



Geogenic Chemicals in Groundwaters and Soils: a research training network

Funded under the European Commission Sixth Framework Programme (2002-2006), Marie Curie Actions –
Human Resources and Mobility Activity Area, Research Training Networks

www.aquatrain.eu

Newsletter

Issue 4, November 2008

Edited by: Julia Leventon, ESR, JRC

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Researcher Updates

Enoma Omoregie is planning

Cristina Jimenez is trying not to get intoxicated with the ecotoxicology of arsenic

Jasmin Mertens is varying pH and phosphate concentration in her batch experiment

Barbara Casentini is continuing with digesting soils and leaching experiments, and hoping the end will come soon

Lenny Winkel is coupling a Gas Chromatograph to an Atomic Fluorescence Spectrometer to be able to quantitatively measure Se speciation in the gas phase

Naresh Rawat is enjoying his first European winter

Babak Shafei is writing a paper for a special issue of ES&T Journal and enjoying working on pore scale modeling

Adrien Mestrot is looking forward to analyzing the Ebro Delta samples he collected (soils, traps, pore water, surface water)

Aimee Hegan is organizing her French field trip and settling into the French way of life

Helen Rowland is mostly writing her deliverable

Geerke Floor is in Girona for some days before heading back to BRGM

Julia Leventon is analyzing institutional networks based on shared discourse using R

Chris Parsons is learning how to implement validation methods in R

Claudia Cascio is moving from Ispra to Leicester and enjoying English tea on the way

Prizes

Jasmin Mertens, ESR based at ETHZ in Zurich was awarded a **prize** for her oral presentation given at CEECHE. Her talk was entitled "Arsenic contamination of groundwaters in the Tisza River Basin and treatment of well water with Al nanoclusters".

Coordinator's Letter

Written by: Dave Polya

It was great to see most of the Researchers at the 4th AquaTRAIN Workshop in Cluj-Napoca – and a big thankyou to Calin and Cristina for their organisation. Doubling up with the Central and Eastern European Conference on Health and the Environment (CEECH) meant that this was a wonderful opportunity for everybody to show a wider audience what excellent work is being done by the Researchers within the AquaTRAIN Network. Congratulations to Jasmin Mertens for receiving a CEECHE award for her outstanding presentation. Congratulations to all the other Researchers who gave excellent presentations – I consistently received a lot of very positive comments about the AquaTRAIN Researchers' presentations from the other delegates I spoke to. Indeed, one US-based delegate was very keen on offering at least one of the Researchers a job – perhaps that could be put on hold for another 24 months, but it shows how well the

AquaTRAIN Researchers are thought of.

One of the most pleasing aspects of the progress of the AquaTRAIN Network is the increasing involvement of Researchers in the management and communication activities of the Network. For example, this Newsletter is edited by Julia Leventon and provides a very useful, less formal means of communication between Researchers and Lead Scientists as well as being available to the public via the AquaTRAIN website at <http://www.AquaTRAIN.eu/>.

Perhaps a more onerous task is the one that Julia and Chris Parsons have taken on in organizing the P2 General Assembly in Ispra December 3rd/4th 2008 – it is great to have a researcher-led event and I hope the experience that Julia and Chris have will encourage others to do the same. Our return to Ispra (after a very successful workshop in February) has been encouraged, not least of all, due to the great facilities, a wonderful working and social environment (e.g.

Geostatistics & Jazz courtesy of Tomislav and friends) and the support of Luca Montanarella and Luis Rodriguez-Lado, all for which we are very grateful

Also of vital importance to the smooth(er) running of the Network has been the work of the Researchers Committee and the Committee Representatives, Helen Rowland and Julia Leventon. From as early as the Duebendorf Management Meeting in January 2008, Helen and Julia have been very clearly putting forward ideas and views on behalf of the Researchers. These are highly valued and many of the suggestions have now been translated into practice – for example provision of long-term e-resources access at The University of Manchester to all Researchers, irrespective of their current location.

Barbara Casentini is currently seeking Researchers' views on the website and I would strongly encourage everyone to respond to her requests – again I highly value the suggestions made and the recommendations that Barbara makes will help make the website a more powerful communication tool – both amongst Network Researchers and Lead Scientists and also between the Network and the outside world. At Barbara's suggestion, we have implemented a better web-based mechanism for viewing Network deliverables (although we found it easier to do this externally to the Network .eu website). Also at Barbara's suggestion, I am currently receiving advice from our website host on how to procure `firstname.lastname@aquatrain.eu` email addresses for all Researchers – we could perhaps rather more easily obtain wiki-based

email addresses or `Manchester.ac.uk` addresses – but I think it worth spending a little bit more time to get the more distinctive `aquatrain.eu` addresses, which are more reflective of the European-wide (and European-funded) partnership this Network represents. I hope (but cannot guarantee) that these addresses will be available by the time all Researchers have provided Chris Parsons with their updated details/photos etc for the website.

It is with some sadness that I must confirm that Peter Tenscher has resigned from his position. We are currently working with Jerome Rose and Arnaud Masion at CEREGE and Parvez Haris at DMU to secure a replacement and to see how best to ensure that the Deliverable, co-ordination of which was allocated to CEREGE and the ESR8 role, is properly completed. We were all very heartened by the Researchers discussions regarding how to cover for the temporary absence of a ESR8.

At the risk of repeating myself, the quality of presentations and the quality of the science presented at the Cluj-Napoca meeting was also very heartening. It is clear that, overall, very good progress is being made. There are, however, a small number of areas where we need further discussions to ensure that overlaps between Researchers' research interests are continued to be built on in a thoughtful way to ensure that these overlaps are constructive and beneficial – both to the Researchers and to the Network. The main focus of our Network is the training of Early Stage Researchers. This is probably a good opportunity for me to underline how important are the Network ERs in providing

guidance to the ESRs with whom they work or whom they mentor and also to help make sure that there are appropriate opportunities for the personal and academic development of ESRs in collaborative projects.

At this time of year, whilst we might be thinking about the recently past Eid or Diwali or the forthcoming Christmas/New Year break, my thoughts are very much also on the shortly-to-come Mid-Term Review – this is a critically important event in the lifetime of the Network. I will be asking Researchers, Lead Scientists and Work Package leaders for quite an amount of information and documentation to enable us to put together a robust and comprehensive Network Mid-Term Report for submission to the European Commission prior to our Mid-Term Review meeting with reviewers appointed by the Commission. Despite this being a very busy time of year for all of us, can I please ask everybody to respond to these requests as promptly as possible.

Well done again to all those who did such a great job at Cluj-Napoca. Looking forward to catching up with everyone at Ispra!

Best regards

Dave

Conferences and Meetings EUROSOILS, Vienna, Austria, August 2008.

A number of AquaTRAIN researchers and lead scientists attended this conference. Cristina Jimenez, ESR based at Babes Bolyai University in Cluj Napoca presented her poster.

Chris Parsons reports that the special session/workshop on contaminant dynamics in flooded soils was particularly useful and interesting.



AquaTRAIN at Eurosoils 2008. L to R: Luis Rodriguez-Lado (DG JRC), Cristina Jimenez (UBB), Lenny Winkel (UJF), Adrien Mestrot (ABDN)

CEECHE, Cluj Napoca, Romania, October 2008

AquaTRAIN were in mass attendance at this conference as it was combined with a network meeting. Most researchers presented, and a full list of titles can be seen below. The conference was organized by Babes Bolyai University in Romania, the USEPA, the US National Institute of Environmental Health Science and the Czech Institute of Experimental Medicine. It was attended by representatives from a number of US institutions, the European WHO and many academics involved in topics related to environmental health in the region. The comments on AquaTRAIN presentations were all positive, and many researchers made some useful contacts. The pre-conference workshops on responsible mining; opportunities to strengthen collaborative research opportunities in the area; the use of new biomarkers generated by the -omic technologies and risk assessment; and children's

environmental health were also well attended by network representatives.

The free-time activities were greatly enjoyed and fostered greater networking! In their down time, researchers were shown around the city by Lucian Farcac. Lucian is a former JRC colleague of Chris Parsons, Claudia Cascio and Julia Leventon. He returned to his hometown of Cluj shortly before the conference, which he also attended. He became an adopted AquaTRAINER for the week! Additionally, the organizers had done a fantastic job of arranging entertainment, including Romanian folk dancing. Everyone entered into the spirit, and there are a few embarrassing photos now in people's possession (and aren't being put in the newsletter)!

A number of researchers also attended the post-conference field trip to see the mine closure and rehabilitation works at Baia de Aries.

Presentations

Julia Leventon – Falling Down the Well: Local peculiarities and the EU policy approach in the case of groundwater contaminated by arsenic in Békés, Hungary.

Helen Rowland et al. – Groundwaters of Eastern Hungary and Western Romania: General geochemistry and controls on arsenic mobilization.

Lenny Winkel et al. – Predicting groundwater arsenic contamination in Southeast Asia from surface parameters.

Enoma Omoregie et al. – Molecular Ecology of groundwater wells in the Pannonian basin: microbial involvement in arsenic cycling.

Luis Rodriguez-Lado, Aimee Hegan et al. – Environmental Hazard Mapping

using Auxilliary Variables and Logistic Regression Modelling: Arsenic Hazard in Shallow Reducing Groundwaters.

Adrien Mestrot et al. – Measuring arsenic volatilization in the environment.

Jasmin Mertens – Arsenic contamination of groundwaters in the Tisza River Basin and treatment of well water with Al nanoclusters.

Claudia Cascio – Volcanism and environmental health: a multidisciplinary approach applied to the Mount Etna region.

Geerke Floor et al. – Geogenic element behavior in soil-rainwater interaction at Mt. Etna, Sicily: Preliminary results.

Barbara Casentini et al. – Irrigation practices and topsoil As accumulation in the As-rich geothermal fields, Chalkidki prefecture, Northern Greece.

David Polya – Probabilistic risk assessment of groundwater arsenic-attributable detrimental human health outcomes in Chakda Block, West Bengal.



Researchers at Baia de Aries. L to R: Barbara Casentini (TUC), Adrien Mestrot (ABDN), Enoma Omoregie (UNIMAN), Luis Rodriguez-Lado (DG JRC).

AquaTRAIN MCRIN Period 2 General Assembly

On the 3rd and 4th December 2008, the AquaTRAIN General Assembly will be held at the DG JRC in Ispra. All researchers, lead scientists and management committee have been sent programmes and registration forms. They must fill these out and return them to Julia Leventon (Julia.leventon@jrc.it) and Chris Parsons (chris.parsons@jrc.it) as soon as possible!

Fieldwork

Adrien Mestrot, Ebro Delta, Spain, July and September 2008

Written by: Adrien Mestrot

The idea behind these field trips was to get a first experience on the Ebro Delta, to meet locals and eventually to bring back samples! And we did...

We went to the delta on two separate weeks (end of July and beginning of September). I arrived at the University of Girona at the beginning of July, hence the difficulty to organise the first field trip in parallel with organising my stay in Spain (contract, administration etc...), all of this in 3 weeks. But once those difficulties surmounted, the trip itself was really pleasant and everything ran smoothly. It was really interesting to meet people, get a first hand knowledge of the delta and mainly to realise the gap between what is planned and what really happens! The delta itself is beautiful; we had some spare time for enjoying the natural reserve and even do a little bit of bird-watching. I think the only bad point of this campaign was the mosquitoes, when I was setting up the flow-box containing the trap in the paddies, I had to do it very quickly! I

totalised once 15 bites in barely a minute!



Adrien Mestrot in the Ebro Delta

Not too many samples were taken but enough to have a first idea of the area. Soils, pore water, surface water and gases (trapping) were sampled and sent to the University of Aberdeen for total and speciation analysis. Both campaigns were a success in the sense that we managed to do all we wanted and even a bit more, I still have to

measure the samples to say for sure and I am looking forward to go back there next summer, even if the climate transition between Aberdeen and the Ebro Delta is not that easy to overcome!

I would like to take the opportunity to thank Nina BERTINI without who these field trips would have been less successful, her help was really precious.

Julia Leventon, Hungary, October 2008

The trip to Cluj for CEECHE proved to be a great opportunity for me to stop off in Hungary and collect some data. The emphasis of my fieldwork in the past has been on collecting information available on the area, observing water use practices and on identifying the research needs with respect to policy (my area of focus). Now that I have finished a full year of research, I have managed to define my research aims and design. This involves looking at the needs of management and policy, and the difficulties in fulfilling this need in two case study areas (Békés, Hungary and Ciumeghiu, Romania). However, in order to research these aims, I needed to collect data. To do so, I interviewed representatives from the Hungarian national and regional (to cover the area of Békés) Public Health Authority (ANTSZ); and representatives from municipal government in Békés. I am currently transcribing the interviews which I recorded. I will then perform a process of discourse analysis in Atlas Ti and am intending to use statistical analysis in R to look for social networks where shared discourse forms the edges.

So, what do I do on my fieldwork? It occurred to me that this fieldwork is quite different from that of many other people in the network. This is mainly because I am collecting social data rather than physical samples, and so the approach needs to be very different. To take a single sample (a recorded interview) I research the organization or institution that I wish to speak to. Usually I have identified the institution through the recommendation of a previous interviewee, or because they are referred to in key documentation; in snowball sampling you are led there. Then I must arrange an interview. This means that I email and phone to book a time. As I am currently living in Italy and had a limited fieldwork time, this was tricky (also with the language barrier). Before the interview takes place, I plan what aspects I need to cover. There are some core questions that all interviewees are asked; usually about what their responsibilities are, what they understand the arsenic contamination problem to be etc. These are designed to ensure that the data I collect will assist in fulfilling my research aims and match my theoretical framework. Further questions are tailored to the institution, particularly where I am interested in them due to a particular project they have been involved in. When in the interview, I ask the pre-arranged questions. But I see these questions as the starting point. These throw up leads which I follow. Sometimes they uncover aspects that I had no previous knowledge of, and so this must also be explored. Often, I end up asking "what do you mean by...?"

Often an interview will last for an hour or more, and are quite intense as I must concentrate on everything and

question everything. I keep notes during the interview to supplement the tape. These notes are key words to prompt me to ask another question, things to follow up through literature searches, or notes on questions that have caused the interviewee to laugh or seem reluctant to talk. As soon as possible following the interview, I write some quick reflections; these include any problems during the interview, my impressions on how it went, any ideas that have occurred to me because of it. These reflections are used during analysis to try to uncover any bias in the way I analyze.

The table below summarizes the main differences I have experienced between physical and social science fieldwork:

Social	Physical
Before	
Organise meetings/interviews and translator (where needed)	Plan sampling locations and equipment needed
During	
Collect a tape recorded conversation based loosely on planned questions	Collect a physical medium (soil, water, hair)
Find meeting location (often easier said than done)	Find wells (often easier said than done)
Mentally demanding	Physically demanding
People do cancel/change appointments at the last minute	Wells/soils don't cancel/change appointments at the last minute
Wear something smart	Wear jeans
After	
Spend hours typing out the transcript	Spend hours filtering, cleaning, or other pre-processing
Always write to say thank you	Wells/soils can't read

WP3 (with guest Julia Leventon), Bihor County, Romania, October 2008

Immediately prior to the CEECHE conference, WP3 researchers and lead scientists met up in Oradea, Romania and were joined by Julia Leventon (WP4). The aim of this little trip was to visit 3 locations in the county of Bihor (Ciumeghiu, Sepreus and Ivram lanceu) to speak with the mayors. The topic of conversation was the pilot remediation plant that WP3 are planning. Insert names, all visited the mayors office to discuss the pilot plant, their requirements and the thoughts of the mayors. In all locations they were positively received, and now have a choice of locations in which to conduct their work. While this was going on, Julia Leventon and Jasmin Mertens went and collected water samples from the wells where the remediation plants are planned. As it was raining and quite cold, Julia and Jasmin had the worst end of this deal!



Meeting the Mayor of Sepreus. L to R: Gerhard Furrer (ETHZ), Jasmin Mertens (ETHZ), Nikos Nikolaidis (TUC), Stephan Hug (EAWAG), Primar Prof Incicau, Barbara Casentini (TUC), Helen Rowland (EAWAG), Cristina Jimenez (UBB), Julia Leventon (DG JRC).

Barbara Casentini, Nea Triglia, Greece, September 2008

Written by: Barbara Casentini

The end of the summer, the hot remembrances are far from the Chalkidiki province and already the first rain peeps out. The farmers run against time trying to harvest the olives as soon as possible, before the water spoils their precious fruits, cultivated anxiously for 1 year and ready to be soon on the tables of everybody. The big green juicy Greek olives, known in all the world, are perfect... you may have the temptation to bite them just now and regret it as soon as a bitter disgusting taste awakes your senses. Workers and workers in the fields fill countless chests, the product is sold 1.40 Euro per kilo to the factory around. The process has to be completed; olives will stay in brine for some period and finally are ready to be sold for 6-7 euros per kilo in all the market, to become an unfailing ingredient of the famous Greek salad.

But behind this bucolic story there are scientific question to be answered: with irrigation water content above 500 ppb of arsenic on average, and with arsenic in topsoil superior to 200 mg/kg, will these olives be safe? It would be nice to verify!! Where all the arsenic accumulated in the soil is coming from? Can only irrigation practices explain these amounts?

A third short field campaign was conducted in Thessaloniki to collect more soil samples (15 samples), in order to have a better spatial distribution. Soil samples were also collected down olive trees at different distances from the mini sprinkler system in order to assess the irrigation contribution on As accumulation on topsoil (2 trees at each field for 3

distances, in 3 different olive orchards). Around 20 samples of olives were collected and at the moment washed and stored in freezer. I will be very happy to receive any suggestion to how process them, any relevant literature you may know and I am also open to any collaboration. At the moment Andrew Meharg advised me for the first steps to measure total content, I will try to set up the procedure and let you know.

Some limestone rocks present on the irrigated fields were collected and they will be analyzed to quantify their arsenic total content. In the previous campaign some limestone rocks were found to be very rich in arsenic (up to 690 mg/kg). A positive significant correlation exists between As and Ca in analyzed soils, and a possible adsorption/coprecipitation of As on limestone (most probably with calcite) will be further investigated as a significant contribution (most probably due to dissolution processes) to As in soil within the region. The next fieldwork is planned for December to collect some core samples in fields with different cultivations and start the setup for the arsenic removal pilot unit installation (planned before the end of January).

Aquatrain around Europe: a non scientific corner on European culture

1st episode: Snapshots from Chania, Crete, Greece as seen by an Italian
by Barbara Casentini



Fig 1: Crete Location

A short photos trip to Chania, Crete capital city until 1971, now one of the best conserved town in the island with Venetian and Turkish influences perfectly combined in an picturesque old harbour and narrow cobbled paths.



Fig. 2: Flying over Chania old Harbour



Fig. 3 The lighthouse: a windy day in Crete, quite common. Breaking waves on the old lighthouse, initially built by Venetian at the end of XVI century but renewed by Egyptians during their occupation period in 1820-1840.



Fig. 4: Lefka Ori (the white mountains, 2453 m a.s.l.) dominates the old harbour view. It's covered by snow from December to April and offer an amazing contrast between sea and mountain. From the plateau of Omalos on the top you can start the descending trip to Samaria Gorges, the longest canyon in Europe. The 17

km long walk it's seen from Cretan people just something tourists enjoy to do but they did not really get why: unnecessary effort without even a coffee !



Fig. 5 Balos Beach: a caribbean corner in Crete. A small sand strip between mainland and a small island surrounded by sea of iridescent colours. A breathtaking view, worthy a visit at any time of the year... but of course summer it's better. The only negative aspect it's the huge amount of tar deposited on the rocks due to the cleaning of the boats in the nearby open sea.



Fig. 6 Katsika: the goat, symbol of Crete. There is also a protected species called kri-kri. Everywhere you go, the untiring climber goats will be there: on the mountains, on the sea and even along the high way. When they look for the hot asphalt you have to drive carefully because you may

always find one of them lazy sleeping just in the middle of the road. Their meat is the most appreciated in the island, and, sorry for the vegetarians, it's something you can't miss it out.



Fig. 7 Octopus: During winter until May is the "kthapodi" period. In the small docks behind the city center , cosy restaurants hang them out to dry under the sun. They told me is to have them more soft when you cook. In Crete usually meat is more loved then fish, an island of shepherd and farmer more than fisherman, but every restaurant will have fresh fried squids (*kalamari*) and octopus. Usually a complete meal won't cost you more than 15 euros.



Fig. 8 The Greek salad: the most known salad, with fresh ingredients and feta cheese on top. You may have Cretan variations with crunchy bread on the bottom (*dhakos*) and fresh cheese on top called *myzithra*. All the Mediterranean products in one, the long life recipe for Cretan people known to be in the past one of the long-lived population in Europe.



Fig 9 Frapé : If you come to Crete and looking around you will ask yourself what is this big coffee glass everybody drinks in bars, in cars, in the bicycle or just while walking.... well this is the famous *Frapé* (*Φραπέ*). It's a strong dose of Nescafé shakered with ice, advisable only for strong heart people. Here for most of the Greeks it is like water, they drink up to 4 per day, I tried once and it was enough, suddenly my heart start running as crazy. You can have *gliko* (sweet), *metrio* (medium) or *sketo* (no sugar). But this is not the only coffee you can drink, they have quite a big variety from the traditional Greek coffee (the one you wait the powder to deposit before drinking) to the *freddo cappuccino* (a mix of espresso, ice and milk cream). Coffee here is not a drink here, it is everything for the cretan social life. You can go out for coffee at any time, and you will not stay less then 1 hour sit and sip. That's why 1 coffee cost up to 4 euros, and can become more an investment than going out to restaurant



Fig. 10 Mailboxes: Are you looking for a letter? Just check it outside! Mailboxes are usually not inside the building but on a corner of the street. Coloured compositions at any cross, modern or ancient, personalized or anonymous, all together waiting for the next letter to arrive.

Greek in pills

- 1) **Ευχαρίστως πάρα πολύ** (*Efkharisto para poli*): Thanks very much
- 2) **Τίποτα** (*Tipota*): You are welcome (literally nothing)
- 3) **Ένα φραπέ γλυκός με γάλα** (*Ena frapé glikos me gala*): One sweet coffee with milk
- 4) **Συγγνώμη δεν καταλαβαίνω** (*Signomi dhen katalaveno*): Sorry i don't understand
- 5) **Έτσι και έτσι** (*Etsi ke etsi*): So and so
- 6) **Όχι** (*Okhi*): No; **Ναι** (*Ne*): Yes
- 7) **Λίγο νερό παρακαλώ** (*Ligo nerò parakalò*): A bit of water please

- 8) **Γειά σου,τι κάνεις;** (*Ya sou, ti kanis?*): hallo, how are you?
- 9) **Μηδέν** (*Midhen*): 0 **Είκοσι ένα** (*Ikossi ena*): 21 **Εβδομήντα πέντε** (*Evdominda pende*): 75
- 10) **Πότε;** (*Pote?*): When? **Τι;** (*Ti?*): What? **Πού;** (*Pu?*): Where?

Next Newsletter

The next deadline for the newsletter is Monday 2nd February 2009. Please feel free to send in your contributions at any time between now and then!

And Finally...

...AquaTRAIN researchers are encouraged to compete in the "Dance your PhD" contest (or at least check out the website). More information can be found here: <http://gonzolabs.org/dance/>. This includes videos of last year's entries, which are well worth a look! My personal favorite is John Bohannon's dance entitled "The Role of WSS Operon in the Adaptive Evolution of Experimental Populations of *Psuedomonas fluorescens* SBW25." My thanks to Helen Rowland for sending me the link, it provides me with endless amusement!