

COordination and iMplementation of a pan European instrumenT for Radioecology

Welcome to the 5th COMET project newsletter

The <u>COMET</u> Final Event, will, be held on the 25th—27th April in Bruges, Belgium. For further details see the <u>COMET Final event webpage</u>. Registration will be closed on 31 March 2017.

Ukrainian workshop: Thirty years after the Chernobyl accident what do we know about the effects of radiation on the environment?

The year 2016 was the 30th anniversary of the world's worst nuclear accident at the Chernobyl nuclear power plant (Ukraine). To mark this anniversary, a workshop was held in Chernihiv (Ukraine) to discuss what we have learnt from studies of the effects of radiation on the environment (i.e. wildlife) in the Chernobyl Exclusion Zone (CEZ), and what questions remain. Consideration was also given to wildlife effect studies conducted in the Fukushima area of Japan following the 2011 releases from the Fukushima Daiichi Nuclear Power Plant.

The topic of the workshop was selected because of the lack of consensus on the impacts of radiation on wildlife in the CEZ. There are a comparatively



large number of publications which report to have observed detrimental effects of radiation on wildlife at comparatively low dose rates. A similar debate is beginning to evolve with respect to observations made within the vicinity of Fukushima. Workshop participants included: radioecologists (including a good representation of scientists from Ukraine and Belarus), regulators, representatives of the nuclear industry, an NGO, a chemical toxicologist and representatives of the media*. The workshop report, including recommendations, is available from the Radioecology Exchange [CLICK HERE] as are most of the presentations [CLICK HERE]. A special issue of Journal of



<u>Environmental Radioactivity</u> is currently being prepared

containing papers relevant to the workshop. Following the workshop participants went on a field trip to the Chernobyl Exclusion Zone. COMET would like to take the opportunity to thank all participants for their open contributions to the workshop and discussion. *Media representatives attending the workshop have published an article in the December 2016 issue of BBC Wildlife with articles anticipated in BBC Earth and Outdoor Photographer in spring 2017. Words and pictures provided by Nick Beresford,

NERC-CEH (Lancaster), UK.

Left photo— COMET workshop attendees

Right photo— Photograph from a wildlife trap camera visited by COMET group in the Chernobyl Exclusion Zone

www.comet-radioecology.org & www.radioecology-exchange.org COMET co-ordinator: Hildegarde Vandenhove

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II International Conference on Radioecological Concentration Process (50 years later)

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From 6th to 9th of November 2016, in Centro Nacional de Aceleradores (Seville, Spain), the II International Conference on Radioecological **Concentration Processes was** held-organised by the Universities of Seville (Spain) and Gothenburg (Sweden). This conference was the second in a series first held in 1966, in response to the anthropogenic injection of artificial radionuclides associated with atmospheric nuclear tests. Fifty years later, the main objectives of the conference were to understand the status of radioecology as a scientific subject and to evaluate its role in the 21st century. Participants from 35 different countries presented more than 160 communications during six sessions. A total of 6 invited lectures, 40 oral and 120 poster presentations were included in the conference program which can downloaded from the web site (http://congreso.us.es/ radecolconp2016/).



In addition to sessions devoted to terrestrial, aquatic and marine radioecology, the conference highlighted emerging topics such as NORM, (naturally occurring radioactive material) hot particles, the role of new radionuclides and new analytical tools in radioecological studies, etc. The conference also highlighted the role of modelling in advancing radioecology through increasing interaction between experimentalists and modellers. Young researchers played an important role in the conference giving oral presentations on a diverse range of subjects, suggesting that the future of radioecology is assured. Two delegates at the conference participated in the first conference, 50 years ago: Prof R. Alexakhin (Russia) and Prof. Persson (Sweden) who conveyed their experience to the younger generation. COMET participation at the conference included two invited lectures by Prof. Brenda



Howard and Prof. Brit Salbu, 10 oral presentations and a number of posters by participants from SCK-CEN, CEH, NRPA, NMBU, IRSN,ANSTO, ETH, Fukushima University and Seville University. In addition, COMET acted as a collaborative entity for the conference by sponsoring two prizes: to the best oral communication and the best poster presentation from young researchers.

A book of extended abstracts of oral and poster presentations will be compiled and distributed to all participants after editing by the University of Seville. Additionally a special edition of Journal of Environmental Radioactivity devoted to the conference will be published in the future.

Words and pictures by Rafael Garcia-Tenorio (University of Seville, Chairman of the Conference)



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Summary of COMET-RATE project 2016

A summary of work carried out in 2016:

Individual radioactive particles from: former weapon test sites (Semipalatinsk, Nevada, Maralinga, etc.), the Chernobyl accident; The inadvertent destruction of nuclear bombs (Palomares and Thule) and environments of reprocessing plants (Dounreay) were compiled and characterised in a database. In addition NORM isolated particles from highly radioactive areas (alum shale, thorium rich areas) and from industrial processes (phosphate industry) were analysed. Abiotic leaching experiments (using rainwater and 0.16 M HCl as leaching agents) and biotic experiments (using rumen fluid as an extractant) were performed on selected particles and bulk soils from the site where analysed particles were isolated including particles from Semipalatinsk, Nevada, Palomares, Thule and

Maralinga, together with NORM isolated particles from the thorium rich area of Fen in Norway.

Studies on the phenomenon of radioactive particle uptake/ retention in free-living biota for estimation of the probability and magnitude of exposure through such retention were carried out. The possible uptake or adsorption of radioactive particles in soil dwelling organisms collected in the field (snails, earthworms, rabbits, mice), as well as filtering organisms (mussels) at contaminated sites was investigated using different and advanced radioanalytical and micro-analytical techniques. The internal distribution of plutonium (Pu) in snails (associated with Palomares) showed as tendency to be accumulated in the digestive system and has showed highly variable concentration ratios (variations of four orders of

magnitude) due to the variability of the Pu contamination in the area.

COMET-RATE presented at the Radiation Protection Week in Oxford (September) and four oral presentations at the II International Radioecological **Concentration Processes** (November). Two of these will be the basis of scientific papers published in Journal of Environmental Radioactivity in a special issue devoted to the conference, and a third one will be the basis for the position paper associated to particles that is under construction with inputs from the RATE partners and members of the IRA-COMET hot-particles group and with the coordination of Prof. Salbu.

Words and pictures provided by Rafael Garcia-Tenorio, (University of Seville)



Scanning electron microscope image of a particle isolated from the terrestrial contaminated area of Thule (Greenland)



Autoradiography of contaminated soil collected at Montebello test site (Australia), where the presence of elevated hot particles can be observed



Laboratory experiment where snails were fed a mixture of organic material and contaminated soils from Palomares to evaluate uptake and retention of hot particles

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Field course on Chernobyl fallout in the environment

One of the objectives of the COMET project is to maintain European capacity and skills in radioecology. The field training courses play an important role here, as they are an opportunity for trainees to take part in measurement campaigns and gather experience in developing sampling strategies and application of different measurement techniques. The training course in Ukraine was held in September 2016 at one of the two radioecological observatory sites. It was focused on most aspects of environmental radiation impact and risks associated with the contamination from the Chernobyl accident in 1986. A lot of attention was given to the key processes, which control the



Participants in the "Red forest" ready for fieldwork

behaviour of radionuclides in different ecosystems. These include basic concepts, variables, parameters and kinetics needed for modelling purposes.

Four intensive days of lectures and exercises covered the whole process of impact assessment, starting with sampling strategies and protocol preparation, sampling campaign, sample pre-treatment and preparation, hot particles and the use of state-of-the-art measurement techniques. Special attention was paid to the problems caused by the uneven distribution of radionuclides in the environment due to the fallout of highly radioactive particles. Application of appropriate methods is important for



Laboratory exercise

assessing the radiation impact and risk, especially in the case of the complex mixture of radionuclides from the Chernobyl accident. Therefore, course included a variety of laboratory training on radiochemistry, gamma, alpha, beta and liquid scintillation spectrometry, sequential extractions, autoradiography, fish sampling and dissection. For further information see the final report and Presentations

Lindis Skipperud (words) & Valery Kasporov (pictures)

Web pages:

<u>NMBU</u> and <u>NuBIP</u> (in Ukrainian use Google translate)



All participants and lecturers in front of Chernobyl reactor 4

Forthcoming Events (2017)

- Radiological Protection of the Environment training course, CEH Lancaster, UK. 15 17 March
- Low Level Exposure to Radiation on Ecosystems , Athens, Greece 22 25 May
- 4th International conference on Radioecology & Environmental Radioactivity, Berlin, Germany. 3 — 8 September
- **EU NORM Symposium**, NPL, London, UK. 2 5 October
- Joint 4th International Symposium on the System of Radiological Protection and 2nd European Radiological Protection Research Week, Paris, France. 10 — 12 October

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