



## Topics Fukushima

October 15, 2019 No.95

JAEA staff measuring radiation using unmanned helicopter

## Contributing to the Environmental Restoration of Fukushima

## Awarded for the first time the Prime Ministers Commendation for Distinguished Contribution to Disaster Prevention

The Fukushima Environmental Safety Center (Miharu Town and Minamisoma City, hereafter referred to “Environmental Safety Center”) was awarded the Prime Ministers



Commendation for Distinguished Contribution to Disaster Prevention on September 20, 2019 for the first time as Japan Atomic Energy Agency (JAEA). This commendation, based on the “On the Disaster Prevention Day and Disaster Preparedness Week” (Approval of Cabinet, May 11, 1982), aims to award groups or individuals that have notably contributed to disaster prevention activities such as saving lives and

preventing damage from spreading at the time of disaster. It also awards those who have contributed to spread of disaster prevention knowledge or preparation of disaster prevention systems at normal time.

The followings are the report on the interview about the award with Dr. Kaname Miyahara, Director General of Environmental Safety Center.

— Following the former award, “The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology (Development Category)” in April 2019, you were awarded again this time. How do you think about such awards for your achievements in many years?

**Miyahara:**

The former Commendation by the Minister of Education, Culture, Sports, Science and Technology was awarded to five representing researchers with the achievements of the systematic research on environmental dynamics. But the Prime Ministers Commendation this time was awarded to our research group with the achievements of the environmental radiation monitoring and environmental dynamics research, from the viewpoint of preparation of disaster prevention system as activities of the Fukushima Environmental Safety Center. I think that the award to the group proved that each member of the Environmental Safety Center has always been thinking about the recovery of Fukushima, and working hard by accumulating daily tasks one by one valuing the trust of society.



As an example of such activities, I would like to introduce the Environmental Monitoring Group. This group has been conducting radiation monitoring of lakes and ponds from the sky using remote-control instruments such as unmanned helicopter, based in Minamisoma City. After understanding the overall picture of operation for remote control instruments, each member has been playing his/her role, and continued working on the radiation measurement using remote control instruments since the accident of the Fukushima Daiichi Nuclear Power Station (1F). The radiation measurements have been conducted mainly in the evacuation areas. At the time of measurement, they of course follow the procedure described in the basic the manual. However, topography and climate at the measurement spots would change every day. Therefore, considering such changes, they have been operating the remote-control

instruments in the best way for the conditions of the day. The team leader and the members have been conducting the measurements with the best method of the day while communicating each other not only at the time of the planning but also at the measurement site. If a problem occurs during the operation, they precisely analyze the obtained data, and carefully conduct the measurement with perfect countermeasures so that the same problems will never happen again.

On the other hand, the main focus of the Environmental Dynamics Research is to quantitatively evaluate how radioactive cesium deposited in non-decontaminated forests



moves from the forests to mountain streams, rivers and estuaries. We have much experience in radiation measurements and handling of radioactive materials. But at the beginning of our project, we had to start the research with scarce knowledge about the ecology of forests and the method for the investigation. Therefore, we

visited research institutes familiar with forests many times to learn how to investigate in forests. Through such efforts, we became to be able to investigate in forests by constructing steady methods for the investigation. Such cooperation with related institutes is very helpful to promote our research. So, I sincerely appreciate these institutes.

Furthermore, in the Environmental Dynamics Research, we have much experience not only in collecting data at the site but also in evaluating by the models utilizing the obtained data. When conducting model evaluation, it is important to make sure that there is no discrepancy between the data acquisition side and the model construction side. For this reason, researchers constructing models go to the measurement sites, and actively exchange opinions with those taking data. By doing so, they make effort to share mutual problems. Such close communication at the site leads to the construction of highly reliable models and evaluation.

I think such daily endeavor has led to the award this time.

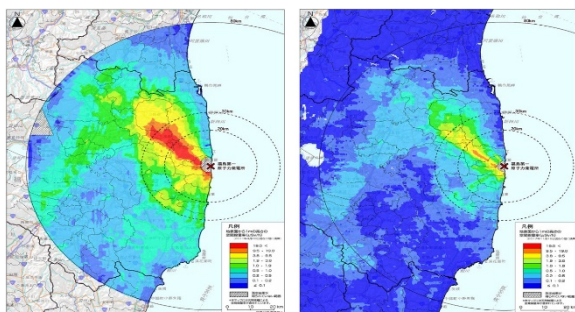
**—What kind of information have you provided? How did you present the information to the general public?**

**Miyahara:**

Our activities on environmental radiation monitoring has begun in June 2011 on a large scale. The radiation monitoring has been conducted by monitoring from the sky, car-borne survey, and spot measurements by survey meters. By combining the data obtained by these different methods, the investigation has been carried out on the distribution of air dose rate and radioactive materials in Fukushima Prefecture inside

and outside. We have also conducted the sampling of soil over a wide range, and quantitatively clarified the distribution of not only radioactive cesium but also iodine and strontium.

What was found in this investigation was that the origin of air dose rate and radiation exposure was almost radioactive cesium as of June 2011. Based on these results, it has become clear that we should thereafter survey mainly radioactive cesium. So, the results became the key information for formulating a wide-area decontamination plan. In addition, we have made easy-to-understand radiation maps by visually displaying the survey results. By these maps, the general public can quantitatively know the air dose rates and amount/distribution of radioactive cesium at a glance. These maps also



Mappings for temporal changes in air dose rate distribution.  
Left: April 2011 Right: November 2017

became the direct scientific ground for canceling evacuation orders. Through these efforts, we have been able to understand a wide-area distribution and predict the future, by investigating the wide region, collecting a lot of data, and performing statistical treatments.

Now, let's explain why we are investigating the environmental dynamics. The reason is that we considered it is important to know the phenomena that cannot be treated only by the statistical analysis. Radioactive cesium trapped in forests is this typical example. It was observed that radioactive cesium trapped in soil of forests moves to mountain streams and rivers while being adsorbed on soil particles at the time of heavy rain. But we considered that the total amount of cesium migration considerably depends on the migration under limited conditions in time and region. Therefore, in environmental dynamics study, we clarified the dominant phenomena that are the key of the movement such as cesium migration at the time of heavy rain. Then, we made it possible to conduct the model evaluation and simulation by formulating the results. By these processes, we became able to predict the future radiation corresponding to the respective various conditions. As a result, it was revealed that only limited amount of radioactive cesium migrates from the forests even at the time of heavy rain.



The obtained results are widely open to the public. One of such activities is a new information site “Fukushima Comprehensive Environmental Information Site”, which was opened in March 2019. This site consists of the following three sub-sites. The first is the “Information Open Site for Environmental Monitoring” which includes the information obtained by the other institutes. The second is the “Base Information, Question and Answer Site”, where we answer simple questions with scientific



knowledge from the perspective of residents about the results obtained mainly in the environmental dynamics research. The third is the “Analysis Example Site”, in which examples obtained by the analysis are introduced. These sites are well organized so that the users can obtain the information they need.

※Fukushima Comprehensive Environmental Information Site :

<https://fukushima.jaea.go.jp/ceis/>

**—What kind of role have the presented data played in responding to the 1F accident?**

**Miyahara:**

Our results have been obtained by combining the approach to statistically treat the environmental monitoring data in wide area with simulation based on the understanding of the phenomena in environmental dynamics research. Up to now, these results have been utilized in the cancelation of the evacuation order and the reconsideration of the countermeasures for radiation protection.

Also, the obtained results have been reported to the related local governments every year. I think that our results have led to ensuring residents’ safety and fostering the sense of security.

**—I understood that you are still now continuously working on the research. Then, what do you think important for the research continuation?**

**Miyahara:**

Towards the cancelation of all difficult-to-return zones by the government, I consider it is important to explain the residents with easy-to-understand words. In addition, I think it is also important to consecutively work so that the returned residents’ will be able to spend their daily lives with peace after the cancelation of the evacuation order. In environmental monitoring, it is important to steadily promote the role that the

Environmental Safety Center should play, in accordance with the comprehensive monitoring plan by the government. Furthermore, from the viewpoint of environmental dynamics, the key issue in long-term investigation is not only clarifying migration of radioactive cesium adsorbed on soil particles but also continuously understanding the temporal change and its cause for cesium concentration in water. From these investigations, the research results will lead to the future prediction of radiation. As to the radioactive cesium dissolved in water for example, the concentration of cesium in river water, even at high places, is now in the order of one-tenth Bq/L, which is far below the standard value of drinking water (10 Bq/L). However, radioactive cesium in river water is considered to be one of the origins of the radioactivity in mushrooms and freshwater fish that contain radioactive cesium higher than the standard value of foods. Therefore, we have to continuously work on this subject.

**—Could you explain about the human resource development?**

**Miyahara:**

I think that the young researchers in the Environmental Safety Center should play their own roles by understanding the whole overview of the research and activities in Fukushima at the site, while sharing problem consciousness with their colleague. Such research attitude will surely lead to not only the restoration of Fukushima but also their own growth as a researcher.

In addition, the Environmental Safety Center is promoting the cooperation with the other institutes, by participating in the network-type research base among three organizations and three universities this year. Now many students participate in this cooperation program. So, we would like to contribute to human resource development in the part of our research and development under this project.

**—Please tell us about your future ambitions.**

**Miyahara**

I think it is important to use the off-site (environmental) efforts that have been conducted by the Environmental Safety Center for on-site activities (1F decommissioning). Up to now, we have made efforts to estimate the radiation distribution at the 1F on-site just after the accident, based on the off-site investigation of the radioactive materials distribution around the 1F. Further, we have been applying scintillation fibers which we have developed in the radiation measurement study to the radiation monitoring of drainage channels. We will make efforts to apply such off-site technology to on-site. As to the research collaboration, we cooperated with foreign countries through the international conferences such Cesium Workshop that had been held three times. In these conferences, the environmental effects were discussed by

comparing with those of the Chernobyl accident. We will continue to send the information and knowledge obtained in the conferences to all over the world.

March 2021 will be just ten years after the accident. On this occasion, we plan to publish a progress report summarizing the activities of the Sector of Fukushima Research and Development so far. Through the report, we would like to surely convey our efforts to the young people who will lead the future and interested people in all over the world.

**TOPICS Fukushima No. 93**

Fukushima Administrative Department Sector of Fukushima Research and Development

Japan Atomic Energy Agency (JAEA)

Address: 8F Taira Central Building, 7-1 Aza-Omachi, Taira, Iwaki-shi, Fukushima 970-8026, Japan

Phone: +81-246-35-7650 Fax: +81-246-24-4031

Website: <https://fukushima.jaea.go.jp/en/>