CAPACITY BUILDING FOR HIGH-RESOLUTION LAND COVER INTERCOMPARISON AND VALIDATION

Validation with GlobeLand30 Geoportal

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Open Data Access

www.globeland30.org
Conceptual Architecture of Globeland30 Platform

- **Design a series of services to provide online browsing, downloading, Geo-statistics, validation and knowledge map.**
- **Connect Globeland30, multiple source data and services.**
Outlines

1. Data Browsing
2. Data Downloading
3. Data Specification
4. Data Statistics
5. Data Validation
Data Browsing

1. Browse GlobeLand30 and source imagery
2. Locate typical landscape
3. Compare Globeland30 in different years or with other reference datasets
Browsing GlobeLand30

Land Cover Types
- Water bodies
- Wetlands
- Artificial Surfaces
- Tundra
- Permanent snow and ice
- Grasslands
- Bare lands
- Cultivated land
- Shrub lands
- Forests

Water bodies
- Kingdom of thousands of lakes
- The largest country in the world
- Beaded Great Rift Valley lakes
- The world's largest river basin

Description
Typical Landscape Types

1. Land Cover Types
   - Water bodies
   - Wetlands
   - Artificial Surfaces
   - Tundra
   - Permanent snow and ice
   - Grasslands
   - Barren lands
   - Cultivated land
   - Shrublands
   - Forests

2. Wetland
   - The world's largest wetland - the Pantanal is the world's largest wetland, flat and slightly sloping, with meandering rivers. In South America, Brazil and Mato Grosso and Mato Grosso do Sul, Bolivia and Paraguay Province in the wetland part, a total area of 242000 square kilometers. Pantana M will be flooded during the rainy season, more than 80% area will be under water, is the world's most abundant aquatic plants concentrated. Pantana M is considered the world's most intensive dynamic ecosystem plant.
   - The world's largest inland del
   - The world's largest delta compl
   - Asia's most unique wetlands

3. Description
   Pantana M Marsh (Pantanal) is the world's largest wetland, flat and slightly sloping, with meandering river. In South America, Brazil and Mato Grosso and Mato Grosso do Sul, Bolivia and Paraguay Province in the wetland part, a total area of 242000 square kilometers. Pantana M will be flooded during the rainy season, more than 80% area will be under water, is the world's most abundant aquatic plants concentrated. Pantana M is considered the world's most intensive dynamic ecosystem plant.
Comparison with Original 30m Imagery
Comparison of two Snapshots

2000

2010
3D

• 2000\2010
Outlines

1. Data Browsing
2. Data Downloading
3. Data Specification
4. Data Statistics
5. Data Validation
Data Downloading

1. Register
2. Log-in
3. Select map sheet
4. Submit application
5. Receive account

-- by map sheet number
-- by a series of coordinates
-- by drawing a shape

receive the FTP download address, account and password via E-mail

GLOBELAND30
Back to Home

Please enter your information
Username: S0002
Password: ********

Forgot password
Register

Our portal has been officially opened on 23 September 2014.
Congratulations! Your application has been agreed. The download information is as follows:
FTP Address: 218.244.250.80.
FTP Account: 34cbf9
FTP Password: 34cbf9

You could download the data in 5 days; please download as soon as possible.
Thanks for using GLOBELAND30 datasets. If you have any question, please contact gic@nsdi.gov.cn.
New user registration

- **User Name:** [ ] *For example: abcd_56*
- **Real Name:** [ ] *Please enter your real name*
- **Email:** [ ] *For example: abc@163.com*
- **Occupation:** [ ] *Please select*
- **Institution:** [ ] *Please give the full name of your institution*
- **Country:** [ ] *Please select*
- **Telephone:** [ ] *Format: +86-756-33936868 or 010-33936868 or 13912345678*
- **Address:** [ ] *

[Register] [Reset]

Back to login
Select interested area – by tiles

• Tile Name format: **N32_20,N32_19**
Select interested area – by coordinate

- Coordinates format: longitude and latitude pair
- E.g.: -180 90, -180 -90, 180 -90, 180 90, -180 90
Select interested area – by geometry

- Draw polygon
Submit Application

- Pop-up window to submit
Outlines

1. Data Browsing
2. Data Downloading
3. Data Specification
4. Data Statistics
5. Data Validation
Classification result file refers to the file storing the classification information of land covers, with its Coordinate information (TFW).
Index map file of classification image refers to the vector layer file recording the range and acquisition time of each scene of classification images.
GlobeLand30 Tile: Content and Format

Metadata file refers to the file recording the metadata information of classification result.

- Classification result file
- Metadata file
- Index map file of classification image
- N10_35_2010LC030.tif
- N10_35_2010LC030.tfw
- N10_35_2010LC030 IMG.shp
- N10_35_2010LC030 MAT.xml
GlobeLand30 Coordinate System

- Coordinate System: WGS84
- Reference Ellipsoid: WGS 84 Ellipsoid
- Projection: UTM Projection
- Zoning: 6°

N11-35 2000

N11-35 2010
GlobeLand30 Data Tile

• between 60°N and 60°S: the size of the tile is 6° (longitude) * 5° (latitude)

• between 60°N and 80°N and between 60°S and 80°S: the size of the tile is 12° (longitude) * 5° (latitude), and project according to the central meridian of every odd 6° zone

- Total Number
  - 2000:853
  - 2010:853
The cutting range of the tile is a rectangular area.
First get the minimum bounding rectangle, then extend out 7500 meters of each vertex of rectangle.
the red rectangle is the minimum bounding rectangle, the green rectangle is the actual area of the single tile.
<table>
<thead>
<tr>
<th>Type</th>
<th>Definition</th>
<th>Type</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivated land</td>
<td>Lands used for agriculture, horticulture and gardens, including paddy fields, irrigated and dry farmland, vegetation and fruit gardens, etc.</td>
<td>10</td>
<td>250 160 255</td>
</tr>
<tr>
<td>Forest</td>
<td>Lands covered with trees, with vegetation cover over 30%, including deciduous and coniferous forests, and sparse woodland with cover 10 - 30%, etc.</td>
<td>20</td>
<td>0 100 0</td>
</tr>
<tr>
<td>Grassland</td>
<td>Lands covered by natural grass with cover over 10%, etc.</td>
<td>30</td>
<td>100 255 0</td>
</tr>
<tr>
<td>Shrubland</td>
<td>Lands covered with shrubs with cover over 30%, including deciduous and evergreen shrubs, and desert steppe with cover over 10%, etc.</td>
<td>40</td>
<td>0 255 120</td>
</tr>
<tr>
<td>Wetland</td>
<td>Lands covered with wetland plants and water bodies, including inland marsh, lake marsh, river floodplain wetland, forest/shrub wetland, peat bogs, mangrove and salt marsh, etc.</td>
<td>50</td>
<td>0 100 255</td>
</tr>
<tr>
<td>Water bodies</td>
<td>Water bodies in the land area, including river, lake, reservoir, fish pond, etc.</td>
<td>60</td>
<td>0 0 255</td>
</tr>
<tr>
<td>Tundra</td>
<td>Lands covered by lichen, moss, hardy perennial herb and shrubs in the polar regions, including shrub tundra, herbaceous tundra, wet tundra and barren tundra, etc.</td>
<td>70</td>
<td>100 100 50</td>
</tr>
<tr>
<td>Artificial Surface</td>
<td>Lands modified by human activities, including all kinds of habitation, industrial and mining area, transportation facilities, and interior urban green zones and water bodies, etc.</td>
<td>80</td>
<td>255 0 0</td>
</tr>
<tr>
<td>Bareland</td>
<td>Lands with vegetation cover lower than 10%, including desert, sandy fields, Gobi, bare rocks, saline and alkaline lands, etc.</td>
<td>90</td>
<td>190 190 190</td>
</tr>
<tr>
<td>Perennial snow or ice</td>
<td>Lands covered by permanent snow, glacier and icecap.</td>
<td>100</td>
<td>200 240 255</td>
</tr>
<tr>
<td>Sea Area</td>
<td></td>
<td>255</td>
<td>0 200 255</td>
</tr>
<tr>
<td>Area Without Data</td>
<td></td>
<td>0</td>
<td>0 0 0</td>
</tr>
</tbody>
</table>
2017 Data Africa

- not available for downloading

2017

2018

Rest of part

2019
Outlines

1. Data Browsing
2. Data Downloading
3. Data Specification
4. Data Statistics
5. Data Validation
Administration cell - Kenya

1. Administration cell
2. Draw point
3. Draw polygon

Nairobi Area

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
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<td>Tundra</td>
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<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>Permanent snow and ice</td>
<td>0</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>Grass lands</td>
<td>184.8087</td>
<td>217.3734</td>
<td>-32.5647</td>
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</tbody>
</table>

GlobeLand30-2010

GlobeLand30-2000
Draw point- Tanzania
Polygon - typical area
# Result - Tanzania

### Land Cover Types

<table>
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<tr>
<th></th>
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<td>Artificial Surfaces</td>
<td>2355.9448</td>
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<td>Tundra</td>
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<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>Permanent snow and ice</td>
<td>0</td>
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<tr>
<td>Grass lands</td>
<td>354359.3689</td>
<td>445503.7634</td>
<td>-91144.3645</td>
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</tbody>
</table>

### GlobeLand30

- **GlobeLand30-2010**
- **GlobeLand30-2000**
Validation of Land Cover Maps

one of the critical steps in land cover mapping, aiming to document the accuracy of land cover maps

allows users to evaluate the utility of these maps for their particular applications
Collaborative validation

- Multi-heterogeneous Info. Services integration and publishing
- Organized work flow in collaboration
- Multi-Users
Selecting samples at which reference data will be collected and used to estimate the overall and class-specific accuracies in the target region(s).

1. Sampling
- Determine sample size for each region
- Assign the sample size to each class
- Allocate samples into space

2. Judgment

3. Assessment

\[ OA = \frac{1}{n} \sum_{i=1}^{m} n_{ii} \]

Selecting samples
- Determine sample size for each region
- Assign the sample size to each class
- Allocate samples into space

Collect reference data

Calculate accuracies
- Overall
- And class-specific
Sampling

Fundamental criteria

- **Probability** - Larger sample sizes or higher sample densities for more heterogeneous regions; sufficient sample numbers for rare class (Wickham, 2010);
- **Spatial balance** - Well spatial distribution, taking the spatial heterogeneity into consideration (Stehman, 2009);
- **Cost effectiveness** - Practical, cost effective sample size (Stehman, 2009).

![Maps of Mauritania, Spain, and Bangladesh](images)
A LSI-Based Sampling Approach

Calculate three-level LSIs (regional, class and units) and use them to derive the subsequent sample sizes and their spatial distributions.

As a quantitative measure of landscape complexity, LSI can characterize the spatial heterogeneity of land cover.

Case in Africa (1)

Spatial distribution of samples
Case in Africa (2)

Sample size per country was derived and all countries have a good number of sample points.

<table>
<thead>
<tr>
<th>Country</th>
<th>Sample Size</th>
<th>Country</th>
<th>Sample Size</th>
<th>Country</th>
<th>Sample Size</th>
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<td>NIGER</td>
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<td>CAMEROON</td>
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<td>KENYA</td>
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<td>LESOTHO</td>
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<td>CENTRAL AFRICAN REPUBLIC</td>
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<td>MADAGASCAR</td>
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<td>CONGO</td>
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</table>
## Case in Africa (3)

### Sample number of each class for every country

<table>
<thead>
<tr>
<th>Country</th>
<th>Number</th>
<th>Crop</th>
<th>Forest</th>
<th>Glass</th>
<th>Shrub</th>
<th>Set</th>
<th>Water</th>
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<th>Bare</th>
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<td>SAO TOME AND PRINCIPE</td>
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Step by step on-line validation

Global Land Cover Validation

### Unfinished validation tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Progress</th>
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### Finished validation tasks

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<tr>
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</tr>
</tbody>
</table>
Thanks for Your Attention!

Contributors to the project:

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