Landslide Tsunamis, and Local Scours.</p> <p>Nguyen Thanh-Tung (2022) Construct a 3D geological model of the Dalun Mountain, Taiwan</p> <p>Tran Huynh-Khoa (2022) Braking effect (velocity- strengthening) of Kaolinite under intermediate slip velocities</p> <p>Joni Fitra (2022) Landslide risk analysis subject to geological uncertainty – a viewpoint from a simplified model</p> <p>Wu, P-S (2022) Study on the relationship between high-angle reverse slope remediation strategy and its failure mechanism by centrifugal test and numerical model</p> <p>Chen, Y-H. (2022) Discussing the influence of geological model uncertainty on the sliding probability and block migration characteristics of the consequent slope-taking the 3.1k collapse of National Highway No. 3 in 2010 as an example</p> <p>Qiu, Y-Z (2022) Development of Deep learning and GAN applied to landslide prediction</p> <p>Chen, P-C. (2022) Fusion of Optical and Thermal Imagery for a Long-term Stability Application to Slopes Monitoring and Evaluation</p> <p>Lin, J-C (2022) Development and Testing of Small Corner Reflector for Synthetic Aperture</p>
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<p>Radar for Slope Monitoring</p> <p>Won, W-J (2022) Exploring the Uncertainty of Geological Model and Material Parameters for Slope Stability Analysis</p> <p>Muhammad Azhar (2022) Exploring the Uncertainty of Geological Model and Material Parameters for Slope Stability Analysis</p> <p>Tang, H-T (2022) Examination of influence factors for hysteresis between soil water content and electrical conductivity measured by TDR</p> <p>Farid Nur Bahti (2021) Parametric Study of the PS- and SBAS-InSAR Processing for Landslide Monitoring – Ali-Shan as Case Study</p> <p><i>Shimane University, Japan (1Master):</i></p> <p>1) Shin-ya Yamamoto: Effects of cedar root system on slope stability in Sambe Experimental Forest of Shimane University: evaluation of physical and mechanical properties and spatial distribution of the roots</p> <p><i>Northeast Forestry University, China(6 Master):</i></p> <p>Tao Yang – MEng School: Faculty of Civil Engineering, Northeast Forestry University, China Title: Study on the Influence of Gravel Pile Group on the Hydrothermal Condition and Deformation of Frozen Marsh Highway Foundation Date of Certification: 2021</p> <p>Mengdi Liu – MEng School: Faculty of Civil Engineering, Northeast Forestry University, China Title: Stability analysis of sandstone covered mudstone cutting slope induced by rainfall Date of Certification: 2021</p> <p>Shuanglin Wang – MEng School: Faculty of Civil Engineering, Northeast Forestry University, China Title: Permafrost degradation characteristics and foundation settlement prediction along Bei-Hei Expressway Date of Certification: 2020</p> <p>Jiawei Wu – MEng School: Faculty of Transportation, Northeast Forestry University, China Title: Analysis on the influence of rainfall on the stability of the embankment of section K177+550 of Beihei Highway Date of Certification: 2022</p> <p>Wanying Wei – MEng School: Faculty of Transportation, Northeast Forestry University, China Title: Analysis on the influence of rainfall on the stability of the embankment of section K177+550 of Beihei Highway Date of Certification: 2022</p> <p>Shengtang Jiang – MEng School: Faculty of Transportation, Northeast Forestry University, China Title: Study on seismic behavior of simply supported continuous box girder bridge in cold regions during construction Date of Certification: 2022</p>
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	<p><i>Croatian Landslide Group</i> <i>University of Rijeka, Rijeka, Croatia (7 Master Thesis)</i></p> <p>Gorana Galić – Master’s Degree Title: Analysis of Retaining Construction Impact on Stability of Slope in Small-Scale Model Date of Certification: 28 September 2022</p> <p>Anita Pušelja – Master’s Degree Title: Slope Instability Development in Small-Scale Model Exposed to a Rainfall Date of Certification: 28 September 2022</p> <p>Nikolina Drpić – Master’s Degree Title: Behaviour of small-scale slope under dynamic loading at 1g conditions Date of Certification: 28 September 2022</p> <p>Nikola Trbović – Master’s Degree Title: Three dimensional stability analysis of the Špičunak landslide Date of Certification: 20 July 2022</p> <p>Martina Turković – Master’s Degree Title: Cyclic Behaviour of Uniform Sand Under Drained and Undrained Conditions at Low Confining Stress Date of Certification: 16 November 2021</p> <p>Magdalena Špoljarić – Master’s Degree Title: Determination of the water retention curve and coefficient of permeability of sand Date of Certification: 08 March 2022</p> <p>Toni Fabijanić – Master’s Degree Title: Stability of Slopes in Scaled Landslide Model Date of Certification: 28 September 2021</p>
<p>ii) Training (short term)</p>	<p><i>Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence:</i></p> <ul style="list-style-type: none"> • Webinar: "Satellite radar monitoring of soil deformations in the Aosta Valley region", organized in collaboration with the Order of Geologists of the Aosta Valley and the Geological Activities Structure of the Autonomous Region of the Aosta Valley, November 24, 2020; • Webinar: “Protecting the population from natural risks - Prevention systems and models of responsibility”, organized in collaboration with the Department of Civil Protection, 9 December 2020; • Webinar: “Satellite radar monitoring of soil deformations in the Veneto Region”, organized in collaboration with the Soil Defense Department of the Veneto Region, 12-26 January 2021; • Webinar: “Study meeting for the presentation of the volume Science, law and criminal trial in the age of risk”, organized by the Foundation for Forensic Training of the Florence Association, in collaboration with the Chair, the Department of Civil Protection, Department of Legal Sciences of the University of Florence, Institute of Geophysics and Volcanology, National Institute of Oceanography, 22 January 2021; • Webinar: "Prevention systems and models of responsibility in the management of natural risks", organized by the Department of Law of the University of Ferrara (Criminal Chamber of Ferrara), in collaboration with the Chair, the Department of Civil Protection, with the patronage of the University of Ferrara, Forensic Foundation of Ferrara, National Institute of Geophysics and Volcanology, Center, CIMA

	<p>Foundation, National Institute of Oceanography, February 5, 2021;</p> <ul style="list-style-type: none"> • Webinar: “Satellite Radar Monitoring of the deformations of the land of the Veneto Region”, organized by the Order of Geologists of the Veneto, in collaboration with the Chair, the Protection and Security of the Territory, Soil Defense Department - U.O. Geology of the Veneto Region, April 21-28, 2021; • Webinar: “Florence and the flood: Engineering, Research and Resilience”, organized in collaboration with the Chair and the University of Calgary, (Canada), August 6, 2021; • LARAM (LAndslide Risk Assessment and Mitigation) International School 2021. September 6-17, 2022. Salerno (Italy) (on-line mode). • Field seminar: “Application of close-range remote sensing techniques for landslide hazard assessment and implementation of nature-based solutions in the framework of the management plans of Georgian rock-carved cultural heritage sites: an update”, Georgia 21-25 October 2021; • 1st Piero Gazzola summer school on rock mechanics applied to CH conservation and protection. (http://eng.cu.edu.eg/en/researchprojects/). Organized jointly by Cairo University, Academy of Science and Technology, Egypt, Sapienza University of Rome, the Italian Institute for Culture in Cairo and the Chair, Cairo 14-21 May 2022. • LARAM (LAndslide Risk Assessment and Mitigation) International School 2021. September 6-17, 2021. Online School. • LARAM (LAndslide Risk Assessment and Mitigation) International School 2022. September 5-16, 2022. Salerno (Italy) (hybrid mode). <p><i>UNESCO CHAIR on Water-related Disaster Risk Reduction at University of Ljubljana</i> organized an online course on “R Program use in hydrology” for undergraduates at UL FGG, Ljubljana, Slovenia, November 2021.</p> <p><i>Amrita Vishwa Vidyapeetham:</i></p> <ul style="list-style-type: none"> • Community Engagement in Chandmari Sikkim India: A community engagement program on “Landslide awareness” and “Landslide early warning system established by Amrita Vishwa Vidyapeetham in Chandmari region of Gangtok, Sikkim” was organized in the Chandmari community twice in 2021 Dec and July 2022. . A team of Sr. Scientist and landslide experts from Amrita University conducted the meeting. Awareness was created about the natural vulnerability of landslides in Sikkim. An elaborate presentation was made on landslide precursors and the Do’s and Don’t’s during a landslide. The functional aspects of Amrita’s three-level early warning system is explained in terms of, (i) how the warnings were delivered and (ii) the zone of influence of each level of warning, etc has been conveyed to the people. It was a highly interactive session, where residents shared their experiences of the ‘precursors’ they noticed during landslides. The local people were also sharing the problems that they were facing in the community <p><i>National Central University, Chinese Taipei:</i></p> <ul style="list-style-type: none"> • Course: A course on landslides is started during the academic year 2020. This course is designed based on theoretical slope stability analysis, so that the students' investigation of the soil and rock slope, planning, analysis, monitoring, treatment countermeasures Theory and Applications, consistency of understanding. <p><i>Croatian Landslide Group</i></p> <ul style="list-style-type: none"> • 1st Workshp on Landslide Physical and Numerical Modelling, Faculty of Civil Engineering University of Rijeka, 23 March 2022, held as a hybrid Workshop, 55 participants from 7 countries. • 12nd Workshop on Landslide Physical and Numerical Modelling, Faculty of Civil Engineering University of Rijeka, 30 August 2022, held as a Hybrid Workshop, 31
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	participants from 6 countries.			
iii) Research	The main and common research activities of this network are the projects of the International Programme on Landslides (IPL) and also activities of ICL World Centres of Excellence (WCoEs). The list of IPL project and WCoEs are presented here.			
IPL-106-2	International Summer School on Rockslides and Related Phenomena in the Kokomerren River Valley, Tien Shan, Kyrgyzstan	Russia	Alexander Strom	2008 -
IPL-112	Landslide mapping and risk mitigation planning in Thailand	Thailand	Saowanee Prachansri	2009 -
IPL-155	Determination of soil parameters of subsurface to be used in slope stability analysis in two different precipitation zones of Sri Lanka.	Sri Lanka	A. A. Virajh Dias	2010 -
IPL-157	Dynamics of subaerial and submarine megaslides	Japan	Kyoji Sassa	2010 -
IPL-158	Development of Community-based Landslide Early Warning System	Indonesia	Teuku Faisal Fathani	2009 -
IPL-159	Development of Education Program for Sustainable Development in Landslide Vulnerable Area through Student Community Service.	Indonesia	Dwikorita Karnawati	2009 -
IPL-165	Development of community-based landslide hazard mapping for landslide risk reduction at the village scale in Java, Indonesia	Indonesia	Dwikorita Karnawati	2010 -
IPL-167	The effect of freezing-thawing on the stability of ancient landslide of North-Black highway	China	Wei Shan	2009 -
IPL-181	Study of slow moving landslide Umka near Belgrade, Serbia	Serbia	Biljana Abolmasov	2012 -
IPL-191	Landslide hazard zonation in Carpathian region of Ukraine using GIS	Ukraine	Yakovliev Yevhenii, Oleksandr M. Trofymchuk	2015-

IPL-192	Development of post-earthquake rainfall induced landslide (PERIL) hazard mitigation framework	USA and Nagendra Sitoula, Nepal	Binod Tiwari	2015-
IPL-196	Development and applications of a multi-sensors drone for geohazards monitoring and mapping	Italy	Veronica Tofani	2015-
IPL-197	Low frequency, high damaging potential landslide events in “low risk” regions – challenges for hazard and risk management	Czech Republic	Jan Klimeš	2015-
IPL-198	Multi-scale rainfall triggering models for Early Warning of Landslides (MUSE)	Italy	Filippo Catani	2015-
IPL-199	The effect of root systems in natural slope erosion protection in the hill country of Sri Lanka	Sri Lanka	Pvip Perera	2015-
IPL-200	An assessment of the rock fall susceptibility based on cut slopes adjacent to highways and railways	Sri Lanka	H.M.J.M.K. Herath	2015-
IPL-202	Ripley landslide monitoring project (Ashcroft, BC, Canada)	Canada	Peter Bobrowsky	2016-
IPL-203	Analysis and identify of landslides based on species distribution and surface temperature difference	China	Ying Guo	2016-
IPL-208	Landslide disaster risk communication in mountain areas	Mexico	Irasema Alcántara Ayala	2016-
IPL-210	Massive landsliding in Serbia following Cyclone Tamara in May 2014	Serbia	Biljana Abolmasov	2016-
IPL-212	The construction of a global database of giant landslides on oceanic island volcanoes	Czech Republic	Matt Rowberry	2016-
IPL-216	Diversity and hydrogeology of mass movements in the Vipava valley, SW Slovenia	Slovenia	Timotej Verbovšek	2016-
IPL-219	Rockfall hazard identification and rockfall protection in the coastal zone of Croatia	Croatia	Željko Arbanas	2017-

IPL-220	Kosovnjek landslide monitoring project (Zagreb, Croatia)	Croatia	Martin Krkač	2017-
IPL-221	PS continuous streaming for landslide monitoring and mapping	Italy	Federico Raspini	2017-
IPL-226	Studying landslide movements from source areas to zone of deposit on using a deterministic approach	Slovenia	Mateja Jemec Auflič	2017-
IPL-227	Development of a web based landslide information system for the landslides in Sri Lanka	Sri Lanka	K M Weerasinghe	2017-
IPL-230	Evolution-based key technology of landslide prevention in Three Gorges Reservoir region, China	China	Huiming Tang	2018-
IPL-231	Landslide mechanism considering Soil-Water-Vegetation coupling effects	China	Su Lijun	2018-
IPL-232	Investigations on landslides in Nilgiris, Tamil Nadu, India	India	S. S. Chandrasekaran	2018-
IPL-233	Archival Records and Documentation of Some Socio-economically Significant Landslides in India	India	Surya Parkash	2018-
IPL-234	Development of landslide detection system based on rainfall prediction and seismic aspect in Banjarnegara Region, Centre of Java, Indonesia	Indonesia	Dr. Munawar	2018-
IPL-235	EO4GEO – Towards an innovative strategy for skills development and capacity building in the space geo-information sector supporting Copernicus User Uptake	Italy	Luca Guerrieri and Daniele Spizzichino	2018-
IPL-236	A multiparametric field laboratory for the investigation on the relationship between material behavior and morphodynamic of landslides	Italy	Andrea Segalini	2018-

IPL-237	The role of time-dependent rock mass deformations and landscape evolution rates as predisposing factors for massive rock slope failures	Italy	Carlo Esposito	2018-
IPL-238	Landslides Threatening Russian Cultural Heritage Sites	Russia	D.N. Gobotsov	2018-
IPL-239	Detailed Interpretation and Evaluation of Dynamic Model Behavior of Pothupitiya Landslide Potential Area (Combined Ground Water and Slope Stability Dynamic Model under PC Raster environment)	Sri Lanka	A A Virajh Dias	2018-
IPL-240	Global Lecture Series – Recent Advances on Landslide Analysis and Remediation	USA	Binod Tiwari	2018-
IPL-242	Studies of disasters related to natural and anthropogenic landslides in Brazil – Characterization of landslides triggers and impacts as a tool to rapid risk analysis	Brazil	Renato Eugenio de Lima	2019-
IPL-243	Wildfire-related landslides in Italy: triggering mechanisms and propagation processes	Italy	Giuseppe Mandrone	2019-
IPL-244	Evolution mechanism and control of landslides induced by sudden rainstorm	China	Huiming Tang	2019-
IPL-245	Laboratory physical modeling of rainfall, slope deformation and landslides triggering	Italy	Giovanna Capparelli	2019-
IPL-246	Classification and spatial distribution of landslides on dumps in brown coal basin in the Czech Republic	Czech Republic	Martin Veselý	2019-
IPL-248	Innovation in slow-moving landslide risk assessment of roads and urban sites by	Italy	Dario Peduto	2019-

		combining multi-sensor multi-source monitoring data			
IPL-249		Development of early warning technology of rain-induced rapid and long-travelling landslides in Sri Lanka	Japan, Sri Lanka	Kazuo Konagai & Asiri Karunawardena	2019-
IPL-250		Investigation of Ecohydrological Processes on Soil-root Mechanical Properties and Landslide Susceptibility in the Steep Terrain Regions, Eastern Tibetan Plateau	China	Peng Cui	2020-
IPL-251		Advancing Landslide Early Warning Systems using Machine Learning & Artificial Intelligence Techniques	India	Maneesha Vinodini Ramesh	2020-
IPL-252		Landslide monitoring with cost-effective GNSS devices and development of a new equipment (LZER0) for real-time applications	Italy	David Zuliani	2020-
IPL-253		Integrated Landslide Disaster Risk Research in Mexico	Mexico	Irasema Alcantara-Ayala	2020-
IPL-254		Ukraine cultural heritage objects within landslide hazardous sites	Ukraine	Oleksandr M. Trofymchuk	2020-
IPL-202 extension		Slow-moving landslide monitoring project (Ashcroft, BC, and Russell, MN, Canada) – extension of IPL-202	Canada	David Huntley	2022-
IPL-255		Monitoring rock glaciers kinematic process using SAR interferometry and offset-tracking in Alpine environment	China and Italy	Quingkai Meng and Federico Raspini	2022-
IPL-256		Investigation of landslide initiation caused by rainfall infiltration using small-scale	Croatia	Josip Peranić	2022-

		physical and numerical modeling (ILIRIM)			
IPL-257		Optimisation of landslide susceptibility assessment for land-use planning in Croatia: from national to local scale	Croatia	Sanja Bernat Gazibara	2022-
IPL-258		Slope stability in vineyards with different management practices (Acronym: WINESLIDES)	Italy	Filippo Catani	2022-
IPL-259		Landslide Risk assessment in AIUla Archaeological sites – Kingdom of Saudi Arabia	Italy	Claudio Margottini	2022-
IPL-260		Landslide Risk assessment in the High City of Antananarivo	Italy	William Frodella	2022-
IPL-261		World-wide-web-based Landslide Observatory (W3bLO)	Slovenia	Matjaž Mikoš	2022-
IPL-262		Deciphering the sensitivity of rock faces to climatic changes and freeze-thaw cycles in permafrost-free regions	Slovenia	Mateja Jemec Aulič	2022-
IPL-263		Societal and Environmental Determinants of Landslide Risk Perception towards Landslide Disaster Risk Reduction; Case Study of Athwelthota Landslide, Baduraliya, Kaluthara, Sri Lanka.	Sri Lanka	N. N. Katuwala	2022-
IPL-264		Study on Suitable Tools for Modeling and Analysing Rain Induced Slope failure in Sri Lankan Residual Soil	Sri Lanka	S S I Kodagoda	2022-
IPL-265		Review of Rockfall Trajectories of Cut Slopes of Roads Using a Distribution Model Approach	Sri Lanka	Nimani Kulathilake	2022-

IPL-266	Climate Change-Induced Landslide Hazard Assessment – for Aiding Climate Resilient Planning for Road Infrastructure.		Thailand	Peeranan Towashiraporn	2022-
IPL-267	The Collaboration of debris flow early warning system between Vietnam and Taiwan		Vietnam and Chinese Taipei	Nguyen Quoc Dinh and Chih-Chung Chung	2022-
List of ongoing the Word Centre of Excellence on Landslide Disaster Reduction (WCOE) for 2020-2023					
1	Slow moving translational landslides in argillaceous soils and weak rocks	Mi□hael T. Hendry	Canada	University of A□berta	
2	Formation mechanism research, disaster warning, and universal education of Cold Regions Landslide	Wei Shan	China	Research Center of Cold Regions Landslide	
3	Landslide Modeling: From Physical to Phenomenological Models	Željko Arbanas, Snježana M. Arbanas	Croatia	Croatian Landslide Group	
4	Community centered landslide disaster risk reduction in changing climate, continuation	Josef STEMBERK	Czech Republic	Institute of Rock Structure and Mechanics Czech Academy of Sciences & Charles University, Faculty of Science	
5	Documentation, Training and Capacity Enhancement on Landslides Risk Reduction and Resilience	Surya Parkash	India	National Institute of Disaster Management (NIDM), Ministry of Home Affairs, Government of India, New Delhi	
6	Internet of Things (IoT) for landslide disaster risk reduction	Maneesha V Ramesh	India	Amrita Vishwa Vidyapeetham, Amritapuri campus	
7	Development of risk reduction strategy and technological innovation for landslide mitigation	Teuku Faisal Fathani	Indonesia	Universitas Gadjah Mada	
8	Development of multidisciplinary and integrated methodologies for mitigating geological risks	Francesca Bozzano	Italy	CERI - Centro di Ricerca Previsione, Prevenzione e Controllo dei Rischi Geologici (Research Centre on Geological	

				risks) – Sapienza Università di Roma
9	Advanced Technologies for Landslides (ATLaS)	Nicola Casagli	Italy	UNESCO Chair for the prevention and the sustainable management of geo-hydrological hazards, University of Firenze (UNIFI)
10	Integrated research on landslide disaster risk	Irasema Alcántara-Ayala	Mexico	Institute of Geography, National Autonomous University of Mexico (UNAM)
11	Landslides in Weathered Heterogeneous Sedimentary Rock Masses such as Flysch	Matjaž Mikoš	Slovenia	University of Ljubljana, Faculty of Civil and Geodetic Engineering (UL FGG)
12	International Training Course on Slope Land disaster Reduction	Louis Ge	Chinese Taipei	Department of Civil Engineering, National Taiwan University
13	National Slope Master Plan, method of certification heritage objects in hazardous landslide sites	Oleksandr Trofymchuk	Ukraine	The Institute of Telecommunication and Global Information Space (ITIGS) of the National Academy of Science of Ukraine (NASU), Research Institute of Building Constructions (RIBC)
14	Developing Model Policy Frameworks, Standards, and Guidelines on Landslide Disaster Reduction	S. S. I. Kodagoda	Sri Lanka	Central Engineering Consultancy Bureau
15	Research on landslide initiation mechanism based on physical model	Katsuo Sasahara & Asiri Karunawardena	Japan & Sri Lanka	The Japan Landslide Society & National Building Research Organisation
16	Bridging Science, Policies, and Partnership for Landslide Risk Management	Hans Guttman	Thailand	Asian Disaster Preparedness Center (ADPC)
17	Central Asia Rockslide Inventory. Compilation, Analysis and Training	Alexander Strom	Russia	JSC "Hydroproject Institute"
18	Harmonization of Landslides Data and National Authorities Capacity Building for Landslide Risk Reduction	Biljana Abolmasov	Serbia	University of Belgrade, Faculty of Mining and Geology

	- continuation			
19	Landslide Susceptibility Map Assessment Base on Climatological Changes Using Geographic Information Systems	Ir. Hj. Zulkifly Bin A. Ghani	Malaysia	Slope Engineering Branch, Public Work Department Malaysia
<p><i>Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence:</i></p> <ul style="list-style-type: none"> • Re-HeED - Reframing Heritage Education in Egypt. Erasmus+ KA2 Cooperation for innovation and the exchange of good practices. • Erasmus + KA 107 - Scientific-cultural collaboration with Ilia State University (Georgia), with the contribution of ISPRA (Higher Institute for Environmental Protection and Research). • Horizon 2020 funded projects: <ul style="list-style-type: none"> - LINKS (Strengthening Links between Technologies and Society for European Disaster Resilience; http://links-project.eu) - PassPORT- Operational Platform managing a fleet of semi-autonomous drones exploiting GNSS high Accuracy and Authentication to improve Security & Safety in port areas; https://www.euspa.europa.eu/operational-platform-managing-fleet-semi-autonomous-drones-exploiting-gnss-high-accuracy-and); • ROMERO (Robots for Extreme Environments; https://www.romero-esmera.it/), an ESMERA (Boosting Robotics Innovation) European Consortium-funded project: • EUSATfinder, a European SME Robotics Application-funded project. • EGMS RASTOOL (European ground motion risk assessment tool), an ECHO EU-funded project. • Copernicus European Ground Motion (EU-GMS; https://land.copernicus.eu/pan-european/european-ground-motion-service), funded by the European Environment Agency (EEA). • European Space Agency (ESA)-funded projects: <ul style="list-style-type: none"> - PATHFINDER (PNT as A Technology to support drones' BVLOS scenarios for preventive monitoring and First responder missions); - G-Class Hydroterra (an Earth Explorer mission for Water Cycle Science). • Other relevant projects: NEXUS-NESS: NEXUS Nature Ecosystem Society Solution Fair and Sustainable Resource Allocation Demonstrator of the Multiple WEF E Nexus Economic, Social and Environmental Benefits for Mediterranean Regions”, program PRIMA - Partnership for Research and Innovation in the Mediterranean Area - Section 1 (06/2021-05/2024). • In November 2020, the "Project of Introducing Talents of Discipline to Universities" presented by the State Key Laboratory of Geohazard Prevention and Geoenvironment Protection (SKLGP) of the Chengdu University of Technology was approved and funded as part of the Chinese program 111 of the Ministry of Chinese education. This project is aimed at networking, training and capacity building activities. It will be attended by associates of the UNESCO Chair and other researchers and professors from important foreign institutions and recognized worldwide as experts in issues relating to landslide risk assessment. As part of this project, remote thematic seminars will be held for students, doctoral students and young researchers on a weekly basis (SKLGP Thursday seminars) and workshops were organized. • The Chair participated as leader of Task 7 “Landslide Scenario assessment” in the World Bank funded project: (SFRARR) “Strengthening Financial Resilience and 				

Accelerating Risk Reduction in Central Asia”, Quantification of Regional Disaster Risk and Capacity Building on Risk Identification.

- The Chair also participates in several regional and national projects, funded by the Italian Ministry of Research and Education (MIUR), by the National Civil Protection Department, as well as by several regional and national governments and agencies, such as the Italian Space Agency (ASI).

UNESCO Chair at University of Ljubljana:

- DAREFFORT Danube River Basin Enhanced Flood Forecasting Cooperation (2018 – 2021) INTERREG Danube Transnational Programme.
- LAND4FLOOD: Natural Flood Retention on Private Land (2017–2021) COST Action.
- DAMOCLES: Understanding and modeling compound climate and weather events (2018–2022) COST Action.
- BORIS: Cross border risk assessment for increased prevention and preparedness in Europe (2021-2022) EU project.
- EU Horizon project.
- Rainfall interception experimentation and modelling for enhanced impact analysis of nature-based solutions (2021-2023) CELSA project.
- Evaluation of intelligent learning techniques for prediction of hydrological data: useful case studies in China and Slovenia (2018-2020) Bilateral project Slovenia – China.
- Validation of different rainfall data in the form of reanalyses for hydrological modelling in Slovenia (2021-2022) Bilateral project Slovenia – Germany.
- Deciphering the sensitivity of rock faces to climate change and freeze-thaw cycles in areas without permafrost (2021-2024) National research project.
- Erosional processes on coastal flysch cliffs and their risk assessment (2020-2023) National research project.
- Development of a methodology for computing flood waves on the basis of extreme rainfall events (2021-2023) National targeted research project.
- Monitoring of flexible net barriers as a debris-flow mitigation measure (2021-2022) Applied research project.
- Hydrological study related to the planning of the hydropower plants on the middle Sava River reach in Slovenia (2021-2022). Applied research project.
- Sediment management in Slovenia (2021-2022). Applied research project.

Croatian Landslide Group, UNIRI-GF, UNIZG-RGNF:

- Physical Modelling of Landslide Remediation Constructions Behaviour Under Static and Seismic Actions, Croatian Science Foundation-funded project (2018-2022)
- Research of Rockfall Processes and Rockfall Hazard Assessment, University of Rijeka-funded project (2019-2021)
- Methodology Development for Landslide Susceptibility Assessment for Land-Use Planning Based on LiDAR Technology, Croatian Science Foundation-funded project (2020-2024)
- Applied Landslide Research for Development of Risk Mitigation and Prevention Measures, EU-funded project (2020-2023)

Institute of Rock Structure and Mechanics, Czech Academy of Sciences:

- Maintenance of global database of mega landslides on volcanic islands.
- Sharing of the landslide occurrence database for the Czech Republic with the NASA global landslide database.
- Preparation and presentation of public exhibition “Life in Earth cracks” dedicated to landslide risk.
- Development and implementation of low-cost sensors for landslide monitoring e.g. in

	<p>Peru, Czech Republic.</p> <p>Charles University:</p> <ul style="list-style-type: none"> • Research of GLOFs (Glacial Lake Outburst Floods) with respect to landslides – case studies, hazard and risk evaluation • Case studies in landslide risk areas and rainfall threshold analysis • Influence of thermo-hydro-mechanical coupling on slope stability under climate change <p>Landslide group in National Central University, Chinese Taipei:</p> <ul style="list-style-type: none"> • The Collaboration of debris flow early warning system between Vietnam and Taiwan • Preliminary Evaluation of Optical Fiber Sensors for Distributed Strain Measurement through Landslide Physical Modelling • Development and validation of multi spatial-temporal scale monitoring and data fusion for rock slope early warning. <p>Institute of Geography, National Autonomous University of Mexico (UNAM):</p> <ul style="list-style-type: none"> • UNDERSTAND-LA: Communities of practice for understanding landslide disasters and risk. • MILADERA, National Strategy for the Reduction of Risk due to Instability of Slopes, CENAPRED. • Landslide disaster risk perception and communication.
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b) Conferences/Meetings

(key conferences and meetings organized by the Chair or to which its Chairholder contributed)

i) Key conferences and workshops hosted by the Chair

1. The ICL-IPL Virtual Conference on 2- 6 November 2020 including the Launching Session of Kyoto Landslide Commitment 2020 (05 November 2020). As the result of this conference, the Kyoto Landslide Commitment 2020 for global promotion of understanding and reducing landslide disaster risk was launched with 90 signatories including UNESCO. Kyoto University, many of ICL members. The network of the UNITWIN-UNESCO/KU/ICL cooperation programme was a core of this initiative.
2. 2022 IPL-KLC online Symposium on 15-16 March 2022
 - Session 1 : 8:00-12:00 AM on 15 March 2022
17 New IPL Project proposal session.
 - Session 2 : 8:30-10:50 AM on 16 March 2022
Ongoing IPL project presentation session
Progress report of 10 ongoing IPL projects were presented
 - Session 3 : 22:00-23:00 15 March (PST), 06:00-07:00 16 March (CET),
14:00-15:00 16 March (JST)
Global Promotion Committee of the International Programme on Landslides and Kyoto Landslide Commitment
14 New IPL projects were approved by the committee and obtained the ongoing status.
3. The Fifth World Landslide Forum (WLF5) on 2-6 November 2021 at the Kyoto International Conference Center, Japan. A High-level panel discussion “Review of KLC2020 and the way forward” was organized on 3 November 2021. At the end of the panel discussion, **Launching Declaration** of the ICL Open Access Book Series “Progress in Landslide Research and

Technology (*P-LRT*)” for the Kyoto Landslide Commitment 2020 was adopted by the panelists and participants of WLF5. The founding issues of P-LRT have been edited and will be published within the year of 2022.

Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence

- 5th World Forum on landslides (WLF5), which due to the COVID-19 pandemic was held in mixed virtual and in presence-mode from November 2-6, 2021, in Kyoto (Japan). In particular, the UNESCO Chair coordinated the activities of Theme 3: Monitoring and early warning of landslides.
- 6th World Landslide Forum (WLF6), which will be held in Florence from 14th to 17th November 2023. The Forum is entitled “Landslide Science for Sustainable Development” and is jointly organized by the by the International Consortium on Landslides (Kyoto, Japan), the International Programme on Landslides (IPL) and the UNESCO Chair on Prevention and Sustainable Management of Geohydrological Hazards at the University of Florence (<https://wlf6.org/>).
- 15th International Symposium on River Sedimentation, that will be held in Florence, from the 5th to the 8th of September 2023 (www.isrs2022.it).

UNESCO Chair on Water-related Disaster Risk Reduction at University of Ljubljana:

- 2021, May 31 – June 2. Bergen (Norway). 14th INTERPRAEVENT Congress.
- 2020, November 16. Ljubljana (Slovenia). Seminar: “Influence of hydro-meteorological and vegetation conditions on nitrate-nitrogen leaching dynamics”. Held by Klaudija Sapač – PhD student at UL FGG.
- 2022, January 19. Ljubljana (Slovenia). Seminar: “Optimization of Early Seepage Detection in Embankments using a distributed temperature system based on fiber optic sensing”. Held by Yasser Ghafoori – PhD student at UL FGG.
- 2022, February 11. Ljubljana (Slovenia). Inauguration lecture: “Variability of extreme hydrologic events and their impact on design discharges”. Held by Mojca Šraj – Professor at UL FGG.
- 2022, May 17. Ljubljana (Slovenia). Seminar: “Dynamic characteristics of soft sediments of the Ljubljana Moor. Held by Timotej Jurček – PhD student at UL FGG.
- 2022, August 31. Ljubljana (Slovenia). Seminar: “Impact of seismic shaking in triggering instability at marginalized urban settlement”. Held by Binod Tiwari – Professor at California State University in Fullerton.

ii) Other conferences/organizational activities undertaken by the Chairholder

UNESCO CHAIR on Prevention and Sustainable Management of Geo-hydrological Hazards of the University of Florence

- Webinar: “Doing research in the days of COVID-19. The situation of Engineering Geology” organized by Italian Association of Engineering and Environmental Geology (AIGAA) and March 3, 2021;
- Webinar “The ANDROMEDA project: new methods of forecasting surface landslides and floods. Speech: Hybrid methodologies based on rainfall thresholds to improve the prediction of surface landslides”, December 12, 2021;
- Webinar “Earth Geo-spatial observation”, organized by Earth Technology Expo, 5 March 2021;
- Congress “EGU General Assembly 2021”, organized by European Geophysical Union (EGU), online, 19-30 April 2021;
- Seminar " Study and monitoring of slope instability phenomena through remote techniques", organized by Italian Association of Engineering and Environmental Geology (AIGAA) and

National Council of Geologists (CNG), 18 June 2021;

- Conference "Geo-spatial observation of the earth. Satellites, scientific instruments and technologies made in Italy in orbit for the control of the territory and the reduction of natural risks ", organized by Earth Technology Expo, Firenze, October 14th, 2021
- VII National Congress of the Italian Association of Engineering and Environmental Geology (AIGAA), September 2021 (Lecco, Italia)
- International Conference Daylighting Rivers: Inquiry Based Learning for Civic Ecology, Final conference of the ERASMUS+ project "Daylighting Rivers", 1-2 December 2020.
- Congress "EGU General Assembly 2022", organized by European Geophysical Union (EGU), 23-27May 2022.

Croatian Landslide Group, UNIRI-GF, UNIZG-RGNF:

- 5th Regional Symposium on Landslides in Adriatic Balkan Region, Faculty of Civil Engineering University of Rijeka, 23-26 March 2022, held as a hybrid Symposium, 85 participants from 13 countries.

iii) A selection of conference presentations by the Chairholder and other colleagues

UNESCO CHAIR on Prevention and Sustainable Management of Geo-hydrological Hazards of the University of Florence

- Seminar in the framework of Joint ENVIMAT and Cultural Property Protection Summer School 2020 Tools and Strategies for strengthening resilience of Cultural Heritage in Climate Change. Lesson 06 October on "Copernicus in support of the safeguarding of Cultural and Natural Heritage at risk
- Virtual Workshop on Space for Twin Cities – Cultural Heritage hosted by ESA on 10 December 2020. "Rome Ancient Walls Satellite Monitoring Project"
- Virtual Workshop AIA/JCS Annual meeting invited lecture on Weathering mechanisms and slope instability processes affecting the Etruscans necropolises of Tarquinia and Southern Etruria.
- Invited speaker for the preparation of G20 and COP 26: Addressing the Climate Crisis Trough Culture: Preserving Heritage and Supporting Green Transition (April 2021).
- Virtual Seminar with UNIFI and UNISA on "Geosciences for the Conservation of Cultural Heritages" 06 June 2021.
- Webinar in the framework of Earth Technology Expo in Florence "Technologies for the management, protection and safety of Cultural Heritage".
- Virtual international Workshop on "Role of Early Warning System in Geo-Meteorological Hazards Risk Reduction", which was held from 8 – 10 December 2021 and organized by Delhi Technological University (India). Oral contribution "Landslide EWSS as Living Beings: Birth, Evolution, Reproduction, and Maturity Stage of the SIGMA Model After 20 Years of Operational Use"
- Virtual International Conference Climate.Culture.Peace. organized by ICCROM and British Council's Cultural Protection Fund (CPF) in partnership with the Department for Digital, Culture, Media and Sport (DCMS), online, 24-28 January 2022.
- Workshop "Towards the International Conference of Cartography Florence ICC2021: the digital cartographic heritage: conservation and services to the citizen", organized by the Tuscany Region, University of Florence and Italian Association of Cartography, 29 April 2021;
- Conference "Mediterranean Symposium on Landslides (MSL)", organized by University of Milano Bicocca and Federation of International Geo-Engineering Societies (FedIGS), online, 7-9 June 2021;
- Seminar "BGS - lunchtime lecture" organized by British Geological Survey, online, 8 July

2021;

- Workshop “Monitoring of geological hazards through ground motion operational services based on satellite interferometry”, organized by ISPRA, Regional authorities, Geologist National Council and Copernicus Academy, 22 and 29 October 2021;
- Congress “First Young Geoscientists National Conference”, organized by Be Geo scientists, Napoli, 7-10 October 2021;
- Seminar “Satellite Interferometry and practical applications”, organized by Tuscany Region, Soil Defence and Civil Protection Department, Florence, 13 October 2021;
- Conference " The monitoring of landslides for the management of natural risks", organized by the Regional Agency for Environmental Protection Lombardy (ARPA), Milan, 10 November 2021.
- Conference “FLOODrisk2020” co-organized by Deltares, HR Wallingford, SAMUI, INRAE and University of Budapest, online, 22-24 June 2021.
- Webinair “A 10 anni dall’alluvione del 25 ottobre 2011 della Liguria e della Lunigiana” organized by Consiglio Nazionale dei Geologi, 22.10.2021.
- XIth Scientific Assembly of the International Association of Hydrological Sciences (IAHS 2022) 29 May - 3 June 2022
- Workshop “International Commission on Statistical Hydrology (ICSH, Statistical Hydrology STAHY 2021”, 16-17 September 2021
- Seminar for the 55th anniversary of the 1966 Flood Event in Florence, CEDAF - Centro di Documentazione sulle Alluvioni di Firenze (Florence Flood Documentation Center), Humanities Library, University of Florence, 08/11/2021.
- Symposium “5th Regional Symposium on Landslides in Adriatic-Balkan Region Landslide Modelling & Applications (ReSyLab)” organized by University of Rijeka, hybrid mode online and Rijeka, 23-26 March 2022.

UNESCO WRDRR Chair at University of Ljubljana:

- Klaudija Lebar: Review of a national flood risk assessment as a basis for developing a methodology for selected cross-border areas – BORIS project, IAHR Congress, Granada, Spain, June 2022.

Landslide group in National Central University, Chinese Taipei:

- Vuong, Thi-Hong-Nhi, Tso-Ren Wu, Chun-Yu Wang, and Chia-Ren Chu, “ Study on Landslide Tsunami using Bingham Model,” 2021 Oceanogeography Annual Conference,, April 28-30 2021, Penghu, Taiwan.
- Wu, Tso-Ren, Thi-Hong-Nhi Vuong, Chun-Wei Lin, Chun-Yu Wang and Chia-Ren Chu, “Study on Mudslide using modified Bi-viscosity Model,” 2021 Oceanogeography Annual Conference, April 28-30 2021, Penghu, Taiwan.
- Wu, Tso-Ren, Thi-Hong-Nhi Vuong, Chun-Wei Lin, Chun-Yue Wang, Chia-Ren Chu, “Modeling the Slump-type Landslide Tsunamis Part I: Developing a Three-dimensional Bingham-type Landslide Model,” August 01-06 2021, AOGS 2021 Virtual.
- Vuong, Thi-Hong-Nhi, Tso-Ren Wu, Chun-Yue Wang, Chia-Ren Chu, “Modeling the Slump-type Landslide Tsunamis Part II: Numerical Simulation of Tsunamis with Bingham Landslide Model,” August 01-06 2021, AOGS 2021 Virtual.
- Wu, Tso-Ren, Thi-Hong-Nhi Vuong, Chun-Wei Lin, Chun-Yu Wang, and Chia-Ren Chu, “Three-Dimensional Simulation on the Rockslide and Mudslide Generated Tsunamis,” 5th World Landslide Forum, November 2-6 2021, Kyoto, Japan.
- Vuong, Thi-Hong-Nhi, Tso-Ren Wu, Chun-Yue Wang, Chia-Ren Chu, “ Numerical Simulation of Landslide Tsunamis using Bingham Model,” The 44th Ocean Engineering Conference in Taiwan, November 18-19 2021, Taoyuan, Taiwan.
- Wu, Tso-Ren, Thi-Hong-Nhi Vuong, Chun-Wei Lin, Chun-Yue Wang, Chia-Ren Chu, “ Developing a Three-Dimensional Discontinuous Bi-viscous model to study Landslide Tsunamis,” The 44th Ocean Engineering Conference in Taiwan, November 18-19 2021,

Taoyuan, Taiwan.

- Wu, Tso-Ren, Thi-Hong-Nhi Vuong, Chun-Wei Lin, Chun-Yue Wang, Chia-Ren Chu, “Modeling the Slump-type Landslide Tsunamis Part I: Developing a Three-dimensional Bingham-type Landslide Model,” 2021 Annual Conference of Geological Society & Chinese Taipei Geophysical Society, November 22-24 2021, Taipei, Taiwan.
- Wu Tso-Ren, Thi-Hong-Nhi Vuong, Chun-Wei Lin, Chun-Yue Wang, Chia-Ren Chu, “Develop a rheology model for the three-dimensional simulations of slump-type landslide generated tsunamis and local scour,” The 12th South China Sea Tsunami Workshop, January 13-14, 2022, Virtual Meeting.
- Vuong, Thi-Hong-Nhi, Tso-Ren Wu, Chun-Yue Wang, Chia-Ren Chu, “Applications of the discontinuous bi-viscosity rheological model to predict local scours induced by tsunamis and river floods,” The 12th South China Sea Tsunami Workshop, January 13-14, 2022, Virtual Meeting.
- Liu, Tien-Chi, Tso-Ren Wu, “Tsunami hazard assessment along the coast of Southwest Taiwan: A case study based on historical tsunamis,” The 12th South China Sea Tsunami Workshop, January 13-14, 2022, Virtual Meeting.
- Wu, Tso-Ren, Thi-Hong-Nhi Vuong, Chun-Yue Wang, Chia-Ren Chu, “How can a shock wave with a 2 cm pressure disturbance lead to a tsunami larger than 40 cm in the Tonga Volcanic Tsunami Event in 2022?,” 2022 Taiwan Geoscience Assembly, June 7-10 2022, Taipei, Taiwan.
- Nguyen, T. T., C. H. Tseng, J. J. Dong, Construct a 3D Geological Model of the Dalun Mountain, Taiwan, 2022/8/1-8/5 AOGS, Singapore (on-line).
- Chung, C.-C. Bo-Chi Chen (2022) Fusion of Optical and Thermal Imagery Monitoring for a Long-term Stability Application to Slopes, Asia Oceania Geosciences Society, 1~5 Aug., Singapore.
- Chih-Chung Chung. (2021) The Development of TDR-integrated landslide Early Warning System, 5th World Landslide Forum, 2-6 November, Kyoto, Japan
- Fari, N.B., Chung, C.-C. (2021) The Parametric Study of PS-InSAR for Landslide Monitoring – Ali Mt. Case. 2021 Asia Oceania Geosciences Society, 1~6 Aug., Singapore.
- Chung, C.-C. Li, Z. Y. (2020). Risk assessment of slope collapse in Neikuihui tribe in Fuxing District, Taoyuan City, The 163rd TCU-ARL Seminar, International Workshop on Data-driven Infrastructure Maintenance and Risk Management, 24 Sep., Tokyo, Japan.

Institute of Geography, National Autonomous University of Mexico (UNAM):

- Alcántara-Ayala, I., 2021, Reflections on the Global Research Agenda on Disaster Risk Reduction, The Integrated Research on Disaster Risk 2021 International Conference, Beijing, China, 8-10 June.
- Alcántara-Ayala, I., 2021, Integrated Disaster Risk Management: addressing systemic risks in mountain contexts, Sustainability Research & Innovation Congress 2021, Brisbane, Australia, 12-15 June.
- Alcántara-Ayala I. 2021, Size Matters: The Impact of Small, Medium and Large Landslide Disasters, 5th World Landslide Forum, WLF 2020, November 5, Kyoto, Japan.
- Garnica-Peña R.J., Cardón-Idelfonso G., Alcántara-Ayala I. 2021, Landslide Exposure Community-Based Mapping: A First Encounter in a Small Rural Locality of Mexico, 5th World Landslide Forum, WLF 2020, November 5, Kyoto, Japan.
- Garnica-Peña R.J., García-Marroquin G., Alcántara-Ayala I. 2021, On the Use of UAVs for Landslide Exposure of Households: La Gloria Neighbourhood, Teziutlán, Puebla. 5th World Landslide Forum, WLF 2020, November 5, Kyoto, Japan.
- Vogel, C., Siame, G., Alcántara-Ayala, I. 2022. The chains that bind us: adding value to the value chain, 1st WMO/WWRP Weather & Society Conference, February 28 - March 11, 2022, Geneva, Switzerland, online, March 8th.
- Capparelli, G., Spolverino, G., Alcántara-Ayala, I., Ruiz-Cortés, N.S. 2022. Physical modelling investigation and integrated analysis of landslides for defining risk scenarios, 5th

Regional Symposium on Landslides in the Adriatic-Balkan Region Landslide Modelling & Application, Faculty of Civil Engineering, University of Rijeka, 23-26 March, Croatia, March 25.

- Alcántara-Ayala, I. 2022, Improved Understanding and Governance of Systemic Risk - Unpacking the 2022 Global Assessment Report, Seventh Session of the Global Platform on Disaster Risk Reduction (GP2022) which took place from 23-28 May 2022 in Bali, Indonesia.
- Alcántara-Ayala, I. 2022, Disaster Risk Reduction: Awareness, With Science and With our Planet, 2022 Regular Session of the Council of the Commission for Environmental Cooperation, intergenerational roundtable Living under crises: sharing knowledge to create more sustainable communities, 14-15 July, Mérida, México.

Charles University

- Scaringi G, Loche M, Turchi S, Lombardo L (2022). Temperature and slope stability in temperate climate. 17th Plinius Conference on Mediterranean Risks, Frascati, Italy, 18-21 October 2022
- Loche M, Scaringi G, Lombardo L (2022) Land Surface Temperature Controls Stability in Gentle Clay Slopes. 10th IAG International Conference on Geomorphology, Coimbra, Portugal, 12-16 September 2022
- Loche M, et al. (2022) Effect of temperature on post-earthquake landsliding near the epicentre of the 2008 Wenchuan earthquake. European Geosciences Union General Assembly, Vienna, Austria, 23-27 May 2022
- Scaringi G, Loche M (2022) Effects of temperature and shearing rate on the residual shear strength of two pure clays. European Geosciences Union General Assembly, Vienna, Austria, 23-27 May 2022

Croatian Landslide Group

- Snježana Mihalić Arbanas: Landslide evidence and spatial prediction: Application of data and information from landslide maps. 5th Regional Symposium on Landslides in Adriatic Balkan Region, Faculty of Civil Engineering University of Rijeka, 23-26 March 2022.
- Martin Krkač, Sanja Bernat Gazibara, Marko Sinčić, Hrvoje Lukačić, Snježana Mihalić Arbanas: Landslide inventory mapping based on LiDAR data: Case study from Hrvatsko Zagorje (Croatia). 5th Regional Symposium on Landslides in Adriatic Balkan Region, Faculty of Civil Engineering University of Rijeka, 23-26 March 2022.
- Josip Peranić, Vedran Jagodnik, Nina Čeh, Martina Vivoda Prodan, Sara Pajalić, Željko Arbanas: Small-scale physical landslide models under 1g infiltration conditions and the role of hydrological monitoring. 5th Regional Symposium on Landslides in Adriatic Balkan Region, Faculty of Civil Engineering University of Rijeka, 23-26 March 2022.
- Nina Čeh, Josip Peranić, Vedran Jagodnik, Sara Pajalić, Martina Vivoda Prodan and Željko Arbanas: Digital image correlation and the use of high-speed cameras for 3D displacement monitoring in 1g small-scale physical models of landslides. 5th Regional Symposium on Landslides in Adriatic Balkan Region, Faculty of Civil Engineering University of Rijeka, 23-26 March 2022.
- Martina Vivoda Prodan, Josip Peranić, Sara Pajalić, Vedran Jagodnik, Nina Čeh, Željko Arbanas: Mechanism of rainfall induced landslides in small-scale models built of different materials. 5th Regional Symposium on Landslides in Adriatic Balkan Region, Faculty of Civil Engineering University of Rijeka, 23-26 March 2022.
- Željko Arbanas; Josip Peranić; Vedran Jagodnik; Martina Vivoda Prodan; Nina Čeh, Sara Pajalić; Davor Plazonić: Impact of gravity retaining wall on the stability of a sandy slope in small-scale physical model. 5th Regional Symposium on Landslides in Adriatic Balkan Region, Faculty of Civil Engineering University of Rijeka, 23-26 March 2022.
- Josip Peranić, Vedran Jagodnik, Nina Čeh, Sara Pajalić, Petra Jagodnik, Željko Arbanas: Landslide initiation in small-scale sandy and clayey slopes exposed to artificial rain. 20th International Conference on Soil Mechanics and Geotechnical Engineering (ICSMGE), Sydney, Australia, 01-05 May 2022.
- Željko Arbanas, Josip Peranić, Vedran Jagodnik, Nina Čeh, Sara Pajalić, Martina Vivoda

Prodan: Behaviour of sandy and clayey slopes exposed to artificial rain in small-scale model. 10th International Conference on Physiscal Modelling in Geotechnics (ICPMG), Daejeon, South Korea, 19-23 September 2022.

c) Interuniversity Exchanges/Partnerships

(principal exchanges/partnerships between the Chair and other institutions including UNESCO Chairs/UNITWIN Networks)

UNITIWN network includes Kyoto University, ICL headquarters, and 60 ICL full member organizations and 19 ICL associates, 12 supporters and 20 KLC2020 official promoters.

The network publishes a monthly Journal *Landslides: Journal of the International Consortium on Landslides*. A total number of pages of the Journal is around 4,000 pages. 2021 Impact Factor is 6.153. Papers are contributed by all over the world as well the UNITWIN network members, and the latest information are distributed world wide. The ICL has published 6 volumes of full color books by the UNITWIN network and other organizations. The joint edition and publication and information dissemination through the Journal and books by the network have contributed to the Interuniversity Exchanges/Partnerships in the global scale.

Volume 1	Sendai Landslide Partnerships and Kyoto Landslide Commitment	579 pages
Volume 2	From Mapping to Hazard and Risk Zonation	418 pages
Volume 3	Monitoring and Early Warning	322 pages
Volume 4	Testing, Modeling and Risk Assessment	456 pages
Volume 5	Catastrophic Landslides and Frontiers of Landslide Science	374 pages
Volume 6	Specific Topics in Landslide Science and Applications	386 pages

From 2022, the ICL and the network started to publish the open access book series “Progress in Landslide Research and Technology.” This book series can be accessed and downloaded by any person free of charge. The information exchange effects are very high especially for developing countries, practitioners, residents in landslide prone areas.

ICL Adriatic-Balkan Network (ICL ABN) - regional scientific network of landslide scientists. The Network activities include joint activities related to landslide risk reduction with the scientific and academic institutions from Croatia, Slovenia and Serbia, scientific institutions from Albania and Slovenia, professional association from Bosnia and Herzegovina and local government from Croatia.

Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence

Memorandums of Understanding exchanged with:

1) International non governmental organizations :

- International Consortium on Landslides (ICL) ;
- International Consortium on Geo-disasters Reduction (ICGdR);
- Global Alliance of Disaster Research Institutes (GADRI);
- Joint International Center on Natural Hazards (JIC-Nh) ;
- Copernicus Academy Network

2) Other Chairs and networks :

- UNESCO Chair on Water Resources Management and Culture at the University for Foreigners in Perugia, Italy;

- UNITWIN-UNESCO/KU/ICL Landslides Risk Mitigation for Society and Environment Cooperation Programme at Kyoto University;
- UNESCO FRIEND-Water initiative (Flow Regimes from International Experimental and Network Data), international research program of a worldwide network for analyzing hydrological data;
- UNESCO Chair on Geoenvironmental Disaster Reduction", Shimane University.
- Centre For Sustainable Heritage Conservation (SHeC)

3) National governmental organizations

- Italian Government - Presidency of the Council of Ministers Civil Protection Department (DPC);
- Institute for Environmental Protection and Research (ISPRA);
- National Alpine Cliff and Speleological Rescue Corp.

Bilateral agreements with other Universities:

- Ilia State University, Tblisi (Georgia)
- Indian Institute of Technology Indore (India)
- Universidade Estadual Paulista "Julio de Mesquita Filho" – UNESP (Brasil)
- China University of Geosciences, Beijing (China)
- Universidad Mayor de San Simón (Bolivia)
- Sibstrin University (Russia)
- Southwest Jaotong University, Chengdu (China)
- Shimane University (Japan)
- Sejong University (Korea)
- Tongji University, Shanghai (China)
- Universidad Michoacana de San Nicolas De Hidalgo, Morelia (Mexico)

UNESCO WRDRR Chair at University of Ljubljana:

University of Ljubljana is a member of the EUTOPIA European University (<https://eutopia-university.eu/>), alliance of 10 European universities (EU funded for 2022-2026).

University of Ljubljana is also a member of other university alliances, such as CELSA – Central European Leuven Strategic Alliance (<https://celsalliance.eu/>), The Guild of European Research-Intensive Universities (<https://www.the-guild.eu/>) or CE7 – seven Central European Universities (), and has signed the LERU (the League of European Research Universities) – CE7 partnership agreement in September 2022.

University of Ljubljana, Faculty of Civil and Geodetic Engineering has exchanged Memorandums of Understanding with:

- University of Calabria, Cosenza, Italy
- ZAHW Zurich University of Applied Sciences, Winterthur, Switzerland

leading to master double-degrees in Water Science & Technology and Environmental Engineering and with 50+ ERASMUS+ partner institutions in 20 European countries and in Turkey for international student exchange.

Landslide group in National Central University, Chinese Taipei:

- University of Transport Technology (UTT)
- Hanoi University of Mining and Geology (HUMG), Hanoi, Vietnam
- Mien Tay Construction University, Vietnam
- Can Tho University, Vietnam
- Department of Plants, Soils and Climate, Utah State University

Institute of Geography, National Autonomous University of Mexico (UNAM):

- GADRI, Global Alliance of Disaster Research Institutes.
- National Center for Disaster Prevention (CENAPRED).
- Secretariat of Integrated Risk Management and Civil Protection of Mexico City.

- UNDRR Latin America and the Caribbean.

d) Publications/Multimedia Materials (major publications and teaching/learning materials)			
<i>Please tick relevant fields of output and indicate volume of output:</i>		[tick]	[no.]
	Books	<input checked="" type="checkbox"/>	
	Books (edited)	<input type="checkbox"/>	
	Books (chapters)	<input type="checkbox"/>	
	Monographs	<input type="checkbox"/>	
	Research Reports	<input checked="" type="checkbox"/>	
	Journal Articles (refereed)	<input checked="" type="checkbox"/>	
	Conference Proceedings	<input checked="" type="checkbox"/>	
	Occasional Papers	<input type="checkbox"/>	
	Teaching/Learning Materials	<input checked="" type="checkbox"/>	
	Multimedia Materials (CD-Rom)	<input type="checkbox"/>	
	Multimedia Materials (Video)	<input type="checkbox"/>	
	Multimedia Materials (Other)	<input type="checkbox"/>	
Give details of major publications and materials including full citations.			
i) Theses			
Ph. D theses			
<i>Kyoto University</i>			
<ul style="list-style-type: none"> • Adapa Gautham (2021) Seismic response of embankment dams with different upstream conditions, Kyoto University, Japan • Anurag Sahare (2021) Kinematic and inertial loading-based seismic assessment of pile foundations in liquefiable soil, Kyoto University, Japan • Xu Jiawei (2021) Evaluation of seepage and deformation of unsaturated slopes during post-shaking rainfall, Kyoto University, Japan 			
<i>Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence</i>			
<i>Ph.D thesis in Earth Sciences</i>			
<ul style="list-style-type: none"> • “Geo-environmental risk analysis for a sustainable local territorial management”. Candidate: Agnese Turchi. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti. Co-tutor: Dr. Federico Di Traglia • "Land monitoring through optical and radar remote sensing”. Candidate: Tania Luti. Department of Earth Sciences, University of Florence. Tutor: Prof. Nicola Casagli • “Permafrost Deformation Monitoring and Interpretation Using InSAR Technique in Northeastern China and Aosta Valley Region, Italy”. Candidate: Monan Shan. Department of Earth Sciences, University of Florence. Tutor: Prof. Nicola Casagli • “Regional scale satellite monitoring for hydrogeological risk reduction”. Candidate: Roberto Montalti. Department of Earth Sciences, University of Florence. Tutor: Prof. Filippo Catani 			
<i>PhD Thesis in the International Doctorate in Civil and Environmental Engineering</i>			

- “Large Wood dynamics in sharp river bends: experimental and numerical investigations”. Candidate: Lorenzo Innocenti. XXXIII Cycle – Co-tutelle with TU Braunschweig. Department of Civil and Environmental Engineering. Tutors: Prof Luca Solari

University of Ljubljana:

- Sapač Klauđija (PhD Thesis Defence in January 2021): Relationship between hydrological and seasonal conditions in controlling the nutrient flushing dynamics. University of Ljubljana, Ljubljana, Slovenia. Tutor: Dr. Simon Rusjan
- Radinja Matej (PhD Thesis Defence June 2022): Automated modelling and design of urban stormwater control measures. University of Ljubljana, Ljubljana, Slovenia. Tutor: Dr. Nataša Atanasova and Prof. Sašo Džeroski
- Gafhoor Yasser (4th year PhD candidate): Optimization of Early Seepage Detection in Embankments using a distributed temperature system based on fiber optic sensing. University of Ljubljana, Ljubljana, Slovenia. Tutor: Dr. Andrej Kryžanowski
- Kuzmanić Tamara (4th year PhD candidate): Research on morphological changes of rocks in the fluvial erosion and sedimentation cycle. University of Ljubljana, Ljubljana, Slovenia. Tutor: Prof. Matjaž Mikoš
- Jurček Timotej (3rd year PhD candidate): Rheological properties of soils. University of Ljubljana, Ljubljana, Slovenia. Tutor: Dr. Matej Maček
- Mark Bryan Alivio (2nd year PhD candidate): University of Ljubljana, Ljubljana, Slovenia. Tutor: Dr Nejc Bezak

Croatian Landslide Group

University of Rijeka:

- Dalibor Udovič (2022): Rockfall Risk Identification in Carbonate Rock Masses along the Transport Routes in Republic of Croatia. University of Rijeka, Rijeka, Croatia. Adviser: Prof. Željko Arbanas

University of Zagreb,

- Marin Sečanj (2021) Quantitative rockfall susceptibility assessment by integrating kinematic and statistical analyses. University of Zagreb, Zagreb, Croatia. Adviser: Prof. Snježana Mihalić Arbanas

Northeast Forestry University, China

- Zhichao Xu (2022) Study on the Influence of Geologic Methane Emission on Wildfire and Surface Deformation in Xiaoxing'anling Permafrost Region. Northeast Forestry University, China. Adviser: Prof. Wei Shan.

Master Theses

Unesco Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the University of Florence

Master Thesis in Geological sciences and technologies:

- " Techniques for analyzing the susceptibility to detachment of stone fragments in the masonry of Palazzo Medici-Riccardi and Palazzo Pitti". Candidate: Ermanno Massini. Department of Earth Science, University of Florence. Tutor: Emanuele Intrieri. Co-tutor: Pierluigi Confuorto
- “Wildfire-affected area analysis and detection methods”. Candidate: Martina Di Natale. Department of Earth Sciences, University of Florence. Tutor: Prof. Sandro Moretti. Co-tutor: Dr. William Frodella
- “Specific risk assessment for rapid landslides in the Valle D’Aosta”. Candidate Antonella Marinelli. Department of Earth Sciences, University of Florence. Tutor: Prof. Nicola Casagli

- “Meteorological modeling for the optimization of landslide risk scenario forecasting systems”. Candidate: Daniel Gialdini. Department of Earth Sciences, University of Florence. Relatore: Ascanio Rosi
- “Mitigation of the falling rocks risk along a motorway section”. Candidate: Federico Berlincioni. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-tutor: Dr. Luca Lombardi
- “Analysis and monitoring of the deformation phenomena affecting the centre of Pomarico (MT)”. Candidate: Agnese Innocenti. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Dott. Masimiliano Nocentini
- “Evaluating the Quincinetto rockslide hazard through multiparametric analysis”. Candidate: Flavia Febo. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutor: Dott. Tommaso Carlà
- “Runout models and real time monitoring integration for Ruinon landslide alerting on the SP29”. Candidate: Di Carlo Rosario Dario. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Dott. Tommaso Carlà
- “Analysis of LiDAR and photogrammetric data for the creation of hazard maps on natural walls equipped for sport climbing”. Candidate: Tommaso Beni. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli
- “Integration of modeling runout and monitoring using Doppler radar for the definition of Ruinon landslide’s rockfall risk scenarios”. Candidate: Roberto Rossi. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Dott. Tommaso Carlà, Dott. Massimiliano Nocentini
- “Experimentation of low cost GNSS networks aimed at monitoring landslides”. Candidate: Alessio Gatto. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Massimiliano Nocentini, Dott. Luca Innocenti
- “Mobile lidar surveys for hydrogeological risk evaluation and mitigation”. Candidate: Flavia Serafini. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Dott.ssa Elena Benedetta Masi
- “Numerical modelling of the Quincinetto rockslide”. Candidate: Giacono Ciabatti. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutor: Dott. Tommaso Carlà
- “Analysis of risk scenarios of Perarolo di Cadore landslide”. Candidate: Francesca Adreani. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. Luca Lombardi, Prof. Filippo Catani
- “Monitoring systems for landslide hazard scenario assessment at rupestrian cultural heritage sites in Georgia”. Candidate: Isabella Frullini. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-Tutors: Dott. William Frodella, Dott. Daniele Spizzichino
- “Wildfire assessment: from field surveys to drone and satellite platform analysis. Implications on soil erosion and slope instability”. Candidate : Giacomo Lazzeri. Department of Earth Sciences, University of Florence. Tutor: Prof. Sandro Moretti. Co-tutors : Dr. William Frodella, Dr. Guglielmo Rossi
- "3D analysis of the kinematic mechanisms of instability affecting the monastery of Vardzia (Georgia)". Candidate : Francesco Facchini. Department of Earth Sciences, University of Florence. Tutor: Prof. Giovanni Gigli. Co-tutor: Dr. William Frodella
- “Spatial and temporal characterization of subsidence in the Municipality of Montemurlo (PO)”. Candidate: Lorenzo Bini. Department of Earth Sciences, University of Florence. Tutor: Prof. Federico Raspini
- “Analysis of satellite radar monitoring data of soil deformations in the Veneto Region”. Candidate: Rebecca Mani. Department of Earth Sciences, University of Florence. Tutor: Prof. Federico Raspini
- “Definition and validation of the vulnerability from slow kinematic landslides in Italy”. Candidate: Francesco Poggi. Department of Earth Sciences, University of Florence. Tutor:

Prof. Federico Raspini

- “Use of maximum entropy algorithms for the assessment of sinkhole susceptibility and risk in the Guidonia-Bagni di Tivoli plain”. Candidate: Paolo Sbarra. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti
- “Experimentation of methodologies for the definition of the risk deriving from collapses in the Valle d'Aosta region”. Candidate: Camilla Medici. Department of Earth Sciences, University of Florence. Tutor: Prof. Silvia Bianchini
- Multitemporal analysis and modeling of the water table in the Municipality of Florence”. Candidate: Filippo Battaglini. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti.
- “Hydrogeological numerical modeling for the design of an open circuit geothermal plant”. Candidate: Tommaso Casati. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti.
- “Rapid Mapping of Landslides Using Deep-learning with Optical Data and SAR”. Candidate: Lorenzo Nava. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti.
- “Analysis and modeling of filtration conditions and stability of embankment sections along the Florentine stretch of the Arno River”. Candidate: Gabriele Fibbi. Department of Earth Sciences, University of Florence. Tutor: Prof. Riccardo Fanti.
- “GB-InSAR technology applied to sinkhole risk assessment: the case of Camaiore”. Candidate: Samuele Gregolon. Department of Earth Sciences, University of Florence. Tutor: Prof. Emanuele Intrieri
- “Quantitative assessment of the risk of slow kinematic landslides in the Arno river basin”. Candidate: Francesco Caleca. Department of Earth Sciences, University of Florence. Tutor: Prof. Filippo Catani.
- “Modeling of risk scenarios relating to the instability of the slopes aimed at improving the operational forecast of landslides”. Candidate: Greta Morreale. Department of Earth Sciences, University of Florence. Tutor: Dr. Samuele Segoni. Co-tutor : Dr. Veronica Tofani
- “Development of a system of thresholds for triggering pluvial landslides induced in Tuscany”. Candidate: Francesco Barbadori. Department of Earth Sciences, University of Florence Tutor: Dr. Samuele Segoni. Co-tutor : Dr. Ascanio Rosi
- “Definition through geophysical measurements of the thickness of the roofs for the purpose of slope stability”. Candidate: Andrea Stefano Giachetti. Department of Earth Sciences, University of Florence. Tutor: Dr. Samuele Segoni. Co-tutor : Dr. Veronica Pazzi
- “Multi-criterion parameterization of the geotechnical properties of soils in the territory of the Metropolitan City of Florence for the distributed and physically based modeling of the triggering of surface landslides”. Candidate: Nocentini Nicola. Department of Earth Sciences, University of Florence. Tutors: Dr. Samuele Segoni. Co-Tutors: Dr. Ascanio Rosi, Dr. Elena Masi

Master Theses in Civil Engineering and in Environmental Engineering

- “Geospatial Analysis of Water Consumption in Tuscany”. Candidate: Claudia De Lucia. Tutor: Prof. Chiara Arrighi. Co-tutors: Prof. Fabio Castelli
- “Validation of Sentinel-I soil moisture data for the purpose of Tuscany’s water balance”. Candidate: Giacomo Abrardo. Tutor: Prof. Fabio Castelli. Co-tutors: Prof. Chiara Arrighi
- “Analysis of risk scenarios induced by embankment breakages of Pistoiese Ombrone river”. Candidate: Scopetani Lorenzo. Tutor: Simona Francalanci. Co-tutors: Prof. Enio Paris, Ingg. Leonardo Faggioli and Jacopo Guerrini
- “Levane dam raising: experimental and numerical study of flow processes”. Candidate: Morozzi Stefano. Tutor: Prof. Enio Paris. Co-tutors: Simona Francalanci, Sara Gabbrielli
- “Hydrological and hydraulic modeling of the Intermunicipal Structural Plan (PSI) of Valtiberina”. Candidate: Tosi Alessandro. Tutor: Simona Francalanci. Co-tutors: Prof. Enrica Caporali, Ing. Simone Galardini
- “Two-dimensional hydraulic modeling of woody debris transport in the urban reach of the

Arno river in Florence”. Candidate: Iannuzzi Ivan. Tutor: Simona Francalanci. Co-tutors: Massimo Rinaldi, Enrico Stefanini, Lorenzo Innocenti

- “Experimentation on the physical model of drainage and dissipation works of Cepparello dam” Candidate: Cioni Filippo. Tutor: Simona Francalanci. Co-tutors: Proff. Luca Solari, Enio Paris, Ing. Lorenzo Lotti
- “Sediment transport of the Arno river in the urban reach of Florence”. Candidate: Niccolò Bertini. Tutor: Prof. Luca Solari. Co-tutors: Simona Francalanci, Enio Paris, Lorenzo Innocenti
- “Feasibility analysis of the implementation of Nature Based Solutions in presence of urban constraints in the district 5 of Florence”. Candidate: Martina Tonola. Tutor: prof. Enrica Caporali. Co-tutor: Prof. Chiara Arrighi, Dott. Tiziana Pileggi, Eng. Simona Cioli
- “Application of sustainable urban drainage systems for the mitigation of the pluvial flood risk in the Municipality of Florence”. Candidate: Damiano Giannelli. Tutor: prof. Enrica Caporali. Co-tutor: prof. Luca Solari, Eng. Matteo Isola, Eng. Simona Cioli
- “Early warning rainfall thresholds in small river basins through a distributed hydrological model”. Candidate: Simone Celima. Tutor: prof. Enrica Caporali. Co-tutor: prof. Chiara Arrighi, eng. Marco Lompi
- “Pluvial floods mitigation using LID-Low Impact Development technologies: a case study in Novoli (Florence)”. Candidate: Alessio Lenzini. Tutor: prof. Enrica Caporali. Co-tutor: prof. Luca Solari, Eng. Simona Cioli, Eng. Matteo Isola
- “Evaluation of Sustainable urban Drainage Systems (SuDS) role in run-off reduction: the case study of Florence (Italy)”. Candidate: Lisa Boccini. Tutor: prof. Enrica Caporali. Co-tutor: Prof. Chiara Arrighi, Eng. Matteo Pampaloni
- “Hydrological and hydraulic reevaluation of the earth dam spillway of Montalto Castle on Ambra River”. Candidate: Alessia Guerrini. Tutor: prof. Enrica Caporali. Co-tutor: prof. Luca Solari, Eng. Remo Chiarini, Eng. Serenza Ciofini
- Analysis of the instability processes in the archaeological area of the necropolis of Norchia and design of a mitigation intervention Candidate Sofia Loreti: DICAM – Department of Civil, Chemistry, Environmental and Material Engineering, University of Bologna. Tutors: prof. Daniela Boldini. Co-Tutor: Daniele Spizzichino

Master Theses in Geoengineering

- “Flood exposure of environmental assets”. Candidate: Gabriele Bertoli. Tutor: Prof. Chiara Arrighi. Co-tutors: Prof. Enrica Caporali
- “Best siting of Water Harvesting (WH) structures using GIS-based Multi-Criteria Analysis in Uttarakhand, India”. Candidate: Rajeshwari Bhookya. Tutor: prof. Giulio Castelli. Co-tutors: prof. Enrica Caporali
- “High-resolution analysis of soil moisture response along a steep forested hillslope”
Candidate: Manogna Pachavai. Tutor: prof. Daniele Penna. Co-tutors: prof. Enrica Caporali
- “Impact of climate change scenarios on the hydrological ecosystem services of the upper Arno river basin”. Candidate: Jerome El Jeitany i. Tutor: prof. Enrica Caporali. Co-tutors: prof. Elena Bresci, Eng. Tommaso Pacetti
- “Modelling slope instability in the High City of Antananarivo (UNESCO Tentative site, Madagascar)”. Candidate: Gianluca Brocca. Tutor: Prof. Veronica Tofani. Co-tutors: Dr. Federico Di Traglia, Dr. William Frodella
- “Assessing the shallow and deep-seated instability of the NW flank of the Stromboli Volcano with Limit Equilibrium analysis”. Candidate: Luca Cassanego. Tutor: Prof. Veronica Tofani. Co-tutors: Federico Di Traglia, Lorenzo Borselli
- “The role of precipitation and groundwater levels in slope displacement patterns: the case study of Castagnola landslide (La Spezia, Italy)”. Candidate: Elisa Leotta. Tutors: Prof. Veronica Tofani. Co-Tutor: Prof. Sandro Moretti, Dr. Luca Tanteri
- “Assessment of landslide dam hazard at basin scale through geomorphic analysis and remote sensing data”. Candidate: Giulia Begliomini. Tutors: Prof. Veronica Tofani. Co-tutor: Prof. Simona Francalanci, Dr. Carlo Tacconi Stefanelli

North-East Forestry University, Harbin, China

- Shuanglin Wang (2020) Permafrost degradation characteristics and foundation settlement prediction along Bei-Hei Expressway. NorthEast Forestry University, Harbin, China.
- Tao Yang (2021) Study on the Influence of Gravel Pile Group on the Hydrothermal Condition and Deformation of Frozen Marsh Highway Foundation. Northeast Forestry University, China
- Mengdi Liu (2021) Stability analysis of sandstone covered mudstone cutting slope induced by rainfall. Northeast Forestry University, China.
- Jiawei Wu (2022) Analysis on the influence of rainfall on the stability of the embankment of section K177+550 of Beihei Highway. Northeast Forestry University, China
- Wanying Wei (2022) Analysis on the influence of rainfall on the stability of the embankment of section K177+550 of Beihei Highway. Northeast Forestry University, China
- Shengtang Jiang (2022) Study on seismic behavior of simply supported continuous box girder bridge in cold regions during construction. Northeast Forestry University, China

Shimane University, Japan (1Master):

- Shin-ya Yamamoto (2021) : Effects of cedar root system on slope stability in Sambe Experimental Forest of Shimane University: evaluation of physical and mechanical properties and spatial distribution of the roots

Croatian Landslide Group

University of Rijeka:

- Gorana Galić (2022): Analysis of Retaining Construction Impact on Stability of Slope in Small-Scale Model. Supervisor: Professor Željko Arbanas, Co-Supervisor: Josip Peranić, PhD.
- Anita Pušelja (2022): Slope Instability Development in Small-Scale Model Exposed to a Rainfall. Supervisor: Professor Željko Arbanas, Co-Supervisor: Josip Peranić, PhD.
- Nikolina Drpić: Behaviour of small-scale slope under dynamic loading at 1g conditions . Supervisor: Assoc. Professor Vedran Jagodnik.
- Nikola Trbović (2022): Three dimensional stability analysis of the Špičunak landslide. Supervisor: Professor Željko Arbanas, Co-Supervisor: Assist. Profesor Martina Vivoda Prodan.
- Martina Turković (2021): Cyclic Behaviour of Uniform Sand Under Drained and Undrained Conditions at Low Confining Stress. Supervisor: Assoc. Professor Vedran Jagodnik.
- Magdalena Špoljarić (2022): Determination of the water retention curve and coefficient of permeability of sand. Supervisor: Assoc. Professor Vedran Jagodnik., Co-Supervisor: Josip Peranić, PhD.
- Toni Fabijanić (2021): Stability of Slopes in Scaled Landslide Model. Supervisor: Professor Željko Arbanas, Co-Supervisor: Josip Peranić, PhD.

ii) Publications

ICL headquarters and Kyoto University

- Doan Huy Loi, S.H.S Jayakody, and Kyoji Sassa, Teaching Tool "Undrained dynamic loading ring shear testing with video". Progress in Landslide Research and Technology, Vol.1, No.2 (Accepted)
- Daisuke Higaki, Kiyoharu Hirota, Khang Dang, Shinji Nakai, Masahiro Kaibori, Satoshi Matsumoto, Masataka Yamada, Satoshi Tsuchiya, Landslides and Countermeasures in Western Japan: Historical Largest Landslide in Unzen and Earthquake-induced Landslides in

- Aso, and Rain-induced Landslides in Hiroshima. *Progress in Landslide Research and Technology*, Vol.1, No.2 (Accepted)
- Kazuo Konagai, Asiri Karunawardena, Kithsiri N. Bandara, Kyoji Sassa, Ryo Onishi, Ryosuke Uzuoka, Shiho Asano, Katsuo Sasahara, Sanchitha Jayakody, Imaya Ariyaratna, Early warning system against rainfall-induced landslide in Sri Lanka. *Progress in Landslide Research and Technology*, Vol.1, No.1 (In press)
 - Beena Ajmera, Hossein Emami Ahari, Doan Huy Loi, HENDY Setiawan, Khang Dang, and Kyoji Sassa, LS-RAPID Manual with Video Tutorials. *Progress in Landslide Research and Technology*, Vol.1, No.1 (In press)
 - Khang Dang, Doan Huy Loi, Kiyoharu Hirota, Yoshinobu Taniguchi & Kyoji Sassa, Landslide triggered by heavy rainfall on 06 September 2020 in Shiiba village, Miyazaki Prefecture, Japan. *Landslides* volume 18, pages3485–3488 (2021)
 - Pham Van Tien, Le Hong Luong, Do Minh Duc, Phan Trong Trinh, Dinh Thi Quynh, Nguyen Chau Lan, Dang Thi Thuy, Nguyen Quoc Phi, Tran Quoc Cuong, Khang Dang & Doan Huy Loi, Rainfall-induced catastrophic landslide in Quang Tri Province: the deadliest single landslide event in Vietnam in 2020. *Landslides* volume 18, pages2323–2327 (2021)
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Book (editors):

- Sassa K, Mikoš M, Sassa S, Bobrowsky P, Takara K, Dang K eds. (2021) *Understanding & Reducing Landslide Disaster Risk*, Vol. 1 Sendai Landslide Partnerships and Kyoto Landslide Commitment, Springer.
- Guzzetti F, Mihalić Arbanas S, Reichenbach P, Sassa K, Bobrowsky P, Takara K eds. (2021) *Understanding & Reducing Landslide Disaster Risk*. Vol. 2 From mapping to hazard and risk zonation, Springer

- Casagli N, Tofani V, Sassa K, Bobrowsky P, Takara K eds. (2021) Vol. 3 Monitoring and early warning
- Tiwari B, Sassa K, Bobrowsky P, Takara K eds. (2021) Understanding & Reducing Landslide Disaster Risk, Vol. 4 Testing, Modeling and Risk Assessment, Springer
- Vilímek V, Wang F, Strom A, Sassa K, Bobrowsky P, Takara K eds. (2021): Understanding & Reducing Landslide Disaster Risk, Vol. 5 Catastrophic Landslides and Frontiers of Landslide Science, Springer.
- Arbanas Z, Bobrowsky P, Konagai K, Sassa K, Takara K eds. (2021): Understanding & Reducing Landslide Disaster Risk, Vol. 6 Specific Topics in Landslide Science and Applications, Springer
- Peranić J, Vivoda Prodan M, Bernat Gazibara S, Krkač M, Mihalić Arbanas S, Arbanas Ž. (Eds.) 2022 Proceedings of the 5th Regional Symposium on Landslides in the Adriatic-Balkan Region. Faculty of Civil Engineering, University of Rijeka (ISBN 978-953-6953-55-4), Faculty of Mining, Geology and Petroleum Engineering, University of Zagreb (ISBN 978-953-6923-47-2). 255 pp.

e) Cooperation with UNESCO Headquarters, Field Offices

ICL was founded by the UNESCO-Kyoto University Joint symposium (UNESCO-International Geoscience Programme (IGCP) No.425 Landslide Hazard Assessment and Cultural Heritage) in 2002. IPL (International Programme on Landslides) was proposed and agreed to establish in the ICL foundation meeting. Total 6 officials from landslide related divisions of Earth Sciences, Water Sciences, Cultural Heritage of UNESCO joined this session, and proposed that the IPL should be included in one of UNESCO Programme, and suggested to apply for UNITWIN cooperation programme. Then, Kyoto University(KU) and the new International Consortium on Landslides (ICL) applied to establish UNITWIN-UNESCO/KU/ICL to UNESCO. It was accepted by UNESCO. In March 2003, Koichiro Matsuura, Director-General of UNESCO, Makoto Nagao, President of Kyoto University, Kyoji Sassa, President of the ICL signed the agreement for the UNITWIN network.

The IPL: A Programme of the ICL for Landslide Disaster Risk Reduction is an activity of the UNITWIN-UNESCO/KU/ICL Cooperation Programme. The first IPL was IPL-C100 *Landslides*: Journal of the International Consortium on Landslides adopted in 2002. Based on IPL-C100, the founding issue of *Landslides* was published in April 2004. *Landslides* significantly developed from 2004 (Quarterly, 300 pages/year) to 2022 (Monthly, 4,000 pages/year). The 2021 Journal Impact Factor was 6.153.

The ICL and the UNITWIN Network organized a Round Table Discussion at the United Nations University, Tokyo, Japan to promote the IPL in January 2006, and adopted “**2006 Tokyo Action Plan**” Strengthening Research and Learning on Landslides and Related Earth System Disasters for Global Risk. The Action Plan was well evaluated, and the ICL exchanged a Memorandum of Understanding with each UNESCO, WMO, FAO, UNU, UN/ISDR (UNDRR), ICSU (ISC) and WFEO. The Tokyo Action Plan established a new International Programme on Landslides with the Global Promotion Committee of IPL. The current logo of IPL was made based on the Tokyo Action Plan.

Irina Bokova, Director General of UNESCO attended the Third World Landslide Forum and handed over the certificates to the leaders of World Centre on Excellence in 2014, and wrote a Foreword to the five volumes of books of WLF4 “Advancing Culture of Living with Landslides.”

ISDR-ICL Sendai Partnerships 2015-2025 for global promotion of understanding and reducing landslide disaster risk was proposed by the ICL under the strong support from UNESCO during the 3rd World Conference on Disaster Risk Reduction in Sendai, Japan. It was established with signing by the ICL, UNESCO, Kyoto University, UNISDR, WMO, FAO, UNU, ICSU, WFEO, IUGS,

IUGG, Government of Japan, Italy and Croatia. UNESCO took major role to create the Sendai Partnerships 2015-2025.

Sendai Landside partnership 2015-2025 must be terminated at 2025. However, a global cooperation to promote landslide disaster risk reduction is important after 2025. The ICL and the network planned to establish a new global and long-standing framework continuing after the Sendai Partnerships. Thus, the Kyoto Landslide Commitment 2020 for global promotion of understanding and reducing landslide disaster risk (KLC2020) was proposed by the ICL and the Network and launched on 5 November 2020 during the 2020 ICL-IPL Online/virtual conference in Kyoto, Japan. Representatives from 90 organizations including David Malone, UN Under-Secretary-General, Miguel Clusener-Godt, Director, Division of Ecological and Earth Sciences, UNESCO, Juichi Yamagiwa, President of Kyoto University signed it.

The Fifth World Landslide Forum (WLF5) was organized in the hybrid mode with onsite, online, pre-recorded presentations from 2 to 6 November 2020 in Kyoto, Japan. A total of 525 persons from 46 countries/regions, five United Nations Organizations and three global scientific organizations joined WLF5. A High-level panel discussion “Review of KLC2020 and the way forward” was organized on 3 November 2021. As the result of the high-level panel discussion, Launching Declaration of the ICL Open Access Book Series “Progress in Landslide Research and Technology” for the Kyoto Landslide Commitment 2020 was adopted by the panelists and participants of WLF5.

Ms Shamila Nair-Bedouelle, Assistant Director-General for Natural Sciences of UNESCO presented the opening greeting of WLF5 and Soichiro Yasukawa (Chief of Disaster Risk Reuction Unit of UNESCO) as a panelist of the high-level panel stressed the significance of the open access book series to successfully promote the Kyoto Landslide Commitment. He has published his paper “Establishment of the Disaster Risk Reduction Unit in UNESCO and UNESCO’s contribution to Global Resilience” in the founding issue (Vol.1, No.1) of *Progress in Landslide Research and Technology*.

UNESCO CHAIR on Prevention and Sustainable Management of Geo-hydrological Hazards of the University of Florence

- The Chair participates to several national and international missions, in collaboration with UNESCO and official partners, to promote the protection of the World’s cultural heritage threatened by geo-hydrological hazards, some of which part of the UNESCO World Heritage list, especially in developing countries: Afghanistan (Bamyan, Herat, Shar-E-Zohak), Kyrgyzstan, Mongolia, Georgia (Vardzia, Vanis Kvabebi, Uplithsikhe, David Gareja and Katskhi), Giordania (Petra), Egypt, Ethiopia (Lalibela), Madagascar (Antananarivo), North Korea (Kogurio), Myanmar (Kyaiktiyo Pagoda), Nepal (Lumbini), Bolivia (Tiwanaku), Chile (Rapa Nui, Easter Island). Regardless the Covid-19 restrictions three international missions were carried out in the analysed period:
 - 20-25/10/2021: laser scanning, thermographic surveys and field inspections in the reupestrian sites of Vardzia, Vanis Kvabebi and David Gareja in Georgia, in the framework of the collaboration with the Italian Institute for Environmental Protection and Research (ISPRA), Ilia State University and the National Agency for Cultural Heritage Preservation of Georgia (NACHPG).
 - 4-10/12/2021: geomorphological, geomechanical and thermographic surveys in the area of AIUla (Saudi Arabia) focused on the protection and conservation problems related to the landslide hazard in the sites of AIUla Old Town, Dadan and Hegra (world heritage UNESCO). The activities, in collaboration with Ispra, were coordinated by RCU (Royal Commission for Alula) and Afalula (French Agency for AIUla development).
 - 3-13/09/2022: field surveys in the High City of Antananarivo (Madagascar) for landslide vulnerability assessment, and presentation of the outcomes of 5 years of activity of landslide hazard assessment to the Antananarivo municipality (in collaboration with Paris Region Expertise Madagascar and RC-Heritage).

Amrita Vishwa Vidyapeetham:

Under UNESCO Chair on Experiential Learning for Sustainable Innovation and Development following international events were conducted and proceedings were released :

- International Symposium on Tsunami Risk Reduction & Community Resilience (ISTRR'20)
- International Symposium on Water Sustainability: Challenges, Technologies & Opportunities (IWSS 2021)
- International Symposium on IoT & ML for Ecosystem Restoration & Multi-hazard Resilience (ISIM 2021)
- International Symposium on Educational Pedagogies & Technologies for Sustainable Development (EPTS 22)
- International Symposium on Water Sustainability: Challenges, Technologies & Opportunities (IWSS 2022)

Institute of Geography, National Autonomous University, UNAM (ICL World Centre of Excellence, UNITWIN Partner Institution):

- Prof. Irasema Alcántara-Ayala is member of the Geo-Hazards Scientific Committee of the International Earth Sciences Program of UNESCO.

f) Other

(any other activities to report)

UNESCO CHAIR on Prevention and Sustainable Management of Geo-hydrological Hazards of the University of Florence:

The Earth Sciences Department of the University of Firenze (UNIFI) is the official Centre of Competence of the Italian Civil Protection for Remote Sensing and Geohazards (Directive of the Italian Prime Minister of 27 February 2004; Decree of the Head of the Italian National Civil Protection Department no. 252 of 26 January 2005); this achievement was confirmed four consecutive times: in 2007, 2011, 2013, 2018 and 2021 respectively.

The Chair has contributed to the volumes entitled "Understanding and Reducing Landslide Disaster Risk", published between late 2020 and early 2021 which are:

- Vol.1 Sendai Landslide Partnerships and Kyoto Landslide Commitment (Editors: Kyoji Sassa, Matjaz Mikos, Shinji Sassa, Peter Bobrowsky, Kaoru Takara, Khang Dang)
- Vol.2 From mapping to hazard and risk zonation (Editors: Fausto Guzzetti, Snjezana Mihalic Arbanas, Paola Reichenbach, Kyoji Sassa, Peter Bobrowsky, Kaoru Takara)
- Vol.3 Monitoring and early warning (Editors: Nicola Casagli, Veronica Tofani, Kyoji Sassa, Peter Bobrowsky, Kaoru Takara)
- Vol.4 Testing, modelling and risk assessment (Editors: Binod Tiwari, Kyoji Sassa, Peter Bobrowsky, Kaoru Takara)
- Vol.5 Catastrophic landslides and Frontier of Landslide Science (Editors: Vit Vilimek, Fawu Wang, Alexander Strom, Kyoji Sassa, Peter Bobrowsky, Kaoru Takara)
- Vol.6 Specific topics in landslide science and applications (Editors: Zeljko Arbanas, Peter Bobrowsky, Kazuo Konagai, Kyoji Sassa, Kaoru Takara)

Amrita Vishwa Vidyapeetham:

- Landslides Early Warnings during 2021 and 2022: Data from our IoT system for landslide

monitoring showed possible conditions for landslides and landslide warnings were issued on 28th June 2022 in Sikkim, and warnings in July 2021 and July-Aug 2022 in Munnar. After the issuing of early warnings the landslides that had occurred after the warnings in the surroundings, validates the reliability of early warnings from our IoT system.

- Using Landslides Tracker Mobile Application during 2021 and 2022 Monsoon: The Landslide tracker application was used by volunteers to share the location of landslides and rains across the world. The volunteers were able to upload the location, event date, images, comments and answer questions. The volunteers can also update the information. The application presents the available events to all the users through the map and list interface.
- Research initiatives at Amrita: As part of the PhD in sustainable development, along with the IoT system for landslide monitoring and Early Warning, research were carried out in the areas of
 - Regional and catchment scale vulnerability assessment and landslide mapping
 - Decision support system for early warning of landslides
 - Characterization of geological settings contributing to increased landslide susceptibility
 - Hydro-geomechanical models and improved early warning systems

3. Future Plans and Development Prospects:

Outline of action plan for the next biennium and short/medium and long-term development prospects. Please do not hesitate to refer to difficulties that the Chair has experienced

(Not exceeding 300 words)

ICL headquarters.

The ICL headquarters will publish a new open access book series “Progress in Landslide Research and Technology” to promote the Kyoto Landslide Commitment 2020 from 2022.

- Vol.1, No.1 and Vol.1, No.2 have been edited. Both are under production by publisher at present, both will be published online and in print within December 2022.
- Vol.2, No.1 and Vol.2, No.2 will be published in 2023.
- The Sixth World Landslide Forum (WLF6) will be organized on November 14-17th, 2023, Florence, Italy.

Themes and sessions

The Forum is organized in the following six scientific Themes:

Theme 1: Kyoto Landslide Commitment for sustainable development

Coordinators: Kyoji Sassa, Matjaž Mikoš, Shinji Sassa, Khang Dan

Theme 2: Remote sensing, monitoring and early warning

Coordinators: Veronica Tofani, Michel Jaboyedoff, Jan Klimes, Hans-Balder Havenith

Theme 3: Testing, modeling and mitigation technique

Coordinators: Binod Tiwari, Kazuo Konagai, Sabatino Cuomo, Xuanmei Fan

Theme 4: Mapping, hazard, risk assessment and management

Coordinators: Paola Reichenbach, Snježana-Mihalić Arbanas, David Huntley, Maneesha Ramesh

Theme 5: Climate change, extreme weather, earthquakes and landslides

Coordinators: Vít Vilímek, Alexander Strom, Stefano Luigi Gariano, Dalia Kirschbaum

Theme 6: Progress in landslide science and applications

Coordinators: Zeljko Arbanas, Fawu Wang, Faisal Fathani, Beena Ajmera

UNESCO CHAIR on Prevention and Sustainable Management of Geo-hydrological Hazards of the University of Florence

The activities foreseen will be in line with the UN 2030 Agenda for sustainable development and

Sustainable Development Goals and with the UNISDR Sendai Framework (2015-2013). In particular, these will include:

- To promote the development of innovative technologies for the prevention and mitigation of geo-hydrological hazards with special emphasis to research and technological development and transfer of knowledge through the organization of stakeholders workshop on geo-hydrological hazards assessment;
- To develop tools and procedures for supporting risk reduction policies and emergency management for the safety of human life through the development of early warning systems and toolkit for disaster response preparedness. Both these objectives will be achieved by managing and developing the current projects and partnerships with scientific institutions, research centers, public administrations and technical stakeholders for research and innovation
- To promote the protection of cultural heritage threatened by geo-hydrological hazards through scientific mission in less developed countries and capacity building through short-term training and practical field training. This activity will include the update, check, management and implementation of the mitigation measures for geo-hydrological hazard reduction in all the Cultural Heritage sites under investigation.
- To promote research and training at international level by hosting more workshops, conferences and seminars, as well as by offering scientific facilities to post-graduated students and visiting researchers through scientific networking and professional training and continuous risk reduction.

As a contribution to KLC2020, the Chair, as a member of ICL, has promoted a new series of open access books "Progress in Landslide Research and Technology". The series was launched during the round table "Review of KLC2020 and the way forward" on November 3, 2021 as part of the 5th World Landslides Forum. The ICL open access book series provides a common platform for publishing recent advances in landslide research and technology for practical applications and the benefit of society. The book series contributes to the Kyoto Landslide Commitment 2020, which is expected to continue until 2030 and beyond, to promote global understanding and reduction of landslide disaster risk, as well as to address the Sustainable Development Goals of the 2030 Agenda. Contributions include original and review articles, technical notes and case studies, educational tools for promoting understanding and reducing the risk of landslide disasters. The first two issues of the series will be published in December 2022.

The UNESCO Chair will organize the 6th World landslide Forum (WLF6), to be held in Florence (Italy), from the 14th to the 17th of November 2023. The Forum will have the subtitle "Landslide Science for Sustainable Development", and will focus on 6 main themes:

- Theme 1: Kyoto Landslide Commitment for sustainable development
- Theme 2: Remote sensing, monitoring and early warning
- Theme 3: Testing, modeling, and mitigation techniques
- Theme 4: Mapping, hazard, risk assessment and management
- Theme 5: Climate change, extreme weather, earthquakes, and landslides
- Theme 6: Progress in landslide science and applications

University of Ljubljana, Ljubljana, Slovenia:

Supporting organisation of the 6th World Landslide Forum in Florence, Italy in September 2023, and the 6th Regional Symposium on Landslides in the Adriatic-Balkan Region to be held in 2023.

Chair's efforts will also be focused on the Kyoto 2020 Landslide Commitment, specifically to its further implementation and development in the sense of supporting Sendai Framework for DRR 2015-2030 & UN Agenda 2030 Sustainable Development Goals Nr. 13 & 17, being also related to SDGs 6 & 9.

We will support the activities of the Global Promotion Committee of the International Program on Landslides and the 2020 Kyoto Landslide Commitment (GPC/IPL-KLC) by chairing this body.

We will support the open-access publishing policy, also by contributing articles to the ICL journal Landslides and ICL new book series Progress in Landslide Research and Technology, both published by Springer Nature, and by executing editorial duties for both.

UNESCO Chair at University of Ljubljana will be further supporting also activities of the UNESCO IHP Programme:

- Supporting the activities of the Slovenian National Committee for IHP UNESCO (since December 2019, UNESCO WRDRR Chairholder is also chairing the NC IHP UNESCO in Slovenia and is a member of the Slovenian National Commission for UNESCO, and two more members of the UNESCO WRDRR Chair are members of the Slovenian NC IHP UNESCO).
- We will support the work of IHP Council in Paris. We will support the IHP project World's Large Rivers Initiative (WLRI).
- We will further on develop and intensify our research activities in experimental basins and cooperation in the Euro-Mediterranean Network of Experimental and Representative Basins (ERB, <https://erb-network.simdif.com/>).
- UNESCO Chair in WRDRR will contribute to the implementation of the UNESCO IHP-IX Programme by contributing to the declared outputs (such as to the planned multi-lingual Glossary on Waters), and continue to support activities of other UNESCO chairs within the existing network, especially through the ICL community in the field of landslide risk reduction, and through already established cooperation within the international hydrology community.
- Maintenance and development of the existing experimental river basins in Slovenia.

We will support the forthcoming 4th Congress on Waters in Slovenia to be held tentatively in 2023.

We will further be supporting publishing of the SCOPUS journal Acta hydrotechnica.

We will further support all kind of national and international University of Ljubljana educational efforts and activities in the field of hydrological sciences and integrated water management, as well as in flood risk management and community (society) capacity building and development through risk dialogue with diverse stakeholders.

UNESCO WRDRR Chair will lead an internal project to establish a Concept for Sustainable Development of the University of Ljubljana.

Northeast Forestry University:

The Geological environment risk research plan for permafrost degraded areas in Northeast China(GERRP) was launched. Through cooperation with IRDR (Integrated Research on Disaster Risk), as well as IPL-WCoE ICL-CRLN (International Consortium on Landslides – Cold Regions Landslide Network), ICGdR(International Consortium on Geo-disaster Reduction)academic activities and the regular academic symposium, shared a case study on geological and environmental changes in the permafrost region of Northeast China. The main goal of establishing a platform for researchers and decision makers is to work together to find actionable policies to promote research on disaster risk and mitigation in permafrost areas in the context of climate change.

Collaborating with network members to apply for international projects.

Landslide group in National Central University from Graduate Institute of Applied Geology, Department of Civil Engineering, Center for Environmental Studies. Chinese Taipei:

- Supporting the activities of the Global Promotion Committee of the International Program on Landslides and the 2020 Kyoto Landslide Commitment (GPC/IPL-KLC) by chairing this body.
- Supporting organisation of the 6th World Landslide Forum in Florence, Italy in September 2023,
- Will be participating in the 2022 ICL-IPL Kyoto Conference
- To promote research and training at international level by hosting more workshops, conferences and seminars, as well as by offering scientific facilities to post-graduated students and visiting researchers through scientific networking and professional training and continuous risk reduction.

Institute of Geography, National Autonomous University, UNAM (ICL World Centre of Excellence, UNITWIN Partner Institution):

- Will contribute to advance investigations on landslide risk perception
- Will continue to research strategies for landslide disaster risk communication
- Will collaborate with the Latin America and Caribbean Office of UNDRR to prepare the Regional Platform on Disaster Risk Reduction in 2023
- Will support training for young scholars on landslide integrated disaster risk research from inter and

transdisciplinary perspectives.

Appendix:**1) Human Resources****Disaster Prevention Research Institute, Kyoto University (host institution)**

Ryosuke Uzuoka: Professor of the Disaster Prevention Research Institute, Kyoto University.
Kaoru Takara: Specially appointed professor, Disaster Prevention Research Institute, Kyoto University

International Consortium on Landslides (ICL)

ICL consists of ICL headquarters and 60 ICL full member organizations and 19 ICL associates, 12 supporters and 20 KLC2020 official promoters.

ICL Headquarters (host institution)

Kyoji Sassa: Professor Emeritus, Director General (Landslide Dynamics)
Kaoru Takara: Professor Emeritus, Managing Director (Hydrology and Hydrogeology)
Kazuo Konagai: Professor Emeritus, Scientific Director (Civil Engineering)
Shinji Sassa: Head of Soil Dynamics Group, Port and Airport Research Institute, National Institute of Maritime, Port and Aviation Technology, Japan. Publication Director (Soil Dynamics)
Satoru Nishikawa: Auditor
Binod Tiwari: Auditor
Zeljko Arbanas: Journal Publication
Khang Dang: University of Science, Vietnam National University, Research Promotion Officer (Landslide Dynamics)
Loi Doan: Researcher (Landslide dynamics)
Kiyoharu Hirota: Information officer (Geology)
Salvano Briceno: ICL Senior advisor
Badaoui Rouhban: IPL advisor
Nicola Casagli: KLC2020 advisor
Jagath Guntilake: Sri Lanka-Japan Research Center, Peradeniya University, ICL Advisor
Ikuo Towhata: ICL-Japan advisor
Hiroataka Ochiai: ICL advisor (Mountain Disaster)
Satoshi Tsuchiya: ICL advisor (Sabo Engineering)
Mie Ueda: Secretary (Accountant)
Kumiko Fujita : Secretary (general affairs)

UNESCO Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of University of Florence (ICL World Centre of Excellence, UNITWIN Partner Institution)

Paolo Canuti Chair Holder
Nicola Casagli Deputy Chairholder
Fabio Castelli Deputy Chairholder
Veronica Tofani Program Coordinator
Filippo Catani Chair Associate
Carlo Alberto Garzonio Chair Associate
Sandro Moretti Chair Associate
Luca Solari Chair Associate
Silvia Bianchini Chair Associate
Enrica Caporali Chair Associate
Riccardo Fanti Chair Associate
Giovanni Gigli Chair Associate
Federico Raspini Chair Associate
Massimo Rinaldi Chair Associate
Grazia Tucci Chair Associate
Enio Paris Chair Associate

Chiara Arrighi Chair Associate
 Valentina Bonora Chair Associate
 Tommaso Carlà Chair Associate
 Pierluigi Confuorto Chair Associate
 Matteo Del Soldato Chair Associate
 Federico Di Traglia Chair Associate
 Simona Francalanci Chair Associate
 William Frodella Chair Associate
 Emanuele Intrieri Chair Associate
 Andrea Masiero Chair Associate
 Francesco Mugnai Chair Associate
 Ascanio Rosi Chair Associate
 Samuele Segoni Chair Associate
 Ignazio Becchi Adjunct Professor
 Giorgio Valentino Federici Adjunct Professor
 Claudio Margottini Adjunct Professor
 Daniele Spizzichino Adjunct Professor
 Anna Elisa Bandecchi Chair Research Assistant
 Elisa Gargini Chair Research Assistant
 Luca Lombardi Chair Research Assistant
 Silvia Massagni Chair Research Assistant
 Massimiliano Nocentini Chair Research Assistant
 Teresa Nolesini Chair Research Assistant
 Guglielmo Rossi Chair Research Assistant
 Luca Tanteri Chair Research Assistant
 Melania Scacciati Chair Research Assistant
 Gabriele Scaduto Chair Research Assistant
 The UNESCO Chair staff is composed by 1 Chair Holder, 2 Deputy Chair Holders, 1 Program Coordinator, 25 Chair Associates, 4 Adjunct Professors and 10 Research Assistants

UNESCO WRDRR Chair University of Ljubljana (ICL World Centre of Excellence, UNITWIN

Partner Institution)

Matjaž Mikoš: Professor – Chair holder (Hydrology, Hydraulic Engineering)
 Mitja Brilly: Professor Emeritus (Hydrology)
 Ana Petkovšek: retired Associate Professor (Engineering Geology)
 Janko Logar: Associate Professor (Geotechnical Engineering)
 Mojca Šraj: Professor (Hydrology)
 Andrej Kryžanowski: Assistant Professor (Hydraulic Engineering)
 Simon Rusjan: Assistant Professor (Hydraulic Engineering)
 Dušan Petrovič: Assistant Professor (Geodetic Engineering)
 Matej Maček: Assistant Professor (Geotechnical Engineering)
 Nejc Bezak: Assistant Professor Dr. (Hydrology)
 Dejan Grigillo: Assistant Dr. (Geodetic Engineering)
 Jasna Smolar: Assistant Dr. (Geotechnical Engineering)
 Mateja Klun: Assistant Dr. (Hydraulic Engineering)
 Kladija Lebar: Researcher Dr. (Hydrology)
 Katarina Zabret: Researcher Dr. (Hydrology)
 Matej Radinja: Researcher Dr. (Urban Hydrology)
 Sašo Petan: Researcher Dr. (Hydrology)
 Jošt Sodnik: Senior Lecturer Dr. (Hydraulic Engineering)
 Timotej Jurček: PhD Student (Geotechnical Engineering)
 Tamara Kuzmanić: PhD Student (Hydraulic Engineering)
 Yasser Ghafoori: PhD Student (Hydraulic Engineering)
 Mark Bryan Alivio: PhD Student (Hydrology)

Northeast Forestry University (ICL World Centre of Excellence, UNITWIN Partner Institution)

Wei Shan: Professor Dr. (Hydrogeology and Engineering Geology)
 Ying Guo: Associate Professor Dr. (Soil physics and soil mechanics)
 Yanqiu Xing: Professor Dr. (Remote Sensing Geology)
 Chengcheng Zhang: Engineer Dr. (Geophysics)

Czech Landslide Group (ICL World centre of Excellence, UNITWIN Partner Institution)

Josef Stemberk (Engineering Geology)
 Vít Vilímek (Geomorphology)
 Jana Smolíková (Geomorphology)
 Jan Klimeš (Engineering Geomorphology)
 Jan Blahůt (Engineering Geomorphology)
 Jan Balek (Engineering Geomorphology)

International Consortium on Geo-disaster Reduction (ICGdR)

ICGdR consists of 61 full member organizations, 11 individual members from 13 nations.
 ICGdR Organization Members:

1. University of Liege (Representative: Hans-Balder HAVENITH)
2. Faculty of Land Resource Engineering, Kunming University of Science and Technology (Representative: Guangzhu CAO)
3. Department of Geotechnical Engineering, Tongji University (Representative: Yonggui CHEN) Department of Geological Engineering, Southwest Jiaotong University (Representative: Qiangong CHENG) Department of Hydraulic Engineering, Tsinghua University (Representative: Yifei CUI)
4. School of Architectural Engineering, Beijing University of Technology (Representative: Fuchu DAI)
5. School of Civil Engineering, Southeast University (Representative: Guoliang DAI)
6. College of Water Resources and Hydropower, Sichuan University (Representative: Jianhui DENG)
7. Department of Civil Engineering, National Taiwan University (Representative: Louis GE)
8. State Key Laboratory of Lake Science and Environment, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences (Representative: Bin HE)
9. Chinese Society for Rock Mechanics and Engineering (CSRME) (Representative: Manchao HE)
10. Institute of Mountain Hazards and Environment, Chinese Academy of Sciences (Representative: Siming HE)
11. School of Civil Engineering, Qingdao University of Technology (Representative: Yong HONG)
12. State Key Laboratory of Geomechanics and Geotechnical Engineering, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences (Representative: Mingjian HU)
13. China Three Gorges University (Representative: Bolin HUANG)
14. College of Civil Engineering, Tongji University (Representative: Yu HUANG)
15. Shandong Provincial Key Laboratory of Marine Environment and Geological Engineering, Ocean University of China (Representative: Yonggang JIA)
16. Three Gorges Research Center for Geo-Hazards, China University of Geosciences (Wuhan), Ministry of Education (Representative: Wenxing JIAN)
17. Institute of Geographic Sciences and Natural Resources Research (IGSNRR), Chinese Academy of Sciences (Representative: Hengxing LAN)
18. School of Geological Engineering and Geomatics, Chang'an University (Representative: Tonglu LI)
19. International Institute for Hydroinformatics and Hazard Resilience (IIHHR), Hebei University of Engineering (Representative: Qinhua LIANG)
20. College of Surveying and Geo-Informatics, Tongji University (Representative: Chun LIU)

21. Research Center of Plateau Disaster Reduction and Emergency Management, Qinghai Normal University/Academy of Plateau Science and Sustainable, People's Government of Qinghai Province & Beijing Normal University, China (Representative: Fenggui LIU)
22. Department of Geo-science and Engineering, Experiment Center of Earth Science, Taiyuan University of Technology (Representative: Jianhui LONG)
23. School of Civil and Hydraulic Engineering, Dalian University of Technology (Representative: Tingkai NIAN)
24. Institute of Geology and Geophysics, Chinese Academy of Sciences (Representative: Shengwen QI)
25. KeyLaboratory of Earthquake Engineering and Engineering Vibration, Institute of Engineering Mechanics, China Earthquake Administration (Representative: Wenhao QI)
26. Institute of Cold Region Science and Engineering, Northeast Forestry University (Representative: Wei SHAN)
27. China Institute of Disaster Prevention (Representative: Jun SHEN)
28. China Geological Survey (Representative: Jusong SHI)
29. IMWA China National Commission (IMWA-CNC) (Representative: Wanghua SUI)
30. Institute of Geomechanics, Chinese Academy of Geological Sciences (Representative: Ping SUN)
31. Liaoning Investigation Institute of Hydrogeology and Engineering Geology (Representative: Shuheng SUN)
32. School of Earth Sciences and Engineering, Nanjing University (Representative: Chao-Sheng TANG)
33. School of Civil Engineering, Tongji University (Representative: Fawu WANG)
34. School of Civil Engineering and Mechanics, Huazhong University of Science and Technology (Representative: Huabin WANG)
35. College of Civil Engineering & Architecture, China Three Gorges University (Representative: Shimei WANG)
36. Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences (Representative: Qingbai WU)
37. School of Naval Architecture, Ocean and Civil Engineering, Shanghai Jiao Tong University (Representative: Aiguo XING)
38. National Institute of Natural Hazards, Ministry of Emergency Management of China (Representative: Chong XU)
39. State Key Laboratory of Geohazard Prevention & Geoenvironment Protection, Chengdu University of Technology (Representative: Qiang XU)
- 40.
41. School of Construction Engineering, Jilin University (Representative: Yan XU)
42. Institute of Geomechanics, Chinese Academy of Geological Sciences (Representative: Xin YAO)
43. Institute of Rock and Soil Mechanics, Chinese Academy of Sciences (Representative: Jianhong YE)
44. Institute of Geology, China Earthquake Administration (Representative: Renmao YUAN)
45. Faculty of Science, Charles University in Prague (Representative: Vít VILIMEK)
46. Laboratoire de Géographie Physique, Meudon / University of Strasbourg (Representative: Patrick WASSMER)
47. Faculty of Engineering, Universitas Gadjah Mada (Representative: Teuku Faisal FATHANI)
48. Department of Civil Engineering, Universitas Muhammadiyah Yogyakarta (Representative: Agus Setyo MUNTOHAR)
49. Department of Earth Sciences, University of Firenze (Representative: Nicola CASAGLI)
50. GEG (Geotechnical Engineering Group), University of Salerno, Italy (Representative: Sabatino CUOMO)
51. Center for Disaster Management Informatics Research, Ehime University (Representative: Netra Prakash BHANDARY)
52. Study Group of Deformation Restraint by Geosynthetics (Representative: Mikio KUBO)

53. School of Environmental Design, Kanazawa University (Representative: Masakatsu MIYAJIMA)
54. Fukui College, National Institute of Technology (Representative: Masaho YOSHIDA)
55. Korea Institute of Geoscience and Mineral Resources (KIGAM) (Representative: Pyeong Koo LEE)
56. Institute of Geomechanics and Mining, National Academy Sciences of the Kyrgyz Republic (Representative: Isakbek TORGOEV)
57. Tribhuvan University (Representative: Ranjan Kumar DAHAL)
58. Risk-group, Institute of Earth Sciences, University of Lausanne (Representative: Michel JABOYEDOFF)
59. Winter Associates (Representative: Mike WINTER)
60. Collage of Engineering and Computer Science, California State University Fullerton (Representative: Binod TIWARI)
61. Iowa State University of Science and Technology (Representative: Beena AJMERA)

ICGdR Individual Member

Ningsheng CHEN (Institute of Mountain Hazards and Environment, Chinese Academy of Sciences)
 Zili DAI (Shanghai University, China)
 Bin LI (Chinese Academy of Geological Science)
 Wuwei MAO (Tongji University, China)
 Jidong TENG (Central South University, China)
 Nicola TROCCOLI (IN.CO. spa, Ingegneri Consulenti, Italy)
 Haiqing YANG (Chongqing University, China)
 Yingbin ZHANG (Southwest Jiaotong University, China)
 Tengyuan ZHAO (Xi'an Jiaotong University, China)
 Hu ZHENG (Tongji University, China)
 Lu ZHENG (Fuzhou University, China)

Landslide group in National Central University from Graduate Institute of Applied Geology, Department of Civil Engineering, Center for Environmental Studies. Chinese Taipei

Yong-Ming Tien Professor (Geotechnical Engineering)
 Ray-Shyan Wu Professor (Water Resource Engineering)
 Jia-Jyun Dong Professor (Engineering Geology)
 Chuen-Fa Ni Professor (Engineering Geology)
 Hsien-Ter Chou Professor (Water Resource Engineering)
 Shu-Kun Hsu Professor (Oceanography)
 Chung-Pai Chang (Remote Sensing)
 Tso-Ren Wu Professor (Water Resource Engineering)
 Wen-Chao Huang Professor (Geotechnical Engineering)
 Wen-Yi Hung Professor (Geotechnical Engineering)
 Chih-Chung Chung Associate Professor (Geotechnical Engineering)

Croatian Landslide Group (ICL World Centre of Excellence, UNITWIN Partner Institution)

Željko Arbanas: Professor (Soil Mechanics and Geotechnical Engineering)
 Snježana Mihalić Arbanas: Professor (Engineering Geology)
 Vedran Jagodnik, Assistant Professor (Soil Mechanics and Geotechnical Engineering)
 Sanja Dugonjić Jovančević, Assistant Professor (Soil Mechanics and Geotechnical Engineering)
 Martin Krkač, Associate Professor (Engineering Geology)
 Martina Vivoda Prodan, Assistant Professor (Soil Mechanics and Geotechnical Engineering)
 Sanja Bernat Gazibara, Postdoc Researcher (Engineering Geology)
 Petra Jagodnik, Lecturer (Engineering Geology)

Josip Peranić, Postdoc Researcher (Soil Mechanics and Geotechnical Engineering)
 Sara Pajalić, Researcher (Soil Mechanics and Geotechnical Engineering)
 Hrvoje Lukačić, Researcher (Engineering Geology)
 Marko Sinčić, Researcher (Engineering Geology)

Institute of Geography, National Autonomous University, UNAM (ICL World Centre of Excellence, UNITWIN Partner Institution):

Irasema Alcántara-Ayala: Professor Dr. (Geography and geomorphology)
 Ana Rosa Moreno: Prof. (Medicine and disaster risk communication)
 Javier Urbina: Prof. (Risk perception, psychology)
 Gabriel Legorreta: Associate Professor Dr. (Geography and geomorphology)
 Ricardo J. Garnica-Peña: Dr. (Geomorphology and Remote Sensing)
 Leobardo Domínguez-Morales: MSc. (Engineering and geology)
 Gema Velásquez-Espinoza: MSc. (Geology)
 César García: MSc. (Geography)
 Karla Hernández Cadena: Miss (Risk perception, psychology)

2) Financial Resources

<i>Please tick sources of financial contribution and specify the amount in U.S. dollars</i>	[tick]	Amount (\$)
Host Institution	<input checked="" type="checkbox"/>	___ 298,200 ___
Partner Institution	<input checked="" type="checkbox"/>	___ 200,000 ___
Government Body	<input checked="" type="checkbox"/>	___ 9,320,236 ___
Other Public Institution/Body (incl. Research Councils)	<input checked="" type="checkbox"/>	___ 3,962,600 ___
UNESCO	<input checked="" type="checkbox"/>	___ 20,000 ___
Other UN Agency	<input type="checkbox"/>	_____
IGO	<input checked="" type="checkbox"/>	___ 2,000,000 ___
NGO	<input checked="" type="checkbox"/>	___ 20,000 ___
Industry	<input checked="" type="checkbox"/>	___ 1,759,898 ___
Other Private	<input checked="" type="checkbox"/>	___ 369,785 ___

Give details of financial contributions, material resources and space.

A: Financial resources of ICL headquarters and major organizations within UNITWIN members for the current two years

ICL headquarters

Host Institution (298,200 USD)

Government Body (1,444,001 USD)

NGO (20,000 USD)

Industry (163,808 USD)

UNESCO Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards of the Florence University

Government Body (176,235 USD)

National Service of Civil Protection (1,452,600 USD)

Industry (96,090 USD)
Private companies (369,785 USD)

UNESCO Chair University of Ljubljana

Direct financial resources for UNESCO Chair are available as a part of the UL FGG research activities financed by the Slovenian National UNESCO Commission (20,000 USD) and specifically for the Chair's teaching activities through the Development Fund of the University of Ljubljana (200,000 USD).

Research activities of the Chair are partially supported by the Slovenian Research Agency through Grant P2-0180 (10,000 USD)

Government Body (UL FGG overall budget for teaching 7.7 million USD)

European Union (UL FGG for projects 2 million USD)

R&D Projects, mainly through Slovenian Research Agency (UL FGG for research projects and early-stage researchers 2.5 million USD)

Industry (UL FGG roughly 1.5 million USD)

B1: Material resources and space of the above organizations selected from 65 member organizations.

ICL headquarters

Major facilities provided by ICL to UNITWIN Programme are:

1) Undrained dynamic loading ring shear apparatus for large-scale landslides which was developed by UNITWIN programme (400,000 USD) for landslide hazard assessment with support of SATREPS (Science and Technology Research Partnerships for Sustainable Development) programme with Vietnam.

2) Transportable undrained dynamic loading ring shear apparatus for smaller landslides which was developed by UNITWIN programme (350,000 USD) for landslide hazard assessment with support of SATREPS (Science and Technology Research Partnerships for Sustainable Development) programme with Vietnam. It was developed by UNITWIN programme (300,000 USD) for landslide hazard assessment with support of SATREPS (Science and Technology Research Partnerships for Sustainable Development) programme with Croatia.

Major facilities provided by DPRI, Kyoto University to UNITWIN Programme is:

Dynamic geotechnical centrifuge at DPRI, Kyoto University, has been in operation since 1988. The geotechnical research group in Kyoto University has been supporting the centrifuge facility. Every year, from undergraduates, masters and doctoral students to post doctoral researchers from all over the world are working and sharing knowledge in the laboratory.

Major Facilities at UNESCO Chair in Florence:

Laboratories:

- GIS and thematic mapping laboratory
- Remote Sensing laboratory specialized on SAR interferometry, optical and hyperspectral remote sensing
- Rock and Soil mechanics laboratory

Equipment:

- GBInSAR monitoring systems
- UAV (Unmanned Aerial Vehicle, SATURN)
- Compact submarine remotely controlled (NEMO-ROV)
- Rock and soil mechanics field and laboratory equipment
- Advanced geotechnical and hydrogeological modelling software
- GPS and topographical survey instrumentation

- 3D laser scanner
- Access to real-time meteorological services
- Fieldspec spectroradiometer
- Infrared thermal Camera and UAV sensor
- Robotized total stations
- Electrical resistivity, electromagnetic and seismic surveying instrumentation
- Portable laser scanner

UAV Ground Penetrating Radar (GPR)

Facilities at Institute of Cold Regions Science and Engineering (ICRSE) in Northeast Forestry University, China:

ICRSE has two parts, ICRSE research center (ICRSE-RC) and ICRSE field observation stations (ICRSE-FOS). The facilities in ICRSE-RC mainly are low-temperature laboratory (20m²), automatic monitoring systems of soil temperature and moisture, triaxial and consolidation instruments and other indoor test equipment, ground penetrating radar, high-density electrical instrument, small rig, light touch detector, unmanned aerial vehicles. The facilities in ICRSE-R are automatic weather stations, automatic monitoring and transmission systems of soil temperature and moisture.

Facilities at Croatian Landslide Group (UNIRI-GF, UNIZG-RGNF):

Laboratories and Observatories:

Geotechnical Laboratory at the Faculty of Civil Engineering University of Rijeka:

Ring shear apparatus

Set of triaxial apparatus (static and dynamic)

Set of direct shear apparatus

Set of oedometers

Resonant column

Unsaturated direct shear apparatus

Triaxial apparatus for rock sample testing

Dynamic and static platforms for small scale landslide modelling

Observatory at the Konstanjek Landslide in Zagreb

Observatory at the Grohovo Landslide near Rijeka

B2: Space provided to UNITWIN Programme.

Spaces at UNITWIN Headquarters in Kyoto, Japan

- 1) UNITWIN Headquarters Building which was jointly constructed by ICL and Kyoto University in the Kyoto University Uji campus and donated to Kyoto University in 2004. It has three rooms, one meeting rooms, one IPL research room, one joint research room and book/journal storage.
- 2) ICL headquarters which is located in a side of the Kyoto University North campus. A room for UNITWIN Coordinator and the research promotion officer and two secretaries who promote and manage the International Programme on Landslides.
- 3) A new SATREPS Project from 2019-2025 has launched for the development of early warning technology of rain-induced long-travelling landslides (RLL) in Sri Lanka. A new ICL-SATREPS office (2 stories house was purchased and reformed for a laboratory for two ring shear apparatuses (1F), a research room and a meeting room (2F)) has launched from 14 December 2020 in 90 m apart from ICL headquarters.

Spaces at UNESCO Chair in Florence:

- 1) UNESCO Chair Headquarters Building in the University of Florence Campus of Arcetri with offices for 25 researchers and meeting room for 20 persons
- 2) Civil Protection Laboratories in the University of Florence Campus of Arcetri with 400 sqm of labs and a conference room for 40 persons
- 3) Engineering Geology Group in the University of Florence main Campus of Arcetri with offices and labs for 25 researchers

Spaces at UNESCO Chair in Ljubljana: 1) UNESCO Chair is hosted by the Faculty of Civil and Geodetic Engineering of the University of Ljubljana (UL FGG) – the Chair is in the building of the UL FGG Department of Environmental Civil Engineering at Hajdrihova ulica 28 in Ljubljana – the main UL FGG building is at Jamova cesta 2, Ljubljana. 2) UNESCO Chair also uses experimental river basins around Slovenia for applied hydrology research, established by the Chair of Hydrology and Hydraulic Engineering at UL FGG and plenty of field hydrologic and hydraulic equipment, as well as hydraulic and geotechnical (soil mechanics) laboratory available at the UL FGG, and its computer facilities. 3) Furthermore, remote sensing equipment such as TLS or UAV from the UL FGG Department of Geodesy is also available for the UNESCO Chair. 4) The Research Institute on Geo- and Hydro Threats at UL FGG established a Laboratory on Aggregates that is available to UNESCO Chair for research purposes.

Spaces at Institute of Cold Regions Science and Engineering in Northeast Forestry University, China: ICRSE has two parts, ICRSE research center (ICRSE-RC) has laboratories and conference rooms, a total of 400 m². Another is ICRSE field observation stations.

End of the Form