United Nations
Educational, Scientific and
Cultural Organization

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

UNESCO Chair experiences

Module 2 Virtual tour of the Earth Sciences Department: organization and activities

Veronica Tofani

http://unesco-geohazards.unifi.it

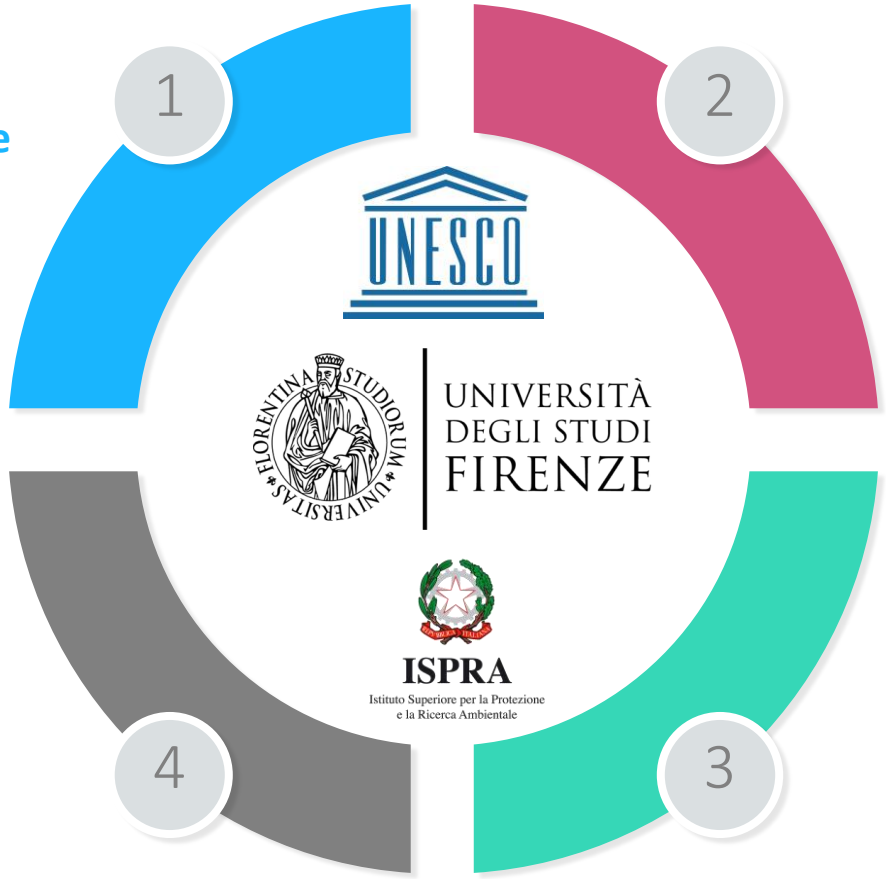
UNESCO Chair

To promote the development of innovative technologies for the prevention and mitigation of Geo-hydrological hazards

To develop tools and procedures for supporting risk reduction policies and emergency management for the safety of the human life

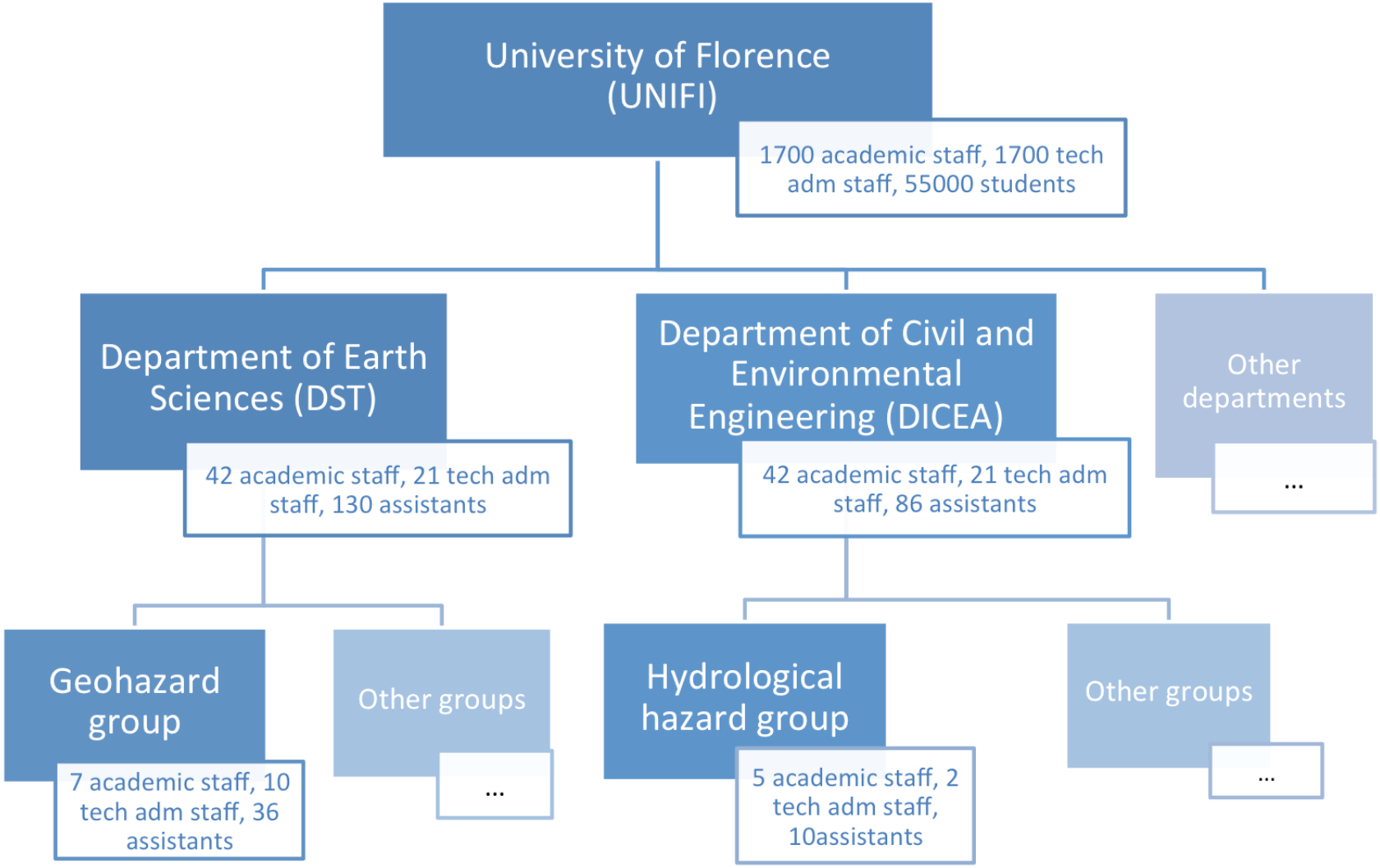
To promote research at international level by offering scientific facilities to post-graduated Students and visiting researchers

To promote the protection of cultural heritage threatened by geo-hydrological hazards



THE MISSION OF THE CHAIR IS TO PROMOTE RESEARCH AND DEVELOPMENT (R&D) FOR THE PREVENTION AND MANAGEMENT OF GEO-HYDROLOGICAL HAZARDS, IN ORDER TO SUPPORT POLICIES AND ACTIONS OF RISK REDUCTION

Host institution - organization



United Nations Educational, Scientific and Cultural Organization · UNESCO Chair on the Prevention and Sustainable Management of Geo-Hydrological Hazards, University of Florence, Italy

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

Italy - Florence

University of Florence

Founded in 1321, it is an important and influential centre for research and higher education in Italy, with 1700 academic and 1700 technical and administrative staff members, over 1600 research assistants and PhD students. It offers a wide range of study programmes at various levels and in all areas of knowledge: 126 Degree courses (First and Second Cycle, corresponding to Bachelor's and Master's Degrees) organized in 10 Schools, with a population of about 51000 enrolled students. Researchers at the University of Florence operate within 24 different departments and 40 research structures comprising inter-departmental and inter-university centres as well as specialized research, knowledge transfer and advanced training centres.

Prof. Paolo Canuti
Prof. Nicola Casagli

Paolo Canuti is the UNESCO Chairholder at the University of Florence, former Professor of Engineering Geology and Hydrogeology and Past President of the International Consortium of Landslides (ICL). He founded the Engineering Geology group at the University of Florence, which is now composed of more than fifty researchers.

Nicola Casagli is full professor of Engineering Geology at the University of Florence, Earth Sciences Department. He is Vice-president of the International Consortium on Geo-disaster Reduction (ICGdR) and Vice-president for Europe of the ICL. He is member of the National Commission for the Prevention of Major Risks of the Italian Government.

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SUSTAINABLE DEVELOPMENT GOALS

PREVENTION AND SUSTAINABLE MANAGEMENT OF GEO-HYDROLOGICAL HAZARDS

TO PROMOTE RESEARCH AND DEVELOPMENT FOR THE PREVENTION AND MANAGEMENT OF GEO-HYDROLOGICAL HAZARDS, IN ORDER TO SUPPORT POLICIES AND ACTIONS OF RISK REDUCTION

SUMMARY

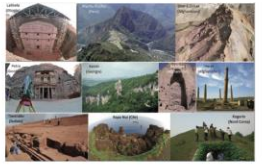
Geo-hydrological hazards are a major threat to human life, property, cultural heritage and the natural and built environments. Risk arises from the interplay of physical processes with social and cultural factors (urbanization, emergency planning, risk preparedness and knowledge). The Chair aims at the implementation of the Sendai Partnership 2015-2025, launched at the World Conference on Disaster Risk Reduction in Sendai by the International Strategy for Disaster Reduction (ISDR) and by the International Consortium on Landslides (ICL), for global promotion of understanding and reducing landslide disaster risk (also signed by UNESCO, the Italian Government and UN organizations). The Chair has been established at the Department of Earth Sciences (DST-UNIFI) and the Department of Civil and Environmental Engineering (DICEA-UNIFI). The DST-UNIFI is World Centre of Excellence (WCoE) on Landslide Risk Reduction (since 2008), member of the ICL (since its foundation in 2002), member of the International Consortium on Geodisaster Reduction (ICGdR) (since 2014), founding member of the Global Alliance of Disaster Research Institutes (GADRI) (since 2015).

Chair partners and supporters

CHAIR SPECIFIC OBJECTIVES

To promote the development of innovative technologies for the prevention and mitigation of geo-hydrological hazards: i) Research & Technological Development activities (monitoring and mapping, remote sensing & Earth Observation, development of prototypes, forecasting models); ii) Transfer of Knowledge (stakeholder workshops on geo-hydrological hazard assessment and risk reduction);
To develop tools and procedures for supporting risk reduction policies and emergency management for the safety of human life: i) Early warning systems (EWS) toolkits designed for geo-hydrological hazard; ii) Resilience Enhancement (toolkits for disaster response preparedness, building resilience of Megacities and rural communities); iii) Best practices of risk mitigation (toolkits and handbooks for risk awareness and risk reduction; emergency response simulation exercises);

To promote the protection of cultural heritage threatened by geo-hydrological hazards: i) Safeguard of cultural heritage at risk; ii) Capacity Building (short-term and practical field training); iii) Dissemination (international conferences, guidelines on best practices, book series);
To promote research at international level by offering scientific facilities to post graduated students and visiting researchers: i) Scientific Networking (yearly post graduate research training programme, visiting professorships and academic exchanges, UNESCO Chair PhD grants); ii) Establishment of exchange programs for early-stage researchers and virtual centre fro cross-fertilization of knowledge; iii) Professional Training and continuous education (risk education stages, joint field missions, professional handbooks and manuals).
All of the Chair objectives will be focused mainly in less developed countries.



MULTIDISCIPLINARY TRAINING

The Chair organizes a new International Academic Master Degree (in English language) on Geoengineering, with the joint competences of the all core members of the Chair, mainly focusing on training carried out by experts on prevention, management and mitigation of geo-hydrological hazards.

Objective 1: to promote the development of innovative technologies for the prevention and mitigation of geo-hydrological hazards

- Development of new technologies for monitoring and mitigation
- Geo-hydrological forecast models
- Quantitative evaluation of geo-hydrological risks

Equipment

ULTRALIGHT AIRCRAFT

HYPERSPECTRAL FIELDSPEC

THERMAL CAMERA

ANTIPOLLUTION DEVICE

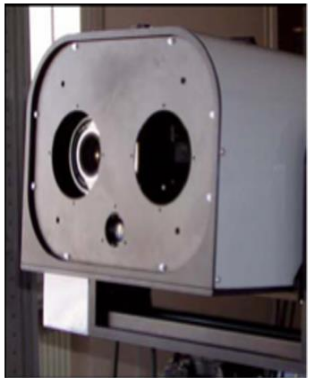
DRONE MULTICOPTER

ROBOTIZED UNDERWATER VEHICLE

Equipment

RADAR INTERFEROMETER

HYPERSPECTRAL SENSOR



SEISMOMETERS

3D LASER SCANNER

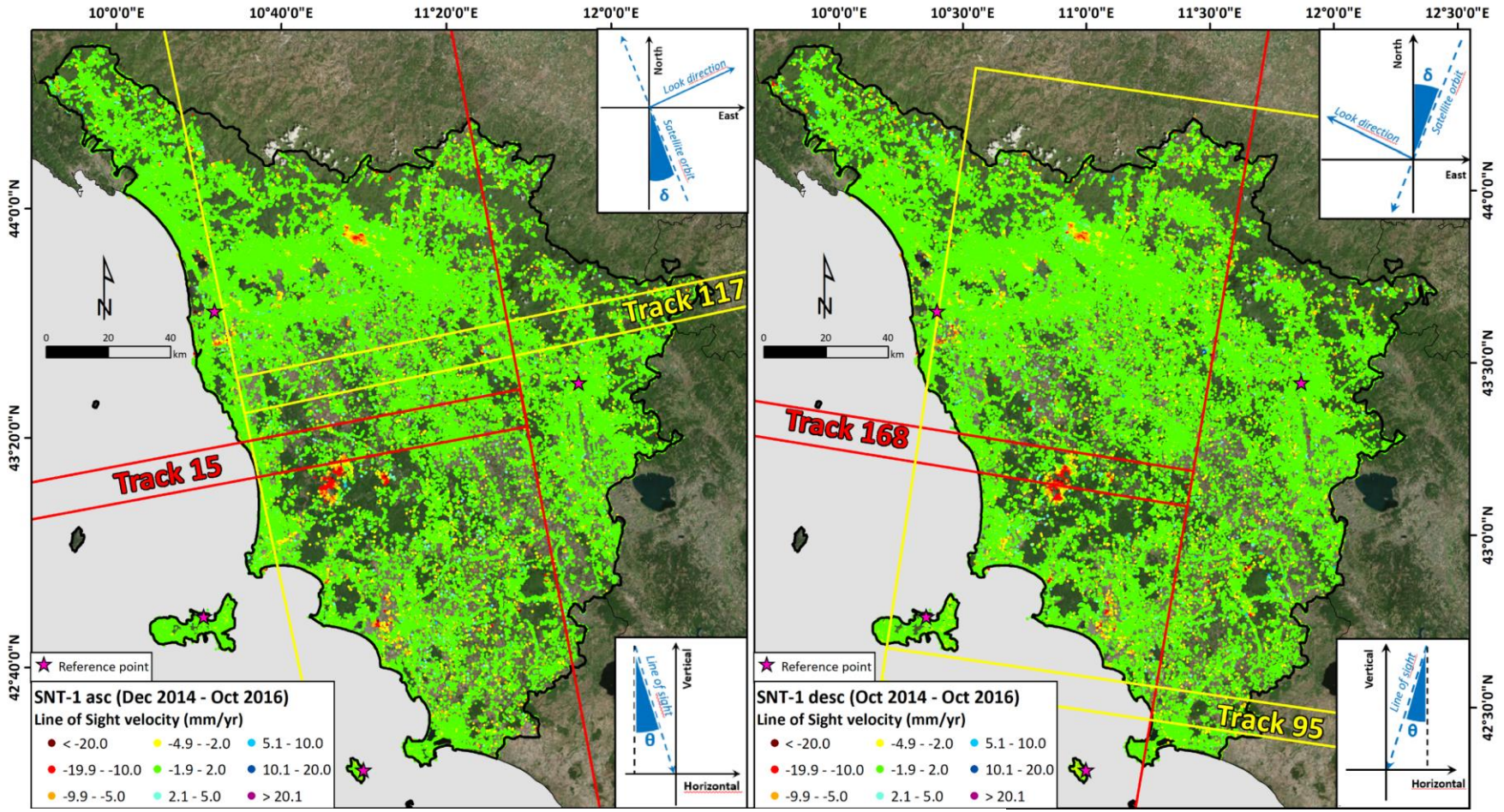
GPS SURVEY KIT

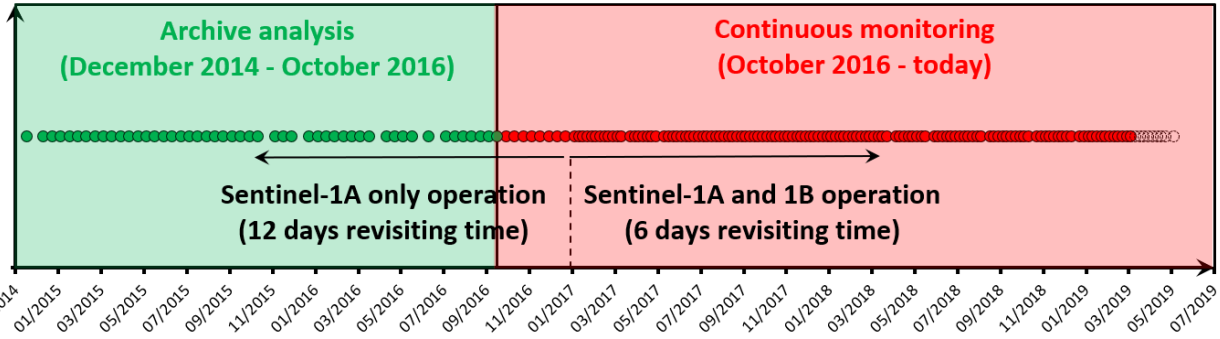
GPS

ACCELEROMETER

ROBOTIZED TOTAL STATION

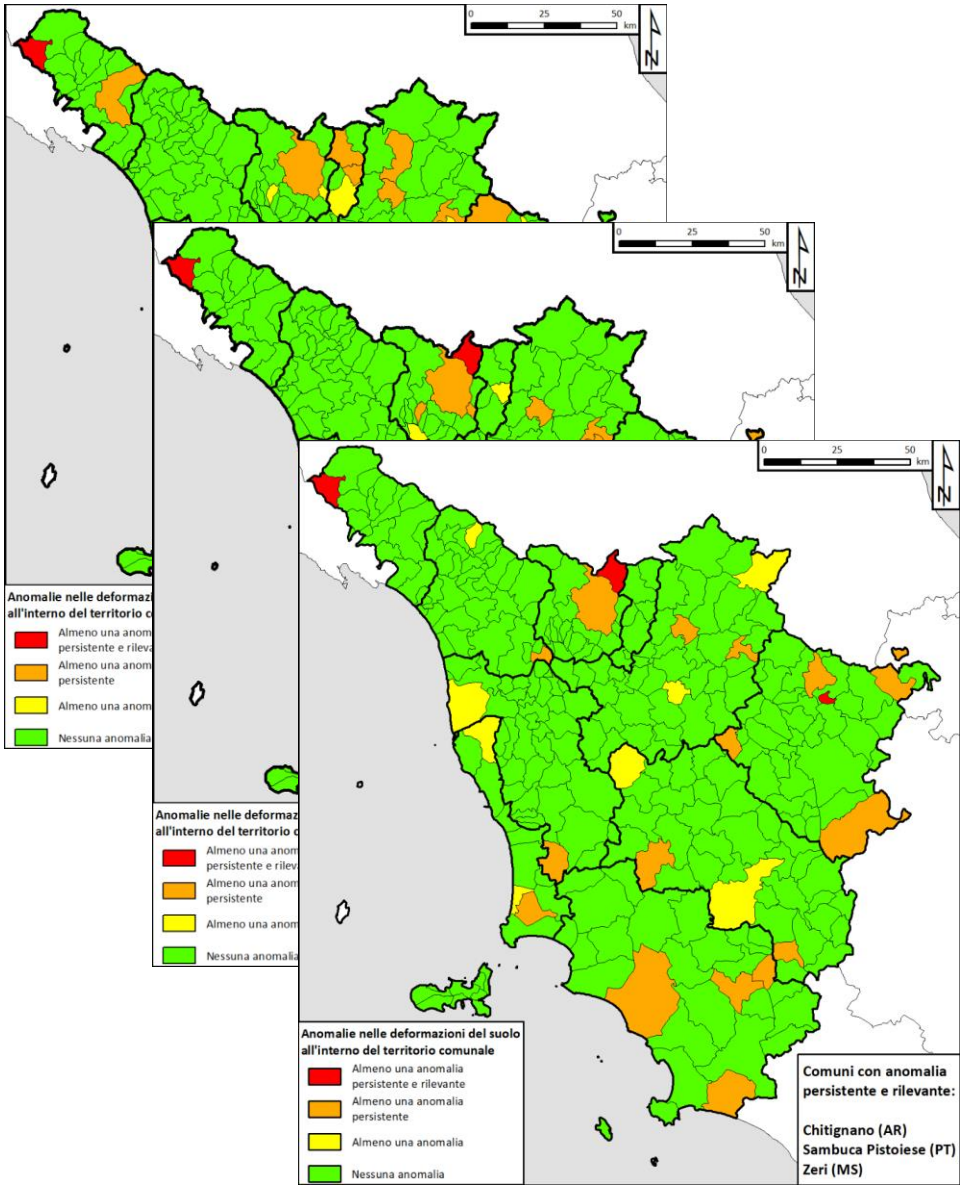
Satellite monitoring





Region	N° images		Update	Time range
Tuscany	Asc	272	82	2014/12/12 - 2020/09/15
	Desc	263	82	2014/10/12 - 2020/09/15

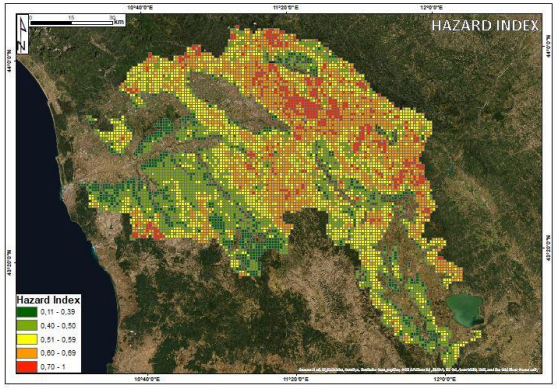
Monitoring bulletins

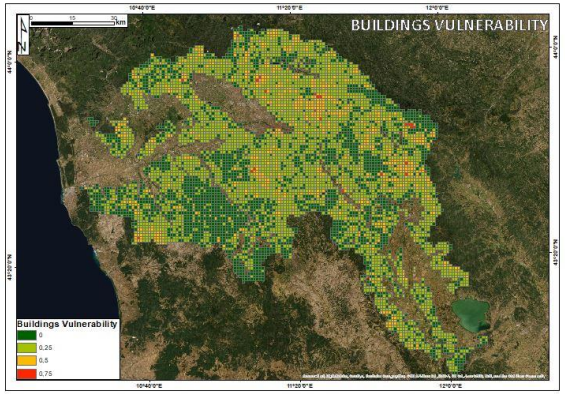


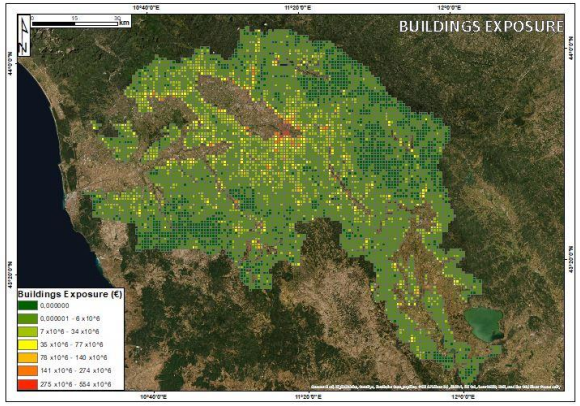
Class	Description
1	No anomaly within the municipality
2	At least one anomaly within the municipality
3	At least one persistent anomaly within the municipality
4	At least one persistent and relevant anomaly within the municipality

Localization of the areas which necessity of further analysis

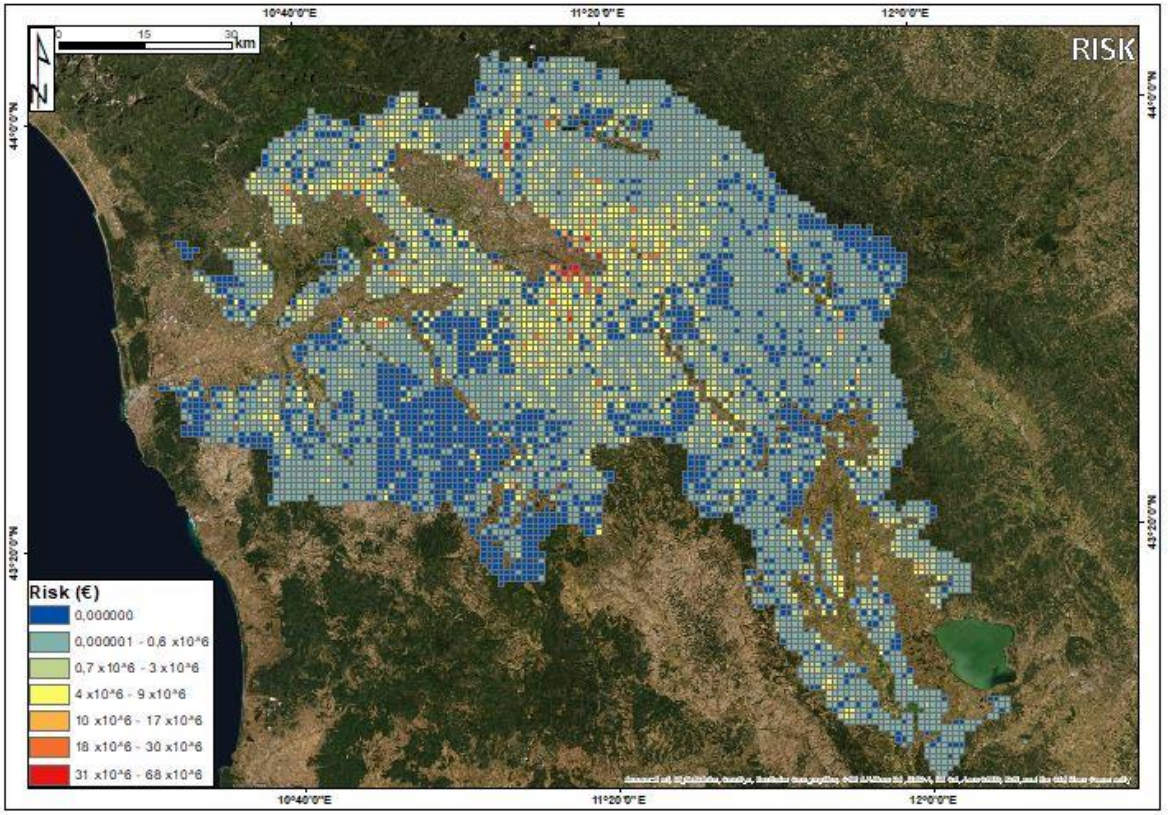
Landslide risk assessment







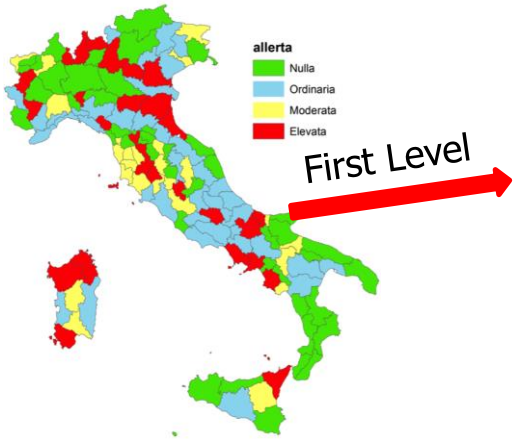
R= H V E



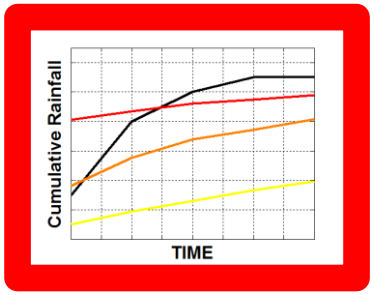
Objective 2: to develop tools and procedures for supporting risk reduction policies and the management of emergencies for the safety of human life

- Early warning systems
- Resilience enhancement
- Contribution to policies for risk reduction

Early warning multiscale system

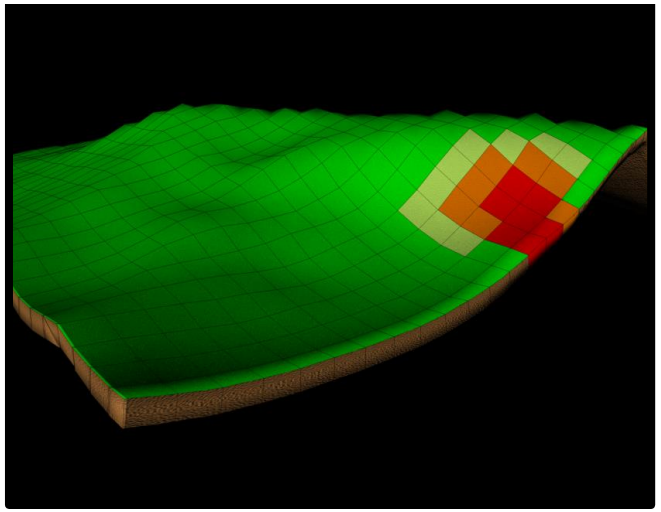


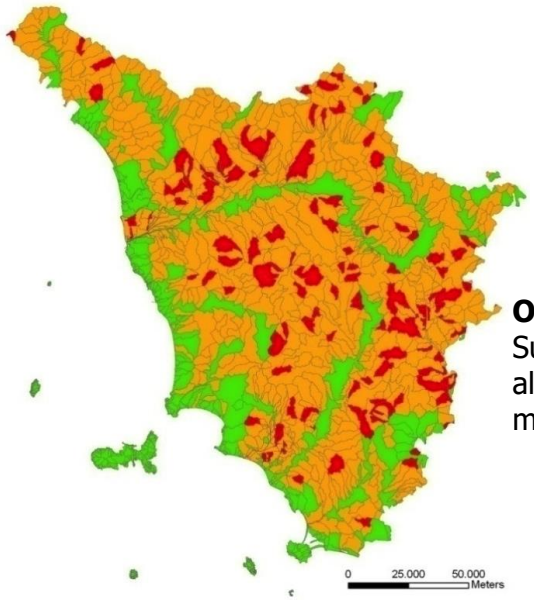
First Level



Local thresholds

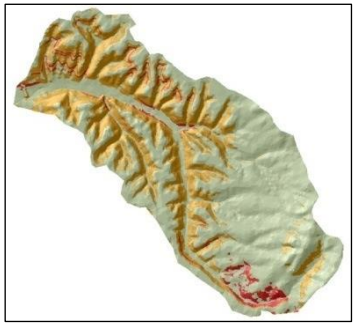
Second level:
physically based probabilistic model





Output :
Subbasin-scale aggregated alert levels based on multiple rainfall thresholds

Output : detailed FoS probability maps for the first-level warning areas



ISDR-ICL Sendai Partnership 2015-2025 as voluntary commitment to the World Conference on Disaster Risk Reduction for Global Promotion of Understanding and Reducing Landslide Disaster Risk

Kyoto Commitment

Kyoto 2020 Commitment for global promotion of understanding and reducing landslide disaster risk

80 signatories (including UNESCO, UNU, IRDR, WFEO, GRF Davos, IGS, UNESCO Chair, Italian Department of Civil Protection)

Kyoto 2020 Commitment is a duty to the Sendai Landslide Partnerships 2015-2025, the Sendai Framework for Disaster Risk Reduction 2015-2030, the 2030 Agenda Sustainable Development Goals, the New Urban Agenda and the Paris Climate Agreement

Objective 3: to promote the protection of cultural heritage threatened by geo-hydrological hazards

- Safeguard of cultural heritage
- Education on cultural heritage protection

Erasmus +
International Credit Mobility

Scientific-cultural collaboration between the University of Florence (Department of Earth Sciences) and Ilia State University of Tblisi (Georgia)

Objective 4: to promote research at the international level by offering scientific facilities to postgraduate students and visiting researchers

- Scientific networking
- Capacity building
- Professional training and continuous risk education

International Consortium on Landslides (ICL)

The International Consortium on Landslides (ICL) created at the Kyoto Symposium in January 2002 is an International non-governmental and non-profit scientific organization supported by UNESCO, WMO, FAO, UNDDR

85 members from 34 countries

Internationa Consortium on Geodisaster Reduction (ICGDR)

The **ICGdR** is an international non-governmental and non-profit making scientific organization legally registered as a non-profit organization in 2013 in the Shimane Prefecture government according to the Japanese law. The ICGdR contributes to a safe and secured social and natural environment by promoting the reduction of disasters triggered by geological and geophysical phenomena on the earth.

60 members from 12 countries

GADRI

Global Alliance for Disaster Reduction

4th Global Summit of Research Institutes for Disaster Risk Reduction (4thGSRIDRR2019)

Increasing the Effectiveness and Relevance of our Institutes

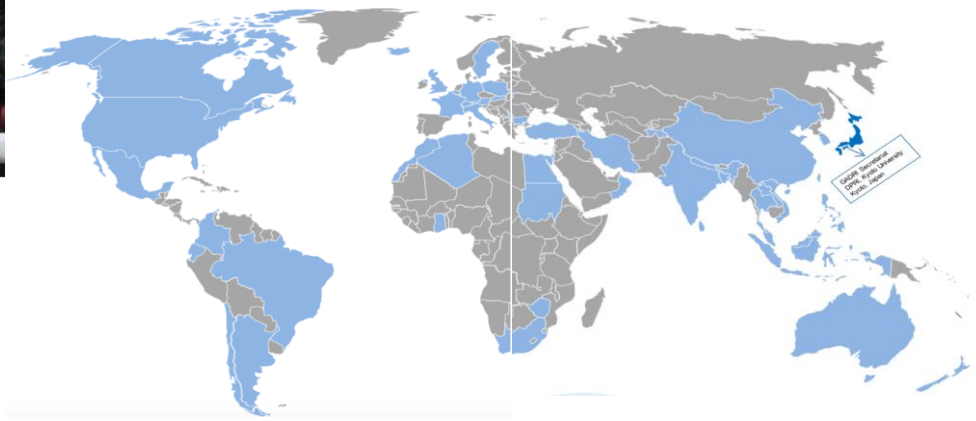
Disaster Prevention Research Institute (DPRI), Kyoto University, Uji Campus

Kyoto, Japan

13th to 15th March 2019

200 members in 52 countries

Geographical Distribution of Members of GADRI as of 31 December 2019



International MSc Geo engineering

GEMs

Started in september 2017

SSD	Course	ECS	Year	ECS
ICAR/01	FLUVIAL HYDRAULICS	9	I	69
ICAR/02	WATERSHED HYDROLOGY	9	II	
	Hydrologic monitoring and prediction	9	II	
ICAR/06	GEOMATICS	6	II	
ICAR/07	EARTHQUAKE GEOTECHNICAL ENGINEERING	6	II	
ICAR/07	SLOPE STABILITY	6	II	
ICAR/08	STRUCTURAL MECHANICS & ENGINEERING I	6	I	
ICAR/09	STRUCTURAL MECHANICS & ENGINEERING II	6	I	
GEO/02	GEOLOGY I	6	I	
GEO/03	GEOLOGY II	6	I	
GEO-02	Field geology	6	I	
GEO/03	Structural Geology	6	I	
GEO/05	ENGINEERING GEOLOGY	9	I	
	Hydrogeology	9	I	
GEO/04	ENGINEERING GEOMORPHOLOGY	6	I	24
	Environmental Geology	6	I	
AGR/08	Watershed Management	6	II	
AGR/14	Soil Conservation	6	II	
MAT/08	COMPUTATIONAL METHODS I	6	I	
SECS-S/05	COMPUTATIONAL METHODS II	6	I	
Free Choice		9	II	27
Thesis		18	II	
Total				120

Thanks for the attention

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