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Possibility of PALSAR data for forest extraction

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Recently, it has become possible to extract various kinds of environmental information using Synthetic Aperture Radar (SAR) in the remote sensing. SAR data widely used for observing the rain forest areas because of the advantage that do not affected by cloud and weather condition. From last 20th century, global warming has become a severe problem over the world. According to the existing studies on global warming, most of the researchers concluded that the main factor is the mass of the emission of CO_2. The trees has a function of absorbing CO_2through photosynthesis, but the carbon storing in the trees will give out again when the trees have been cut down. Correct identification of the forest distribution and its changes are important information for the carbon cycle research. However, when we review the existing forest maps that derived from SAR data, many studies have used optical sensors with SAR data. It means that the results have effected by nighttime or cloud covers.

Objective of this study is to examine the distinction ability between forest and other vegetations only using PALSAR data. The study area covers for central Africa. Used data are 50m resolutions of PALSAR mosaic data in 2008, Google Earth and 500m resolution MODIS data (2008) ,and 1 km resolution Percent tree map (ROKHMATULOH, 2003) for validation data. To confirm the distinction ability between forest and other vegetations, following five types of land covers have selected; forest, herbaceous, cropland, cropland/other vegetation mosaic and urban. Training points for above classes were collected using Google Earth. In this study, two kinds of polarization waves of PALSAR data which called HH polarization wave and HV polarization wave were used and the threshold method was applied when decide the ranges of backscattering factor (BF) for forest on the images. Backscattering factor for forest in the HH image (FH) was ranged -9.754<FH<-2.135. In this range, herbaceous cover have ranged from -9.754<FH<-4 while Cropland and Cropland/other vegetation mosaic were ranged for -9.754<FH<-4.5 and -9.754<FH<-2.5, respectively. Urban have coincided ranges with forest backscattering factor in HH image. Also, scattering factors in HV image for each land covers were extracted, because forest could not extracted with only single polarization. Forest scattering factor was about 14<FV<-6, while herbaceous and cropland/other vegetation mosaic were included from-10<FV<-1. Part result for the urban have same value with above HH image. Based on the above analysis, we conclude that:

1, <Forest> and <Cropland> can be classified very well; 2,It is easy to classify <Forest> and <Herbaceous> or <Forest> and <Cropland/other vegetation mosaic>; 3,It is very difficult to classify <Forest> and<Urban>. At the end of the analysis of backscattering factor, the range of the forest backscattering factor is decided to A -B (A is when [-9.754<FH<-2.135] and moreover [-14.535<FV<-6.309], B is [-9.754<FH<-8.180] and moreover [-14.535<FV<-11.540]).

Our next step is to extract the urban area included in forest area. NDVI data that calculated from band1 and band2 for MODIS would be used in this step. Collected training data for forest and urban area would be used for deriving NDVI values. Finally, we extracted forest map from PALSAR data together use with NDVI values and the extracted result was checked by the training data of Percent Tree .

Keywords: PALSAR data, forest extraction