

# Co-creative Radiation Education Programme (CREPE) in Osaka University

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&  
Other Hamadohri Workshop Members



Program of NRA Human Resource  
Development



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**WHAT HAS  
HAPPENED?**



**SOIL SAMPLING  
PROJECT AND  
OTHER  
ENVIRONMENTA  
L STUDIES**



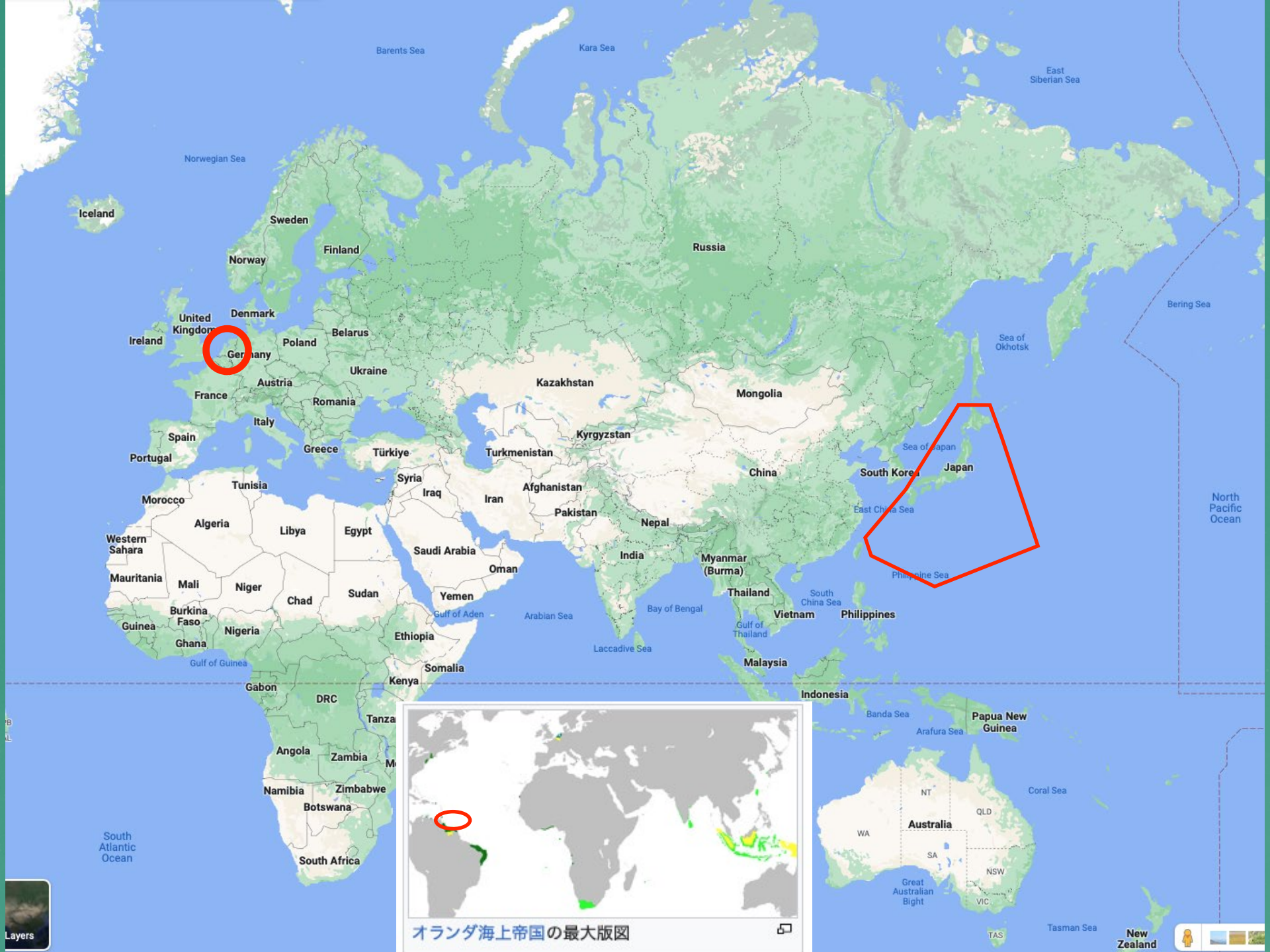
**HAMADOHRI  
SCHOOL OF  
ENVIRONMENTA  
L RADIATION**



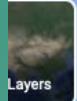
**CO-CREATIVE  
RADIATION  
EDUCATION  
PROGRAMME**

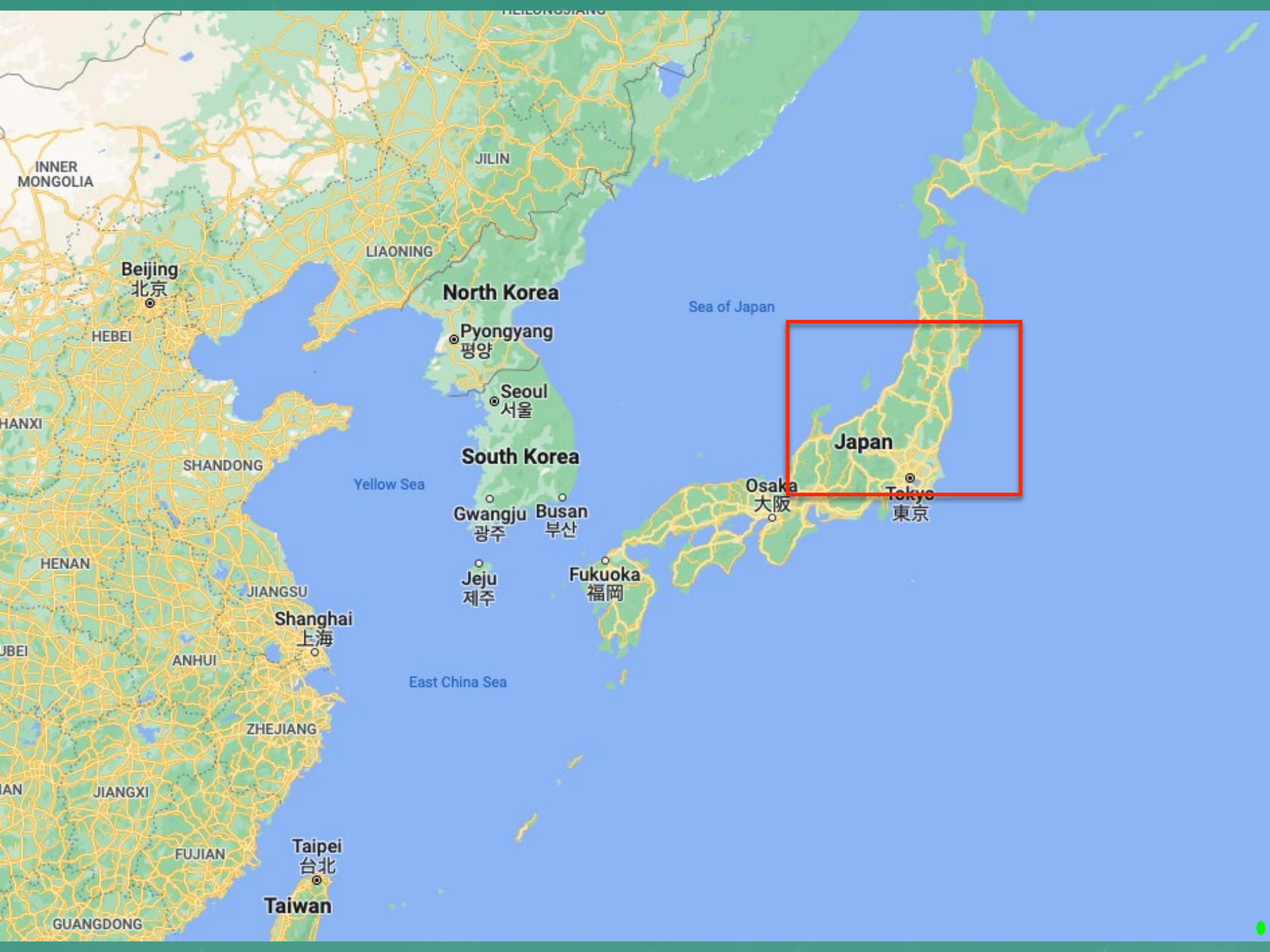


**SUMMARY**



オランダ海上帝国の最大版图





INNER MONGOLIA

JILIN

LIAONING

Beijing  
北京

North Korea

Sea of Japan

Pyongyang  
평양

Seoul  
서울



Japan

South Korea

Gwangju  
광주

Busan  
부산

Osaka  
大阪

Tokyo  
東京

Yellow Sea

Jeju  
제주

Fukuoka  
福岡

Shanghai  
上海

East China Sea

JIANGSU

ANHUI

ZHEJIANG

Taipei  
台北

Taiwan

FUJIAN

JIANGXI

GUANGDONG

HANXI

SHANDONG

HENAN

UBEI

IAN



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Satellite



Akita  
秋田

IWATE

Hanamaki  
花巻

YAMAGATA

MIYAGI

Sendai  
仙台

Ishinomaki  
石巻

Niigata  
新潟

Fukushima  
福島

Koriyama  
郡山

FUKUSHIMA

Iwaki  
いわき

NIIGATA

TOCHIGI

Kanazawa  
金沢

Nagano  
長野

GUNMA

IBARAKI

TOYAMA

ISHIKAWA

NAGANO

SAITAMA

GIFU

Tokyo  
東京

YAMANASHI

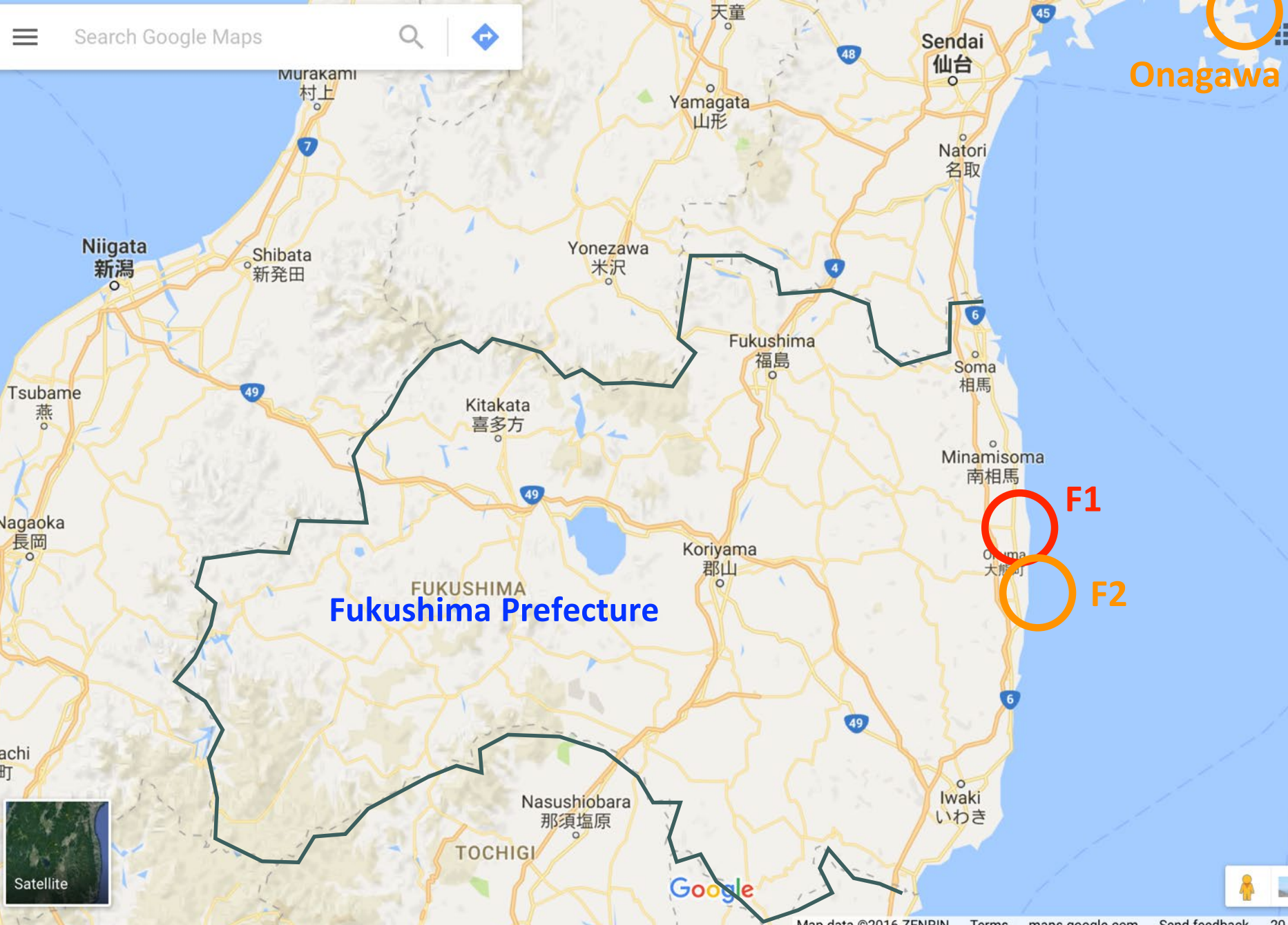
Google



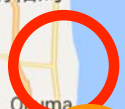
Onagawa



Search Google Maps



FUKUSHIMA  
Fukushima Prefecture



F1



F2



Satellite



## Fukushima

A typical Japanese farmland



# TSUNAMI AT FUKUSHIMA #1



ETRAP 2023, June 30 2023 @ Groningen, The Netherlands



## OBJECT OF THE SOIL PROJECT

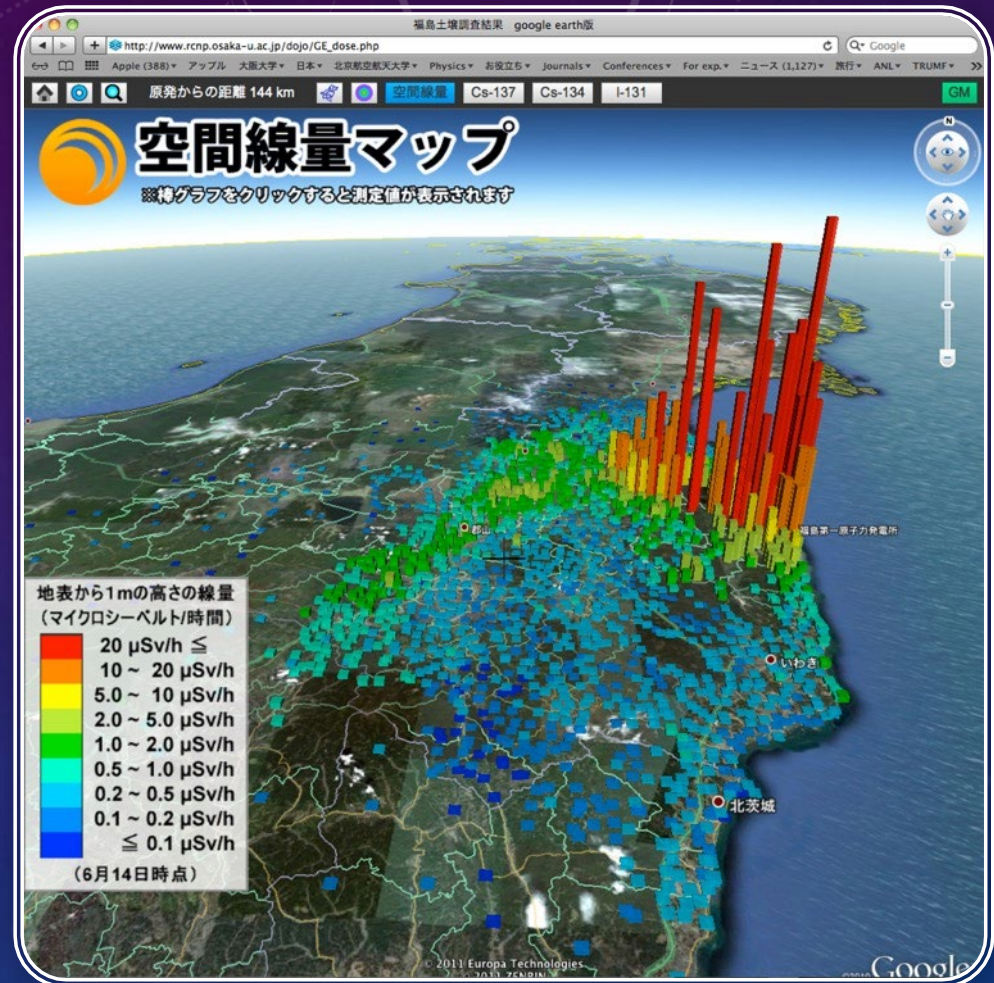
- To measure the 3D distribution of emitted radioactivity and then, make it possible to estimate the radiation in the living quarter.
- To understand the relation between radioactivity in the soil and the radiation in living environment.
- To understand the movement of radioactivities: both the surface distribution and depth (3D) distribution
- Then predict the living conditions for the future.

## WHAT WE HAVE LEARNED

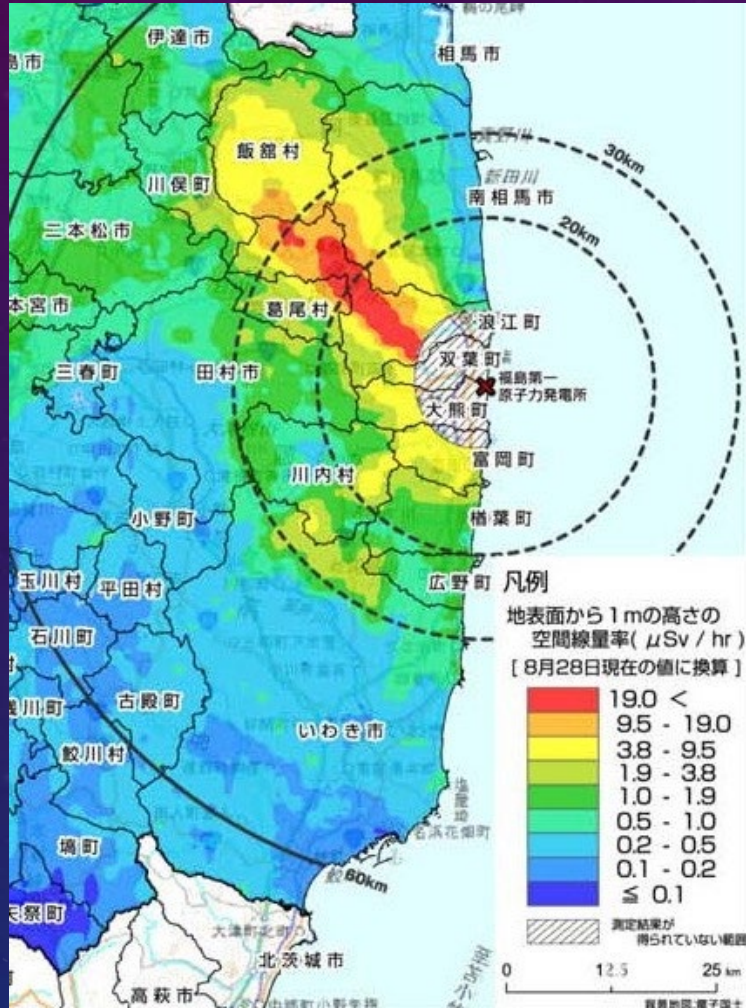
- $^{134}\text{Cs}$  and  $^{137}\text{Cs}$  were mixed almost in the same amount. Other activities were less than 1/100 of those. (August 2011)
- Radiation at 1 m high is explained by those radioactivities in the ground.
- Most of the radioactivities stayed within 5 cm from the surface.
- It is extremely difficult to remove Cs from soil.
- The depth distribution shows that Cs is absorbed in one-touch absorption.

# WHAT WE HAVE INFORMED ABOUT

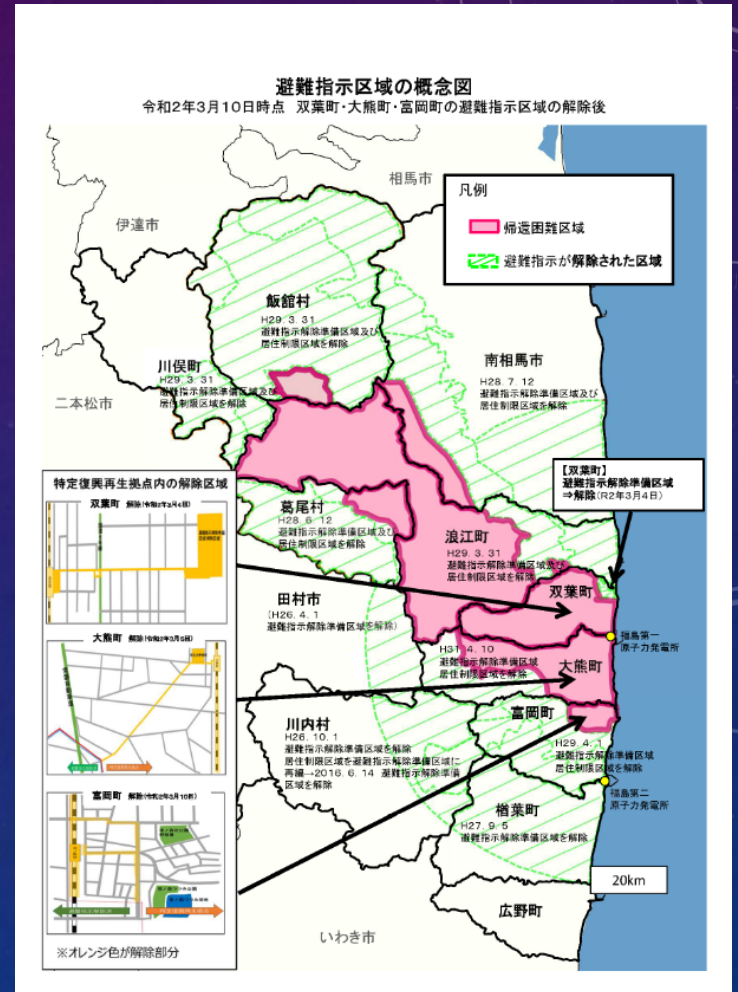
- High contamination area in NW direction. Low contamination area exist even near F1.
- Possibility of removing contamination just by removing 5 cm thick surface soil.
- This map allowed to make evacuation and return plan in long term.



# NUCLEAR POWER PLANT ACCIDENT THEN AND NOW



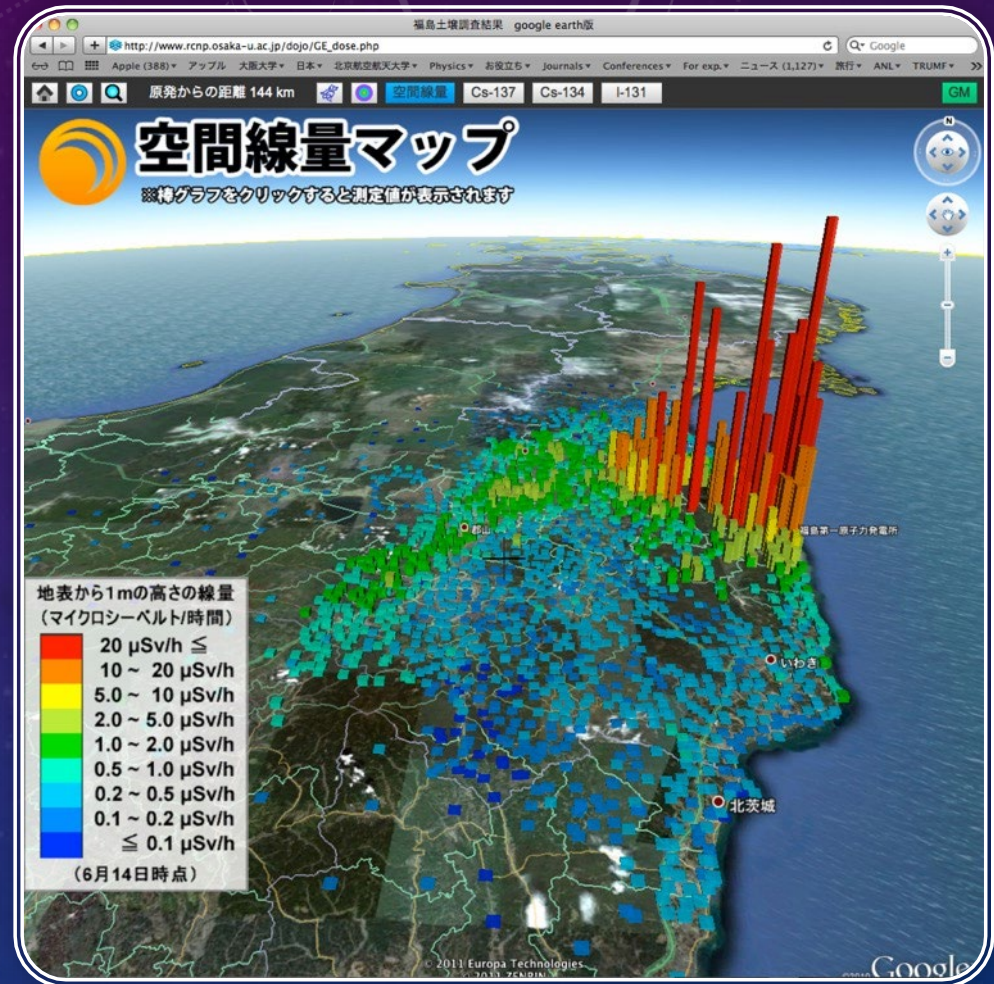
<http://www.imart.co.jp/fukushima-genpatu-houshasen-osenzenkoku-map.html>



<https://www.pref.fukushima.lg.jp/site/portal/list271-840.html>

# WHAT WE HAVE INFORMED ABOUT

- High contamination area in NW direction. Low contamination area exist even near F1.
- Possibility of removing contamination just by removing 5 cm thick surface soil.
- This map allowed to make evacuation and return plan in long term.



# NEXT QUESTION



**How those contaminants transported?**

**Contaminants on soil moves only with the soil grain.  
Contaminants on trees fall and cover the ground surface (litter layer). Leaves rot and absorbed in soil, flow out with rain, ...**

- We continue to sample soils and leaves for at least 20 years.**
- We are establishing the local school of Osaka University for studying and educating about environmental radioactivities.**



**How the contaminants circulate in the forest?**

## SO WHAT DO WE DO IN LONG TERM **SCHOOL AT THE SITE**

### **Think positive:**

*The contaminated field provides precious opportunities!*

*Use it for study and education!*

- **to learn basic of the problems**
- **to experience**
  - field works in the radiation environment
  - related social and scientific problems,
  - then **consider** what they can do for better.
- **to become a person who can respond to problems reasonably well based on his/her own correct scientific knowledges.**

***Minimize Harmful Wrong Rumor!***

# ***HAMADOHRI SCHOOL OF ENVIRONMENTAL RADIATION***

Pre-lectrues (in Osaka University Campus)

and

Hands-on training (in Fukushima)



# Pre-lectures

The lectures are given in advance to learn basic knowledge of radiation and related fields.



# Educational Pre-lectures

1. Introduction: To check current level of understanding and set **goals for achievement**
2. Overview: To give **an overview** of the whole lecture and to understand the path
3. **Radiation around us**: Radiation that exists around us and is used in our daily lives
4. Radiation and **physics**: Understanding the principle of generation and interaction from the aspect of physics
5. Radiation and **chemistry**: To understand how radioactive materials exist in the environment.
6. Radiation and **biology**: Understanding of radiation exposure based on the latest findings on biological effects
7. Radiation and statistics: Understanding of the knowledge necessary to deal with stochastic events **statistically**.
8. Radiation detectors: Understanding the principles of radiation **detection**
9. **Measurement** practice: Measurement of environmental radiation, radioactive minerals, etc.
10. **Radiation in society**: How radiation and nuclear energy are used in society
11. Nuclear accident: Understanding of the accident at the Fukushima Daiichi Nuclear Power Plant in chronological order
12. Disaster prevention: What actions to take to protect your life when you encounter a disaster
13. Accidents and the society: How did society perceive the accident ? How does society deal with radiation?
- 14~15. Discussion: Discussion by students.

# Hands-on training

- Students experience field activities (sampling, measurements) in Iitate Village, Okuma Town, and Futaba Town in Fukushima Prefecture, contaminated by FUKUSHIMA F1 ACCIDENT.
- Students learn and consider, fully with their 5 senses, about Fukushima F1 Accident and Fukushima Recovery
- Students discuss together for the Future of Fukushima based on their obtained scientific knowledge and present status of Fukushima area.

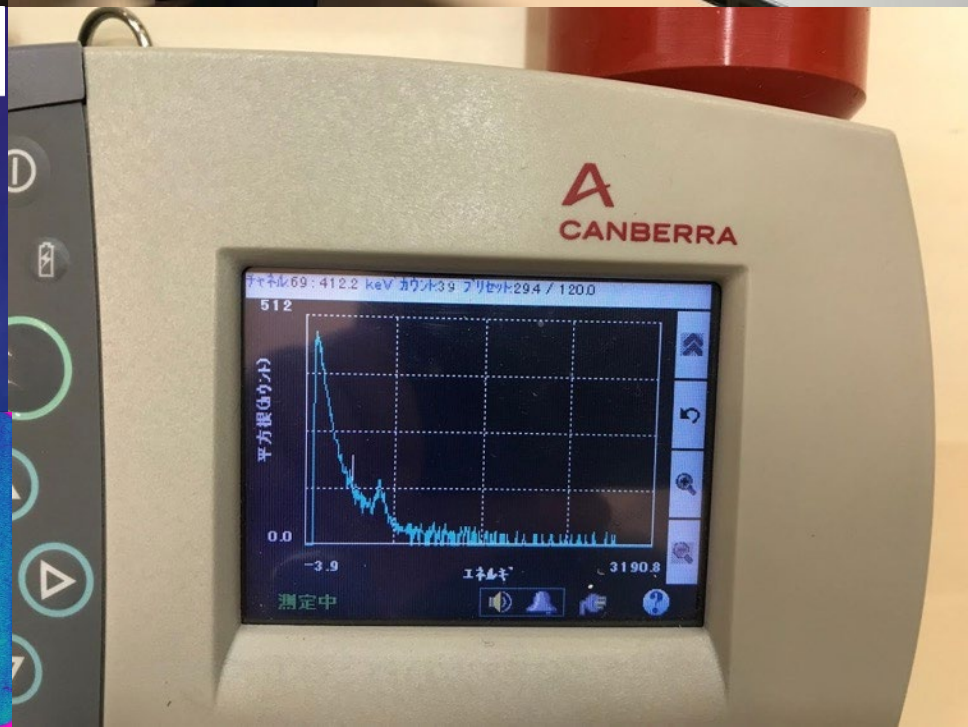
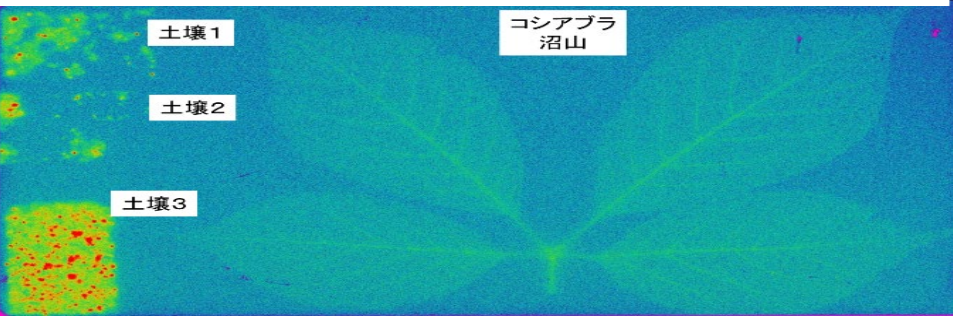
# Sampling & Pre-treatment



# Sample Measurements



2018年9月2日 飯館村放射線研修



# Interaction with local residents



# Student Discussions



# HAMADOHRI SCHOOL OF ENVIRONMENTAL RADIATION

2016



2022



**Male: Female  $\cong$  3 : 2**  
**Humanities: Science  $\cong$  1 : 1**  
(5 Faculties)      (5 Faculties)



# 大阪大学 共創的放射線教育プログラム

Co-creative Radiation Education Programme

# CREPE

- ニュース
- 概要
- 組織・体制
- 共創的放射線教育プログラム  
[学部学生用]
- 共創的放射線教育プログラム  
[大学院学生用]
- 原子力規制庁人材育成事業

社会との共創による多様な知をもつ  
次世代人材育成プログラム



<https://www.rcnp.osaka-u.ac.jp/crepe/>

# Areas Related to "Radiation Science"

Elementary particles

Elementary particles

Universe

Solar System

Earth

Mountains and Rivers

Structure

Society

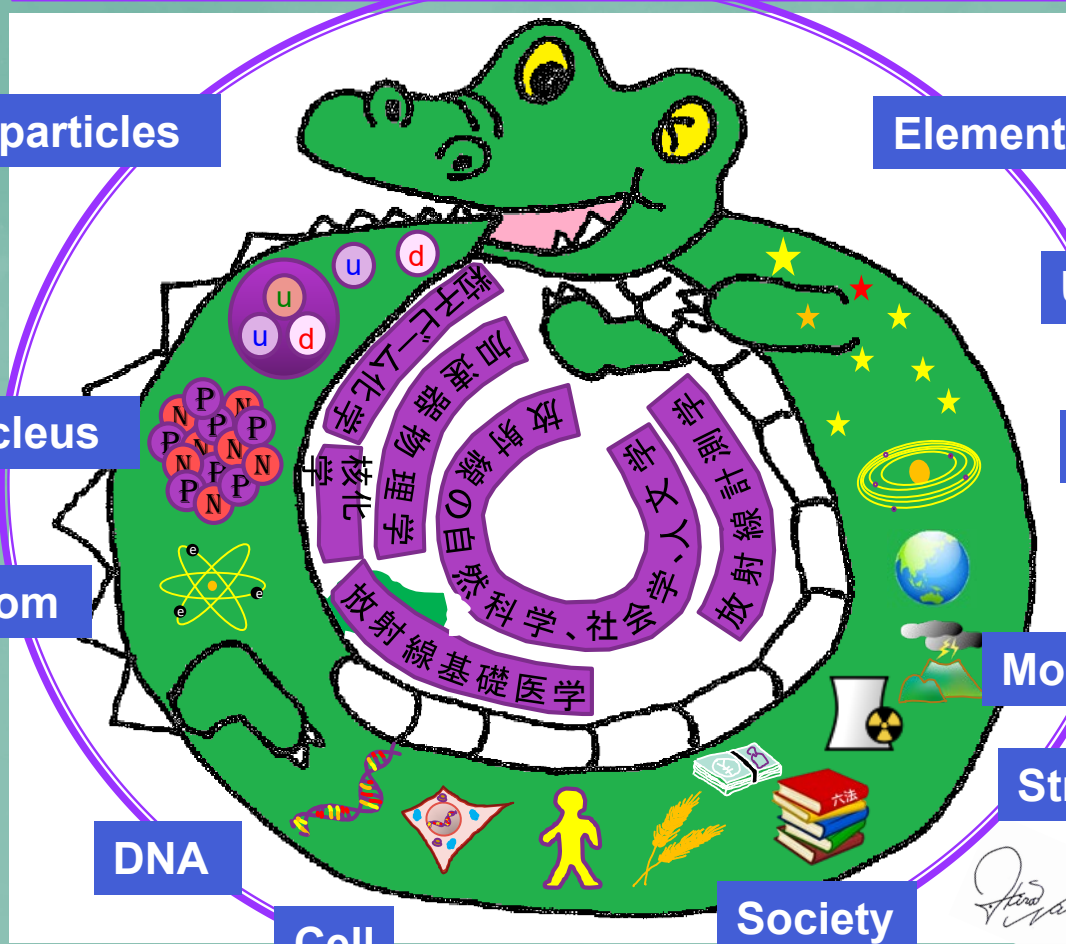
Animal · Plant

DNA

Cell

Atomic nucleus

Atom



# Co-Creative Radiation Education ProgrammE (CREPE)



CREPES with different flavors



CREPE made according to students' own tastes and cooking methods

Photo taken from Wikipedia

# Co-Creative Radiation Education Programme (CREPE) For Undergraduate Students

**Completion certificate issuance**

**Radiation Society Co-  
Creation Subject Group**

Natural Science Knowledge  
Subjects  
Social Science Knowledge Subjects

**Radiation Practical  
Course Group**

Environmental radiation training  
in Hamadohri, Fukushima  
Prefecture  
(Advanced training)

**Fukushima Hamadohri Area  
Environmental Radiation School**

# Co-Creative Radiation Education Programme (CREPE)

**Radiation Society Co-Creation Subject Group : 4 credits or more**

Natural Science Knowledge Subjects: 2 credits or more

Social Science Knowledge Subjects: 2 credits or more

- **Topic of Chemistry**
- **Basic Ideas of Physics**
- **Basic Environmental Science**
- **Natural Science of Radiation, Sociology, Humanities**
- **A Door to Academia (Environmental Radiation in Fukushima)**
- **A Door to Academia (Radiation Science around Us)**
- **A Door to Academia (Radiation in Everyday Life)**

- **Knowledge of Disasters And Knowledge of Reconstruction**
- **Contemporary Environmental Issues**
- **Introduction to Facilitation**
- **Science and Technology and Public Policy**
- **History of Science/Introduction to Philosophy of Science**
- **Introduction to Science, Technology and Society**

**Radiation Practical Course Course Group : 4 credits or more**

- **Environmental Radiation Training in Fukushima (Basic)**
- **Environmental Radiation Training in Iitate Village, Fukushima Prefecture (Advanced)**

**Total 8 credits or more**

**Starting in the fall of 2021, 35 students have taken the course, and 8 have completed it.**

# Co-Creative Radiation Education Programme (CREPE) For Graduate Students

Fusion of knowledge

**Development of human resources capable of emerging by combining advanced "intelligence" of experts in a wide range of fields**

Integration of knowledge with Society

**Through environmental radiation measurement training in the Fukushima Hamadohri area, we develop human resources who can solve social problems**



Main: Institute for Radiation Sciences

Sub: Graduate School of Science

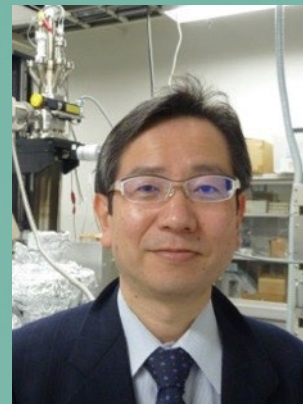
Research Center of Nuclear

Physics

Graduate School of Medicine

Graduate School of Engineering

CO Design Center



Representative in charge  
Michio OKADA

# Co-Creative Radiation Education Programme (CREPE): Graduate School



## Completion certificate issuance

Fusion of knowledge

Integration of knowledge with society

### Graduate School of Science

- Basic of Radiation Detection and Measurement
- Radiation Detection and Measurement
- Accelerator Physics
- Nuclear Structure
- Nuclear Chemistry
- Beam Chemistry
- Nuclear Physics in the Universe

### Graduate School of Medicine

- High Precision Radiation Therapy
- Particle therapy
- Radiation Biology

### CO Design Center

- Science and Technology Communication Learned from Practitioners
- Science and Technology Communication Seminar
- Introduction to Facilitation
- History of Science/Introduction to Philosophy of Science
- Introduction to Science, Technology and Society
- Science, Technology and Public Policy

### Institute for Radiation Sciences

Introduction to Radiation Detection and Measurement

Radiation Safety (Basics)

Natural Science of Radiation, Sociology, Humanities

### Graduate School of Engineering

- Energy Politics
- Fusion Reactor Engineering
- Decontamination Science and Engineering

### Institute for Radiation Sciences Research Center of Nuclear Physics

- Radiation Measurement (Basics)
- Radiation Measurement (Application)
- Fukushima Hamadori district environmental radiation basics
- Fukushima Hamadori district environmental radiation application



Starting in the spring of 2023,  
9 students have taken the course.

# Summary

**We have constructed Co-Creative Radiation Education ProgrammE ( CREPE) for graduate and undergraduate students in Osaka University, in Hopes of the Reconstruction of Fukushima Hamadohri.**



*Education is like a box of chocolates,  
Students never know what*