HTT29-P01   Room:Convention Hall   Time:May 24 18:15-19:30

Preliminary study on detection limits of abandoned farmlands using NDVI and NDWI time-series data

SAKUMA, Asahi[1]* ; SHIMAZAKI, Hiroto[1]

[1]National Institute of Technology, Kisarazu College

Increase of abandoned farmlands is gaining attention in Japan as a problem causing difficulties such as: expansion of breeding habitat potentially preferred by vermin; increase of small parcels where illegal dumping occurs; and deterioration of rural landscapes. To address this problem, it is important to periodically survey the extent and distribution of abandoned farmlands over a broad spatial range. However, conventional surveying methods are labor intensive and time-consuming, requiring surveyors to cover every parcel often situated in hostile locations.

Remote sensing provides us with a low cost, repeatable alternative means for broad-scale mapping of abandoned farmlands. A previous study suggested that Normalized Difference Vegetation Index (NDVI) derived from remotely-sensed data could have potential to discriminate an abandoned paddy from a paddy area since the difference in NDVI becomes significant at the periods of one month after planting and two months after harvesting. Normalized Difference Water Index (NDWI) was also applied successfully to detecting changes in agricultural activity in a paddy area. However, the success of previous studies depends on acquiring data not affected by cloud contamination at the suitable timing in terms of crop calendar.

The objective of this study is to assess the detection limit of an abandoned paddy using the time-series data derived from MODIS surface-reflectance products. Firstly we refined the time-series reflectance data by removing the effects of cloud contamination based on the Savitzky-Golay filter. Secondly a simple linear mixture model was adopted to estimate temporal signatures of underlying end-member landcover types and simulate mixed signatures at different end-member compositions. Thirdly we calculated NDVI and NDWI time series using the simulated signatures and explored the minimum fraction of abandoned paddy potentially including the signal relevant to cessation of agricultural activity. Preliminary results showed that successful detection is limited to the pixel dominated by abandoned paddy areas.

Keywords: abandoned farmland, spatial resolution, temporal resolution, time-series analysis, mixed pixel