Sentinel Asia
-A space-based disaster management support in the Asia-Pacific region-

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Sentinel Asia Steering Committee Secretariat
Japan Aerospace Exploration Agency
Sentinel Asia

Sentinel Asia is a voluntary initiative by a collaboration between space agencies and disaster management agencies, applying remote sensing and Web-GIS technologies to assist disaster management in the Asia-Pacific region.

In Oct 2005, APRSAF-12, in Kitakyushu, Japan, the plan to initiate the pilot project was approved. http://www.aprsaf.org/data/aprsaf12_data/day3/5_sswg%20sumrepo.pdf

In Feb 2006, Joint Project Team (JPT) was organized and Sentinel Asia has started. Sentinel Asia is the first initiative under APRSAF. http://sentinel.tksc.jaxa.jp/
Collaboration among Sentinel Asia Communities

Sentinel Asia
Since 2006

111 Organizations

Space Community
8 organizations

International Community
10 organizations

Data Analysis Support Community (universities, research institutions)
39 organizations

Disaster Management Community (DMO/DMA)
54 organizations
Data Provider Node (DPN) - Sentinel Asia Constellation contributing to Emergency Observations

**ISRO**
RESOURCESAT-2, OCEANSAT-2/OCM
IMS-1, CARTOSAT-1&2, RISAT-1

**JAXA**
ALOS-2

**STI/VAST**

**VNREDSat-1A**

**NARLabs**

**GISTDA**

**FORMOSAT-5**

**CRISP**

**TeLEOS-1**

**KIBO HDTV-EF2**

**MBRSC**

**DubaiSat-2**

**KhalifaSat**

escalation from Sentinel Asia Constellation
Emergency Observation Flow

Requesting Organization (RO)
- ADRC members
- JPT members

Disaster Occurrence

Emergency Observation Request, Disaster Info
- Communication on status of disaster, observation, etc.

ADRC
- Escalation of Emergency Observation Request
- Emergency Observation Request
- Disaster Info
- Analyzed Products
- Satellite Images & Disaster Info

Data Provider Node (DPN)
- Archive Images
- Images by Emergency Observation
- Analyzable Data
- Own Data

Sentinel Asia EOR Support System
- https://optemis.sentinel-asia.org/

Support

JAXA (JPT Secretariat)

Disaster Management Agencies in Asia

International Disaster Charter

Feedback

Support.
Data Analysis Node (DAN)

Framework of satellite data analysis to provide analyzed products

2 P-DAN
45 DAN (incl. 8 DPN)
EOR Review, Responded Disaster by Geographical Distribution

30 countries/regions
343 disasters

Feb. 2007 - 15 March. 2021
More than 1000 VAPs!
These data are shared with our users via Web-GIS.
FOREST FIRE IN GOSEONG COUNTY, GANGWON PROVINCE, KOREA
As observed by FORMOSAT-5 image on 8 April 2019

Legend:
- Road
- Building
- Water body
- Burnt area
- Potentially burnt area

Data Sources:
- Satellite image: Pre-disaster - LANDSAT-8, 3 April 2019
  Post-disaster - FORMOSAT-5, 8 April 2019
- Copyright: © NSPO (2019) - All rights reserved
- © USGS (2019) - All rights reserved
- GIS data: Water body, Road, Building © OSM 2019
- Service Layer Credits: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO,

Description:
This map shows possible burnt and potential burnt areas from forest fire on 4 April 2019, which has affected Goseong county, Gangwon province. Note that burnt and potential burnt areas may also include forest areas.

Map product made by GIC-AIT (v1.0).

Disclaimer: The accuracy of this product is not validated.

Map Information
MAP SCALE 1:10,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree

Kilometers
0 0.55 1.1 1.65 2.2
Sentinel Asia Evolution Image

Technology Development

Step 1
2006-2007
Pilot Project

Step 2
2008-2012

Step 3
2013 onwards

New Satellites
New Technologies

User Requirement

User: JPT members, Disaster Management Org.

Voluntary initiative under APRSAF, led by JAXA

2015-2019
New Sentinel Asia

To push forward
Step 3 by:
- Joint Drive
- For End Users
- Strategic Management by Steering Committee

2020 onwards

To be studied in Steering Committee

To aim at autonomously sustainable activity/management

More contribution from each participating institutions under APRSAF
Concept of SA Strategic Plan

“Challenges for Disaster Risk Reduction by a Collaboration between Space and Disaster Management Agencies”

**MITIGATION**
- Hazard Map
- Early Warning
- Success Story
- Pre-disaster monitoring

**PREPAREDNESS**
- Training
- Capacity Building
- Standard Operation Procedure (SOP)

**RECOVERY**
- Mid/Long-term monitoring
- Recovery Status

**RESPONSE**
- Emergency Observation
- Data Analysis
- Damage Assessment

![Sentinel Asia Logo](image)
Mitigation/Preparedness

Key points:
• Recognition of Disaster occurrence spots by Hazard Map produced by space-based information.
• Expand Philippines Success Story, (Hazard maps, Early warning system of landslide etc.) to other countries.
• Development of new early warning system as a result of WGs activity.
• User enhancement by show-case, use-case of Sentinel Asia activity
• Capacity building for organization/agency,(not individual person) on remote-sensing and GIS technology. One DAN in each country.
Key points;
• Sharing all information on the Web
• Easy registration of EOR
• Visualization on the Status of DPN and DAN activity
• Quick response from requirement to data provision
• More useful and helpful products and information
Japan Aerospace Exploration Agency

Sentinel Asia Members/Users

Sentinel Asia Member (Disaster Management Organization/Agency)

Notification/Communication by ADRC

Satellite images, VAPs and Information

Emergency Observation Request

Confirmation

Sentinel Asia Portal Site

Sentinel Asia OPTEMIS @GISTDA

Sentinel Asia Cloud Storage /Analysis @ASGC

Web-GIS online

Emergency Observation Request

Status Report

Observation Data Provision

VAP Upload

Data Analysis Node

Data Provide Node
Recovery

Key points;
• Monitor devastating damage, like huge flood, caused by big disaster in regular.
• Monitor the situation related to secondary disaster, like landslide dam, in regular.

Huge Flood in Thailand, 2012
Flood Analysis using AVNIR-2 image

- Generating flooded area polygon at regional government
- Calculating surface at flooded area
- Providing those data to Government of Japan and local governments

Surface: Fukushima Pref.

Flooded areas decreasing with time
Current Status of the Strategic Plan

• Currently the first draft of long-term plan is drafted,
• Action items identified during the discussions are summarized and shared with SC members to identify possible contribution of partners and the time frame of achieving them,
• Action plan was summarized into 5 main themes and supported by 5 leading agencies with their voluntary worked;

II. Value Added Product (VAP): Yamaguchi University
III. End-user Enhancement: GIC-AIT
IV. Step-3 Activities (Complete DRR cycle): ADRC, IWMI and GIC-AIT
V. Communication, Collaboration and Cooperation: ADRC

And Concept Paper on SDG, Sendai-framework and the relationship/benefit/usage of Sentinel Asia is being prepared by IWMI and GIC-AIT
Developing Standard Operation Procedure (SOP) for Sentinel Asia

The purpose of SOP is to make clear each role and to strengthen the network between JPT members and other agencies in Myanmar, Thailand and Viet Nam.

[Table of Contents (Myanmar version)]

1. Preface
   1-1. Introduction
   1-2. Objectives
   1-3. Essential Conditions
   1-4. Member List in Myanmar
   1-5. Scope of this Manual

2. Discussion for EOR among Members in Myanmar
   2-1. Disaster Information Sharing
   2-2. Confirmation for EOR

3. Preparing and Submitting EOR Sheet
   3-1. About EOR Sheet
   3-2. Preparing EOR Sheet
   3-3. Submitting EOR Sheet

4. Registration into Sentinel Asia Server
   4-1. About Sentinel Asia Server
   4-2. User Name and Password for Sentinel Asia Server
   4-3. Registration Disaster Information into Sentinel Asia Server

5. Providing Disaster Information and Feedbacks
<table>
<thead>
<tr>
<th>Country</th>
<th>Date</th>
<th>Venue</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Myanmar</td>
<td>30 January 2018</td>
<td>Horizon Lake View Resort</td>
<td>(RRD, DMH, ADPC, MIMU, One map Myanmar, etc.)</td>
</tr>
<tr>
<td>In Thailand</td>
<td>22 February 2018</td>
<td>Wayupak Convention Center</td>
<td>(DDPM, GISTDA, MOI, RID, DWR, RFD, ADPC, etc.)</td>
</tr>
<tr>
<td>In Vietnam</td>
<td>19-20 March 2018</td>
<td>STI building</td>
<td>(STI, MONRE, DMPTC, etc.)</td>
</tr>
</tbody>
</table>
This figure was confirmed by participants in each workshop.
Summary

- Sentinel Asia (SA) is a voluntary initiative by a collaboration between space agencies and disaster management agencies to reduced disaster risk in Asian-Pacific region.
- SA has responded over 300 requirements from JPT and ADRC members since 2007.
- SA is expected to implement not only emergency observation but activities covering entire disaster management cycle including mitigation/preparedness and recovery phase after a disaster.
- Space-based technology would have great potential to contribute to more activities for “Disaster Risk Reduction” in Asia and the Pacific.