Japanese Technology Takes on the Challenge of Water-Related Disasters

Since ancient times, Japan has persevered against frequent water-related disasters. Various technologies cultivated over many years of effort have yielded significant results in disaster reduction.

A continuous monitoring system is essential for reducing the damage caused by water-related disasters. Japan has honed weather observation and forecasting technology and developed an early warning information system that makes use of information and communications technology. By continuously monitoring the motion of the atmosphere from space with weather satellites, weather conditions can be ascertained as they change from one moment to the next.

Japan plans to start operations of the world's first next-generation meteorological satellite (Himawari-8) in 2015. It is drawing attention from around the globe because of its sophisticated monitoring capabilities—boasting three times the number of functions, three times the observation frequency, and double the resolution of current satellites.

But this alone is not enough to grasp hard-to-ascertain localized weather conditions. To accomplish this, Japan has deployed the X-band polarimetric (multiparameter) Radar Information Network (XRAIN). The first of its kind to reach practical application, XRAIN provides detailed measurement of rainfall focusing on metropolitan areas. This radar network measures at a resolution sixteen times higher, and collects data at a frequency five times higher than that of conventional systems and sends that data in real time. By estimating rainfall from the shape of raindrops and ascertaining their direction and speed, it can accurately estimate the amount of rainfall—providing a powerful tool for predicting a water-related disaster within thirty or sixty minutes. The information obtained is widely accessible to the public via smartphone apps and other devices.

Furthermore, in response to a request for technical cooperation from the government of Thailand, which suffered from severe flood damage in 2011, Japan developed and provided a flood forecasting system. Implementing the latest technology combined with water-level observation and satellite data, it has become the world's first forecasting system capable of predicting areas where flooding may occur, with the accuracy and speed required for practical use. The flood forecast information is widely and easily accessible via computers and mobile devices.

A water management simulator was also developed at the same time, enabling the Thai government to achieve better flood management. It easily provides accurate results of simulations of river discharge related to operation of flood control facilities, including reservoirs. This simulator, jointly developed, was built based on the assumption that it would be operated by the Thai government, which greatly welcomed its development. In this way, Japan's cutting-edge technology is widely used by the people of Thailand today, and is effective in reducing flood damage.

By mobilizing its advanced technology, Japan continues its contribution to the reduction of damage from water-related disasters around the globe through utilizing such knowledge, technology, and experience.
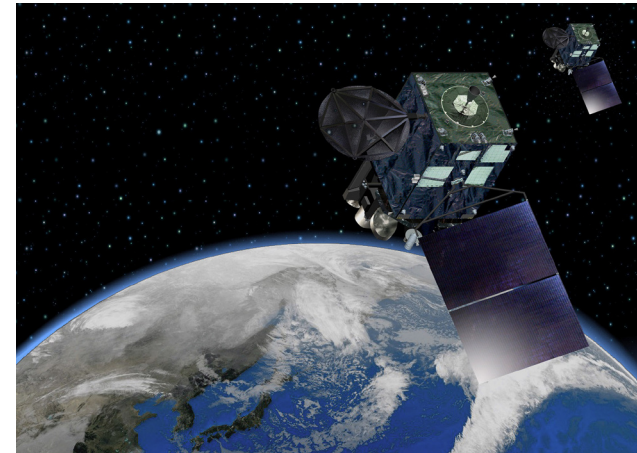
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1. An Image of the Himawari-8 satellite, which is equipped with cutting-edge technology. *Himawari* means sunflower. 2. The XRAIN system can observe and distribute information about the precipitation in more detail. Compared to conventional systems, XRAIN can operate with five times higher frequency and in sixteen times higher resolution. 3. Useful observation data is distributed via mobile devices. By pointing your phone towards the sky, rain distribution is displayed on the screen, and by pointing it towards the ground, rainfall of the surrounding area is displayed. 4 & 5. The flood forecasting system for the Chao Phraya River in Thailand is easy to use even for non-specialists and can be accessed from tablet devices. Cutting-edge technology makes quick and accurate flood forecasting possible.

Current radar (C-band radar)

XRAIN