

Session 1, Lessons learned during an unprecedented pandemic situation

Sentinel Asia activation under the COVID-19

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Co-Chair, Emergency Preparedness Working Group (EPWG), APEC

Visiting Professor, Research Center for Urban Safety & Security (RCUSS), Kobe University

Opportunities of Remote Sensing Technology

Letter on Sentinel Asia under Covid-19 from Executive Secretary Sentinel Asia Executive Secretariat
on 17th July 2020



17 July 2020
20/JAXA/SAOC No. 0715001

Dear Sentinel Asia colleagues,

**Sincere gratitude for your support during the "Heavy rain of July, Reiwa 2" in Japan,
statement of our commitment to Sentinel Asia, and request for your continued support
under the COVID-19 pandemic**

For more than several months, we have been faced by unprecedented crises caused by the COVID-19 pandemic. Over the world, more than 10 million people have been infected by COVID-19 and more than 500,000 have perished. The situation seems to keep deteriorating and the numbers are continuously growing. This COVID-19 pandemic has changed the way of our lives completely.

A natural disaster amid COVID-19 could be a real nightmare. The local authorities and people in the affected area will be forced to address "dual challenges": they will have to combat disasters, while keeping themselves safe from COVID-19. The newly introduced norms such as "social distancing" and "self-seclusion" for containment of the spread of the virus make rescue and evacuation activities much more difficult than ever before.

Now, the season has come when water-related natural disasters such as typhoons, monsoons, and tropical cyclones are expected to occur frequently. Particularly, the Asia-Pacific region is prone to such disasters. Moreover, as this region is the most densely populated region, people in this region are more vulnerable to risks caused by the dual challenges than anywhere else.

However, looking at the bright side, remote-sensing technologies and our cooperation under "Sentinel Asia" could bring us hope. Satellite observation data provided by Data Provider Nodes (DPNs) of Sentinel Asia enable us to monitor or narrow down the possible affected area remotely, without visiting the area. Then, damage maps generated from satellite data in combination with open street maps provided by Data Analysis Nodes (DANs) of Sentinel Asia could contribute to detecting the area more precisely. local authorities' identifying appropriate evacuation sites and establishing evacuation plans. Also, members of Sentinel Asia from the international community could appeal to the humanitarian community for solidarity and for support based on the damage maps and contribute to mobilizing relief parties and supplies effectively under the mobility and distancing restrictions imposed by the COVID-19. Furthermore, as Sentinel Asia is mandated to address the entire disaster risk management cycle including the pre-disaster phase, Sentinel Asia could contribute to earning the lead time to respond to possible disasters, which has become particularly crucial under the COVID-19 pandemic.

- For sustainable development, JAXA makes efforts to solve global environmental problems. -



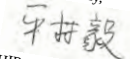
In fact, now we realize keenly the benefit and blessing of Sentinel Asia. Record-breaking torrential heavy rain hit the prefectures of Kumamoto and Kagoshima in the southern Japanese island of Kyushu on 4 July 2020. The heavy rain, named "Heavy rain of July, Reiwa 2" triggered floods and landslides, which claimed at least 68 people's lives. Many people remain missing and thousands of houses have been destroyed. What is different from ordinary disasters is that we have been confronted by the very dual challenges: The COVID-19 pandemic has complicated the rescue efforts. The need to maintain social distancing has reduced capacity at shelters, and the fear of catching and spreading COVID-19 has dissuaded volunteers from coming to help who would otherwise offer help.

Thus, the help from Sentinel Asia has been more precious than ever. In this case, immediately after the emergency observation request (EOR) from JAXA, several DPNs conducted observations, then several DANs analyzed and provided value-added products. Also, the EOR was escalated to the International Disaster Charter with the support of Sentinel Asia colleagues and an expert from the Sentinel Asia community has been supporting as the Project Manager. We are still struggling with the disaster, but we have been greatly encouraged by the thought and the fact that you, Sentinel Asia colleagues, are with us. We would like to take this opportunity to extend our sincere gratitude to all of you who have supported us.

As we ourselves have experienced, under this critical situation, Sentinel Asia could not be more helpful and beneficial than ever before. Sentinel Asia could harmonize disaster response approach with the combat against COVID-19 and provide solutions for dual challenges. Albeit the devastating circumstances, through cooperation, we could turn the current adversity into a good opportunity to enhance the value of Sentinel Asia. Sentinel Asia could be a model cooperation platform in the context of global agenda such as Sendai Framework for Disaster Risk Reduction, and the Sustainable Development Goals (SDGs).

Therefore, we, the Sentinel Asia Executive Secretariat will be committed to supporting Sentinel Asia and make our best to collaborate with DPNs, DANs, and all Joint Project Team members to ensure the normal operation of Sentinel Asia's emergency observations. At the same time, as solidarity among Sentinel Asia members will be pivotal, we kindly request you for your continued support, just as you have supported us. We believe we can build back better from the crises and we look forward to meeting you again after we have recovered with resilience.

Yours sincerely,


HIRABAYASHI, Takeshi
Executive Secretary
Sentinel Asia Executive Secretariat

- For sustainable development, JAXA makes efforts to solve global environmental problems. -



Effective, Reliable, Practical & Flexible

- OPTEMIS, led by GISTDA
- Mobile App for Post Disaster Survey, led by GCI-AIT
- Calibration Site for Various Satellite Data, led by Yamaguchi University
- Flexible Emergency Observation Operation (case study in Lebanon, Turkey) , led by ADRC
- Escalation of IDC through Sentinel Asia

OPTEMIS

Integrated operation & information sharing system
for Emergency Observation of Sentinel Asia

Led by GISTDA

About OPTEMIS

OPTEMIS for Sentinel Asia has important functions, such as the **Emergency Observation Request (EOR)** on WEB, and visualization on the status of **DPN** and **DAN**. JPT members can request **EOR** via this system.

Requester

Name *
Makoto Ikeda

Organization *
Memberships *

Phone
123456

Cellular Phone
123456

Fax

Email Notification (use commas to separate multiple email addresses)
example@email.com, example2@email.com

Add Contact Person

Request Area

Area Type ☒ Input Circle ☐ Input Rectangle

Latitude Center (DMS)
Degrees Minutes Seconds N

Longitude Center (DMS)
Degrees Minutes Seconds E

Radius (km)

+ Add to map

Disaster Management Organization

ADRC is the first point of contact in the Sentinel Asia system for the first evaluation of an EOR and judges the Sentinel Asia Secretariat provide following information.

Organization

Planned end-user of the observed information

Please provide us information, to the best of your knowledge, on the use of the satellite image. ADRC may ask some questions to the user of the image.

The information/image shall be used only for the purpose stated above.

Escalation for IDC

The requesting organization (RO) may further ask whether to elevate this Emergency Observation Request (EOR) to International Charter for Space and Major Disasters (ICD) when secretariat confirms its appropriateness. If RO wished to elevate to IDC, please check the box on the bottom.

☐ Elevate

OPTEMIS

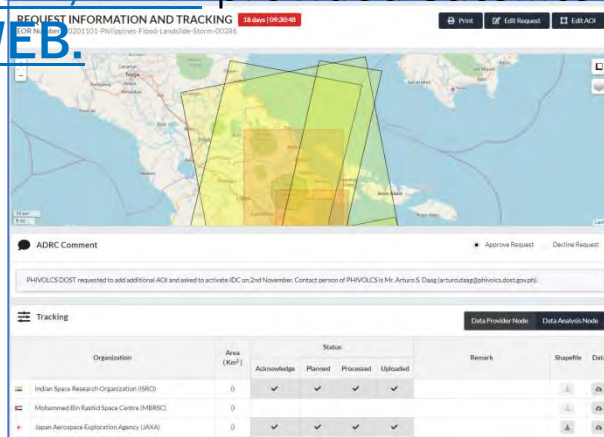
[Necessary items for EOR registration]

- Requester information
- Disaster Management Organization
- Kind of disaster
- Purpose for utilization
- Latest information about disaster (news source, damages, number of affected people, etc)
- AOI: Area of Interesting for observation
- Escalation to IDC (International Disaster Charter)
- etc

Case Study – Typhoon GONI (November 2020, Philippines)

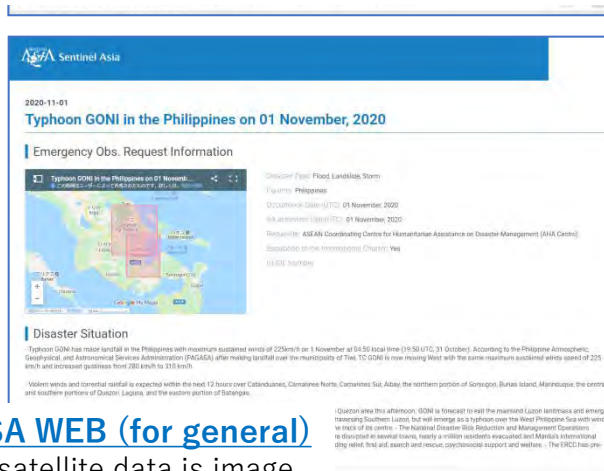
AHA Center requested about Typhoon GONI in November 2020. And ADRC registered this request information into [OPTEMIS](#) and asked to support [DPN/DAN](#).

[DPN/DAN](#) provided satellite data and [product \(VAP\)](#) via [OPTEMIS](#) and [SA WEB](#).



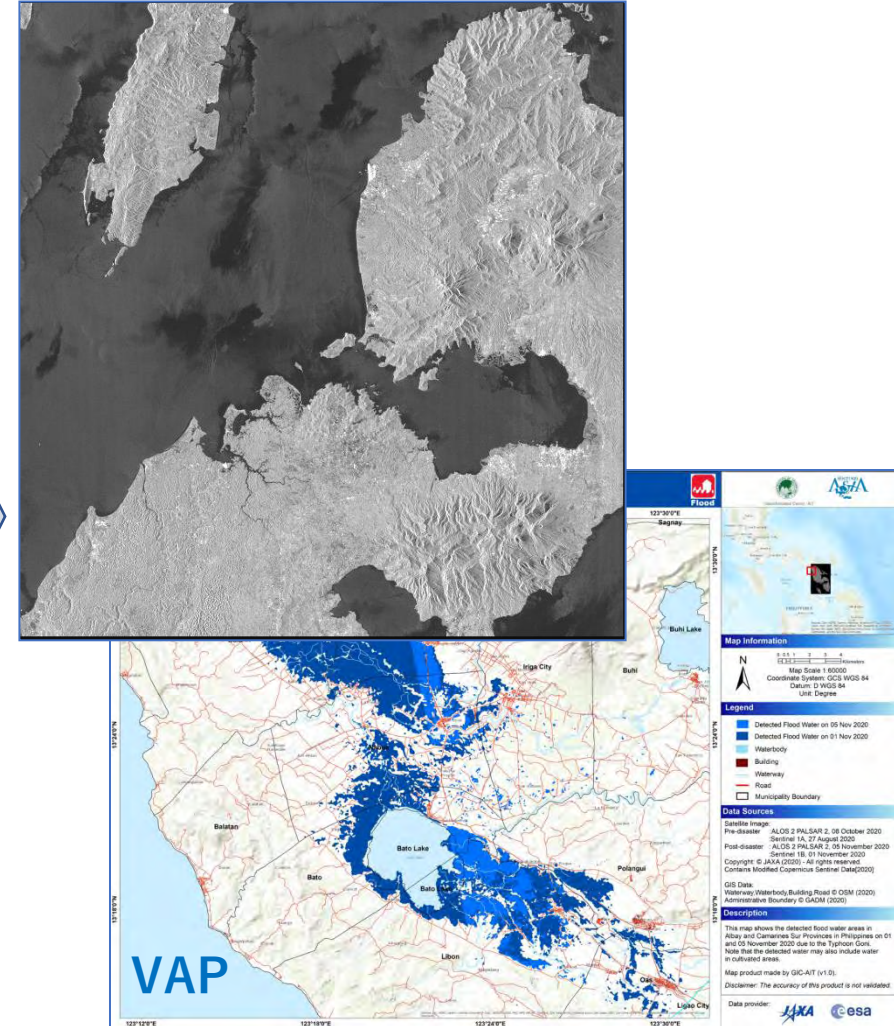
[OPTEMIS \(for only JPT members\)](#)

*satellite data includes coordinate (X and Y) information



[SA WEB \(for general\)](#)

*satellite data is image



Mobile App for Post Disaster Survey

Validation with ground truth

Led by GIC-AIT

- The mobile app is developed to **collect information on latest disasters and their impacts** on building, properties, and infrastructures.
- The collected information will be useful for post-disaster activities, particularly the **satellite-based disaster mapping**.

Structure of the app

GIC Disaster Survey							
Disaster Information							
Disaster Type	Flood	Landslide	Earthquake	Cyclone	Volcano Eruption	Forest Fire	Other
	Flood Type (Riverine Flood, Flash Flood, Urban Flood, Coastal Flood, Other)	Landslide Type (Mudflows, Rock Falls, Debris flows, Other)	Secondary Hazard (Tsunami, Liquefaction, Flooding, Landslide, Fires)	Secondary Hazard (Storm Surges, Strong Wind, Tornadoes, Flooding)	Secondary Hazard (Lava Flows, Lahars, Volcanic Gases, Volcanic Ashes, Fire, Pyroclastic Flows)	Secondary Hazard	
	Flood Water Level (Ankle, Waist, Chest, Head, Above Head, Other)						
Damage Information							
Damage Object	Building (Building type, Construction Materials, Number of Floor, Damage level)	Building (Building type, Construction Materials, Number of Floor, Damage level)	Building (Building type, Construction Materials, Number of Floor, Damage level)	Building (Building type, Construction Materials, Number of Floor, Damage level)	Building (Building type, Construction Materials, Number of Floor, Damage level)	Building (Building type, Construction Materials, Number of Floor, Damage level)	Other information related to damage
	Road (Road type, Construction Materials, Impassable Road, Damage level)	Road (Road type, Construction Materials, Impassable Road, Damage level)	Road (Road type, Construction Materials, Impassable Road, Damage level)	Road (Road type, Construction Materials, Impassable Road, Damage level)	Road (Road type, Construction Materials, Impassable Road, Damage level)	Road (Road type, Construction Materials, Impassable Road, Damage level)	Other information related to damage
	Bridge (Bridge type, Construction Materials, Impassable Bridge, Damage level,)	Bridge (Bridge type, Construction Materials, Impassable Bridge, Damage level,)	Bridge (Bridge type, Construction Materials, Impassable Bridge, Damage level,)	Bridge (Bridge type, Construction Materials, Impassable Bridge, Damage level,)	Bridge (Bridge type, Construction Materials, Impassable Bridge, Damage level,)	Bridge (Bridge type, Construction Materials, Impassable Bridge, Damage level,)	Other information related to damage
	Agriculture (Crop Type, Damage Level)	Agriculture (Crop Type, Damage Level)	Agriculture (Crop Type, Damage Level)	Agriculture (Crop Type, Damage Level)	Agriculture (Crop Type, Damage Level)	Agriculture (Crop Type, Damage Level)	Other information related to damage
Survey location							
Geo-tagged photos							
Additional Information and Comment							

**GIC** Disaster Survey
Asian Institute of Technology

The mobile app is developed to collect information on current disasters and its impact to important objects, properties, and infrastructures. The collected information will be useful for disaster response and post-disaster activities, including for the satellite-based disaster mapping Sentinel Asia.

Please complete the following survey regarding disaster occurring in your area.

Date/Time*

 10/28/2020

 10:10 AM

Disaster Information

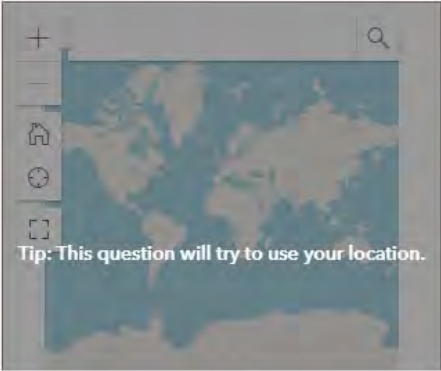
Disaster Type*
What disaster is occurring in your area?

-Please Select-

Damage Information

Other information related to damage*
Please specify any information related to damage such as object type and its properties, damage level.

Survey Location*



Tip: This question will try to use your location.

How to access the mobile app?

- Web link
 - <https://arcg.is/1HWGWX0>
- QR Code

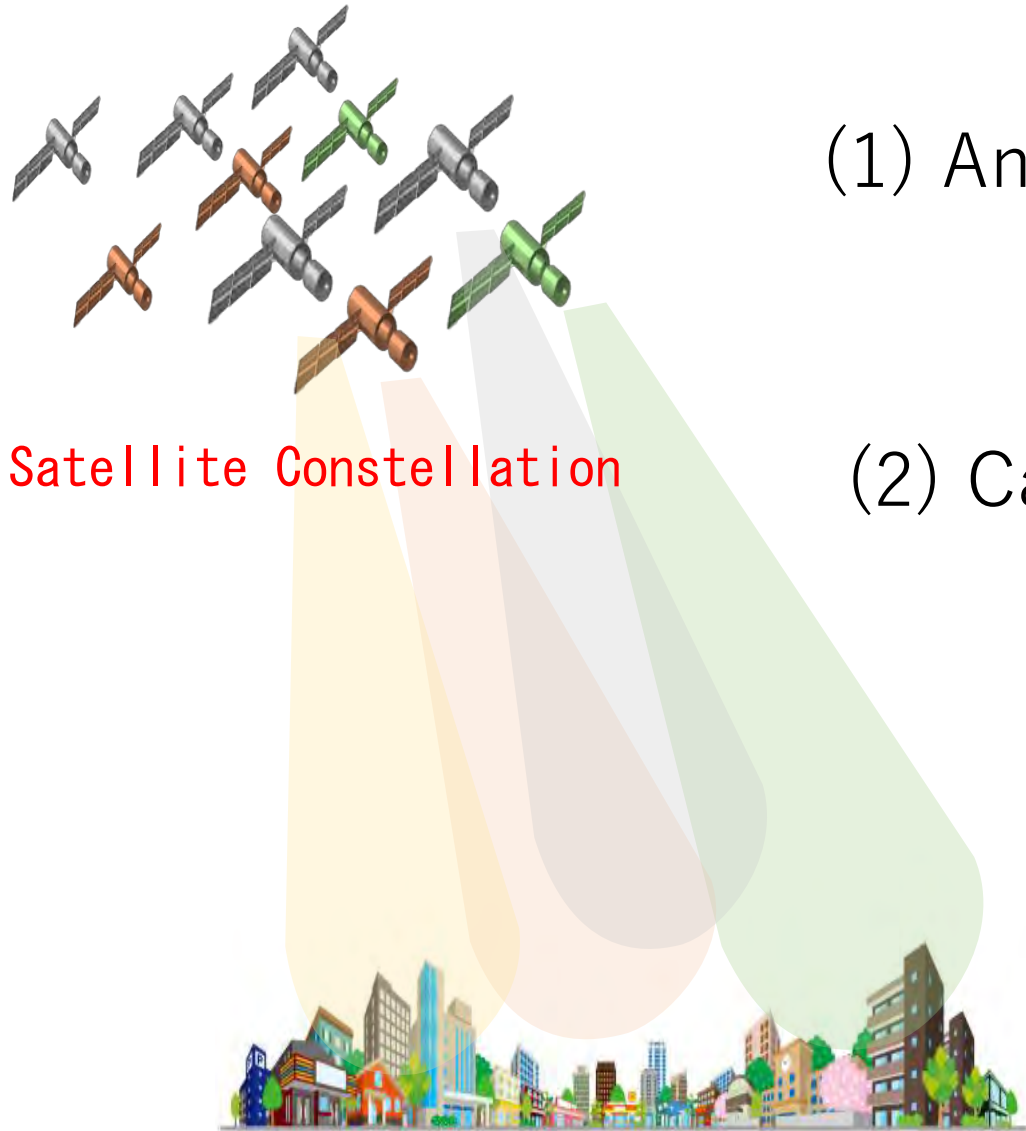


Calibration Site for Data of Multiple Satellites

Development of calibration tool for AI analysis of satellite imagery of multiple satellites

Led by Yamaguchi University

Two Challenges



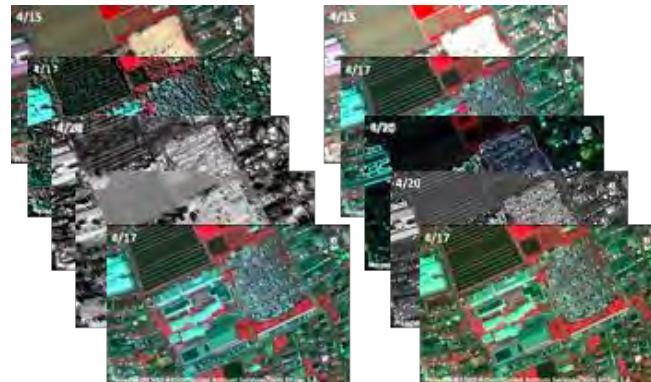
Satellite Constellation

(1) Analysis for Huge Amount of Satellite Data

→ Applying AI technologies

(2) Calibration for Various Satellite Data

→ Development of Calibration Site

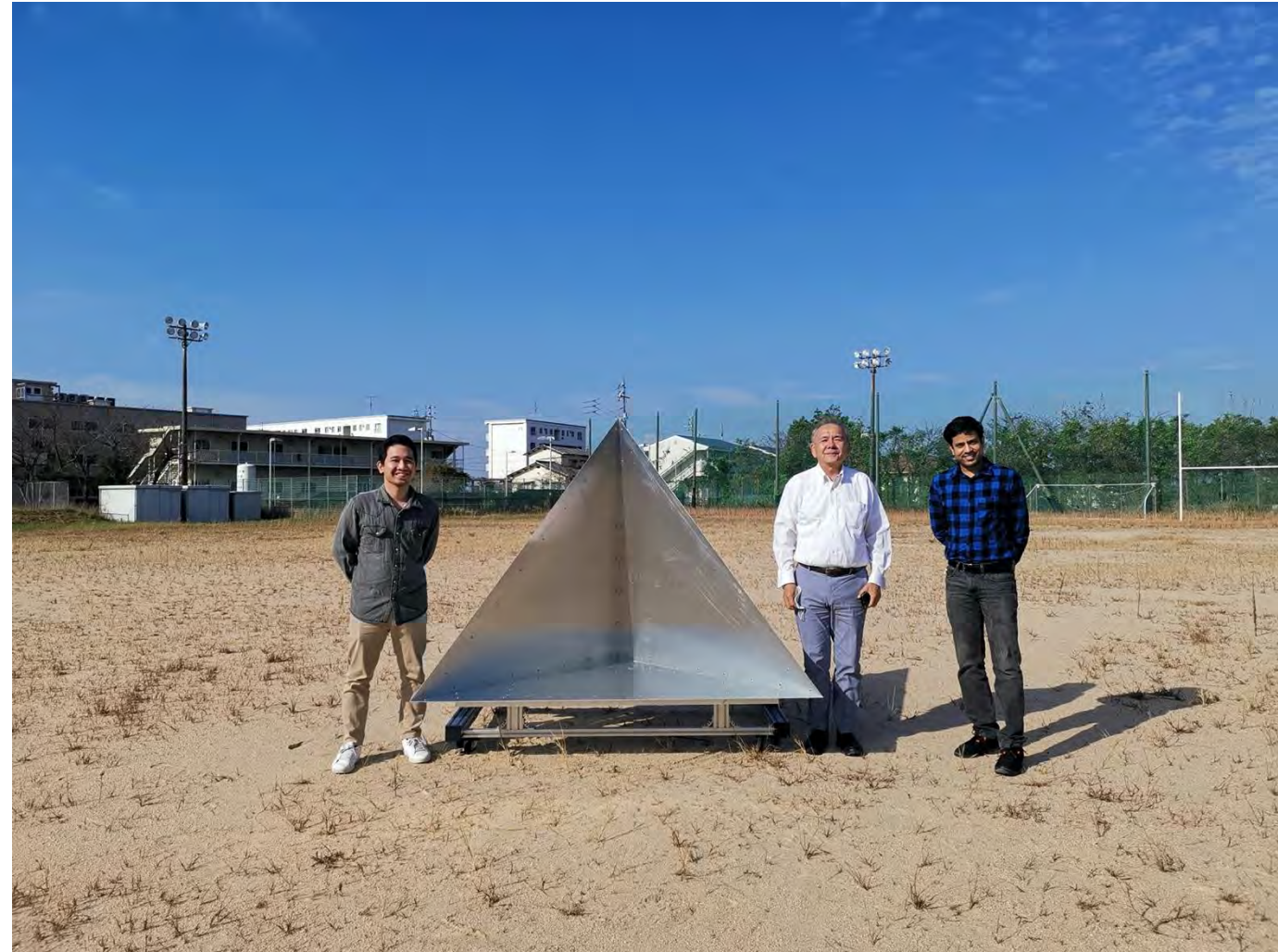


Calibration Site for Conner Reflector

Corner Reflectors (CR) can be used as coherent targets in SAR images for calibration by using strong backscattering property and temporal stability.



Small target (Matsuda Tekkousho)



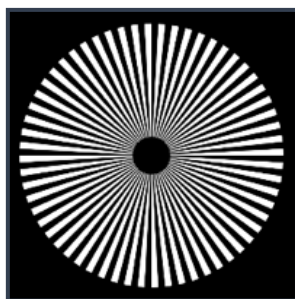
Yamaguchi University

Calibration Site for Ground Target

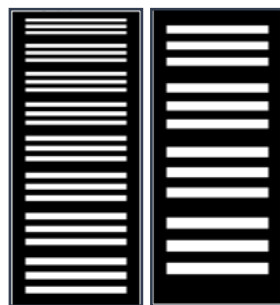
Ground Target for Optical Image (2.5m)



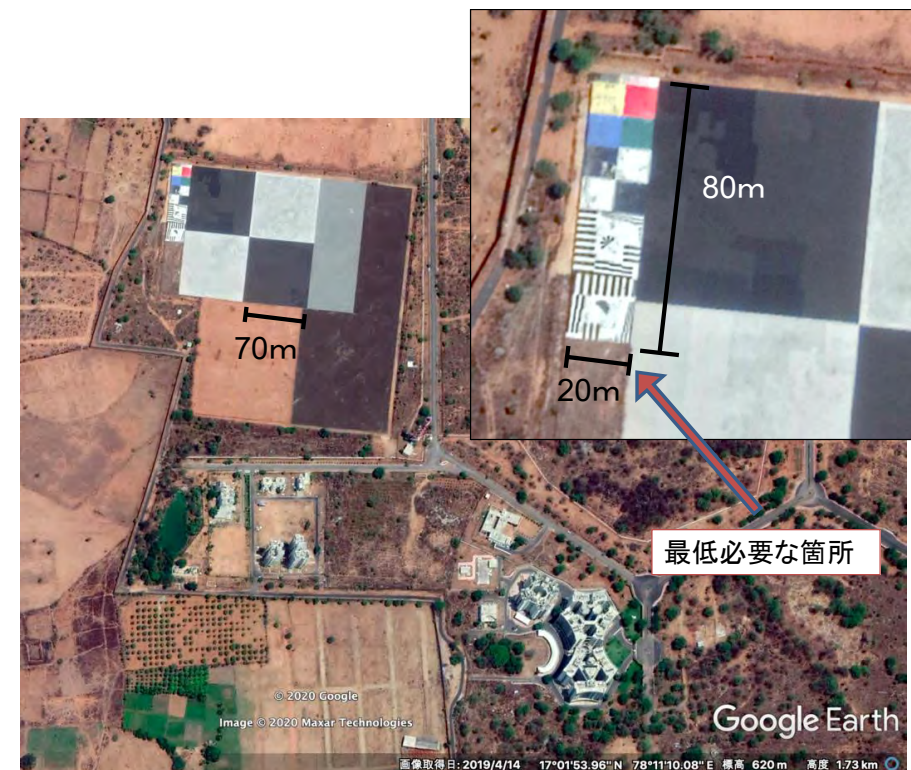
Tokiwa Park at Ube, Yamaguchi



(20m × 20m)



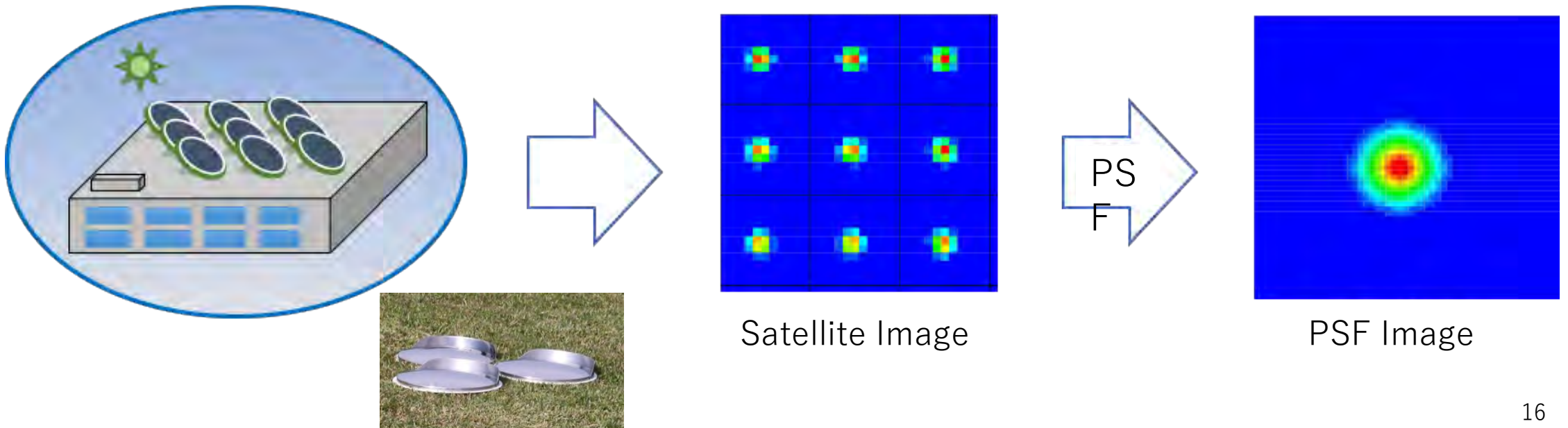
(10m × 20m)



Ground Target by ISRO

Calibration Site for Mirror Array

- Mirror Arrays is to create two arrays of calibration targets for deriving absolute calibration coefficients of Earth remote sensing systems in the solar reflective spectrum.
- Array of single mirrors used to oversample the sensor's point spread function (PSF) providing necessary spatial quality information needed to perform the radiometric calibration of a sensor.



Flexible Emergency Observation Operation (case study in Lebanon, Turkey)

Led by ADRC

Explosion in Beirut, Lebanon on 08 August, 2020

- Activation of Sentinel Asia Emergency Observation by the request of AFAD Turkey for the event of Lebanon
- Emergency rescue operation of AFAD in Beirut

cf: Sentinel Asia URL;

<https://sentinel-asia.org/EO/article20200808LB.html>

Turkey Earthquake on 30 October, 2020

- Activation of Sentinel Asia Emergency Observation by ADRC on behalf of AFAD, Turkey
- JICA contacted Sentinel Asia for the information products which support JICA emergency support in Turkey

cf: Sentinel Asia URL;

<https://sentinel-asia.org/EO/article20201030TR.html>

Escalation of IDC through Sentinel Asia

In Sentinel Asia emergency observation, **Project Manager** and **Data Analysis Organizations** are **assigned in advance**

UNSPIDER could escalate to IDC through Sentinel Asia for the disaster events in Asia and the Pacific

Escalation from Sentinel Asia to IDC

Sentinel Asia 4.0.0

Emergency Request Form
Request Satellite Data

Requester

Name * Makoto Ikeda
Organization * Asian Disaster Relief Center

Phone 123 Cellular Phone 123 Fax Email * mi-ikeda@adrc.ac.jp

Email Notification (use commas to separate multiple emails)
eg: example1@example.com, example2@example.com

☐ Add Contact Person

Disaster Management Organization

ADRC is the first point of contact in the Sentinel Asia information by Disaster Management Organization to undertake the first evaluation of an EOR and judge if the framework is suitable to assist. To proceed the EOR contact with DMOs. Please provide following information.

Organization Email

Planned end-user of the observed information

Please provide us information, to the best of your knowledge, of the organization (e.g. Disaster Management Organization) that will utilize the satellite image. ADRC may ask some questions to the organization, if needed.

☐ The information/image shall be used only for our organization ☐ The information/image shall be used for other purposes

Request Area

Area Type ☐ Input Circle ☐ Input Rectangle

Map showing the Request Area with a scale bar (1000 km, 1000 mi) and a "Finish" button.

Escalation for IDC

The requesting organization (RO) may further ask whether to elevate this Emergency Observation Request (EOR) to International Charter for Space and Major Disasters (IDC) when secretariat confirms its appropriateness. If RO wished to elevate to IDC, please check the box on the bottom.

☐ Elevate



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20 years of the International Charter - See our special anniversary publications

The International Charter Space and Major Disasters

Providing satellite data to those affected by natural or man-made disasters through

Call Details Dashboard: Temp Call (new)

1 Date and time of the call

Day 06-Nov-2020
Local time (hours, minutes) 11:11

2a Name and contact information of the caller (organisation submitting this request)

Organization ADRC
Contact - Name Mr. Ikeda Contact - Surname Ikeda
Phone +81 76 2554000 FAX +81 76 2554000
E-mail sampei@adrc.ac.jp Mobile Phone +81 3 37121212

Submitted on behalf of [Name] [Email]

3 Type of disaster

☐ Earthquake ☐ Flood (large area) ☐ Flash Flood ☐ Landslide
☐ Oil spill ☐ Sea ice ☐ Snow hazard ☐ Storm & Hurricane (Rural area)
☐ Storm & Hurricane (Urban areas & infrastructure) ☐ Tsunami ☐ Volcanic eruptions ☐ Wildfire
☐ Other (specify):

4 Affected area

Enter coordinates or draw shapes on the map

Upload KMZ, KML or ZIP (including SHP) file

Map showing the affected area with a scale bar (1000 km, 1000 mi) and a "Finish" button.

OPTEMIS (Sentinel Asia)

COS-2 (International Disaster Charter)

Number of Escalation to IDC (2011-2020) *as of 5 Nov 2020

