EVALUATING CHANGE DETECTION IN KWANGNEUNG EXPERIMENT FOREST USING BOTH ALOS PALSAR AND AVNIR-2

Min-Gee HONG[a*], Joonsoo CHOI[b], and Choen KIM[c]

[a*]Dept. of Applied Information Technology, Graduate School, Kookmin University,

Seoul 136-702, Korea; Tel: + 82-2-910-5080;

E-mail: hd21351@kookmin.ac.kr

[b]Professor, Dept. of Computer Science, Kookmin University,

Seoul 136-702, Korea; Tel: + 82-2-910-4798;

E-mail: jschoi@kookmin.ac.kr

[c]Professor, College of Forest Science, Kookmin University,

Seoul 136-702, Korea; Tel: + 82-2-910-4813;

E-mail: choenkim@kookmin.ac.kr

KEY WORDS: ALOS PALSAR, AVNIR-2, Change Detection, IFSAR, Coherence Image

ABSTRACT: PALSAR data was found to be suitable for monitoring forest cover and mountainous regions change detection. Particularly, PALSAR intensity and coherence image have been successfully implemented. We carried out studies on IFSAR method for time-series change detection using multi temporal ALOS PALSAR data. In order to detect the change in KEF, five PALSAR images acquired from 2008 to 2010. The study area is situated in 1111ha KEF, 127° 12' 05'' North in latitude and 37° 70' 50'' - 37° 81' 32'' East in longitude. A multi-temporal PALSAR coherence image presents an objective record of irregular forest change detection between two PALSAR image acquisitions as decoherence features. Therefore, coherence imagery can therefore be used as a reconnaissance tool for monitoring the environmental.

References from Other Literature:

Smith, J., 1987b. Economic printing of color photos. Report KRL-3, Kennedy Laboratories, Arlington, VA-USA.

Smith, J., 1988. Single Station Self-Calibration Technique. In: International Archives of Photogrammetry and Remote Sensing, Kyoto, Vol.XXVII, Part B5, pp.456-469.

1. Introduction

Land cover mapping and timely detecting land-cover changes has become a concerned issue about urbanization, which has a significant impact on our habitation. Urban areas are the most rapidly expanding and changing elements of the landscape in China, the largest developing country.

2. Study area and Data

Kwangneung Experiment Forest was selected as the target area for this study which is well established. The study used digital forest map that contains properties of age class and tree species.

QuickBird imagery which fusion between multispectrum(MS) data and panchromatic data is used in this study. The pixel size of resampling of fused images from QuickBird is 0.594m. Root-Mean-Square-Error (RMSE) of 1.57 was calculated using digital topographic map as preprocessing of images for accurate classification.

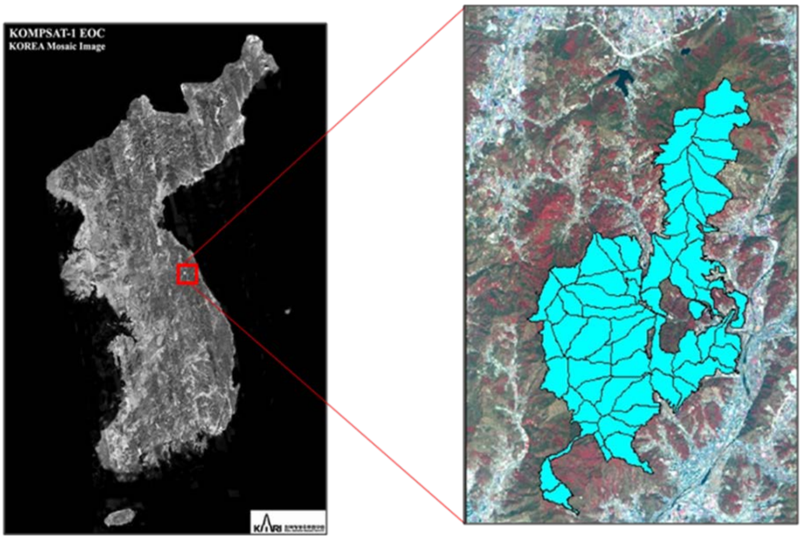

Figure 1. Kwangneung Experiment Forest acquired in a leaf-off condition on April 5, 2005, 11:21 AM(KST)

3. Methodology

Korean Pine trees and Japanese Red Pine trees were classified according to age class (4 age class, 6 age class) through SQL from properties of digital forest map. NDVI imagery on Korean Pine trees and Japanese Red Pine trees classified using NDVI formula(ρ_{nir}-ρ_{red} / ρ_{nir}+$\rho_{red)}$ were calculated since the accuracy of NDVI imagery on classified forests is higher than the entire images that includes non-vegetation areas. This study generated DEM through digital topographic map and performed aspect division by 10° interval.

The reason for using 10° division is because NDVI has a little difference through comparison of regression equation between 5°and 10°interval thus 5° interval NDVI directionality study is somewhat unnecessary (Hong, 2010). Spatial analysis was performed NDVI and aspect (1°-360°) generated using DEM.

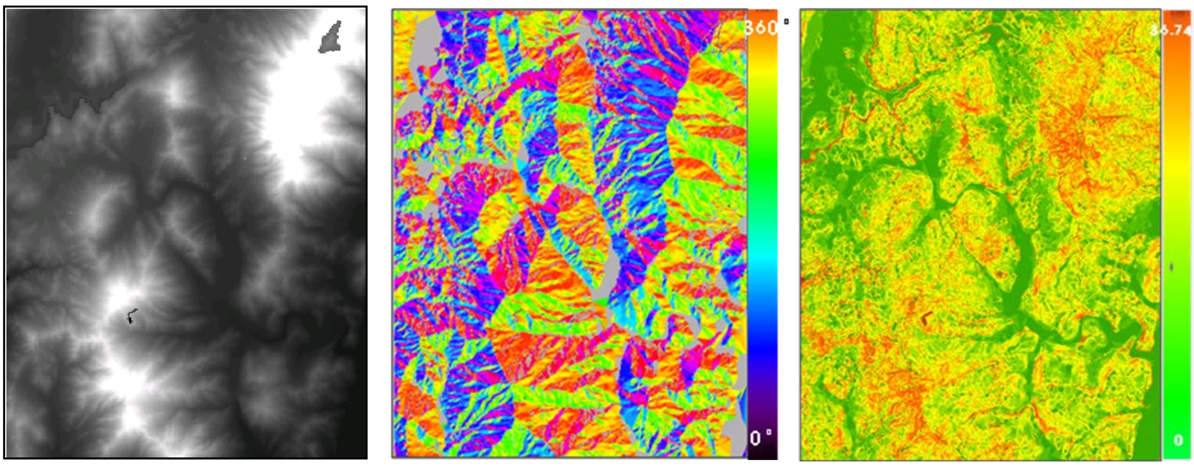

Figure 2. DEM(left), aspect(middle), and slope(right) imagery of Kwangneung Experiment Forest

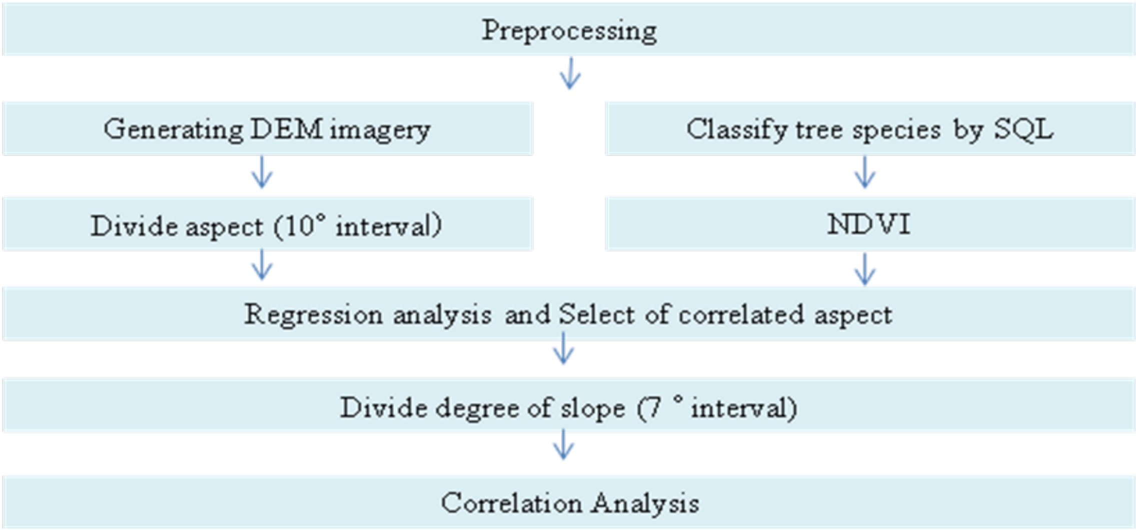

Figure 3. The methodology of this project can be described by the flow chart

3. Results

The results of regression analysis on the average between aspect divided at 10° interval and NDVI digital number value are shown in Table 1. Table 1 shows the results of analysis by selecting the same and tree species, age class, aspect and degree of slope.

Regression equation shows almost normal distribution curve. It examined topographic effects affecting QuickBird image-based NDVI through previously described processes. NDVI showed differences by topographic effects even for and tree species the same condition.

Figure 4 shows the number of pixels on aspect (10° interval) divided to compensate NDVI from QuickBird MS by the effects of directionality.

Each aspect zone with the most number of pixels were selected and divided degree of slope at 7° interval and analyzed NDVI in the same way as analyzing aspect.

4. Conclusions

This study analyzed the properties of NDVI directionality on forests classified with the same condition. Conclusion can be summarized in the following three issues.

First, NDVI is regularly reduced in the order of South-East-West-North.

Second, NDVI digital number value tends to increase as age class on pine and nut pine trees increased. NDVI increases as age class increases since NIR value is higher as there are more lamina from healthy and mature canopies. However, it is hard to regard individual NDVI as the unique value of tree types by age class.

Third, there were errors in reiterating QuickBird images and the digital forest map for classifying and tree species under the same condition.

Therefore, NDVI on forest topographic effects can be clearly investigated only when types of trees are accurately classified through accurate pre-processes and field inventory data.

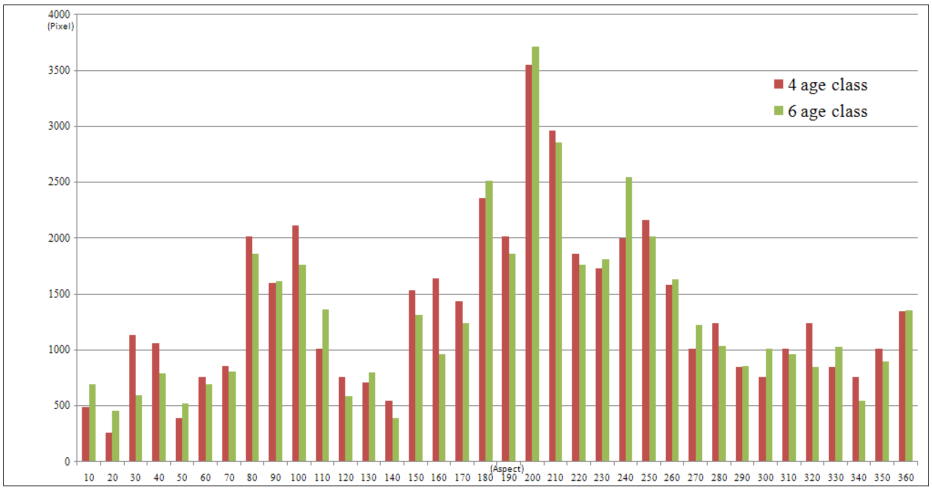

Figure 4. Compared with aspect and number of pixel

Table 1. Correction on NDVI DN value from QuickBird MS data.

	Korean Pine trees		Japanese Red Pine trees	
	4 age class	6 age class	4 age class	6 age class
Regression	$y=-2E-0.6x^2+0.0007x+0.2136$	$y=-2E-0.5x^2+0.0007x+0.2259$	$y=-1E-0.6x^2+0.0006x+0.2215$	$y=-1E-0.6x^2+0.0006x+0.2333$
NDVI DN value	0.2159	0.2308	0.2314	0.2398

References

Kim, C., 1996. A Pilot Study on Environmental Understanding and Estimation of the Nak-Dong River Basin Using Fuyo-1 OPS Data. Journal of the Korean Society of Remote Sensing, 12(2), pp. 170-198.

Hong, M. G., 2010. NDVI signature for mountain forest in accordance with topographic effects using QuickBird multi-spectral data. 2010 Spring Conference on Spatial Information, pp.117-118.