

## **World Centre of Excellence (WCoE-13) 2017-2020 Progress Report Form 2019**

**1 January 2018 to 31 December 2018**

1. Short Title of WCoE: Landslides in Weathered Flysch: from activation to deposition
2. Name of Institution: University of Ljubljana, Faculty of Civil and Geodetic Engineering (UL FGG), Assoc. Prof. Ana Petkovšek, ana.petkovsek@fgg.uni-lj.si
3. List of core members: Assoc. Prof. Janko Logar, Prof. Matjaž Mikoš, Assist. Prof. Dušan Petrovič, Assist. Matej Maček, PhD
4. Progress report of activities up to 31 December 2018

In 2019, the most important activities of the WCoE were:

- a) Activities related to the organization of the next, i.e. the 5<sup>th</sup> World Landslide Forum in Kyoto in 2020 (<http://wlf5.iplhq.org/>),
- b) Activities related to the forthcoming 4<sup>th</sup> Regional Symposium on Landslides in the Adriatic-Balkan Region in 2019 in Sarajevo, Bosnia and Hercegovina (<http://www.geo-zs.si/ReSyLAB2017/>),
- c) Activities related to the two IPL projects, IPL-225 & IPL-226 (separate reports are available on the IPL website).

At UL FGG, the UNESCO Chair on Water-related Disaster Risk Reduction (established in 2016; [www.unesco-floods.eu](http://www.unesco-floods.eu)), is a member of the UNITWIN Cooperation Programme on Landslide Risk Mitigation for Society and the Environment (activity report: <http://iplhq.org/category/icl/unitwin-progress-report-icl/>). The UNESCO Chair started cooperation with the UNESCO WENDI Chair in Water, Energy and Disaster Management for Sustainable Development at the University of Kyoto, Japan.

We have studied the rheological parameters of different muds and soils in a geotechnical laboratory. The study focused on a comparison of rheological data measured by a cylindrical rheometer in comparison with the Marsh funnels (cone flow tests) and lateral spreading. This study was performed after observing a poor correlation with laboratory results in a large rheometer when simulating the 2000 Stože Landslide debris flow using the Flo-2D Model. We started to build a new laboratory for aggregates, where also rocks not only soils will be studied (slake durability, frost-weathering effects) – two rooms were refurbished for this purpose.

In 2018, first test swelling tests in marls were performed in an osmotic oedometer (of our own design). Based on these tests, some improvements of the equipment will be made in 2019.

In 2018, we publish a paper within the research collaboration with University of Rijeka, Croatia (ICL Member) on soil-water relations in flysch rock masses (Peranić et al., 2018) - a bilateral research project on landslides in flysch in 2016-2017. Furthermore, we disseminate results from the dissertation on debris-flow

hazard assessment in torrential catchments in Slovenia (Sodnik & Mikoš, 2018a; 2018b) and at the INTERPRAEVENT 2018 Congress in Pacific Rim (Sodnik et al., 2018). We have studied the impact of forests on debris flows (Fidej et al., 2018). We have supported the visibility of the ICL by a research paper on the bibliometric impact of books published by the ICL (Mikoš, 2018a). We have reported our activities at the international stage (Mikoš & Bezak, 2018; Mikoš, 2018b).

## 5. Plan of future activities

In 2019, we will continue to study rheological parameters of muds and soils under laboratory conditions, and we will further develop osmotic oedometer. In the oedometer, we would like to measure swelling deformation as a function of suction of different marls (including those from flysch) which form multiple landslide problems. The laboratory for aggregates will be equipped with selected equipment.

In 2019, we will be working in the framework of the national research program “*Water Science and Technology, and Geotechnical Engineering: Tools and Methods for Process Analyses and Simulations, and Development of Technologies*” (2017-2021). Furthermore, we will be working together with the Geological Survey of Slovenia (GeoZS, ICL Member) on the IPL-225 Project “*Recognition of potentially hazardous torrential fans using geomorphometric methods and simulating fan formation*”, and on the IPL-226 Project “*Studying landslide movements from source areas to zone of deposition using a deterministic approach*”.

In 2019, we will co-organize the World Construction Forum ([www.wcf2019.org](http://www.wcf2019.org)) in Ljubljana (April 8–11, 2019) with the main theme on *Buildings and Infrastructure Resilience*, including a special theme on *Disaster Risk Management & Governance for Resilient Communities*, the 4<sup>th</sup> Regional Symposium on Landslides in the Adriatic-Balkan Region (4<sup>th</sup> ReSyLAB; [http://www.geotehnika.ba/ReSyLAB\\_2019.html](http://www.geotehnika.ba/ReSyLAB_2019.html)),

## 6. Publications

Fidej G, Mikoš M, Jež J, Kumelj Š, Diaci, J (2018). Assessment of forest protective function against debris-flows. *Gozdarski vestnik*, 76(4), 167-180 (in Slovene with the English abstract)

Mikoš M (2018a). The bibliometric impact of books published by the International Consortium on Landslides. *Landslides : Journal of the international consortium on landslides*, 15(8), 1459-1482.

Mikoš M (2018b). *UNESCO Chair on Water-related Disaster Risk Reduction and its recent activities: 7th Asia-Europe Meeting, Sustainable Development Dialogue, Integrated Water Management in the 21st Century: Addressing Imminent Challenges, Budimpešta, Hungary, 11.-12. 9. 2018.* [https://www.researchgate.net/publication/327594502\\_UNESCO\\_Chair\\_on\\_Water-related\\_Disaster\\_Risk\\_Reduction\\_-\\_presentation\\_in\\_pdf\\_at\\_7th\\_ASEM\\_Sustainable\\_Development\\_Dialogue\\_in\\_Budapest\\_Hungary](https://www.researchgate.net/publication/327594502_UNESCO_Chair_on_Water-related_Disaster_Risk_Reduction_-_presentation_in_pdf_at_7th_ASEM_Sustainable_Development_Dialogue_in_Budapest_Hungary).

Mikoš M, Bezak, N (2018). Poročilo s 4. svetovnega foruma o zemeljskih plazovih, Ljubljana, Slovenija, 2017 = Report from the 4th World Landslide Forum, Ljubljana, Slovenia, 2017. *Ujma*, 32, 284-292, <http://www.sos112.si/slo/tdocs/ujma/2018/284-292.pdf>.

Peranić J, Arbanas Ž, Cuomo S, Maček M (2018) Soil-water characteristic curve of residual soil from a flysch rock mass. *Geofluids*, <https://www.hindawi.com/journals/geofluids/2018/6297819/>.

Sodnik J, Mikoš, M (2018a). Zemeljski plazovi pri ocenjevanju nevarnosti zaradi delovanja drobirskih tokov = Landslides at debris flow hazard assessment. *Gradbeni vestnik*, 67(6), 120-131. (in Slovene with the English abstract)

Sodnik J, Mikoš, M (2018b). Predlog metodologije za ocenjevanje nevarnosti zaradi delovanja drobirskih tokov. In: *Zbornik referatov*, 29. Mišičev vodarski dan 2018, 57-65, <http://www.mvd20.com/LETO2018/R7.pdf>. (in Slovene with the English abstract)

Sodnik J, Maček M, Mikoš, M (2018). Estimating Landslide Volumes Using LS-rapid Model -The 2000 Stože Landslide in NW Slovenia. In: YAMADA T (Ed.): *Large scale sediment disasters in orogenic zones and countermeasures: symposium proceedings*, INTERPRAEVENT 2018, 32-41.