ANALOGUE SITES TO TEST MARTIAN DRILLS AND IMPROVE THEIR INTERPRETATION. Zs. Kapui[1], J. Szeberényi[1], B. Bradák-Hayashi[2], I. Milinkó[3], T. Végh[3]; [1]MTA CSFK, 9400 Sopron, Csatkai u. 6-8, Hungary, [2]Department of Earth and Planetary Science, Kobe University, 1-1, Rokkodai-cho, Nada-ku, Kobe, Hyogo, Japan, 657-8501, [3]Department of Physical Geography, Eötvös Lorand University, Pázmány P. sétány 1/c, Budapest, Hungary E-mail: kapui.zsuzsanna@csfk.mta.hu

Introduction: Earth analog observations [1,2] could support much the realization of space exploration, especially in the case of next Mars missions [3,4], such as ExoMars (EXM). Drilling activity could be improved and optimized by connecting analogue sites and to the facilities and the workflow of the mission, meanwhile it also supports the development of Hungarian planetary science activity. Drilling activity is an important next step where beside technological improvement, new results will be gained in planetary science [5,6] and astrobiology [7]. Although the Hungarian sites are not perfect analogues, they can be useful, because sediments of various depositional conditions can be observed in small scale at these locations. The analysis of the shallow drilling cores easily can be completed and controlled by the study of the outcrops nearby.

The first target outcrop: One of the most important analogue locations is Pilismarót (N 47˚47.17 E 18˚52.327) which is located close to the village Visegrád in Hungary. The advantage of this easy to access outcrop is that several geological profiles can be determined within a small area, the fluvial, alluvial and aeolian facies and the transition zones between them can be easily identified and reached by shallow drills.

Methods: Field and laboratory measurements are going to be performed during the research, including site selection, drill, borehole wall scanning, sample acquisition, and later laboratory analysis are to be made. Macroscopic description and the magnetic susceptibility measurements will be carried out on the field while further investigations will be accomplished in the laboratory of the MTA-CSFK with optical, infrared and Raman facilities. The methods are partly to improve workflow and identify indicators ("smoking guns") for ancient wet conditions using different facilities together

Mars relevant expectations: The wind, water and ice were also important transport media on Mars. Facies and sedimentary structures are controlled by the same physical laws on both planets although differences in the rare atmosphere, lower gravity, temperature regime, strong UV and particle radiation, and drier weather and aggressive chemistry on Mars. More sediment can be settled and/or preserved in specific geodynamic settings by the absence of global plate tectonics, therefore thicker and less disturbed layers could be observed occasionally in the Martian outcrops. Occasionally coarser grain size can be expected than on the Earth, because the larger wind speed needs to mobilize the sediments. Despite all of these factors, the Pilismarót site could be as a relevant analogue location, because there are aeolian and fluvial sediments just as in Mars and the method top differentiate them could be applied to Mars.

Analogue properties in focus: The ephemeral liquid water filled bodies (rivers, various flows, lakes etc.) could be often ephemeral, terminating with a desiccation phase and possible change from fluvial/lacustrine to aeolian facies. Such a transition is to be analyzed at the Pilismarót site, where the change in paleo-environments could be analyzed at the top 1-3 meter of the sedimentary strata here. The lowermost part of the profile was characterized by grey colored, cross bedding and laminated coarse/medium sand (e.g. S1-3$_{lam}$). Grey/light grey colored, fine laminated/homogeneous finer sand/aleurite sand was observed in the middle part of the succession (AS1-2). The finer sand/sandy aleurite layers were intercalated by black, greenish black, thin clayey strata (P1-2$_{alluv}$) and carbonate branches. The lower (fluvial/alluvial) and the upper (aeolian) part of the section were separated by a brown/black colored, clayey well developed paleosol with angular blocky ped structure (P4). The upper part of the section consisted of fine grained wind-blown materials such as loess and fine sand (e.g. S1$_{aeol}$). The aeolian sediments were intercalated by weak humid horizons.

Plans for the first drill: We will make the first analog ExoMars drill and the first measurements at this location, because the different facies (fluvial, alluvial, aeolian) and their transition zone are near the surface and can be reached by shallow drill.

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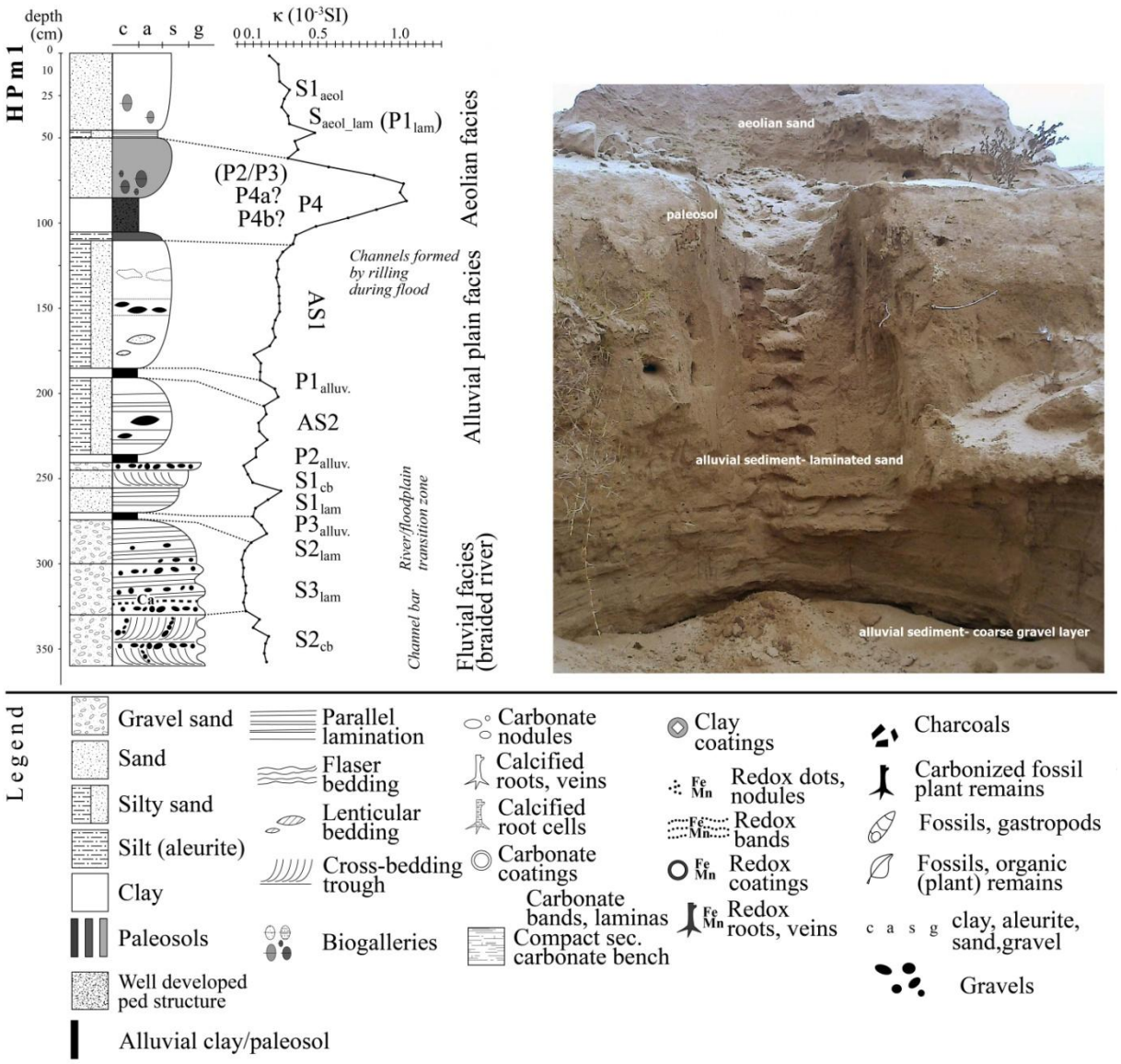
depth (cm)
c a s g
κ (10-3SI)
0 0.1 0.5 1.0
HPm1
S1aeol
Saeol_lam (P1lam)
(P2/P3)
P4a?
P4b?
P4
Channels formed by rilling during flood
AS1
P1alluv.
AS2
P2alluv.
S1cb
S1lam
P3alluv.
S2lam
S3lam
S2cb
Ca
River/floodplain transition zone
Channel bar
Aeolian facies
Alluvial plain facies
Fluvial facies (braided river)
aeolian sand
paleosol
alluvial sediment- laminated sand
alluvial sediment- coarse gravel layer
Legend
Gravel sand
Sand
Silty sand
Silt (aleurite)
Clay
Paleosols
Well developed ped structure
Alluvial clay/paleosol
Parallel lamination
Flaser bedding
Lenticular bedding
Cross-bedding trough
Biogalleries
Carbonate nodules
Calcified roots, veins
Calcified root cells
Carbonate coatings
Carbonate bands, laminas
Compact sec. carbonate bench
Clay coatings
Redox dots, nodules
Redox bands
Redox coatings
Redox roots, veins
Charcoals
Carbonized fossil plant remains
Fossils, gastropods
Fossils, organic (plant) remains
c a s g clay, aleurite, sand,gravel
Gravels