GoldenRAM

CUPRUMIN water quality sampling locations

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Sampling principles - © Pinja

- **Sentinel-2** satellite collects multispectral land surface imagery mainly at **10m and 20m native resolution** depending on the wavelength
    - The pixel locations are near constant
- How the sampling locations were picked (remote sensing perspective):
    1. Create polygon grid specifying the pixel (20x20m) locations
    2. Extract the pixels which are **fully within the lake**/river boundary (to avoid the effect of land on the reflectances)
    3. Specify the **number of samples** needed (min. **40** per site: 30+ near site & some reference) and a **minimum distance** between samples (**100m**)
        - Accessible nearby lakes/rivers in West/North-West were considered as potential reference areas
    4. Select enough water pixels randomly/near interesting locations following the minimum requirements
    5. Manual adjustments if needed:
        - At least one sample per each small pond → Usually the small ponds had only 1-3 (20x20m) pixel options considered as water
        - If more samples are needed/some locations turn out unreachable/interesting parts of the lake were skipped, points can be added/moved/removed
    6. Adjust within pixel locations. We could take several measurements within S2 pixels for inner variability.

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Two field visits were organized, within the Roșia Poieni mining perimeter, in two different periods: 20-22 May and 04-06 August 2024, thus we had access to the Roșia Poieni Open Pit, the Valea Șesei tailing pond and the Valea Cuibarului waste dump . Measurements: Water sampling & on site pH; TSF Mapping with DRONES

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CUPRUMIN – G-RAM PLATFORM METADATA

- (Acid lake Valea Steregoiu-left&center

Sentinel-2 Composites *EcoSpectral*

Description	This composite can help distinguish between urban areas, vegetated regions, and water bodies.
R	NDVI (Normalized Difference Vegetation Index) = Emphasizes vegetation cover, showing forests, crops, and grasslands.
G	NDMI (Normalized Difference Moisture Index) = Reflects moisture content in the soil and vegetation, indicating water bodies, wetlands, and areas with high moisture content.
B	NDBI (Normalized Difference Built-up Index) = Highlights built-up areas, urban regions, and infrastructure.
Master Info	S2A_MSIL2A_20240215T093101_N0510_R136_T34TFS_20240215T124853.SAFE
template	ocli.pro.aikp.pca.sentinel_2
project	Romania

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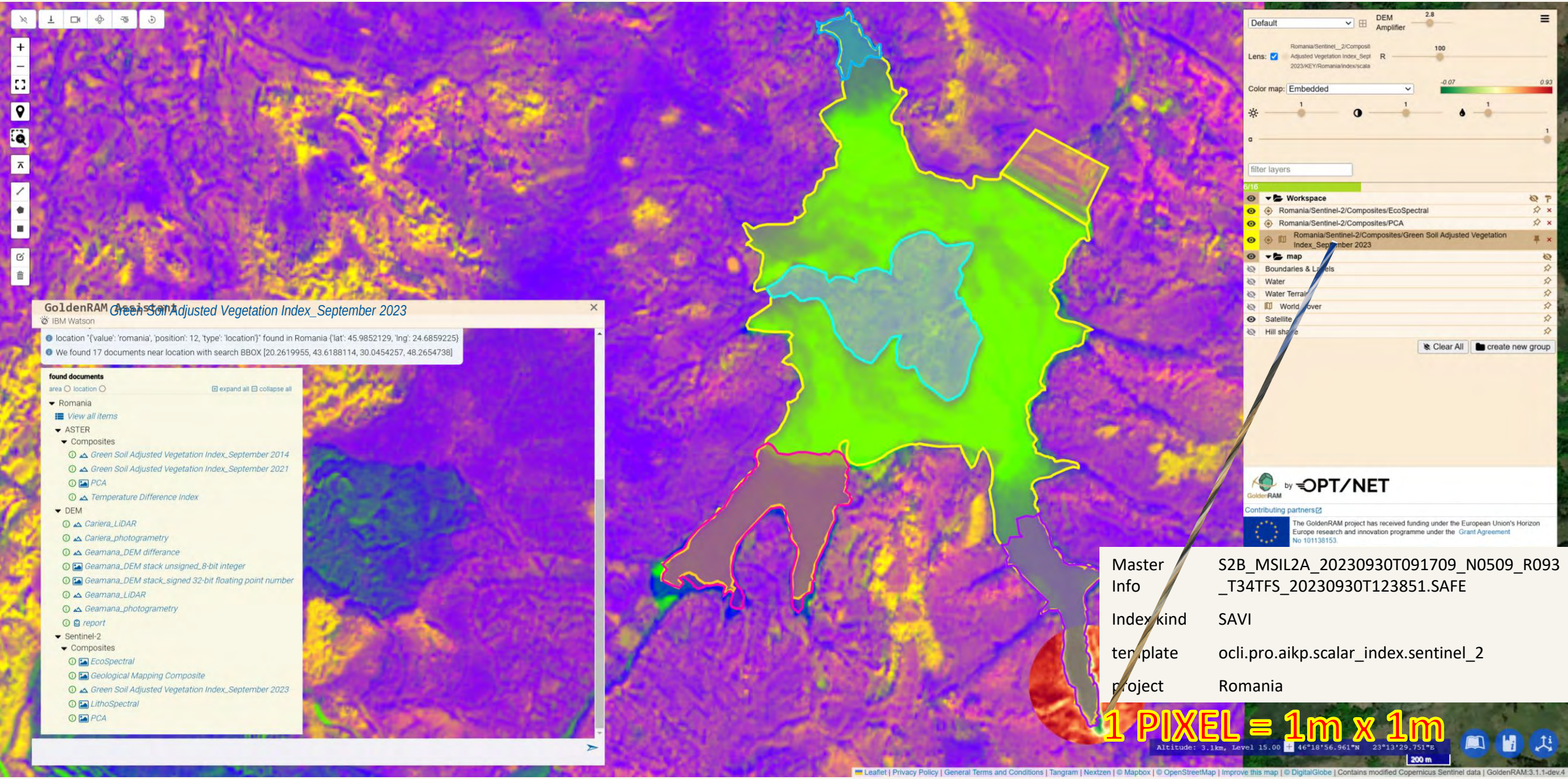
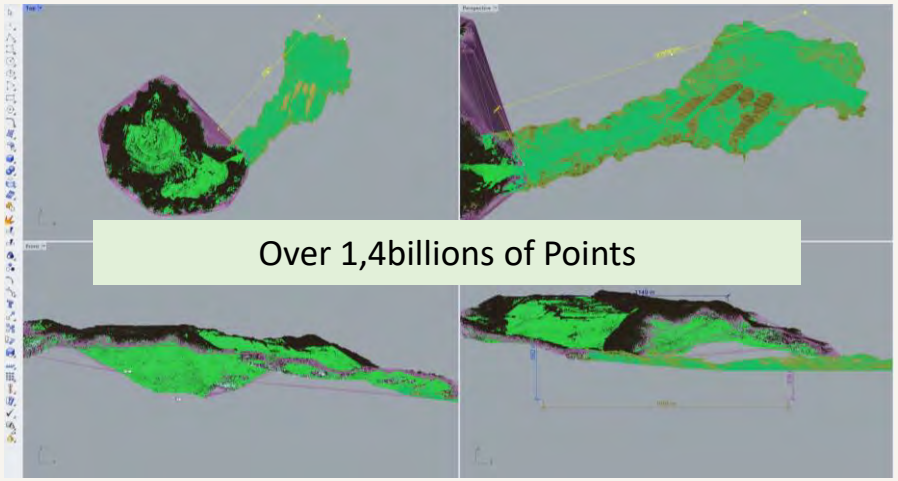
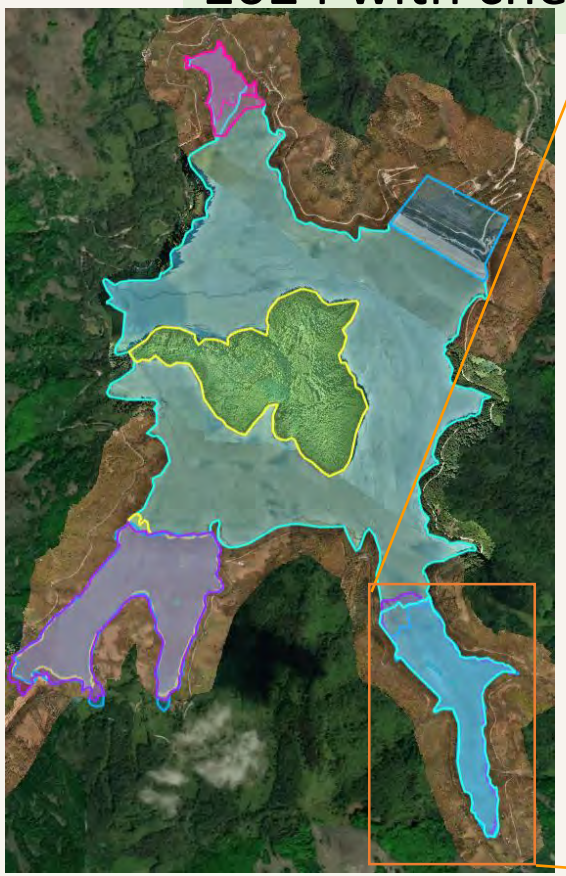
GOLDEN-RAM PLATFORM DATA – ENVIRONMENTAL MONITORING – WATER SURFACE

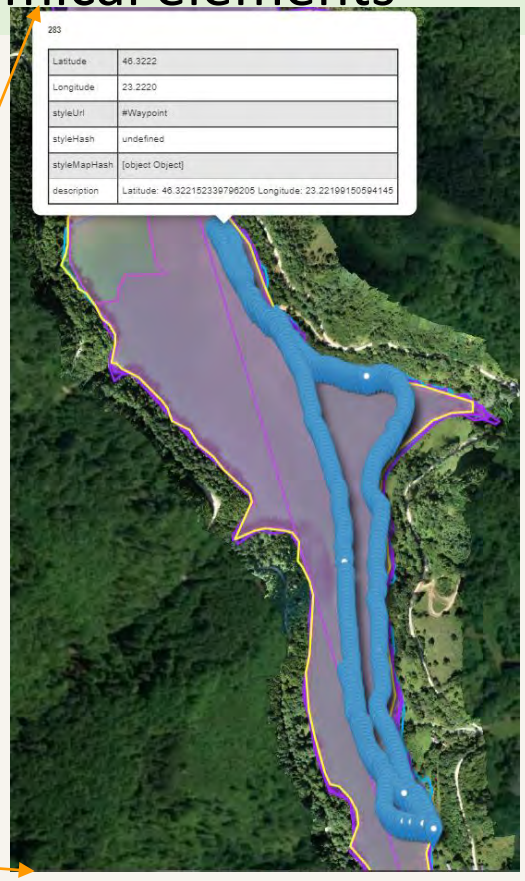


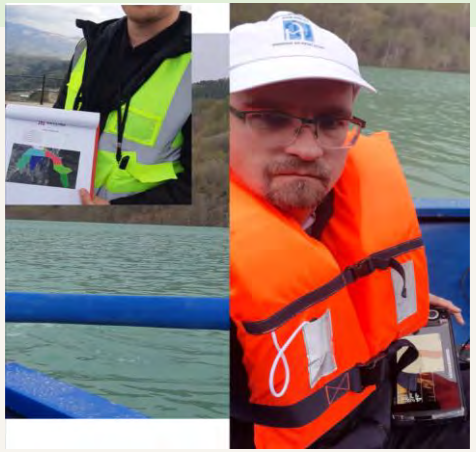
Field Trial Site 3: Roşia Poieni / Romania



Visualization and calculation of Tailing Pond's see page September 2001 – May 2022 – October 2022 – also the depth of the water; Points cloud August 2024 with chemical elements







High 3D resolution elevation model of Valea Sesei Tailing Pond

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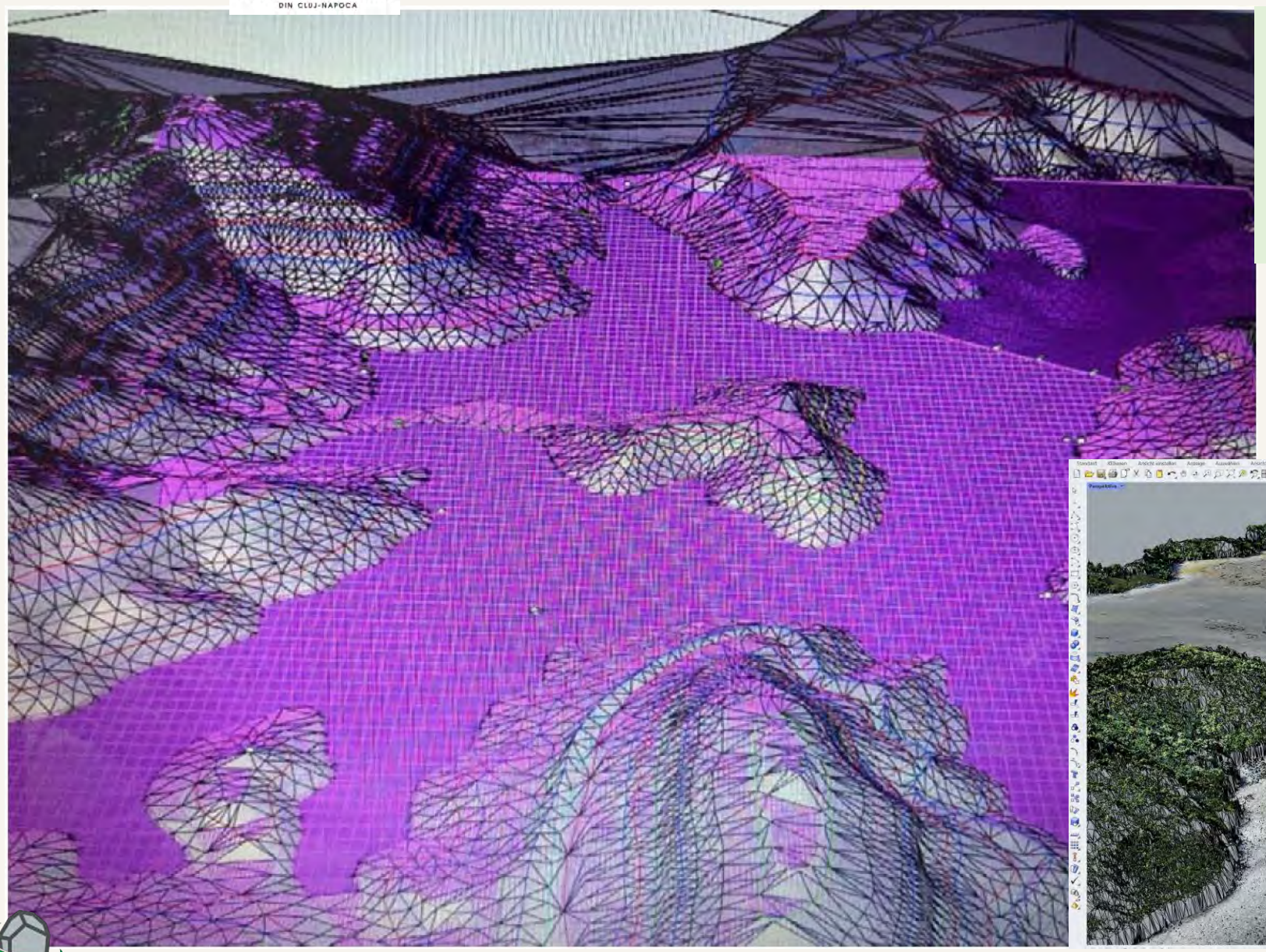
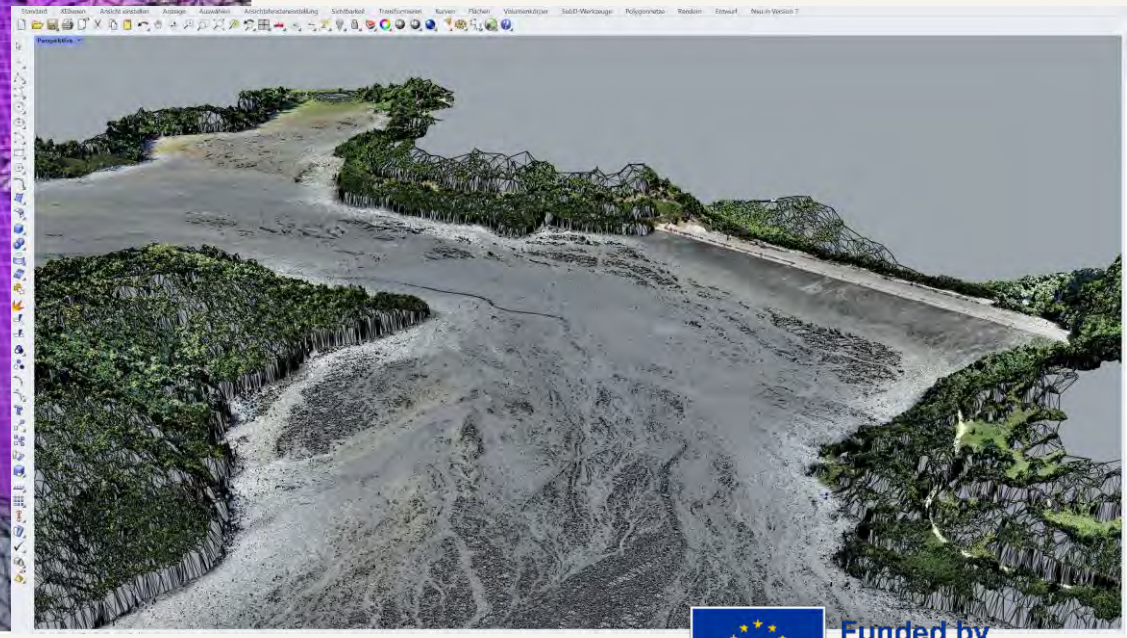


High 3D resolution elevation model of Valea Sesei Tailing Pond – Volume at 708m asl (68.036.554 m3)



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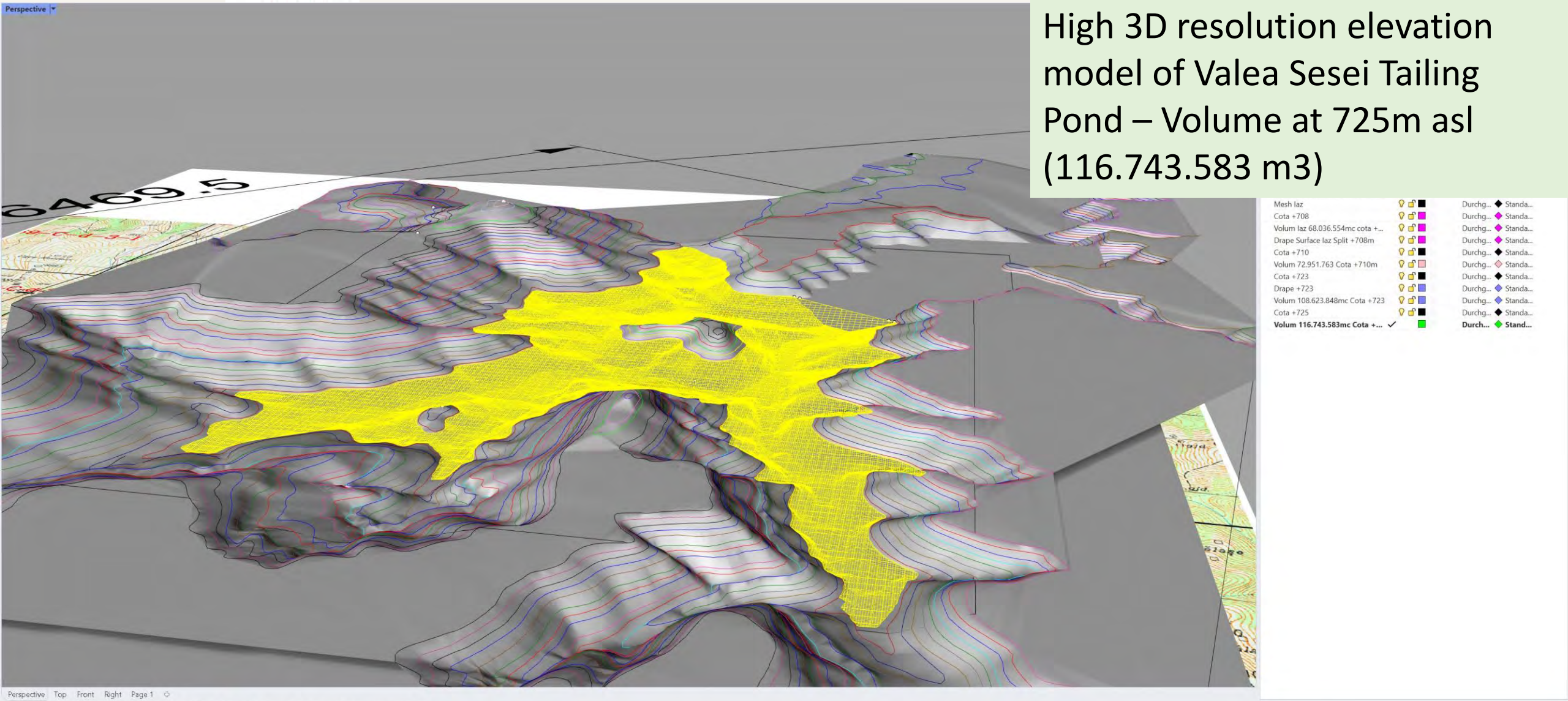
High 3D resolution elevation model of Valea Sesei Tailing Pond – Volume at 725m asl (116.743.583 m3)



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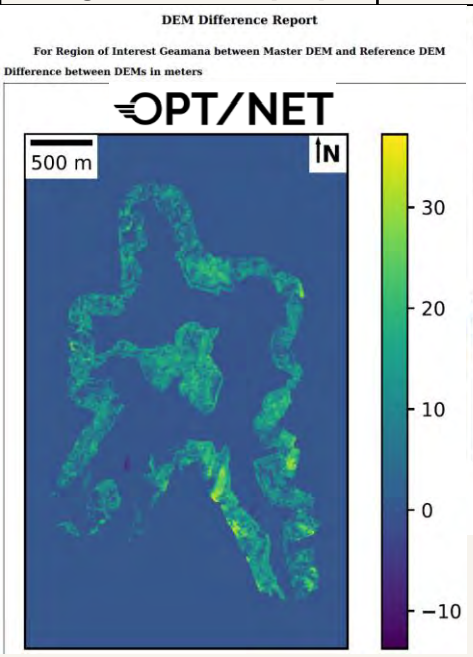
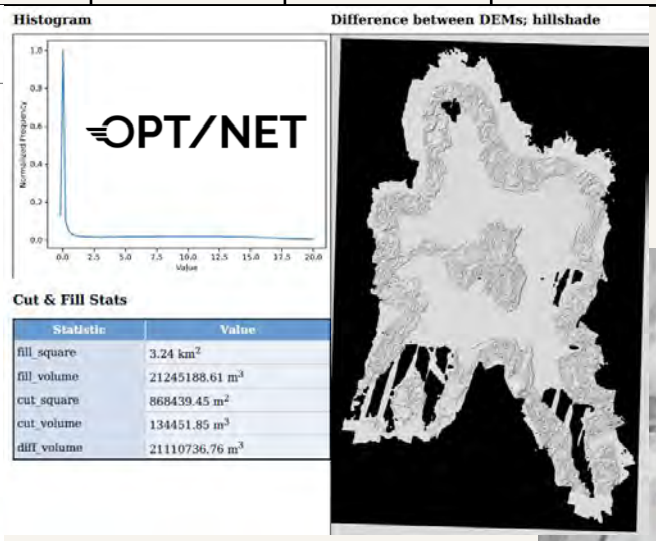
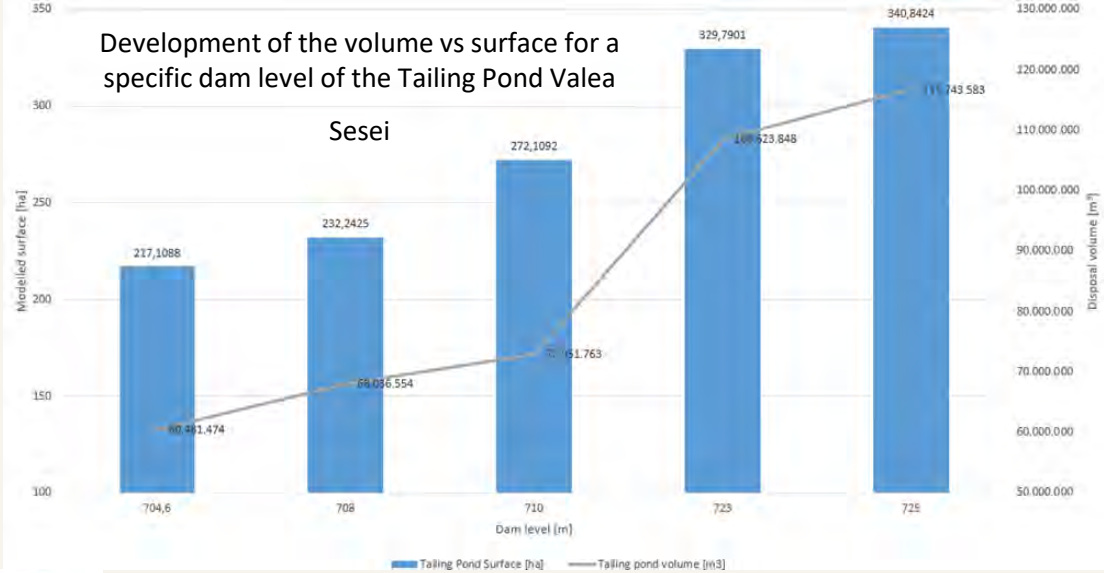
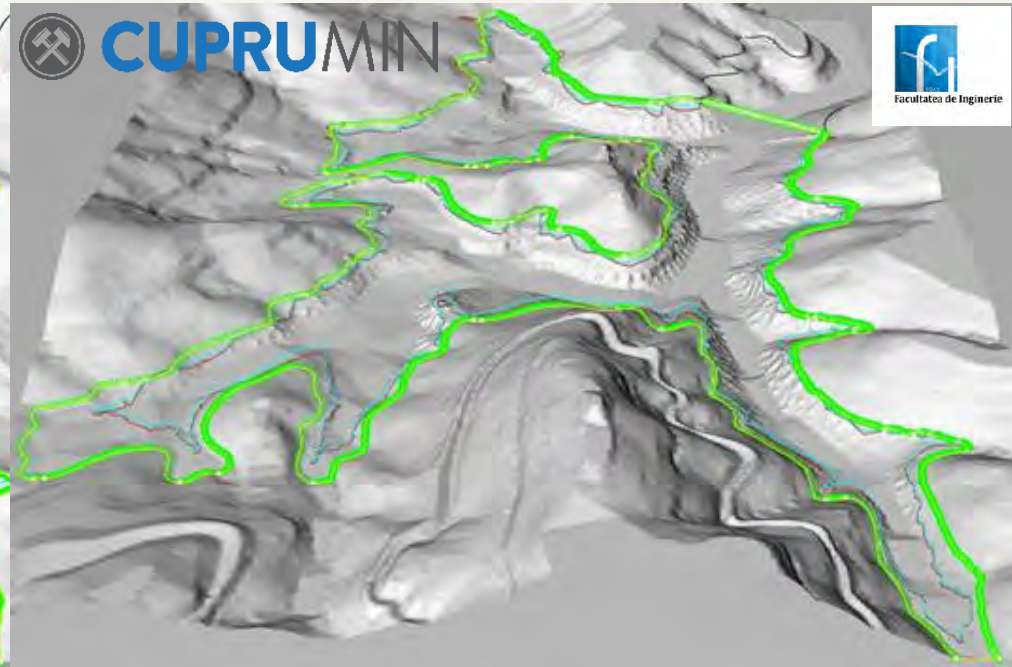
Dam level [m]	704,6	708	710	723	725
Tailing Pond Surface [ha]	217,1088	232,2425	272,1092	329,7901	340,8424
Tailing Pond volume [m3]	60.481.474	68.036.554	72.951.763	108.623.848	116.743.583





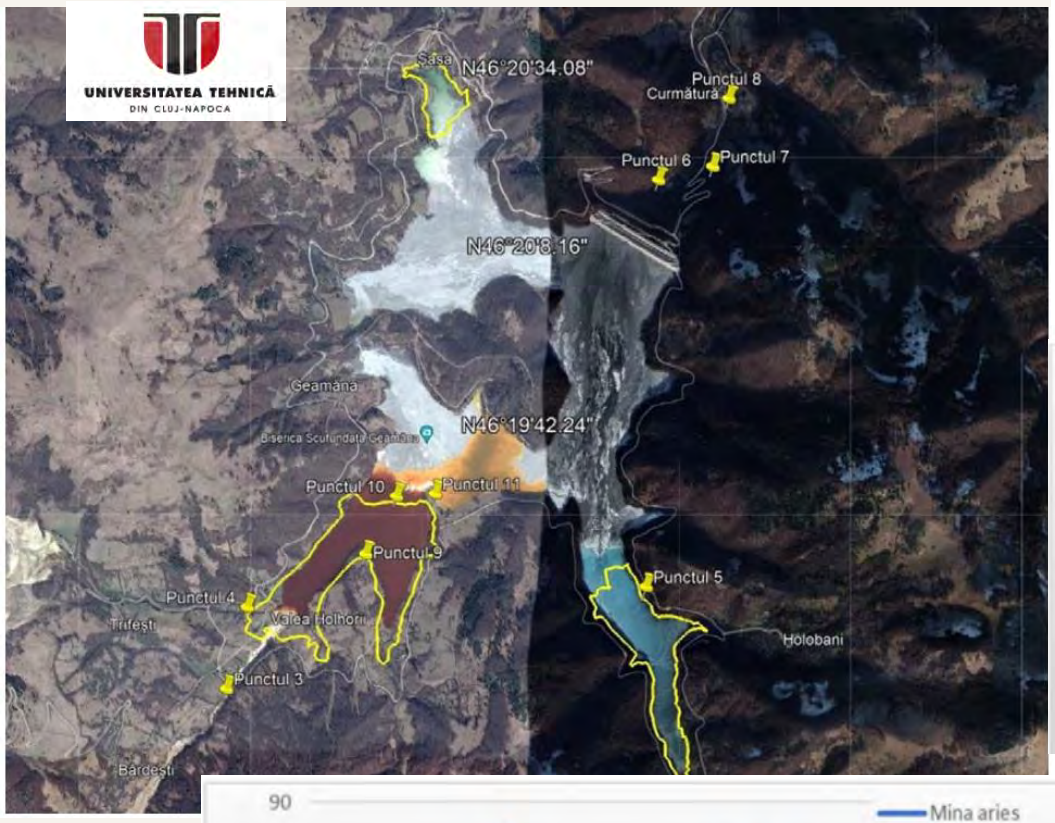


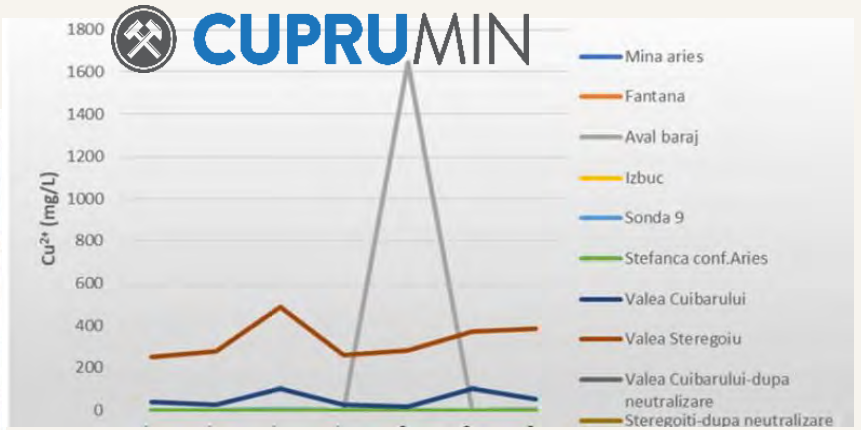
Dam, surface, and volume assessment of tailing pond

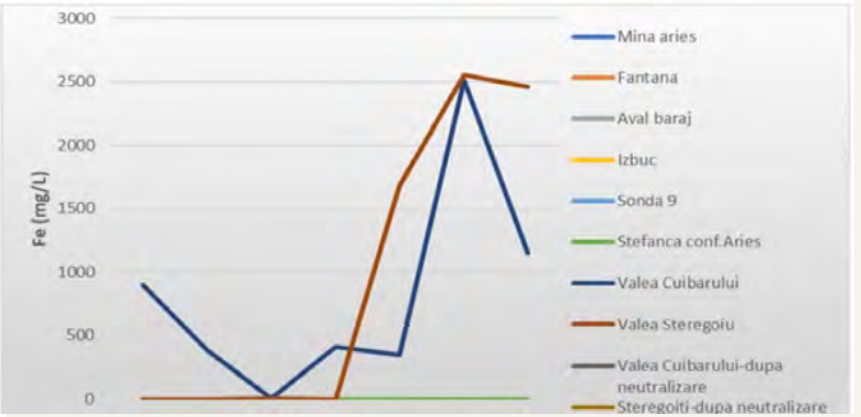


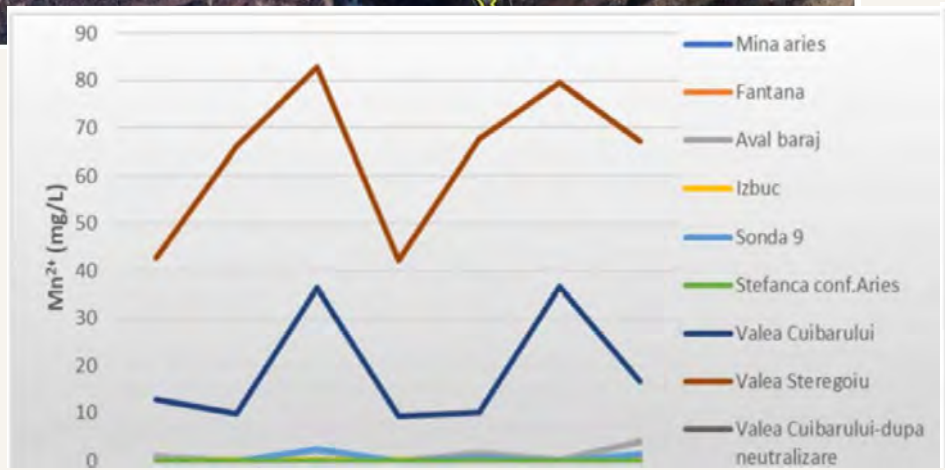
Real 3D digitized valley beneath the tailing pond Valea Sesei material or water (level of dam at +704.6m with an occupied volume of V=60.481.474m3 and Surface S=217,11ha)

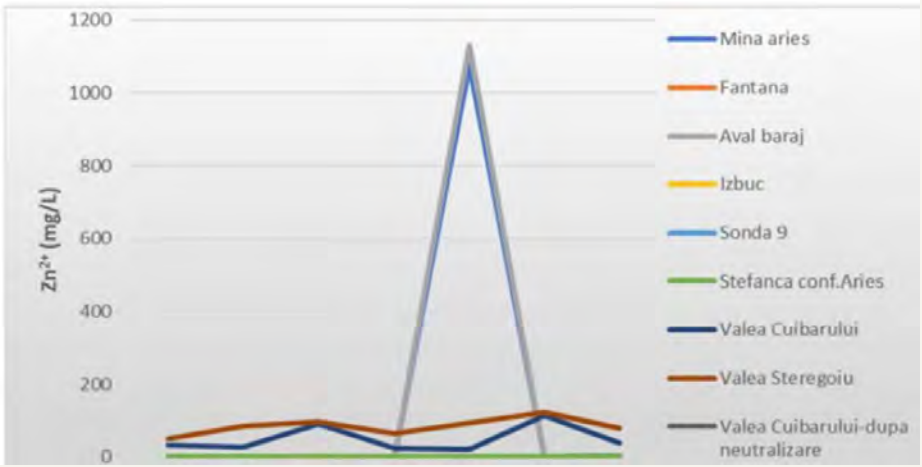
GOLDEN-RAM PLATFORM DATA – ENVIRONMENTAL MONITORING – WATER SURFACE











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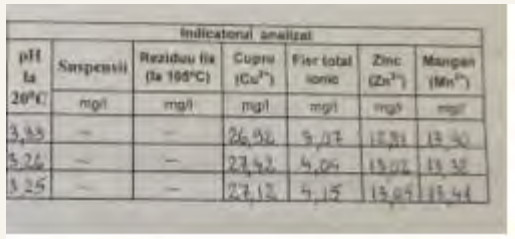
Water sampling (Acid lake Valea Steregoiu-left&center; basic lake Sonda 9-right)



Indicatorul analizat						
pH la 20°C	Suspensii	Reziduu fix (la 105°C)	Cupru (Cu^{2+})	Fier total ioni	Zinc (Zn^{2+})	Mangan (Mn^{2+})
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
3,33	–	–	26,56	5,07	17,81	13,30
3,26	–	–	23,42	4,04	13,02	13,38
3,25	–	–	23,12	4,15	13,09	13,41

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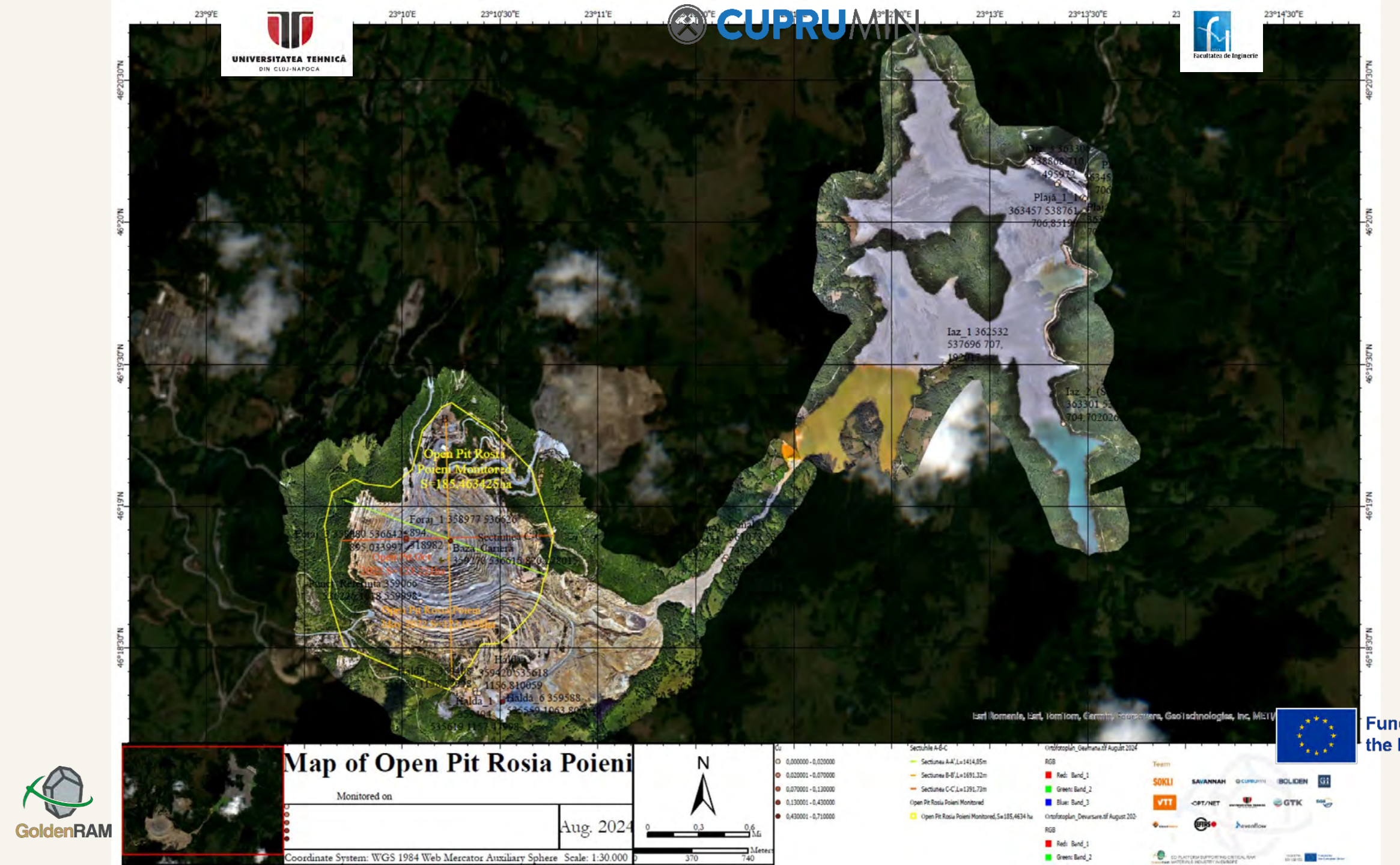

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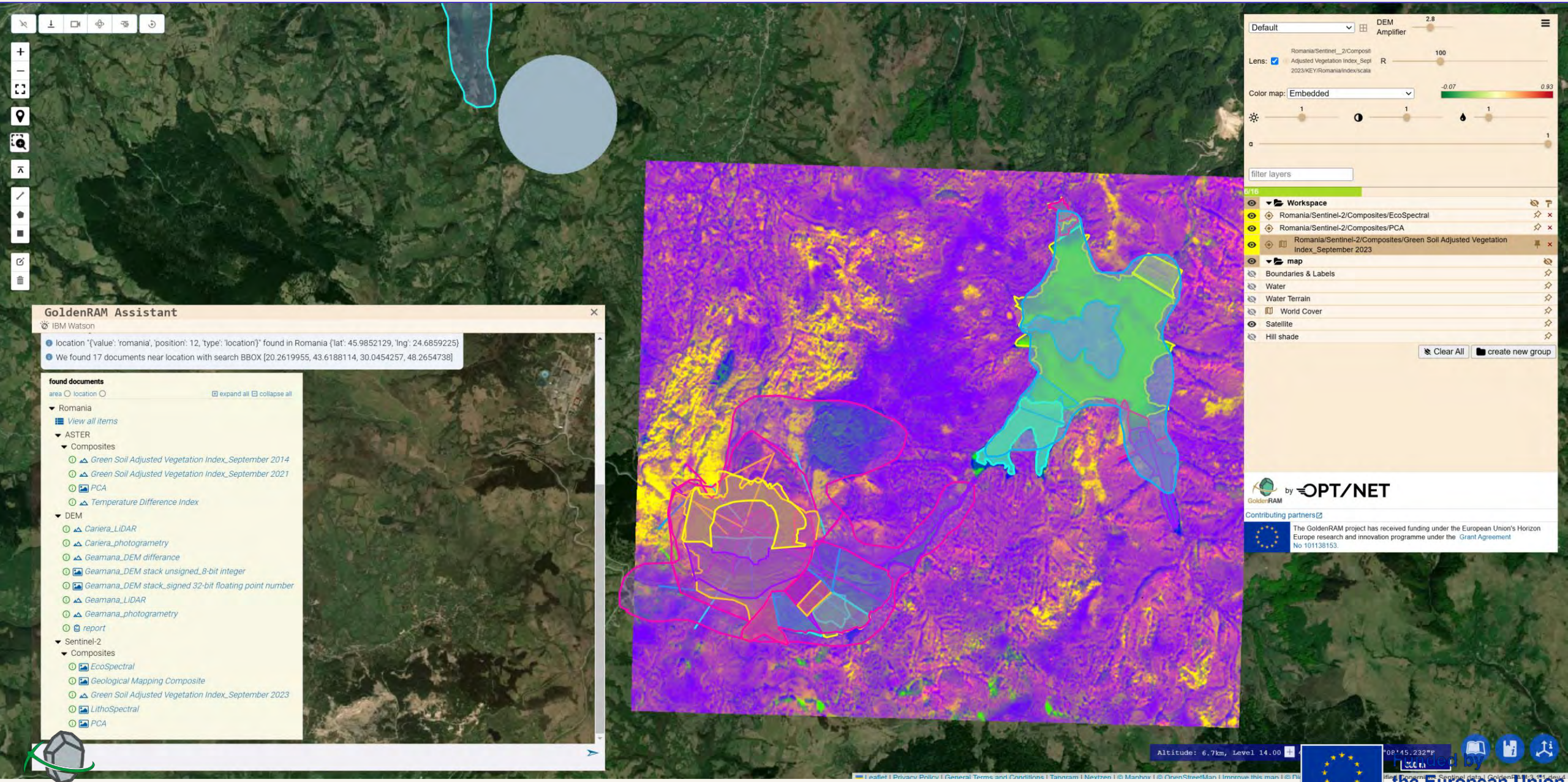
GoldenRAM Assistant
IBM Watson
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We found 17 documents near location with search BBOX [20.2619955, 43.6188114, 30.0454257, 48.2654738]
found documents
area location
expand all collapse all
Romania
View all items
ASTER
Composites
Green Soil Adjusted Vegetation Index_September 2014
Green Soil Adjusted Vegetation Index_September 2021
PCA
Temperature Difference Index
DEM
Cariera_LiDAR
Cariera_photogrametry
Geamana_DEM differance
Geamana_DEM stack unsigned_8-bit integer
Geamana_DEM stack_signed 32-bit floating point number
Geamana_LiDAR
Geamana_photogrametry
report
Sentinel-2
Composites
EcoSpectral
Geological Mapping Composite
Green Soil Adjusted Vegetation Index_September 2023
LithoSpectral
PCA
Default
DEM Amplifier
2.8
Lens:
Romania/Sentinel_2/Composit
Adjusted Vegetation Index_Sept
2023/KEY/Romania/index/scala
R
100
Color map:
Embedded
-0.07
0.93
filter layers
6/16
Workspace
Romania/Sentinel-2/Composites/EcoSpectral
Romania/Sentinel-2/Composites/PCA
Romania/Sentinel-2/Composites/Green Soil Adjusted Vegetation Index_September 2023
map
Boundaries & Labels
Water
Water Terrain
World Cover
Satellite
Hill shade
Clear All
create new group
by OPT/NET
Contributing partners
The GoldenRAM project has received funding under the European Union's Horizon Europe research and innovation programme under the Grant Agreement No 101138153.
Altitude: 6.7km, Level 14.00
Leaflet | Privacy Policy | General Terms and Conditions | Tangram | Nextzen | © Mapbox | © OpenStreetMap | Improve this map
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Water_Monitoring_Pinja | Fields: Water_Monitoring_Pinja

Current Layer: Water_Monitoring_Pinja

Visible	Read Only	Field Name	Alias
☑	☐	Comment	Comment
☑	☐	Descript	Descript
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☑	☐	pH_10_07_2024_	pH_10_07_2024_
☑	☐	pH_04_04_2024_	pH_04_04_2024_
☑	☐	pH_22_12_2023_	pH_22_12_2023_
☑	☐	pH_20_09_2023_	pH_20_09_2023_
☑	☐	pH_05_07_2023_	pH_05_07_2023_
☑	☐	pH_30_03_2023_	pH_30_03_2023_
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☑	☐	DateTime	DateTime
☑	☐	Depth	Depth(m)
☑	☐	Elevation	Elevation

Water_Monitoring_Pinja | Fields: Water_Monitoring_Pinja

Current Layer: Water_Monitoring_Pinja

Visible	Read Only	Field Name	Alias
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☑	☐	Fix_res_24_03_2021_	Fix_res_24_03_2021_
☑	☐	Latitude	Latitude
☑	☐	Longitude	Longitude

Water_Monitoring_Pinja | Fields: Water_Monitoring_Pinja

Current Layer: Water_Monitoring_Pinja

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☑	☐	Susp_14_12_2021_	Susp_14_12_2021_	Double
☑	☐	Susp_23_09_2021_	Susp_23_09_2021_	Double
☑	☐	Susp_29_06_2021_	Susp_29_06_2021_	Double
☑	☐	Susp_24_03_2021_	Susp_24_03_2021_	Double

Water_Monitoring_Pinja | Fields: Water_Monitoring_Pinja

Current Layer: Water_Monitoring_Pinja

Visible	Read Only	Field Name	Alias	Data Type
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☑	☐	Mn_2plus_28_06_2022_	Mn2+__28_06_2022_	Double
☑	☐	Mn_2plus_31_03_2022_	Mn2+_31_03_2022_	Double
☑	☐	Mn_2plus_14_12_2021_	Mn2+_14_12_2021_	Double
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☑	☐	Mn_2plus_29_06_2021_	Mn2+_29_06_2021_	Double
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☑	☑	OBJECTID	OBJECTID	Object ID
☑	☐	Susp_25_09_2024_	Susp_25_09_2024_	Double
☑	☐	Susp_10_07_2024_	Susp_10_07_2024_	Double
☑	☐	Susp_04_04_2024_	Susp_04_04_2024_	Double
☑	☐	Susp_22_12_2023_	Susp_22_12_2023_	Double
☑	☐	Susp_20_09_2023_	Susp_20_09_2023_	Double
☑	☐	Susp_05_07_2023_	Susp_05_07_2023_	Double
☑	☐	Susp_30_03_2023_	Susp_30_03_2023_	Double
☑	☐	Susp_15_12_2022_	Susp_15_12_2022_	Double
☑	☐	Susp_28_09_2022_	Susp_28_09_2022_	Double
☑	☐	Susp_28_06_2022_	Susp_28_06_2022_	Double
☑	☐	Susp_31_03_2022_	Susp_31_03_2022_	Double
☑	☐	Susp_14_12_2021_	Susp_14_12_2021_	Double
☑	☐	Susp_23_09_2021_	Susp_23_09_2021_	Double
☑	☐	Susp_29_06_2021_	Susp_29_06_2021_	Double
☑	☐	Susp_24_03_2021_	Susp_24_03_2021_	Double
☑	☐	Zn_2plus_25_09_2024_	Zn2+_25_09_2024_	Double
☑	☐	Zn_2plus_10_07_2024_	Zn2+_10_07_2024_	Double
☑	☐	Zn_2plus_04_04_2024_	Zn2+_04_04_2024_	Double
☑	☐	Zn_2plus_22_12_2023_	Zn2+_22_12_2023_	Double
☑	☐	Zn_2plus_20_09_2023_	Zn2+_20_09_2023_	Double
☑	☐	Zn_2plus_05_07_2023_	Zn2+_05_07_2023_	Double
☑	☐	Zn_2plus_30_03_2023_	Zn2+_30_03_2023_	Double
☑	☐	Zn_2plus_15_12_2022_	Zn2+_15_12_2022_	Double
☑	☐	Zn_2plus_28_09_2022_	Zn2+_28_09_2022_	Double
☑	☐	Zn_2plus_28_06_2022_	Zn2+_28_06_2022_	Double
☑	☐	Zn_2plus_31_03_2022_	Zn2+_31_03_2022_	Double
☑	☐	Zn_2plus_14_12_2021_	Zn2+_14_12_2021_	Double
☑	☐	Zn_2plus_23_09_2021_	Zn2+_23_09_2021_	Double
☑	☐	Zn_2plus_29_06_2021_	Zn2+_29_06_2021_	Double
☑	☐	Zn_2plus_24_03_2021_	Zn2+_24_03_2021_	Double

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	Comment	Descript	DateTime	Depth(m)	pH_25_09_2024_	pH_10_07_2024_	pH_04_04_2024_	pH_22_12_2023_	pH_20_09_2023_	pH_05_07_2023_	pH_30_03_2023_	pH_15_12_2022_	pH_28_09_2022_	pH_28_06_2022_	pH_31_03_2022_	pH_14_12_2021_	pH_23_09_2021_	pH_29_06_2021_	pH_24_03_2021_
1	LAC 2 BAZIC	Monitoring Point - Serban Andrei	12.05.2024 03:56:00	3,69	<Null>	<Null>	7,91	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
2	Fantana	Monitoring Point - Romeo Morar	<Null>	0	7,52	7,55	7,68	<Null>	7,43	<Null>	7,61	<Null>	<Null>	<Null>	7,18	<Null>	<Null>	<Null>	7,62
3	Stefanca confl.Aries	Monitoring Point - Romeo Morar	<Null>	0	8,09	8,01	7,66	<Null>	7,84	<Null>	8,35	<Null>	<Null>	<Null>	8,89	<Null>	<Null>	<Null>	8,38
4	Izbuc	Monitoring Point - Romeo Morar	<Null>	0	7,56	7,58	7,48	<Null>	7,59	<Null>	7,55	<Null>	<Null>	<Null>	7,35	<Null>	<Null>	<Null>	7,53
5	LAC 2 BAZIC	Monitoring Point - Serban Andrei	05.04.2024 05:52:00	3,69	<Null>	<Null>	7,22	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
6	LAC 2 BAZIC	Monitoring Point - Serban Andrei	12.05.2024 03:56:00	4,85	<Null>	<Null>	6,99	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
7	Mira Aries	Monitoring Point - Romeo Morar	<Null>	0	7,87	7,61	6,59	<Null>	6,51	<Null>	5,39	<Null>	<Null>	<Null>	5,25	<Null>	<Null>	<Null>	6,86
8	Sonda 10	Monitoring Point - Romeo Morar	<Null>	0	7,55	7,39	6,04	5,6	6,28	7,1	5,35	<Null>	6,99	6,8	6,04	6	7,2	<Null>	9,41
9	Aval baraj	Monitoring Point - Romeo Morar	<Null>	0	7,61	7,28	5,94	<Null>	6,22	<Null>	5,28	<Null>	<Null>	<Null>	5,06	<Null>	<Null>	<Null>	7,38
10	LAC 1 ACID	Monitoring Point - Serban Andrei	17.05.2024 10:29:00	4,77	<Null>	<Null>	2,81	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
11	LAC 1 ACID	Monitoring Point - Serban Andrei	16.05.2024 05:04:00	5,8	<Null>	<Null>	2,77	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
12	LAC 1 ACID	Monitoring Point - Serban Andrei	17.05.2024 10:29:00	5,65	<Null>	<Null>	2,74	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
13	LAC 1 ACID	Monitoring Point - Serban Andrei	16.05.2024 05:04:00	3,36	<Null>	<Null>	2,73	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
14	Lac acid intrare	Monitoring Point - Romeo Morar	<Null>	0	2,41	2,6	2,72	2,63	2,57	2,4	2,56	2,59	2,41	2,62	2,7	2,47	2,33	2,62	2,34
15	Vl. Cuibarului	Monitoring Point - Romeo Morar	<Null>	0	2,12	2,39	2,71	2,69	2,4	2,23	2,54	2,74	2,46	2,43	2,82	2,71	2,26	2,88	2,22
16	LAC 1 ACID	Monitoring Point - Serban Andrei	17.05.2024 10:29:00	6,01	<Null>	<Null>	2,7	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
17	Vl. Steregoi	Monitoring Point - Romeo Morar	<Null>	0	2,34	2,51	2,68	2,58	2,53	2,3	2,55	2,52	2,34	2,52	2,63	2,4	2,28	2,55	2,26

	Comment	Descript	DateTime	Cu2+_25_09_2024_	Cu2+_10_07_2024_	Cu2+_04_04_2024_	Cu2+_22_12_2023_	Cu2+_20_09_2023_	Cu2+_05_07_2023_	Cu2+_30_03_2023_	Cu2+_15_12_2022_	Cu2+_28_09_2022_	Cu2+_28_06_2022_	Cu2+_31_03_2022_	Cu2+_14_12_2021_	Cu2+_23_09_2021_	Cu2+_29_06_2021_	Cu2+_24_03_2021_
1	Vl. Steregoi	Monitoring Point - Romeo Morar	<Null>	367,6	314,3	222,1	246,4	395,2	283,4	343,1	232,8	385,85	372	283,5	261,3	487,8	278,5	249
2	Lac acid intrare	Monitoring Point - Romeo Morar	<Null>	361,2	303,2	221	<Null>	<Null>	274,2	<Null>	<Null>	<Null>	<Null>	<Null>	254,2	<Null>	<Null>	<Null>
3	Vl. Cuibarului	Monitoring Point - Romeo Morar	<Null>	159,6	116	47,55	41,8	129,9	82,27	62,4	30,1	52,69	103,4	19,39	26,93	105	27,84	39,6
4	Sonda 10	Monitoring Point - Romeo Morar	<Null>	0,073	0,651	1,205	<Null>	1,124	<Null>	4,949	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
5	Aval baraj	Monitoring Point - Romeo Morar	<Null>	0,064	0,622	1,127	<Null>	1,014	<Null>	4,807	<Null>	<Null>	<Null>	1,646	<Null>	<Null>	<Null>	<Null>
6	Mira Aries	Monitoring Point - Romeo Morar	<Null>	0,06	0,596	1,043	<Null>	0,981	<Null>	3,605	<Null>	<Null>	<Null>	1,312	<Null>	<Null>	<Null>	0,115

	Comment	Descript	DateTime	Fe_total_25_09_2024_	Fe_total_10_07_2024_	Fe_total_04_04_2024_	Fe_total_22_12_2023_	Fe_total_20_09_2023_	Fe_total_05_07_2023_	Fe_total_30_03_2023_	Fe_total_15_12_2022_	Fe_total_28_09_2022_	Fe_total_28_06_2022_	Fe_total_31_03_2022_	Fe_total_14_12_2021_	Fe_total_23_09_2021_	Fe_total_29_06_2021_	Fe_total_24_03_2021_
1	Vl. Steregoi	Monitoring Point - Romeo Morar	<Null>	2715	2273,5	1505	1781,6	2220,25	2002,75	1626,5	1614	2460,75	2550,5	1684,38	1333,38	2947	2150	1350
2	Lac acid intrare	Monitoring Point - Romeo Morar	<Null>	2432	2123,3	1401	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
3	Vl. Cuibarului	Monitoring Point - Romeo Morar	<Null>	2975	2114	743,5	657,2	2059,75	1682	1025,5	649,1	1145,63	2510	345,1	407,6	2685	381,75	900
4	Aval baraj	Monitoring Point - Romeo Morar	<Null>	0,635	0,671	0,862	<Null>	0,497	<Null>	2,858	<Null>	<Null>	<Null>	0,172	<Null>	<Null>	<Null>	<Null>
5	Sonda 10	Monitoring Point - Romeo Morar	<Null>	0,672	0,694	0,847	<Null>	0,505	<Null>	2,65	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
6	Mira Aries	Monitoring Point - Romeo Morar	<Null>	0,41	0,612	0,813	<Null>	0,488	<Null>	2,312	<Null>	<Null>	<Null>	0,159	<Null>	<Null>	<Null>	<Null>
7	Izbuc	Monitoring Point - Romeo Morar	<Null>	<Null>	0,256	0,187	<Null>	0,094	<Null>	0,131	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>

Field: Add Calculate Selection: Select By Attributes Zoom To Switch Clear Delete Copy

	Comment	Descript	DateTime	Fix_res_25_09_2024_	Fix_res_10_07_2024_	Fix_res_04_04_2024_	Fix_res_22_12_2023_	Fix_res_20_09_2023_	Fix_res_05_07_2023_	Fix_res_30_03_2023_	Fix_res_15_12_2022_	Fix_res_28_09_2022_	Fix_res_28_06_2022_	Fix_res_31_03_2022_	Fix_res_14_12_2021_	Fix_res_23_09_2021_	Fix_res_29_06_2021_	Fix_res_24_03_2021_
1	Vl. Steregoi	Monitoring Point - Romeo Morar	<Null>	49220	37820	32584	34218	47845	29615	27248	32654	48128	40552	37328	27308	32147	24163	21473
2	Lac acid intrare	Monitoring Point - Romeo Morar	<Null>	44520	31520	32400	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
3	Vl. Cuibarului	Monitoring Point - Romeo Morar	<Null>	46652	32724	16247	17541	35634	18612	16400	16801	21732	33048	6824	8464	27846	15114	16352
4	Aval baraj	Monitoring Point - Romeo Morar	<Null>	1514	1549	1401	<Null>	1652	<Null>	1203	<Null>	<Null>	<Null>	1572	<Null>	<Null>	<Null>	1487
5	Sonda 10	Monitoring Point - Romeo Morar	<Null>	1523	1578	1393	<Null>	1647	<Null>	1248	<Null>	<Null>	<Null>	1024	<Null>	<Null>	<Null>	1472
6	Mira Aries	Monitoring Point - Romeo Morar	<Null>	1501	1502	1365	<Null>	1624	<Null>	1185	<Null>	<Null>	<Null>	1531	<Null>	<Null>	<Null>	1519
7	Izbuc	Monitoring Point - Romeo Morar	<Null>	786	801	795	<Null>	893	<Null>	976	<Null>	<Null>	<Null>	914	<Null>	<Null>	<Null>	873

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	Comment	Descript	DateTime	Latitude	Longitude	Mn2+_25_09_2024_	Mn2+_10_07_2024_	Mn2+_04_04_2024_	Mn2+_22_12_2023_	Mn2+_20_09_2023_	Mn2+_05_07_2023_	Mn2+_30_03_2023_	Mn2+_15_12_2022_	Mn2+_28_09_2022_	Mn2+_28_06_2022_	Mn2+_31_03_2022_	Mn2+_14_12_2021_	Mn2+_23_09_2021_	Mn2+_29_06_2021_	Mn2+_24_03_2021_
1	Vl. Steregoi	Monitoring Point - Romeo Morar	<Null>	46,32063	23,199622	81,2	71,6	47,8	55,7	85,9	55,7	52,2	48	67,18	79,5	67,65	42,28	83	66,25	42,7
2	Lac acid intrare	Monitoring Point - Romeo Morar	<Null>	46,322774	23,20652	79,5	70,6	44,2	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
3	Vl. Cuibarului	Monitoring Point - Romeo Morar	<Null>	46,317349	23,198406	43,1	33,3	13,43	21,8	40,5	23,1	20,6	11,3	16,6	36,7	10,11	9,25	36,3	9,85	12,96
4	Aval baraj	Monitoring Point - Romeo Morar	<Null>	46,338386	23,226771	0,986	1,595	1,495	<Null>	1,244	<Null>	2,296	<Null>	<Null>	<Null>	1,647	<Null>	<Null>	<Null>	0,934
5	Sonda 10	Monitoring Point - Romeo Morar	<Null>	46,321455	23,222881	1,065	1,629	1,516	<Null>	1,318	<Null>	2,372	<Null>	<Null>	<Null>	0,753	<Null>	<Null>	<Null>	<Null>
6	Mira Aries	Monitoring Point - Romeo Morar	<Null>	46,37616	23,23355	0,932	1,537	1,478	<Null>	1,236	<Null>	2,086	<Null>	<Null>	<Null>	1,469	<Null>	<Null>	<Null>	1,023
7	Izbuc	Monitoring Point - Romeo Morar	<Null>	46,337849	23,223618	<Null>	0,121	0,108	<Null>	0,065	<Null>	0,093	<Null>	<Null>	<Null>	0,13	<Null>	<Null>	<Null>	0,106

	Comment	Descript	DateTime	Susp_25_09_2024(mg/l)_	Susp_10_07_2024_	Susp_04_04_2024_	Susp_22_12_2023_	Susp_20_09_2023_	Susp_05_07_2023_	Susp_30_03_2023_	Susp_15_12_2022_	Susp_28_09_2022_	Susp_28_06_2022_	Susp_31_03_2022_	Susp_14_12_2021_	Susp_23_09_2021_	Susp_29_06_2021_	Susp_24_03_2021_
1	Vl. Steregoi	Monitoring Point - Romeo Morar	<Null>	1938	1239	869	904	359	781	908	803	1639	1199	1144	767	204	181	296
2	Vl. Cuibarului	Monitoring Point - Romeo Morar	<Null>	1245	852	531	504	318	234	568	498	898	881	244	492	281	451	315
3	Lac acid intrare	Monitoring Point - Romeo Morar	<Null>	1120	1145	855	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
4	Sonda 10	Monitoring Point - Romeo Morar	<Null>	31	30	41	<Null>	52	<Null>	61	<Null>	<Null>	<Null>	36	<Null>	<Null>	<Null>	42
5	Aval baraj	Monitoring Point - Romeo Morar	<Null>	30	45	48	<Null>	56	<Null>	54	<Null>	<Null>	<Null>	46	<Null>	<Null>	<Null>	49
6	Mira Aries	Monitoring Point - Romeo Morar	<Null>	28	38	46	<Null>	49	<Null>	69	<Null>	<Null>	<Null>	56	<Null>	<Null>	<Null>	46
7	Izbuc	Monitoring Point - Romeo Morar	<Null>	24	70	63	<Null>	55	<Null>	46	<Null>	<Null>	<Null>	52	<Null>	<Null>	<Null>	35
8	Stefanca confl.Aries	Monitoring Point - Romeo Morar	<Null>	23	25	30	<Null>	21	<Null>	25	<Null>	<Null>	<Null>	22	<Null>	<Null>	<Null>	296
9	Fantana	Monitoring Point - Romeo Morar	<Null>	21	23	21	<Null>	25	<Null>	19	<Null>	<Null>	<Null>	20	<Null>	<Null>	<Null>	23

Comment	Descript	DateTime	Zn2+_25_09_2024_	Zn2+_10_07_2024_	Zn2+_04_04_2024_	Zn2+_22_12_2023_	Zn2+_20_09_2023_	Zn2+_05_07_2023_	Zn2+_30_03_2023_	Zn2+_15_12_2022_	Zn2+_28_09_2022_	Zn2+_28_06_2022_	Zn2+_31_03_2022_	Zn2+_14_12_2021_	Zn2+_23_09_2021_	Zn2+_29_06_2021_	Zn2+_24_03_2021_
Vl. Cuibarului	Monitoring Point - Romeo Morar	<Null>	114,5	94,4	29,5	33,6	97,5	62,3	41,7	23,5	38,35	115	20,17	24,62	90,5	26,32	32,2
Vl. Steregoi	Monitoring Point - Romeo Morar	<Null>	97,25	85,1	52,6	62,3	93,3	57,9	77,9	54,28	78,25	123,5	93,68	64,08	98	86	50,2
Lac acid intrare	Monitoring Point - Romeo Morar	<Null>	94,54	80,2	51,4	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
Sonda 10	Monitoring Point - Romeo Morar	<Null>	0,298	0,822	1,234	<Null>	0,927	<Null>	2,433	<Null>	<Null>	<Null>	0,488	<Null>	<Null>	<Null>	<Null>
Aval baraj	Monitoring Point - Romeo Morar	<Null>	0,247	0,803	1,229	<Null>	0,912	<Null>	2,39	<Null>	<Null>	<Null>	1,132	<Null>	<Null>	<Null>	<Null>
Mira Aries	Monitoring Point - Romeo Morar	<Null>	0,222	0,784	1,214	<Null>	0,885	<Null>	1,986	<Null>	<Null>	<Null>	1,078	<Null>	<Null>	<Null>	0,487

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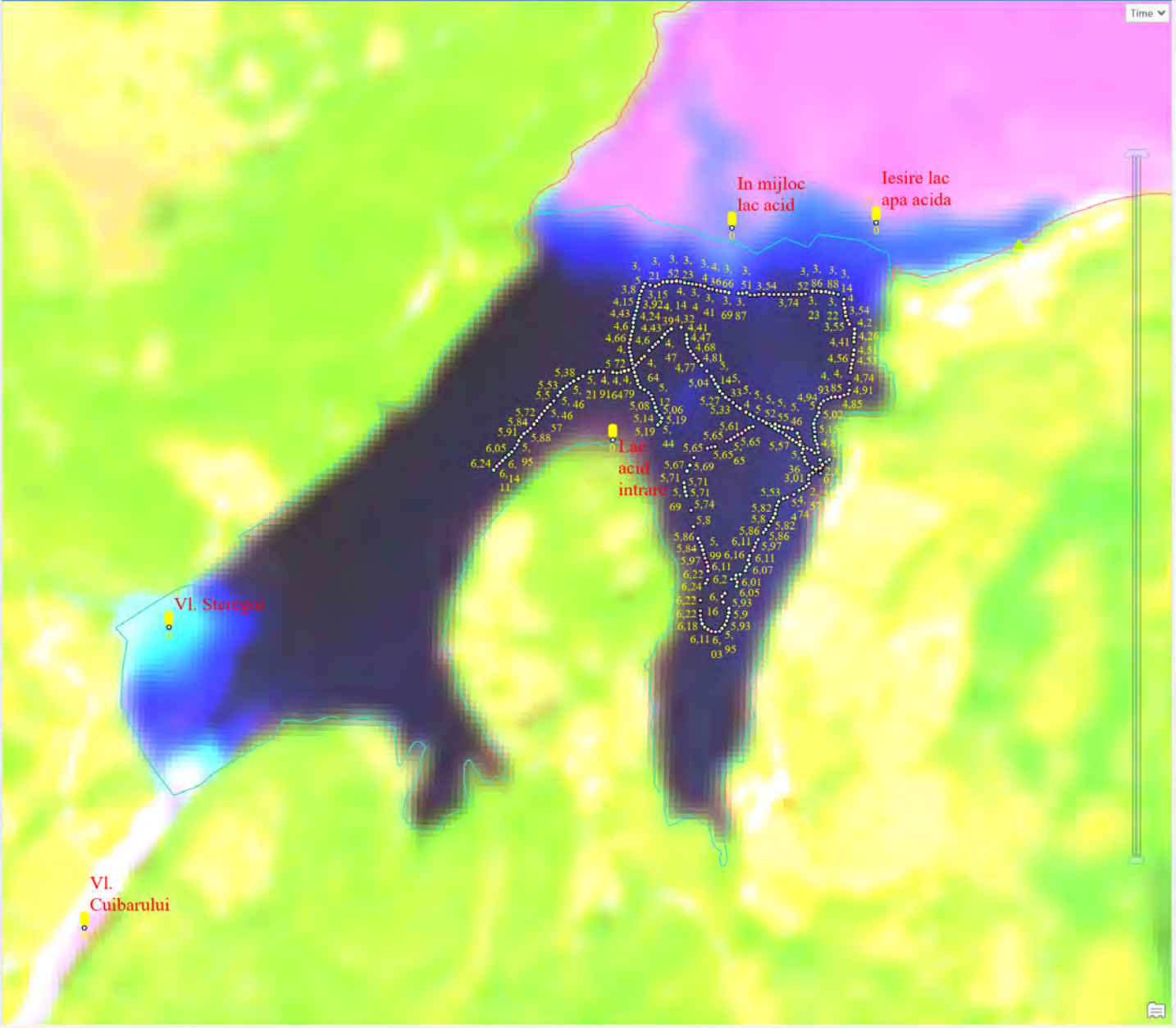
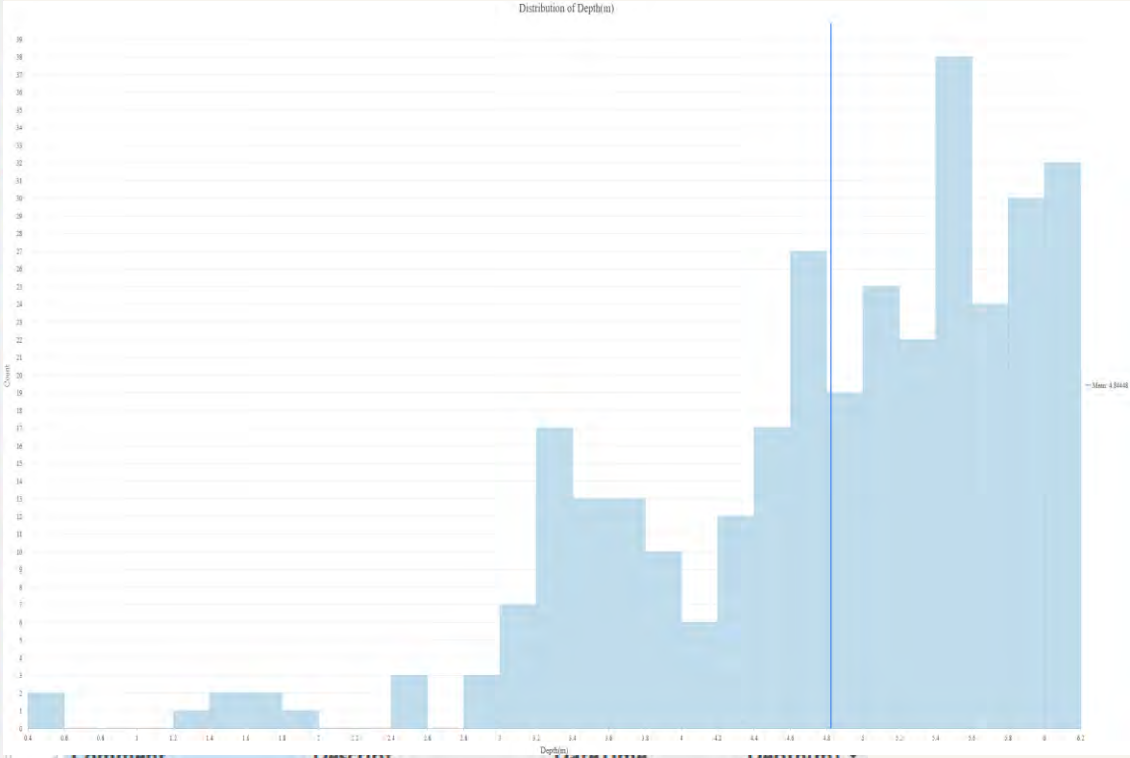


Water depth (m) for Acid Lake – Date: May 2024



	Comment	Descript	DateTime	Depth(m)
1	LAC 1 ACID	Monitoring Point - Ser...	17.05.2024 10:29:00	6,24
2	LAC 1 ACID	Monitoring Point - Ser...	17.05.2024 10:29:00	6,24
3	LAC 1 ACID	Monitoring Point - Ser...	17.05.2024 10:29:00	6,22
4	LAC 1 ACID	Monitoring Point - Ser...	16.05.2024 05:04:00	6,22
5	LAC 1 ACID	Monitoring Point - Ser...	16.05.2024 05:04:00	6,22
6	LAC 1 ACID	Monitoring Point - Ser...	16.05.2024 05:04:00	6,22
7	LAC 1 ACID	Monitoring Point - Ser...	16.05.2024 05:04:00	6,2
8	LAC 1 ACID	Monitoring Point - Ser...	16.05.2024 05:04:00	6,18
9	LAC 1 ACID	Monitoring Point - Ser...	16.05.2024 05:04:00	6,16
10	LAC 1 ACID	Monitoring Point - Ser...	16.05.2024 05:04:00	6,16

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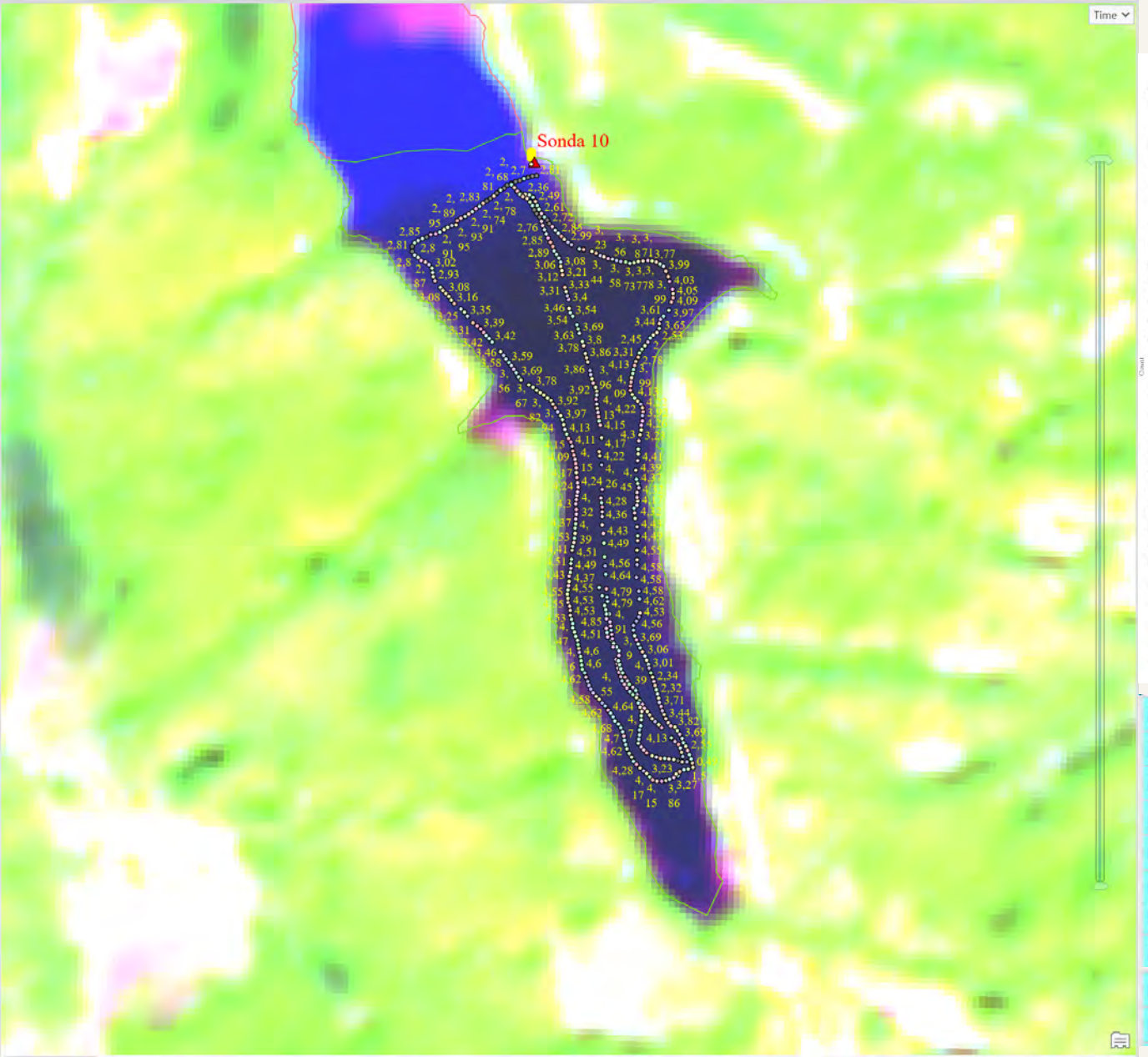
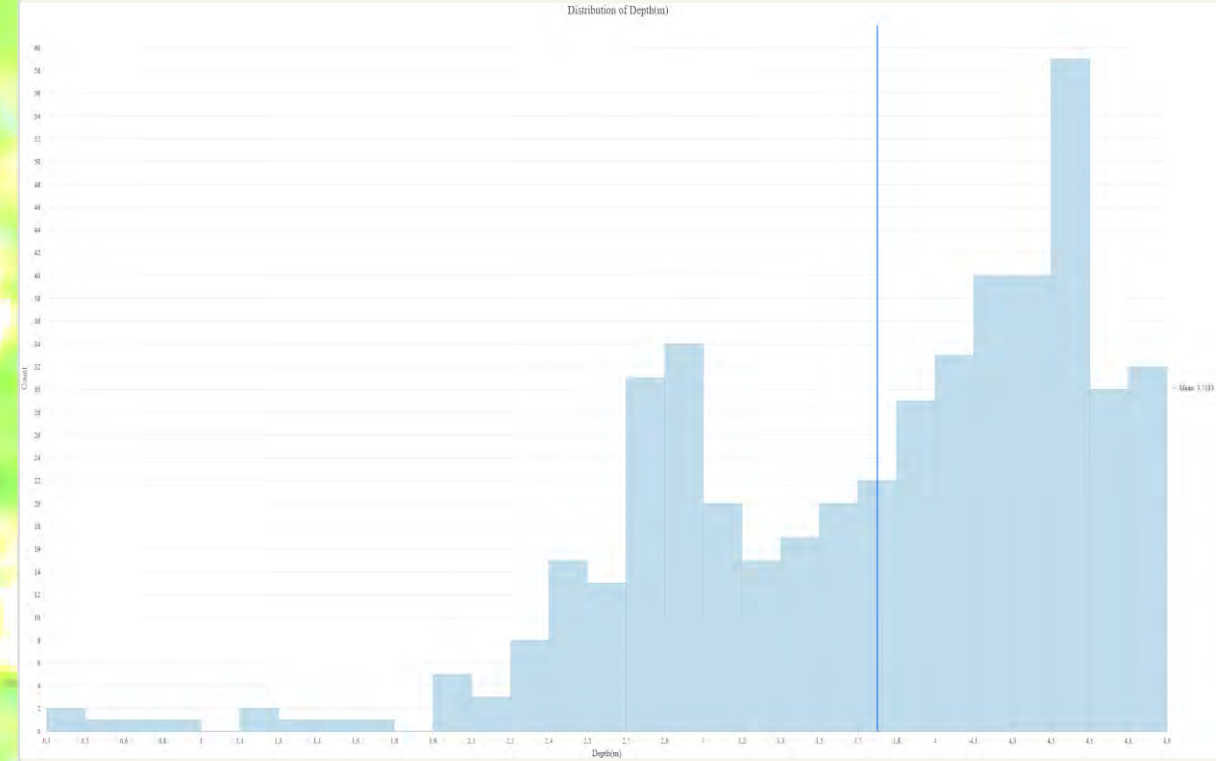
Water depth (m) for basic Lake – Date: May 2024





LAC 2 BAZIC	Monitoring Point - Ser...	12.05.2024 03:56:00	4,93
LAC 2 BAZIC	Monitoring Point - Ser...	12.05.2024 03:56:00	4,93
LAC 2 BAZIC	Monitoring Point - Ser...	12.05.2024 03:56:00	4,91
LAC 2 BAZIC	Monitoring Point - Ser...	12.05.2024 03:56:00	4,91
LAC 2 BAZIC	Monitoring Point - Ser...	12.05.2024 03:56:00	4,89
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LAC 2 BAZIC	Monitoring Point - Ser...	12.05.2024 03:56:00	4,85

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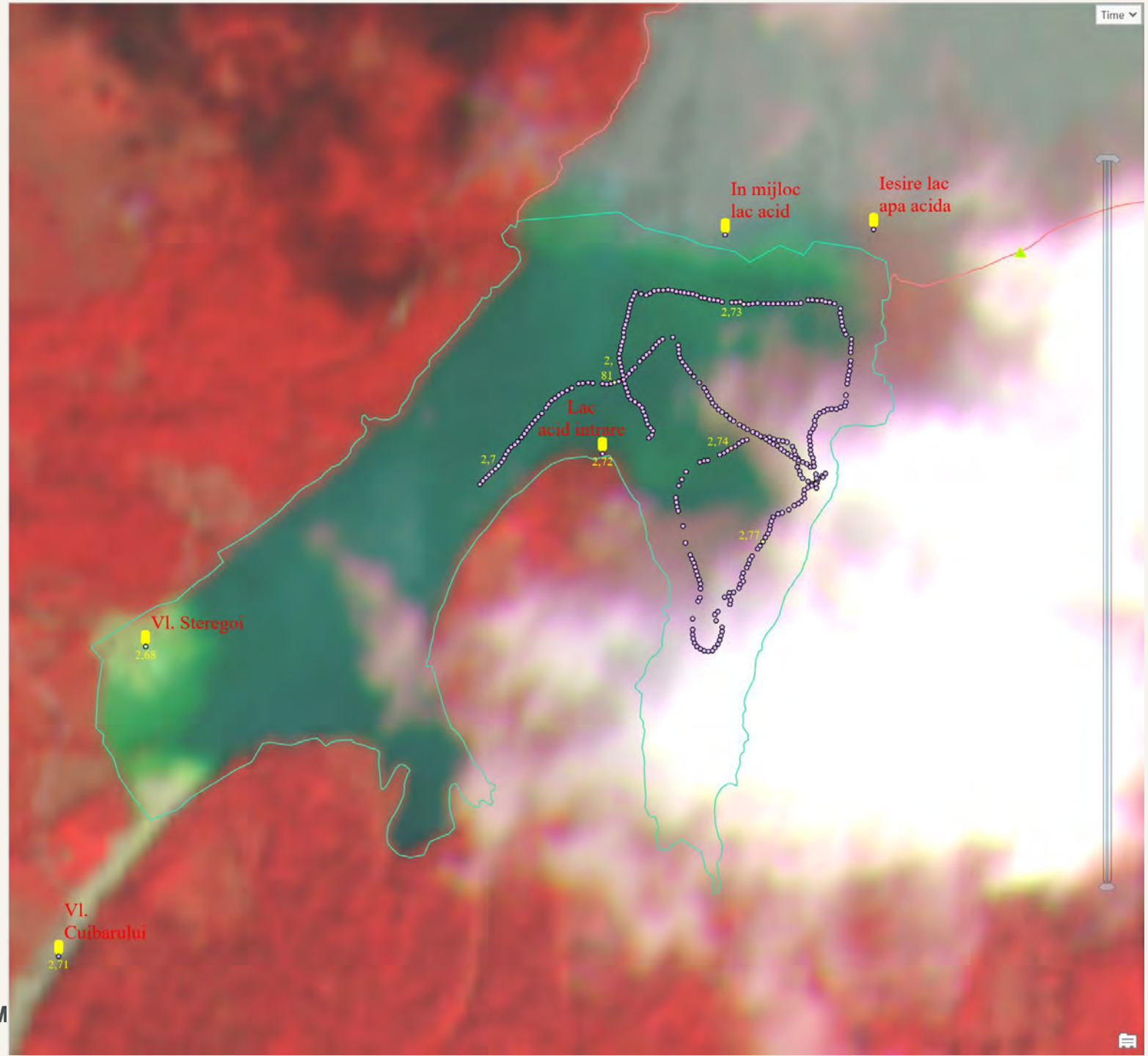

pH for Acid Lake
– Date: April 2024

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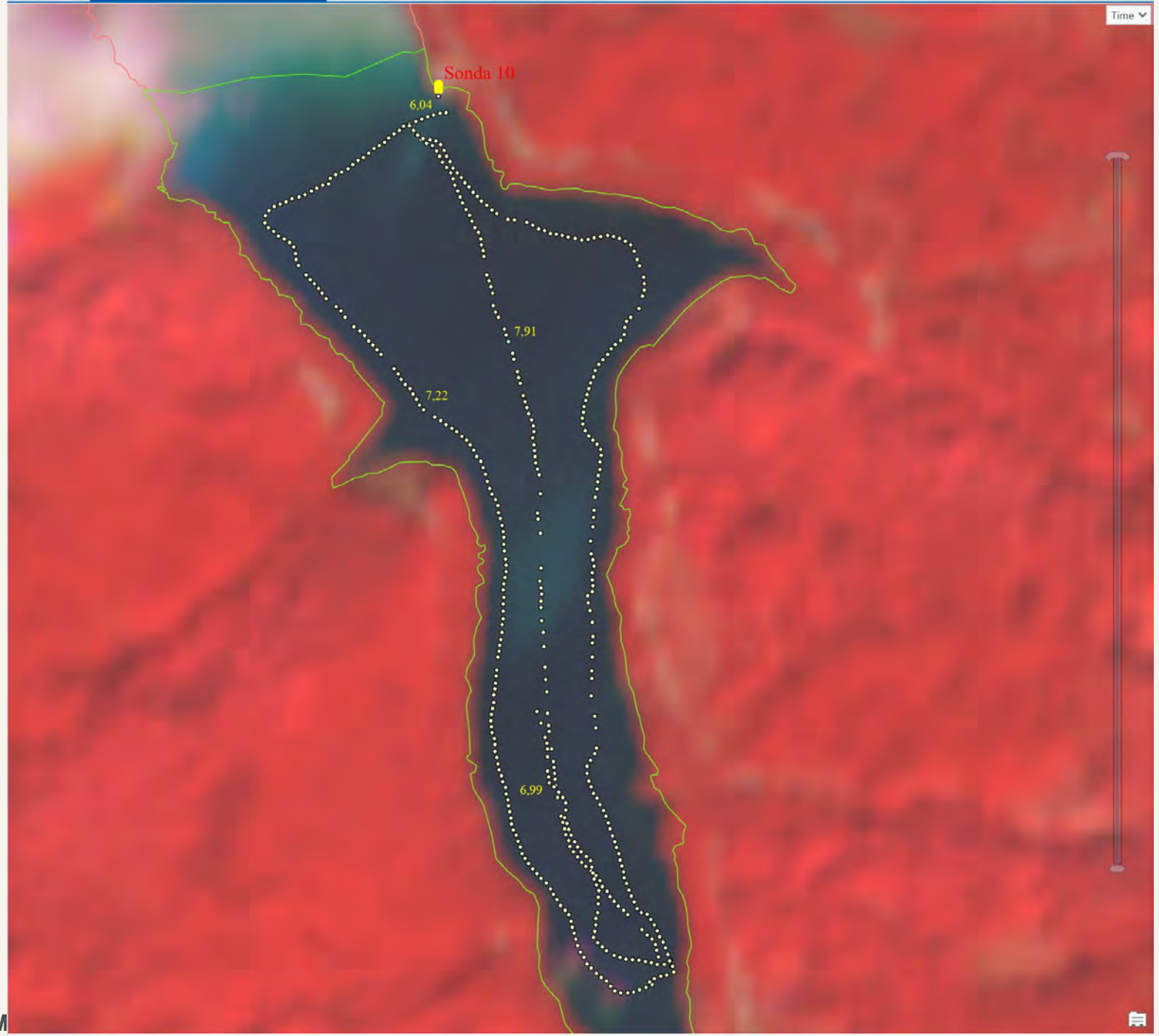

pH for basic Lake
– Date: April 2024

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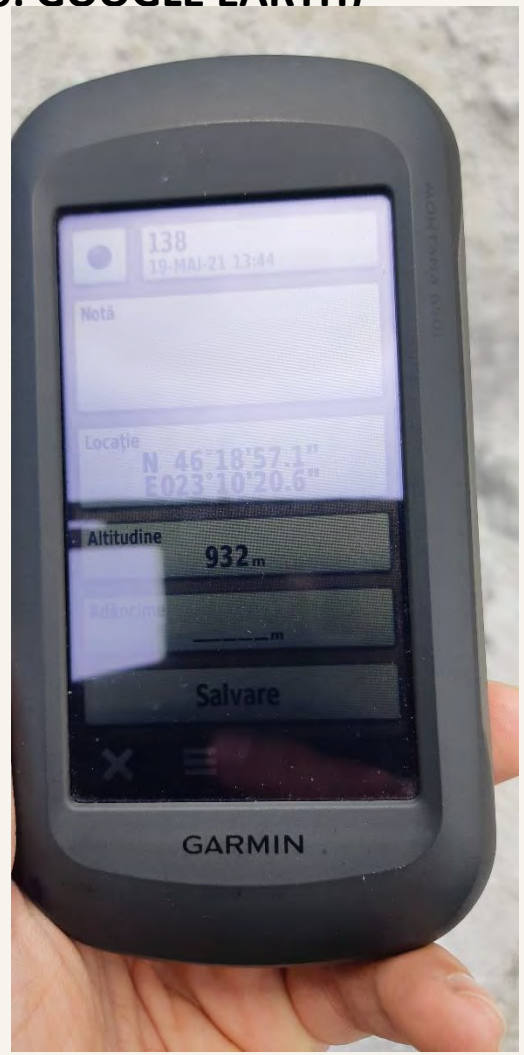
STARTED IN THE GOLDENEYE PROJECT **Field Work (18. – 19.05.2021)/ The Romanian STERE**
Coordinates will be Transformed in ETRS89 therefor
elevation level also. (Foto: GOOGLE EARTH)

COORDINATES ETRS 89			
Pct.	Nord(X)	Est(Y)	LEVEL(Z)
F1.1 & F1.2	46°18'51.58408"	23°10'05.57669"	906.523
F2.1 & F2.2	46°18'49.27911"	23°10'24.45868"	983.636
F3.1 & F3.2	46°18'57.01420"	23°10'20.50572"	969.093



STARTED IN THE GOLDENEYE PROJECT

Drone Data Acquisition and processing

Rosia Poieni Open pit

Flight 1 - August 2021

Flight 2 – May 2022

Flight 3 – October 2022

STARTED IN THE GOLDENEYE PROJECT

Drone Data Acquisition and processing

Valea Șesei Tailing Pond

Water Surface Monitoring

Flight 1 - September 2021

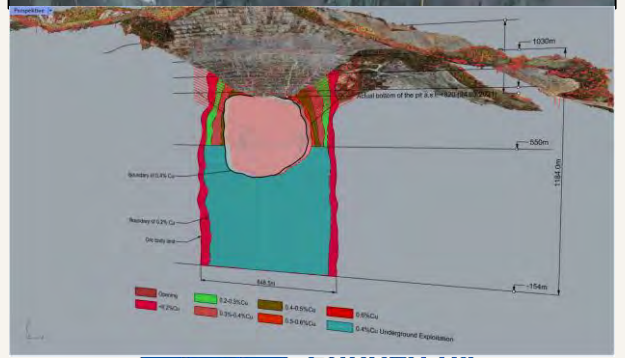
Flight 2 – May 2022

Flight 3 – October 2022

➢ Romania

Open pit extraction in Romania:

- Roşia Poieni district
- Extraction of the Cu ore
- Target for extraction: mineralization of low Cu-content delimited by the isolation of 0.1% Cu content
- Exact location of Cu deposit has not been found so far due to expensive drillings



Aim – Mineralogical knowledge

Integration of satellite data and drone or proximity data to improve mineral predictions

Existing information:

- Geological maps
- We have created a 2D geological model
- Stream sediment geochemistry

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UTCN and CUP regarding the Field Trials & Evaluation has started for the test plan the analysis of the selected area in order to understand and support the collecting data process of the involved partners in the WP6 also. A the KLM polygon created and was used to project and extract the POI from WGS84 in STEREO70 (Romanian Projection System) and vice-versa. The identification of the area in the field was also done in one of the field trip (Figure 2).

The 1st time created 3D modell (with mote than 15.700 points was used to prepare the batch files for the FLAC 2D analyses.

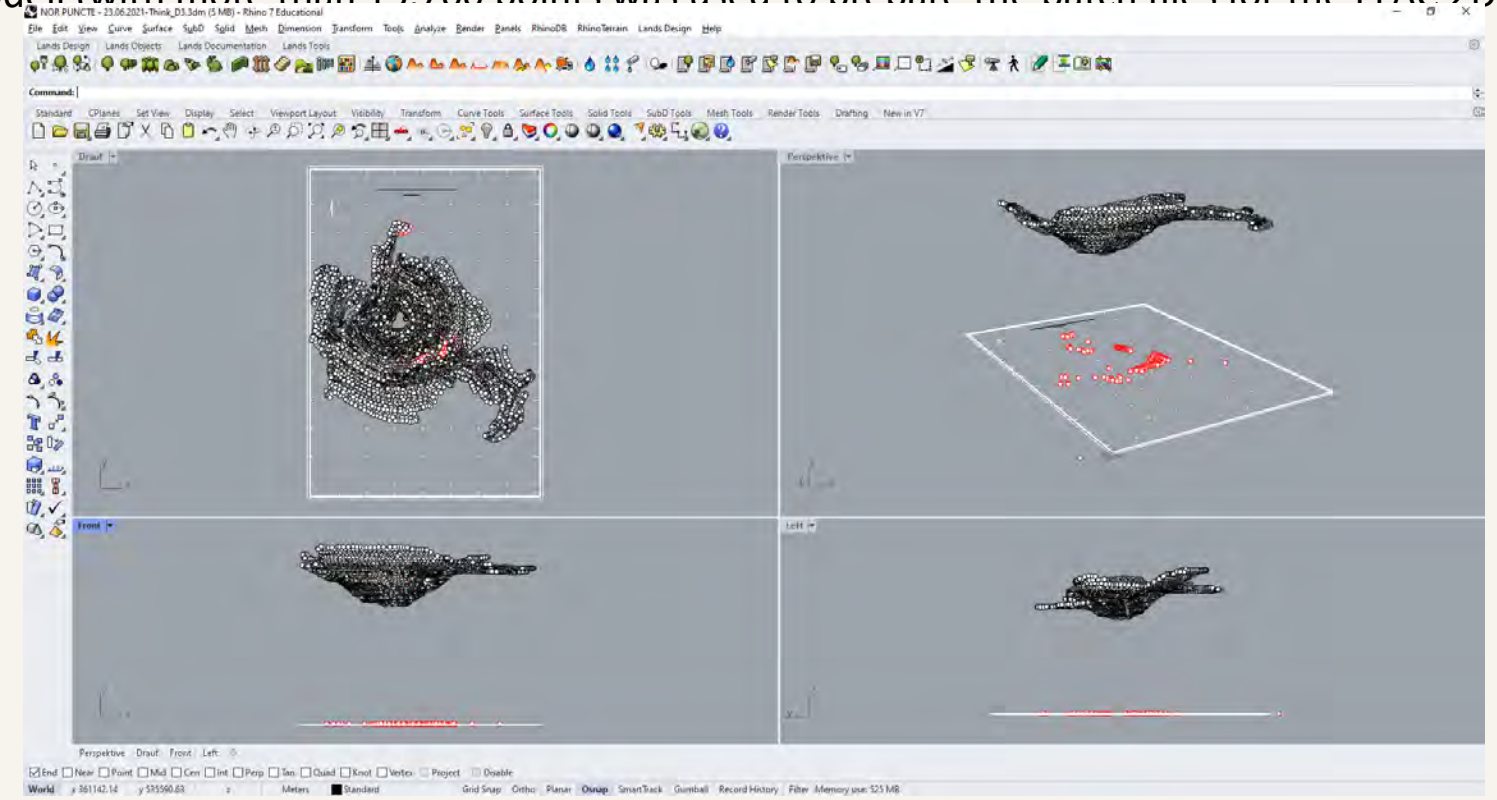


Figure 1: Open Pit Elevated Points Cloud

UTCN has develop a 2D safety analyses (using FLAC-2D) in vertical sections of the open pit and waste dump.
The elevated points cloud was used to triangulate the surfaces and so the 3D geometry of the Open Pit Rosia Poieni.

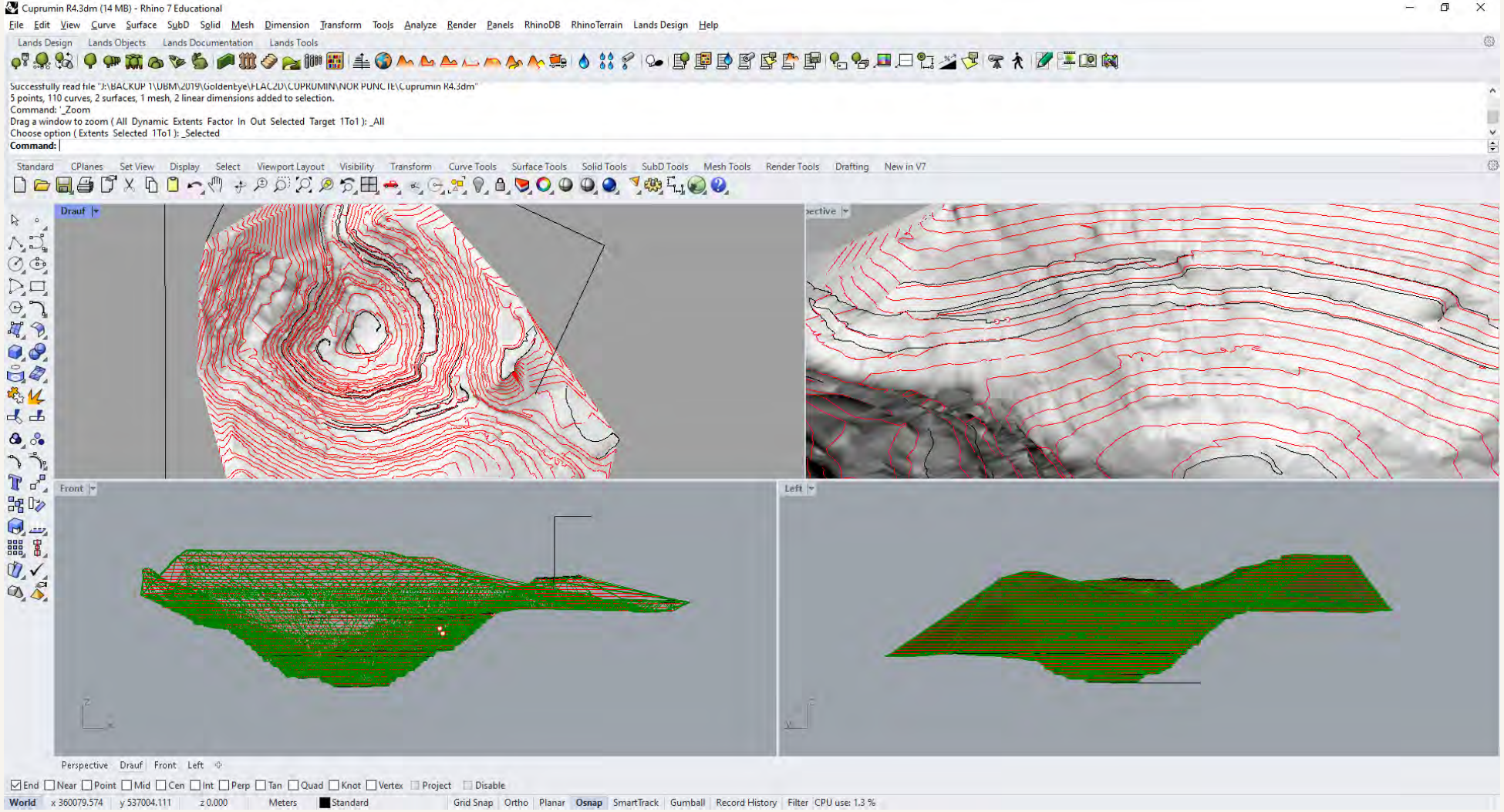


Figure 2: Triangulated surface of the Open Pit-a real scale of 1:1 of the Open Pit

Using the projected section over the Open Pit, a cross section (with more than 3000 points) was created and exported in FLAC2D to generate the real geometry of the benches (prior the drone flights)

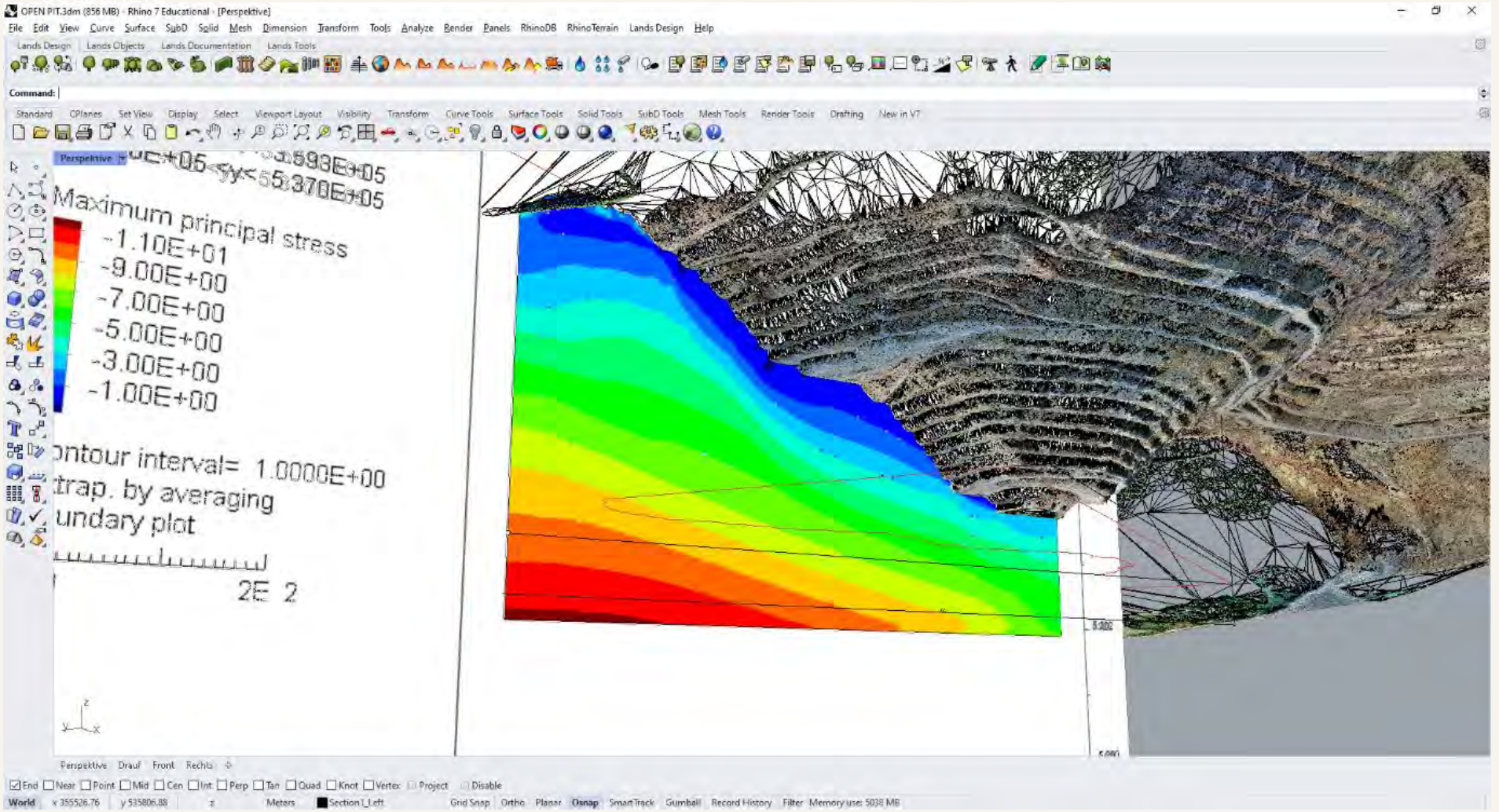
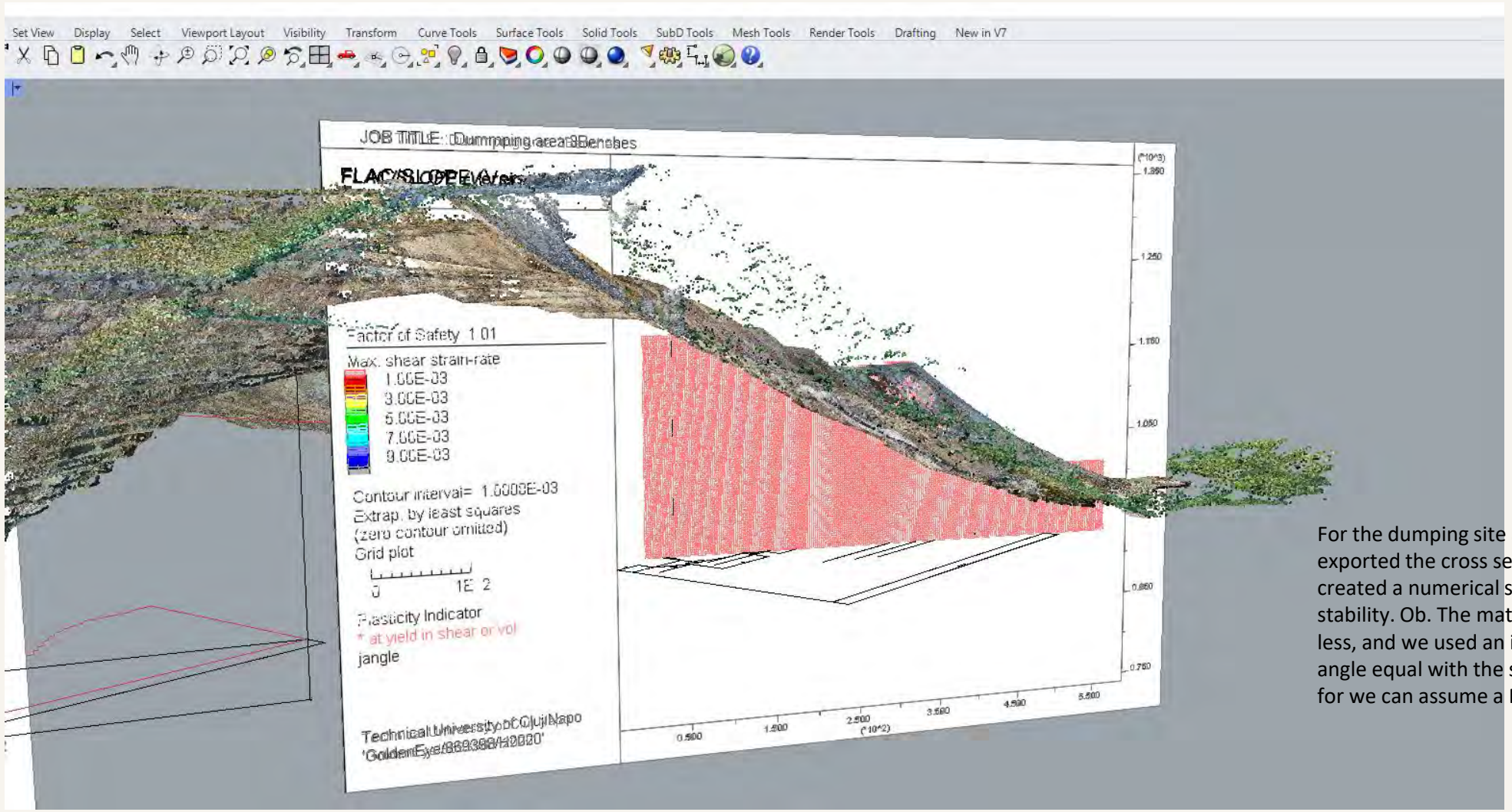


Figure 7: Attached numerical simulation results to the real geometry

Obs.: In the used simulation only 1 type of rock was included. For the next steps, several layers of different kind of rock and faults will be included

In the next step, the Points Cloud from the Rhinoceros was used (more than 20 Mio. points) to create the 2nd mode realistic 3D Modell of the Open Pit. Also, the simulated FLAC2D results were exported as dxf files and added in the Model.

The sterile material stored in the dump comes from the discovery of the Roșia Poieni copper deposit and is made up of a mixture of altered/disaggregated and unaltered - compact andesites. To these eruptive rocks are also added, in a small percentage, fragments of the Cretaceous sedimentary rocks (with altered clay intercalations) and the tailings with a high clay content from the superficial blanket (deluvial deposits).



For the dumping site area was also exported the cross section of it and created a numerical simulation of its stability. Ob. The material is cohesion less, and we used an internal friction angle equal with the slope angle, there for we can assume a FoS by the limit.

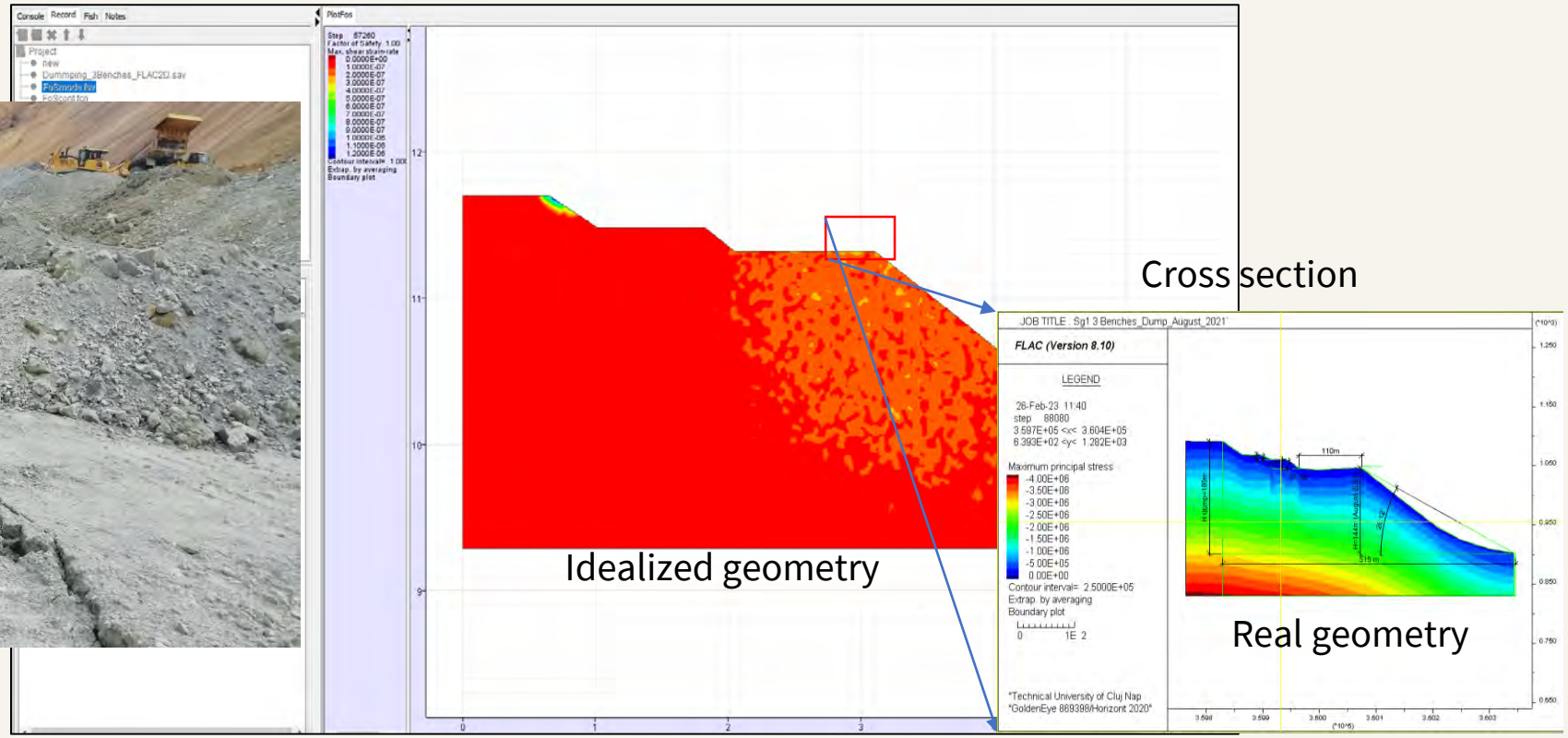
Figure 11: Imported in the 3D model of the cross section of the dumping area from FLAC2D

In the range of the Tailing Pond, the imported points tform were used to create the 3D model of it. More than 20Mio point was used also.

Waste dump Valea Cuibarului in Rosia Poieni:

- High resolution simulation of factor of safety of the open pit slopes as well as more precise monitoring of stability of the material in the tailing pond and the stability of the tailing dams allowing for safer mine site operations

➢ **Romania**



Example of factor of safety prediction over waste dump cross section at Rosia Poieni

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Figure . Instability phenomena in the upper slope and berm of the waste dump

Figure . Phenomena of physical and chemical disaggregation of rock fragments at the base of the dump

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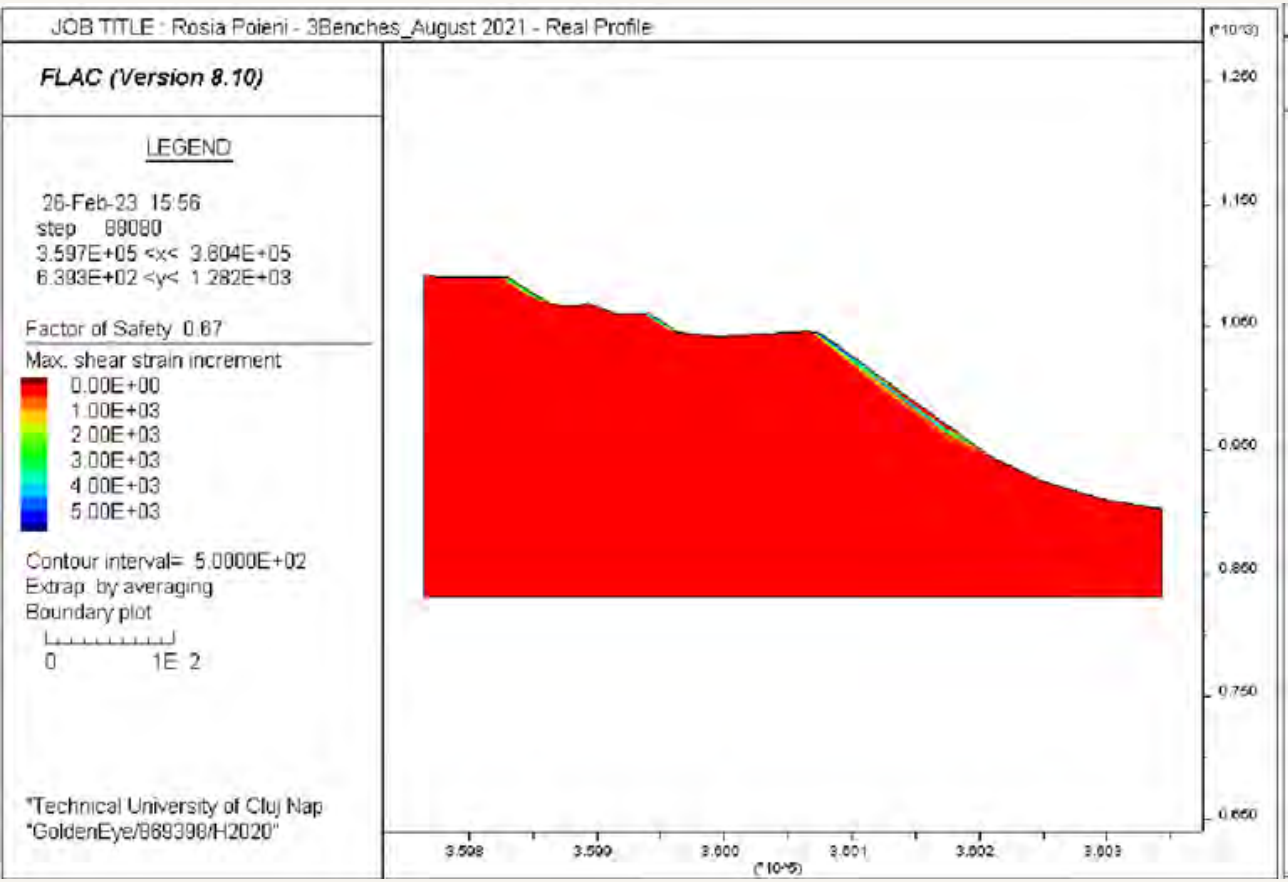
CHEMICAL PHENOMENA IN THE WASTE DUMP OF ROȘIA POIENI

The Roșia Poieni deposit is characterized by its widespread structure and highly variable content, leading to the establishment of a minimum exploitable concentration over time, while the remaining mineralization is deemed sterile and stored in waste dumps. Consequently, these waste dumps contain significant amounts of sulfide mineralization, contributing to their high reactivity. Environmentally, these dumps are not inert; they are highly reactive and result in the acid drainage typically associated with the mining of polymetallic sulfides. The oxidation reactions of sulfides contribute to the degradation of the particles within the dumps and compromise their physical stability.

In the dumps or tailing ponds, the disseminated sulfides periodically receive rainwater and are exposed to air. The reactivity of sulfides in such conditions is extreme and will essentially continue until they are entirely depleted. During dry periods without precipitation, sulfides come into contact with air and lead to the formation of sulfate, hydroxide, and oxyhydroxide efflorescences (secondary minerals). These formations resemble those found in a mine or open pit; however, the fine grain size of the sulfides provides a large contact surface area, which significantly enhances their reactivity.

During rainfall, sulfates are leached (dissolved and washed out) by precipitation, resulting in acidic waters enriched with heavy metal ions, aluminum, and sulfate ions ($SO4^{2-}$). The washing of the sulfide surface allows for the continued formation of secondary minerals during the subsequent dry periods. This phenomenon recurs with each alternating period of rainfall and dryness, creating a dynamic environment that affects both the chemistry and stability of the tailings.

The continuous interplay between precipitation and evaporation exacerbates the chemical reactions occurring in the waste dumps, leading to a cycle of mineral dissolution and formation that has significant implications for both environmental management and the stability of mining sites. Understanding these processes is crucial for mitigating the environmental impact of mining activities, particularly in areas with sulfide-rich deposits like Roșia Poieni.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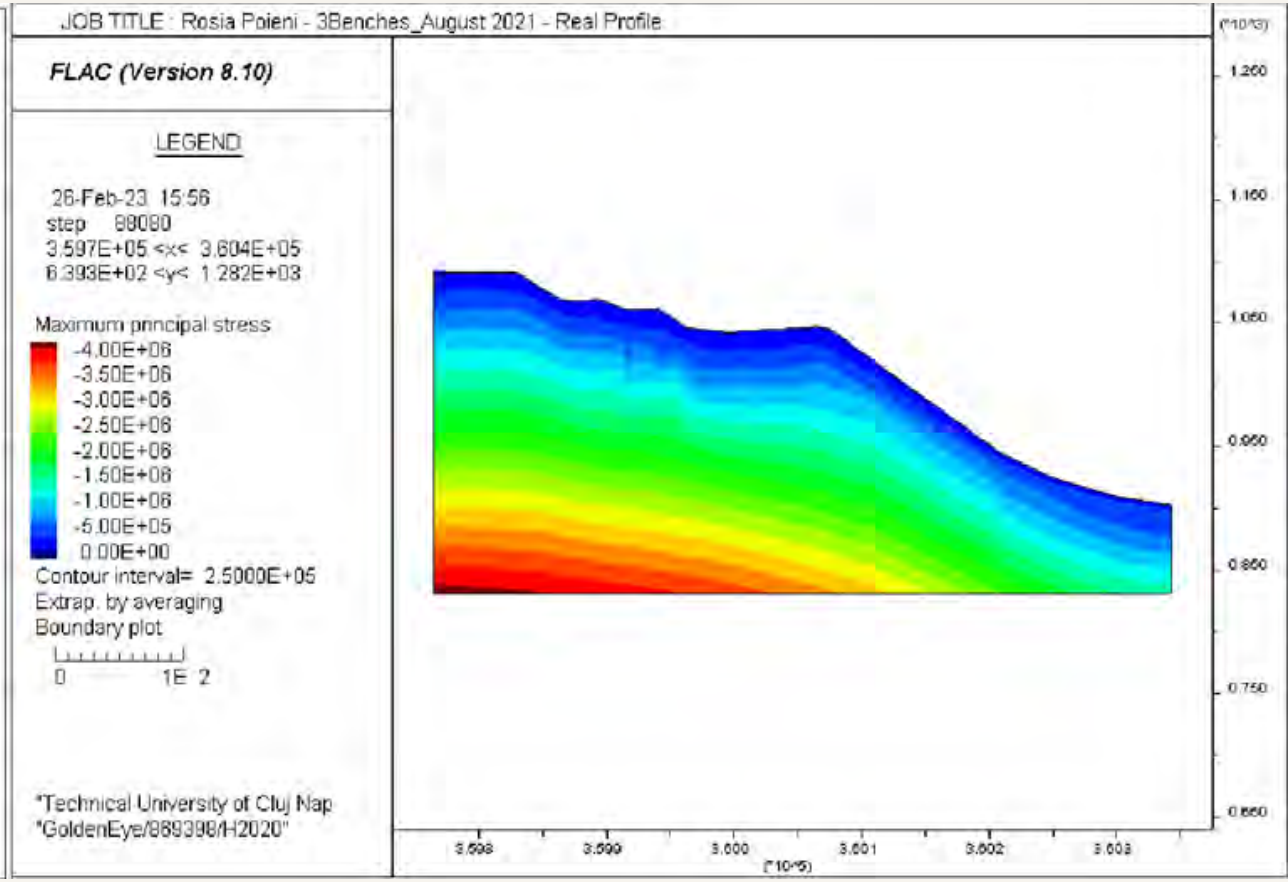
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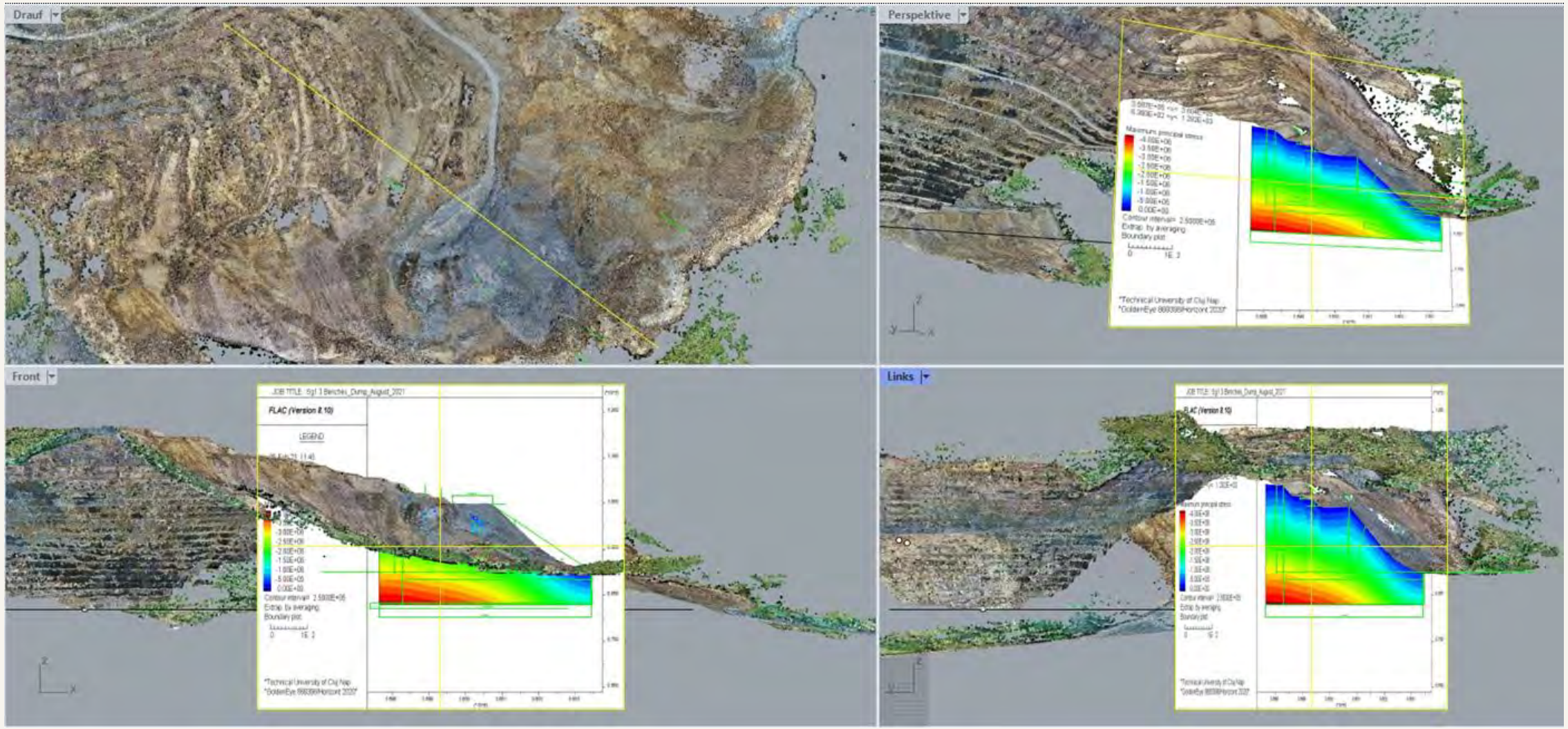
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Links
FLAC (Version 8.10)
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Figure : The condition of the slope and acid lake at the base of the dump

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