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For Establishment of Nationwide Sandy Beach Monitoring by Satellite

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1. Importance of country-wide sandy beach monitoring

High waves caused by the typhoon that hit Seisho Coast, Kanagawa, collapsed the bypass (Photo). This is partly attributable to the erosion of the sandy beach in front of the bypass and further erosion of the ground that was supporting the bypass by high waves caused by the typhoon.

Sand beach is natural and local infrastructure with multilateral functions, such as the effect of reducing the impact of storm surge and tsunami, provision of recreation space, and ecosystem conservation. Therefore, conservation of sandy beaches is indispensable to maintain the sound national land.

However, erosion of sandy beaches is progressing in many coasts and countermeasures are urgently needed. In order to take measures efficiently starting with high-priority coasts within the limited budget, sandy beach monitoring is required across the country.

2. Issues of the conventional monitoring method

As for the conventional method of reading shore lines on the topographic map issued by the Geospatial Information Authority, the topographic map is updated only once in a dozen or so years and time of observation differs according to locations.

Since preventive maintenance has been promoted in maintenance of infrastructure, monitoring is important for conservation of sandy beach. In order to find coasts where erosion is progressing at an early stage and take measures before suffering damage, it is required to develop a method for monitoring sandy beaches across the country with a high frequency.



Photo: Damage to Seisho Bypass in 2007
(Source: Homepage of Yokohama River and National Highway Office, Kanto Regional Development Bureau)

3. Usability of monitoring using satellite images

For monitoring sandy beaches across the country with a high frequency, development of a method using satellite images is under consideration. Use of a satellite for monitoring will enable simultaneous photography of a large area. Satellite observation is conducted several times a year and observation results are accumulated.

As shown by Google Earth, etc., images provided by an optical satellite are clear enough to identify sandy beaches, while images are costly and no observation is made when cloudy.

In contrast, images taken by SAR (synthetic aperture radar) satellite (see Figure) are available at lower cost and observation by SAR is not subject to weather, while it is visually and technically difficult to identify coast lines, so that consideration is required for technical development and practical use.

4. Future perspective

From fiscal 2016, in the public offer for research and development of technologies for river works, "Technical research development for coastline monitoring using satellite images" will be conducted and development of coastline monitoring method using SAR satellite will also start by executing an agreement with the Japan Aerospace Exploration Agency (JAXA). The NILIM aims to establish a country-wide sandy beach monitoring system with focus on the development methods provided by the public offer and in combination with other monitoring methods including images by optical satellite.

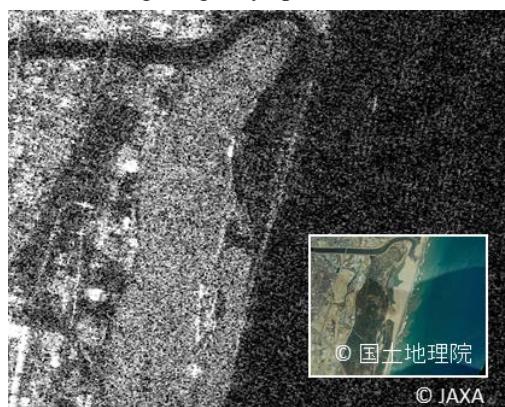


Figure: Satellite image and aerial photograph of the mouth of the Ishizaki River, Miyazaki by SAR satellite (Advanced Land Observing Satellite "Daichi") (right frame)