



## ISET-R Plenary Conference

@Laboratory of Advanced Research A in University of Tsukuba  
March 11-12, 2016

Five years have passed since FDNPP, the Fukushima Dai-ichi Nuclear Power Plant accident. 4th ISET-R Plenary Conference was held on 11-12 March 2016. Ninety-four participants participated this conference and active discussion have conducted .

On the first day, the head investigator, Prof. Yuichi Onda made an explanation on the objective and future plans of the Plenary Conference, followed by presentations on recent progress on their reserach from the principal investigators of each research group. Discussions were held in each four research group (B01 : chemical status, B02 : forest, B03 : terrestrial environment to rivers, B04 : calculation of radiation exposure). After the discussion, convivial gathering was held.

On the second day, discussions were held on how to complete the final report and what to do in the final year for the project. Four sectional research groups are the projects dealing with four cross-sectoral themes which are expected to create a new research in Grant-in-Aid for Scientific Research on Innovative Areas. Coordination committee focuses on those projects aiming to strengthen the collaboration between them, by supporting holding a work shop and so forth.

All the public offering researches belong to one of four projects, aiming to consolidate a collaborative research and to create a new research. The notable point of B04 is that this group collects all the research results of environmental transfer of radionuclides and carries out an evaluation of radiation exposure in a specific area to make a feed back to the residents and ecosystem.

### B01

Estimation of deposition process of radionuclides based on the investigation, analysis and clarification of chemical status at the time of release and impact assessment of transfer [A01, A03, A04]

### B02

Clarification of circulation process of radionuclides in forest environment and modeling of the process [A01, A03, A04]

### B03

Clarification of transfer process of radionuclides from terrestrial environment to marine environment through river network [A02, A03, A04]

### B04

Calculation of locational radiation exposure based on radionuclide behavior and transfer in the environment [A01, A02, A03, A04]

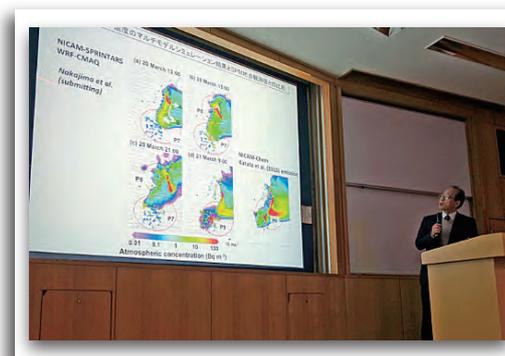
## Presentation on recent developments of research by principle investigators of each research group

### Group A01-1

#### Teruyuki NAKAJIMA , Japan Aerospace Exploration Agency

“Understanding the atmospheric transport modeling and transfer process of fallout radionuclides”

Collaborative research with A01-2(Land atmosphere) for grasping composition and form through sampling and observing the concentration in the atmosphere, and another joint work with coordination committee, A04-7(Chemical forms) and A04-8(Development of measurement Technology) have led to a further understanding of wet and dry deposition flux, time change of density in atmosphere and its variation factor. We would like to associate with A02-3(Ocean) and A02-4(Marine economics) for the study of deposition in the ocean and influence on life, and with A03-5(Migration process at land) and A03-6(Terrestrial ecology) for the study of deposition in land and migration to soil and ground water.



### Group A01-2

#### Yasuhito IGARASHI, Meteorological Research Institute

“Understanding atmospheric deposition, dispersion process, and land interaction of radionuclides”

Such research results have been improving as 1) systematic collection and radioactivity analysis of air sample 2) elucidation of primary release 3) elucidation of secondary release 4) accuracy improvement of atmospheric model and modeling re-entrainment process.

Cooperation with A01-1, 02-3, 03-5, 03-6, 04-7 and 04-8 is reflected on a model calculation. And we held projects for fostering young researchers “collection method and electron microprobe analysis of air sample using high volume sampler” and “writing thesis training” , and the latter one received favorable reviews.



### Group A02-3

#### Masatoshi YAMADA, Hirosaki University

“Understanding the distribution status of radionuclides in sea and seafloor sediment”

So far, efforts have been put on grasping the dispersion of radionuclides in the sea and seafloor sediments. We’ re aiming at gathering a wide range of data and elucidating the circulation process in the sea.

Clarification of the vertical transport process of radionuclides to the seafloor sediment, and the released amount of radionuclides other than  $^{134}\text{Cs}$  and  $^{137}\text{Cs}$  such as  $^{90}\text{Sr}$ ,  $^{129}\text{I}$ ,  $^{239+240}\text{Pu}$  are also required.



## Group A02-4

### Jota KANDA, Tokyo University of Marine Science and Technology

“Understanding the migration and concentration of radioactive materials in marine ecosystems”

Tokyo University of Marine Science and Technology has been analyzing spatio-temporal distribution of radioactivity concentration in the seawater, seafloor sediments, plankton, and benthos since July 2011 in collaboration with Fukushima Prefectural Fisheries Experiment Station, Fukushima University Institute of Environmental Radioactivity, and National Institute for Quantum and Radiological Science and Technology. This year, a research was conducted boarding a research training vessel, Oshoro-maru, collaborating with Hokkaido University. High-dose particles were found in the plankton samples with high concentration of  $^{137}\text{Cs}$  and settling particles. Therefore, we’re studying on reasons why  $^{137}\text{Cs}$  concentrations greatly differ from study to study, from samples to samples. New themes were raised as to possibility of transfer of high-dose radiocesium particles to creatures, origin of high-dose particles, and transfer process to oceans.



## Group A03-5

### Yuichi ONDA, University of Tsukubae

“Understanding the migration process of radionuclides associated with water and sediment”

As a result of monitoring transfer of radionuclides in forest catchments and rivers including Abukuma River and Nitta River, together with modeling of such observations, we found that the land use has influence on radionuclide transfer. In verifying such models, estimation based on each observation site is required to clarify how radionuclides flow down the river, accumulate, and reach the marine area.

As to cesium flux from rivers to oceans, it is crucial to estimate cesium transfer flux and its timing and to identify a proper timing to grasp the cesium transfer. We also need to keep working on a task about how we should integrate a radiocesium concentration into a flux from many rivers including Niida River.

We are working on a study of cesium flux to the ocean and calculation of its timing (collaboration with A03, A04 and A07), measurement of the ecosystem in the Cs deposited areas in the moderate level (collaboration with A06), influence evaluation including on decontamination effect, and understanding the whole image of cesium flux (collaboration with A02, A06 and IRSN).

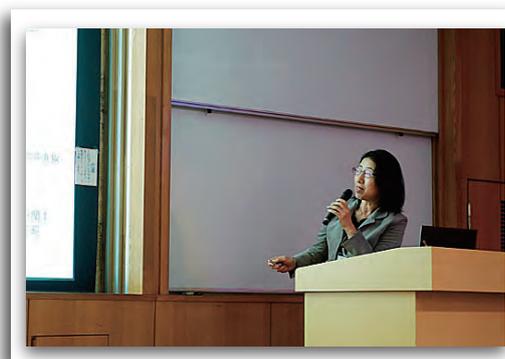


## Group A03-6

### Chisato TAKENAKA, Nagoya University

“Understanding the radionuclide circulation process in terrestrial ecosystem”

Various kinds of investigations have been conducted so far, and for the final year we are planning to set our goal of gaining a general understanding of where, how long and what kind of form radioactive Cs would exist in Setohachiyama (cedar, Japanese red pine, broad leaved forest), conducting a future



prediction using a model, and experiment on clarifying whether the model can be applied to a transfer of wild life. And the themes that we should work on in future are studies on accuracy improvement on modeling cedar trees, influence from decomposition on spherical cesium-bearing particles and its localization, organizing both common and different point about kinetics of potassium and contribution of mycorrhizal fungi in a root absorption into each tree species.

### Group A04-7

#### Yoshio TAKAHASHI, Tokyo University

“Development of microanalysis technology and chemical form of radionuclides associated with migration”

What we have worked on is (1) develop and apply high-sensitivity measurement that enables estimating quantity of tiny amount of radionuclides (2) research on existence form from macro to micro (including a method development), and elucidation of element process and transfer estimation. It is essential to clarify a change of Kd affected by an ionic strength and increase of total Cs concentration in modeling adsorption and desorption transfer of cesium into particle settled in the ocean. It could be possible that our analysis of stable isotope ratio in spherical cesium-bearing particles enables isotope fractionation from Fe and Zn in anthropogenic aerosol to identify an existence of volatilization process and estimation of volatile temperature.



### Group A04-8

#### Atsushi SHINOHARA, Osaka University

“Radionuclide measurement in various chemical forms and development of technology”

Our outcomes include developing and standardizing radioactivity analysis method, developing chemical pretreatment and measurement method and simulation on radioactive isotope release. In the simulation, we have worked on an experiment on element release from dummy fuel under high temperature, a simulation on creating insoluble particles that contain an amount of Cs, a research on bond behavior of aerosol in-reactor, and an elucidation of composed behavior of aerosol in the environment to clarify cesium release from radionuclides fuel or condition in reactor when the plants got a major damage by the massive damage.



At the end of the first day, a convivial gathering was held. An active discussion was exchanged, and the participants built intimacy between them.

In a project for fostering young researchers, who take a lead in a study on environmental transfer of radionuclides which is crucial theme of ISET-R, two participants were awarded for attending programs in all fields.



They were Kotaro Ochi (Meiji University) and Shota Kanbayashi (Toyama University), who were granted a certification by the head investigator.

Mr.Ochi who got hired at Japan Atomic Energy Agency spoke of his aspiration as a leader of young researchers for a study on environmental transfer of radionuclides.



On the second day, the conference started with a poster presentation. There were 34 presentations, and a productive discussion was held, followed by a presentation and overall discussion over what was discussed the previous day in the four research groups at 10am.

Such agendas as how to conclude the project, what to do for the final report and what themes should be focused on were discussed.



### B01 Chemical forms, Yasuhito IGARASHI

Themes we are working on involve chemical forms of insoluble cesium (cesium ball), of radioactive iodine and etc. Our major goal is to search for the form in a radiation release. We keep working on experiments of iodine and cesium although it's difficult to clarify and get a certain result from a research on cesium. We are planning to indicate sampling sites on a map to make a whole picture clearer for a further understanding.



### B02 Forest, Chisato TAKENAKA

We consider that the goals of the study on cesium behavior in a forest ecosystem are future estimation in the utilization of forest and wildlife animals, and influence on agricultural lands. There are many tasks we should deal with, but priorities are to be set on suggestions on forest management/utilization based on types of vegetation and zoning by the amount of deposition. Moreover, we need to clarify the transfer of cesium to the outside forest environment. We will summarize our five-year study and show the overall view of what is essential in the study of forests and what happened to the radionuclides deposited in the forests.



### B03 From terrestrial environment to rivers, Yuichi ONDA

There are still many tasks to tackle such as discharge of radionuclides from a forest environment, behavior of radionuclides in rice paddy field and farmland. The study on transfer of radionuclides from the upstream Niida River in Fukushima to the ocean has just started and we found that the sediment deposited near the mouth of the river is being eroded. In studying river environment, it is essential to focus on temporal variation of radionuclide concentration, identification of subjects to which radionuclides are attached, influence of flooding, estimation of flux, and desorption in sea water. The results of the study including river monitoring and effect of land use will be reflected in the article now being written.



### B04 Calculation of radioactive exposure, Haruo TSURUTA

Estimation of internal exposure to radioactive materials via respiration in short-term, mid-term and long-term (lifetime) after the FDNPP accident is a specific research agenda to examine. It is important to collect data on material balance of radionuclides and their temporal variation in each research field and to clarify the mechanism. Together with the collection and discovery of database available to use, we will put efforts in building such mechanism. Consolidation of data which are being published in articles should be proceeded.



At the end of the conference, encouraging comments were given from the advisors.

**Professor Shibata:** Where did the cesium deposited on mountains go? It has to be clarified by this group, so please make efforts to draw a picture to visualize the research achievements.”

**Professor Gamou:** Research has been conducted from various angles and now is the time to wrap up the achievements of five years. Creating a database is a critical task.”

**Professor Moriguchi:** The study itself is scientifically interesting, but we have to be careful as to how we convey the results. Efforts have to be made to announce an overall picture. The results obtained by the projects will be beneficial especially to those who have been affected by the FDNPP accident.”

#### <Subsequent conference>

On July 2, 2016, a subsequent ISET-R Plenary Conference was held at Yokohama Institute for Earth Sciences, JAMSTEC. The materials are posted on our ISET-R website at <http://www.ied.tsukuba.ac.jp/hydrogeo/isetr/member/160702General.html>.

#### <Scheduled programs fostering young researchers>

[A01-1] Theme: The Third Seminar on the simulation of radioactive contamination caused by FDNPP accident

Date: August 25 & 26, 2016 at Asano Section, Hongo Campus, University of Tokyo

[A01-2] Theme: Training in collecting samples of atmospheric, rainfall radioactivity bioaerosol and in electron microscopy observation

Date: Field training Sept. 1 & 2, 2016 or Sept. 12 & 13, at Namie-machi, Futaba-gun, Fukushima Pref. Electron microscopy observation Sept. 30, 2016 at Meteorological Research Institute

[A02-3] Theme: Analysis of radiocesium in sea water. Visit to the oceanographic research vessel “MIRAI” equipped with large observational equipment and Mutsu Science Museum

Date: October 24 & 25 at Mutsu Institute for Oceanography, JAMSTEC

[A03-5] Theme: Transfer of radionuclides with a forest and measurement method of air dose rate

Date: From Sept. 21 to 24, 2016, field training in Yamakiya District, Fukushima Pref. and lectures at Adataru Fureai Center

[A03-6] Introductory session to ecology of wildlife animals and measurement method of radioactive wild boars

Date: Nov. 25, 2016 at Center for Weed and Wildlife Management, Utsunomiya University