

3-3. Providing Disaster Information by Utilizing Earth Observation Satellite

3-3-1. Sentinel Asia

(1) Objective

ADRC continues to participate in the Sentinel Asia project. The project was launched in 2006 with an objective of establishing a disaster risk management system by making the use of satellite images in Asia. ADRC functions as the focal point to receive emergency observation request in the framework of the Sentinel Asia. Upon receiving a request, ADRC decides whether the request is appropriate or not and whether the emergency observation should be implemented mainly for the assessment of damages and casualties or not. Based on its own judgment, ADRC will forward the request to five space agencies, namely, the ISRO (India), the JAXA (Japan), the GISTDA (Thailand), the KARI (Korea), NARL (Taiwan), CRISP (Singapore) participating in the Sentinel Asia Project.

In accordance with the Cooperation Agreement between the United Nations Office for Outer Space Affairs (UNOOSA) and ADRC signed on 4 June 2009 on the establishment of ADRC UN-SPIDER Regional Support Office, ADRC UN-SPIDER Regional Support Office has been established within ADRC premises and operated by ADRC staff members as coordinators of ADRC UN-SPIDER RSO.

ADRC, as a UN-SPIDER RSO, should thus work toward ensuring the successful completion of the UN-SPIDER Work Plan thereby facilitating countries in Asia to have access to and develop the capacity to use space-based information to support the full disaster management cycle.

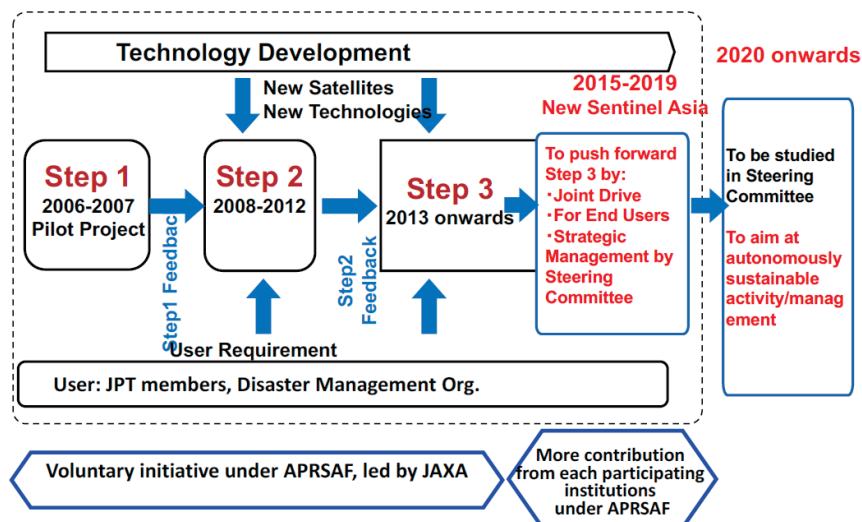


Fig.3-3-1. Flow of emergency observation

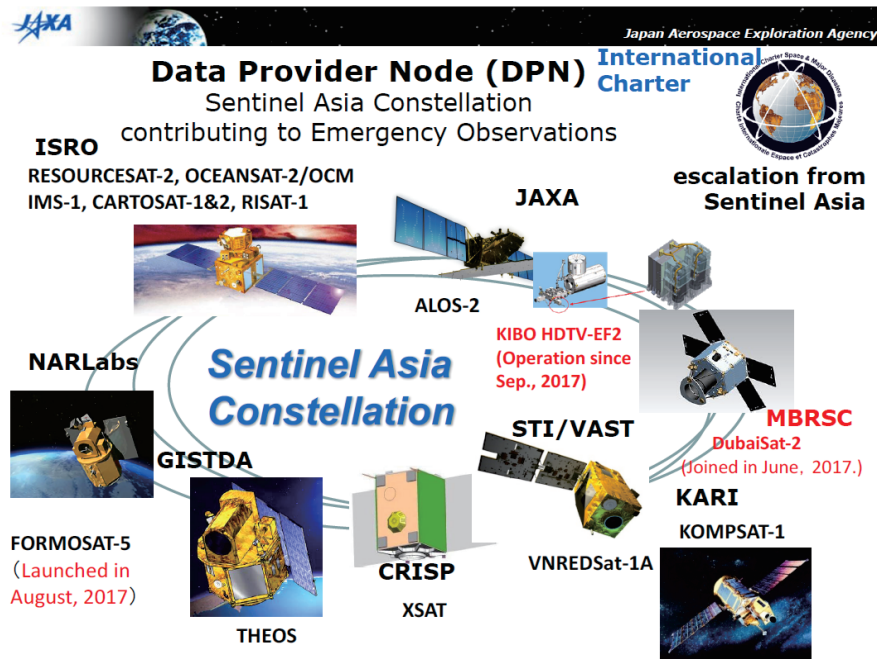


Fig.3-3-2. Data Provider Nodes of Sentinel Asia

(2)Implementation of Sentinel Asia Step3

A step-by-step approach for the implementation of Sentinel Asia was adopted as follows:

- Step1: Implementation of the backbone Sentinel Asia data dissemination system
- Step2: Expansion of the dissemination backbone with new satellite communication systems
- Step3: Establishment of a comprehensive disaster management support system

At APRSAF-19 (Asia-Pacific Regional Space Agency Forum, APRSAF) held in Kuala Lumpur in December 2012, successful completion of Sentinel Asia Step2 was declared. Sentinel Asia Step3 has the following concept, based on experiences in Step2 and user requirements.

- A basic continuation of Step2 activities
- Expansion from response (in Step1 and Step2) to cover the mitigation/preparedness and recovery phases in the disaster management cycle (Fig. 3-3-1)
- Participation of various satellites: earth observation satellites, communication satellites, and navigation satellites
- Further collaboration for operation
- Further utilization of human networking through capacity building and outreach



Fig.3-3-3. Concept of Sentinel Asia Step3

(3) Emergency Observation Activities for this year

Despite the year to year changes in the number of requests, the ratio of activated numbers remains stable at around 80%. After a peak of 2010-2011, however, the number of requests reduced after ALOS, a laser sensor, had stopped in May 2011, which might have affected the number of requests. From January to December 2017, 33 emergency observations were requested, 31 of which were undertaken, after the operation of ALOS-2, and succeeding satellite of ALOS had started from November, 2014.

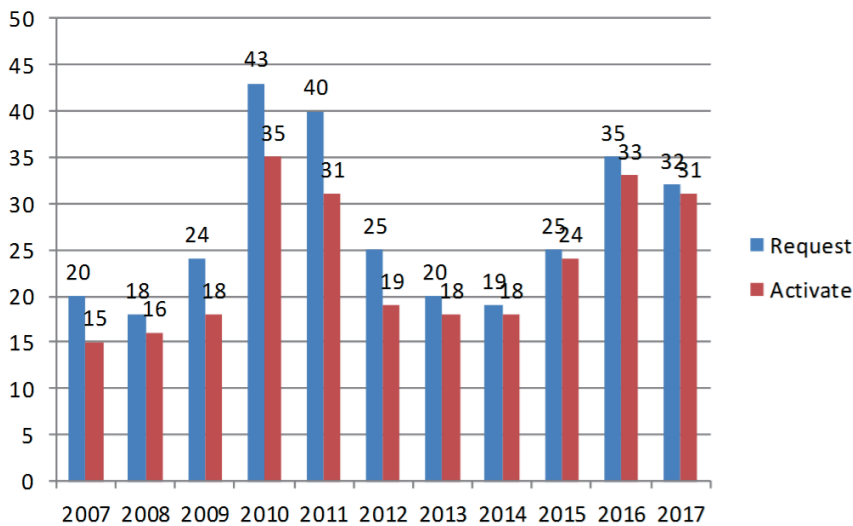


Fig.3-3-4. Changes in the number of emergency observation 2007-2017

Looking at the breakdown of type of disaster from 20107 to 2017, the ratio of flood occupies for more than one third of the total (Fig. 3-3-5).

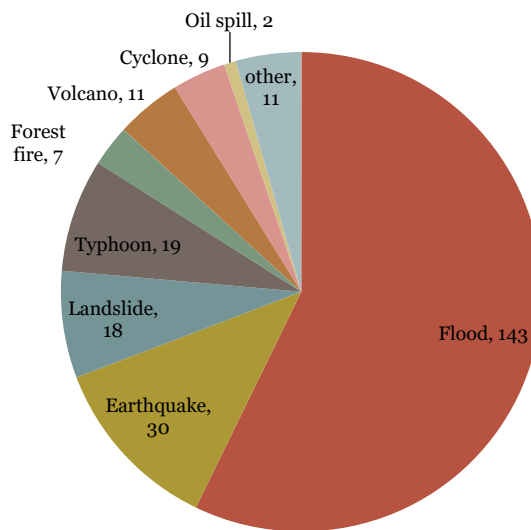


Fig.3-3-5. Breakdown by type of disaster (2007-2017)

Regarding the number of activation, many EORs were requested by Indonesia Philippine, Vietnam, Japan, Nepal, India, Pakistan, and so on. Many requests have been made by the countries where relatively both DRR organization and space agency are relatively large such as Indonesia with BNPB and LAPAN. ADRC received 12 request from Vietnam as the largest in 2017.

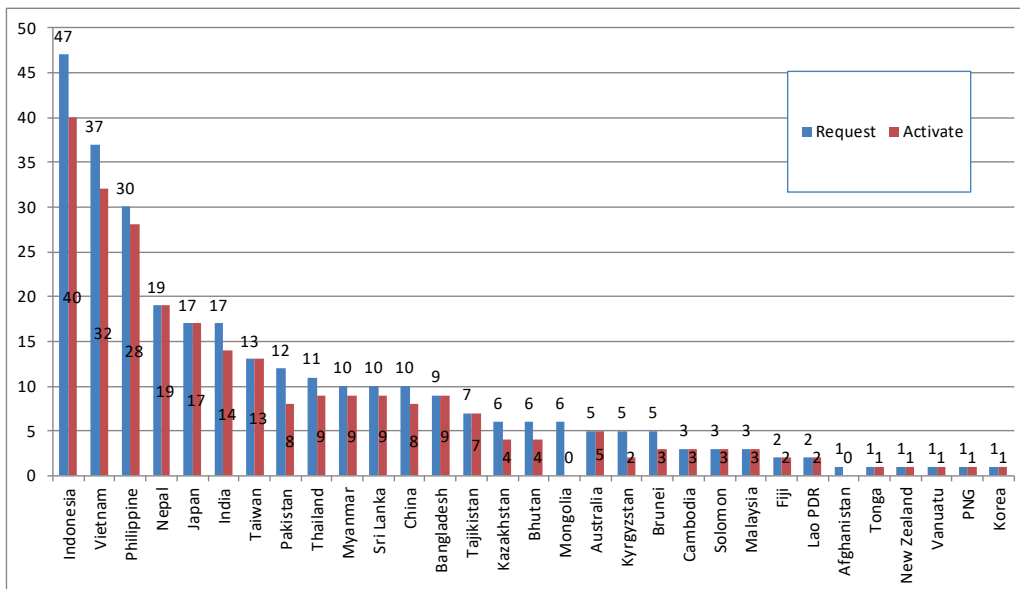


Fig.3-3-6. Breakdown by the country of the request and the activation of the Emergency observation (2007-2017)

3-3-2. Sentinel Asia STEP3 activities for DRR3-3-2. Utilization Promotion of Earth Observation Satellite for DRR

(1) Participation for International Conferences

① The 24th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-24)

The 24th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF) was held from 14 to 17 November in Bengaluru, India. It was co-organized by the Department of Space (DOS), Indian Space Research Organization (ISRO), Ministry of Education, Culture, Sports, Science and Technology (MEXT), and the Japan Aerospace Exploration Agency (JAXA).

APRSAF was established in 1993 to enhance space activities in the Asia-Pacific region. Attended by space agencies, governments, and international organizations such as the United Nations as well as companies, universities and research institutes, this forum is the largest space-related conference in the Asia-Pacific region. APRSAF has four Working Groups: the (1) Space Applications Working Group (SAWG), (2) Space Technology Working Group (STWG), (3) Space Environment Utilization Working Group (SEUWG), and (4) Space Education Working Group (SEWG). APRSAF participants share information about their activities and the future plans for their countries and regions in each working group. APRSAF also supports international projects designed to find solutions to common issues such as disaster management and environmental protection.

The Sentinel Asia initiative is one such activities, and involves the use of space-based information in the form of satellite images for disaster management in the Asia-Pacific region. ADRC has been tasked with the responsibility of receiving emergency observation requests from ADRC member countries and Joint Project Team (JPT) members. ADRC joined the Space Applications Working Group (SAWG) and reported on Trends in Emergency Observation Requests of Sentinel Asia. Sentinel Asia marked its 10th anniversary in 2016 and its continued development is expected in 2017 and beyond. ADRC is planning to strengthen its network with disaster management organizations and to develop standard operating procedures for Sentinel Asia.

② The 7th Annual UN-SPIDER Conference

The 7th Annual UN-SPIDER Conference, jointly organized by the United Nations Office for Outer Space Affairs (UNOOSA) and the Ministry of Civil Affairs of the People's Republic of China, was held in Beijing on 23-25 October 2017. The three-day program included site visits to various organizations by the approximately 100 participants, including representatives of Space Agencies and Disaster Management Organizations from 34 countries and eight regions. The ADRC representative joined the conference in the afternoon of 24 October due to flight and weather challenges.

The theme of session 3, which started in the afternoon of the second day, was “Technology integrated for disaster risk assessment and emergency response.” Presenters included representatives from the Food and Agriculture Organization of the United Nations (FAO), Beijing Normal University, Continuum Planning and Development Trust, India (a non-profit organization), and the Ministry of Home Affairs of India. The FAO report in particular highlighted the indicators affecting food aid decision-making within seventy-two (72) hours after a disaster by focusing on the examples of Cyclone Pam (Vanuatu, 6 March 2015) and the Great Southern Asia Floods (Bangladesh, August-September / Sri-Lanka May / Nepal, August 2017).

An ADRC representative participated in the session on “Integrated emergency response tools/systems” held after the break. Reports were given by World Vision International, the Department of Civil Protection of Zimbabwe, and Indonesia’s National Institute of Aeronautics and Space (Lembaga Penerbangan dan Antariksa Nasional - LAPAN). LAPAN reported on the landslides that occur every year in Banjarnegara, Central Java and expressed appreciation for the contributions of Sentinel Asia.

On the final day of the conference, sessions were held in the morning, followed by site visits in the afternoon. Session 4 focused on “Integrated applications of Earth observation, global navigation satellite system and telecommunication constellations for disaster risk reduction and climate change related extreme hazards” and presentations were given by Newcastle University (England), Beijing University (China), and Delta University (USA).

Newcastle University reported on landslide analysis using Interferometric SAR in Xinmo village, Mao County in the Ngawa Tibetan and Qiang Autonomous Prefecture, Sichuan Province, China. Beijing University’s report focused on the analysis of the effects of the Kumamoto Earthquake using the Polarimetric SAR (ALOS PALSAR PolSAR, 21 April 2016). Both reports emphasized that Synthetic Aperture Radar (SAR) satellites are expected to become even easier to use in emergency response and situation assessments efforts.

Session 5 focused on the theme of “Networking and engagement with the UN-SPIDER network.” At the end of the session, the ADRC representative reported that ADRC has been playing the role of a Regional Support Office (RSO) for UN-SPIDER through the Sentinel Asia initiative and its escalation to an international charter. ADRC noted that it would be continuing to promote further voluntary involvement in disaster risk reduction activities by highlighting, for example, the participation of Mohammed Bin Rashid Space Centre (MBRSC) in Sentinel Asia and the provision of images from the August Jiuzhaigou Earthquake by Sentinel Asia.

In the afternoon, participants were divided into two groups that visited either the National Disaster Reduction Center of China or the China Academy of Space Technology (CAST) Exhibition Center. The ADRC representative participated in the former.



Fig.3-3-7. Presentation on the Annual UN-SPIDER Conference

③ The 3rd Steering Committee Meeting of Sentinel Asia

The 3rd Steering Committee Meeting of Sentinel Asia was held on 13 and 14 December, 2017 in Bangkok, Thailand and ADRC attended the meeting on Day 1.

Following the five themes of the draft strategic plan of Sentinel Asia, participants reviewed the present status of the Strategic Plan and discussed how to promote it more effectively by item by item. ADRC made a presentation on the theme of “Communication, Collaboration and Cooperation” towards better bridging DRR organizations and space agencies and updated the plan to organize ACDR 2018, annual meeting of ADRC and JPTM by JAXA in this October in Awaji, Japan, as agreed last October at the ADRC steering committee meeting held in Azerbaijan.

This time, Mohammed Bin Rashid Space Centre (MBRSC), UAE, that has joined Sentinel Asia since last year, attended the SC meeting for the first time as a new SC member to represent Data Provider Nodes of Sentinel Asia, and reported about the organization and activities. UAE has promoted development of Mars by following a hundred-year plan, which is planned for the future generations.

④ Fifth Joint Project Team Meeting for Sentinel Asia STEP3 (JPTM2018) Held in Taiwan

Asian Disaster Reduction Center (ADRC) participated in the Fifth Joint Project Team Meeting for Sentinel Asia, which was organized by the Japan Aerospace Exploration Agency (JAXA) and the National Applied Research Laboratories (NARL) from 23 to 24 January 2018 in Taiwan. The meeting was attended by around 50 participants including representatives of satellite agencies, disaster management organizations, and academic institutions in Japan. The meeting primarily covered the following topics:

- ✓ Status Report
- ✓ Sentinel Asia Strategic Plan for the next 10 years
- ✓ Local Hosts' Special Session

- ✓ WG Activities & Member reports
- ✓ Sentinel Asia Step3 to Sendai Framework for DRR
- ✓ Project Management
- ✓ Mitigation and Preparation
- ✓ Emergency Response

ADRC gave presentations on the activation of emergency observations in 2017 and its role as host of the next JPTM.



Fig.3-3-8. Fifth Joint Project Team Meeting for Sentinel Asia STEP3