Aug 2009

NoMiracle Newsletter No. 15

NOvel Methods for Integrated Risk Assessment of CumuLative stressors in Europe

Mark your calendar for the conference:

PHIME & NoMiracle Conference

Multiple Stressors – Novel Methods for Integrated Risk Assessment

Aarhus, Denmark
28-30 September 2009

Online registration:
http://www.kongreskompagniet.dk/multiplestressors

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   NoMiracle Conference
   Novel Methods for Integrated Risk Assessment of Cumulative Stressors,
   Aarhus, 28-30 September 2009
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3. NoMiracle Courses
   27 September 2009
   Ferskvandscentret, Silkeborg

10. NoMiracle co-ordination

Effects of environmental contaminants on organism's tolerance of climatic stress

Anne-Mette Bindesbøl
www.dmu.dk/Pub/PHD_AMB.pdf

In her NoMiracle funded Ph. D. thesis, Anne-Mette Bindesbøl recently put forward the hypothesis that the cold tolerance of earthworms living in cold regions may be reduced by heavy metals contaminating the soil harbouring such species. Eco-physiological studies have shown that low temperature tolerance of an earthworm depends on biochemical modifications of the cell membrane during autumn, which enable cell functionality at low temperature. Bindesbøl and co-workers observed that worms cultured in soil contaminated with ecologically realistic concentrations of copper were much less cold tolerant than worms from uncontaminated soil. In a paper published in the latest issue of Environmental Science & Technology, Bindesbøl shows that this reduced cold tolerance is likely caused by detrimental modifications of the membrane chemistry due to copper's effect on lipid peroxidation. This study is one of the first to provide a mechanistic explanation of such commonly observed interactions between effects of chemicals and natural stressors.

Further reading:

Bindesbøl A-M, Bayley M, Damgaard C, Hedlund K, Holmstrup M, (2009) Changes in membrane phospholipids as a mechanistic explanation for decreased freeze tolerance in earthworms exposed to sub-lethal copper concentrations. Environmental Science and Technology 43: 5495-5500.

NoMiracle courses

Sunday 27 September 2009
Ferskvandscentret Silkeborg

Course 1. **Ecological risk assessment: the concepts of sensitivity and vulnerability**

Course 2. **Mixture toxicity within a DEB context – Experimental design and Data analysis**

Course 3. **Separation of uncertainty and variability in risk assessment**

Course 4. **Uncertainty bottlenecks in risk assessment**

In 2009, NoMiracle offers 4 courses demonstrating methods and tools for risk assessment of cumulative stressors developed during the NoMiracle project. The courses will be held at the Ferskvandscentret in Silkeborg, Denmark, Sunday September 27, 2009.

Courses are planned so that participants of the open workshop "Multiple Stressors – Novel Methods for Integrated Risk Assessment" held in Aarhus, Denmark September 28-30, 2009, are able to participate. For more information on the conference. See www.dmu.dk/Nyheder/Kalender/NoMiracle

Course 1.

Ecological risk assessment: the concepts of sensitivity and vulnerability

Teacher: **Jack Faber**, jack.faber@wur.nl
Teacher: **Marieke de Lange**, marieke.delange@wur.nl
Time: Sunday 27 September 2009, **10.00 – 12.00**
Price Cource 1: **65** € (including breakfast and lunch)
Price Cource 1+2: **75** € (including breakfast, lunch and refreshments)

General

Current site-specific ecological risk assessment (ss-ERA) is focused on the prediction and assessment of potential or actual effects arising from environmental contamination. The assessment of risk is approached from the contaminant side, addressing environmental fate, toxicokinetics, etc. from a toxicant's angle. A complementary approach may also be followed, however, to assess the vulnerability of ecological receptors for contaminants and other stressors. Such an approach would be an innovative addition to ss-ERA. At present, methods for vulnerability assessment are scarce and limited to specific groups of organisms. Wider development of such methods is needed to complement ss-ERA, as well as to prepare for demands set by European environmental policy, such as the Water Framework Directive or the Soil Strategy, that require the recognition of vulnerable soils and water bodies for protection purposes. In this presentation, a new method, developed at Alterra, is presented which can be used for ecological vulnerability analysis in wildlife. This method is based on life-history traits, feeding biology, physiology, dispersal and other characteristics of specific vertebrate and invertebrate species from aquatic or terrestrial habitats. The method also extends to an assessment of food chains and ecotopes, and is differentiated for a number of chemicals. The application of this method in ss-ERA will be exemplified, as well as the use in risk mapping.

Course objectives

To present a discourse on ecological vulnerability assessment. Attendants will gain understanding of field relevant risk assessment for ecological receptors. This type of knowledge is helpful in recognizing wild species at risk, which species to monitor, compare urgencies for nature protection targets, etc.

Course content

- ecological risk assessment: sensitivity & vulnerability
- ecological vulnerability comparisons between species, food chains and habitats
- application in ssERA
- vulnerability mapping

Teaching methods

Powerpoint presentation, discussion.

References

De Lange H.J., J.J.C. Van der Pol, J. Lahr, & J.H. Faber (2007) Ecological vulnerability in wildlife; A conceptual approach to assess impact of environmental stressors, Alterra-rapport 1305, 112 pp

De Lange H.J., J.J.C. Van der Pol & J.H. Faber (2008) Ecological vulnerability analysis of food chains and ecotopes. Alterra-rapport 1565, 88 pp.

De Lange, H.J., J. Lahr, J.J.C. Van der Pol, Y. Wessels & J.H. Faber (in press) Ecological vulnerability in wildlife. An expert judgment and multi-criteria analysis tool using ecological traits to assess relative impact of pollutants. Environmental Toxicology and Chemistry. http://www.setacjournals.org/archive/1552-8618/preprint/2009/pdf/10.1897_08-626.1.pdf

Course 2.

Mixture toxicity within a DEB context – Experimental design and Data analysis

Teacher: **Jan Baas,** jan.baas@falw.vu.n
Time: Sunday 27 September 2009, **14.00 – 17.00**
Price Cource 2: **60** € (including lunch and refreshments)
Price Cource 1+2: **75** € (including breakfast, lunch and refreshments)

General

This course teaches the basic concepts of how toxic effects build up over time and build this to an understanding of the processes behind observed effect patterns. You will learn basic concepts of how the physiology of organisms is affected by toxicants, how to interpret data, limitations of the current methods and what experimental design issues are important to consider before starting your experiments.

Course objectives

After taking this course you are expected to:

- get a better understanding of how effects build up in time,
- interpret different effect patterns,
- understand the limitations of traditional methods,
- critically evaluate existing data sets and design experiments.

Course content

- Uptake and elimination kinetics
- Basic concepts of the survival model
- Modeling survival for single compounds and for mixtures
- Basic concepts of the framework for the interpretation of growth and reproduction data
- Comparison of process-based approaches with the CA/IA apporaches
- Experimental design: How to ensure the experiments can address your question?

Teaching methods

The course will comprise interactive lectures.

References

Nisbet, R.M., Muller, E.B., Lika, K. and Kooijman, S.A.L.M. (2000) From molecules to ecosystems through dynamic energy budget models. J. Anim. Ecol. 69: 913 - 926

Baas J., B.P.P. Van Houte, C.A.M. Van Gestel and S.A.L.M. Kooijman (2007) Modeling The Effects Of Binary Mixtures On Survival In Time, Environ. Toxicol. Chem. 26: 1320–1327

Course 3.

Separation of uncertainty and variability in risk assessment

Teacher: **Ad Ragas**, A.Ragas@science.ru.nl
Time: Sunday 27 September 2009, **10.00 – 17.00**
Price Cource 3: **75** € (including breakfast, lunch and refreshments)

General

In risk assessment, mathematical models are often used to estimate exposure and risk. The outcome of these models can vary due to uncertainty and variability. Uncertainty is the analyst's lack of knowledge (or level of ignorance) about the system. Variability represents random or stochastic heterogeneity in the system, e.g. within a population (inter-individual variability), an area (spatial variability) or time frame (temporal variability). It is important that variability and uncertainty are separated and propagated independently through a model. Variability determines the size of the risk, whereas uncertainty determines the reliability of the model predictions. Knowing variability can aid in the identification of risk reduction measures, whereas knowing uncertainty can aid in programming additional research to reduce risk.

Course objectives

At the end of this course you will be able to:

- distinguish between variability and uncertainty in risk assessment studies;
- quantify the influence of inter-individual variability and uncertainty in human exposure calculations using (nested) Monte Carlo simulation;
- indicate the implications of uncertainty and variability in various risk assessment studies, e.g. derivation of the ADI, the NOECeco and exposure assessment..

Course content

- An introduction on different types of uncertainty and variability in risk assessment
- A case study on separation of uncertainty and inter-individual variability in human exposure assessment. This case study will include:
  - introduction into a simple human exposure model;
  - separation of uncertainty and inter-individual variability;
  - interpretation of the results;
- Examples of other studies on the separation of uncertainty and variability, i.e. in derivation of ADIs and the NOECeco.

Teaching methods

The course consists of lectures in combination with a computer assignment.

References

Ragas, A.M.J., Brouwer, F.P.E., Büchner, F.L., Hendriks, H.W.M., Huijbregts, M.A.J., 2009. Separation of uncertainty and interindividual variability in human exposure modeling. Journal of Exposure Analysis and Environmental Epidemiology 19(2): 201-212.

Ragas, A.M.J., Huijbregts, M.A.J., Henning-de Jong, I., Leuven, R.S.E.W. 2009. Uncertainty in Environmental Risk Assessment: Implications for Risk-Based Management of River Basins. Integrated Environmental Assessment and Management 5(1): 27-37.

Course 4.

Uncertainty bottlenecks in risk assessment

Teacher: **Peter Borgen Sørensen,** pbs@dmu.dk
Time: Sunday 27 September 2009, **10.00 – 17.00**
Price Cource 4: **75** € (including breakfast, lunch and refreshments)

General

Uncertainty assessment of risk level predictions is important for application in decision making. This is conventionally done using different mathematical techniques that estimate the uncertainty of the risk prediction only as a result of value uncertainty for the input parameters applied in the predicting equations. However, the uncertainty that matters is the total uncertainty that can lead to wrong conclusions about the risk level prediction, and this includes much more than just the uncertainty due to input parameters. This course will display a much more complete evaluation method for assessing the uncertainty in the risk assessment illustrated by examples for Nomiracle.

Course objectives

- To implement guidelines to assess the total uncertainty related to risk level predictions
- To raise awareness about all critical aspects that govern the uncertainty of the risk assessment.

Course content

The course will consist of four parts:

1. Defining the uncertainty paradigm used in the course and relating it to specific references for general uncertainty assessment methods
2. Setting up a stepwise and systematic uncertainty evaluation approach that relates the need for risk level predictions to the total uncertainty of those predictions
3. Application of the uncertainty evaluation approach on a case study. Specific risk prediction problems will be analysed in order to illustrate the systematic approach.
4. Reviews of actual risk prediction problems that the course participants are working with. Specific risk prediction problems that the participants are working with can be evaluated using the systematic approach as a part of the exercise.

Teaching methods

The teaching methods uses lectures that integrate the specific problems of uncertainty that the participants are dealing with. This is done both during the lectures and by exercises.

References

Sørensen, P. B., R. Brüggemann, M. Thomsen, S. Gyldenkærne, 2009, How to Giude and Assess Risk Reduction using Risk Characterization Indicators, American Journal of Applied Sciences, Vol. 6, No. 6, pp 1255-1263, (open access: http://www.scipub.org/fulltext/ajas/ajas661255-1263.pdf)

Walker W.E., P. Harremoes, J. Rotmans, J.P.Van Der Sluijs, M. B. A. Van Asselt, P. Janssen and M. P. Krayer Von Krauss, 2003, Defining Uncertainty, A Conceptual Basis for Uncertainty Management in Model-Based Decision Support, Integrated Assessment, Vol. 4, No. 1, pp. 5-17.

Registration

By e-mail to NoMiracle: nomiracle@dmu.dk
cc. Morten Strandberg: mts@dmu.dk
BEFORE SEPTEMBER 1, 2009

Please indicate:
Name
Course No & Price (€)
Accomodation at Ferskvandscentret & Price (€)
Total price (€)

Fee should be paid directly to the Ferskvandscentret at arrival

Address and contact information

Ferskvandscentret
Vejlsøvej 51,
DK-8600 Silkeborg
Denmark
E-mail: fvc@fvc.dk
www.ferskvandscentret.dk
Phone: +45 8921 2121

Accomodation at Ferskvandscentret, single room 65 €

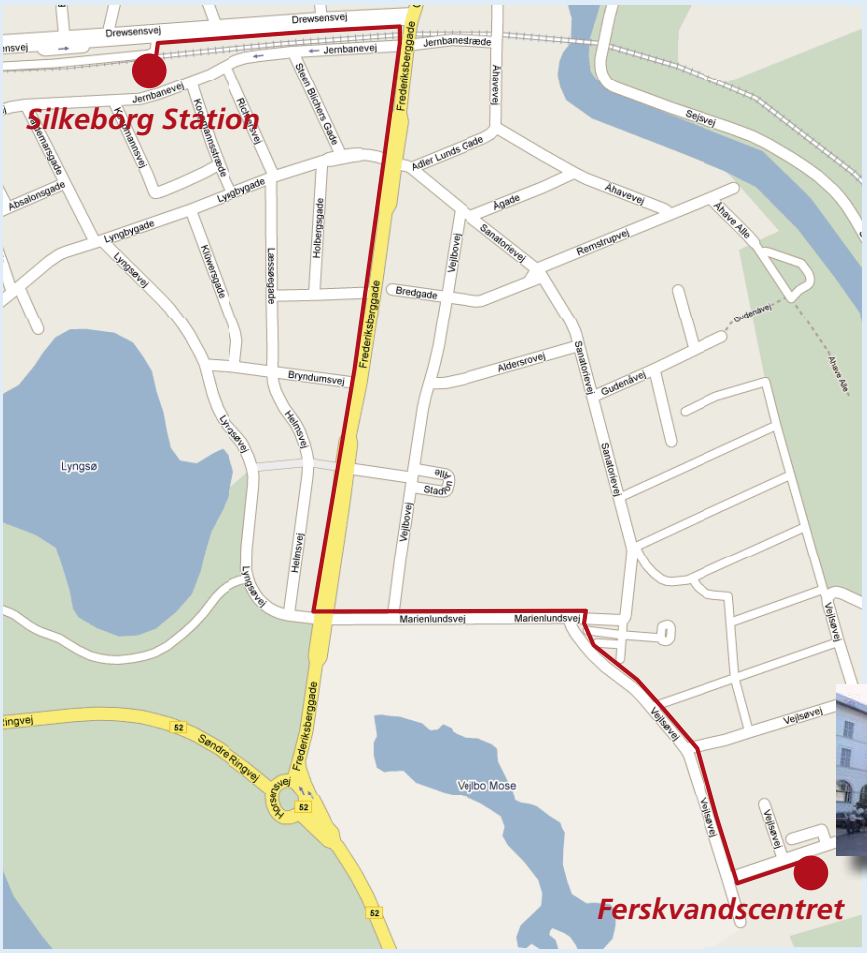
How to get to Ferskvandscentret

From Billund Airport
By taxi from Billund Airport to Silkeborg Ferskvandcentret– approximately one hour

Other transportation, please check:
www.billund-airport.dk/rejseinfo/til_og_fra_lufthavnen.aspx

From Aarhus Main Station -> Silkeborg Station
The local train departs from Aarhus Main Station once or twice per hour
(direction "Herning or Skjern").

From Silkeborg Station it takes 5 min. to reach Ferskvandscentret by taxi or 15-20 minutes if you walk.



Overveiw of the NoMiracle course area, 27 September 2009

NoMiracle co-ordination

Visit NoMiracle and subscribe to the Newsletter at: http://nomiracle.jrc.it

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The integrated project NoMiracle is funded by the European Commissions Sixth Framework Programme.

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Dr. Georges Deschamps

The NoMiracle Newsletter is published by National Environmental Research Institute, Aarhus University
ISSN: 1902-6226