Land Cover Classification with PALSAR Polarimetric Data in Kalimantan, Indonesia

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Introduction

Demand on land cover information

Control of Wildfire damage

- Lack of the ground truth data
- Technique is not established

Making Land cover map with only PALSAR data in the tropical area because clouds are covered anytime.
We use SAR carried on ALOS

Bands: L band of microwave (about 24cm)

Very effective for tropical area because it is observed even under the clouds

Many polarized waves can be observed (HH, HV, VH, VV)
The H and V parts of an antenna can receive the two orthogonal components of the incoming wave, and the system electronics keep these two signals separate.

<table>
<thead>
<tr>
<th>send</th>
<th>receive</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH</td>
<td>Horizontal</td>
</tr>
<tr>
<td>VV</td>
<td>Vertical</td>
</tr>
<tr>
<td>HV</td>
<td>Horizontal</td>
</tr>
<tr>
<td>VH</td>
<td>Vertical</td>
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</tbody>
</table>

- **HH** polarization
  - Roughness of the ground
- **HV** polarization
  - Amount of biomass in the forest
Study Area and Data

- Study Area
  - Mega-hectare area (near Palangka Raya), central part of Kalimantan Island
  
    - 113°44’E ~ 114°33’E
    - 1°44’S ~ 2°53’S

- PALSAR Data
  - July 9th, August 24th, and October 9th in 2007
ISODATA method

- A kind of non-hierarchical cluster analysis

- The classes are fixed to 20.
- Repetition calculation until the data accord with 99%.
Classification

Re-classification of HV-volume scattering

Legend
- Water
- Thick Forest
- Thin Forest
- Grass
- Shrub
- Urban

POSTEL vegetation

Plot Density
- High
- Low
Other results that the training data was changed

Upper: July 9th, 2007
middle: August 24th, 2007
Lower: October 9th, 2007

Plot areas are similar when training data has changed from the imagery on July 9th to other days.
Discussion about classification

- Consistency with the characters of microwave polarization
  - The classification in the plots are similar
- In HH-VV scatters graph, urban area is plotted wide but low density
  - Urban area is covered under 2% of study area

- Universally of training data
  - Adaptation for any time in this study area

Our result is GOOD.
Seasonal change

Flood was disappeared.

Vegetation recovered in the burnt area.

July 9th, 2007
46days

August 24th, 2007
Orbiter period

October 9th, 2007
46days
Validation of our results with hotspot data

August 24th, 2007

The area around hotspot changed to burnt area.

October 9\textsuperscript{th}, 2007

Hotspot was detected by MOD14.
Compared with previous study

By SarVision (May, 2007)

This study (July 9th, 2007)
Forest and Scrub area are the same with previous analysis (SarVision, 2007).
Burnt area is detected.

Classification with forest biomass is almost same.

River banks and hills are different.
Detail classification of scrub and bush is not good.

HH polarization may be effective for classification of them.
With PALSAR HH-VV polarization data in central Kalimantan,

- Classification of vegetation (burnt forest, forest and scrub) are available.
- Classification with ISODATA method is effective

For improvement of accuracy,
- Rocks, slope and ground water will be considered.
- Mask processing with GIS data is needed for obvious land cover like water body.
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