

Algae survey by multispectral fluorescence technique in Romanian Waters

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ROMANIA ...



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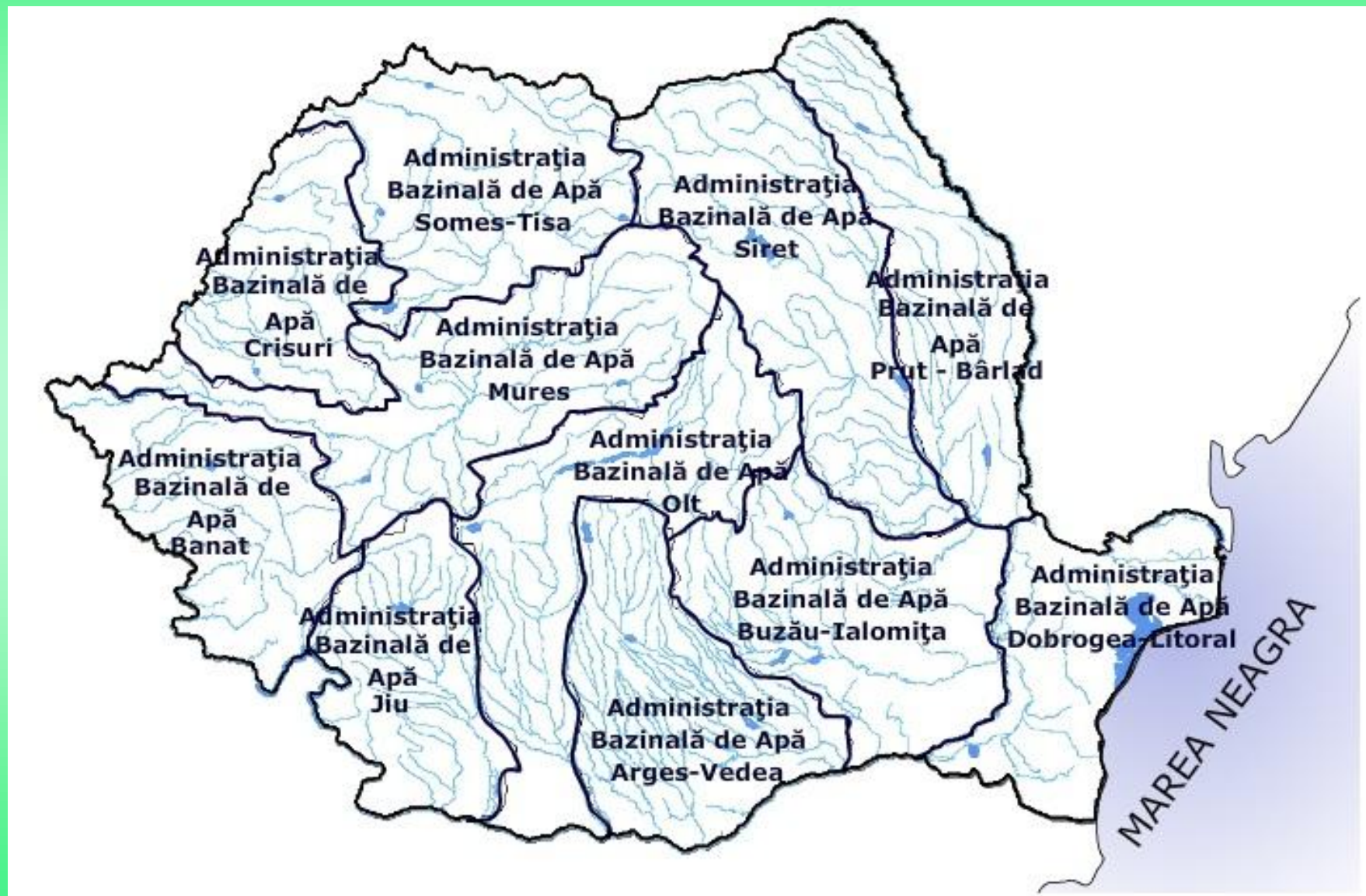
ROMANIA ...



ROMANIAN WATERS

- Administratia Nationala Apele Romane
www.rowater.ro
- managing and administration of surface and ground waters (rivers, lakes, boreholes, Danube, Black Sea) and wastewaters
- monitoring of water resources, floods and water quality, water management
- 11 directorates grouped on river courses

ROMANIAN WATERS



ROMANIAN WATERS

- project - Integrated Nutrient Pollution Control
- devices: 9 pcs FLUOROPROBE III (Ministry of Environment and Forests - December 2009)
- supplier: MDS ELECTRIC, www.mdselectric.ro
- demand: better algae monitoring, next level in algae determination, *in situ* determination
- result: a significant increase of accuracy, results collected, post-processing

MDS ELECTRIC

- dealer of bbe MOLDAENKE in Romania/Moldova
- supplier of water quality instruments, analysers, multiparameters, dataloggers, remote data transmission systems
- ISO 9001 certified since 2010
- average yearly turnover 500 K EUR
- various projects for borehole monitoring (700 dataloggers), water quality monitoring (100 instruments: model 6920, YSI), fluorescence differentiation (9 instruments: model Fluoroprobe III)
- **www.mdselectric.ro**

THE SOLUTION

- the bbe Fluoroprobe III is an instrument for determination of the concentration of chlorophyll in water by using a significant fluorescence excitation spectrum for each type of algae group
- we are using the Fluoroprobe calibrated for four groups of algae: green algae, blue-green algae, diatoms and cryptophyceae
- it also detects yellow substances to enhance the accuracy of determination

Fluoroprobe III advantages:

- *in situ* determination of chlorophyll with high accuracy – eliminates the pigment degradation which interferes as a result of transportation to the laboratory site and the intermediate steps in the classical chemical method (with ethyl-alcohol)
- easy to use with autostart plug
- pre-adjustment of algae classes

Fluoroprobe III advantages:

- real time computing/calculation
- instant graphic plot function which reveals the distribution of the algae group
- can be used for real-time observations or just recording the chlorophyll values at some specific depth or time

THE MEASUREMENTS / DETERMINATIONS



THE MEASUREMENTS / DETERMINATIONS



.... AND THE RESULTS

FluoroProbe - L.UZ-baraj_20110914

File Edit Probe View Graphics Options Calibration ?

L.UZ-baraj_20110914

time	depth [m]	temp. [°C]	chlorophyll-a [µg/l] / YS [r.u.]					total [µg/l]	transm. [%]	int. temp.	
			Green .	Bluegr.	Diatom.	Crypto.	Yellow.			[°C]	[°C]
12:27:02	0,55	20,9	0,95	0,63	2,88	0,12	0,82	4,58	86,20	17,3	20,3
12:27:04	0,56	20,9	4,70	0,16	1,70	1,01	0,54	7,58	86,75	17,3	20,3
12:27:05	0,58	20,9	1,48	0,71	2,32	0,19	0,75	4,69	86,56	17,3	20,3
12:27:06	0,69	20,8	4,53	0,09	1,05	1,95	0,60	7,63	86,64	17,4	20,4
12:27:07	0,75	20,8	2,28	0,00	2,98	0,00	0,78	5,26	86,59	17,2	20,3
12:27:09	0,78	20,8	0,00	0,00	3,15	0,53	0,76	3,67	86,62	17,2	20,4
12:27:10	0,82	20,8	0,00	0,78	3,14	0,00	1,02	3,92	86,50	17,2	20,4
12:27:11	0,85	20,7	0,81	0,39	3,10	0,00	1,10	4,30	86,35	17,2	20,4
12:27:13	0,89	20,8	1,21	0,06	2,26	1,94	0,73	5,47	86,75	17,4	20,5
12:27:14	0,83	20,8	0,00	1,17	3,69	0,00	0,53	4,87	85,76	17,2	20,5
12:27:15	0,88	20,8	0,00	0,39	3,36	0,53	0,54	4,28	86,83	17,2	20,4
12:27:16	0,97	20,8	1,09	0,07	2,18	1,48	1,15	4,83	86,31	17,3	20,5

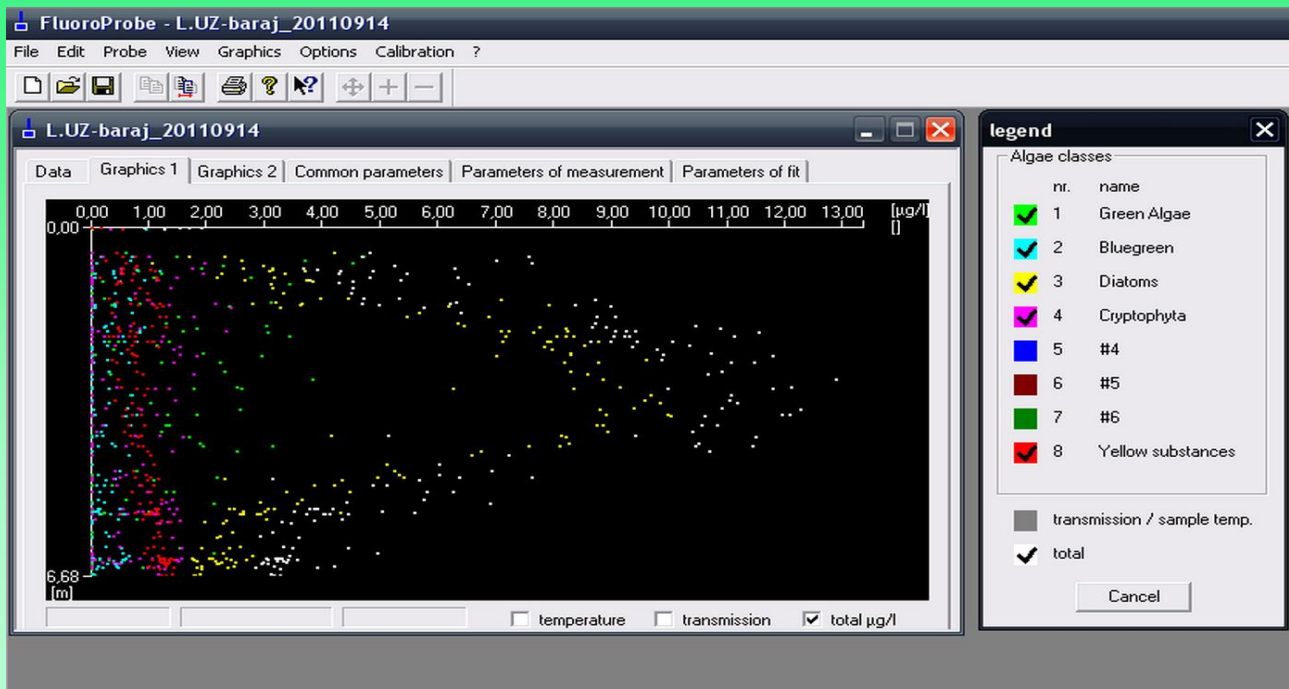
results: fitted

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UZ LAKE - DAM SECTION

.... AND THE RESULTS

- table that shows the general measured data displayed as values in columns: time, depth, temperature, the chlorophyll concentration in each group of algae and the total chlorophyll concentration
- the surveys are made in deep lakes using the integrated sampling method in different sections of the lake (usually dam and middle lake)



UZ LAKE – DAM SECTION

- graphic that shows the vertical distribution of the four groups of algae in Lake UZ (Eastern Romania)
- diatoms were the dominant group, their maximum concentration was measured at 4 m depth
- the pick of the chlorophyll concentration between 3 - 4 m depth was given by the blue-green algae group

RAPORT DE ÎNCERCARE CENTRALIZATOR Nr. 878 / 24.07.2011

REZULTATE CLOROFILA "a"

Cod probă	Data	Curs de apa	Sectiunea de recoltare	Vol. filtrat(L)	665nm	750nm	665a nm	750a nm	Valoare clorofila "a" (µg/l)
2000L/	14.09.'11	<u>Lacul Uz</u>	<i>baraj</i>	1/"in situl"	0,2747	0,0115	0,2393	0,0121	4,2624 / 8,506
2001L	14.09.'11	<u>Lacul Uz</u>	<i>mijloc lac</i>	1/"in situl"	0,2419	0,0059	0,2085	0,0062	3,9901 / 7,857

Intocmit,
Biolog Vlad Amariuca

- results of the assessment with the classical method (upper value) and the fluoroprobe method (lower value)
- the values recorded with the fluoroprobe will always be higher and more accurate

The use of FluoroProbe in some lakes near Turda, Romania

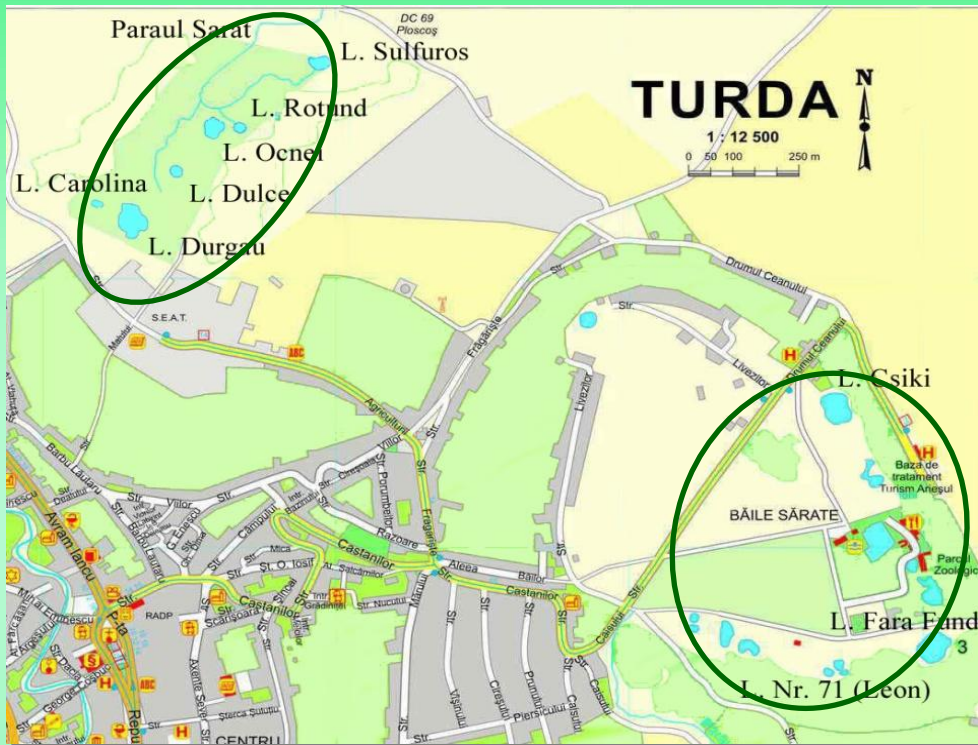


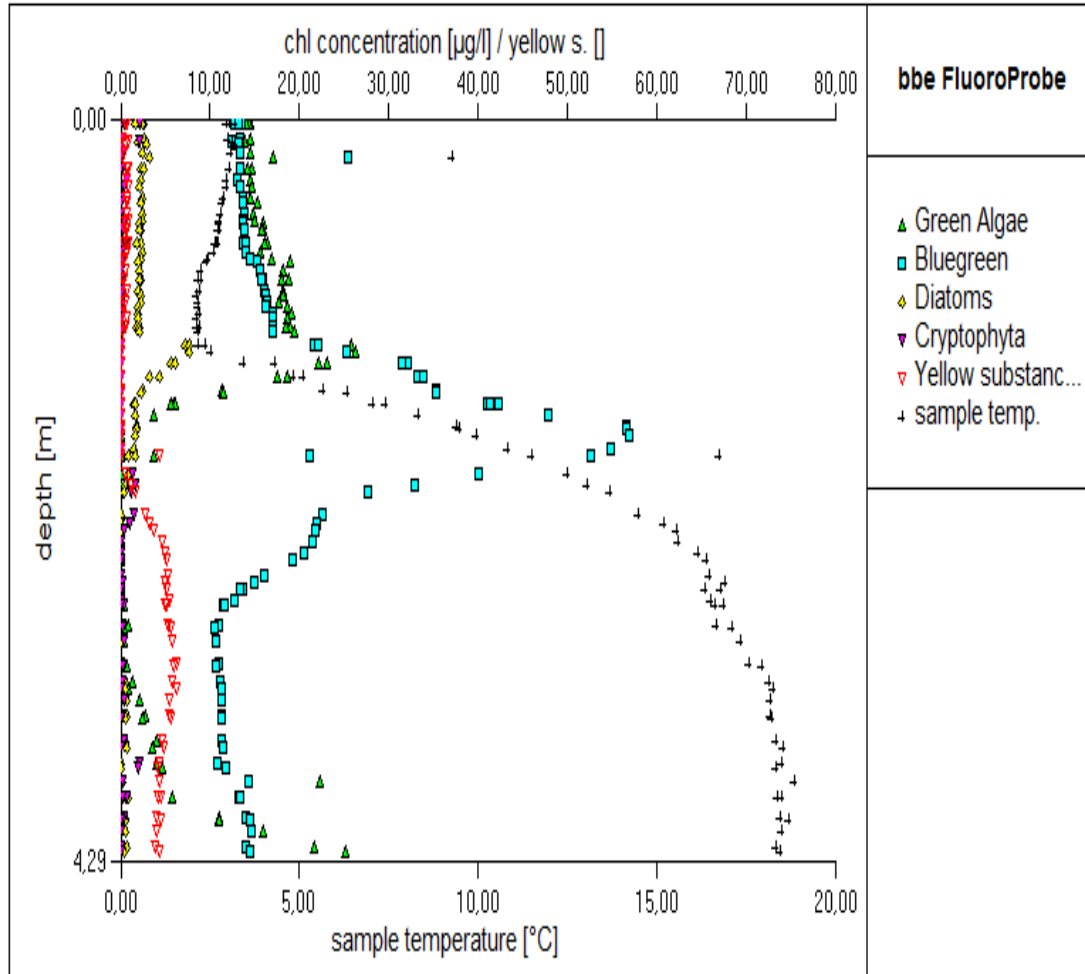
Fig. 1. Geographical location of investigated lakes from Sărată Valley and Băile Romane



Fig. 2. The FluoroProbe Version 2.2 E1, 09/08



Lake Durgău



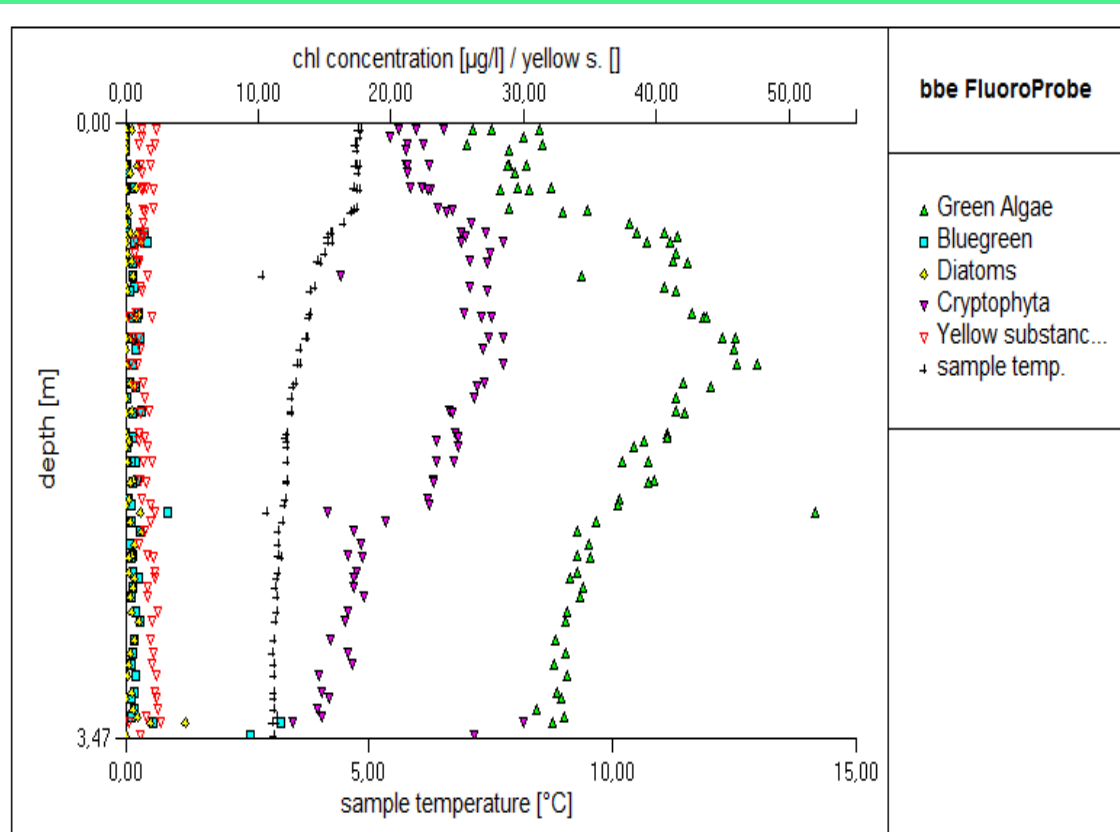
- temp.: starts at 3°C, thermocline at 1.3 m; increase to 18°C (heliothermic quality)
- diatoms: peak at 1.3 m (2 - 3 µg·l⁻¹)
- green algae: max. 26.4 µg·l⁻¹ at 1.34 m
- cyanobacteria: 56.96 µg·l⁻¹ at 1.83 m
- cryptophyta: low amounts



Fig. 4. Lake Durgău (Dörgő-tó)

Fig. 3. Graphical representation of the results obtained with the FluoroProbe Version 2.2 E1, 09/08 using the instrument's software, Lake Durgău

Lake Csiki



- Temp.: relatively uniform, autumn water mixture – between 3-4.8°C; thermocline at 0.5 m;
- green algae: max. 47.9 $\mu\text{g}\cdot\text{l}^{-1}$ at 1.36 m
- cryptophyta: 0.65 m (maximum value 28.73 $\mu\text{g}\cdot\text{l}^{-1}$)
- cyanobacteria: low values;
- diatoms: low values, homogeneous (avg – 0.42 $\mu\text{g}\cdot\text{l}^{-1}$)

Fig. 5. Graphical representation of the results obtained with the FluoroProbe Version 2.2 E1, 09/08 using the instrument's software, Lake Csiki



Fig. 6. Lake Csiki (in summer and winter, just before “ice hole sampling”)

Lake Leon

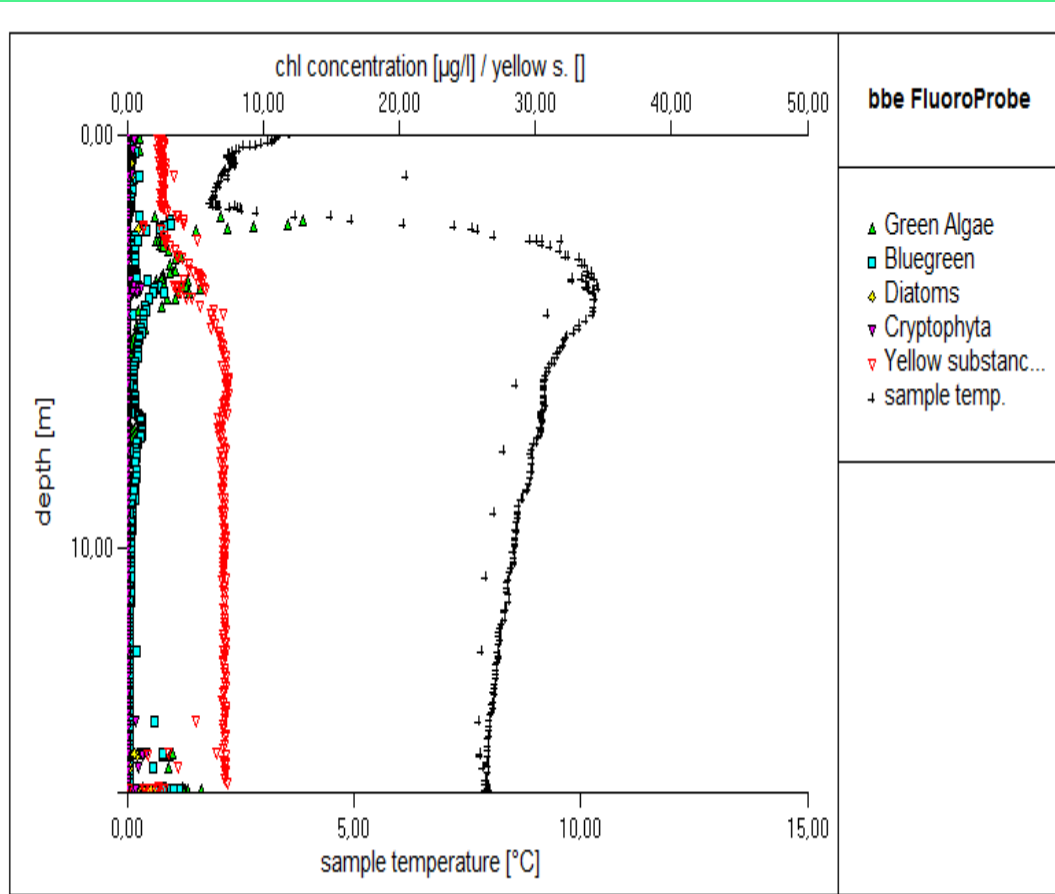


Fig. 7. Graphical representation of the results obtained with the FluoroProbe Version 2.2 E1, 09/08 using the instrument's software

- Temp.: between 1.8°C -10,4°C; thermocline starts at 1.62 m;
- green algae: max 3.25 $\mu\text{g}\cdot\text{l}^{-1}$ at 2.2 m
- cryptophyta: max. 28.73 $\mu\text{g}\cdot\text{l}^{-1}$ at 0.65 m
- cyanobacteria: max. 12.98 $\mu\text{g}\cdot\text{l}^{-1}$;
- diatoms: low values

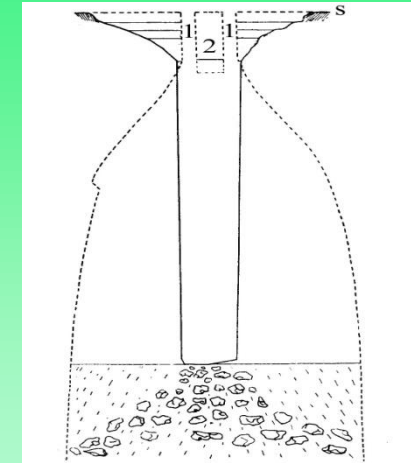


Fig. 8. S - surface; 1 – mine shaft; 2 – dividing wall; discontinuous line – old mine; continuous line – present basin)



Fig. 9. Measurements with FluoroProbe Version 2.2 E1, 09/08



We thank you for your attention !

Questions ...

www.mdselectric.ro

www.rowaters.ro