

2020.11.19

Japan GSD Lecture Series vol.1
Harvard Graduate School of Design
@Zoom

Made in Fukushima

- Restoration of Fukushima radioactive farmland -



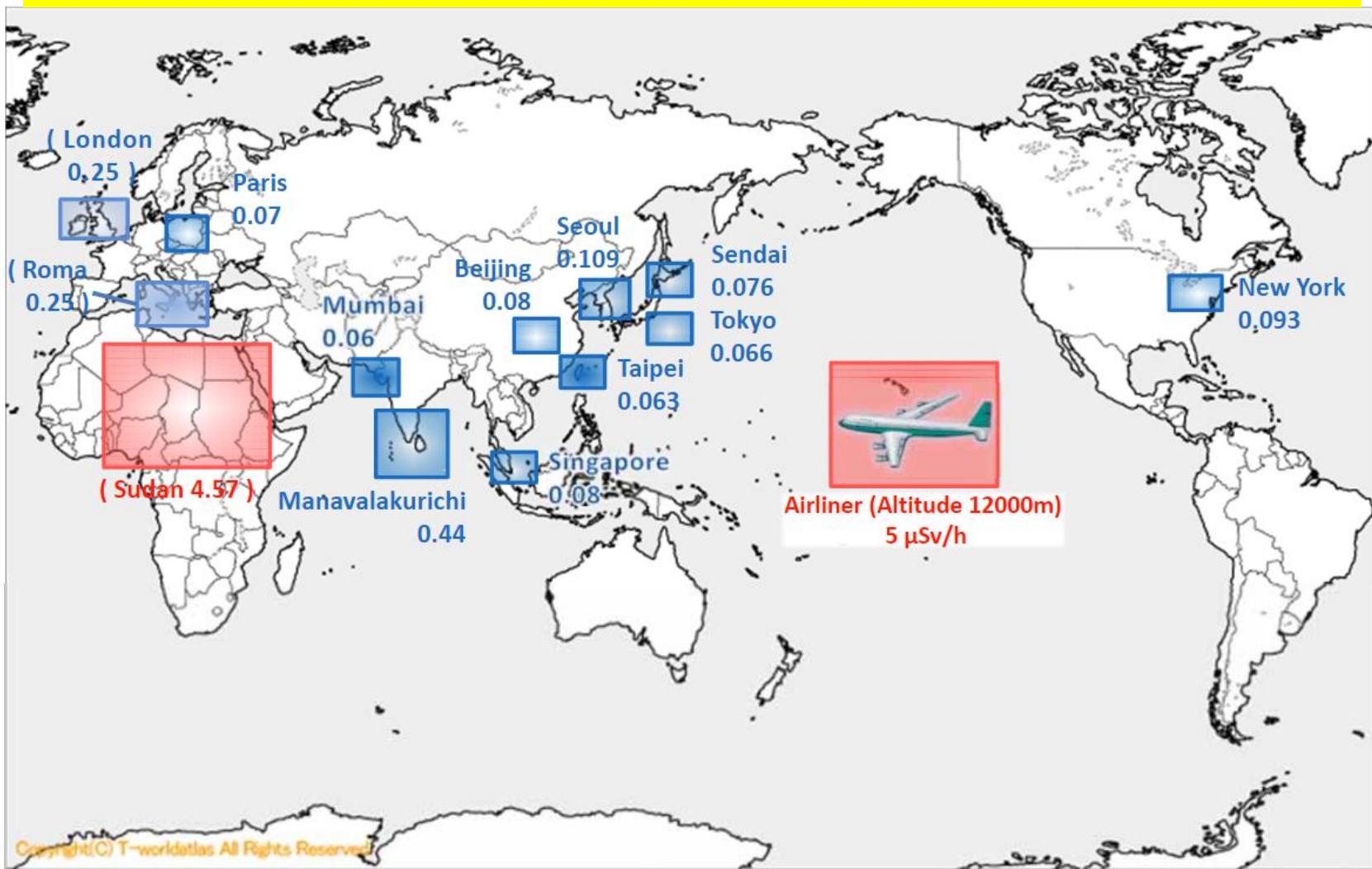
Masaru MIZOGUCHI

Graduate school of Agricultural and Life Sciences

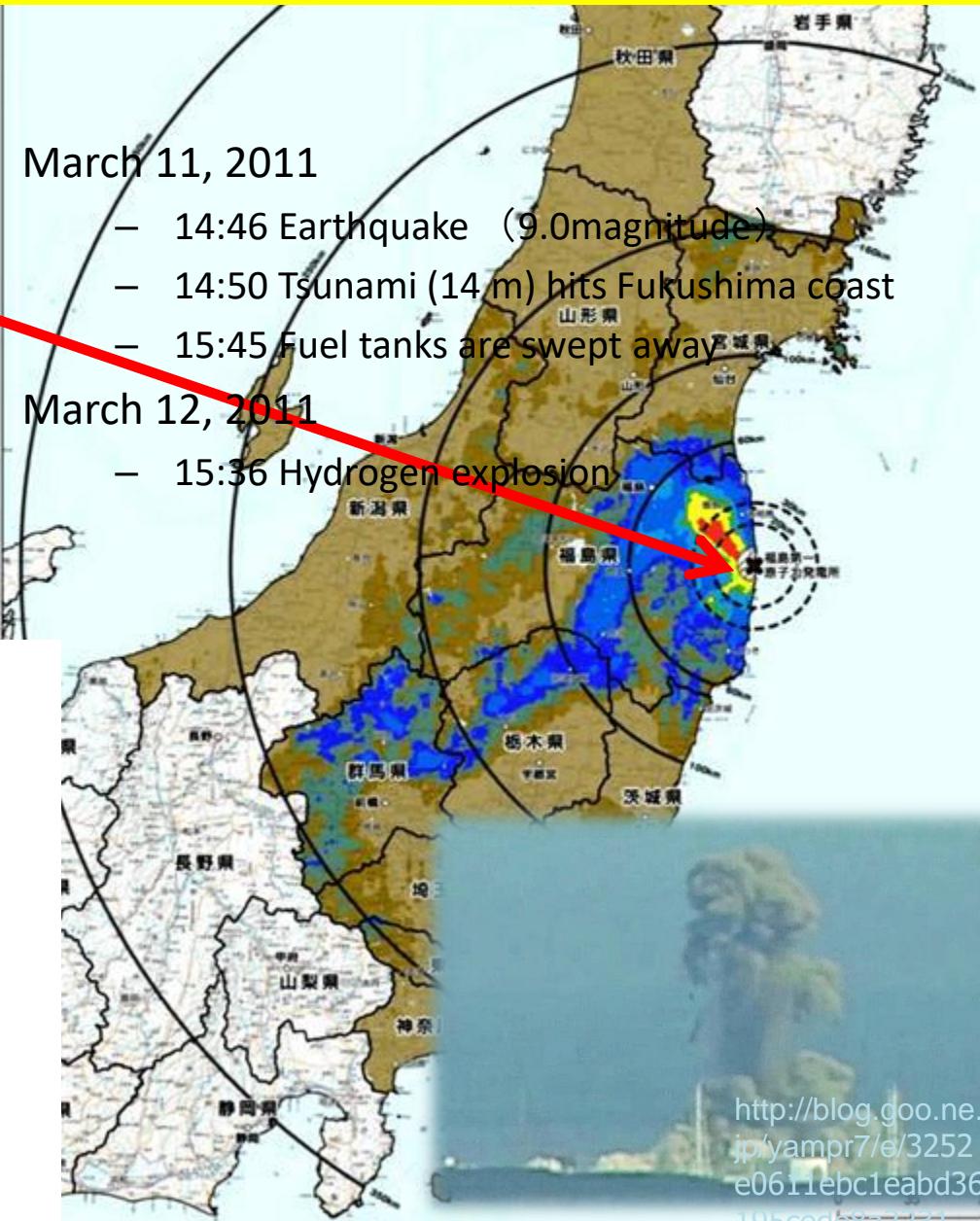
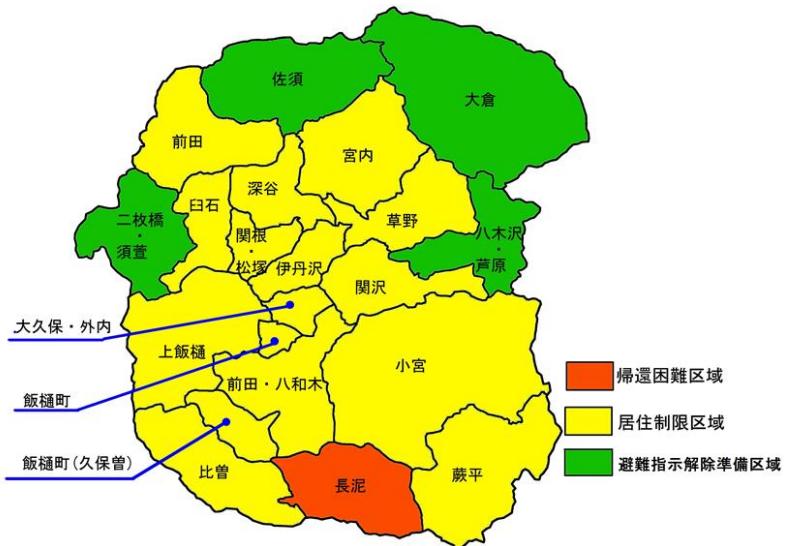
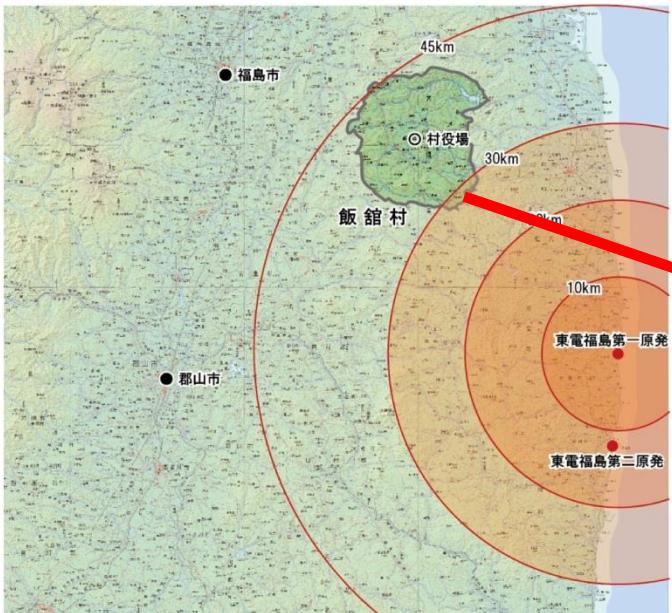
The University of Tokyo, Japan

Radiation dose in the world (uSv/h)

May 2011

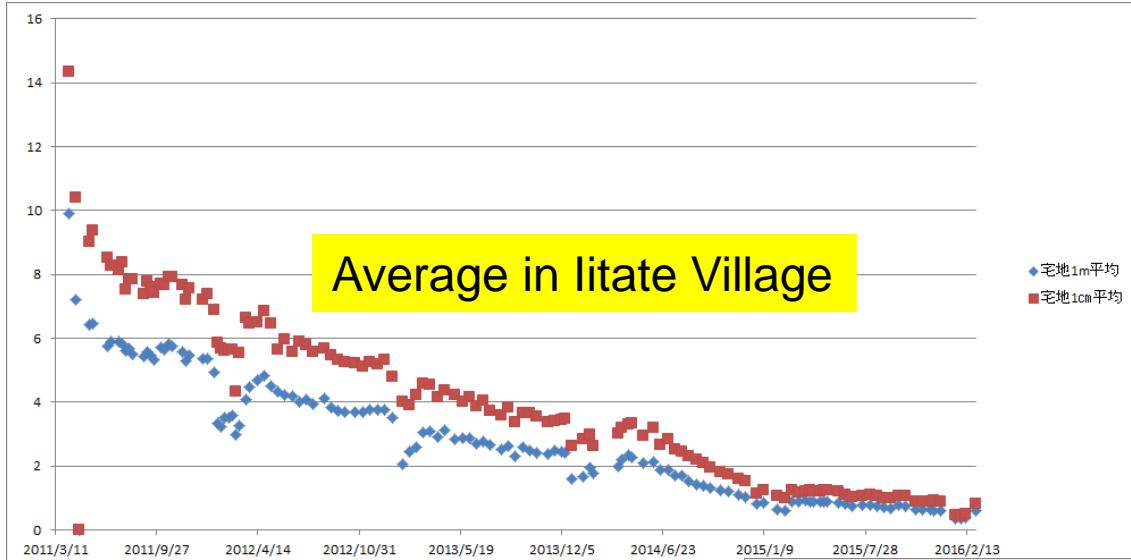


Iitate Village in Fukushima Prefecture



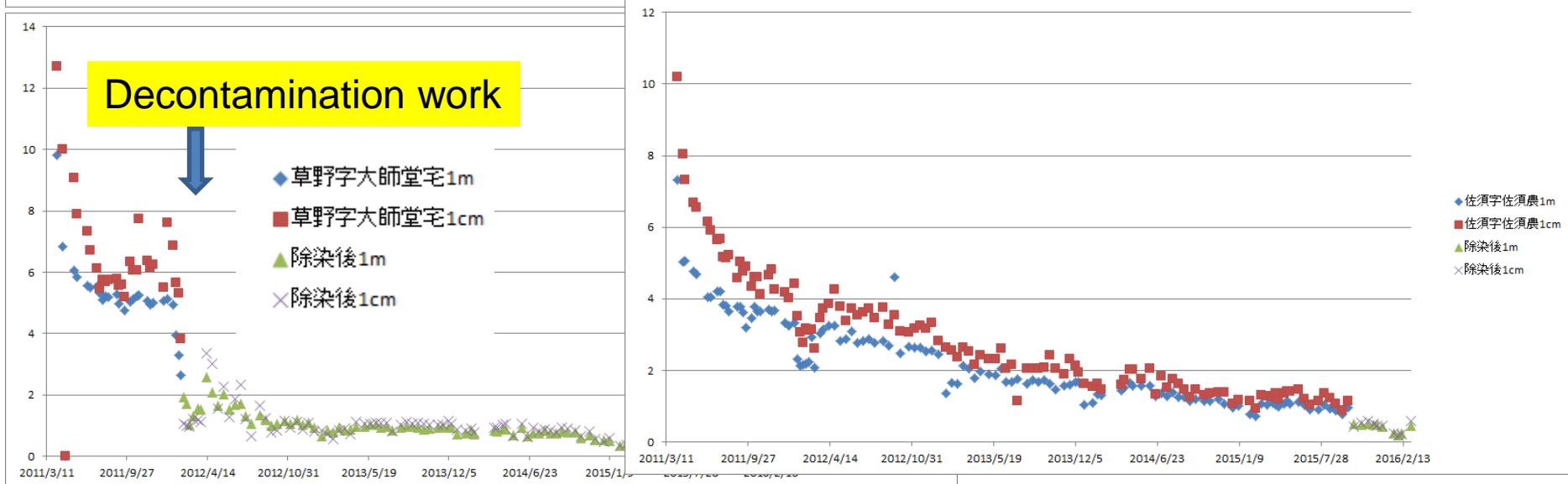
<http://blog.goo.ne.jp/yampr7/e/3252e0611ebc1eabd36195cede8az231>

Change of Radiation dose in Iitate Village



Source:

<http://www.fukushima-saisei.jp/mon/trendiitate/#00>



How did I act immediately after the nuclear accident?

(2011.3.11) **The Great East Japan Earthquake**

(2011.3.15) Establishment of the University of Tokyo's Fukushima Reconstruction Agricultural Engineering Council (UT-FRAE)

(2011.5.30) Seminar on Radioactive Cesium on Clay Surface

(2011.6.25) First visit to Iitate Village

(2011.7.10) Symposium talk: the "soil" of Iitate Village

(2011.8.30) Encounter with NPO: "RESURRECTION OF FUKUSHIMA"

(2011.9.4) UT-FRAE first Field Survey of Iitate Village



History of development of farmland decontamination methods and agricultural revitalization

- (2012.1.8) Frost Stripping Method
- (2012.4.1) Mud Sweeping Method with a weeder machine
- (2012.10.6) Student Tour of the Faculty of Agriculture,
University of Tokyo
- (2012.12.1) The burial method
(contaminated soil burial method)
- (2013.5.15) The Muddy Waters Forced Drainage method
- (2013.6.6) Waterlogging Experiment in a Paddy Field
- (2015.6.26) Drainage Survey of Farmland Soil
after Decontamination
- (2016.6.24) Decontamination experiment in forest
(contaminated soil burial method)
- (2017.3.21) Iitate flowerbed
- (2017.3.31) Lifting the Evacuation Order
- (2018.3.5) Collaboration Agreement
between Iitate Village and the University of Tokyo
- (2018.5.1) The birth of the sake “Like a Phoenix”
- (2019.6)Nominated for Cannes Lions
- (2019.8) Buckwheat Cultivation by Todai Murajuku



Please visit the following URL for the contents and photos of each item.
<http://www.iai.ga.a.u-tokyo.ac.jp/mizo/edrp/fukushima/201017.html>



小宮の大久保さん方

東大院生ら協力 飯

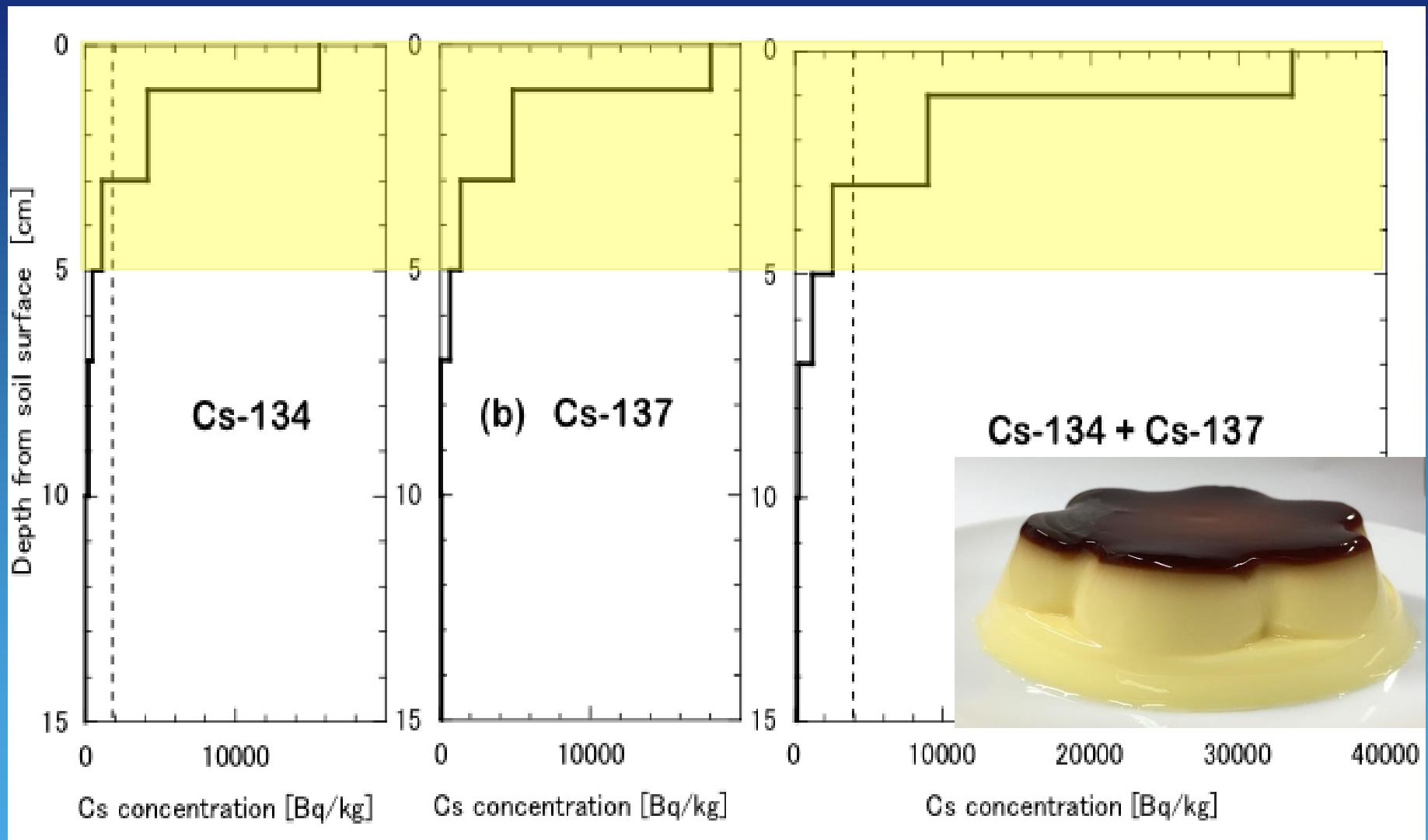
東京電力福島第一原発事故に伴う避難指示が三十一日解除される飯舘村小宮の大久保金一さんをの方の畳に二十日、村の形をした花壇が完成した。花で復興の象徴を作ろうと活動する人々の情熱を東京大の大学院生らが後押しした。



飯舘村が東大と連携協定



Vertical distribution of Cs in soil (24/5/2011)



Shiozawa et al. (2011): Vertical concentration profiles of radioactive cesium and convective velocity in soil in a paddy field in Fukushima. Radioisotopes 60 : 323-328



Stripping topsoil method



Soil puddling method

農林水產省

Official decontamination methods by Government

MAFF

Ministry of Agriculture, Forestry and Fisheries

From August, 2012



Deep plowing method

Reality of narrow agricultural field

Wild boars



Heavy Weed



Disturbed agricultural field



After the decontamination in Iitate



Decontamination work (2014.10)



“Temporal-temporal” storage space in a paddy



Soil dressing of farmland by sand (2015.3)



[Click to movie](#)

Development of decontamination method farmers can do by themselves in paddy contaminated by radiocaesium in Fukushima



Prof. Masaru Mizoguchi
Dept. of Global Agricultural Science
Univ. of Tokyo

Empathy & Collaboration

The Resurrection of Fukushima: Characteristics & Keywords

Goal: Recovery of the area
Collaboration
Independent Volunteers
Vitality from the varieties of participants
Knowledge, techniques, work experience, network
Breadth of vision
Flexible handling
Detailed care

Specialists
Science & Technology
**Universities/
Research Institute**
Interdisciplinary Collaboration

Resurrection of Fukushima



Non-Profit Organization



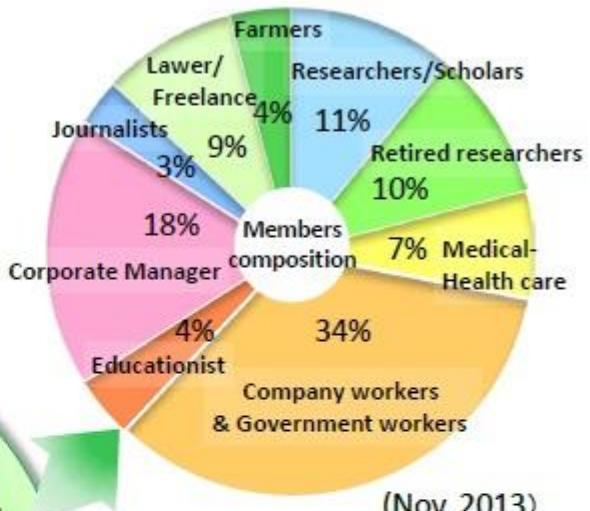
Power for Recovery
Experience, knowledge,
Tradition, culture, wisdom

Villagers

Collaboration against Scattering

Empathy & Collaboration

Members



(Nov. 2013)

Public Service
**National
Prefectural
Local**

Overcome Sectionalism
& Bureaucratism

•Message from the leader of "Resurrection of Fukushima"

Practices utilizing the properties of cesium and clay (2012)



Rotary weeder method
(2012.4.1)

decontamination method by
stripping frozen soil
(2012.1.8)



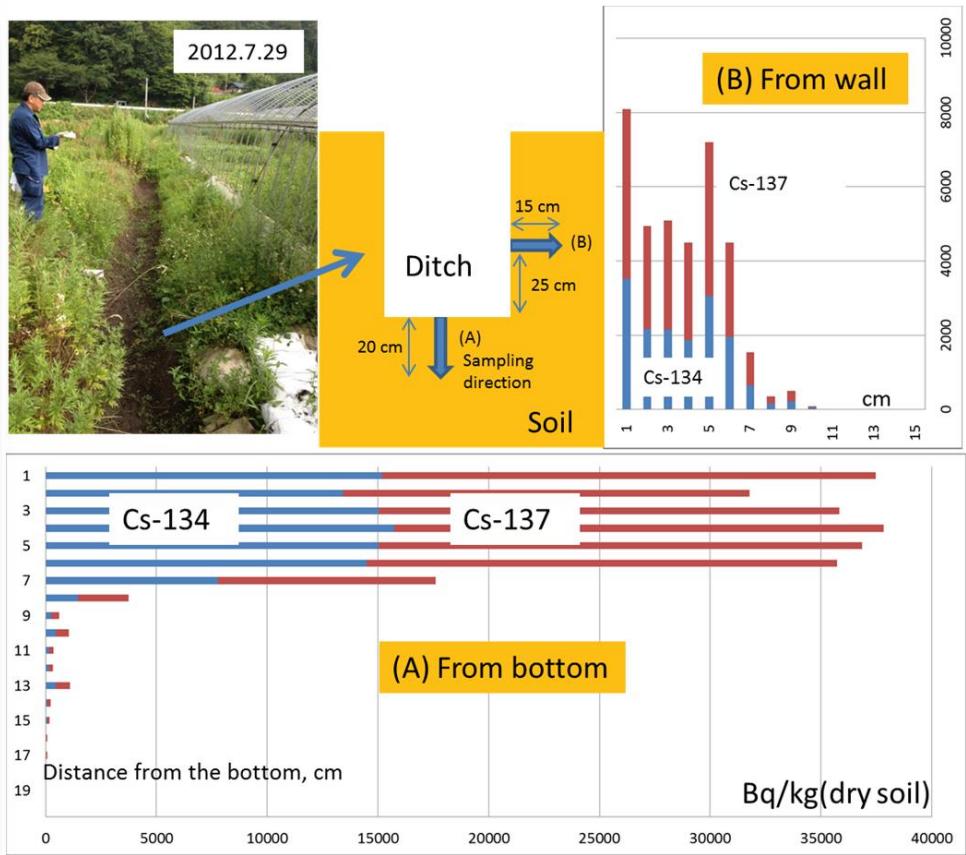
Made-method-2 (Komiya method)

Soil puddling + Deep plowing method (2013)



(2013.5.18)

Pour contaminated muddy water into the drain



A result of the radioactivity measured at each depth by sampling the soil of the bottom and sides of the groove after a dried-up Cesium is not expected to immersion in the soil!

Why all right? – Soil Filtration function!



Fresh water comes out when muddy water is poured in the sand. When this operation is repeated, fresh water becomes slow to come out. Clay particles with radioactive cesium are also trapped in the sand by this principle.

Made-method-1 (Sasu method)

Stripping topsoil + Deep plowing method



Burial of contaminated soil

Compaction of soil

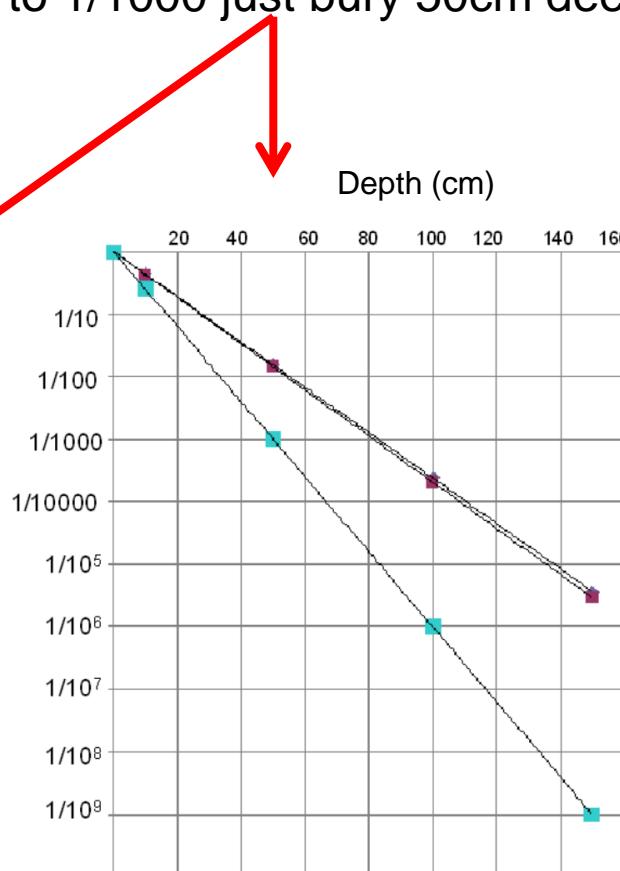
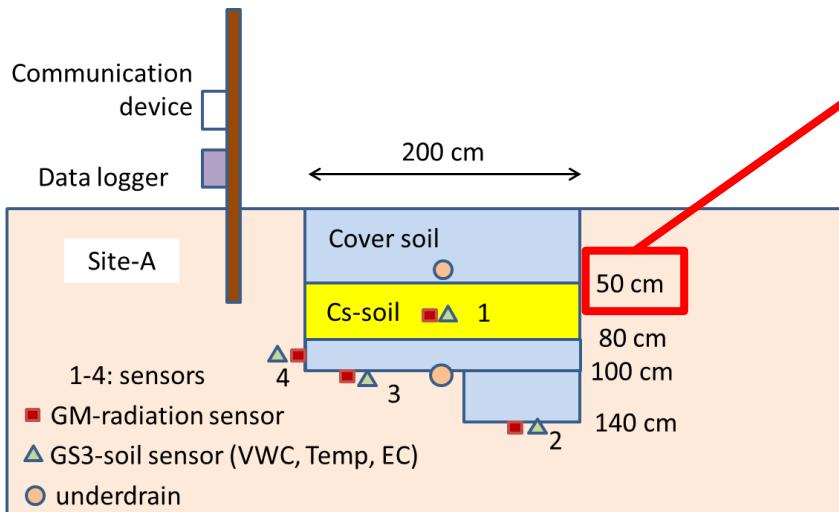
2012.12.1

18

Contaminated soil should be buried in the bare hole!

Because

1. Cs is fixed to clay minerals such as weathered mica in soil
2. Radiation dose is 1/100 to 1/1000 just bury 50cm deep!



Question?



Does NOT Cs leak out from the buried contaminated soil?

Measurement of soil radiation

- Instrument “Choshaku-kun”
- Easy to measure soil radiation in a well
- 1 m long, 3 cm in diameter
- with 10 pieces of GM tube arranged at 10cm intervals
- 3-5 min to measure



Buried work



溝口勝 @msrmz · 2017年3月12日

返信先: @msrmzさん

松塚の猛史さんの田んぼで測定。長尺くんを固定する新兵器の三脚を作って投入。

2014/5/18

2015/11/15

Measurement

15/3/21

16/3/20

16/11/6

17/3/12

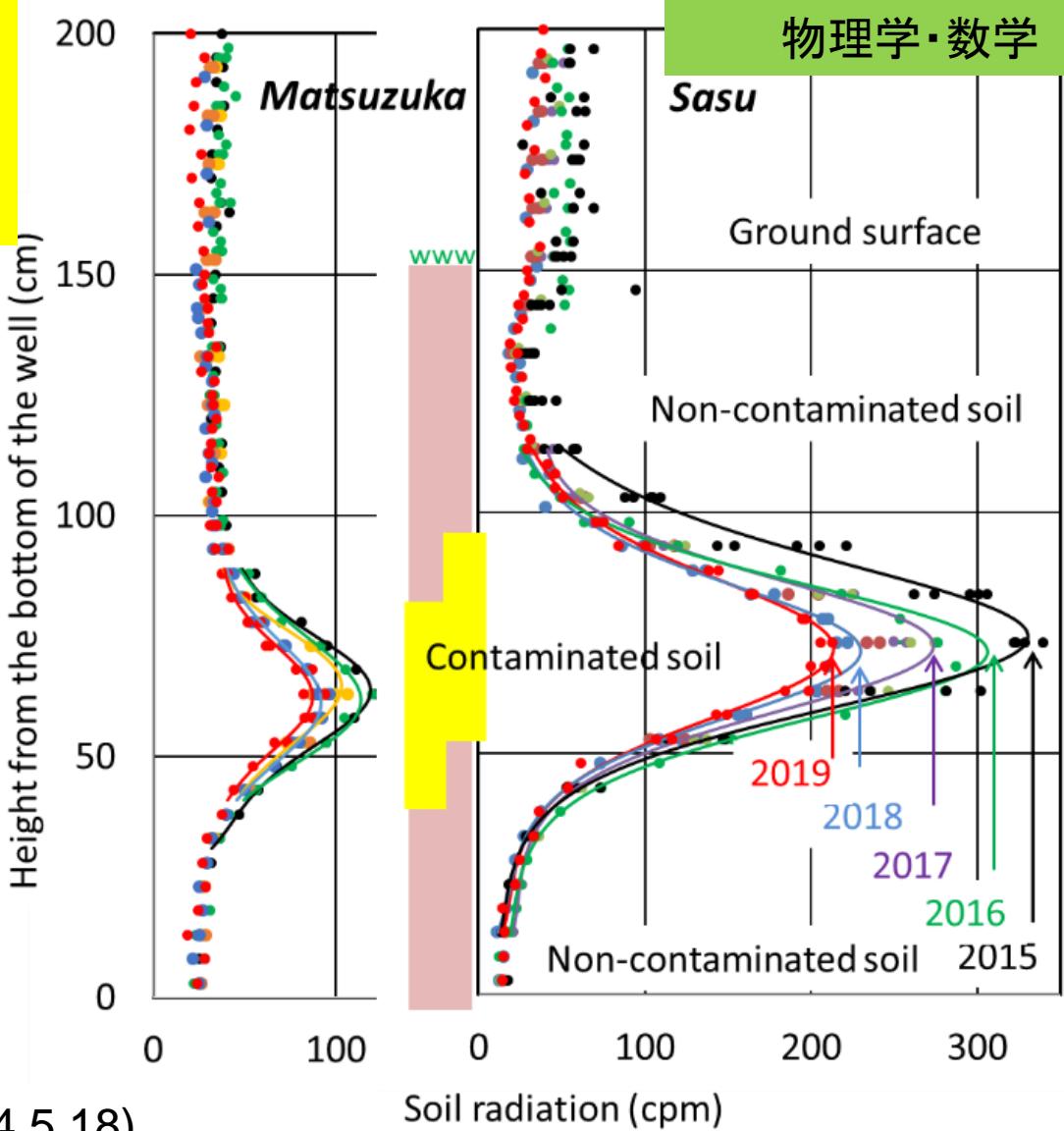
17/12/9

18/3/11

19/3/10



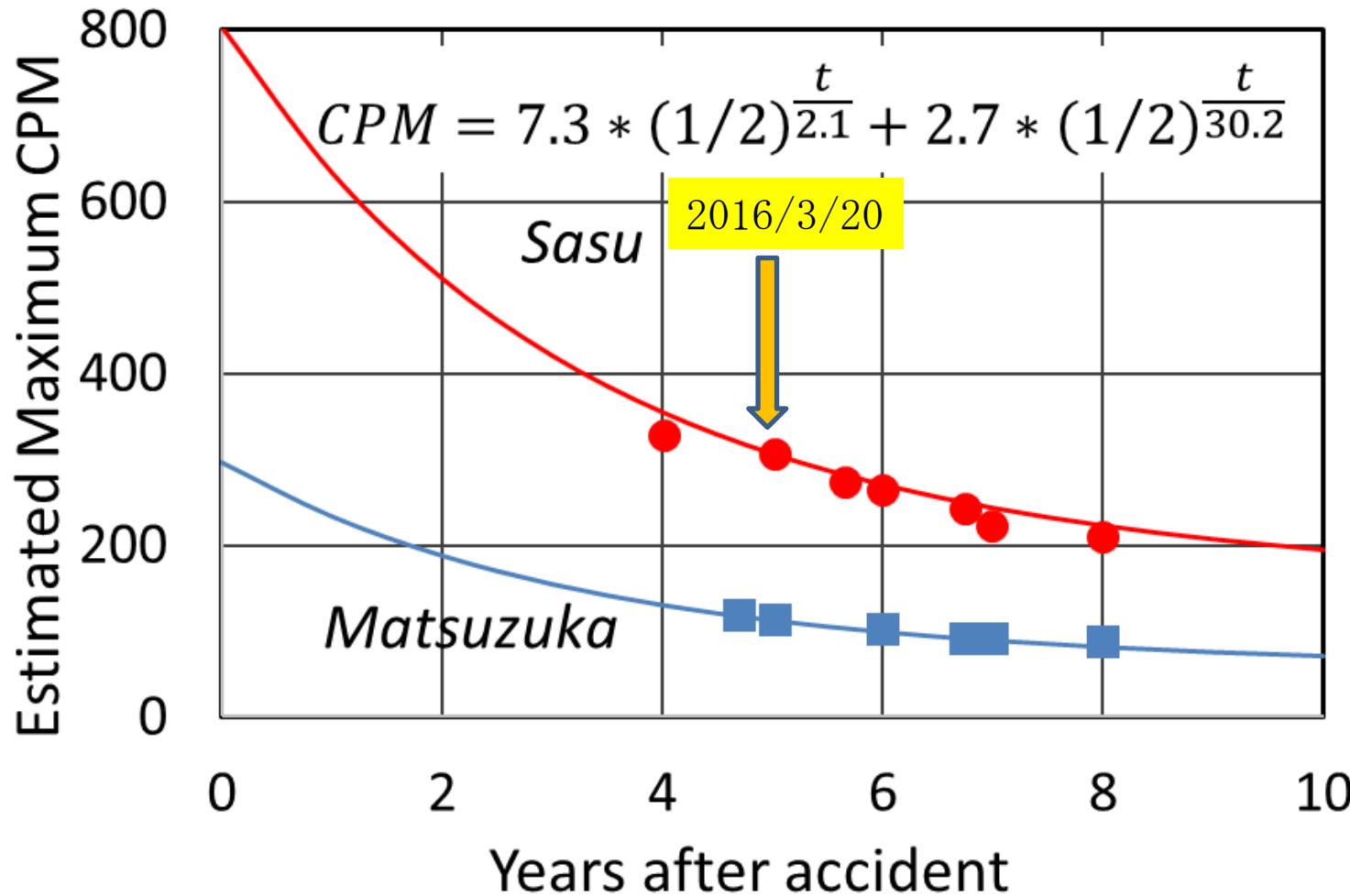
Profiles of soil radiation level



Burial of contaminated soil(2014.5.18)

- The peak depth of soil radiation has not changed
- The maximum of soil radiation levels are decaying naturally

Estimation of soil radiation with theory



- The maximum of soil radiation is decaying, in line with theory.

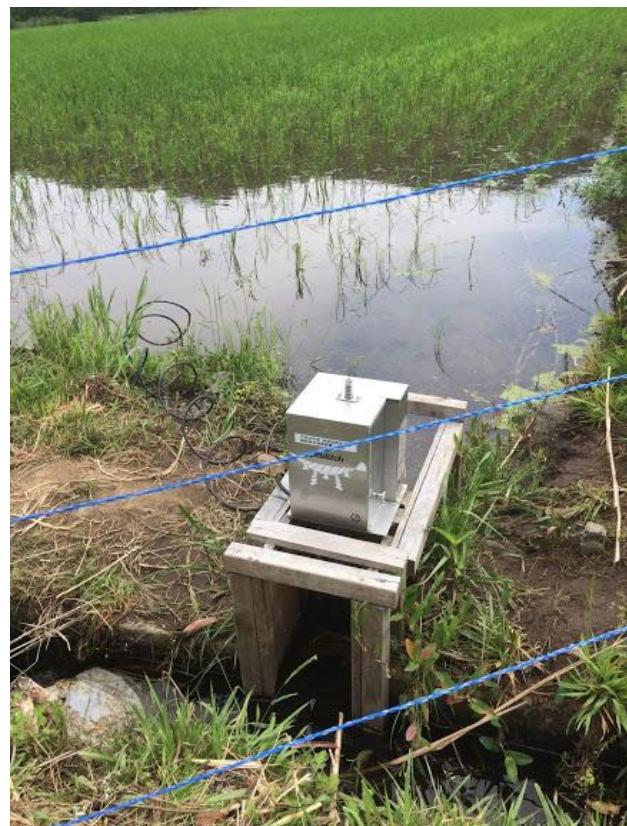
Revitalizing Agriculture in Fukushima

Rice cultivation trial by NPO since 2012



ICT Agriculture practice in Fukushima

Irrigation-water control in paddy field in Iitate Village, (2018)



1. Set Paditch

2. Add camera

3. Control gate

Conquer the world with Iitate sake

Sake without heat



Sake with heat



虎捕山の麓から 飯館再生のために
スマート農業のテクノロジーで育てた酒米から純米酒が誕生しました

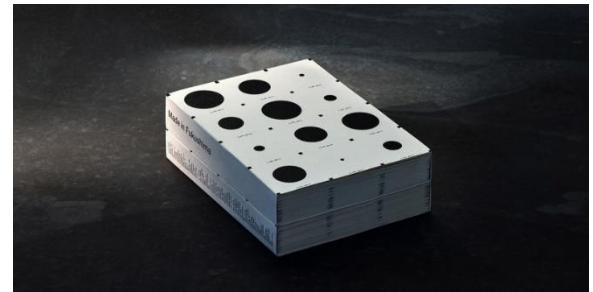


フィールド WiFi カメラによる酒米水田の監視



You can buy it at Takasakiya in front of the Faculty of Agriculture, UTokyo!

Cannes

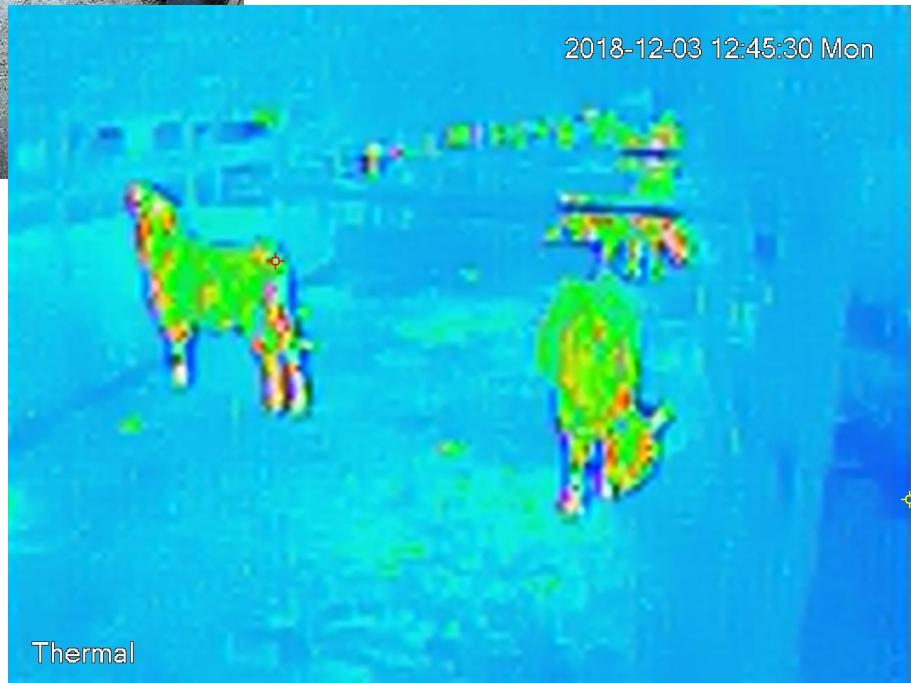
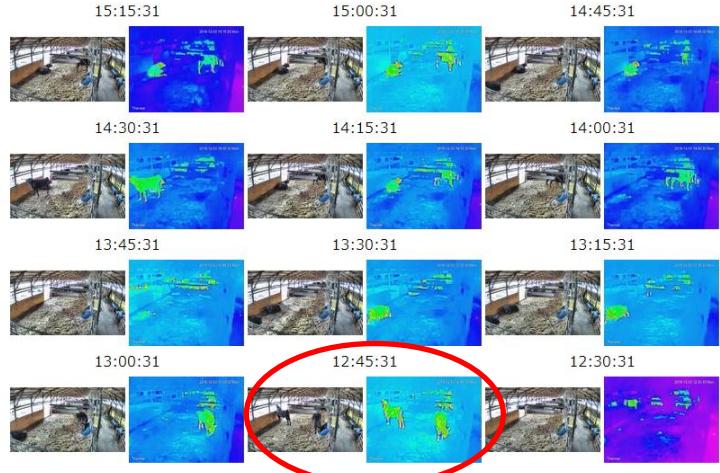
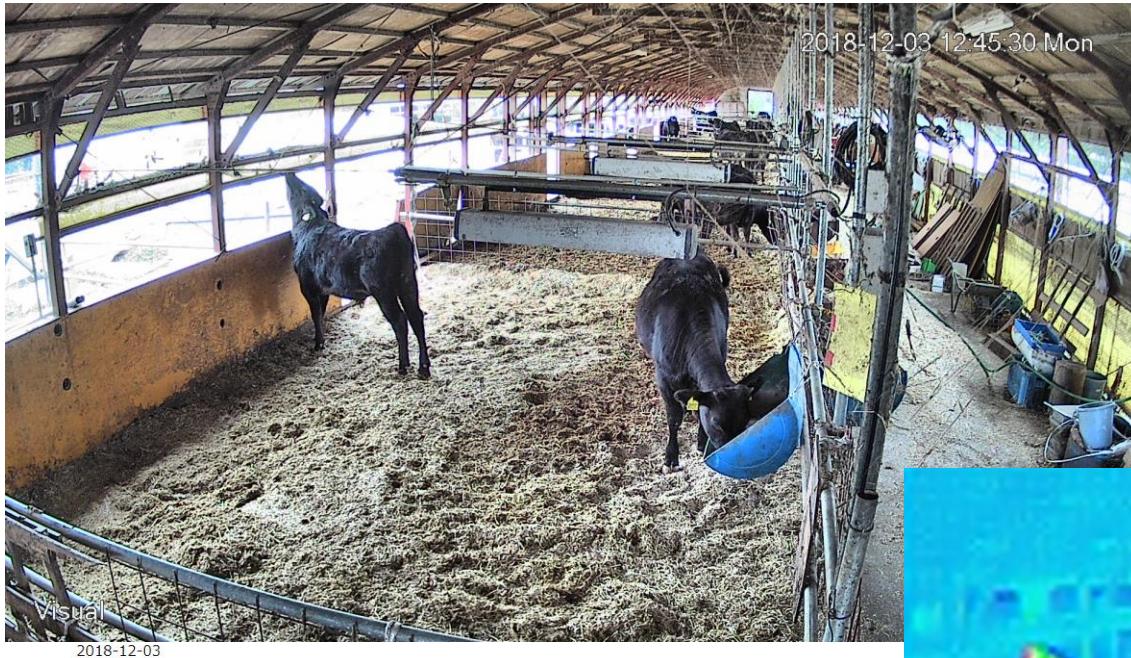


<https://www.madeinfukushima.com/>

2019/6/19



Cattle (Wagyu) monitoring in litate village using image and thermal camera



Wagyu was brand of
litate Village



Wagyu's revival will be a
symbol of agricultural revival

Rural regeneration and youth education

litate Village field tours by soil scientists



Japanese Society of Soil Physics
27 Oct. 2013



The 5th International Workshop of CAAM
6-8 March 2016

Madei Univ. (2018)



2018年10月6日-7日
宮城大学、茨城大学、
明治大学、四日市大学

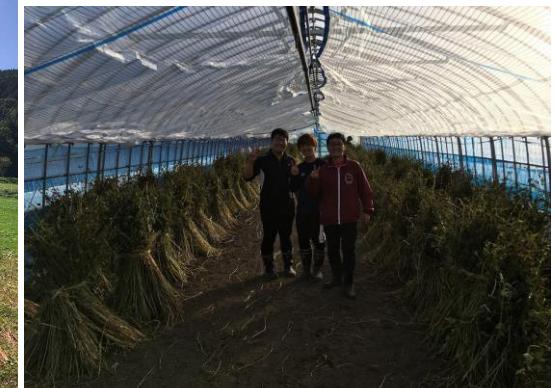


2018年10月14日-15日
弘前大学、佐賀大学、三重大学、東京農工大学、明治大学



2018年11月25日-26日
宇都宮大学、京都大学、明治大学、東京大学

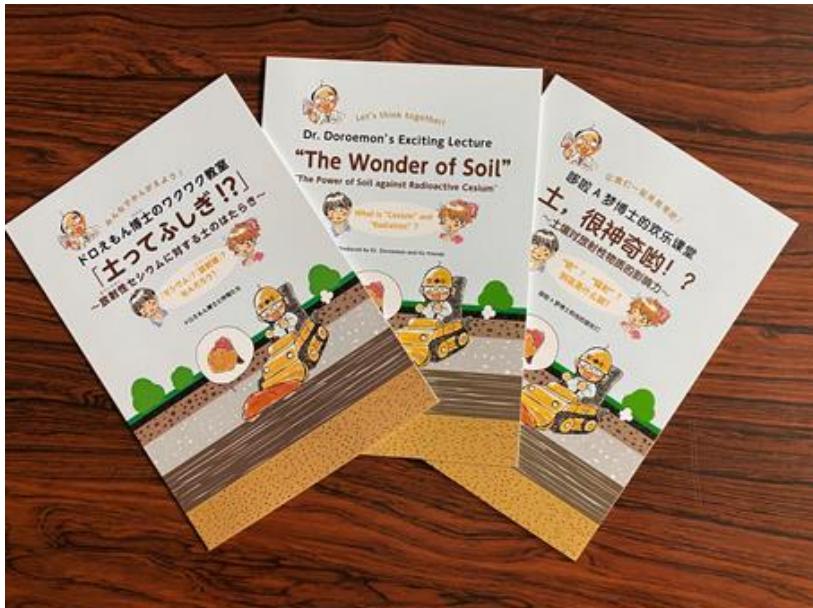
Todai Mura Juku (Soba cultivation @ Hiso, 2019)



Agricultural soil education for the general public



Soil Museum (2018.4.29)



Japanese

English

Chinese

Publication of
Dr. Doroemon
([Kindle版](#))



Tour for high school students
([2019.9.14-15](#))

What are we to do with the contaminated soil?

Stripping and burying the soil will protect you from radiation.

It's only soil on the surface, so should I strip it?

Instead of collecting and putting them in a bag, there is also a way to bury them deep in the ground.

Burying Experiment of Contaminated Soil

Radiation dose when Burying Cesium-Contaminated Soil

The figure shows a graph of radiation dose (mSv/h) versus depth (cm) for different burial depths (0, 10, 20, 30 cm) and a chart of radiation dose (mSv/h) versus time (days) for a 30 cm burial depth.

English

Agricultural engineering for Reconstruction

- Prof. Hidesaburo Ueno
 - Owner of Hachiko dog
 - Professor at Univ. of Tokyo
 - Law of Land consolidation(1900)
 - Lecture of Land consolidation (1905)
- Agricultural engineering
 - Infrastructure of food production
 - Barren land to fertile farmland
 - Land reclamation
 - Irrigation and drainage
 - Farmland decontamination
- Land use after decontamination
 - Rural plan after villagers return



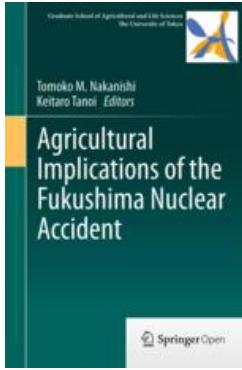
上野英三郎博士とハチ公

(2015.3.8)

FPBL :

Tips for “Robust Infrastructure Resilient”

- Quotations of Prof. Tokitaka Yokoi (1860-1927)
 - Agricultural science flourished, but agriculture destroyed
 - Those who stand on the earth will not fall, those who live on the earth will not starve, those who protect the earth will not perish
(the earth = soil)
 - Ask the rice about the rice, ask the farmers about the agriculture
- What should the Faculty of Agriculture do now?
 - Strengthen learning to discover and solve issues on site
 - FPBL(Field and Project-Based Learning) is important



Activity reports can be downloaded from homepage



Collection of Mizo's works on Fukushima (in English)

Movie:

http://www.iai.ga.a.u-tokyo.ac.jp/mizo/edrp/fukushima/Fukushima_articles.html

1. (2015.3.3) The Rebirth of Fukushima ([D](#), [H](#), [S](#))
2. (2013.9.19)[Frozen soil shuts water flow](#)
3. (2012.11.20)[Filtration of muddy water using sand](#)

Fresh water comes out when muddy water is poured in the sand. When this operation is repeated, fresh water becomes slow to come out. Clay particles with radioactive cesium are also trapped in the sand by this principle.

TV

1. (2013.12.19) [Decontaminating Fukushima: Cleaning up Farms](#)(NHK WORLD)
2. (2013.12.09) [Decontamination: Challenge of the Villagers](#)(NHK-WORLD,TOMORROW)
3. (2012.03.09) [Japan tsunami: Battling Fukushima radiation one year on](#)(BBC, UK)

How do we act
for the afflicted area
after Fukushima nuclear accident?
The respective trajectories of experts and sufferers

原発事故後、
いかに行動したか
専門家と被災者の軌跡

Article:

1. (2013.12.12) [FUKUSHIMA NEDFRYSNING SOM SKAPAR FRAGETECKEN](#)
2. (2013.10.31)[How Engineers Use Ground Freezing to Build Bigger, Safer, and Deeper](#)(NOVA next, USA)

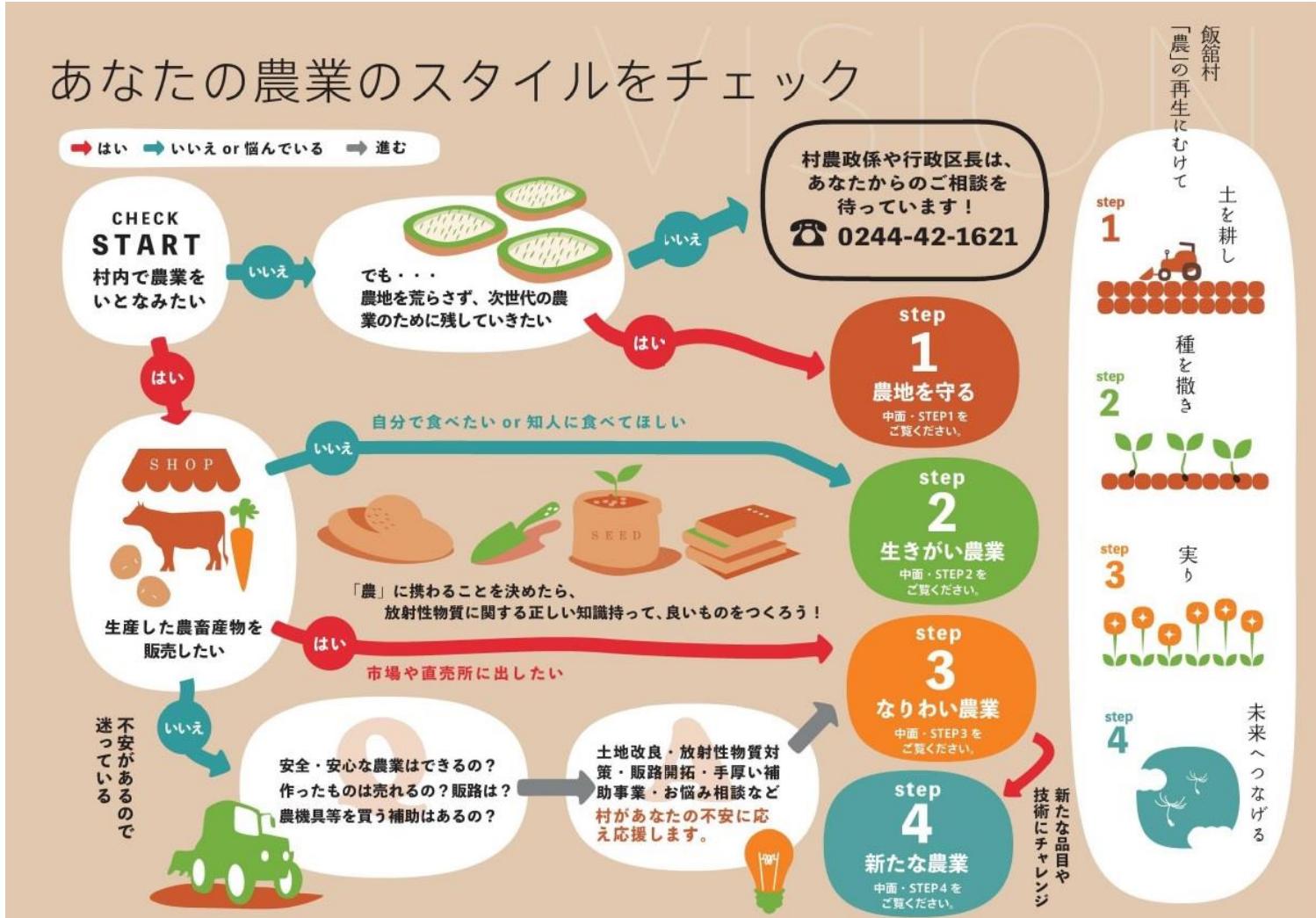
Academic meeting:

Thank you for your attention



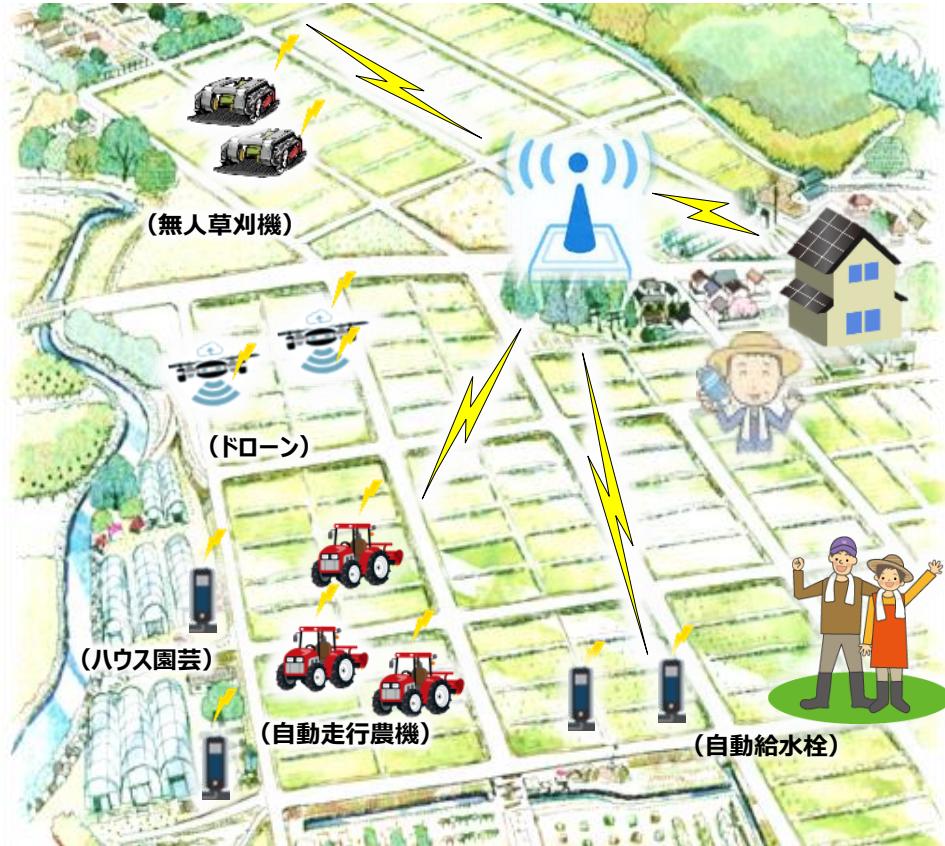
飯館村役場の戦略

Initiate Village Office Strategy



今後の展開 the next deployment

- 村内の情報ネットワーク環境整備
- Improvement of information network environment in the village



令和2年度予算概算要求の概要, p.27
<http://www.maff.go.jp/j/nousin/soumu/yosan/>

スマート農業推進農村情報基盤整備実証事業
(農林水産省農村振興局地域整備課)

Smart agricultural promotion and rural
information infrastructure development
demonstration project
(MAFF Bureau Regional Development