

2.1.8 Summary

After the Great East Japan Earthquake, JAXA conducted disaster monitoring using the Advanced Land Observing Satellite “Daichi” and enlisted the help of international organizations involved in disaster monitoring (such as the Disaster Charter and Sentinel Asia), thereby contributing to efforts made by national/local government bodies to collect information and support relief operations.

- Top priority was given to emergency observation of affected areas using Daichi, and 643 satellite images were obtained.
- In reciprocation for Daichi’s active international contribution to relief efforts in previous major disasters elsewhere, intensive observation was conducted in response to the Great East Japan Earthquake by 14 countries and regions using 27 satellites through the framework of international cooperation, which includes organizations such as the Disaster Charter and Sentinel Asia. As a result, approximately 5,700 satellite images were provided.
- These images were processed and analyzed by JAXA to facilitate usage by disaster management organizations, and were provided to ten ministries, agencies, organizations and municipalities, including the Cabinet Secretariat and the Cabinet Office for disaster management.
- The images were analyzed in various ways by institutions and researchers around the world, and the information obtained was shared extensively through the framework of the Disaster Charter, Sentinel Asia, Geo-Supersite and other organizations.
- The images were utilized to determine the extent of damage over wide areas that could not be viewed from the ground or from aircraft, and to plan disaster countermeasures.
- Approximately 80 analyzed images were provided to various organizations after the Great East Japan Earthquake. The Daichi Bosai WEB site received as many as 1,500 hits from central government ministries/agencies and local governments.
- The Cabinet Office sent letters of thanks to the Disaster Charter and Sentinel Asia.

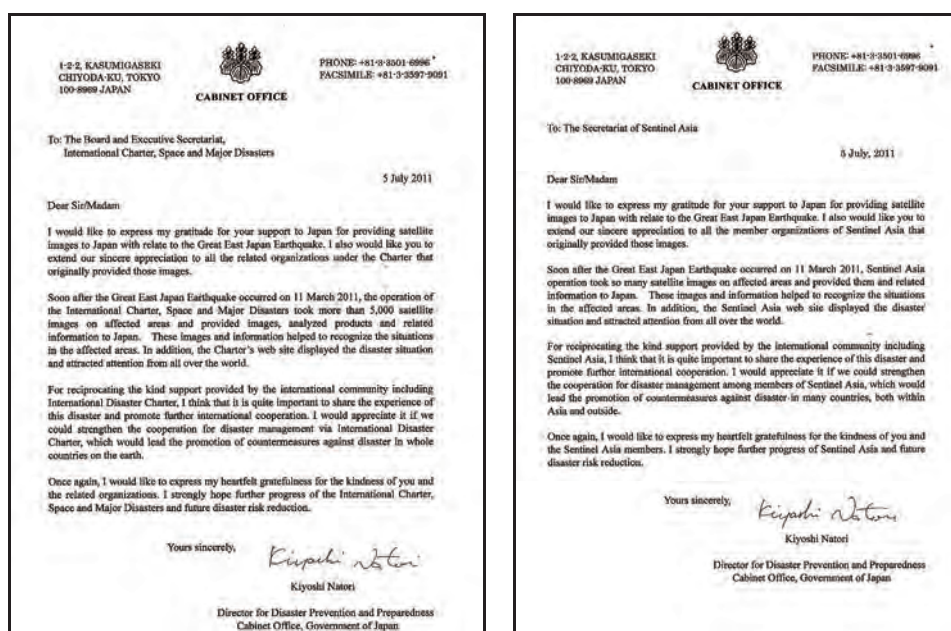


Figure 2.1-73 Letters of thanks from the Cabinet Office to the Disaster Charter and Sentinel Asia

Based on the provision of disaster images, the following observations were made:

- When large-scale disasters like the Great East Japan Earthquake strike, satellite image products comparing pre- and post-disaster conditions are very useful primary information sources in the initial stages of response to determine the extent of the damage. Superimposing geospatial information (e.g., place and street names) onto satellite images and recent images taken in the months before the disaster in particular enhances the usefulness of such data.
- Daichi images provided useful extensive aerial views to support information collection immediately after the disaster.
- In terms of the division of roles, airplanes and helicopters were intensively used to observe tsunami-damaged coastal areas, while nadir observations by Daichi over extensive inland areas significantly contributed to the surveying of landslide-related damage.
- In response to the nuclear power plant accident triggered by the tsunami, satellite observation was useful in enabling ongoing unmanned monitoring of areas affected by high radiation levels.
- Planar crustal movement and inland areas at high risk of landslides could be determined using only data from Daichi, which is equipped with L-band SAR and optical sensors and is capable of observing extensive areas.
- Interferometric SAR images enabled identification of changes over the entire Tohoku region and helped to clarify that the cause of subsidence along the Pacific coast was not local surface ground contraction but extensive settlement resulting from the sliding of the earthquake source fault along the plate boundary.
- In addition to the monitoring of crustal movement triggered by inland active faults and volcanic activity resulting from earthquake-related changes in stress, local crustal movement stemming from inland aftershocks was also identified. In this way, observation data helped to clarify the fault mechanisms of several aftershocks.
- A combination of SAR and optical images was needed to improve data interpretation accuracy. As stereoscopic observation is also effective, stereovision was used to investigate damage from landslides.
- Repeated satellite observation over a long period of time was important in identifying changes in the affected areas. Japan's satellites play an important role in this regard.
- International organizations such as the Disaster Charter and Sentinel Asia serve to increase observation frequency. In particular, the European Space Agency (ESA) highlighted the activities of the Disaster Charter and GEO in response to the Great East Japan Earthquake.
- Through the Disaster Charter, commercial high-resolution satellites were used to assess the conditions of collapsed buildings, determine the extent of damage to roads and railways and carefully monitor the situation at the nuclear power plant.
- As it was impossible to determine conditions after the nuclear power plant accident using visible light and SAR images alone, infrared radiation sensor and other temperature detection data were needed.