

# ReSyLAB 2017

3<sup>rd</sup> Regional Symposium on Landslides  
in the Adriatic-Balkan Region, Ljubljana

## Symposium programme



Univerza v Ljubljani



11 - 13 October 2017  
Ljubljana, Slovenia

**SYMPOSIUM SPONZORS**

Acknowledgments

The Organizing committee is deeply appreciative of the sponsorships generously provided by the following companies:



3Dsurvey



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## GENERAL INFORMATION

### SYMPOSIUM VENUE, 11 October 2017

UNIVERSITY OF LJUBLJANA  
KONGRESNI TRG 12  
SI-1000 LJUBLJANA  
SLOVENIA

### REGISTRATION DESK

The Registration Desk of the first day of the 3<sup>rd</sup> ReSyLAB will be located in the Hall of Zbornična dvorana in the first floor of University of Ljubljana (entrance from KONGRESNI TRG).

### SYMPOSIUM VENUE, 12 October 2017

UNIVERSITY OF LJUBLJANA  
FACULTY OF CIVIL AND GEODETIC ENGINEERING  
JAMOVA CESTA 2  
SI-1000 LJUBLJANA  
SLOVENIA

### REGISTRATION DESK

The Registration Desk of the second day of the 3<sup>rd</sup> ReSyLAB will be located in the 2<sup>nd</sup> floor of Faculty of Civil and Geodetic Engineering.

### OFFICIAL LANGUAGE

The official language of the 3<sup>rd</sup> Regional symposium on Landslides in the Adriatic-Balkan Region is English.

### PHOTO EXHIBITION

Please take this symposium as an opportunity to visit the photo exhibition of the selected photos from the WLF4 Landslide Photo Contest on the ground floor at the Faculty of Civil and Geodetic Engineering.

### COFFEE BREAK AND LUNCH

During session breaks, refreshments will be served free of charge to participants wearing symposium identification badges. Lunches are included in the registration fee and will be served during lunch time.

### INFORMATION FOR SPEAKERS

#### ORAL PRESENTATIONS

All accepted abstracts and full papers will be presented orally. Authors should bring their presentations (in PowerPoint or PDF format) on a USB stick or CD/DVD-ROM, and must upload them to the computer in the section room 30 minutes before the actual time of the session. Symposium staff will assist authors with the loading of the presentation and will transfer the presentation files to the computers in the presentation rooms.

Each presentation should be 12 minutes speech followed by 3 minutes of discussion.

#### FIELD STUDY TOUR

Requirements for participants: there will be approximately two hours of walking at the both field study tours. Weather-appropriate clothing and sturdy footwear is required. Travel cost and a lunch box are covered by the organizers and symposium sponsors.

#### REGISTRATION FEE

Symposium fee for all participants is 120 EUR, except for students for whom it is 60 EUR. The registration fee includes: symposium material, admission to all scientific sessions, book of abstracts, Proceedings of the 3<sup>rd</sup> ReSyLAB, refreshments during coffee breaks and lunches, social event and a field study tours (optional).

Due to delays the Proceedings of the 3<sup>rd</sup> ReSyLAB will be published soon after the symposium.

## SIDE EVENT

### ROUND TABLE DISCUSSION

**TITLE:** ENHANCING COOPERATION BETWEEN THE LANDSLIDE SCIENCE COMMUNITY AND END USERS

**DATE:** Wednesday, 11 October 2017, 13:30–15:00

**VENUE:** Zbornična dvorana, University of Ljubljana, Kongresni trg 12, 1000 Ljubljana

#### ORGANIZERS

Adriatic-Balkan Network of the International Consortium on Landslides (ICL ABN)

#### INTRODUCTORY LECTURE

International and regional cooperation on reducing landslide risk in Italy  
VERONICA TOFANI, Department of Earth Sciences, University of Firenze, Italy

#### MODERATOR

MATJAŽ MIKOŠ, Chair of the UNESCO Chair on Water-related Disaster Risk Reduction, Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia

Invited panelists include landslide scientists from academic and research institutions and civil protection administration authorities from Bosnia in Hercegovina, Croatia, Serbia and Slovenia. Following the ISDR-ICL Sendai Partnerships 2015-2025 for Global Promotion of Understanding and Reducing Landslide Disaster Risk and the 2017 Ljubljana Declaration on Landslide Risk Reduction the Round Table Discussion will explore possible ways of enhancing cooperation between the landslide science community and end users from administrative bodies in BIH, Croatia, Serbia and Slovenia.

The round table discussion will cover the following topics:

- (1) Disaster risk factors and scenarios, including emerging disaster risks, in the medium and long term;
- (2) Enhance research for local, regional, national applications;
- (3) Support actions by local communities and authorities; and
- (4) Support decision-making with interaction between policy makers and the scientific community.

The aim of the Round Table Discussion is to debate, with a wider audience, the priorities for future practical applications derived from the scientific results gained in the framework of landslide research in those member-countries that belong to the ICL Adriatic-Balkan Network: Albania, Bosnia and Herzegovina, Croatia, Slovenia and Serbia. The discussion among governmental representatives and scientists will be conducted with a view to finding answers to questions related to current and applicable use of geoenvironmental data and information in systems dealing with land-use planning, civil and environmental protection, and to the development of related necessary legislative documentation (e.g., guidelines, laws).

## SOCIAL EVENT

**DATE:** Wednesday, 11 October 2017, 18:00

Welcome reception in the Ljubljana City Hall (Mestna hiša).

Participants will also have the opportunity to attend a short guided tour in Ljubljana city centre focusing on natural stone in cultural buildings and monuments.

## SYMPOSIUM PROGRAMME

### WEDNESDAY, 11 OCTOBER 2017

**VENUE:** ZBORNIČNA DVORANA, UNIVERSITY OF LJUBLJANA, KONGRESNI TRG 12, 1000 LJUBLJANA

8:30 – 9:30      Registration  
9:30 – 12:00     Opening Ceremony, Keynote speakers

**Opening Adress**    Miloš Bavec – Director of Geological Survey of Slovenia  
                              Maja Makovec Brenčič – Minister of Education, Science and Sport  
                              Igor Papič – Rector of University of Ljubljana  
                              Matjaž Mikoš – Vice president of International Consortium of Landslides  
                              Snježana Mihalić Arbanas – Coordinator of ICL ABN Network

**Keynote speakers**    Veronica Tofani – Landslide monitoring and rapid mapping  
                              Lisa Borgatti – From slow to fast. Modelling, monitoring and mitigating Deep-seated Gravitational Slope Deformations  
                              Miloš Bavec – Recent developments in landslide research in Slovenia

12:00 – 13:30     Lunch  
13:30 – 15:00     Round Table Discussion  
                              Enhancing cooperation between the landslide science community and end users  
15:00 – 15:30     Coffee break  
15:30 – 17:15     Oral Session<sup>1</sup>  
18:00                Social event

### THURSDAY, 12 OCTOBER 2017

**VENUE:** FACULTY OF CIVIL AND GEODETIC ENGINEERING, JAMOVA 2, 1000 LJUBLJANA, P-II/6, 2<sup>ND</sup> FLOOR

9:00 – 17:30      Oral Sessions<sup>1</sup>  
17:30 – 18:00     Symposium conclusions

### FRIDAY, 13 OCTOBER 2017

#### FIELD STUDY TOURS (OPTIONAL)

8:00 – 17:00      1. Landslides in Vipava valley  
                              Departure from Faculty of Civil and Geodetic Engineering, Jamova 2, 1000 Ljubljana  
8:00 – 15:00      2. Potoška planina landslide  
                              Departure from Faculty of Civil and Geodetic Engineering, Jamova 2, 1000 Ljubljana

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<sup>1</sup>See Programme Schedule of Oral Sessions for details

**PROGRAMME SCHEDULE OF ORAL SESSIONS****WEDNESDAY, 11 OCTOBER 2017****SESSION 1 15:30 - 17:15 CONVENER(S): MATJAŽ MIKOŠ, SNJEŽANA MIHALIĆ ARBANAS**

- 15:30 – 16:00 **Keynote lecture:** Analysis of Rainfall Preceding Debris Flows on the Smědavská hora Mt., Jizerské hory Mts., Czech Republic  
*Vít Vilímek, Jana Smolíková, Jan Blahút*
- 16:00 – 16:15 Extreme precipitation events and landslides activation in Croatia and Bosnia and Herzegovina  
*Sanja Bernat Gazibara, Krešimir Pavlič, Ivana Vlahek, Hamid Begić, Sabid Zekan, Martin Krkač, Marin Sečan, Snježana Mihalić Arbanas*
- 16:15 – 16:30 Challenges for operational forecasting of rainfall induced landslides in Slovenia  
*Mateja Jemec Auflič, Jasna Šinigoj, Matija Krivic*
- 16:30 – 16:45 Damage caused by landslides and other natural disasters in Slovenia between 1991 and 2008  
*Matija Zorn, Mauro Hrvatin, Jure Tičar*
- 16:45 – 17:00 MyDewetra CapRadNet: the evolution of the DewetraNet platform for hydrometeorological risk management and marine ecosystems monitoring  
*Miranda Deda, Luca Molini, Paolo Campanella, Paola Tepsich, Antonio Libroia, Marco Massabo, Mateja Jemec Auflič*
- 17:00 – 17:15 The role of multisector partnerships in landslide prevention  
*Špela Kumelj, Tina Peternel, Jernej Jež, Blaž Milanič, Mateja Jemec Auflič*

**THURSDAY 12 OCTOBER****SESSION 2 9:00 - 10:45 CONVENER(S): BILJANA ABOLMASOV, JERNEJ JEŽ**

- 9:00 – 9:30 **Keynote lecture:** Towards a pan-European landslide database from the Geological Surveys  
*Gerardo Herrera et al.*
- 9:30 – 9:45 Analysis of rock falls on the road section Renke-Zagorje, Slovenia  
*Darja Rozina, Mateja Jemec Auflič, Timotej Verbovšek*
- 9:45 – 10:00 Rockfall Risks Management in the Slovenian Road Network  
*Suzana Svetličič*
- 10:00 – 10:15 Karst structures in heterogeneous lithological units as a potential geo-engineering hazard factor for mining and civil infrastructures  
*Željko Pogačnik, Kei Ogata, Gian Andrea Pini, Giorgio Tunis*
- 10:15 – 10:30 The use of GPR for determining sheath fold blocks in the heterogeneous horizons of subaquatic gravity flows in W Slovenia – the case of Anhovo  
*Marijana Zajc, Željko Pogačnik, Andrej Gosar*
- 10:30 – 10:45 GPR facies determination – Pusto Brdo- Srebrnjak Hill's Recent and Hystorical Landslides  
*Željka Sladović*
- 10:45 – 11:15 **Coffee break**



## PROGRAMME SCHEDULE OF ORAL SESSIONS

### SESSION 3 11:15 - 12:45 CONVENER(S): ŽELJKO ARBANAS, TINA PETERNEL

- 11:15 – 11:30 Combined interpretation of optical and SAR data for landslide mapping  
*Daniel Hölbling, Barbara Friedl, Jirathana Dittrich, Francesca Cigna, Gro Birkefeldt Møller Pedersen*
- 11:30 – 11:45 Identification of potentially unstable rock blocks on the road cut in the Krka National park, Croatia  
*Marin Sečanj, Sanja Bernat Gazibara, Snježana Mihalić Arbanas, Martin Krkač, Željko Arbanas, Mariana Martinko*
- 11:45 – 12:00 Rockfall monitoring and simulation on a rock slope near Ljig in Serbia  
*Miloš Marjanović, Biljana Abolmasov, Marko Pejić, Snežana Bogdanović, Mileva Samardžić-Petrović*
- 12:00 – 12:15 The slow-moving landslides of NW coast of Malta: insights from long-term monitoring and modeling  
*Stefano Devoto, Matteo Mantovani, Alessandro Pasuto, Mauro Soldati*
- 12:15 – 12:30 Preliminary results of Selanac debris flow modelling in RAMMS- a case study  
*Jelka Krušić, Katarina Andrejev, Biljana Abolmasov, Miloš Marjanović*
- 12:30 – 12:45 Stože landslide triggering simulation using LS-Rapid  
*Jošt Sodnik, Matej Maček, Matjaž Mikoš*
- 12:45 – 14:00 Lunch

### SESSION 4 14:00 - 15:30 CONVENER(S): MARTIN KRKAČ, MATEJA JEMEC AUFLIČ

- 14:00 – 14:15 Automated GNSS monitoring of Umka landslide-review of seven years' experience and results  
*Biljana Abolmasov, Marko Pejić, Mileva Samardžić Petrović, Uroš Đurić, Svetozar Milenković*
- 14:15 – 14:30 Photogrammetric monitoring of Potoska Planina landslide  
*Vid Peterman*
- 14:30 – 14:45 Observing the surface movement pattern of Potoška planina landslide using geodetic techniques  
*Tina Peternel, Marko Komac*
- 14:45 – 15:00 Tools for the real time visualization and analysis of Ground-based data: application to the monitoring of landslides  
*Giovanni Nico, Uroš Kostić, Andrea di Pasquale*
- 15:00 – 15:15 Visibility analysis for planning terrestrial landslide alert systems with webcams  
*Florian Albrecht, Damian Taferner, Mateja Jemec Auflič, Daniel Hölbling*
- 15:15 – 15:30 A web service for landslide mapping based on Earth Observation data  
*Daniel Hölbling, Florian Albrecht, Elisabeth Weinke, Clemens Eisank, Filippo Vecchiotti, Barbara Friedl, Antonia Osberger, Arben Kociu*
- 15:30 – 16:00 Coffee break

## PROGRAMME SCHEDULE OF ORAL SESSIONS

### SESSION 5 16:00 - 17:30 CONVENER(S): MATEJ MAČEK, TIMOTEJ VERBOVŠEK

- 16:00 – 16:15 Estimation of possible economic losses of large water transportation systems due to landslides, Case studies from Republic of Macedonia  
*Natasha Nedelkovska, Igor Peshevski, Milorad Jovanovski, Sead Abazi, Bojan Susinov*
- 16:15 – 16:30 Origin of planation surfaces in the hinterland of Šumljak fossil landslides, Rebrnice (Vipava Valley, SW Slovenia)  
*Tomislav Popit*
- 16:30 – 16:45 Using tree-ring analysis in studies of slope mass movements  
*Andrej Novak, Andrej Šmuc, Ryszard J. Kaczka*
- 16:45 – 17:00 The Spatio-Temporal Dynamics of the Ciprnik complex Landslide, Tamar Valley, Julian Alps, Slovenia  
*Andrej Šmuc, Karolina Janecka, Michal Lempa, Andrej Novak, Ryszard J. Kaczka*
- 17:00 – 17:15 The engineering geological - geomechanical properties of soil landslides settlements "Svrake ", Vogosca, Sarajevo and concept of rehabilitation  
*Hamid Begić*
- 17:15 – 17:30 Spatial engineering geological and geotechnical modeling of embankment with RNK- method and stability analyses of waste water treatment facility (UPOV) in Vukovar  
*Želimir Ortolan, Mensur Mulabdić, Krunoslav Minažek, Jelena Kaluđer, Jelena Matijević, Marko Ortolan*
- 17:30 – 18:00 Symposium conclusions

## FIELD STUDY TOUR

### 1. LANDSLIDES VIPAVA VALLEY

All stops lie in the Vipava valley, SW Slovenia, whose northern flank consists of fold and thrust structure of the External Dinarides composed of a series of nappes of Mesozoic carbonates thrust over Palaeogene flysch. Such a geological setting and steep slope morphology led to a number of various mass movements, which will be visited during the excursion.



**STOP 1.** First stop will be Stogovce landslide near the town of Ajdovščina. A landslide was triggered during an extreme precipitation event (300–520 mm) between the September 16<sup>th</sup> and 20<sup>th</sup> in year 2010. Material is comprised of debris of fractured Upper Triassic limestone and dolomite and weathered flysch, and due to its measured movements, is still capable of being transformed into a debris flow. Present movements (2012–mid 2015 period) are in range of several cm/month, with cumulative movement of 45 cm in this period., and depth to the slip surface was detected from 13 m to 25 m. From this stop, several huge carbonate

blocks will also be visible on the slopes of Čaven mountain, which have detached from the high carbonate plateau and rotated during the transport. Transport ranges from 80 m to about 2 km, and block areas range from 7.5–175 ha.

**STOP 2.** We will continue to the nearby Slano blato landslide above the village Lokavec, one of the biggest mass movements in Slovenia. During the period of heavy rain on 17–19 November 2000, the landslide was reactivated as mudflow with velocities up to 60–100 m/day. The landslide is currently 1.4 km in length and boasts a volume of more than 1 mio m<sup>3</sup>. Several mitigation methods were constructed, including a small rockfill dam, deep concrete shafts in the upper part, and two 2 m and 13 m high concrete dams. Present activity is constrained to the main scarp only.

**STOP 3.** We will stop at the Hubelj spring, among one of the largest water supply karstic springs in the Vipava valley. Spring emerges on the contact of Upper Triassic and Jurassic limestones, overthrust on Eocene flysch. The spring mean discharge is 3 m<sup>3</sup>/s, with minimum and maximum values from 0.2 m<sup>3</sup>/s to 59 m<sup>3</sup>/s. Apart from being the drinking water source for the town of Ajdovščina and surroundings, spring is important for the evolution of recent landslide morphology. Hubelj spring has eroded a large volume of a huge fossil rock avalanche deposits of nearby Gradiška gmajna, with thickness of carbonate gravel sediments up to 50 m. Estimated volume before the erosion is 19 mio m<sup>3</sup>, and present volume about 10 mio m<sup>3</sup>. Age of the event is not known.

**STOP 4.** Final stop will be in the Rebrnice region, a SW-facing slope that borders the Vipava Valley and the NE-lying Nanos Plateau in SW Slovenia. Several fossil and recent complex landslides appear in this region, with total volumes of about 2.8 mio km<sup>3</sup>. We will visit the Podboršt landslide, one of the many landslides with open active deep fractures and mitigation measures (pile walls) close to

the constructed highway, which transects the landslide body. Sediments mostly comprise the debris, carbonate gravel, and weathered flysch.

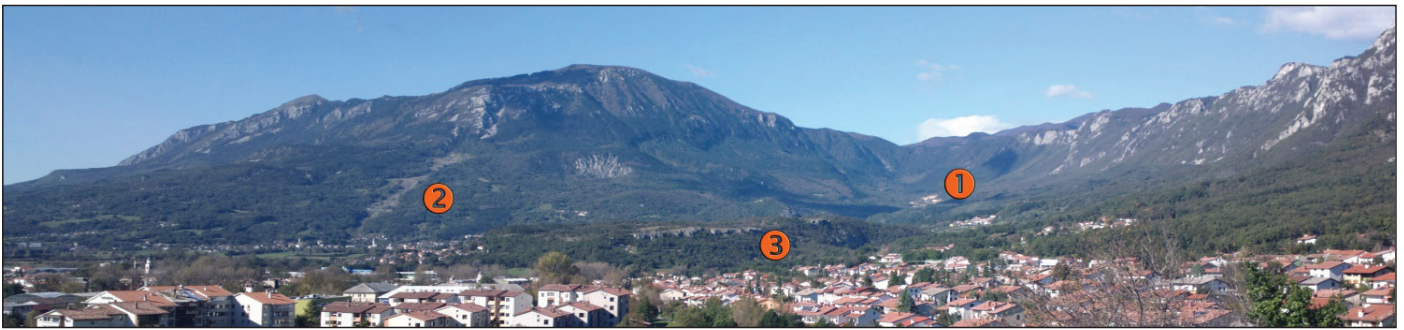


Fig 1. Landslides Stogovce (1), Slano blato (2) and Gradiška gmajna (3).

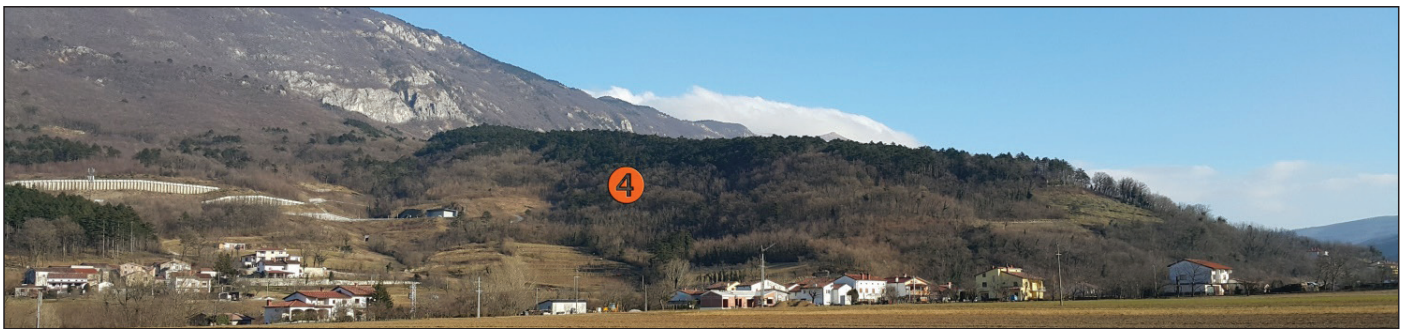


Fig 2. Landslide Podboršt (4).

## FIELD STUDY TOUR

### 2. POTOŠKA PLANINA LANDSLIDE

Potoška planina landslide is situated in the NW Slovenia, in the Karavanke mountain ridge, near the town Jesenice (Fig. 1). During the field trip we will observe surface features, different types of slope mass movements and real-time monitoring techniques.

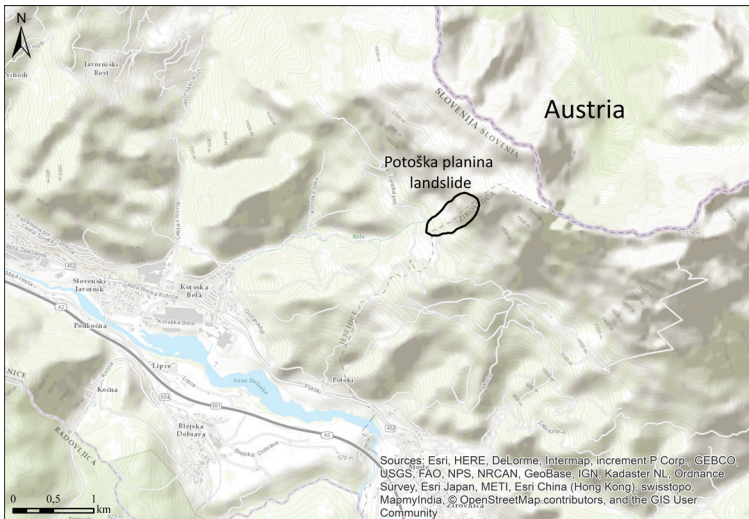


Fig. 1 Location of the Potoška planina landslide.



Fig.2 A view from the top of the Potoška planina landslide looking directly down the slide to the underlying village of Koroška Bela.

The broader area of the Potoška planina landslide is known to have experienced severe debris-flow events in the recent geological past. The most recent of these events occurred in the 18th century and caused the partial or total destruction of more than 40 buildings and cultivated areas in a village down-slope (Koroška Bela) located in the area of the alluvial fan. Presently, some 2,200 inhabitants live in the area of the alluvial fan of past debris flows.

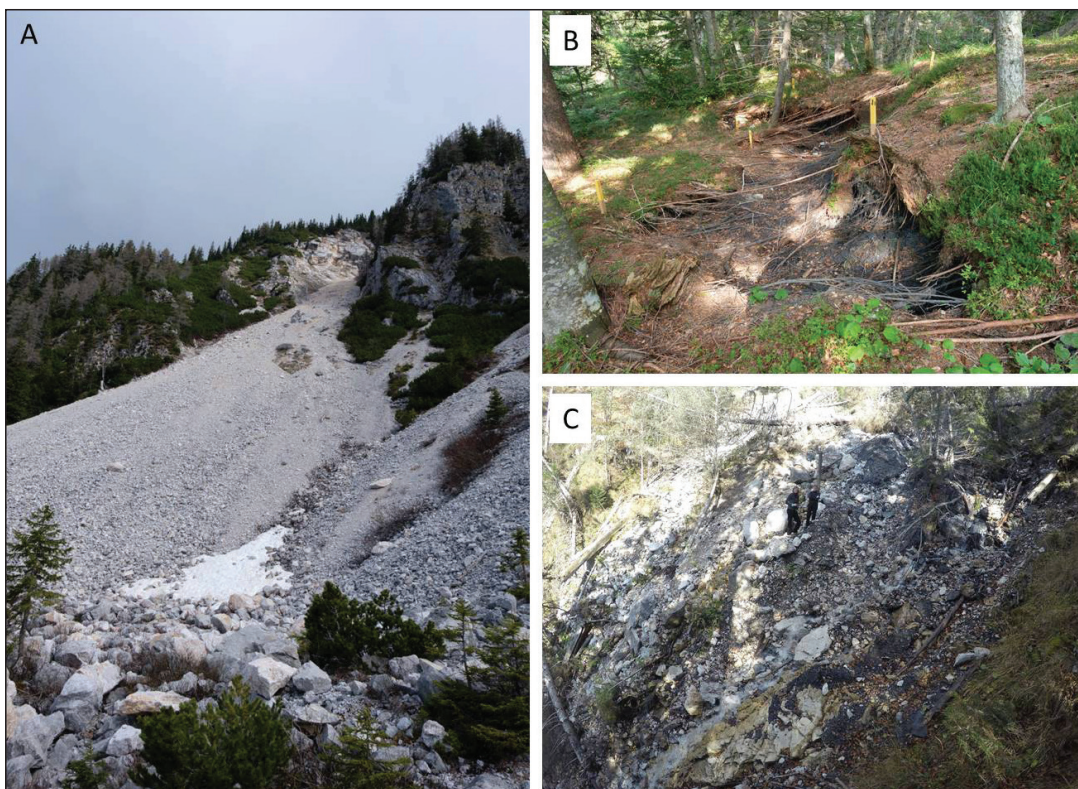


Fig. 3 Potoška planina landslide is subjected to different slope mass movements.

During the field trip we will observe rockslides and runoff of talus material in the upper part (Fig. 3A), to deep-seated slow-motion slide in the middle part (Fig. 3B) and active slope mass movements at the toe of the landslide (Fig. 3C), which is considered to be the most active part of the landslide. The sliding mass in this part is composed of tectonically deformed and weathered clastic rocks covered with a large amount of talus material, which is unstable and prone to landslides.

Along the way we will also see the new established monitoring system which serves for real-time monitoring of the surface patterns at the toe of the landslides (Fig. 4). Monitoring system provides images that are transmitted in real-time through the network for transmission and enable immediate notification of landslide activity and landslide behaviour.



Fig. 4:Real-time monitoring.

Previous studies on the Potoška planina landslide (<http://link.springer.com/article/10.1007/s10346-016-0759-6>), using UAV photogrammetry and tachymetric measurements, showed a steadily downslope movement of the entire area with localised surges of superficial slips.

The Potoška planina landslide was part of the International Programme on Landslides (IPL) project “Study of the slow moving landslide at Potoška planina (Karavanke Mountains, NW Slovenia)” (IPL-188).