Estimation of Flooded Area Based on Satellite Imagery and Terrain Data

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(a) Purpose of study or research hypothesis

This study simultaneously used satellite image data and topographical data to identify and verify flooded areas of Yeongdeok-gun, Gyeongbuk, Korea, caused by the Typhoon Kong-Rey.

(b) Key issue(s) or problem(s) addressed

Inundation trace map is used as basic data for national disaster prevention, but there is a limit to the completely investigation of the flooded area due to the extensive inundation area and rapid drainage. In addition, since the Inundation trace map is officially published the following year after disaster, it is difficult to respond and manage quickly. Therefore, to solve this problem, this study attempts to estimate flooded areas using satellite images.

(c) Methodology or approach used

The satellite image data was obtained from ESA Sentinel-1 Synthetic Aperture Radar (SAR) image and PlanetLab's PlanetScope optical image. Topographical data used to identify the depth and the extent of the flooding is the DSM data with the resolution of 0.02m, 0.1m, 0.5m, 1m, 3m, 5m, and 10m that was obtained through drone surveying. The area with large color difference before and after the flooding was designated as the primary flooded area, and the area that was identified lower than the this primary flooded area according to the topography data was determined as the final flooded area.

(d) Results or conclusions derived from the project

The accuracy calculated by the intersection versus union method increased with increasing resolution of the topographical data and ranged between 62 and 97 percent depending on the analysis area. In the case of flat lands, SAR images showed high accuracy, and in case of the area with densely placed buildings, optical satellite images showed high accuracy.

(e) Implications of the project relevant to congress themes

In this study, it is expected that the estimation of inundation trace map using satellite images will be faster and more extensively available.