



Processing Sentinel data using Orfeo Toolbox, Geospatial Data Abstraction Libraries and

pktools for forest monitoring

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pktools

- Application of Orfeo Toolbox (OTB); Geospatial Data Abstraction Library (GDAL) & pktools for:
 - Sentinel-1 (S-1) Synthetic Aperture Radar data processing
 - Sentinel-2 (S-2) Optical data processing
- 2. Generation of an automated change detection algorithm in a Linux environment to monitor changes in Coillte's forest estates



S-1 – SAR data





C-band Synthetic Aperture Radar (SAR)

Level 1.1 Ground Range Detected (GRD); Interferometric Wide Swath (IW) mode; Descending pass

> Spatial Resolution – 20m; Revisit time – 6 days

Image acquisition timeline - February 2015 - April 2017 (Bimonthly data)

Dual Polarisation – VV+VH

Study Area for S-1 SAR processing





S-1 Pre-processing Workflow with OTB and GDAL





Output from S-1 SAR Pre-processing Workflow





S-1 SAR Post-processing Workflow





Output from S-1 Post-processing Workflow



Date of image acquisition: 2016-08-21 and 2017-06-29



Difference image: otbcli_BandMath

More commission errors were observed in comparison with the validation dataset from Coillte forest inventory.

Overall accuracy – 79% Producer's accuracy (omission errors) – 77% User's accuracy (commission errors) – 73%

Conclusions

- S-1 C-band with VV+VH polarisation was not optimal for forest monitoring purposes because of factors such as soil moisture and shorter wavelength (3.8 – 7.5cm).
- Polarisation channels HV+HH tend to be more suitable for forest monitoring compared to VV+VH polarisation. VV channel is mainly suitable for Marine applications.
- Subsequent focus on SAR sensors with longer wavelengths such as L-band (15 - 30cm) and P-band (30-100cm) to be considered.







Multispectral Instrument (MSI)

Number of reflectance bands – 13; Revisit time – 5 days

Number of tiles covering the entire country - 11

Year of image acquisition - 2017

Workflow for S-2 Optical Data Processing





Output from S-2 Workflow





Range of NDVI values







Thank you!! ③