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## Weathering experiments on badland materials – advantages and obstacles

**Milica Kasanin-Grubin**<sup>1</sup>, Nevena Antić<sup>1</sup>, Milica Stefanović<sup>2</sup>, and Aydoğan Avciouğlu<sup>3</sup>

<sup>1</sup>University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Department of Chemistry, Belgrade, Serbia

(mkasaningrubin@chem.bg.ac.rs, nevena.antic@ihm.bg.ac.rs)

<sup>2</sup>University of Belgrade, Innovation Center of the Faculty of Technology and Metallurgy Ltd, Karnegijeva 4, Belgrade, Serbia

(mstefanovic@tmf.bg.ac.rs)

<sup>3</sup>Eurasia Institute of Earth Sciences, Istanbul Technical University, Istanbul, Turkey (avcioglua19@itu.edu.tr)

Badlands are landscapes in which, due to lithological properties and climate conditions, various geomorphological processes are active, resulting in high erosion rates. Comprehensive work has been done in badland areas both on the big and on the smaller scale in order to understand the subtle differences between sites. The development of weathering profile and surface crust have been recognized as crucial for hillslope processes in badlands. However, solely field work is not able to provide necessary detailed information regarding weathering processes. To better understand the development of the weathering profiles and surface crust, it is necessary to monitor badland materials exposed to different climate settings in controlled laboratory conditions. There are a number of issues that have to be considered when creating the experiment protocol. Those include defining the appropriate size and shape of the sample, reproducing the close as possible to natural wetting and drying conditions, determining the inclination of the sample, setting the duration of the experiment and choosing parameters that should be measured. A minimal error in the experiment protocol could endanger the whole experiment process and produce invalid results. In this study we will show different experiment setups and an array of parameters that should be measured. We will also show the most common obstacles and experiment shortcomings.

Nowadays there are a number of techniques available to ensure the precise following of changes in the chosen parameters during the experiment. For example, using image analyses for monitoring the surface changes has proven to be a very useful tool in monitoring both crack development or change in number, size and shape of fragments. Physico-chemical analyses of leachate characteristics provide information on infiltrations rates and mineral dissolution. Analyses of mineralogical and physico-chemical properties of the material prior and after the experiment provides clear insight into changes in surface grain size, mineralogy, chemical composition, porosity etc.

Mimicking nature conditions is not straightforward and one must bear in mind the limitations of the laboratory experiments. High on the shortcoming list is intentional excluding of certain parameters so that other parameters could be undistruptively monitored. This has to be done

carefully and with a clear rationale. Next limitation includes the sample size which has to be usable in the laboratory, but also large enough to produce valuable results. And finally setting the climate parameters is most challenging. Setting the drying temperature and the precipitation intensity, duration and its chemical composition will greatly influence the results. In conclusion, laboratory experiments can be very useful in close monitoring of weathering processes. However, there are certain limitations that the experimenter should take into consideration and make sure it is not an obstacle to correctly answer the research questions.