



RECETOX NEWSLETTER

The RECETOX NEWSLETTER is a quarterly newsletter by the Research Centre for Toxic Compounds in the Environment (RECETOX), Brno, Czech Republic.

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discover,
prove
and apply



RECETOX is an independent REsearch CEntre for TOXic Compounds in the Environment operating within the Faculty of Science, Masaryk University, Brno, Czech Republic. The Centre fulfills three roles: an academic institution providing university education, a research institution working on transformation of research into practical applications, and a body supporting implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) and of sound chemicals management in general, nationally and internationally.

In this issue

- ▶ Summary of the Andromede SoMoPro Project
- ▶ Follow up Birth Cohort Study
- ▶ RECETOX's international success



Editorial

Dear readers,

The past months were spent at full performance - in the classrooms during the spring semester, in laboratories and in the field doing hands-on testing of our hypotheses and analyzing samples, in presentations of our work and results at international conferences, and also in launching new projects and preparing a range of proposals.

Although the coming summer months are a holiday period for many people, RECETOX will not only rest and gather strength for the next academic year. We are finishing several projects now. This newsletter will provide you with a summary of findings of the Andromede project supported by the SoMoPro Programme and with outcomes of the global simultaneous meeting of Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions in relation to chemicals and wastes.

Moreover, we look forward to welcoming participants of the traditional six-day long international summer school in our premises in June, and wish for success on final exams for our students graduating from their bachelor, master and doctoral studies this summer. Last but not least, we will be busy preparing for training courses and seminars taking place in the RECETOX research infrastructure before the start of the next semester.

We wish you pleasant reading and a relaxing summer

Katka Šebková
on behalf of June issue editors

PS - The RECETOX newsletter is also available automatically if registered through www.recetox.muni.cz or newsletter@recetox.muni.cz and it is published in English and Czech. The next issue will be released in October 2015.



Calendar of Events

- ▶ 20–22 April 2015 **XII International Conference Air 2015 (Ovzduší)**, hotel Žebětínský dvůr, Brno, Czech Republic
- ▶ 30 April 2015 **Business Research Forum of Masaryk University, CEITEC**, Brno, Czech Republic
- ▶ 1–5 May 2015 **SETAC**, Barcelona, Spain
- ▶ 4–15 May 2015 **Joint meeting of the Conferences of the Parties to the chemicals and waste conventions (triple COPs)**, Geneva, Switzerland
- ▶ 7–9 May 2015 **Science Fair at the triple COP**, Geneva, Switzerland
- ▶ 15–20 June 2015 **XI International Summer School on Toxic Compounds in the Environment, RECETOX**, Brno, Czech Republic
- ▶ 22–23 June 2015 **International workshop on SAICM and priorities of the health sector by 2020**, ECEH Bonn, Germany
- ▶ 24–25 June 2015 **International workshop on Involvement of the health sector in the implementation of the Minamata Convention on Mercury**, WHO ECEH Bonn, Germany.
- ▶ 23–28 August 2015 **International Conference Dioxin 2015**, Rio de Janeiro, Brazil
- ▶ 27 September–2 October 2015 **4th Meeting of International Conference on Chemicals Management (ICCM4)**, Geneva, Switzerland



Spring 2015 in RECETOX

Conference Air 2015



The 12th Czech-Slovak Conference Air 2015 (Ovzduší 2015 in Czech) was held in hotel Žebětínský dvůr, Brno, Czech Republic from 20–22 April 2015. It was organized by RECETOX (Research Centre for Toxic Compounds in the Environment) research infrastructure in cooperation with the Czech Hydrometeorological Institute and sponsored by Českomoravský cement a.s. – Heidelberg Cement Group, SITA Ltd, and SIAD Czech, Ltd.

This traditional biennial meeting was attended by 106 participants - experts, students and private sector stakeholders from both the Czech Republic and Slovakia who discussed challenges and developments in air protection over the last two years.

Professor Ivan Holoubek opened the conference with a lecture on “Problems of chemical pollution in the environment – myths and reality”. This was followed by sessions on the state of atmospheric pollution in the Czech Republic and Slovakia, new pollutants and their sources, novel methods for identi-



fication of pollutants, monitoring challenges as well as the evaluation of the impact of air pollution on abiotic and biotic components of the environment, health impacts and risk assessment. Furthermore, sampling and analytical methods for determining emissions and content of ambient air as well as relevant legal aspects were also debated.

In addition, a part of the conference was a presentation of the opportunities for cooperation with the RECETOX research infrastructure and its three core facilities – the Trace Analytical Laboratories, the GENASIS environmental database and the ELSPAC epidemiological study. The conference was also complemented by several sessions of poster presentations. All presentations are comprised in the Book of abstracts (ISBN 978-80-210-7829-1). Moreover, a number of lively scientific, technical and other discussions including exchange of experience and knowledge in preparation of new joint projects took place in the margins of the conference. We look forward to seeing you at the next Air conference in 2017.

Scope of Accreditation Broadened

We are very happy to announce that our Trace Analytical Laboratories (TAL) successfully broadened their accreditation in May 2015. The Czech Institute for Accreditation issued a certificate for our laboratories and staff to sample soils, water, sediments, indoor and outdoor ambient air (both high volume and low volume samplers). This accreditation complements the existing one for chemical analyses of food, feeds, biological material and environmental samples (ambient and indoor air, surface waters, sediments and soils) for dibenzodioxins and furans, dioxin-like and indicator polychlorinated biphenyls and polybrominated diphenyl ethers granted to the TAL in April 2014.

We would like to acknowledge the whole team for their success: Petra Příbylová, Anton Kočan, Rostislav Červenka, Roman Prokeš, Jiří Kohoutek, Branislav Vrana and Milan Sánka.





11th Summer School on Toxic Compounds in the Environment 2015

The Stockholm Convention Regional Centre in the Czech Republic (RECETOX), RECETOX Research Infrastructure in cooperation with UNEP, the Ministry of Environment of the Czech Republic and CYNACOST EU action are organizing the 11th International Summer School on Toxic Compounds in the Environment, held on the RECETOX premises in Brno, Czech Republic from 15–20 June 2015. The intensive six day programme will be filled with lectures, laboratory exercises, hands-on training and this year also two site visits and one field trip. The special theme is cyanobacterial blooms in freshwater, organized jointly with the EU COST action CYANOCOST, and this will provide the latest insight into both research and policy developments.

In addition, a parallel class organized in cooperation with the Secretariat of the Stockholm Convention will enhance capacity in support of the Global Monitoring Plan under the Stockholm Convention in many developing countries. Two days of this module will be devoted to enhancing the practical knowledge of participants in relation to sampling of air, water and other media, laboratory analyses related to POPs, data management, use of available tools and risk assessment. We look forward to welcoming the 2015 summer school participants and guest lecturers in Brno soon!



Stockholm Convention
Regional Centre for Capacity Building
and the Transfer of Technology



New Papers Published

A selection of new RECETOX papers published in prestigious peer-reviewed journals from March 2015 onwards:

- Horváth, P., Šebej, P., Šolomek, T., Klán, P., Small-Molecule Fluorophores with Large Stokes Shifts: 9-Iminopyronin Analogues as Clickable Tags. *The Journal of Organic Chemistry* dx.doi.org/10.1021/jo502213t
- Octaviani M., Stemmler I., Lammel G., Graf H.F.: “Atmospheric transport of persistent organic pollutants to and from the Arctic under present-day and future climate”, *Environ. Sci. Technol.* 49 (2015) doi:10.1021/505636g
- Vašíčková J., Váňa M., Komprdová K., Hofman J., 2015: The variability of standard artificial soils: Effects on the survival and reproduction of springtail (*Folsomia candida*) and potworm (*Enchytraeus crypticus*). *Ecotoxicology and Environmental Safety* 114 (2015), 38-43p., DOI:10.1016/j.ecoenv.2015.01.007
- Liskova, V., Bednar, D., Holubeva, T., Prudnikova, T., Rezacova, P., Koudelakova, T., Sebestova, E., Kuta Smatanova, I., Brezovsky, J., Chaloupkova, R., Damborsky, J., 2015: Balancing the Stability-Activity Trade-off by Fine-Tuning Dehalogenase Access Tunnels. *ChemCatChem* 7: 648-659.

RECETOX research infrastructure provides OPEN-ACCESS to Czech and international researchers to work on their projects and use the expertise and instrumentation available in our Centre.

Visit www.recetox.muni.cz/RI for the application procedure.

For more information, please contact
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(ruzickova@recetox.muni.cz).





RECETOX Projects Insight

SoMoPro Project – Andromede

The first newsletter of 2014 contained an article about three new research projects granted to RECETOX in a project call by the South Moravian Programme for Distinguished Researchers (SoMoPro) for projects implemented between 2014 and 2016. That article provided a brief abstract of the each project and mentioned that individual texts will be exploring them in greater detail in the future. As one of the three projects, Andromede, comes to the close in June 2015, we have asked its investigator, our colleague Dr. Luca Nizzetto, to sum up his research and give us more information about the project implementation and results.

Luca told us: “The project ANDROMEDE (Anthropogenic and Natural Drivers of Releases and Occurrence of Mixtures of Endocrine Disruptors in the Environment) aims at further development of a mathematical model based on INCA for the analysis and prediction of mixtures of environmental contaminants in the water environment. Therefore, the project also encompassed a series of case studies aimed at generating so far unavailable real-time data subsequently used for model development, testing, and verification. The case studies selected included both the local/national (the modelling of the Morava River catchment and data collection in both the Morava and Vltava rivers) and the international scenarios (the Ganges River catchment in India). A need to address steep gradients in social, economical and natural conditions justified the involvement of so different environments and social contexts in order to identify and analyze a range of the possible drivers controlling emissions of water contaminants.” Let’s look at the results now.

Results: case studies

The novel tools introduced into the INCA model were successfully tested in a number of environments. A forest catchment was used to predict fate of polychlorinated biphenyls, Ganges River data served to analyze anthropogenic releases of per-fluorinated compounds to water and to study socio-economic descriptors of the landscape, and the Morava River catchment was used to simulate the long term fate of contaminants, in particular of DDT. Ondřej Sánka, RECETOX student at the doctoral level, developed this application in collaboration with Dr. Luca Nizzetto. Modelling tools were designed and used to assess the long term fate of DDT from many decades of past agricultural use, and which still remains in significant quantity in Moravian soils. Agreement with the modeled results is currently being tested on a measured data set gathered in the same area between 2006-2008.

In addition, simulation of fluxes of contaminants and of historical atmospheric deposition trends were tested in cooperation with the group of Professor Gerhard Lammel and staff of the Šumava national park in a small catchment in Šumava.



Dr. Luca Nizzetto

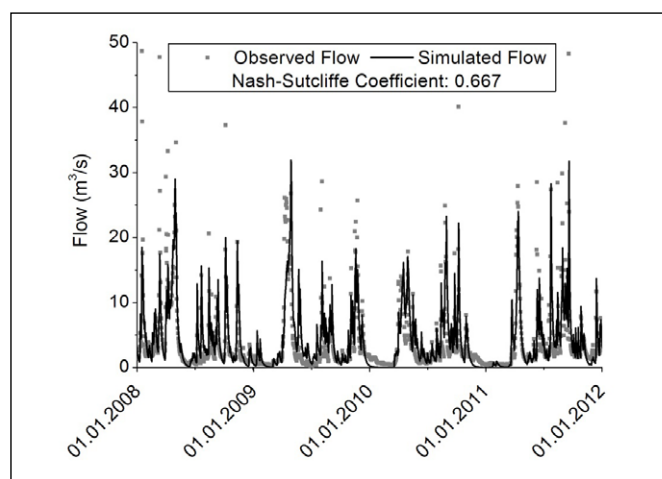


Figure 1: Comparison of INCA-Contaminants modeled river flow (line) with measured discharge data (individual data points)

Last but not least, a sampling campaign coordinated by Jitka Bečanová and Roman Prokeš was carried out, aimed at investigating releases of contaminants of emerging concern (contained in several pharmaceutical and personal care products) to rivers from the two largest Czech cities: Prague and Brno. The rationale for having data from both Brno and Prague was to compare the two cities to assess the impact of tourism on contaminant releases patterns and/or their levels.

The water samples were collected upstream and downstream the point where urban effluents are emitted into the Vltava (Prague) and Svatka (Brno) rivers. As shown in Figures 2 and 3, samples were collected at six locations around Brno for 24 hours. This information is used as input to the model to simulate exposure and fluxes of these emerging pollutants in the river network. The outcome of this case study is more detailed information on the emission pattern of pharmaceutical and personal care product releases for a 24 hour cycle.



Results: New model

The new Integrated Catchment - Contaminant model (INCA Contaminant) is the main output of the project. It is a complex modeling tool that integrates state of the art knowledge and additional models from different scientific disciplines including hydrology, biogeochemistry, landscape analysis and environmental chemistry. The model embodies a series of unique

features, such as highly realistic description of the environment, contaminant fate over time and location, and the possibility of conducting simultaneous predictions for an arbitrary number of contaminants interacting among themselves.

Further, the results show that the new INCA-Contaminant model can be used to simulate water flow, sediment transport, and soil biogeochemistry of virtually any river, at a high level of accuracy and detail as shown in Figure 1. In addition, simulation of the contaminant occurrence in the catchment and in the river delivers daily predictions of concentrations in water, sediment and soil. Moreover, model can also simulate formation of degradation products released to the environment and identify cascade of degradation products and thus assess fate of a mixture of contaminants.

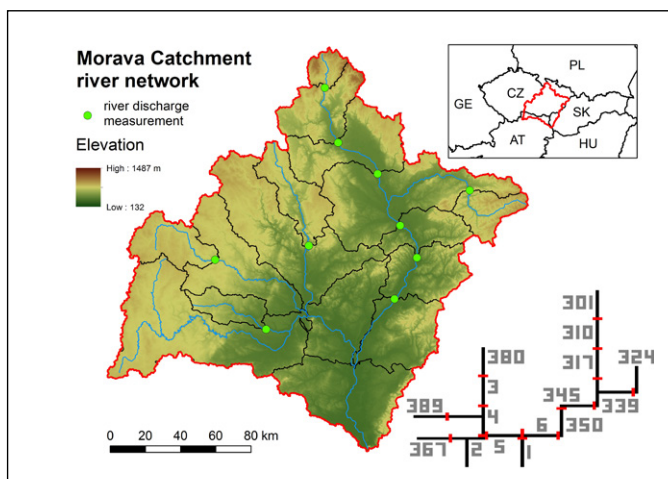


Figure 2: Morava Catchment river network used in the model

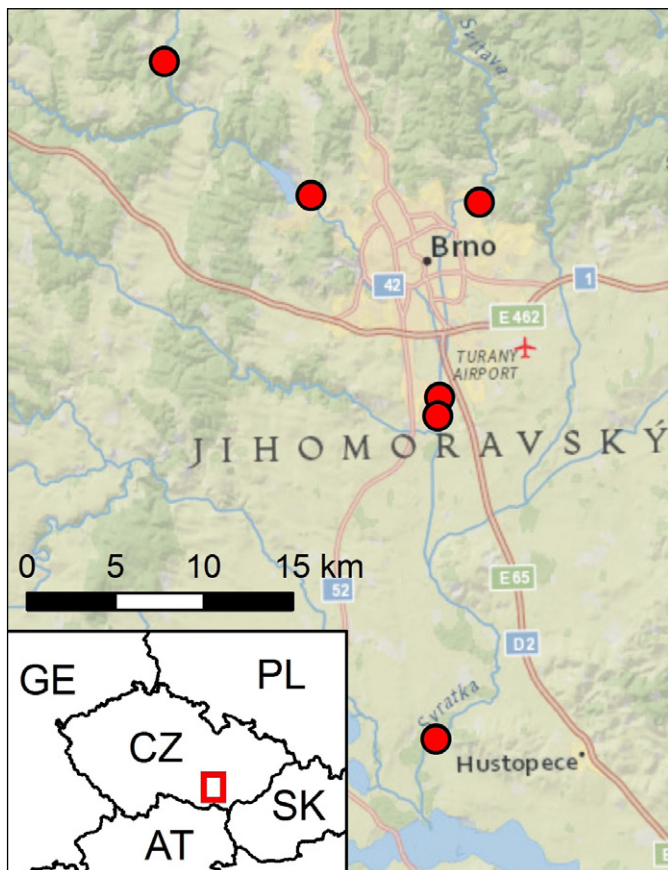


Figure 3a: Sampling sites for 24 hours emission pattern study



Figure 3b: Sampling Svatka river in 24 hours emission pattern study



Conclusions

Now, let's hear from Luca his summary of the project in a few sentences: "In conclusion, the ANDROMEDE project delivers more than it was expected at its beginning. The key result is naturally the new modeling tool INCA Contaminants. In addition, a specific application for the Morava River will be available at RECETOX for future research and scientific consulting service in the year to come. Then, data generated in case studies provide new information on occurrence and release patterns of emerging contaminants from households to the water ecosystem in the Czech Republic and beyond. These concentrations can be regarded as the fingerprint of anthropogenic impact that human society leaves on the water ecosystems from its everyday life in relation to people's health status and lifestyle in

the areas studied. Secondly, the project brought together several teams at RECETOX and prompted cooperation with institutions from the Czech Republic, Sweden, Norway and India that will continue beyond the project. Such cooperation already sprang new ideas. One of them materialized into a successful patent application. Thirdly, results are spread internationally. They were presented at two conferences and three international workshops were organized. Three scientific papers are already evaluated to be published in prestigious peer-reviewed journals and two more are under preparation. Last but not least, there are several people trained in using the tool at RECETOX and further research will continue after the project termination. All I can say I am very proud of such outcomes." And, so are we. Congratulations, Luca!

CELSPAC: TNG Project Launch



Martina Hoferková in the maternity hospital with the first participants of the TNG birth cohort

A new stage of the ELSPAC birth cohort study started in Brno Faculty Hospital on Monday 20 April 2015 as the CELSPAC: TNG (Central European Longitudinal Study of Pregnancy and Childhood: The Next Generation). Recruitment of participants (mother-child pairs) started that day and samples of cord blood and questionnaire-based responses on health, social and demographic indicators will be collected with the consent of the mother and archived in line with the birth cohort study protocol.

The CELSPAC:TNG study is a follow up to the World Health Organization's ELSPAC study undertaken in Brno since 1990; it is a joint research project of RECETOX, Masaryk University and the Brno Faculty Hospital. The aim is to shed more light on factors such as life style, smoking, diet, environment, social status, stress levels and family relations and their influence on the course of pregnancy, birth, health development and further growth of the child. The archived samples will also be stored to allow for maximum scope of analyses in the future by RECETOX or its partners (based on available methods, state-of-the-art knowledge and social and policy demand) in order to evaluate the significance of individual factors and their interaction.

Current health data show that incidence of some neurologic, cardio, metabolic, immune and oncological diseases and fertility disorders are increasing in the population. While a number of the disorders and diseases are related to aging of the population, many also affect children and young people. Diseases with unclear etiology can be caused by a range of simultaneous internal and external factors (including the environment), however we do not possess enough information to identify and analyze all interactions and factors yet.

We will keep you updated on our research findings and further stages in the course of the CELSPAC:TNG study. At present, we are launching analyses of microRNA (miRNA) that are involved in post-transcription regulation of gene expression and may potentially be biomarkers of certain disorders related to pregnancy and disability of the fetus.

Finally, we would like hereby acknowledge support of all involved in the TNG study - participating families, doctors and medical professionals of the Brno Faculty Hospital.

CELSPAC: TNG team: Lenka Andrýšková, Pavel Piler, Vít Kandrnl and Martina Hoferková



RECETOX Abroad

RECETOX's Success in the Stockholm Convention Conference

The third simultaneous meetings of the three conferences of the Parties to the three conventions (twelfth meeting of the Conference of the Parties to the Basel Convention (BC COP-12), the seventh meeting of the Conference of the Parties to the Rotterdam Convention (RC COP-7), and the seventh meeting of the Conference of the Parties to the Stockholm Convention (SC COP-7)) were held back-to-back in the International Conference Centre (CICG) in Geneva from 4 to 15 May 2015. The main topic of the conference was application of research into policy in the implementation of the three conventions and chemicals management in general - From Science to Action for a Safer Tomorrow.

Seventeen hundred delegates from 180 countries met for 13 days to consider proposals to list eight chemicals in the Stockholm or Rotterdam Conventions, foster mutual cooperation among the conventions, and to push for progress in implementation of chemicals management to improve health and environmental protection from hazardous chemicals.

RECETOX took part in the meeting in its capacity as the Stockholm Convention Regional Centre. We participated in the meetings of the Central and Eastern European region (CEE), EU coordinations and in the Science Fair. We also presented our long-term monitoring activities, novel tools for environmental data management and use, capacity building activities in developing countries and countries with economies in transition, and results of projects for monitoring, laboratory analyses and other capacities needed for implementation of the Stockholm Convention and chemicals management in general on a dedicated stand (4-6 May 2015) and in the frames of the Global Monitoring Plan (7-15 May 2015). We have also discussed further cooperation and preparation of projects related to sampling and monitoring of toxic chemicals with a number of European, African and Asian countries.

The conferences reviewed performance of all 23 Basel and Stockholm Convention Regional Centres worldwide and we are proud to announce that we reached the top spot and our mandate was prolonged by additional four years.

In addition, RECETOX co-organized a side event with the United Nations Environment Programme (UNEP) on 6 May 2015 and presented the electronic tool for the Global Monitoring Plan of the Stockholm Convention (GMP) - a global portal for visualization of POPs levels globally www.pops-gmp.org containing validated data for ambient air, human breast milk and water. This tool was made on demand by the RECETOX research infrastructure to serve all Parties to the Stockholm Convention in visualizing, using and presenting their information from monitoring activities, and to serve as a tool for the effectiveness evaluation of the Stockholm Convention in relation to measures eliminating POP releases to the environment.

Moreover, our side event attended by more than 100 people applauded the first screening of the video made by RECETOX explaining procedures and challenges of passive sampling of POPs in ambient air.

Last but not least, we are also happy to announce that appreciation of the expertise available in RECETOX materialized in the nomination and endorsement of Professor Ivan Holoubek as one of the members of effectiveness evaluation committee on behalf of the Central and Eastern European region.

More information on the outcomes of the joint meetings is available on the UNEP website of the three conventions.





RECETOX News

Summary of 2014

A summary of our work, research, activities and achievements in 2014 in English and Czech is available in the yearly report released in April 2015. The document is available online from the RECETOX website. Please check the Information Materials section of the website www.recetox.muni.cz.

Awards

On 6 May 2015 at the Dies Academics ceremony, Dr. Mikuláš Bek, Rector of the Masaryk University, acknowledged work successes of 18 best students, researchers, and of one team of Masaryk University.

We are proudly announcing that professor Jiří Damborský, head of the Protein Engineering Research Programme at RECETOX received yet another award (in addition to J. G. Mendel Prize granted to him and his team for outstanding results with international significance in 2014). This year, the award recognizes his long term outstanding research outcomes. Congratulations!

Short Announcements

We are happy to announce the birth of children in families of our young staff between April 2014 and early June 2015. Congratulations to Blanka Maňáková on the birth of her son Rastislav, to Anita Erséková and Filip Vaculovič on the birth of their son Oliver, and to Kateřina Nováková on the birth of her second child, daughter Lea.

Business Research Forum

Jakub Hofman, Milan Sářka and Barbora Feixová presented research, projects, case studies and activities of the RECETOX in the event organized by the Centre for Technology Transfer, Masaryk University to bring closer researchers and business – both private and public sector stakeholders. The Forum was held at CEITEC premises in Brno Bohunice Campus on 30 April 2015 with the aim to foster cooperation between academia and business in the Brno region and nationally.



Business Research Forum



Barbora Feixová and Jakub Hofman represent RECETOX at the Forum

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