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the examination of disaster operation reinforcement efforts (such as the provision of satellite image data and communication lines) and systems to ensure appropriate and timely dispatch of related information.

## 5. Summary

Following the Great East Japan Earthquake of March 11, 2011, JAXA assisted the government's Emergency Disaster Response Headquarters, central government ministries and agencies, local governments and other related institutions in producing a full picture of the disaster. It also facilitated recovery efforts by providing these organizations with images captured by Daichi and overseas satellites, and supplied related analysis results as needed. The Agency further provided satellite communication lines using KIZUNA and KIKU No. 8 at disaster countermeasures offices and other places in Iwate Prefecture and Miyagi Prefecture's Onagawa Town as a temporary replacement for damaged terrestrial networks. Through these communication lines, it provided disaster areas with logistics support based on the temporary restoration of Internet connections and IP phones, thereby allowing people to check the safety of others and collect a variety of information. These activities were made possible by years of effort on JAXA's part to promote satellite application to disaster management, routine communication with disaster management organizations and other institutions, and participation in disaster prevention drills and other related events.

Six months after the Great East Japan Earthquake, many reports had been published by government agencies. One issued by the Headquarters for the Reconstruction from the Great East Japan Earthquake (Basic Policy on Reconstruction from the Great East Japan Earthquake; July 29, 2011) recognized once again the effectiveness of satellite application in wide-area disasters, and highlighted the need to strengthen satellite communication capabilities and utilize satellite systems for various purposes, including clarification of the extent of damage.

Reports published by the Central Disaster Prevention Council and the Japan Meteorological Agency also pointed out the need to reinforce tsunami observation and improve tsunami warning systems. In this regard, JAXA sees a need to upgrade its satellite communication and satellite positioning technologies and to partner with parties involved in the monitoring of GPS buoys and water-pressure gauges.

In the government's science and technology policy, reconstruction and recovery from the March 11 disaster and improved safety during future calamities were identified as key areas for attention. With the development of ALOS-2 and next-generation of information and communication engineering test satellites positioned as specific policy measures, there are high expectations for satellites in the future.

The completion of Daichi's operations as its service lifetime was exceeded has created a significant need in various fields for the early launch of its successors (ALOS-2 and ALOS-3). Moves toward the development of systems and structures based on the use of images captured by Daichi have also begun.

In this way, satellites have become indispensable tools for supporting safety and security in Japan. However, they do not represent a silver-bullet solution, and their operation requires terrestrial equipment as well as work by organizations and personnel. For satellites to become essential as a system in their own right, JAXA must continue its close collaboration with disaster management organizations and overcome challenges yet to be identified rather than simply implementing ongoing technological upgrades.

Finally, we at JAXA offer our sincere condolences to the families of those who perished in the disaster and our deepest sympathies to everyone affected. We would also like to express our sincere appreciation to all staff of the organizations concerned as well as to the Disaster Charter and Sentinel Asia for their guidance, support and cooperation in JAXA's responses to the disaster.

Report on JAXA's Response to the Great East Japan Earthquake  
—Assistance using earth observation satellites and communication satellites—

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