Global Land Cover and Intelligent Analysis of Remote Sensed Images

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• Land Cover (LC) maps: a key class of global geospatial datasets

- LC maps are fundamental for a wide range of users and applications such as planning, nature and biodiversity protection, natural resources management, etc.

- LC products represent a key input to monitor the indicators of the Sustainable Development Goals (SDGs)

- LC data promote evidence-based policy-making on issues like soil consumption and deforestation
## High Resolution Land Cover

<table>
<thead>
<tr>
<th>Name</th>
<th>Resolution (m)</th>
<th>Temporal Coverage</th>
<th>Producer</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM-GLC</td>
<td>30</td>
<td>2010, 2015</td>
<td>Tsinghua University</td>
</tr>
<tr>
<td>GlobeLand30</td>
<td>30</td>
<td>2000, 2010, 2015</td>
<td>National Geomatics Center of China (NGCC)</td>
</tr>
<tr>
<td>Global Water Surface</td>
<td>30</td>
<td>1984-2015</td>
<td>Joint Research Centre (JRC)</td>
</tr>
<tr>
<td>Forest / Non-Forest map</td>
<td>25</td>
<td>2007-2010 2015-2016</td>
<td>Japan Aerospace Exploration Agency (JAXA)</td>
</tr>
<tr>
<td>Global Urban Footprint</td>
<td>12</td>
<td>2011</td>
<td>German Aerospace Center (DLR)</td>
</tr>
<tr>
<td>Tree Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global forest cover gain</td>
<td>30</td>
<td>2000-2012</td>
<td>University of Maryland</td>
</tr>
<tr>
<td>Global forest cover loss</td>
<td></td>
<td>2000-2015</td>
<td></td>
</tr>
</tbody>
</table>
Outline

• Monitoring land use change using satellite images and artificial intelligence (Wen-zhong John SHI)

• Operational Updating of GlobeLand30 (Peng SHU)

• Spatiotemporal evolution of urban within Guangdong-Hong Kong-Macau Bay Area in 1987-2017 (Qingquan LI)

• Global High Resolution Land Cover Validation Capacity Building (Maria A BROVELLI)

• Validating land cover through mapathons - challenges and opportunities (Serena COETZEE)
Monitoring land use change using satellite images and artificial intelligence

Prof. Dr. John W Z Shi
Department of Land Surveying and GeoInformatics
The Hong Kong Polytechnic University, Hong Kong
Email: lswzshi@polyu.edu.hk
Change Detection Methods

Model-based
- Markov random field
- Active contour model
- FCM, k-means
- Deep learning
- ...

Transformation
- Principle component analysis
- Kauth-Thomas tasseled cap
- Fast Fourier transformation
- ...

Visual analytics

Object

Super-pixel

Pixel

Sub-pixel

Algebra
- Change vector analysis
- Image differencing
- Image rationing
- Image correlation
- ...

Post classification
- Maximum likelihood
- Random forests
- Support vector machine
- ...

1) Dynamic threshold model
2) Fuzzy topology-based model
3) MRF model incorporating spatial attraction
4) Designed new level set model
5) Local spectral similarity-based model
Similarity Model based on Local Spectral Trend

Local spectral trend of difference and similarity
AI-based Change Detection

Visual cortex learns to see

Landslide Extraction

Deep Learning

Landslide feature representation

Input Layer
Middle Layers
Output Layer

CNN Extraction AI Method

Tai O Image, 2009

Landslide ground truth

CNN extraction result

CNN extraction result with post processing
## Results and Comparison

<table>
<thead>
<tr>
<th></th>
<th>Pixel-based Assessment</th>
<th>Object-based Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Precision</td>
<td>Recall</td>
</tr>
<tr>
<td>Feature-based Method</td>
<td>56.16%</td>
<td>52.74%</td>
</tr>
<tr>
<td>AI-based Method</td>
<td>90.10%</td>
<td>78.29%</td>
</tr>
<tr>
<td>Increase Rate</td>
<td>+33.94%</td>
<td>+25.55%</td>
</tr>
</tbody>
</table>
The System
Urban Land Use CD
Vegetation Cover CD

影像 T1

影像 T2

变化区域

Difference image X

Fuzzy c-means

Membership probability

Spatial attraction

Improved MRF

Change map
Water Body CD

变化区域

影像T1

影像T2

图像比较

流程图：
- 计算两个类别的隶属度函数
- 求差图像
- 求未改变像素类
- 求改变像素类
- 再分类模糊边界像素
References (1)


References (2)


Thank you!

Questions?
Operational updating of GlobeLand30

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Introduction

China Launched GlobeLand30 on Sep. 2014, the 1\textsuperscript{st} 30-m earth land cover map with 10 classes and two years (2000, 2010)

GlobeLand30 Users are now from 131 countries and regions.
## Introduction

### Major Application Field of GlobeLand30

<table>
<thead>
<tr>
<th>Research Fields</th>
<th>Proportion of Each Field</th>
<th>University</th>
<th>Institute</th>
<th>Government</th>
<th>NGO</th>
<th>UN</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Change</td>
<td>7.51%</td>
<td>38.62%</td>
<td>31.29%</td>
<td>7.32%</td>
<td>9.32%</td>
<td>3.06%</td>
<td>10.39%</td>
</tr>
<tr>
<td>Biodiversity and Ecosystem</td>
<td>26.94%</td>
<td>48.85%</td>
<td>32.26%</td>
<td>0.59%</td>
<td>3.19%</td>
<td>1.15%</td>
<td>13.96%</td>
</tr>
<tr>
<td>Disaster Resilience</td>
<td>13.69%</td>
<td>73.78%</td>
<td>10.30%</td>
<td>9.72%</td>
<td>1.68%</td>
<td>2.26%</td>
<td>2.26%</td>
</tr>
<tr>
<td>Energy and Mineral Resources Management</td>
<td>5.33%</td>
<td>29.46%</td>
<td>29.46%</td>
<td>20.64%</td>
<td>4.32%</td>
<td>0.00%</td>
<td>16.14%</td>
</tr>
<tr>
<td>Food Security and Sustainable Agriculture</td>
<td>10.09%</td>
<td>48.86%</td>
<td>16.25%</td>
<td>3.87%</td>
<td>12.39%</td>
<td>6.24%</td>
<td>12.39%</td>
</tr>
<tr>
<td>Infrastructure and Transportation Management</td>
<td>3.84%</td>
<td>48.96%</td>
<td>26.56%</td>
<td>2.08%</td>
<td>12.24%</td>
<td>0.00%</td>
<td>10.16%</td>
</tr>
<tr>
<td>Public Health Surveillance</td>
<td>4.06%</td>
<td>40.39%</td>
<td>38.67%</td>
<td>3.94%</td>
<td>5.67%</td>
<td>5.67%</td>
<td>5.67%</td>
</tr>
<tr>
<td>Sustainable Urban Development</td>
<td>15.98%</td>
<td>64.21%</td>
<td>19.59%</td>
<td>6.38%</td>
<td>2.44%</td>
<td>1.00%</td>
<td>6.38%</td>
</tr>
<tr>
<td>Water Resources Management</td>
<td>12.53%</td>
<td>59.38%</td>
<td>19.39%</td>
<td>7.50%</td>
<td>1.84%</td>
<td>0.64%</td>
<td>11.25%</td>
</tr>
<tr>
<td><strong>Proportion of each organization</strong></td>
<td><strong>100.00%</strong> (Sum)</td>
<td><strong>53.88%</strong></td>
<td><strong>23.81%</strong></td>
<td><strong>5.72%</strong></td>
<td><strong>4.62%</strong></td>
<td><strong>1.96%</strong></td>
<td><strong>10.02%</strong></td>
</tr>
</tbody>
</table>

*Note: The italic figures mean the relative proportion of each organization in this research filed, and the sum of each line is 100%.***
Introduction

Evaluating uncertainty of 7 GLC products on hydro-climate modeling in India.

Mean daily (1998–2007) simulated land surface fluxes (ETa a, LE a, and Ha) for rainfed condition from reference data, difference of mean daily simulated land surface fluxes of each GLC from reference data set (DETa b–h, DLE b–h, and DH b–h) for rainfed condition.

Introduction

Characterizing, monitoring, and simulating land cover Dynamics

Fig. 7. a) Map of land cover persistence within 2000-2010, b) Transition from all classes to bareland within 2000-2010.

Fig. 8. Cubic trend of change towards bareland (a), artificial surfaces (b), cultivated land (c), forest (d).

Introduction

Simulating the distribution of African Savanna elephants

Figure 2. Prediction maps from MaxEnt showing probability of elephant occurrence within the study area based on the Globeland30 (left) and Globcover (center) based on GPS collar training data, a subset of which is shown over Globeland30 classification scheme (right).

Contents

Introduction

Updating Strategy

Quality Control

Conclusion
P-O-K based approach with split-and-merge strategy to produce GlobeLand30
Improved split-and-merge strategy to update GlobeLand30
Improved split-and-merge strategy to update GlobeLand30

Level 1: easy to extract automatically

- Water
- Permanent Snow
- Forest

Level 2: partly east to extract automatically with regional characteristics

- Artificial Surface
- Cropland

Level 3: easy to confuse and depend more on other characteristics than spectral and texture

- Wetland
- Shrubland
- Grassland
- Bareland
Updating Strategy

Level 1: overall automated extraction

Level 2: regional automated extraction

Level 3: knowledge based edit and extraction

Multi-scale Segmentation

split-and-merge Updating

Level 1/2 class

2010 LC

Changed area decision tree quick search

Other class

Corresponding class

Uncertain Area

Merge with Unchanged Area

Inherit

Post editing with Computer-human interaction

New LC
Updating Strategy

Deep Learning extraction with automated workflow is under development

Level 1: overall automated extraction

Level 2: regional automated extraction

Multi-scale Segmentation

split-and-merge Updating

Level 1/2 class

2010 LC

Changed area decision tree quick search

Other class

Corresponding class

Uncertain Area

Merge with Unchanged Area

Inherit

Post editing with Computer-human interaction

New LC
The next version of GlobeLand30 will be finished in 2019.
Contents

Introduction

Updating Strategy

Quality Control

Conclusion
Quality Control

Knowledge rule framework based on Eco-regions has been built

Word Wild Fund, WWF Eco-regions with dem NDVI Temperature etc.

867 eco-regions
Quality Control

Single Variable-Threshold change of elevation

Omit and Emit discover based on four integrated variable

Four eco-variable combination improve accuracy and efficiency
Quality Control

Global surface heterogeneity calculation

Edge length calculation with 3km grid using Mean, then integrate to 1:250000 map sheet grid
Conclusion

24°34'17.14"N, 46°37'53.75"E Liard, Saudi Arabia

13°58'30.15"N, 103°14'16.61"E Surin Province, Cambodia
Conclusion

- GlobeLand30 is widely used in many areas which give a strong support to update and improve the product.

- Improved split-and-merge updating strategy has been promoted and implemented on updating project.

- Quality control approaches are developed to provide a comprehensive way to identify the possible omit and emit objects.

- A more integrated and automated workflow and operation are under development to improve the efficiency of updating.

- Spatio - Temporal inconsistency between different version to auto-detect errors is designed and under development.
www.globeland30.org

Thank you

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Spatiotemporal evolution of urban within Guangdong-Hong Kong-Macau Bay Area in 1987-2017

Qingquan Li

Key Laboratory for Geo-Environmental Monitoring of Coastal Zone of the National Administration of Surveying, Mapping and GeoInformation & Shenzhen Key Laboratory of Spatial Smart Sensing and Services, Shenzhen University, Shenzhen, China

liqq@szu.edu.cn
Contents

一 Background
二 Study area
三 Data and methods
四 Results and discussion
Background

Guangdong-Hong Kong-Macau Bay Area has been experiencing a remarkable urbanization process during the past several decades. We need to understand the three aspects of information:

◆ The spatiotemporal features of urban expansion in 1987-2017
◆ The rationalities of urban expansion within this bay area.
◆ The driving forces of urban expansion.
Study area

(1) Guangdong-Hong Kong-Macau Bay Area includes eleven cities (9+2).

(2) This bay area has a population of more than 0.66 million and a total area of about 56000 square kilometers.

(3) It is also the starting point of the Maritime Silk Road (海上丝绸之路) and the gateway of China to access the world.
Data and methods

Remote sensing data:

Thirty-two Landsat TM and OLI images captured around 1987, 1997, 2007 and 2017 were downloaded from the USGS Global Visualization Viewer (GloVis, https://glovis.usgs.gov/).

Socio-economic data:

Socio-economic data included population and gross domestic product (GDP) of eleven cities within the bay area in 1987-2017.

Methods:

✓ Spatiotemporal evolution of urban: Integrating remote sensing, landscape analysis and geographic information system (GIS) techniques.
✓ Rationality of urban expansion: Using urban area-population elastic coefficient (UPEC) and urban area-GDP elastic coefficient (UGEC).
## Results and discussion

Spatiotemporal evolution of urban agglomeration

<table>
<thead>
<tr>
<th>Guangdong-Hong Kong-Macau Bay Area</th>
<th>Urban areas (km²)</th>
<th>Urban area changes (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>605.71</td>
<td>1996.27</td>
</tr>
</tbody>
</table>

### Land use types

- Urban land
- Cultivated/exposed land
- Cropland/grassland
- Forest
- Water

### Urban areas

- 1987
- 1997
- 2007
- 2017

- 2007
- Urban area
- Non-urban
### Spatiotemporal evolution of eleven cities

#### Study areas

<table>
<thead>
<tr>
<th>Study areas</th>
<th>Urban areas (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1987</td>
</tr>
<tr>
<td>Guangzhou</td>
<td>146.90</td>
</tr>
<tr>
<td>Shenzhen</td>
<td>67.67</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>91.29</td>
</tr>
<tr>
<td>Macau</td>
<td>4.87</td>
</tr>
<tr>
<td>Foshan</td>
<td>104.52</td>
</tr>
<tr>
<td>Huizhou</td>
<td>46.12</td>
</tr>
<tr>
<td>Jiangmen</td>
<td>41.56</td>
</tr>
<tr>
<td>Zhongshan</td>
<td>17.03</td>
</tr>
<tr>
<td>Dongguan</td>
<td>46.15</td>
</tr>
<tr>
<td>Zhaoqing</td>
<td>28.84</td>
</tr>
<tr>
<td>Zhuhai</td>
<td>10.50</td>
</tr>
</tbody>
</table>

#### Study areas

<table>
<thead>
<tr>
<th>Study areas</th>
<th>Urban area changes (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guangzhou</td>
<td>276.06</td>
</tr>
<tr>
<td>Shenzhen</td>
<td>269.65</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>33.63</td>
</tr>
<tr>
<td>Macau</td>
<td>2.45</td>
</tr>
<tr>
<td>Foshan</td>
<td>275.25</td>
</tr>
<tr>
<td>Huizhou</td>
<td>14.15</td>
</tr>
<tr>
<td>Jiangmen</td>
<td>61.64</td>
</tr>
<tr>
<td>Zhongshan</td>
<td>106.64</td>
</tr>
<tr>
<td>Dongguan</td>
<td>290.78</td>
</tr>
<tr>
<td>Zhaoqing</td>
<td>20.96</td>
</tr>
<tr>
<td>Zhuhai</td>
<td>39.28</td>
</tr>
</tbody>
</table>
urban agglomeration level
city level

(a) Guangzhou
(b) Shenzhen
(c) Hong Kong
(d) Macao
(e) Foshan
(f) Huizhou
(g) Jiangmen
(h) Zhongshan
(i) Dongguan
(j) Zhaoqing
(k) Zhuhai

Existing urban in 1987
Urban expansion in 1987-1997
Urban expansion in 1997-2007
Urban expansion in 2007-2017

0 20 40 80 Kilometers
0 10 20 40 Kilometers
0 5 10 20 Kilometers
0 2 4 8 Kilometers
0 15 30 60 Kilometers
0 20 40 80 Kilometers
0 10 20 40 Kilometers
0 80 Kilometers
0 20 40 80 Kilometers

0 20 40 80 Kilometers
0 5 10 20 Kilometers
0 2 4 8 Kilometers
0 15 30 60 Kilometers
0 20 40 80 Kilometers
0 10 20 40 Kilometers
0 80 Kilometers
0 20 40 80 Kilometers

Existing urban in 1987
Urban expansion in 1987-1997
Urban expansion in 1997-2007
Urban expansion in 2007-2017
Outlying, edge-expansion and infilling are three types used for describing urban growth types of Guangdong-Hong Kong-Macau Bay Area.
Rationality of urban expansion

(1) The UPEC values varied with cities and periods, and the values of most cities all exceed 1.12, except for Shenzhen and Macau (1987-1997 and 2007-2017, respectively).

(2) Generally, UGEC showed that the average annual rate of economy exceeded the average annual rate of urban area expansion in all cities.
Conclusion:

① Over time, Guangdong-Hong Kong-Macau Bay Area formed a triangle zonal expansion pattern.

② The composition of urban expansion types varied with cities and study periods.


The driving forces of urban expansion within Guangdong-Hong Kong-Macau Bay Area might be attributed to differences of multiple factors in history, natural controlling factor, policy (e.g. reform and opening policy and local urban planning policies), terrain, transportation, population and GDP scale.
Thank you!
Questions?
Global Land Cover Validation Capacity Building

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The context

• **High-resolution LC maps** are rapidly increasing due to the continuous advances in Remote Sensing sensors and geospatial technologies
  
o  Several countries (e.g. EU, USA, Australia) and political organizations have their own high-resolution LC maps
  
o  Developing countries do not have their own high-resolution datasets but they can benefit from the free availability of open global high-resolution LC products (e.g. GlobeLand30)

• It is important that data users and producers in the fields of GIS and RS, especially in developing countries, have:
  
o  **Awareness** of the existence and importance of global high-resolution LC maps
  
o  **Capability to perform** high-resolution LC maps validation and inter-comparison to determine their usability for different applications
Capacity Building for High-Resolution Land Cover Inter-comparison and Validation: the project

• It was funded by the International Society for Photogrammetry and Remote Sensing (Educational and Capacity Building Initiatives 2018)

• Chairs: Maria A. Brovelli, Politecnico di Milano and Hao Wu, National Geomatics Center of China

• Creation of ad hoc teaching material released under open access licenses, and software-based material released under open source licenses to maximize the exploitation and impact within the community
Desktop solution

• Desktop procedure for LC map validation, implemented in QGIS and using GlobeLand30 as sample dataset. The teaching material license is CC BY 4.0

• Validation is performed taking advantage of custom scripts for PyQGIS (https://github.com/GoricaB/Land-cover-validation) written by M. Molinari and G. Bratic under the guidance of M. A. Brovelli
### Use case 1

**Objective**
Validation of GlobeLand30 by means of a comparison with a reference points dataset obtained from LUCAS, a land use and land cover survey programme promoted by Eurostat.

**Area of interest**
Lombardy Region (Northern Italy)

**Datasets**
- **GlobeLand30 2010** raster maps covering the Lombardy Region area: N32_40_2010LC030, N32_45_2010LC030 (available in DATA\GL30_Italy folder). The data are provided in WGS84/UTM32N coordinate system (EPSG: 32632)
- **LUCAS 2009** dataset related to Italy (available [here](#) or in DATA\LUCAS folder). The data are provided in WGS84 reference system (EPSG: 4326)

### Use case 2

**Objective**
Validation of GlobeLand30 by means of a comparison with a reference raster dataset obtained from DUSAF, a land use and land cover database of Lombardy Region, Italy.

**Area of interest**
Como Province, Lombardy Region (Northern Italy)

**Datasets**
- **GlobeLand30 2010** raster map covering the Como Province area: N32_45_2010LC030 (available in DATA\GL30_Italy folder). The map is provided in the WGS84/UTM 32N coordinate system (EPSG: 32632)
- **DUSAF 4.0 – Use of soil 2012** database consists of vector maps for every province in Lombardy Region, as well as for the whole Lombardy Region (available [here](#)). The map is in WGS84 reference system, UTM 32N projection (EPSG:32632).
Confusion Matrix derived indexes

- Most commonly used:
  - Overall accuracy (P0)
  - Producer’s accuracy (PA)
  - User’s Accuracy (UA)

- Derived from P0, PA, UA
  - Average of user’s accuracy (AUA) or of producers accuracy (APA)
  - Combined user’s (CAU) or producer’s accuracy (CAP)
  - Hellden’s mean accuracy (MAH)
  - Short’s mean accuracy (MAS)
  - Classification success index (CSI) and its variations Group Success Index (GCSI) and Individual classification success index (ICSI)

- Margfit

- Derived from information theory
  - Average mutual information (AMI) and different ways of normalizing it (NMIa – arithmetic mean, NMIg – geometric mean)

- Kappa and kappa-like indexes
  - Standard kappa index (K)
  - Conditional kappa (Kc)
  - Weighted kappa (Kw)
  - Tau (τ)
  - Aickin’s alpha (α)
  - Ground truth index (GT)

- Indexes of disagreement
  - Quantity disagreement
  - Allocation disagreement
Web solution

• Web procedure for GlobeLand30 validation, implemented in a geoportal. The teaching material license is CC BY 4.0
• The procedures and the educational material are developed by NGCC.
Online Validation of GlobeLand30

STEP 4: Sample judgment

- Plausibility judgment
- Blind judgment

Rate of progress: 100.00% (310/310)
Product: GlobeLand30-2010
Region: Ukraine
Sampling method: Landscape Shape index
Confidence level: 85%
Selection method: Random sampling

<table>
<thead>
<tr>
<th>LC Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivated land</td>
<td>50</td>
</tr>
<tr>
<td>Forest</td>
<td>50</td>
</tr>
<tr>
<td>Grasslands</td>
<td>50</td>
</tr>
<tr>
<td>Artificial surfaces</td>
<td>46</td>
</tr>
<tr>
<td>Water bodies</td>
<td>39</td>
</tr>
<tr>
<td>Wetland</td>
<td>31</td>
</tr>
<tr>
<td>Shrublands</td>
<td>30</td>
</tr>
<tr>
<td>Bareland</td>
<td>11</td>
</tr>
</tbody>
</table>

Download samples dataset
Mobile solution

• Development of a web app, named **Land Cover Collector**, to allow users to collect field data according to the same LC nomenclature of GlobeLand30.

• The web app was developed by C. E. Kilsedar under the guidance of M. A. Brovelli and it is released under the GPL 3.0. Collected data are released under the Open Database License (ODbL).

• Code is available at [https://github.com/kilsedar/land-cover-collector](https://github.com/kilsedar/land-cover-collector).

• You can see the land cover data collected with this application using the URL in the “Download data” section under “Information”. More information on how to download the data can be found in the same section.

• You can access the application on Web at [https://landcover.como.polimi.it/collector/](https://landcover.como.polimi.it/collector/).

• You can install it on your iOS or Android mobile device, using App Store or Google Play respectively. Search for “Land Cover Collector”.

• You can also download the apk for installing it on Android devices from [https://landcover.como.polimi.it/collector/land-cover-collector.apk](https://landcover.como.polimi.it/collector/land-cover-collector.apk).
Register

After reading the terms and conditions, register by filling in the form, entering your gender, age and work status.
Collect data

On mobile devices turn on your GPS, start the application, and allow it to access the device's location to place the marker in your position. Instead, desktop browsers ask you to access your location. In this case, allow location access. Then move the marker to fine-tune its position.
Collect data

Click on “Insert your point of land cover!” button and select the classification of your point.
Collect data

State your certainty and then optionally add a comment.
Collect data

Take a photo of north, east, south and west. While taking photo, hold your device vertical to the ground.
Collect data

Submit the information you entered. While adding your point, if you want to cancel, you need to click on “Back” until “Cancel” button appears, and then “Cancel”.
Visualize & query data

The point you added will be visible in the “My map” as a marker, with an icon of its corresponding classification. The point can be queried to see the inserted information.
Visualize & query data

In “Everyone” section points inserted by everyone can be seen. The points belonging to the same classification and close enough to each other will be aggregated and will be given a color of their classification. The basemap can be changed from OpenStreetMap to Bing Aerial, both in “My map” and “Everyone”.
Land Cover Validation Capacity Building (ISPRS)

High-Resolution Land Cover Inter-comparison and Validation

Nairobi, 3 September 2018, 9:00-13:00 am
Regional Centre for Mapping of Resources for Development (RCMRD)
Kasarani Road, Off Thika Road
P.O.Box 632-00618
Nairobi, Kenya
Room: GIS Training Lab
Speakers: Prof. Chen Jun, Prof. Maria Antonia Broveli, Mr. Peng Shu, Dr. Marco Minghini
Local Organizers: Mrs. Phoebe Oduor and Kenneth Kasera

High-Resolution Land Cover Intercomparison and Validation

Dar Es Salaam, 1 September 2018, 9:00-13:00 am
World Bank
Room: Room No. 110 First floor, Address (50 Mirambo Street)
Speakers: Prof. Chen Jun, Prof. Maria Antonia Broveli, Mr. Peng Shu, Dr. Marco Minghini
Local Organizers: Mr. Msililake Msilanga, Miss. Devotha Laurent

Workshop 2: Capacity Building for High-Resolution Land Cover Intercomparison...
By ISPRS, Working Group V/4

Fundamental for many management, ecological and economic analysis and modeling of soil consumption assessment. It is an open data to be shared among the stakeholders to promote the research and development. Moreover, there is a need to evaluate their accuracy and...
Contributors to the project

Maria Antonia Brovelli (PoliMI), Hao Wu (NGCC)

Gorica Bratic (PoliMI), Jun Chen (NGCC), Candan Eylül Kilsedar (PoliMI), Marco Minghini (PoliMI), Monia Molinari (PoliMI), Peng Shu (NGCC), Hongwei Zhang (NGCC), Xinyan Zheng (NGCC)

Workshop local organizers: Msilikale Msilanga (World Bank) Devotha Laurent (World Bank) Phoebe Oduor (Regional Center for Mapping of Resources for Development)
Training Material

GIS Team

GEO4D (2017-2020)

GEO4D is a Capacity Building in Higher Education project, funded by the Erasmus+ Programme of the European Commission with the aim to modernize higher education in geodesy in order to support sustainable development in Jordan. The specific project's objective is to establish 3 new geodesy/GIS laboratories at 3 Jordanian partner universities during 2018, develop and start 3 new master programmes in autumn 2019 and introduce e-learning, Problem-Based Learning (PBL) and quality assurance in geodesy education during 2020.

Capacity Building for High-Resolution Land Cover Intercomparison and Validation (2018)

Funded as one of the ISPRS Education and Capacity Building Initiatives 2018, the project aims to create computer-aided teaching and learning material about the intercomparison/validation of global land cover maps and to organize three workshops, two of which are held in developing countries (Tanzania and Kenya). The training material for validation with QGIS can be downloaded here, and the training material on how to use the Land Cover Collector application can be downloaded here. Principal investigators are Politecnico di Milano and the National Geomatics Center of China. The development of the Land Cover Collector application was supported by Italian Ministry of Education, University and Research (MIUR) thanks to the URBAN GEO BIG DATA project.

http://geomobile.como.polimi.it/website/
Thank you!
Questions?
Validating land cover through mapathons – challenges and opportunities

Serena Coetzee
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University of Pretoria – Pretoria – South Africa
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Introduction

• Land cover data describes the physical material on the surface of the earth
  • grassland, shrubland, water, artificial surface, ...

• Land cover data has been validated through gaming (Brovelli et al. 2017) and crowdsourcing (Fritz et al. 2017)

• Here we propose land cover validation through mapathons...
Openly licensed geospatial database created and edited daily by volunteers worldwide
OpenStreetMap contributions

1. field mapping
2. remote mapping
3. bulk import
mapathon ~ map marathon

collaborative effort

by groups of people who meet together
(e.g. at a university or a company)

for collecting specific map data
where OpenStreetMap data is scarce or non-existent
(typically for humanitarian purposes)

through remote mapping
Supports university efforts to offer meaningful global learning experiences, build a socially engaged citizenry, enhance long-term scientific capacity around the world, and foster youth leadership.
Step 4: Trim Project

Trim the task grid to the Area of Interest (optional). You can keep task squares complete, or clip them to the AOI. This could take some time.

- Clip tasks to Area of Interest
  - TRIM

NEXT
BACK TO PREVIOUS
Mapping

Get started by choosing your editor of choice.

- iD Editor

Download this task as a gpx file to see its boundary.

Done editing? Leave a comment and select one of the options below that matches your editing status:

- Leave a comment:

  500 characters remaining

- MARK AS COMPLETELY MAPPED
- MARK AS BAD IMAGERY
- STOP MAPPING

Legend:
- Ready
- Mapped
- Bad imagery
- Validated
- Invalidated
- Locked
- Locked by you

History

Locked for mapping by refresher.
141 chapters in 41 countries (> 5,000 students)

Mapped in OpenStreetMap since 2016:
2,776,167 buildings, 422,344 roads, >20,000 other features
2,000,000 map changes per month

(Statistics: April 2018)
Can we do the same to validate land cover?
Cultivated land
Grassland
Wetland
Forest
Shrublands
Water bodies
Artificial surfaces
Permanent snow and ice
Practical learning experience
Edit ‘real’ data that will be used by others
Take responsibility for quality of data
Do not accept quality of data at face value!
Opportunity to network with peers, also globally

Sense of belonging, have fun, find friends
Raise awareness
Climate change and other environmental impacts
Sense of space, place, location and navigation
Careers in environmental science, geospatial information, mapping

Global Mapathon to help end female genital mutilation (FGM), 28 September 2018, St Johns, Johannesburg, ZA
Thank you!

Questions?
Questions, Comments and suggestions