Creation of the Guide to Interpretation of Sediment Disasters with Synthetic Aperture Radar (SAR) images

(Research period: FY2017 to FY2019)

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1. Implementation of joint research

The Sabo Risk-Management Division has been conducting a joint research on development of a sediment disaster monitoring method using Advanced Land Observing Satellite No. 2 "Daichi No. 2" with Japan Aerospace Exploration Agency (JAXA) since FY2017. This research devised a method of identifying promptly the position and area of sediment disaster using the images of Synthetic Aperture Radar ("SAR") observed by "Daichi No. 2." In addition, this method was applied to actual disaster response in the July 2017 Northern Kyushu Heavy Rain and the 2018 Hokkaido Eastern Iburi Earthquake, both of which occurred during the period of this research, and the effectiveness and issues of the joint research were clarified. Based on the research results above, we decided to create a manual describing the sediment disaster interpretation research method using SAR images, aiming for practical use in disaster response by Regional Development Bureaus etc.

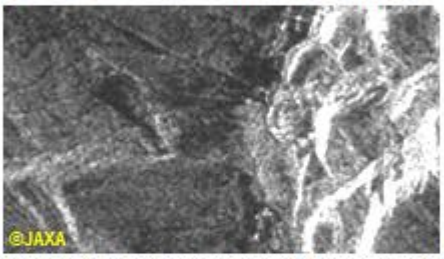
2. Features of the research method

Since the launch of Daichi No. 2 (2014), a large amount of archive images of various sites across Japan has been accumulated. This research enabled intuitive and easy interpretation with eyes using those images, which will not require advanced interpretation technique with single polarized wave SAR images, by visualizing changes before and after the disaster.

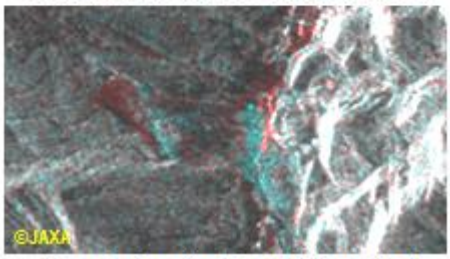
As the Figure shows, the conventional sediment disaster research using SAR images required the interpretation of geographical changes and reservoir area formation due to slope failure with shade of the image (Fig., middle: Technical Note of NILIM No.760). However, this method can indicate changes in the site with color, which enables quick provision of information in taking initial actions to address disasters (Fig. bottom).

This method has also been applied to many large-scale disasters, which are frequent in recent years. Information on the accuracy and characteristics of interpretation, time required for actions, etc. concerning this method, which was obtained from actual use in disaster response, will serve as important data when Regional Development Bureaus etc. consider about practical use of this method. We intend to organize various conditions as well as information on the operation of this method, including difference of characteristics due to the relationship between the Satellite and slope direction, and provide results as a guideline introducing examples for realization of quick and correct initial actions.

Oblique photo of slope collapse
(July 2017 Northern Kyushu Heavy Rain, Hita-shi, Oita)



Interpretation with a single polarized wave SAR image (Technical Note of NILIM No. 760)



Result of application of this method

Fig. Results of visibility improvement by application of this method

3. Preparation of the guideline

The result of this joint study was issued as "Guide to Interpretation of Sediment Disasters with Synthetic Aperture Radar (SAR) Images," Technical Note of NILIM No. 1110.

☞**See the following for details.**

1) Technical Note of NILIM No.1110
2) Civil Engineering Journal, Vol.61, No.12, 2019, pp. 16-19