

World Centre of Excellence (WCoE-2017-2020)
Progress Report Form 2018
1 January 2018 to 31 December 2018

1. Short Title of WCoE: **Center for Applied Landslide Research (CALaR)**
2. Name of Institution (Name of leader and email)

Croatian Landslide Group

Snježana Mihalić Arbanas

Full Professor, University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Department of Geology and Geological Engineering, Zagreb, Croatia

University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Pierottijeva St. No. 6, 10000 Zagreb, Croatia, fax +385 1 4836064, phone +385 1 5535765, e-mail smihalic@rgn.hr

Željko Arbanas

Full Professor, University of Rijeka, Faculty of Civil Engineering, Department of Hydrotechnics and Geotechnics, Rijeka, Croatia

University of Rijeka, Faculty of Civil Engineering, Radmile Matejčić St. No. 3, 51000 Rijeka, Croatia, fax +385 51 265998, phone +385 51 265902, e-mail zeljko.arbanas@gradri.uniri.hr

3. List of core members

Assist. Prof. Martin Krkač, University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Zagreb, Croatia

Assist. Prof. Vedran Jagodnik, University of Rijeka, Faculty of Civil Engineering, Rijeka, Croatia

Other members:

Sanja Bernat Gazibara, PhD student; Marin Sećanj, PhD student

University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Zagreb, Croatia

Assist. Prof. Sanja Dugonjić Jovančević; Assist. Prof. Martina Vivoda Prodan; Dr Petra Đomlija; Dr Josip Peranić; Sara Pajalić, PhD student

University of Rijeka, Faculty of Civil Engineering, Rijeka, Croatia

4. Progress report of activities up to 31 December 2018 (up to 30 lines)

(i) The results of the interdisciplinary scientific joint research of CLG's scientists, for the period of two years (2017-2018), are published in: 1 **PhD dissertation** ("*Identification and classification of landslides and erosion phenomena using the visual interpretation of the Vinodol Valley digital elevation model*", Domlija, P.), 6 **papers in international journals** (3 paper in the *Landslides journal*) and 27 papers at the international conferences (16 **papers at the WLF4**, 6 **papers at the 2nd ReSyLAB**, 2 **papers at the 3rd ReSyLAB**, 3 **papers are from other international scientific conferences**) and in the *ISDR-ICL Landslide Interactive Teaching Tools* (6 chapters). Besides scientific publications, there are 9 **Master Thesis** and 16 **Undergraduate Thesis** supervised by CLG's scientists.

(ii) The **regional scientific** and **high-education projects** and cooperation are the following:

- One **bilateral Croatian-Slovenian scientific projects** (2016-2017 "*Laboratory testing and numerical modelling of landslides in flysch deposits of Croatia and Slovenia*", Project Leader Arbanas, Ž.); one **Croatian scientific HRZZ projects** (2018-2021 "*Physical modelling of landslide remediation constructions behaviour under static and seismic actions, ModLandRemSS*", Leader Arbanas, Ž.); two **ICL IPL projects** (2017-2021 IPL-219 "*Rockfall hazard identification and rockfall protection in the coastal zone of Croatia*", Project Leader Arbanas, Ž.; 2017-2019 IPL-220 "*Kostanjek landslide monitoring project (Zagreb, Croatia)*", Project Leader Krkač, M.); two research **projects supported by the University of Rijeka** (2019-2021 "*Research of rockfall processes and rockfall hazard assessment*", Project Leader Arbanas, Ž.; 2019-2021 "*Laboratory research of static and cyclic soil behavior at landslide activation*", Project Leader Jagodnik, V.; 2018-2019 "*Analysis of the rock mass and instability phenomena along the karst-flysch contacts*", Project Leader Dugonjić Jovančević, S.); research **projects supported by the University of Zagreb** (2015-2019 "*Analysis and identification of the Kostanjek landslide hazard based on monitoring data*", Project Leader Mihalić Arbanas, Ž.); One **European DG ECHO project** (2015-2017 "*Resilient European Communities Against Local Landslides, RECALL*", Project Members);
- **Mobility of lecturers and (under)graduate students to Slovenia** (2017, 2018 Vipava Valley, Field trip for Graduate study students) and **to Bosnia & Herzegovina** (2017 Gračanica Municipality, Field trip for Graduate study students; 2018 Vogošća Municipality, Field trip for Graduate study students); **mobility of professors to Italy** (2017 Arbanas, Ž., Member of PhD Evaluation Committee at the University of Salerno); **mobility of PhD students to Italy** (2017 Peranić, J., PhD research/laboratory testing at the University of Salerno; 2018 Sečanj, M., PhD course LARAM School in Salerno), **to Slovenia** (2017 Peranić, J., PhD research/laboratory testing at the University of Ljubljana)

- **ICL activities and participation as Officers of ICL: ICL Board and IPL GPC members** 2010-today (Mihalić Arbanas, S., Arbanas, Ž.); 2012-today **Coordination of regional and thematic networks, ICL Adriatic-Balkan network** (Coordinators and co-coordinators of the ICL ABN, Mihalić Arbanas, S., Arbanas, Ž.) and ICL Landslide Monitoring and Warning Network (Co-coordinator and coordinator Arbanas, Ž.); 2013-today **Chair of ICL Network Committee** (Mihalić Arbanas, S.); 2018-2020 **Vice-president of ICL for publications** (Arbanas, Ž.)
- **Organization of regional symposia** (3rd ReSyLAB, Ljubljana, Slovenia, 2017; 4th ReSyLAB, Sarajevo, BIH, 2019) and **WLF 5** (Kyoto, 2020).

(iii) Continuous cooperation with Croatian **national, regional and local governments** in the framework of:

- **Performing official landslide risk assessment for Republic of Croatia** in joint cooperation with *Ministry of Civil Engineering and Spatial Planning of the RH* (MGIPU) and *Croatian Platform for Risk Reduction*, published in the study “*Landslide risk assessment in the Republic of Croatia*”,
- **Design of remedial measures and measures in urgent situations of high landslide risk** (*Croatian Roads; County of Istria; Šibensko-Kninska County; City of Omiš*),
- **Consultative support** to authorities **related to geotechnical investigation of landslides** (*Sisačko-Moslavačka County; City of Zagreb; Petrinja City; Hrvatska Kostajnica City; Dvor Municipality*),
- **Consultative support** to the national government, *Ministry of Civil Engineering and Spatial Planning of the RH* (MGIPU), **related to landslide disaster response and recovery** from the MORLE in March 2018,
- **Presentation of application of scientific results in praxis to stakeholders** (e.g., presentation of landslide inventories, landslide hazard and risk zonation, landslide monitoring, prediction and early warning, landslide modeling for specific purposes) (*Croatian National Protection and Rescue Directorate, DUZS; Croatian Water; Vukovar-Srijem County; Sisačko-Moslavačka County; Petrinja City*),
- Involvement in **joint activities related to ICL Sendai Partnership** (*Croatian National Protection and Rescue Directorate, DUZS; City of Zagreb; Ministry of Civil Engineering and Spatial Planning of the RH*).

(iv) **Communication and dissemination** of scientific results to the:

- **Lectures about application of scientific results in civil protection and risk mitigation** to the *wider professional community and governmental authorities* (Oral presentation “*Recent experiences in rockfall hazard and risk assessment*”, Arbanas, Ž.; Oral presentation “*Landslide hazard and risk analysis: international and Croatian experience in last 20 years*”, Mihalić Arbanas, S.; Poster presentation “*Landslide inventory mapping based on LiDAR data*”, Bernat Gazibara, S.; Poster presentation “*Monitoring and prediction of landslide movement*”, Krkač, M.)
- **Lecture about scientific results** to the *Croatian Academy of Science and Arts* (Oral presentation “*Using the remote sensing techniques in rockfall susceptibility assessment*”, Sečanj, M.)
- **Lecture about application of scientific results in urban planning** to the *students community from geographic and architecture faculties* (Oral presentation “*Landslides in urban area of the City of Zagreb*”, Bernat Gazibara, S.)

5. Plan of future activities (up to 30 lines)

(i) Publication of results of scientific research during 2019 in the form of: 2 **PhD dissertation** (“*Importance of geotechnical cross-section unsaturated zone for landslide occurrence in flysch deposits*”, Peranić, J.; “*Methodology for landslide mapping using high resolution digital elevation model in the Podsljeme area (City of Zagreb)*”, Bernat Gazibara, S.), 19 **papers in international journals** (25% papers in the *Landslides journal*) and 10 papers at the international conferences (8 **papers at the 4th ReSyLAB**, 2 **papers at other international scientific conferences**). Besides scientific publications, there are 3 **Master Thesis** and 7 **Undergraduate Thesis** supervised by CLG’s scientists on the subjects related to landslides

(ii) Implementation of **regional scientific** and **high-education projects** and cooperation are the following:

- **Croatian scientific HRZZ projects** (2018-2021 “*Physical modelling of landslide remediation constructions behaviour under static and seismic actions, ModLandRemSS*”, Leader Arbanas, Ž.); two **ICL IPL projects** (2017-2021 IPL-219 “*Rockfall hazard identification and rockfall protection in the coastal zone of Croatia*”, Project Leader Arbanas, Ž.; 2017-2019 IPL-220 “*Kostanjek landslide monitoring project (Zagreb, Croatia)*”, Project Leader Krkač, M.); two research **projects supported by the University of Rijeka** (2019-2021 “*Research of rockfall processes and rockfall hazard assessment*”, Project Leader Arbanas, Ž.; 2019-2021 “*Laboratory research of static and cyclic soil behavior at landslide activation*”, Project Leader Jagodnik, V.; 2018-2019 “*Analysis of the rock mass and instability phenomena along the karst-flysch*”

contacts”, Project Leader Dugonjić Jovančević, S.); research **projects supported by the University of Zagreb** (2015-2019 “*Analysis and identification of the Kostanjek landslide hazard based on monitoring data*”, Project Leader Mihalić Arbanas, Ž.)

- **Mobility of professors to Italy** (2019 Mihalić Arbanas, S., Member of PhD Evaluation Committee at the University of Florence); **mobility of experienced researchers to Italy** (2019 Vivoda Prodan, M. and Dugonjić Jovančević, S., research/laboratory testing at the University of Salerno) and **Norway** (2019 Dugonjić Jovančević, S., research/laboratory testing at the University of Salerno); **mobility of PhD students to Switzerland** (2019 Pajalić, S., PhD course LARAM School in Laussane)
- **ICL activities and participation as Officers of ICL**
- **Organization of regional symposia** (4th ReSyLAB, Sarajevo, BIH, 2019) and **WLF 5** (Kyoto, 2020).

(iii) Continuous cooperation with Croatian **national, regional and local governments** in the framework of:

- **Continuous cooperation on landslide risk assessment of Republic of Croatia (development of strategy)** in joint cooperation with *Ministry of Civil Engineering and Spatial Planning of the RH* (MGIPU) and *Croatian Platform for Risk Reduction*; **Consultative support to regional and local government related to geotechnical investigation of landslides and remedial measures**; **Consultative support to national, regional and local government related to measures in urgent situations of high landslide risk and landslide disaster response and recovery** from the MORLE,
- **Presentation of application of scientific results in praxis** (e.g., landslide inventories, landslide hazard and risk zonation, landslide monitoring, prediction and early warning),
- Involvement in **joint activities related to ICL Sendai Partnership**.

(iv) **Communication and dissemination** of scientific results to the:

- **Lecture about scientific results of the CLG** to the *Department of Earth Sciences of the University of Firenze* (Oral presentation “*Applied Landslide Research in the area of Dinarides and Pannonian Basin in Croatia*”, Mihalić Arbanas, S. & Arbanas, Ž.)
- **Lecture about scientific results related to landslide inventory mapping** to the *wider public of Science festival 2019* (Oral presentation “*From airborne laser scanning to geomorphological mapping – research in color*”, Đomlija, P.)

6. Publication (in Landslides, proceedings, meeting reports, or WEB)

Papers in scientific journals

1. DUGONJIĆ JOVANČEVIĆ, S., ARBANAS, Ž. (2017): Influence of the runout potential on landslide-susceptible areas along the flysch–karst contact in Istria, Croatia. *Natural Hazards*. 85/3, 1347-1362.
2. KRKAČ, M., ŠPOLJARIĆ, D., BERNAT, S., MIHALIĆ ARBANAS, S. (2017): Method for prediction of landslide movements based on random forests. *Landslides*. 14/3, 947-960. doi.org/10.1007/s10346-016-0761-z
3. MIHALIĆ ARBANAS, S., SEČANJ, M., BERNAT GAZIBARA, S., KRKAČ, M., BEGIĆ, H., DŽINDO, A., ZEKAN, S., ARBANAS, Ž. (2017): Landslides in the Dinarides and Pannonian Basin—from the largest historical and recent landslides in Croatia to catastrophic landslides caused by Cyclone Tamara (2014) in Bosnia and Herzegovina. *Landslides*. 14/6, 1861-1876. DOI 10.1007/s10346-017-0880-1
4. PERANIĆ, J., ARBANAS, Ž., CUOMO, S., MAČEK, M. (2018) Soil-water characteristic curve of residual soil from a flysch rock mass. *Geofluids*. 2018/Article ID 6297819, 1-15. DOI 10.1155/2018/6297819
5. VIVODA PRODAN, M., MILEUSNIĆ, M., MIHALIĆ ARBANAS, S., ARBANAS, Ž. (2017) Influence of weathering processes on the shear strength of siltstones from a flysch rock mass along the northern Adriatic coast of Croatia. *Bulletin of Engineering Geology and the Environment*. 76, 2, 695-711. DOI 10.1007/s10064-016-0881-7
6. JEMEC AUFLIČ, M., MIKOŠ, M., VERBOVŠEK, T., ARBANAS, Ž., MIHALIĆ ARBANAS, S. (2017): 3rd Regional Symposium on Landslides in the Adriatic-Balkan Region (3rd ReSyLAB)—a final report. *Landslides*. 15/2, 381-384.

Papers in proceedings of the World Landslide Forum

1. ARBANAS, Ž., MIHALIĆ ARBANAS, S., SASSA, K., MARUI, H., FUKUOKA, H., KRKAČ, M., VIVODA PRODAN, M., BERNAT GAZIBARA, S., ĐOMLIJA, P. (2017): The Croatian-Japanese SATREPS Joint Research Project on Landslides (IPL-161). **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 1 'ISDR-ICL Sendai Partnership 2015-2025' / Sassa K., Mikoš, M., Yin, Y., (eds). Springer, Switzerland. 395-409.
2. ARBANAS, Ž., MIHALIĆ ARBANAS, S., VIVODA PRODAN, M., PERANIĆ, J., SEČANJ, M., BERNAT GAZIBARA, S., KRKAČ, M. (2017): Preliminary Investigations and Numerical Simulations of a Landslide Reactivation. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 2 'Advances in Landslide Science / Mikoš, M., Tiwari, B., Yin, Y., Sassa K. (eds). Springer, Switzerland. 649-657.
3. ARBANAS, Ž., TOFANI, V. (2017): Introduction: Landslide Monitoring and Warning. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 3 'Advances in Landslide Technology' / Mikoš, M., Arbanas, Ž., Yin, Y., Sassa K. (eds). Springer, Switzerland. 23-32.
4. BERNAT GAZIBARA, S., KRKAČ, M., SEČANJ, M., MIHALIĆ ARBANAS, S. (2017): Identification and mapping of shallow landslides in the City of Zagreb (Croatia) using the LiDAR-based terrain model. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 2 'Advances in Landslide Science' / Mikoš, M., Tiwari, B., Yin, Y., Sassa K. (eds). Springer, Switzerland. 1093-1100.
5. CUOMO, S., DE CHIARA, V., DUGONJIĆ JOVANČEVIĆ, S., VIVODA PRODAN, M., ARBANAS, Ž. (2017): Insights from LS-RAPID Modeling of Montaguto Earthflow (Italy). **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 2 'Advances in Landslide Science' / Mikoš, M.; Tiwari, B.; Yin, Y.; Sassa, K. (eds). Springer, Switzerland. 611-619.
6. FATANI, T.F., ARBANAS, Ž. (2017): Introduction: Landslide Disasters and Relief. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 3 'Advances in Landslide Technology' / Mikoš, M., Arbanas, Ž., Yin, Y., Sassa K. (eds). Springer, Switzerland. 379-382.
7. KRKAČ, M., MIHALIĆ ARBANAS, S., ARBANAS, Ž., BERNAT GAZIBARA, S., SEČANJ, M. (2017): Prediction of the Kostanjek Landslide Movements Based on Monitoring Results Using Random Forests Technique. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 3 'Advances in Landslide Technology' / Mikoš, M., Arbanas, Ž., Yin, Y., Sassa K. (eds). Springer, Switzerland. 267-275.
8. LOGAR, J., CUOMO, S., ARBANAS, Ž. (2017): Introduction: Landslide Mitigation, Remediation and

Stabilization. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 3 'Advances in Landslide Technology' / Mikoš, M., Arbanas, Ž., Yin, Y., Sassa K. (eds). Springer, Switzerland. 441-444.

9. MIHALIĆ ARBANAS, S., ARBANAS, Ž., KRKAČ, M., BERNAT GAZIBARA, S., VIVODA PRODAN, M., DOMLIJA, P., JAGODNIK, V., DUGONJIĆ JOVANČEVIĆ, S., SEČANJ, M., PERANIĆ, J. (2017): Landslide Risk Reduction in Croatia: Scientific research in the framework of the WCoE 2014- 2017, IPL 173, IPL 184, ICL ABN. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 1 'ISDR-ICL Sendai Partnership 2015-2025' / Sassa K., Mikoš, M., Yin, Y., (eds). Springer, Switzerland. 301-312.
10. MIHALIĆ ARBANAS, S. (2017): Landslide Hazard, Risk Assessment and Prediction: Landslide Inventories and Susceptibility, Hazard Mapping Methods, Damage Potential—Part 2. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 2 'Advances in Landslide Science' / Mikoš, M., Tiwari, B., Yin, Y., Sassa K. (eds). Springer, Switzerland. 695-698.
11. PAJALIĆ, S., ĐOMLIJA, P., JAGODNIK, V., ARBANAS, Ž. (2017): Diversity of materials in Landslide Bodies in the Vinodol Valley, Croatia. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 5 'Landslides in Different Environments' / Mikoš M., Vilimek V., Yin Y., Sassa K. (eds). Springer, Switzerland. 507-516.
12. RUŽIĆ, I., BENAC, Č., DUGONJIĆ JOVANČEVIĆ, S. (2017): Coastal Erosion and Instability Phenomena on the Coast of Krk Island (NE Adriatic Sea). **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 5 'Landslides in Different Environments' / Mikoš M., Vilimek V., Yin Y., Sassa K. (eds). Springer, Switzerland. 361-367.
13. SASSA, K., ARBANAS, Ž. (2017): Landslides: Journal of the International Consortium on Landslides. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 1 'ISDR-ICL Sendai Partnership 2015-2025' / Sassa K., Mikoš, M., Yin, Y., (eds). Springer, Switzerland. 257-268.
14. SASSA, K., GUZZETTI, F., YAMAGISHI, H., ARBANAS, Ž. [...] SETIAWAN, H. (2017): Landslide Dynamics: ISDR-ICL Landslide Interactive Teaching Tools (LITT). **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 1 'ISDR-ICL Sendai Partnership 2015-2025' / Sassa K., Mikoš, M., Yin, Y., (eds). Springer, Switzerland. 193-218.
15. SEČANJ, M., MIHALIĆ ARBANAS, S., KORDIĆ, B., KRKAČ, M., BERNAT GAZIBARA, S., (2017): Identification of Rock Fall Prone Areas on the Steep Slopes Above the Town of Omiš, Croatia. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol. 5 'Landslides in Different Environments' / Mikoš, M., Vilimek, V., Yin, Y., Sassa K. (eds). Springer, Switzerland. 481-487.
16. VIVODA PRODAN, M., ARBANAS, Ž. (2017) Parametric Analysis of Weathering Effect on Possible Reactivation of the Valići Landslide, Croatia. **Proceedings of the 4th World Landslide Forum** 'Advancing Culture of Living with Landslides', Vol 2. 'Advances in Landslide Science' / Mikoš, M., Tiwari, B., Yin, Y., Sassa, K. (eds.). Springer, Germany. 621-631

Papers in proceedings of the Regional Symposium on Landslides in the Adriatic-Balkan Region

1. ARBANAS, Ž., VIVODA, M., MIHALIĆ ARBANAS, S., PERANIĆ, J., SEČANJ, M., BERNAT, S., KRKAČ, M. (2017): Analysis of a reservoir water level impact on landslide reactivation. **Proceedings of the 2nd Regional Symposium on Landslides in the Adriatic-Balkan Region** / Abolmasov, B., Marjanović, M., Đurić, U. (eds). Faculty of Mining and Geology, University of Belgrade, Serbia. C1-C6.
2. BERNAT, S., MIHALIĆ ARBANAS, S., KRKAČ, M., SEČANJ, M. (2017): Catalog of precipitation events that triggered landslides in northwestern Croatia. **Proceedings of the 2nd Regional Symposium on Landslides in the Adriatic-Balkan Region** / Abolmasov, B., Marjanović, M., Đurić, U. (eds). Faculty of Mining and Geology, University of Belgrade, Serbia. 103-107.
3. BERNAT GAZIBARA, S., KRKAČ, M., VLAHEK, I., PAVLIĆ, K., BEGIĆ, H., ZEKAN, S., SEČANJ, M., MIHALIĆ ARBANAS, S. (2018): Extreme precipitation events and landslides activation in Croatia and Bosnia and Herzegovina. **Proceedings of the 3rd Regional Symposium on Landslides in the Adriatic Balkan Region: Advances in Landslide Research** / Jemec Auflič, M., Mikoš, M., Verbovšek, T. (eds.). Geological Survey of Slovenia: Ljubljana. 19-24.

4. DUGONJIĆ JOVANČEVIĆ, S., ARBANAS, Ž., VIVODA, M., PERANIĆ, J., ĐOMLIJA, P. (2017) Landslide hazard and risk assessment in Istria, Croatia. **Proceedings of the 2nd Regional Symposium on Landslides in the Adriatic-Balkan Region** / Abolmasov, B., Marjanović, M., Đurić, U. (eds). Faculty of Mining and Geology, University of Belgrade, Serbia. 117-121.
5. ĐOMLIJA, P., BOČIĆ, N., MIHALIĆ ARBANAS, S. (2017): Identification of geomorphological units and hazardous processes in the Vinodol Valley. **Proceedings of the 2nd Regional Symposium on Landslides in the Adriatic-Balkan Region** / Abolmasov, B., Marjanović, M., Đurić, U. (eds). Faculty of Mining and Geology, University of Belgrade, Serbia. 109-116.
6. MIHALIĆ ARBANAS, S., SEČANJ, M., BERNAT GAZIBARA, S., KRKAČ, M., ARBANAS, Ž. (2017): Identification and Mapping of the Valići Lake Landslide (Primorsko-Goranska County, Croatia). **Proceedings of the 2nd Regional Symposium on Landslides in the Adriatic-Balkan Region** / Abolmasov, B., Marjanović, M., Đurić, U. (eds). Faculty of Mining and Geology, University of Belgrade, Serbia. 197-202.
7. PETERNEL, T., DUGONJIĆ JOVANČEVIĆ, S., MIKOŠ, M., ĐOMLIJA, P., ARBANAS, Ž. (2017): Geological conditions of landslides in flysch deposits in Slovenia and Croatia. **Proceedings of the 2nd Regional Symposium on Landslides in the Adriatic-Balkan Region** / Abolmasov, B., Marjanović, M., Đurić, U. (eds). Faculty of Mining and Geology, University of Belgrade, Serbia. 215-220.
8. SEČANJ, M., BERNAT GAZIBARA, S., MIHALIĆ ARBANAS, S., KRKAČ, M., MARTINKO, M., ARBANAS, Ž. (2018): Identification of potentially unstable rock blocks on the road cut in the Krka National park, Croatia. **Proceedings of the 3rd Regional Symposium on Landslides in the Adriatic Balkan Region: Advances in Landslide Research** / Jemec Auflič, M., Mikoš, M., Verbovšek, T. (eds.). Geological Survey of Slovenia: Ljubljana. 113-118.

Papers in proceedings of international scientific conferences

1. MARENDIĆ, A., PAAR, R., TOMIĆ, H., ROIĆ, M., KRKAČ, M. (2017): Deformation monitoring of Kostanjek landslide in Croatia using multiple sensor networks and UAV. **Proceedings of the 7th International Conference on Engineering Surveying - INGEO 2017** / Kopáček, A., Kyrinović, P., Henriques, M.-J. (eds). Lisbon, Laboratório nacional de engenharia civil. 203-210.
2. PERANIĆ, J., ARBANAS, Ž., FORESTA, V.; CUOMO, S., MAČEK, M. (2018) Determination of soil water retention curve of residual soil from a flysch rock mass. **Proceedings of the 7th International Conference on Unsaturated Soils (UNSAT2018)**, Vol. 1 'Unsaturated soils' / Ng, C.W.W., Leung, A.K., Chiu, A.C.F., Zhou, C.,(eds). The Hong Kong University of Science and Technology, Hong Kong. 379-384.
3. RUŽIĆ, I., BENAC, Č., DUGONJIĆ JOVANČEVIĆ, S., MATEŠIĆ, L. (2017) Coastal erosion and instability phenomena at Stara Baška, Krk Island, Croatia, **Proceedings of the Coastal and Maritime Mediterranean Conference**, EDITION 4 Split, 171-176.

Chapter in ICL Teaching Tools

1. ARBANAS, Ž., MIHALIĆ ARBANAS, S., VIVODA PRODAN, M., PERANIĆ, J., DUGONJIĆ JOVANČEVIĆ, S., JAGODNIK, V. (2018): TXT-tool 3.385-1.2: Landslide Comprehensive Monitoring System: The Grohovo Landslide Case Study, Croatia. **Landslide Dynamics: ISDR-ICL Landslide Interactive Teaching Tools, Vol. 1 'Fundamentals, Mapping and Monitoring'** / Sassa, K., Guzzetti, F., Yamagishi, H., Arbanas, Ž., Casagli, N., McSaveney, M., Dang, K. (eds). Springer, Cham. 465-478.
2. DUGONJIĆ JOVANČEVIĆ, S., NAGAI, O., SASSA, K., ARBANAS, Ž. (2018): TXT-tool 3.385-1.2: Deterministic Landslide Susceptibility Analyses Using LS-Rapid Software. **Landslide Dynamics: ISDR-ICL Landslide Interactive Teaching Tools** / Sassa, K., Tiwari, B., Liu, K., McSaveney, E., Strom, A., Setiawan, H. (eds). Springer, Germany. 169-179.
3. GRADIŠKI, K., SASSA, K., HE, B., ARBANAS, Ž., MIHALIĆ ARBANAS, S., KRKAČ, M., KVASNIČKA, P., OŠTRIĆ, M. (2018): TXT-tool 3.385-1.1: Application of Integrated Landslide Simulation Model LS-Rapid to the Kostanjek Landslide, Zagreb, Croatia. **Landslide Dynamics: ISDR-ICL Landslide Interactive Teaching Tools** / Sassa, K., Guzzetti, F., Yamagishi, H., Arbanas, Ž., Casagli, N., McSaveney, M., Dang, K. (eds). Cham, Springer. 101-109.
4. KRKAČ, M., ŠPOLJARIĆ, D., BERNAT GAZIBARA, S., MIHALIĆ ARBANAS, S., (2018): TXT-tool 4.385-1.1: Method for Prediction of Landslide Movements Based on Random Forests. **Landslide Dynamics: ISDR-ICL**

- Landslide Interactive Teaching Tools* / Sassa, K., Guzzetti, F., Yamagishi, H., Arbanas, Ž., Casagli, N., McSaveney, M., Dang, K. (eds). Cham, Springer. 575-597.
- MIHALIĆ ARBANAS, S., KRKAČ, M., BERNAT GAZIBARA, S., KOMAC, M., SEČANJ, M., ARBANAS, Ž. (2018): TXT-tool 2.385-1.1 A Comprehensive Landslide Monitoring System: The Kostanjek Landslide, Croatia. *Landslide Dynamics: ISDR-ICL Landslide Interactive Teaching Tools* / Sassa, K., Guzzetti, F., Yamagishi, H., Arbanas, Ž., Casagli, N., McSaveney, M., Dang, K. (eds). Cham, Springer. 449-464.
 - VIVODA PRODAN, M., DUGONJIĆ JOVANČEVIĆ, S., ARBANAS, Ž. (2018): TXT-tool 3.385-1.3: Landslide Occurrence Prediction in the Rječina River Valley as a Base for an Early Warning System. *Landslide Dynamics: ISDR-ICL Landslide Interactive Teaching Tools* / Sassa, K., Tiwari, B., Liu, K., McSaveney, E., Strom, A., Setiawan, H. (eds). Springer, Germany. 263-275. DOI 10.1007/978-3-319-57777-7_13

PhD Thesis

- ĐOMLIJA, P. (2018): Identification and classification of landslides and erosion phenomena using the visual interpretation of the Vinodol Valley digital elevation model. **PhD Thesis**. Zagreb, Faculty of Mining, Geology and Petroleum Engineering of the University of Zagreb. 527p. (Supervisor: Mihalić Arbanas, S., Bočić, N.)

MS Thesis

- CINDRIĆ, M. (2017) Numerical modeling of a complex underground structure. **MS Thesis**, Faculty of Civil Engineering, University of Rijeka, Rijeka, Croatia. In Croatian (Supervisor: Jagodnik, V.)
- BAGARIĆ, J. (2018): Engineering geological model of the Trstenik landslide (City of Zagreb). **MS Thesis**. Zagreb, Faculty of Mining, Geology and Petroleum Engineering of the University of Zagreb. 42p. (Supervisor: Krkač, M.)
- ERAK, M. (2018): Landslide susceptibility map of the Republic of Croatia. **MS Thesis**. Zagreb, Faculty of Mining, Geology and Petroleum Engineering of the University of Zagreb. 35p. (Supervisor: Mihalić Arbanas, S.)
- DINKO KLARIĆ (2018): Risk Analyses in the Wider Area of the Grohovo Landslide. **MS Thesis**. Rijeka, Faculty of Civil Engineering of the University of Rijeka. (Supervisor Dugonjić Jovančević, S.)
- KRISTINA PLAZIBAT (2018): Instability Analysis in the Rječina River Valley. **MS Thesis**. Rijeka, Faculty of Civil Engineering of the University of Rijeka. (Supervisor Dugonjić Jovančević, S.)
- LONČAR, A. (2018): Engineering geological model of the Pantovčak landslide in Zagreb. **MS Thesis**. Zagreb, Faculty of Mining, Geology and Petroleum Engineering. 42p. (Supervisor: Krkač, M.)
- MARTINKO, M. (2017): Engineering geological investigation of rock mass cuts on County Road 6055 (Oklaj-Kistanje). **MS Thesis**. Zagreb, Faculty of Mining, Geology and Petroleum Engineering. 68p. (Supervisor: Krkač, M.)
- PAVIĆ, I. (2018): Remediation of the landslide at the Local Road LC50059 Lazi-Štefanići in Istria. **MS Thesis**. Zagreb, Faculty of Civil Engineering of the University of Rijeka. 81p. (Supervisor: Arbanas, Ž.)
- POSARIĆ, D. (2018): Analysis of preparatory conditions to landslides and erosion processes on the territory of the Republic of Croatia. **MS Thesis**. Zagreb, Faculty of Mining, Geology and Petroleum Engineering of the University of Zagreb. 51p. (Supervisor: Mihalić Arbanas, S.)

BS Thesis

- ANTULOV-FANTULIN, I. (2017) Determination of soil strength parameters in the ring shear apparatus. **BS Thesis**. Rijeka, Faculty of Civil Engineering of the University of Rijeka. 42p. (Supervisors: Arbanas, Ž.; Vivoda Prodan, M.)
- AHMIČIĆ, S. (2018): Types of the rock mass failure. **BS Thesis**, Faculty of Civil Engineering of the University of Rijeka. (Supervisor Dugonjić Jovančević, S.)
- BIŠIĆ, E. (2018): Effect of discontinuity characteristics on the rock mass stability – case study of the City of Rijeka. **BS Thesis**. Rijeka, Faculty of Civil Engineering. 57p. (Supervisor: Đomlija, P.)
- DEBELJAK, M. (2017): Identification and description of the KS-2' borehole core at the Kostanjek landslide, Zagreb. **BS Thesis**. Zagreb, Faculty of Mining, Geology and Petroleum Engineering. 30p. (Supervisor: Mihalić Arbanas, S.)
- GAŠPARIĆ, L. (2018) Influence of pH value on the shear strength of soil. **BS Thesis**, Faculty of Civil Engineering, University of Rijeka, Rijeka, Croatia. In Croatian (Supervisor: Jagodnik, V.)
- JURIĆ, I. (2018): Role of engineering geological mapping in geotechnical engineering – case study of the building

- pit KBC Rijeka. **BS Thesis**. Rijeka, Faculty of Civil Engineering. 42p. (Supervisor: Đomlija, P.)
7. KRUŽIĆ, L. (2017): Rock mass classification of road cut slopes in the Vinodol Valley. **BS Thesis**. Rijeka, Faculty of Civil Engineering. 45p. (Supervisor: Đomlija, P.)
 8. MARETIĆ, A. (2018) Unconsolidated undrained shear strength of laboratory prepared samples. **BS Thesis**, Faculty of Civil Engineering, University of Rijeka, Rijeka, Croatia. In Croatian (Supervisor: Jagodnik, V.)
 9. MIHALJEVIĆ, J. (2018): Genetic and engineering classification of soils in the Dubračina River Basin. **BS Thesis**. Rijeka, Faculty of Civil Engineering. 48p. (Supervisor: Đomlija, P.)
 10. MIŠKULIN, M. (2017): Overview of investigation methods for geotechnical design. **BS Thesis**. Rijeka, Faculty of Civil Engineering. 28p. (Supervisor: Đomlija, P.)
 11. OŠTRIĆ, K. (2017): Geological Strength Index of the rock mass in road cut slopes in Istria. **BS Thesis**. Rijeka, Faculty of Civil Engineering. 40p. (Supervisor: Đomlija, P.)
 12. PILAT, L. (2018): Geophysical investigations in geotechnical engineering. **BS Thesis**. Rijeka, Faculty of Civil Engineering. 41p. (Supervisor: Đomlija, P.)
 13. PRŠA, M. (2018): Testing the clay activity of the colluvial deposits of the Dubračina River Basin. **BS Thesis**. Rijeka, Faculty of Civil Engineering. 37p. (Supervisor: Đomlija, P.)
 14. ROJNIĆ, N. (2018): Toppling failures in rock masses. **BS Thesis**. Zagreb, Faculty of Civil Engineering of the University of Rijeka. (Supervisor: Arbanas, Ž.)
 15. SALAMUN, A. (2017): Engineering soil identification and description at the landslide located between Struga Banska and Unčani along Una river. **BS Thesis**. Zagreb, Faculty of Mining, Geology and Petroleum Engineering. 26p. (Supervisor: Mihalić Arbanas, S.)
 16. VORIĆ, L. (2018) influence of silts on shear strength of sand. **BS Thesis**, Faculty of Civil Engineering, University of Rijeka, Rijeka, Croatia. In Croatian (Supervisor: Jagodnik, V.)

Note:

Please fill and submit this form by **30 March 2019** to **ICL Network** <icl-network@iclhq.org>

Less than 2 printed pages.

Activities are recommended to submit to the ICL-IPL activities of Landslides: Journal of International Consortium on Landslides.