Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

HTT33-05 Room:101B Time:May 27 10:00-10:15

Detecting of Mangrove Damaged Area caused by Super Typhoon ”Heian” from High Resolution Satellite Images

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The Republic of the Philippines is well known as typhoon passing route. One of the largest typhoon in the history has passed Philippines at the beginning of November 2013. This typhoon called ”Haiyan” or ”Yolanda” in Philippine, has gave massive damage not only to the human’s life and infrastructures but also ecological system.

Because of Philippines has long coastal line, ecosystems in the coastal area is very important for people’s livelihood. So that, urgent damage assessment of natural resources in the coastal area is very essential once disaster occurred. This study assessed the mangrove destructive situation after super typhoon ”Haiyan” in Batan Bay, Panay Island in Philippine by using high resolution satellite image.

Fortunately, we have took the image of QuickBird in 6th September 2012 (before typhoon), and we also have captured ground situation after Haiyan attack by WorldView-2 in 3rd February 2014. The density of mangrove in this area is so sparse that middle and low resolution satellite image cannot detect each mangrove composition. The image resolution of these two images, meanwhile, is approximately 2.0 m and therefore very suitable for recognizing detail of mangrove tree structure. On the other hand, spectrum resolution of these images is much remitted and cannot identify between on land vegetation and mangrove. To solve this limitation, we used topography map, which scale is 1/50,000 (1954), in order to eliminate on land vegetation before the start of image processing. Mangrove area before the typhoon was identified from the image year 2012 using supervised classification method. Then, the image year 2014 (after typhoon) of the same location was extracted for image comparison. The NDVI (Normalized Difference Vegetation Index), which indicates vegetation activity and biomass density, of two images were calculated and used for recognizing mangrove damaged area. Differences of two temporal images were computed by ”Change Detection Method”, which is provided by ENVI software, and we could detect significant value decrease for the whole target area.

Results showed that mangrove trees were damaged widely, especially those at the edges and along fish pond dikes. We concluded that this image analysis method is suitable for the mangrove damage assessment. Understanding damage level or spatial distribution of damaged areas can support decision making for the recovery and protection of the mangrove area.

Keywords: High resolution satellite image, Mangrove, Typhoon, Philippines