FACET: Monitoring the forests of Central Africa using remotely sensed data sets (Forêts d'Afrique Centrale Évaluées par Télédétection)

Atlas of forest cover and loss for 2000-2010 in the Republic of the Congo (ROC)

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FACET (Monitoring the forests of Central Africa using remotely sensed data sets/ *Forêts d'Afrique Centrale Évaluées par Télédétection*) is an OSFAC project that quantitatively evaluates the spatiotemporal dynamics of forest change in Central Africa through the use of multi-temporal satellite data. The series of multi-temporal data from the FACET project will contribute to many environmental and planning projects in Central Africa.

The FACET analysis used an automated "wall-to-wall" remote sensing method (as opposed to a sample-based method) developed jointly by South Dakota State University and the University of Maryland. An exhaustive mining of the Landsat Enhanced Thematic Mapper Plus (ETM+) archive, totaling 2491 images containing less than 50% cloud cover, was performed to generate maps of forest cover extent and loss along with corresponding image composites. The DVD data consist of the Landsat image composites and thematic classifications of forest cover and forest cover loss for the periods 2000-2005-2010 for the Republic of Congo.

Data included on this DVD:
(Prepared by: Svetlana Turubanova, Peter Potapov, Matthew C. Hansen – University of Maryland)

1. **Landsat pseudo color image composites (band combination 5-4-3):**

year2000.tif - Circa year 2000 (median of 5 cloud-free observations closest to July, 1, 2000)
year2005.tif - Circa year 2005 (median of 5 cloud-free observations closest to July, 1, 2005)
year2010.tif - Circa year 2010 (median of 5 cloud-free observations closest to July, 1, 2010)
median.tif – Median band values for 2000-2005 time interval

Data format: TIFF (LZW), 8bit, 3 bands
Projection: Sinusoidal
Central meridian: 20E
Sphere Arc/Info (radius 6370997m)
ULX: -1079970m
ULY: 479970m
Pixel size: 60m x 60m

Data description:

Included in this DVD are three seamless cloud-free Landsat image composited mosaics for the whole of the Republic of Congo. The image mosaics are based on ETM+ SWIR, NIR and

Red spectral bands and represent three time periods: circa 2000, circa 2005 and circa 2010, using the median of 5 cloud free observations closest to July 1 of that year. The ETM+ data are resampled to a 60m spatial resolution. Image data represent top-of-atmosphere (TOA) reflectance normalized using MODIS atmospherically corrected inputs. The per band reflectance values are scaled to Digital Numbers (DN) with a range of 1 to 255. To obtain reflectance values, use the following equation: reflectance = (DN-1)/254.

Landsat data can be accessed for free from the United States Geological Survey (USGS) at the following website: landsat.usgs.gov.

2. **Forest cover and loss map for ROC: map.tif**

Data format: TIFF (LZW), 8bit, single band
Projection: Sinusoidal
Central meridian: 20E
Sphere Arc/Info (radius 6370997m)
ULX: -1079970m
ULY: 479970m
Pixel size: 60m x 60m

Legend:

0	No Data (outside ROC)
1	Non-forest areas
2	No Data (within ROC)
3	Water bodies
4	Primary humid tropical forests
5	Secondary humid tropical forests
6	Swamp forests
7	Forest cover loss 2000-2005 within primary forest
8	Forest cover loss 2000-2005 within secondary forest
9	Forest cover loss 2000-2005 within swamp forest
10	Forest cover loss 2005-2010 within primary forest
11	Forest cover loss 2005-2010 within secondary forest
12	Forest cover loss 2005-2010 within swamp forest

Data description:

Forest is defined as an area with trees at least five (5) meters in height and a canopy cover of at least 60% at a spatial resolution of 60m. Forest areas have been divided into three categories: primary forest, secondary forest and swamp forest (swamp forest is a subset of primary forest).

Primary forest is defined as a mature forest, including old growth forest, plantations, mature trees, and forest galleries. Primary forests have a mature, heterogeneous canopy height and structure that extinguishes incoming light, reduces reflectance and makes these forests appear dark in satellite imagery.

Secondary forest includes recently regrown forests following a disturbance. Secondary forests are characterized by uniform canopies that increase reflectance, particularly in the near infra-red wavelengths, when compared to primary forests.

Swamp forest is defined as primary forest occurring in wetlands. Wetlands are transitional lands located between terrestrial and aquatic systems where the water table is usually at or near the surface, or where the land is covered by shallow water.

Other land cover types are considered non-forest.

Forest cover loss was mapped by quantifying the change in forest to non-forest cover during the period under study. Permanent water bodies were mapped separately.

References:

Jean-Robert B. Bwangoy, Matthew C. Hansen, David P. Roy, Gianfranco De Grandi, Christopher O. Justice. Wetland mapping in the Congo Basin using optical and radar remotely sensed data and derived topographical indices. Remote Sensing of Environment, Volume 114 (2010), Pages 73-86.
http://dx.doi.org/10.1016/j.rse.2009.08.004.

Peter V. Potapov, Svetlana A. Turubanova, Matthew C. Hansen, Bernard Adusei, Mark Broich, Alice Altstatt, Landing Mane, Christopher O. Justice. Quantifying forest cover loss in Democratic Republic of the Congo, 2000–2010, with Landsat ETM+ data. Remote Sensing of Environment, Volume 122 (2012), Pages 106-116.
http://dx.doi.org/10.1016/j.rse.2011.08.027.

Other raster and vector data included on this DVD

Hydrographie_generale (Source: World Resources Institute)

- Hydro_lin.shp - Rivers
- Hydro_surf.shp – Lakes and large water bodies

WRI_vector data (Source: World Resources Institute)

- Departments.shp – Departements (an administrative unit) in ROC
- Population_points.shp – Population centers
- Protected_areas.shp – Protected Areas
- Roads.shp – Roads, including paved and logging roads

NaturalEarth_base (Source: Natural Earth, http://www.naturalearthdata.com/)

- NaturalEarth_base.tif (http://www.naturalearthdata.com/http//www.naturalearthdata.com/download/10m/raster/NE1_LR_LC_SR_W_DR.zip - Natural Earth I with shaded relief, water and drainage basins: Satellite-derived land cover data and shaded relief presented with a light, natural palette suitable for making thematic and reference maps.)

View the FACET and associated data in ArcGIS Explorer

ArcGIS Explorer Desktop is a free GIS viewer that provides an easy way to explore, visualize, and share GIS information.

With ArcGIS Explorer, you can

- Access ready-to-use ArcGIS Online basemaps and layers.
- Fuse your local data with map services to create custom maps.
- Add photos, reports, videos, and other information to your maps.
- Perform spatial analysis (e.g., visibility, modeling, proximity search).

Download ArcGIS Explorer and view the system requirements information: http://www.esri.com/software/arcgis/explorer/index.html

How to view the FACET data using ArcGIS Explorer:

1. Copy the « ArcGISExplorerDownload.exe » file to your computer (or download the file from the ESRI website)
2. Double click on the file to install ArcGIS Explorer
3. Follow the ArcGIS Explorer installation instructions
4. Once you have installed ArcGIS Explorer to your computer, double click on the RoC_FACET_data.nmf file.
5. ArcGIS Explorer should open with the ROC FACET raster data loaded with some additional vector data.

View the FACET data online:

1. The ROC FACET dataset will be made available on the OSFAC website: http://osfac.net and on the CARPE Data Explorer: http://congo.iluci.org/dataexplorer.
2. The FACET products for all available Congo Basin countries can be viewed on the CARPE WebGIS, CARPE Mapper: http://congo.iluci.org/carpemapper.