

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 and whether the emergency observation should be implemented mainly by assessing the damages and casualties. 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), MBRSC (Dubai) 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 the ADRC UN-SPIDER Regional Support Office, the ADRC UN-SPIDER Regional Support Office has been established within ADRC office and operated by ADRC staff members as coordinators of the ADRC UN-SPIDER RSO.

ADRC, as a UN-SPIDER RSO, should thus work towards ensuring the successful implementation 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 whole of disaster management cycle.

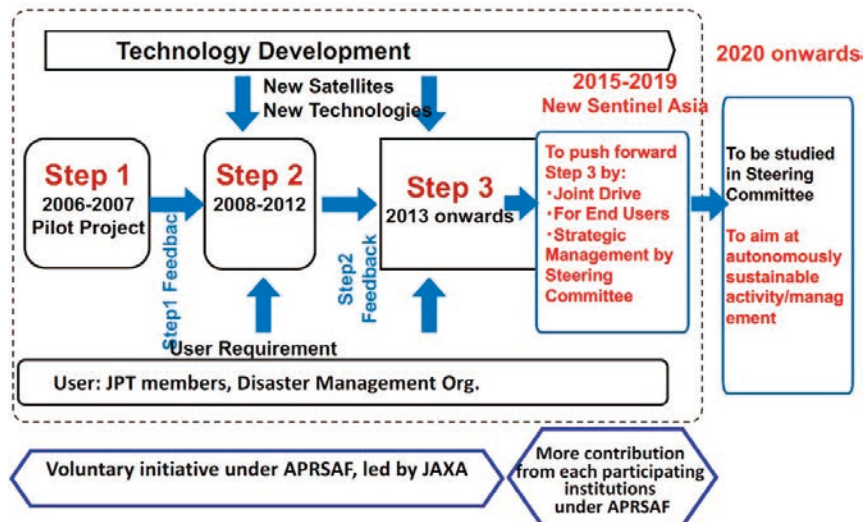


Fig.3-3-1 Flow of emergency observation

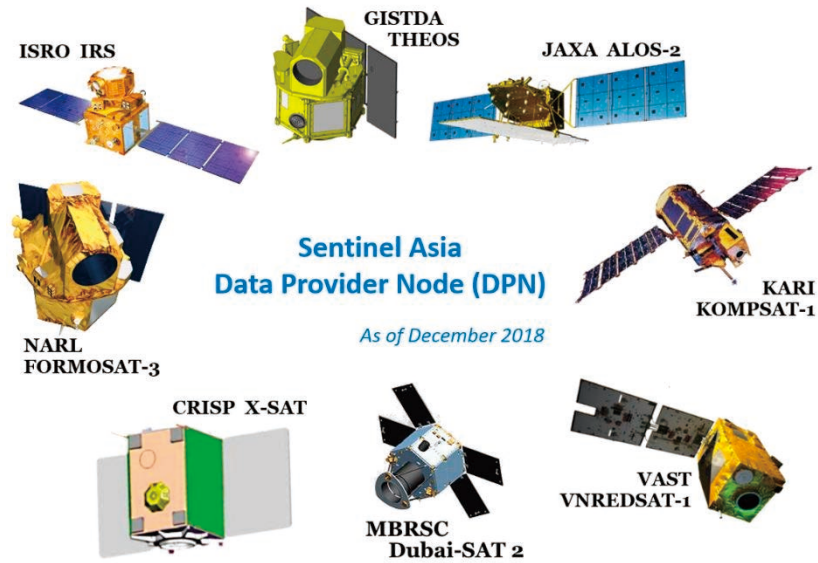


Fig.3-3-2 Data Provider Nodes of Sentinel Asia

(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 Step 2 was declared. Sentinel Asia Step 3 has the following concept, based on experiences in Step 2 and user requirements.
- A basic continuation of Step 2 activities
- Expansion from response (in Step 1 and Step 2) to cover the mitigation/preparedness and recovery phases in the disaster management cycle
- 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

(3) Emergency Observation Activities in the Past

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 2018, 31 emergency observations were

requested, 30 of which were undertaken, after the operation of ALOS-2, and succeeding satellite of ALOS had started from November, 2014.

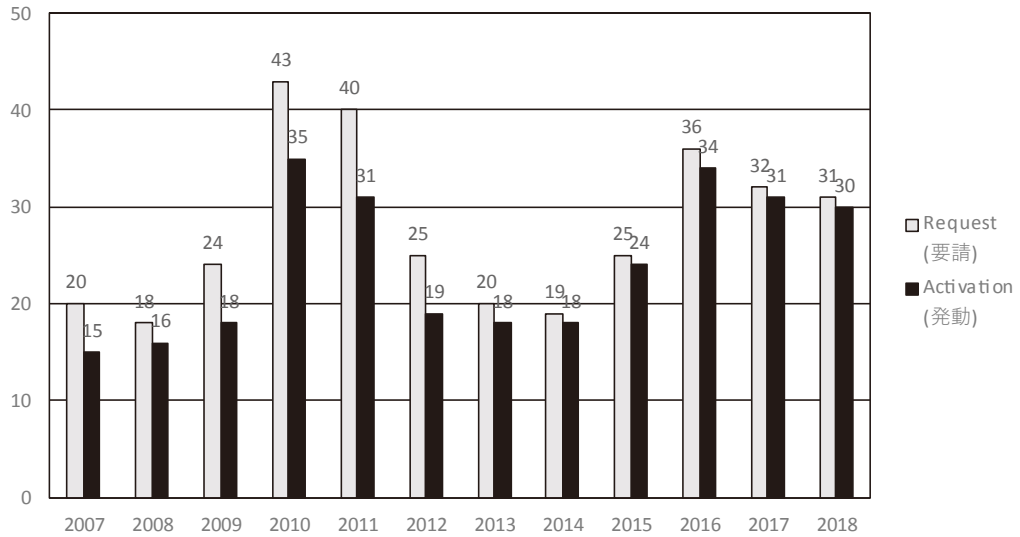


Fig.3-3-3 Changes in the number of emergency observation 2007-2018

Looking at the breakdown of type of disaster from 2007 to 2018, the ratio of flood occupies for more than one third of the total (Fig. 3-3-4). Regarding the number of activation, many EORs were activated by Vietnam, Indonesia and India in 2018 (Fig. 3-3-5).

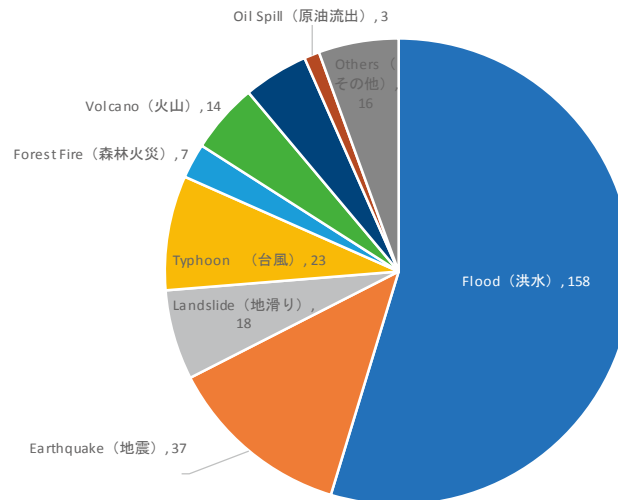


Fig.3-3-4 Breakdown by type of disaster (N=289)

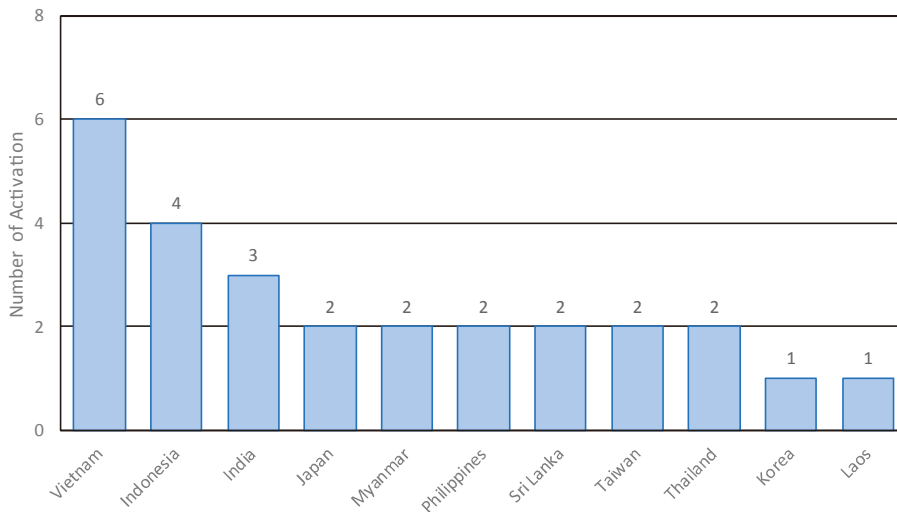


Fig.3-3-5 Number of activation in 2018

3-3-2. Building a University Network for Analysis Satellite Data on Sentinel Asia

Natural hazards have been on the rise worldwide, including the Asia-Pacific region (Figure 3-3-6). In light of the increasing frequency of natural disasters and an elevated loss of lives and properties from these events, Sentinel Asia (SA), a collaborative, regional project, was conceptualized in 2005, and begun to operate in 2007. It is engaged in activities to share and provide disaster-related information, including earth observation satellite images via the internet, to contribute toward disaster management in the Asia-Pacific region. Space agencies from the member countries of the Asia-Pacific Region Space Agency Forum (APRSF), including JAXA and disaster risk reduction agencies in the Asia-Pacific region such as ADRC, cooperate in forming a joint project team (JPT) and promoting SA.

As of December 2018, it consists of 107 member organizations, including 91 agencies from 28 countries/regions and 16 international organizations. JAXA has been serving as a secretariat of the JPT.

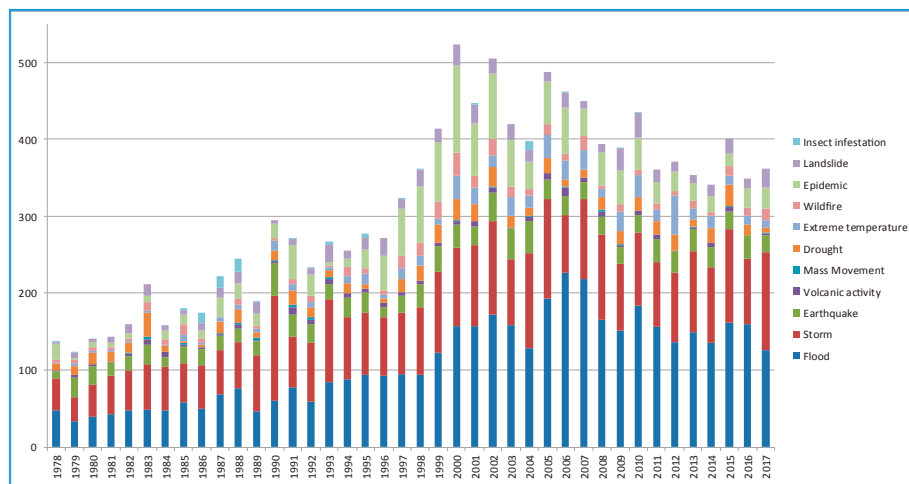


Fig. 3-3-6 Trend of natural hazards from 1978 to 2017

For the better activity of SA, to strengthen network between space agencies and disaster management organizations is necessary. Especially, a role of universities is quite important for developing disaster situation map in case of disaster. This project focuses on capacity building for university researchers in the Asian region. It is expected that an output of this project contributes to the utilization of space technology in DRR.

ADRC joined as one of member in this project which is coordinated by Yamaguchi University in 2017. ADRC has been participating in related international conferences and workshops and sharing information to SA members. ADRC participated in a symposium entitled “Human Resource Development and Space Data Utilization for Disasters”, which was organized by Yamaguchi University and Udayana University on 11 January 2019 in Bali, Indonesia. The symposium was attended by about 50 participants representing local disaster management organizations, as well as from Tokyo University, the National Research Institute for Earth Science and Disaster Resilience, and the organizing institutions, Yamaguchi University and Udayana University. ADRC presented information on Sentinel Asia and the activation of emergency observations. ADRC also explained how emergency observations are requested during disasters and how to become a member of the Sentinel Asia program.

3-3-3. Participation in the International Conference on Sentinel Asia

(1) The 25th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-25)

The 25th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF) was held from 6 to 9 November 2018 in Singapore. It was co-organized by the Singapore Space and Technology Association (SSTA), 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.

ADRC also reported at the plenary session for Sentinel Asia's past development, strategic plan formulated by the Steering Committee of Sentinel Asia, and its endorsement at the JPTM held in Awaji Island, Hyogo, Japan last week.

On the final day, the Chairman made recommendation to implement the Sentinel-Asia Strategic Plan.



Fig. 3-3-7 APRSAF Conference

(2) The 8th Annual UN-SPIDER Conference

The eighth 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 24-26 October 2018.

The ADRC representative reported latest Sentinel Asia activities and role of RSO in a session 1 on "Institutional strengthening and preparedness for improving emergency response using space technologies". Especially it was focused on an importance to escalate International Disaster Charter for data sharing with requestors. In addition, ADRC got an interview about past RSO activity and discussed about the next steps for the better of strong relationship.



Fig.3-3-8 Participation for Session

(3) The Steering Committee Meeting of Sentinel Asia

ADRC attended the meeting of the Sentinel Asia Steering Committee held in Thailand, on 29-30 January 2019. The meeting was held by JAXA, which serves as the secretariat of the Sentinel Asia Joint Project Team, other space agencies in Asia working, and image analysis organizations and ADRC participated to facilitate connections between these organizations.

Opening remarks was made by Mr. Koji Suzuki, Executive Director of ADRC. A briefing by JAXA followed these on the Steering Committee Mandate and status and lessons learned from emergency observations conducted thus far. All of these help demonstrate the advantages of satellite imagery for DRR purposes. Space agencies and research organizations reported on DAN activities. In addition, it focused on a basic approach for discussing the strategic plan that will be discussed throughout the year in preparation for the Asia-Pacific Regional Space Agency Forum (APRSAF), scheduled for the fall of 2020.



Fig.3-3-9 Participants of the Steering Committee Meeting

(4) Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific on its third session, UNESCAP, Thailand

The Ministerial Conference was attended by representatives of the following members and associate members: Azerbaijan; Bangladesh; Bhutan; Cambodia; China; Fiji; France; Hong Kong, China; India; Indonesia; Iran; Japan; Kazakhstan; Kyrgyz Republic; Lao People's Democratic Republic; Maldives; Mongolia; Myanmar; Pakistan; Papua New Guinea; Republic of Korea; Russian Federation; Sri Lanka; Thailand; Timor-Leste; Tonga; Turkey; Tuvalu; United Kingdom of Great Britain and Northern Ireland; and Viet Nam.

The Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030) is developed as a follow-up to the Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development, 2012–2017. It is a regionally coordinated plan that harnesses space applications and digital innovations to help countries in Asia and the Pacific, particularly those with special needs, to achieve the Sustainable Development Goals.

The Plan was formulated through an extensive and inclusive consultation and drafting process driven by country needs. The process consisted of an open-ended Drafting Committee comprising senior technical experts, nominated by members and associate members of the Economic and Social Commission for Asia and the Pacific (ESCAP), as well as the Intergovernmental Consultative Committee on the Regional Space Applications Programme for Sustainable Development.



Fig.3-3-10 Participants of the Conference

Given the good practices and experiences that emerged from the implementation of the previous Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development, 2012–2017, and in line with the thematic areas contained in the regional road map for implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific, the Plan addresses: (a) disaster risk management; (b) natural resource management; (c) connectivity; (d) social

development; (e) energy; and (f) climate change.

Implementation modalities are through: (a) research and knowledge-sharing; (b) capacity-building and technical support; and (c) intergovernmental discussions and regional practices. Among the three, capacity-building and technical support are the priority for most Asia-Pacific countries.

Actions are not designed to be implemented by one entity alone, rather they are designed to guide national actions for sustainable development, and promote regional cooperation in support of global initiatives.

As the Plan covers a long implementation period, a review of implementation at the ministerial level to coincide with the end of each four-year phase is included. The Plan also foresees enhanced partnerships at the regional level.

In the preparatory meeting one day before the Ministerial meeting, the draft plan was discussed and ADRC proposed in collaboration with JAXA to proposed to revise the draft plan and successfully incorporated Sentinel Asia as one of the good practices of regional cooperation for space-based technology application to disaster risk reduction and capacity development for Asia and the Pacific.

(5) The Sixth Joint Project Team Meeting for Sentinel Asia STEP3

ADRC participated in the Sixth Joint Project Team Meeting for Sentinel Asia, which was held by JAXA and ADRC from one to 2 November 2018 in Awaji, Japan. About 40 participants including representatives of satellite agencies, disaster management organizations, and academic institutions in Japan attended the meeting. The meeting primarily covered the following topics:

Session 1: Overview

Session 2: New Membership and Working Group Activities

Session 3: Users' Session

Session 4: Local Host's Session

Session 5: Project Management

Session 6: Sentinel Asia System

Session 7: Strategic Plan for Sentinel Asia (under the leadership of the Steering Committee)

Session 8: Special Session - Contributions of Sentinel Asia to Achieving the Global Agenda

Session 9: Closing session

The ADRC member countries of Myanmar, Lao PDR, and Malaysia also joined this meeting and gave presentations on disaster management in their respective countries. ADRC presented information on the activation of emergency observations in 2017 and activities related to the Sentinel Asia Strategic Plan. Mr. Suzuki, ADRC Executive Director and co-chair of the event, gave closing remarks.



Fig.3-3-11 Participants of the Sixth Joint Project Team Meeting

(6) The Human Resource Development and Space Data Utilization for Disasters

ADRC participated in a symposium entitled Human Resource Development and Space Data Utilization for Disasters, which was organized by Yamaguchi University and Udayana University on 11 January 2019 in Bali, Indonesia. About 50 participants representing local disaster management organizations, Tokyo University, the National Research Institute for Earth Science and Disaster Resilience, and the organizing institutions, Yamaguchi University and Udayana University, attended the symposium. ADRC presented information on Sentinel Asia and the activation of emergency observations. ADRC also explained how emergency observations requested during disasters and how to become a member of the Sentinel Asia program.



Fig. 3-3-12 Lecture by Yamaguchi University at the Symposium