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Romanian-Swiss Research Programme: scientific report of a Joint Research Project

1. General Information

Project number: **IZERZ0 – 142228/1**

Project title: **Mercury threat in industrially impacted surface water bodies in Romania - integrated approach (MERCURO)**

Reporting period: 01 January 2013 – 31 December 2013

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Researchers financed by the project in Switzerland

Name and affiliation	Sex	Date of birth	Position (with employment percentage)	Other
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Researchers financed by the project in Romania

Name and affiliation	Sex	Date of birth	Position (with employment percentage)	Other
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Ungureanu Gh. Viorel / GeoEcoMar	M	09.04.1964	Senior researcher / Technical responsible (Part time)	Sedimentology
Secrieru Dan / GeoEcoMar	M	01.03.1950	Senior researcher (Full time, after Sept 2013)	Geochemistry
Voicaru Cristiana / GeoEcoMar	F	01.06.1968	Researcher / Administrativeresponsible (Full time)	Hydrotechnical
Catianis Irina / GeoEcoMar	F	14.03.1969	Researcher (Full time after Sept 2013)	Ecology
Zazu Mariana / GeoEcoMar	F	09.08.1973	Research (Part time)	Biology
Vasiliu Dan / GeoEcoMar	M	23.08.1970	Research (Full time, after Sept 2013)	Chemistry
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2. Introduction

The overall goal of the MERCURO project is to assess the Hg threat in industrially impacted surface water bodies in Romania. The project focuses on the one of the most anthropogenically impacted surface water body in Romania - River Olt basin. By using an approach integrating hydro(geo)logical, physical, chemical, and ecotoxicological tools the following key issues are planned to be address:

- Performance of an Hg survey and estimation the pollution extent in water and sediments;
- Determination of the transport, dispersion and speciation of Hg in water column and sediments;
- Assessment of the bioaccumulation and effect of Hg to different organisms with emphasis on the primary producers in particular microalgae, periphyton and macrophytes;
- Evaluation of food chain transfer and possible risks for the human beings.

Strengthening the capacity, improving integration of scientists in the international network as well as developing "best practices" for impact assessment of micropollutants are other expected outcomes of the project.

3. Scientific results

3.1. Transport and dispersion of Hg in water column and sediments (GeoEcoMar and UniGe)

3.1.1. Bathymetric surveys of reservoirs (GeoEcoMar)

The bathymetric survey was performed during the first field campaign between 16th and 22th of April 2013. The bathymetric data were obtained with a GPS CEEDUCER single beam echosounder and the water level was obtained from the Babeni, Ionesti and Zavideni dams measuring gauges. For each reservoir transverse and longitudinal profiles were recorded. All profiles were plan-ned in such a way to ensure a good interpolation of the data in order to obtain reliable bathymetric maps. All raw data were corrected for water level variations in the reservoirs that appeared during the measurement time due to the water influx from upstream and opening of the dam gates. Variations in water level were up to 15 cm. Additional points were added to the measured bathymetric data to increase the accuracy of the interpolation, such as reservoir limits, con-tours of island and emerged sediment deposition areas. Then depths were converted to elevations. Data were interpolated and DEMs of the 3 reservoirs were derived from the interpolation. All data were loaded in ESRI ArcGIS and maps of the reservoir bottom morphology were realized. The comparison with the initial morphology will be done in 2014.

3.1.2. Sediment sampling and analysis (GeoEcoMar, UniGe for the second field campaign)

Bottom sediments of Babeni, Ionesti and Zavideni reservoirs were sampled during the first field campaign with the aim to obtain new data on Hg and other metal contamination of the bottom sediments. In each of the 3 reservoirs, grab samples were taken and described as follows: (i) Babeni reservoir – 4 samples along a longitudinal profile; (ii) Ionesti reservoir – an extended areal sampling with 30 samples in a rectangular grid; (iii) Zavideni reservoir – 4 samples along a longitudinal profile. Some of the grab samples showed a clear layering. In this situation the two layers were sub-sampled individually. Each grab sample was described from a macroscopical point of view and subsampled for grain size, metal and mercury analyses. To this moment only the granulometry and geochemical analyses are ready. Grain-size determination was done using a Malvern Mastersizer 2000. Grain-size distribution and statistical Folk parameters were determined. The type of sediment was obtained from the Shepard's diagram. As a general remark a zonation of sediments in all reservoirs in respect to the grain-size was observed. Sand and coarser fractions are more important in the upstream part. Silt dominates the mid-section of the reservoirs and clay is predominant near the dams, in the Southern part. This distribution is in accordance with the differences

between the grain-size of sediments transported by the Olt River and its tributaries as well as between the current velocity and competence. As the Olt enters into the reservoir there is a sharp decrease of water flow velocity causing the sedimentation of coarser sediments in the vicinity of the river inlet. High flood events transport sand fraction at a greater distance along the main water current. Finer Olt sediments and the silty fraction settle farther away from the Olt inlet and also within newly formed deltas secondary deltas. Clay fraction dominates the downstream end of the reservoirs. The contents of Ca, Fe, Ti, Zr, Ba, Sr, Rb, Zn, Ni, Mn, Cr, V, Co, Pb, Cu and Cd are already measured. The interpretation of the results is still on the way. Mercury analyses are still on the way, due to the late purchase of the dry-freezer that had to be used in sample preparation.

During the second joint field campaign sediments from four cascade reservoirs in Babeni, Onesti, Zavideni, and Dragasani were sampled. A total of ten cores were collected. The longest sediment core from each reservoir were opened, photographed and subsampled at 1-cm intervals (*Fig. 1*). Basic sedimentological analysis including volume magnetic susceptibility, water content, grain-size were performed. Mercury content determination and sediment dating are underway. Preliminary measurements show that the sediment profiles are continuous and unaffected by major sedimentological events that could disrupt the continuity of the sediment archives. The only major change is observed in the Dragasani core, where a major shift in water content at 46 cm depth is found.

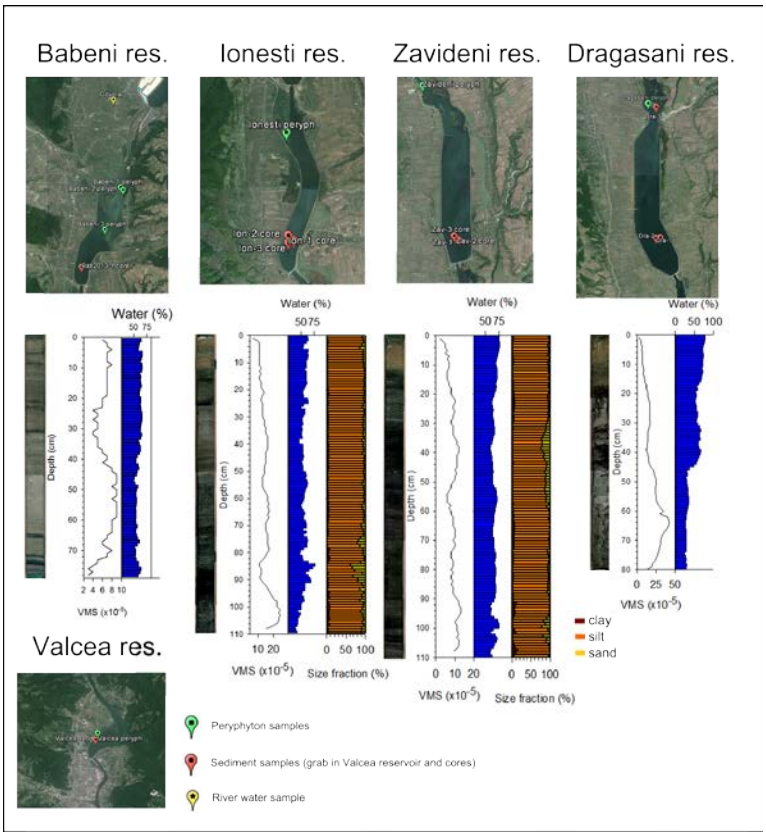

Fig. 1 *Map of study sites where surface sediment, sediment core and periphyton exposure. Sediment cores have been analyzed for volume magnetic susceptibility, water content and grain size.*

3.1.3. Numerical modelling of sediment and Hg dispersion (GeoEcoMar)

The bathymetry of the reservoirs was used to design the elementary grid necessary to the numerical modelling. The grid is made up of triangular cells of various sizes depending to the water depth. It serves as base for the numerical simulation of water flow using the SHYFEM model. The next step, which will be done in 2014, is to run the model in different flow conditions defined by water inflow and outflow from the reservoirs, based on the discharge data that will be obtained from Apele Romane.

3.2. Mercury partitioning and speciation (UniGe)

Evaluation of the Hg partitioning and speciation in the water column of the Olt River reservoirs allows to better understand Hg fate after its release by the Oltchim platform and the interactions with primary producers. The focus during the first year was on the study of Hg speciation in the dissolved fraction (<0.45 μm), which was simulated by the chemical equilibrium model taking onto account the basic water quality parameters such as major cation and anions, dissolved organic carbon (DOC) and pH as well as total concentrations of mercury (*Table 1*).

***Table 1**: Measured pH, mean dissolved organic carbon (± s.d., n=3), total dissolved concentrations of major cations and anions (± s.d., n=2) as well as total metal concentrations (± s.d., n=3) in the studied reservoirs along the Olt River and Govora River (Romania) in September 2013. N.D. indicates not determined. Charges omitted for simplicity*.

Measured	Valcea	Babeni 1	Babeni 2	Babeni 3	Babeni 4	Ionesti	Zavideni	Dragasani	Govora
pH	8.38	7.94	8.42	8.03	8.14	9.35	8.21	7.95	8.75
DOC ($mg.L^{-1}$)	2.12 ± 0.05	2.33 ± 0.03	2.82 ± 0.09	2.85 ± 0.16	3.42 ± 0.66	3.68 ± 0.65	3.02 ± 0.58	2.46 ± 0.57	N.D.
Na (mM)	0.99 ± 0.02	2.57 ± 0.02	2.77 ± 0.02	2.53 ± 0.01	3.14	2.89 ± 0.03	2.71 ± 0.02	2.97 ± 0.01	91.2 ± 0.9
K (μM)	97.3 ± 2.0	111.7 ± 3.1	110.2 ± 1.0	105.0 ± 0.2	118.6 ± 7.1	133.3 ± 1.0	114.0 ± 1.3	122.5 ± 2.4	N.D.
Mg (μM)	168.9 ± 5.5	180.4 ± 2.7	186.8	174.1 ± 1.8	183.9 ± 16.1	195.6 ± 1.9	196.0 ± 2.0	186.1 ± 3.8	N.D.
Ca (mM)	0.72 ± 0.02	2.08 ± 0.04	2.30	2.20 ± 0.02	2.50 ± 0.12	1.78 ± 0.02	2.19 ± 0.01	2.45 ± 0.05	1440 ± 102
F (μM)	4.28 ± 0.16	4.49 ± 0.14	5.05 ± 0.32	5.08 ± 0.25	4.75 ± 0.14	5.24 ± 0.09	4.20 ± 2.07	0.81 ± 0.05	N.D.
Cl (mM)	0.81 ± 0.01	5.16 ± 0.15	5.57± 0.01	5.27 ± 0.03	7.22 ± 0.31	6.05 ± 0.09	5.55 ± 0.03	6.49 ± 0.11	2835 ± 4
Br (μM)	0.64 ± 0.13	0.76 ± 0.02	0.71 ± 0.01	0.75 ± 0.02	0.80 ± 0.01	0.62 ± 0.03	0.70 ± 0.01	0.70 ± 0.01	N.D.
SO_4 (μM)	174 ± 3	203 ± 2	245 ± 4	244 ± 2	231 ± 2	263 ± 1	251 ± 1	253 ± 2	N.D.
NO_3 (μM)	14.7 ± 2.0	51.6 ± 5.8	37.6 ± 1.2	34.3 ± 0.2	36.5 ± 1.3	1.5 ± 1.7	27.2 ± 4.3	37.4 ± 0.4	N.D.
Cr (nM)	2.3 ± 0.3	3.3 ± 0.3	3.3 ± 0.3	3.1 ± 0.5	3.8 ± 0.3	2.6 ± 0.2	2.4 ± 0.3	2.7 ± 0.1	N.D.
Co (nM)	4.1 ± 0.2	6.2 ± 2.6	4.3 ± 0.4	4.2 ± 0.1	4.7 ± 0.2	3.8 ± 0.2	4.1 ± 0.4	4.0 ± 0.3	N.D.
Ni (nM)	16.7 ± 0.9	20.3 ± 1.1	18.8 ± 0.7	20.6 ± 0.5	18.8 ± 0.6	13.9 ± 0.6	18.0 ± 0.3	20.7 ± 1.4	N.D
Zn (nM)	0.6 ± 0.2	1.3 ± 0.2	2.2 ± 0.4	1.2 ± 0.1	0.8 ± 0.1	2.2 ± 1.3	3.5 ± 0.2	17.1 ± 1.4	N.D
As (nM)	38.2 ± 1.7	28.4 ± 1.0	31.1 ± 1.1	34.6 ± 1.1	28.9 ± 0.7	20.6 ± 0.9	39.4 ± 0.3	44.3 ± 1.4	N.D
Pb (nM)	1.1 ± 1.4	15.1 ± 0.6	16.0 ± 1.9	16.9 ± 3.0	0.7 ± 0.2	0.9 ± 0.1	0.5 ± 0.1	0.8 ± 0.1	N.D
Hg (pM)	2.4 ± 0.3	5.6 ± 2.2	6.2 ± 2.9	5.9 ± 2.2	11.5 ± 4.6	3.9 ± 1.6	4.1 ± 1.6	3.3 ± 2.0	384± 183

These input parameters were measured either in-situ or in the water samples from the field campaign in September 2013. Valcea reservoir was used as a reference site to provide background values of water quality for the Olt River. Babeni Reservoir is considered to be most impacted by the Oltchim platform via the Govora River. In all reservoirs measured pHs were slightly alkaline (7.94 to 9.35), suggesting a high activity of inhabiting primary producers. Nonetheless DOC concentrations were relatively low between 2.1 and 3.68 mg/L. The Valcea reservoir had rather low concentrations of Ca^{2+} (0.72 ± 0.02 mM) and Mg^{2+} (168.9 ± 5.5 μM), contributing to moderate hardness (*Table 1*). However an increase of Ca^{2+} (x 2.9), Na^{+} (x 2.6), Cl^{-} (x 6.4) and NO_3^{-} (x 3.5) concentrations was observed in the subsequent reservoirs, which could be attributed to the input from the Govora River. Indeed the Ca^{2+} concentration in Govora River waters wasd 2000-fold higher, Na^{+} - 92 fold, and Cl^{-}- 2835 folds than the Valcea water. Such high concentrations may be explained by the use of NaCl and $CaCl_2$ during the chloralkali process by the Oltchim plateform. Beside these high inputs of anions and cations, the Govora River also contained very high concentration of Pb

and Hg with a value of 384 ± 183 pM (Hg), which is about 160 times higher than the background concentration measured in Valcea. This results in 14-fold Pb and 2-fold Hg higher concentrations in Babeni reservoirs. WHAM/model VII offering the advantage comprising methylmercury in its default database was used to model the speciation of mercury in the dissolved phase. Mercury inorganic speciation was found to be highly dependent on the chloride concentrations. In the reference site of Valcea, the predominant Hg species was $Hg(OH)_2$ whereas in subsequent reservoirs, $HgCl_2$ and $Hg(OH)CO_3^{2-}$ also contribute to the main complexes. In the Govora River, Hg speciation is mainly controlled by the chloride concentration with $HgCl_4^{2-}$ and $HgCl_3$- as predominant species. In presence of DOM, Hg was estimated to be mainly under Hg-DOM forms (> 99.9%) with Hg-fulvic complexes representing more than 80% of the complexes. Colloidal Hg fraction of Hg, from the release point of Hg (Govora River) to the end of the Babeni reservoir is planned to be studied during the joint field campaign planned for 2014.

3.3. Hg accumulation and effects to aquatic primary producers (UniGe).

3.3.1. Ecotoxicological assessment of water and sediments by batteries of microbiotests (Unige and GeoEcoMar)

A series of ecotoxicological tests were performed to assess water and sediment quality of Babeni, Ionesti and Zavideni reservoirs. These experiments were conducted by Mariana Zazu, a Master student at GeoEcoMar in close collaboration with Dr. Severine LeFaucheur during her research stay at the Institute Forel in spring 2013. Among the three reservoirs, Ionesti was found to have the poorest water and sediment quality. Indeed *Daphnia magna* exhibited a 30 % immobilization and mortality after 48 h exposure to Ionesti waters whereas only 20% of effect was observed in the two other reservoirs. Exposure experiments performed with the unicellular green alga *Chlamydomonas reinhardtii*, followed the same tendency with the lowest growth rate obtained in Ionesti water. Sediments collected in Ionesti had also the poorest quality among the three reservoirs with the highest mortality measured in the ostracod crustacean *Heterocypris incongruens* (27%) and the lowest growth rate for the aquatic plant *Myriophyllum aquaticum*. Further ecotoxicological tests will be performed during the second year in order to understand the quality status of Ionesti reservoir.

3.3.2. Hg accumulation in algae and transcriptome analysis (UniGe)

Hg accumulation and its effects at the transcriptomic level of *C. reinhardtii* in the field were studied during the campaign of 2013. To that end, algae were exposed directly to natural waters i.e. in Valcea (as a control) and Babeni (impacted sites) with ***S***tirred ***U***nderwater ***B***iouptake ***S***ystems for 24 h. No Hg accumulation was detected in exposed algae whereas transcriptomic analysis was not possible due to a poor purification of RNA. Consequently, the accumulation and transcriptomic analysis will be performed the next field campaign. In order to better understand the source of problems during the field experiments, laboratory experiments on toxicity and accumulation of inorganic Hg (Hg^{II}) and methylmercury (CH_3Hg) towards *C. reinhardtii* were further performed. Methylmercury (EC_{50}=19.6 nM) was found to be more toxic for algae than Hg^{II} (EC_{50}=600 nM). Moreover, a modification of algal cell granularity and chlorophyll a content was observed when algae were exposed to CH_3Hg whereas no effects on cell traits and chlorophyll a were found under Hg^{II} exposure. Both species seem thus to have different modes of toxic action towards unicellular algae.

3.3.3. Hg accumulation in periphyton from different locations (UniGe)

The accumulation of Hg in the periphyton was studies by means of two set-ups: (i) periphyton grown on artificial substrata during two weeks along the Olt River (five sites) and (ii) periphyton grown in the reference reservoir (Valcea) for two weeks and then transferred for 24 hours into the contaminatedreservoirs along with the gradient of mercury pollution. Total and intracellular (e.g. cysteine washed) Hg content in periphyton were about five times higher in periphyton collected in Babeni reservoir than in those from the reference Valcea reservoir (*Fig. 2*).

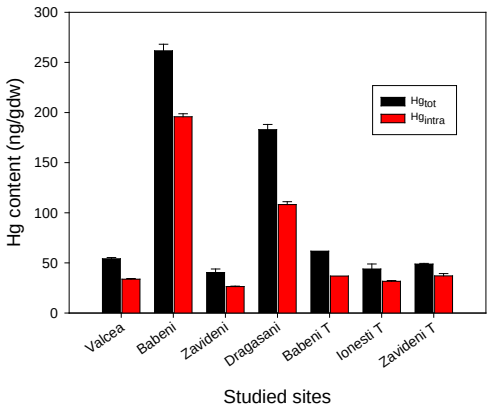

Fig. 2. *Total and intracellular Hg concentra-tions in periphyton collected along the Olt River after two weeks of substrata colonizationand after 1 day translocation (T).*

Total Hg content in periphyton decreased in the Zavideni reservoir downstream of Babeni but further increase downstream in Dragasani reservoir. Between 60 and 74% of the accumulated Hg were found in the intracellular fraction, suggesting that Hg was strongly attached to the biofilms or intracellular accumulated inside the microorganisms inhabiting the biofilms. The bioaccumulation factor (calculated with the total dissolved Hg concentrations in water) was higher in periphyton collected in Dragasani (1.7×10^7 L/Kg) than those collected in the other studied reservoirs, which have bioconcentration factors of 7.02×10^6, 5.3×10^6 and 3.8×10^6 L/Kg for Valcea, Babeni and Zavideni, respectively.

In parallel, the composition of the periphytic community was examined by epifluorescence using fluorescent markers and DNA extraction. To study the biofilm community composition with microscopy, three colonized slides from each site were used: one was fixed with formaldehyde, the second was stained with DAPI to determine the biotic and abiotic fraction and the third one was fixed and stained with Texas-Red to measure the exopolyssacharide (EPS) fraction (*Fig. 3*).

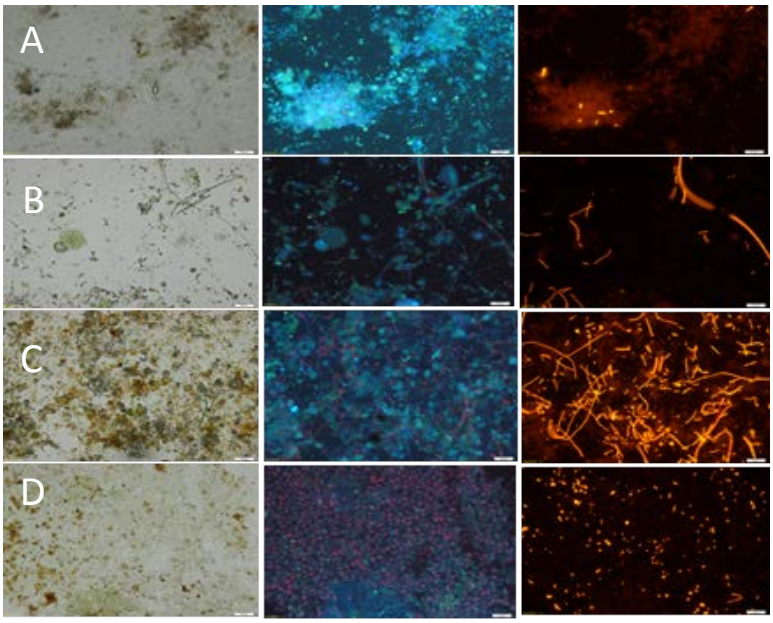

Fig. 3*. Microscopic images of periphyton collected at the different study sites and observed by epifluorescence microscopy (left to right, biofilms without stain observed with bright field, biofilms stained with DAPI and observed with the DAPI channel and biofilms without stains observed in FITC channel) - (A) Valcea, (B) Babeni,(C) Zavideni, (D) Dragasani.*

There was a strong correlation between the degree of substrate colonisation, biotic fraction and the contamination. Artificial substrata were colonized to about 60% in the reference Valcea reservoir, while at the most polluted reservoir Babeni only 28 % of the slide was colonized with the lowest biotic fraction. Finally, no EPS quantification was possible due to the presence of a large quantity of cyanobacteria, which impede EPS signals.

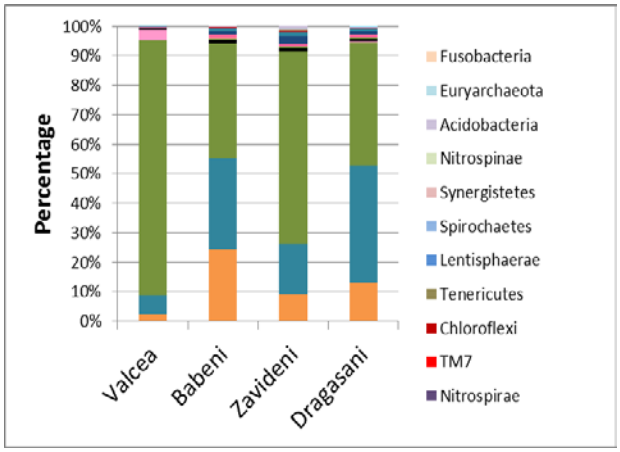

Fig. 4. *Bacterial composition of the different sites at the phylum level.*

Overall periphyton composition varied greatly between the different studied sites. Furthermore, DNA sequencing showed that the bacterial composition of periphytic biofilms varied among the reservoirs *(Fig. 4)*. The main phylum was *Proteobacteria* found in each reservoir, however *Cyanobacteria* were abundant in the most polluted site (Babeni). Bacterial diversity in Valcea differed from the other sites, whereas Babeni and Dragasani reservoir diversity was closer. Indeed phylum such as *Cyanobacteria, Bacteroidestes, Gemmatimonadete* were mainly found in Babeni and Dragasani reservoirs, whereas the more represented phylum in Zavideni were *Actinobacteria* and *Chloroflexi* and *Deinococcus-Thermus* in Valcea.

qPCR analysis demonstrated that the diversity of mercuric reductase genes (*mer*A) responsible for the Hg reduction and demethylation decrease in peryphyton (B>Z>D~V reservoirs) with decrease of total Hg concentrations in water. By contrast the abundance of *dsr*A genes specific for sulphate reducing bacteria and *Geobacter* cytochrome c oxidase gene – *gcs* abundance (B~D>Z>V) were better correlated with the amount of the Hg accumulated in the periphyton. The abondance of *Hgc*B, required for mercury methylation was much higher in periphyton from Zavedeni than that from Babeni. Taken together the results show strong effect of mercury contamination on the periphyton community composition and point out their suitability as Hg contamination bioindicators. Methylmercury in periphyton and reservoir waters still need to be measured to confirm the results.

3.3.4 Comparison with macrophytes exposed at the same sites (UniGe)

Shoots of *Elodea nuttallii* grown in the laboratory were exposed 24 h in the field in similar sampling sites that *C. reinhardtii* in addition to those collected from native macrophytes. No difference in Hg bioaccumulation in *Elodea nuttallii* shoots were found between the different study sites (Figure 5). Bioconcentration factor were similar at each site, with a value of 6.4 x 10^6, 7.6 x10^6, 4.1 x 10^6, 2.1 x10^6 L/Kg for Valcea, Babeni site 1, Babeni site 2 and Babeni site 3, respectively. Concentration of mercury in natives *Elodea nuttallii* shoots was significantly higher in Babeni than in Valcea.

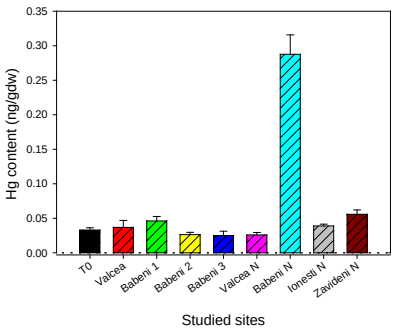

Fig. 5. *Intracellular Hg concentrations in shoots of E. nuttallii exposed at different sites during 24 hours in the Olt River and in the shoots of E. nuttallii natives (right).*

Bioaccumulation factor was slightly higher in Babeni reservoir than in others (2.3 x10^7 L/kg in Babeni, 9.7 x10^6 in Valcea, 6.4 x10^6 in Ionesti and 8.18 x10^6 in Zavideni L/Kg). However, generally as it was observed for periphyton, bioaccumulation factors were similar, for plants grown in laboratory and exposed into the field. Plant transcriptomic analysis is postponed to next year.

4. Deviations from research plan

No special deviations of the research plan to mention during the first year.

5. Collaboration aspects

General co-ordination of the project is under the responsibility of V. Slaveykova, Director of the Institute F. A. Forel and PI of team 1. Dr. Oaie, Director of GeoEcoMar and PI of team 2 with active participation of Ungureanu co-ordinator in Romania. Kick-off meeting was organised 5th of March 2013 at University of Geneva, where the plns for the first year of the project were discussed between V. Ungureanu (GeoEcoMar), V. Slaveykova, J-L. Loizeau, C. Cosio, S.Le Faucheur and P. Dranguet (UniGe). Due to the imposed budget cut the coordination visit of V. Slaveykova to GeoEcoMar was canceled, and the coordination issues were discussed also during the kick-off meeting in Geneva. In addition, Skype conferences were organised at the regular base, as well as e –mail exchanges all over the year.

Mariana Zazu from GeoEcoMar has participated in a training program in ecotoxicology between 28th of April and 18th of May, organized by UniGe in the Institute Forel's laboratory. The first week was devoted to the theoretical basis of ecotoxicological tests that were planned to be applied. Next two weeks were dedicated to test the water and sediment samples from stations on the river Olt set, using four organisms: Daphnia magna (from Daphtoxkit FTM), *Chlamydomonas reinhardtii*, *Heterocypris incongruens* (from Ostracodtoxkit F) and *Myriophillum aquaticum*. Ecotoxicology methodologies based on the rapid microbiotests with standard organisms to assess water and sediment quality were optimized and used to characterize the samples form the Old River basin (see the attached knowledge transfer document). Following this training period Mme Zazu should be able implement these tests in the newly developed laboratory of ecotoxicology in GeoEcoMar.

Three field campaigns were organized during this period. First one during the period 16th – 22th of April 2013 with the major goal to perform the bathymetric surveys and bottom sediment sampling of Babeni, Ionesti and Zavideni reservoirs. The second one between 26th and 28th of August 2013 aimed to place the periphyton setups in Valcea, Babeni, Ionesti and Zavieni reservoirs. The third field campaign took place from the 4th to the 13th of September 2013, as planned. V. Ungureanu, M. Zazu and C. Ungureanu (GeoEcoMar), and C. Cosio, P. Dranguet, S. Le Faucheur, and J.-L. Loizeau (UniGe) actively participated in the campaign. Sediment cores and waters samples in the four cascading reservoirs were collected; in-situ exposure and transplantation experiments with aquatic plants and periphyton assemblage were performed by the UniGe team. In addition, surface sediment samples in Dragasani reservoir were retrieved for total mercury analysis and benthic community determination by GeoEcoMar team. No major difficulties to mention during the organisation and performance of the filed campaign. The planned visit of the second GeoEcoMar scientist to the University of Geneva was postponed to the first quarter of 2014, instead 2013 to allow performing the planned Hg speciation measurements by the newly acquired mercury speciation analyser installed at the Institute Forel in December 2013.

6. Research output

Scientific publications and presentations at different conferences by V. Slaveykova, C. Cosio, S. Le Faucheur, J-L- Loizeau and V. Ungureanu in relation with MERCURO project:

Research papers

S. Le Faucheur, P. G.C. Campbell, C. Fortin and V.I. Slaveykova "Interactions between mercury and phytoplankton: Speciation, bioavailability and internal handling" *Environ. Toxicol. Chem*. Special issue Global mercury partnership (2014) DOI: 10.1002/etc.2424

Cosio, R. Flück, N. Regier, V.I. Slaveykova "Effects of macrophytes on the fate of mercury in aquatic systems" *Environ. Toxicol. Chem.* Special issue Global mercury partnership (2014) DOI: 10.1002/etc.2499.

A. Garcia Bravo, S. Le Faucheur, M. Monperrus, D. Amouroux, V. I. Slaveykova, Species-specific isotope tracers to study the accumulation and biotransformation of mixtures of inorganic and methyl mercury by microalga *Chlamydomonas reinhardtii*, *Env Pol* (submitted).

Oral presentations

Regier N., Grosse-Honebrink A., Garcia Bravo A., and Cosio C. (2013) Influence of a macrophyte on bacterial communities in a Hg polluted sediment (Babeni Reservoir, Romania). DNA watch workshop 4-5 December 2013 (Frasne, France).

Le Faucheur S., Portilla Castillo E., Slaveykova V.I. "Toxicity of mercury towards *Chlamydomonas reinhardtii* in presence of perfluoroctane sulphonate" 11th Swiss Geoscience Meeting, 15-16 November 2013, Lausanne, Switzerland (Special symposium Environmental Biogeosciences)

Le Faucheur S., Portilla Castillo C.E. and Slaveykova V.I. (2013) The toxicity of $HgCl_2$ towards unicellular green algae increases in presence of perfluorooctane sulphonate. International Conference on Mercury as a Global Pollutant (ICMGP) 28. July 2. August 2013 (Edinburg, UK)

Cosio C. (2013) Interactions between Hg and the rooted macrophyte *Elodea nuttallii* in aquatic environment. International Conference on Mercury as a Global Pollutant (ICMGP) 28. July 2. August 2013 (Edinburg, UK).

Regier N., Larras, F., Cosio C. (2013) Hg bioaccumulation in shoots of the macrophyte *Elodea nuttallii*: an opportunity for phytoremediation or a risk for the trophic chain? 23rd annual Europe meeting of the Society of Environmental Toxicology and Chemistry (SETAC) 12-16.05.2013 (Glasgow, UK).

Regier N., Flück, R., Cosio C. (2013) Interactions between Hg in the aquatic environment and macrophytes. 23rd annual Europe meeting of the Society of Environmental Toxicology and Chemistry (SETAC) 12-16.05.2013 (Glasgow, UK).

Events oriented towards the large public

December 4th, 2013. Mercury toxicity towards freshwater algae to Polish scientists from Cracow Technical University. Participants: V. Slavekyova, J.L. Loizeau, S. Le Faucheur

November 12th, 2013. Visit of 60 high secondary school scholars from Moudon (VD Switzerland) and Prevessin (Ain, France). Introduction to mercury toxicological assessment to Swiss and French high school students; Visit of the mercury and ecotoxicology labs. J.L. Loizeau, S. Le Faucheur

Knowledge transfer between Swiss and Romanian team

Knowledge transfer in ecotoxicology - Mercury threat in industrially impacted surface water bodies in Romania, M. Zazu, V. Ungureanu (GeoEcoMar), S. Le Faucheur, P. Dranguet, V. I. Slaveykova (University of Geneva)