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The Geospatial Way to a Better World

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Global Land Cover and Intelligent Analysis of Remote Sensed Images

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3 National Geomatics Center China; 4 Shenzhen University – China; 5 University of Pretoria – South Africa

- # 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

Name	Resolution (m)	Temporal Coverage	Producer
FROM-GLC	30	2010, 2015	Tsinghua University
GlobeLand30	30	2000, 2010,2015	National Geomatics Center of China (NGCC)
Global Water Surface	30	1984-2015	Joint Research Centre (JRC)
Forest / Non-Forest map	25	2007-2010 2015-2016	Japan Aerospace Exploration Agency (JAXA)
Global Urban Footprint	12	2011	German Aerospace Center (DLR)
Global Human Settlement Layer	38	1975, 1990, 2000, 2014	Joint Research Centre (JRC)
Tree Cover	30	2000	University of Maryland
Global forest cover gain		2000-2012	
Global forest cover loss		2000-2015	

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

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The Hong Kong Polytechnic University, Hong Kong

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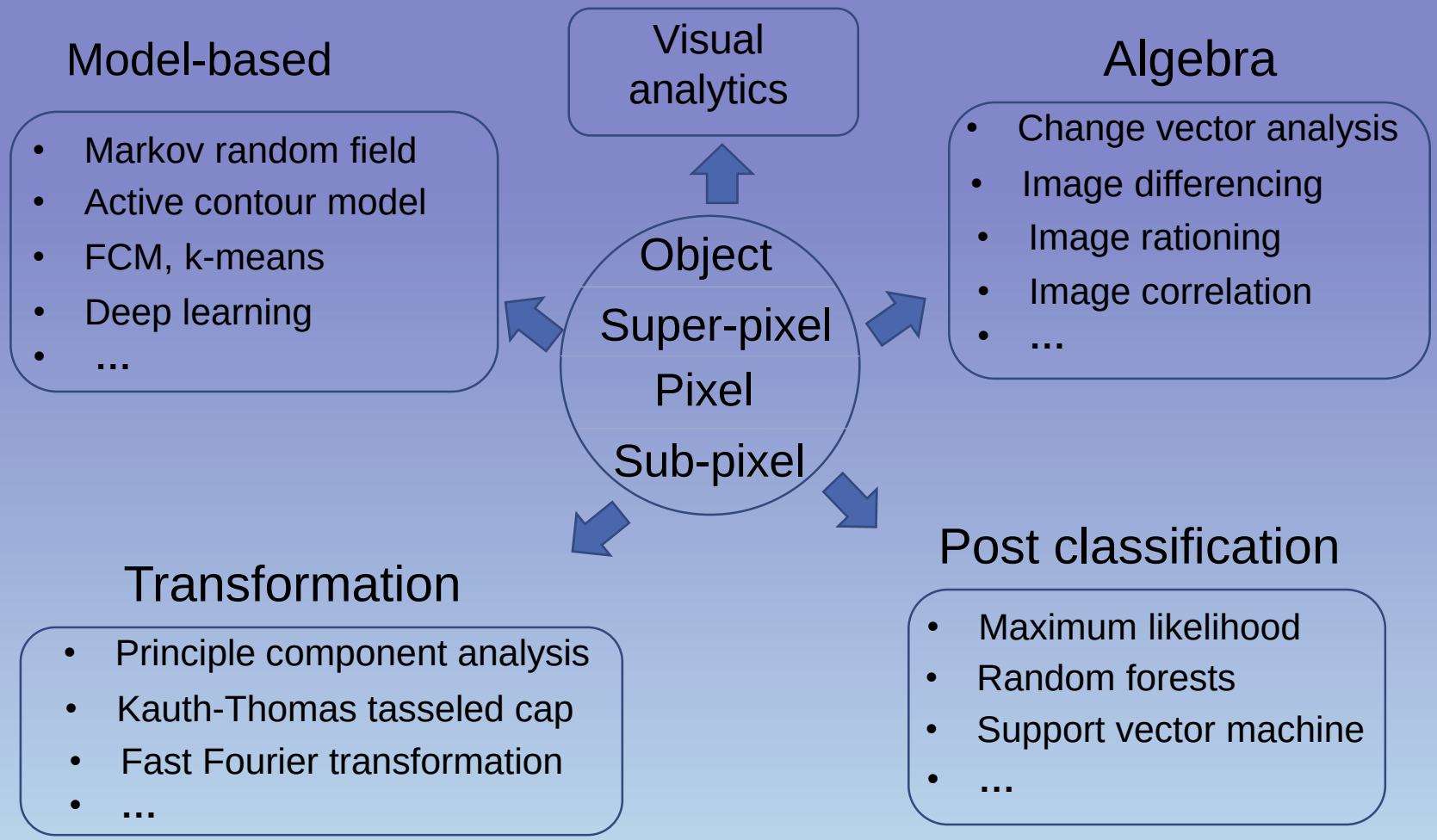
THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Change Detection Methods



Strategy: Design New Methods

1) Dynamic threshold model

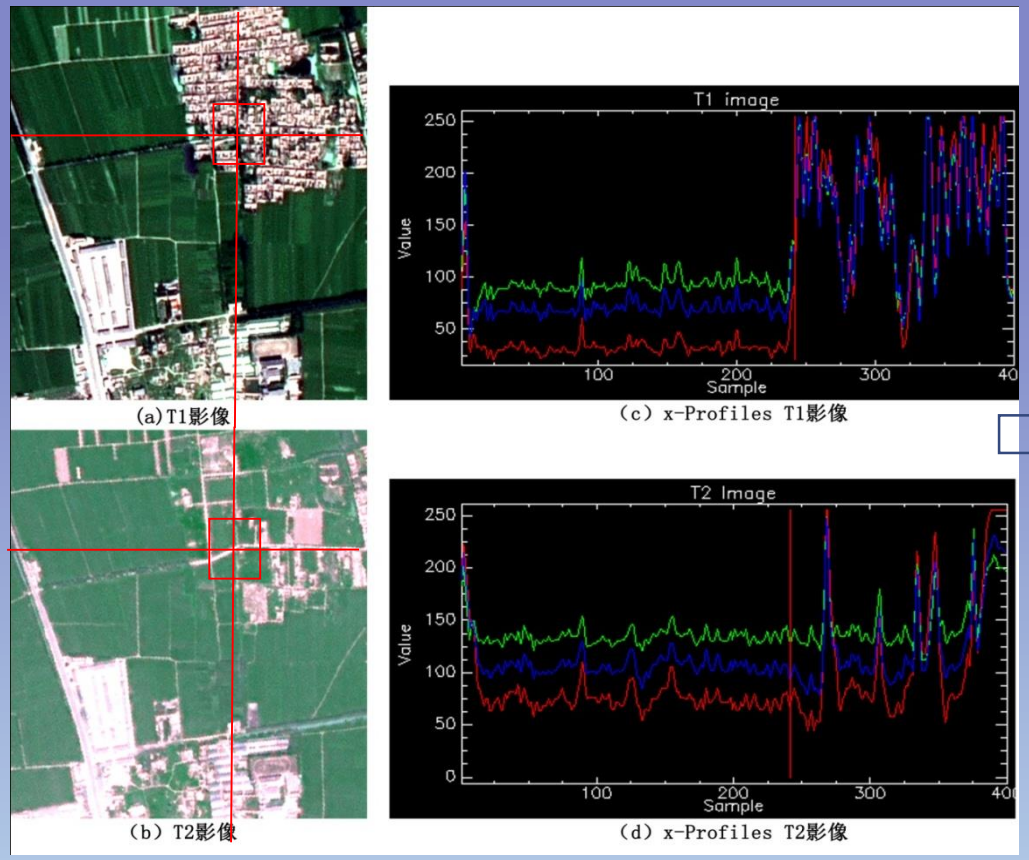
2) Fuzzy topology-based model

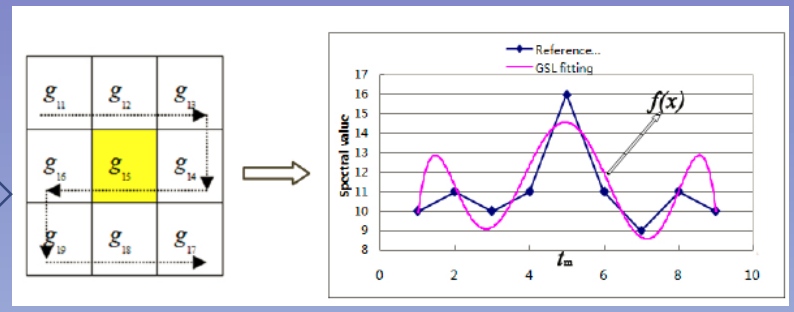
3) MRF model incorporating spatial attraction

4) Designed new level set model

5) Local spectral similarity-based model

Similarity Model based on Local Spectral Trend

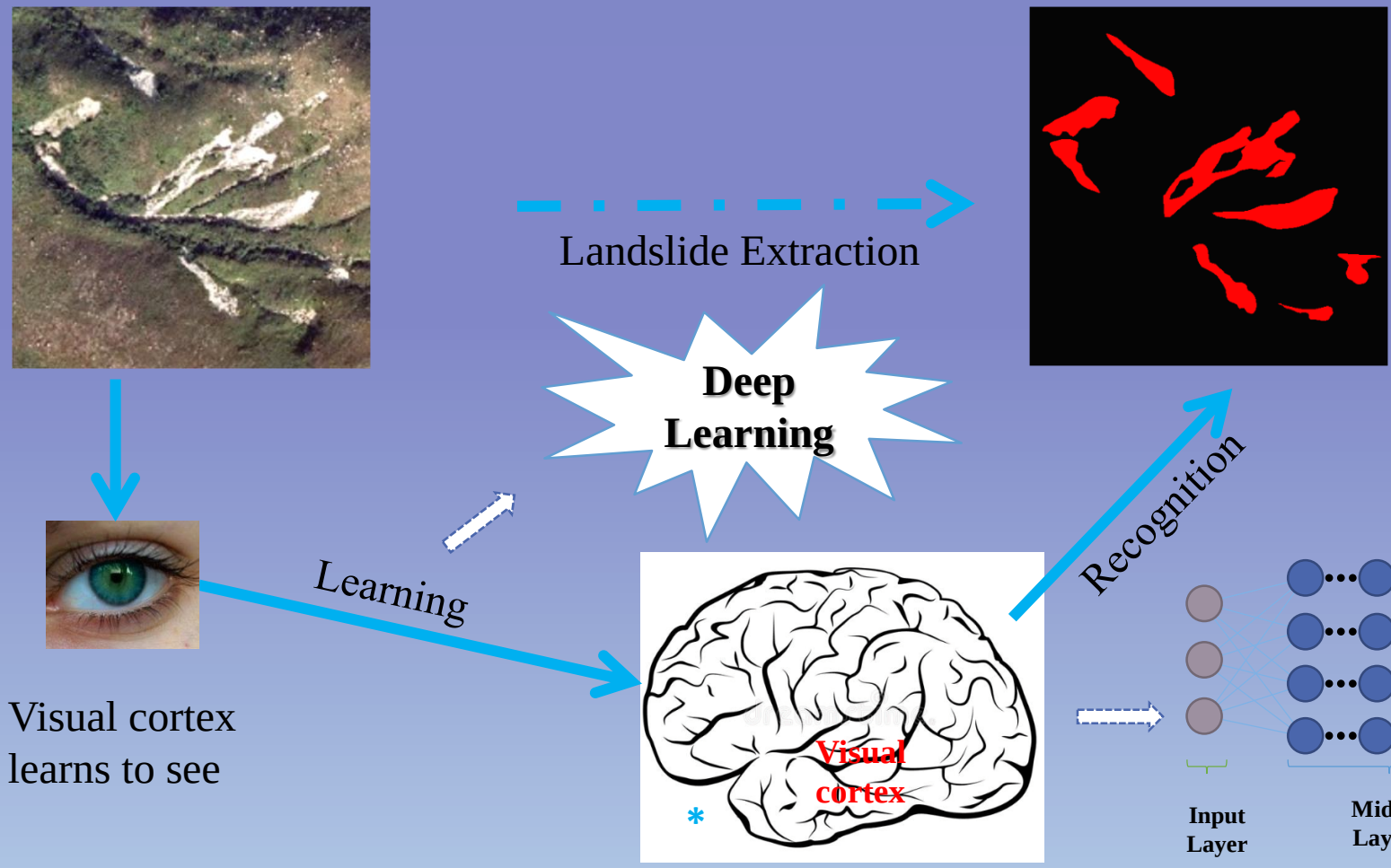




Local spectral information trend

Local spectral trend of difference and similarity

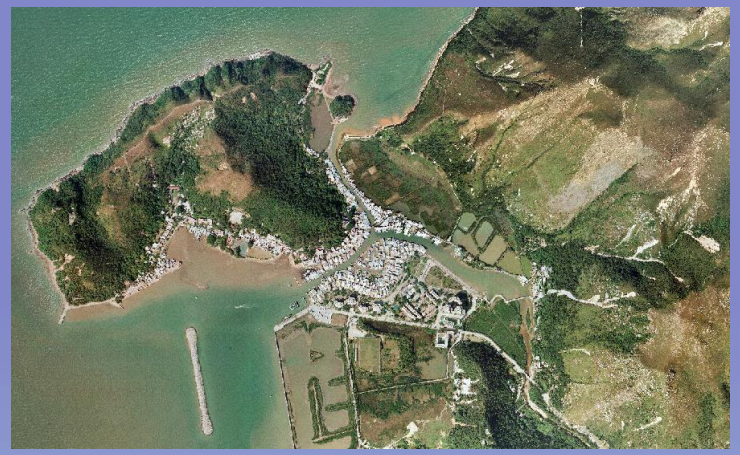
AI-based Change Detection



* https://www.fldefensivedrivingschool.com/brain-black-and-white-outline.html

Pilot Area Study

CNN Extraction AI Method



Tai O Image, 2009

Landslide ground truth

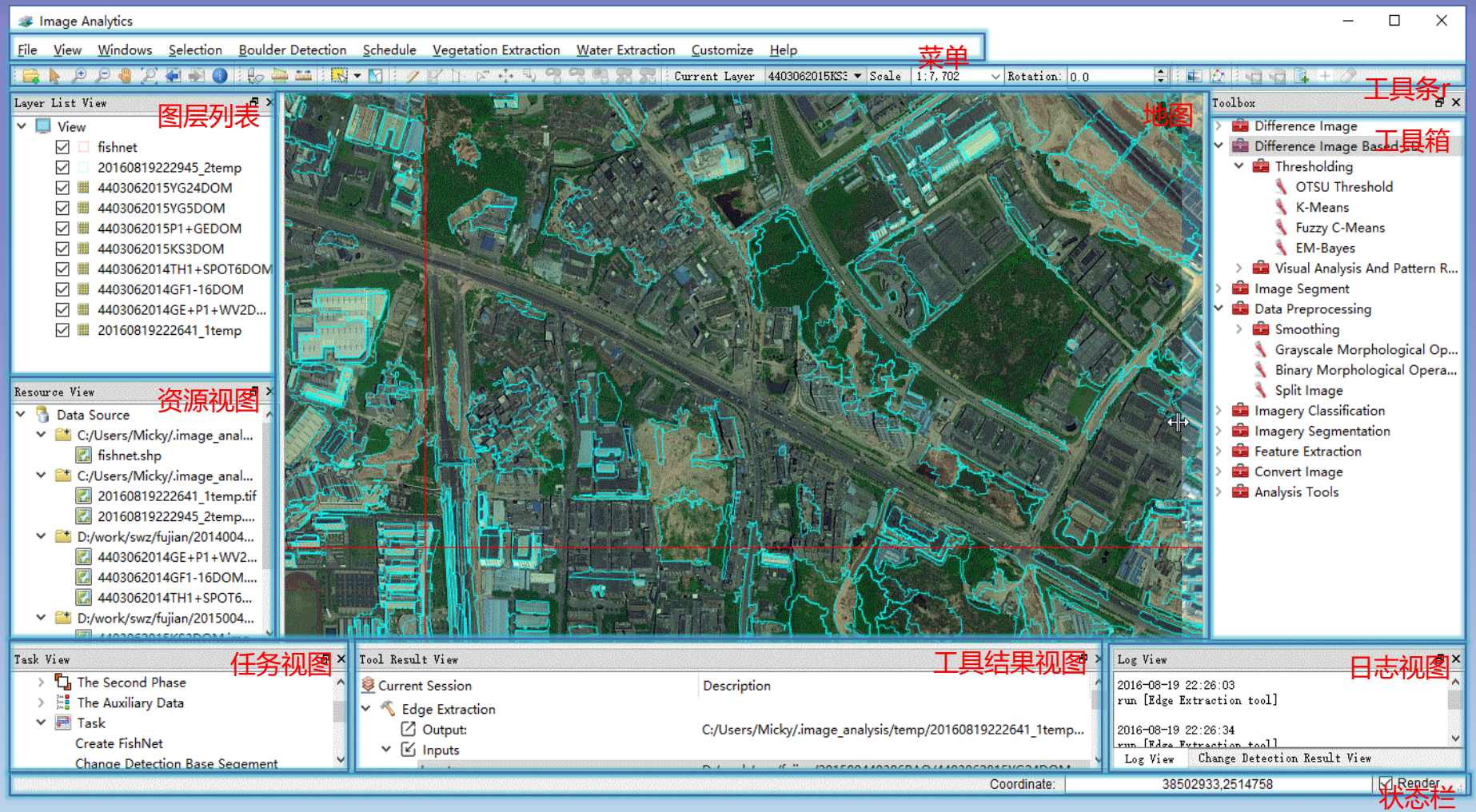
CNN extraction result

CNN extraction result with post processing

Results and Comparison

	Pixel-based Assessment			Object-based Assessment		
	Precision	***Recall***	***F1 Score***	***Precision***	***Recall***	***F1 Score***
Feature-based Method	56.16%	52.74%	0.5439	86.96%	52.46%	0.6544
AI-based Method	90.10%	78.29%	0.8378	85.71%	93.02%	0.8922
Increase Rate	**+33.94%**	**+25.55%**	**+0.2939**	-1.25%	**+40.56%**	**+0.2378**

The System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Current Layer
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Rotation:
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工具条r
Layer List View
图层列表
View
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地图
Toolbox
工具箱
Difference Image
Difference Image Based
Thresholding
OTSU Threshold
K-Means
Fuzzy C-Means
EM-Bayes
Visual Analysis And Pattern R...
Image Segment
Data Preprocessing
Smoothing
Grayscale Morphological Op...
Binary Morphological Opera...
Split Image
Imagery Classification
Imagery Segmentation
Feature Extraction
Convert Image
Analysis Tools
Resource View
资源视图
Data Source
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4403062014TH1+SPOT6...
D:/work/swz/fujian/2015004...
Task View
任务视图
The Second Phase
The Auxiliary Data
Task
Create FishNet
Change Detection Base Segement
Tool Result View
工具结果视图
Current Session
Description
Edge Extraction
Output:
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Inputs
Log View
日志视图
2016-08-19 22:26:03
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Log View
Change Detection Result View
Coordinate:
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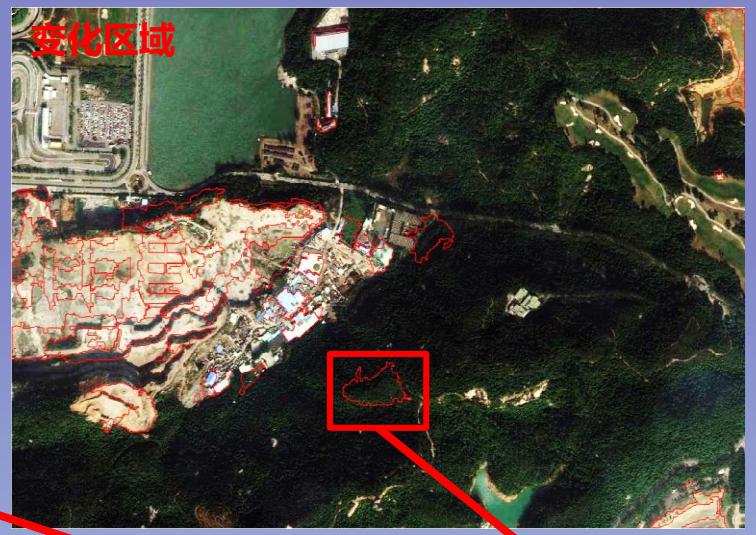
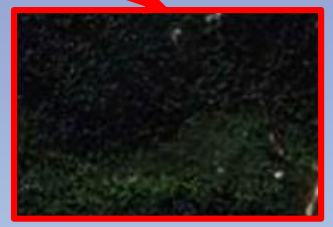
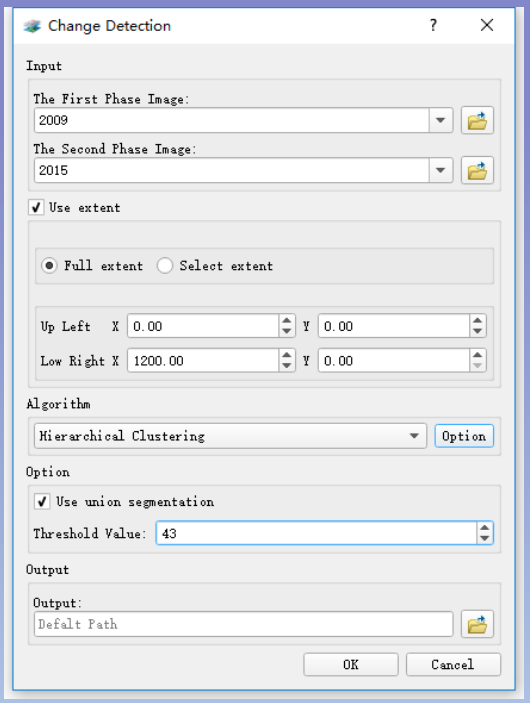
Render
状态栏

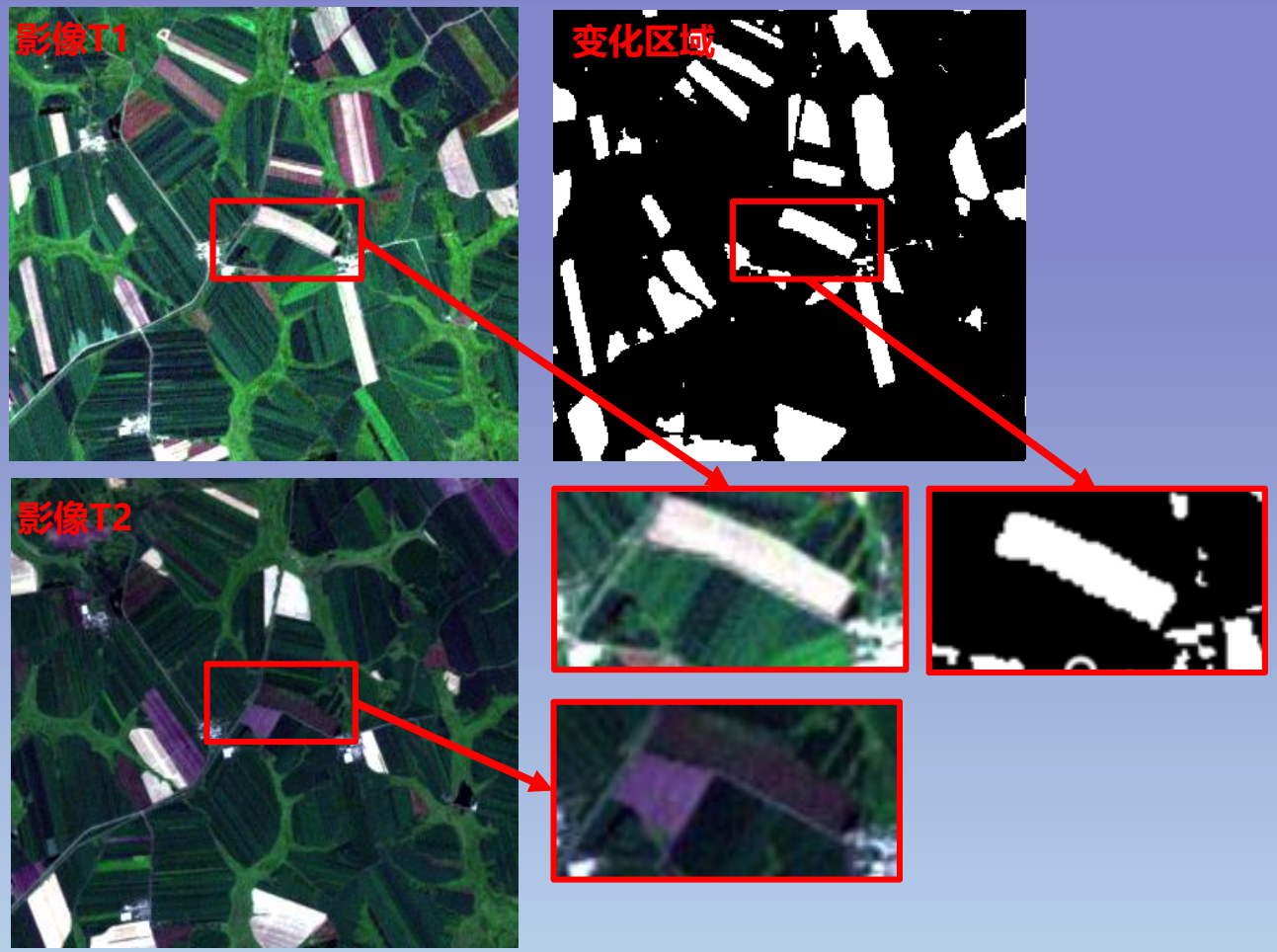
Urban Land Use CD

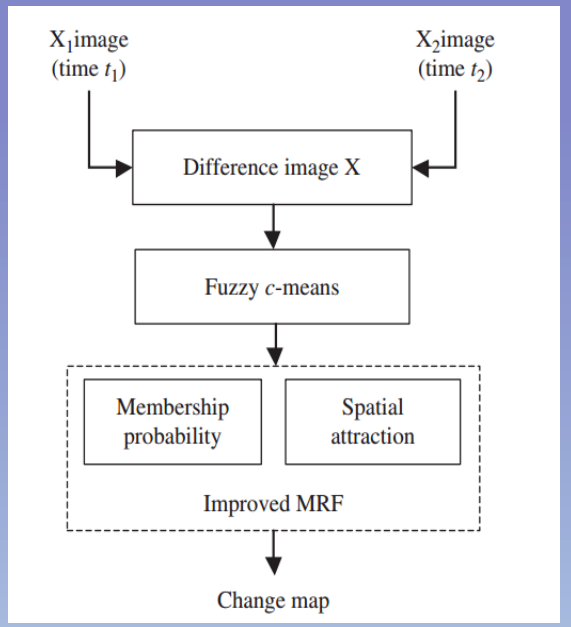




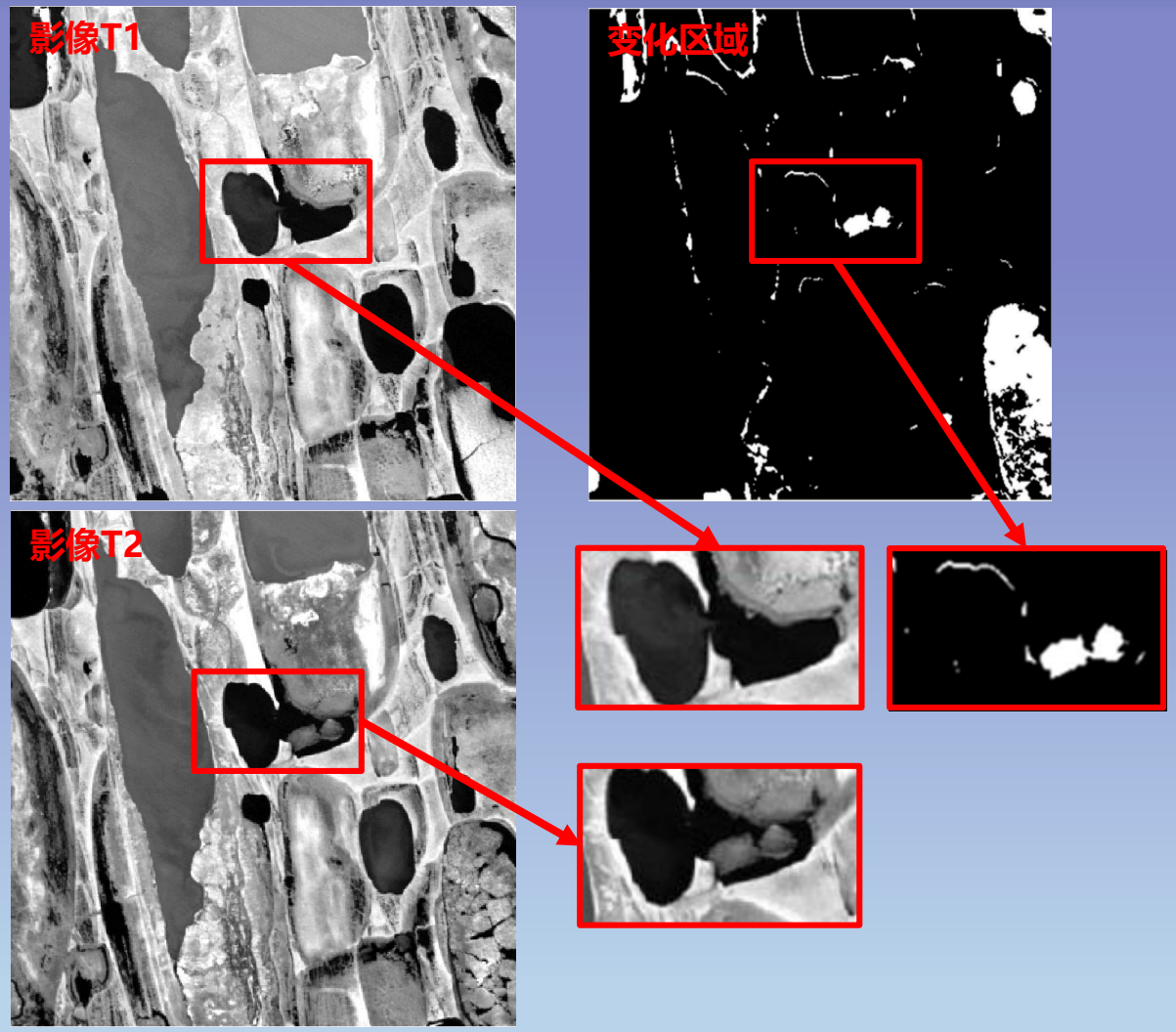


Vegetation Cover CD

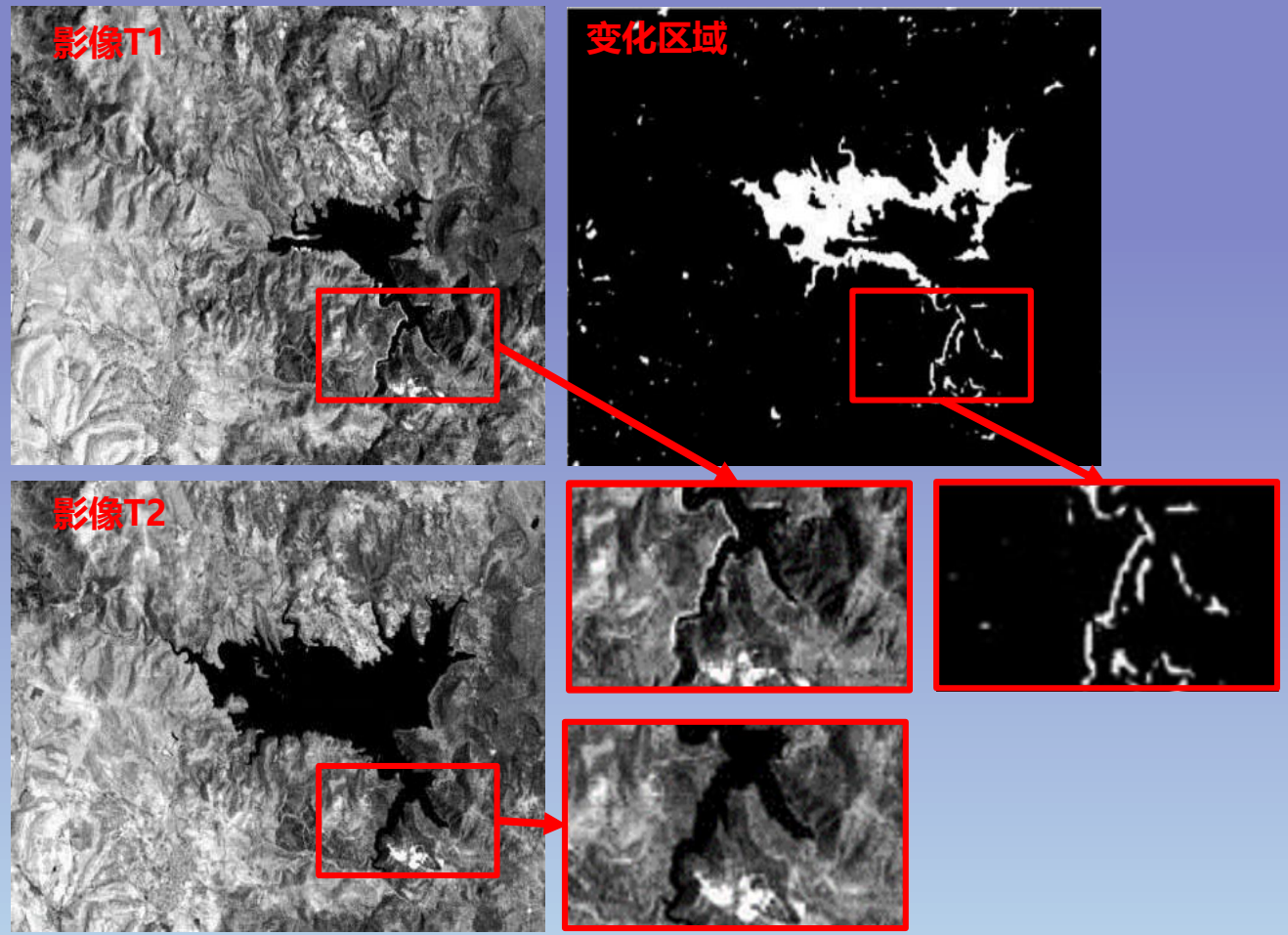


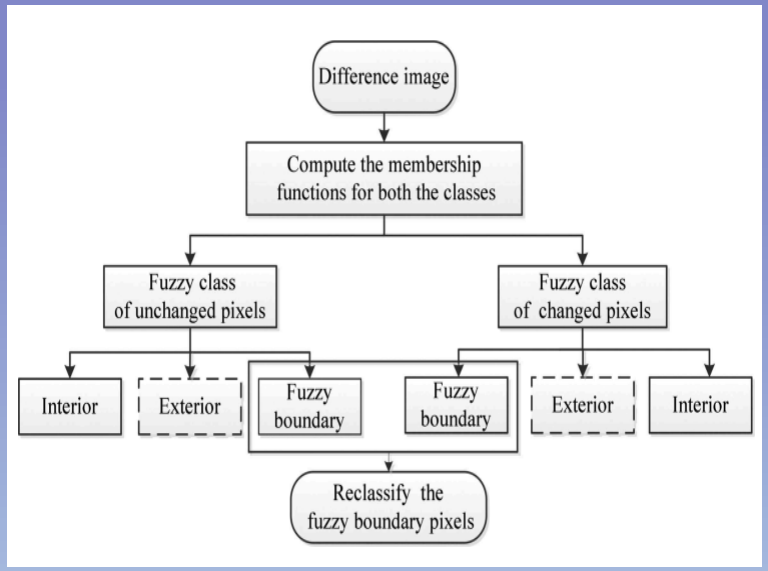


Glacier CD



Water Body CD





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- Zhang, P.L., Shi, W.Z., Wong, M.S. and Chen, J.P.*, 2013. A reliability-based multi-algorithm fusion technique in detecting changes in land cover. *Remote Sensing*, 5(3): 1134-1151.
- Shi, W.Z. and Ding, H.Y., 2011. A probability model-based method for land cover change detection using multi-spectral remotely sensed images. *Photogrammetrie Fernerkundung Geoinformation*, (4): 271-280. Doi: 10.1127/1432-8364/2011/0088.

Thank you!
Questions?

Operational updating of GlobeLand30

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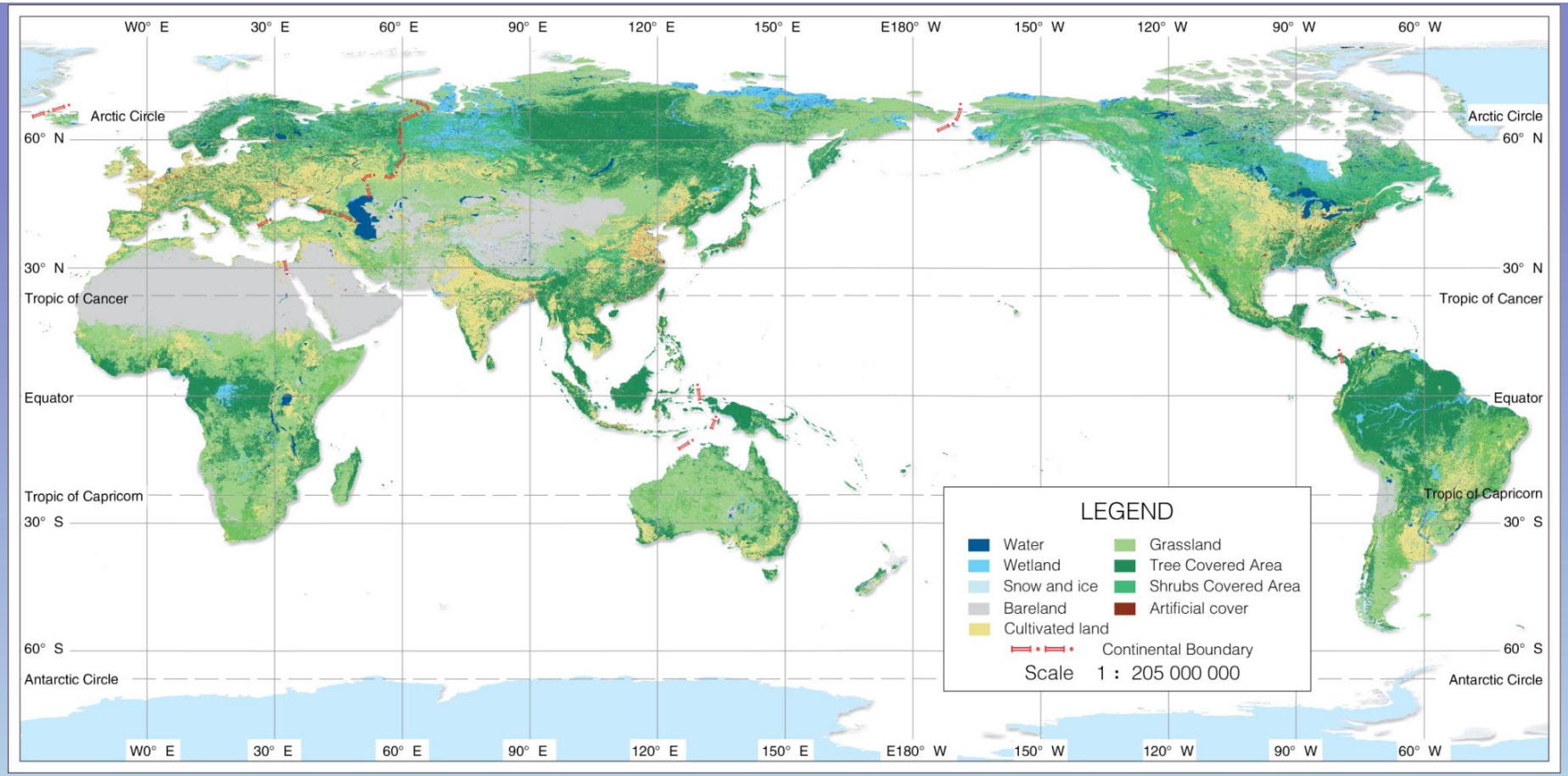
国家基础地理信息中心
National Geomatics Center of China

Contents

Introduction

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

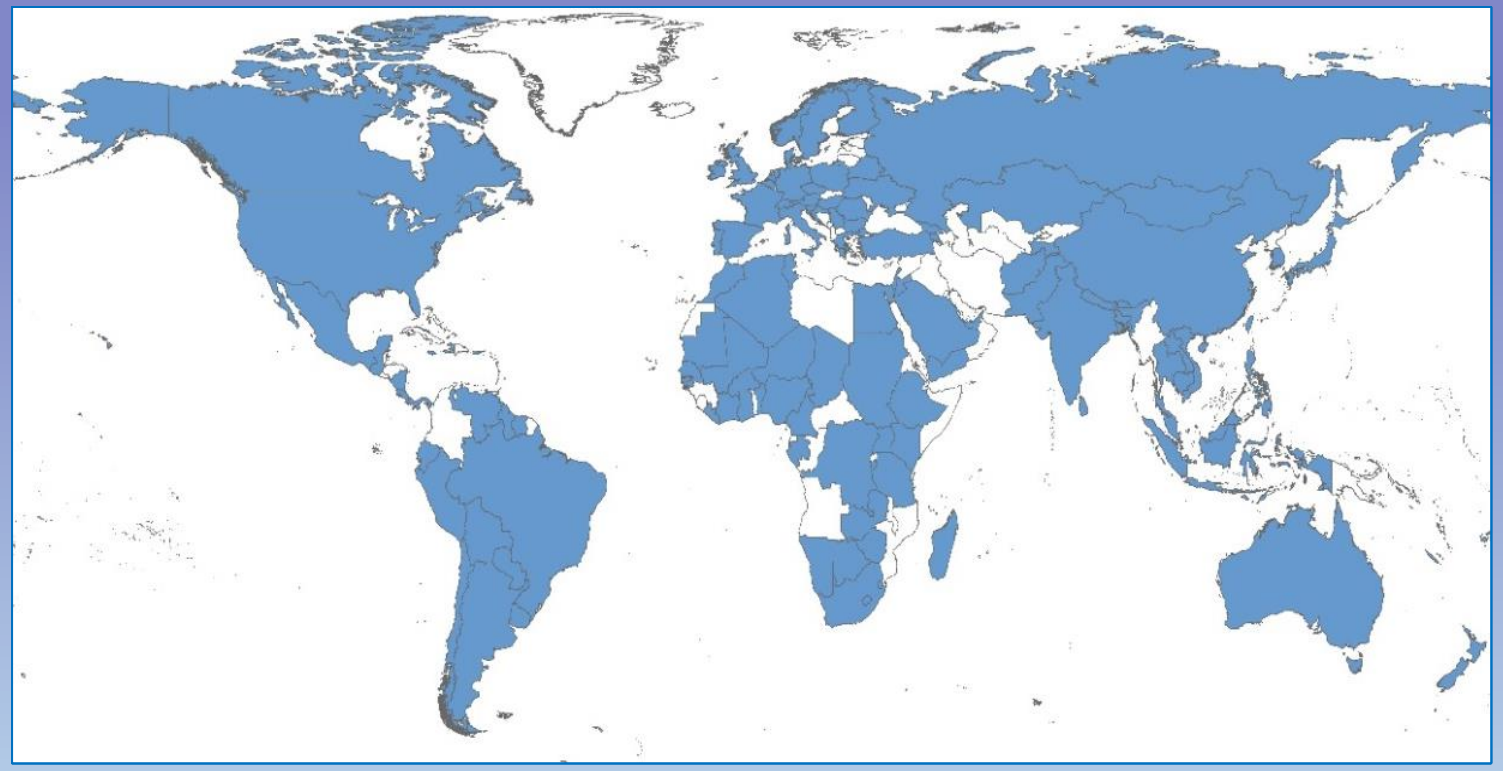


Chen et.al. 2015. Global land cover mapping at 30m resolution: a POK-based operational approach, ISPRS J. P&RS , 103 (2015): 7-27

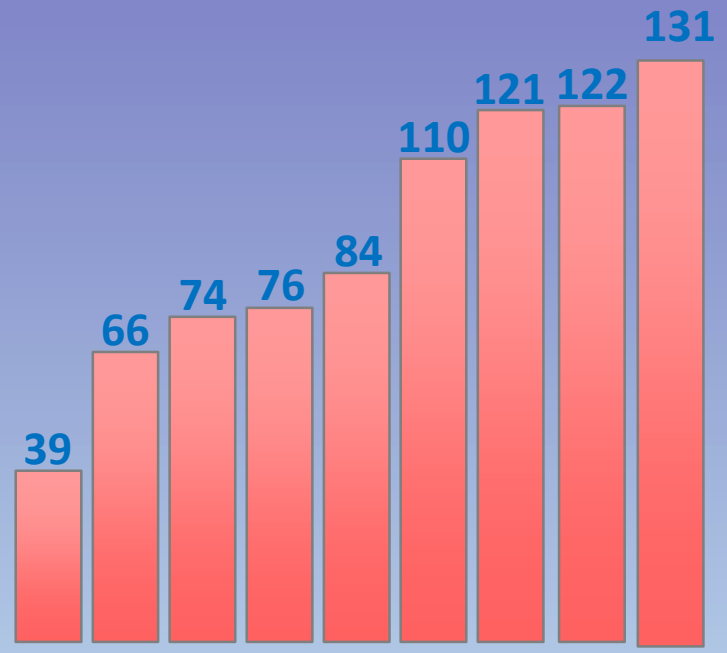
Introduction

GlobeLand30 Users are now from 131 countries and regions.

2018 Oct.



Countries and Regions Increasing



Introduction

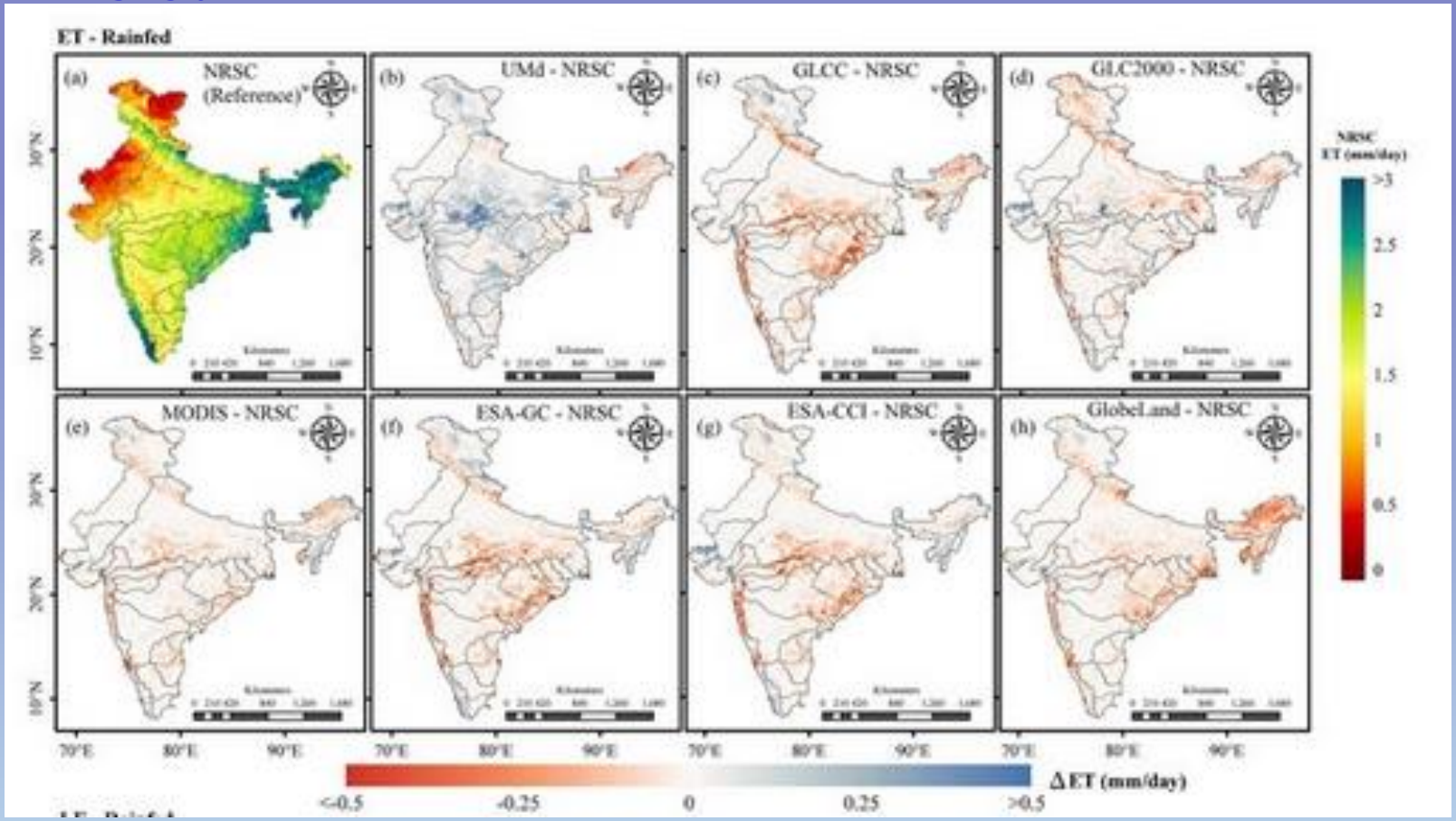
Major Application Field of GlobeLand30

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

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 H a) 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.

Madhusoodhanan, C.G.; Sreeja, K.G.; Eldho, T.I. Assessment of uncertainties in global land cover products for hydro-climate modeling in India. Water Resour. Res. 2017, 53, 1713–1734.

Introduction

Characterizing, monitoring, and simulating land cover Dynamics

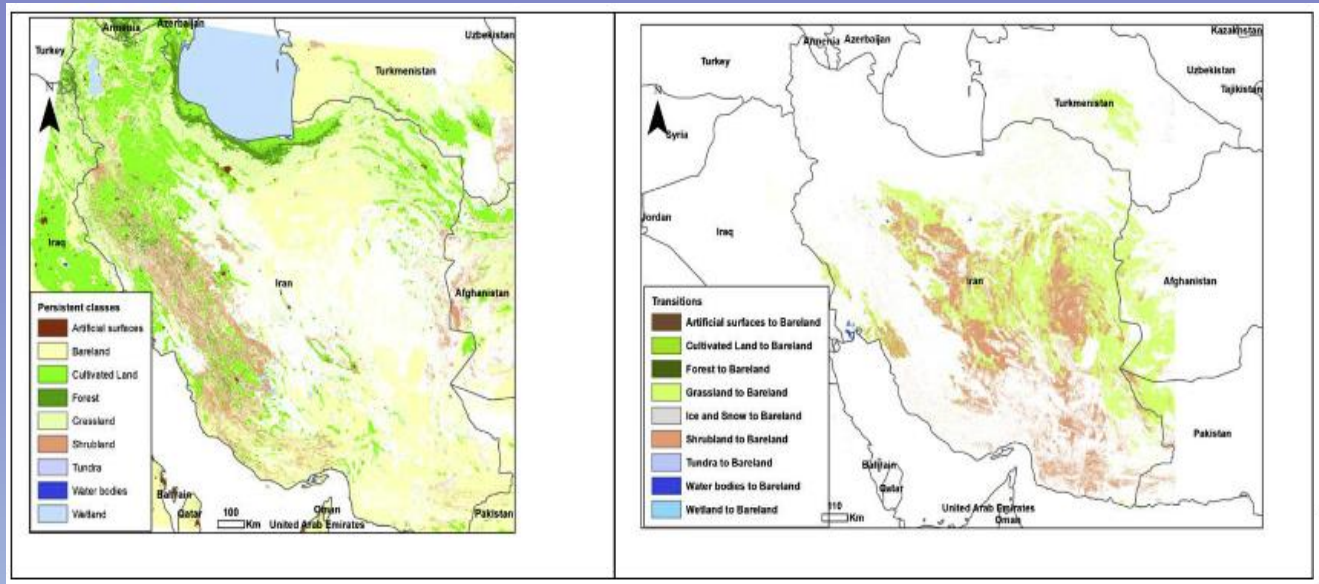


Fig. 7. a) Map of land cover persistence within 2000–2010, b) Transition from all classes to bareland within 2000–2010.

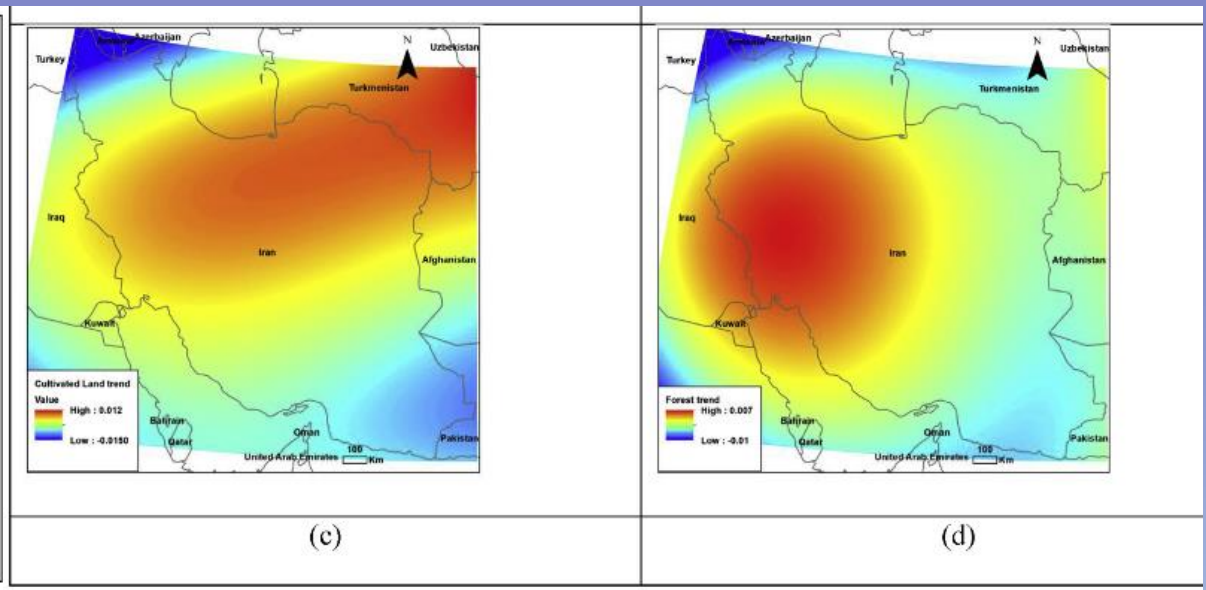


Fig. 8. Cubic trend of change towards bareland (a), artificial surfaces (b), cultivated land (c), forest (d).

Jamal Jokar Arsanjani. 2018. Characterizing, monitoring, and simulating land cover dynamics using GlobeLand30: A case study from 2000 to 2030. Journal of Environmental Management

Introduction

Simulating the distribution of African Savanna elephants

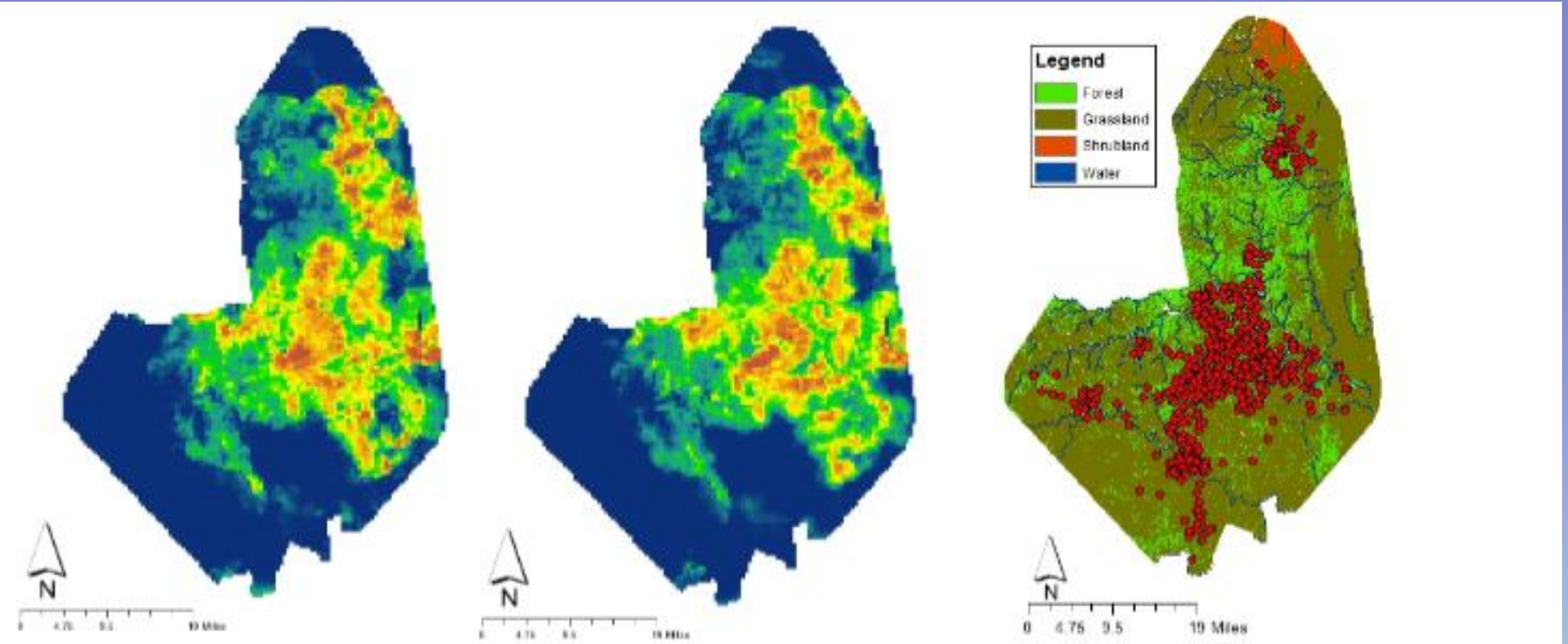


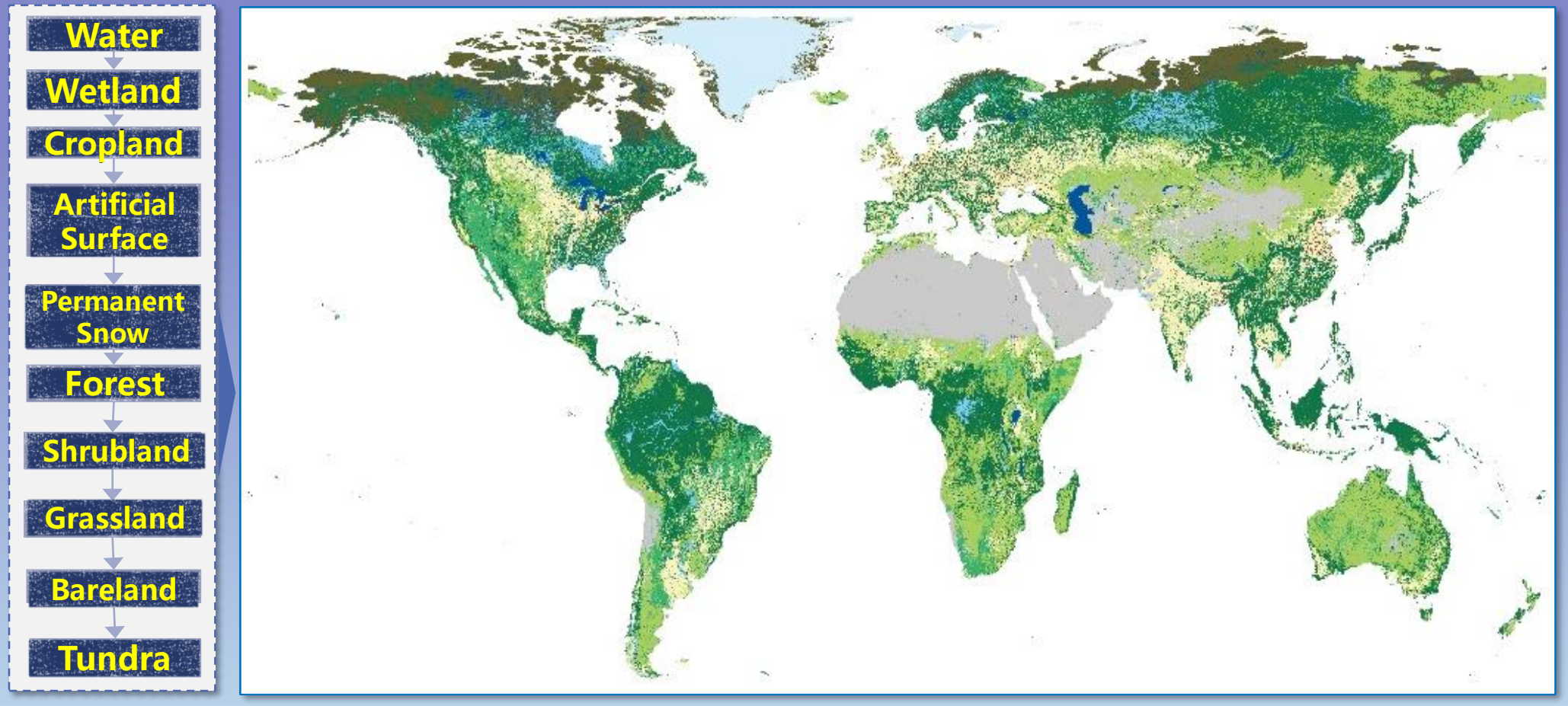
Figure 2. Prediction maps from MaxEnt showing probability of elephant occurrence within the study area based on the Globeland30 (left) and Globcover (center) based on GPS collar training data, a subset of which is shown over Globeland30 classification scheme (right).

Xu, W.; Heys, B.; Fayrer-Hosken, R.; Presotto, A. Modeling the distribution of African Savanna elephants in Kruger National Park: An application of multi-scale GlobeLand30 data. ISPRS-Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci. 2016, XLI-B8, 1327–1334. [CrossRef]

Contents

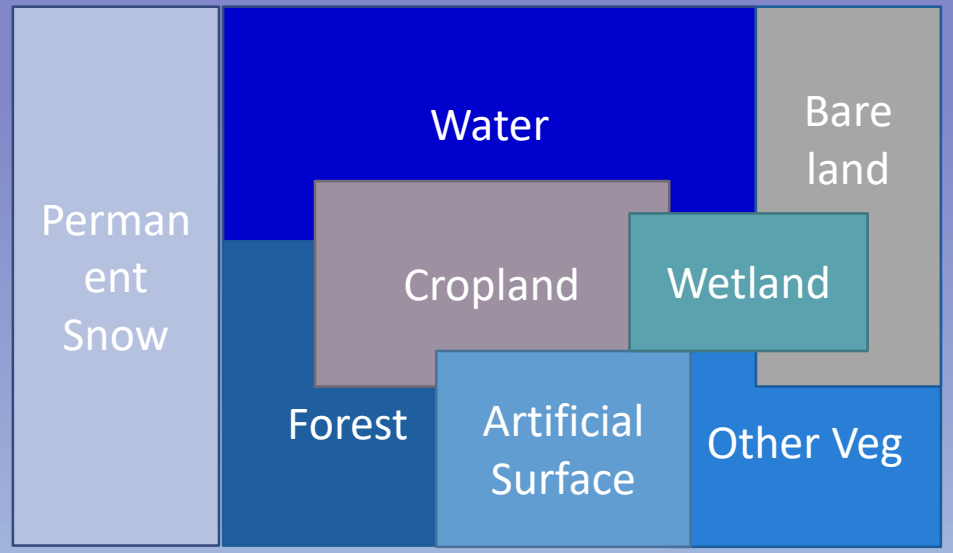
Updating Strategy

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



Updating Strategy

Improved split-and-merge strategy to update GlobeLand30



Water
Permanent Snow
Forest
Artificial Surface
Cropland
Wetland
Shrubland
Grassland
Bareland

Updating Strategy

Improved split-and-merge strategy to update GlobeLand30

Level 1: easy to extract automatically

Level 2: partly east to extract automatically with regional characteristics

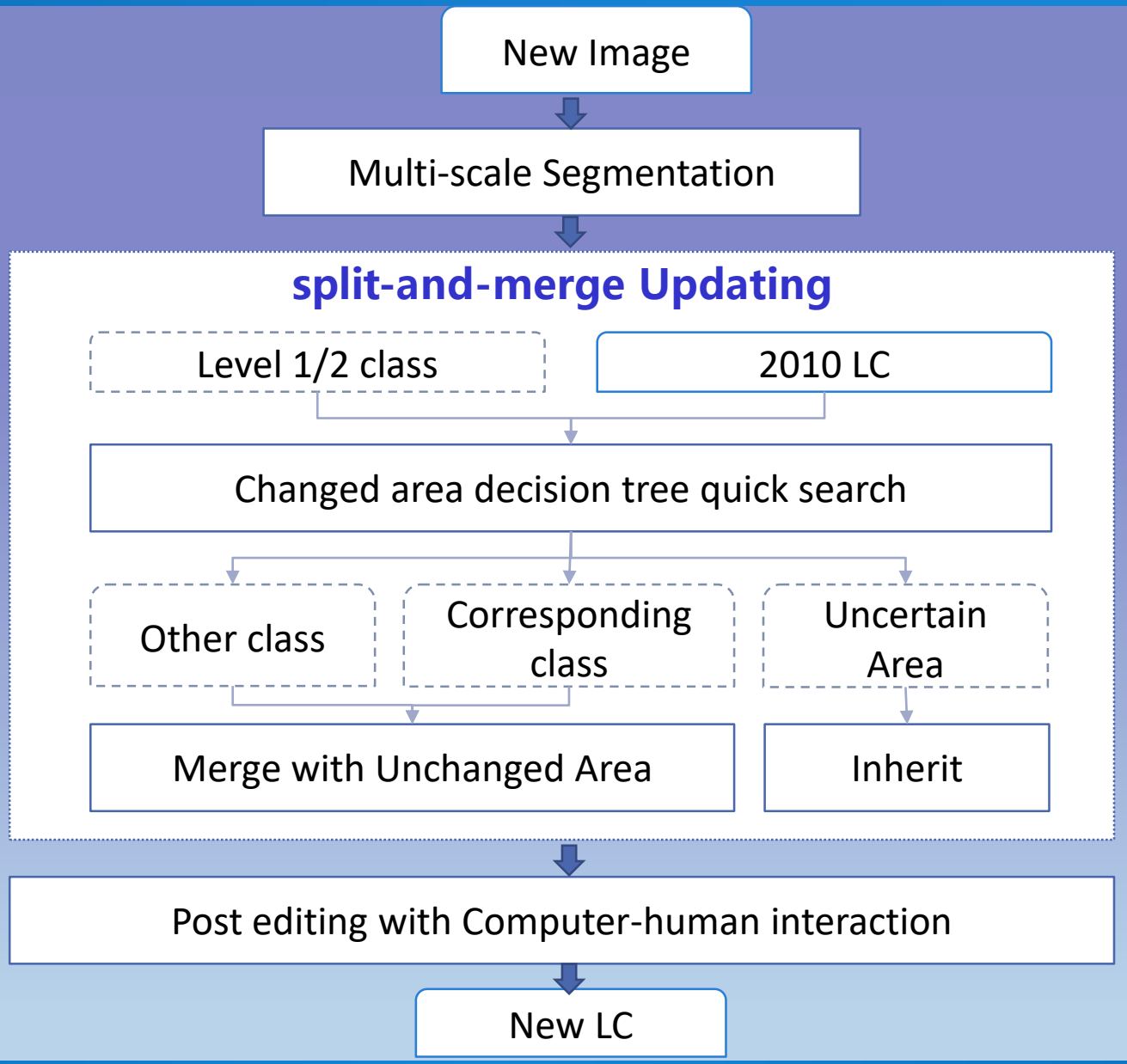
Lever 3: easy to confuse and depend more on other characteristics than spectral and texture

Updating Strategy

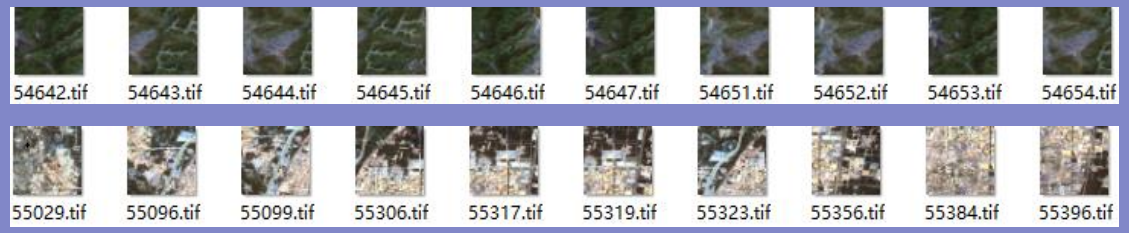
Level 1: overall automated extraction

Level 2: regional automated extraction

Lever 3: knowledge based edit and extraction



Updating Strategy



Deep Learning extraction with automated workflow is under development

Level 1: overall automated extraction

Level 2: regional automated extraction

Minimum Mapping Unit

New Image

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

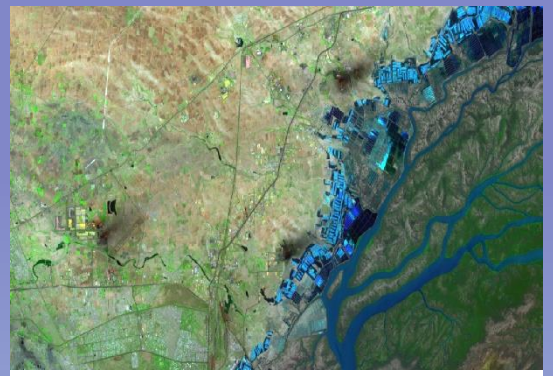
Inherit

Post editing with Computer-human interaction

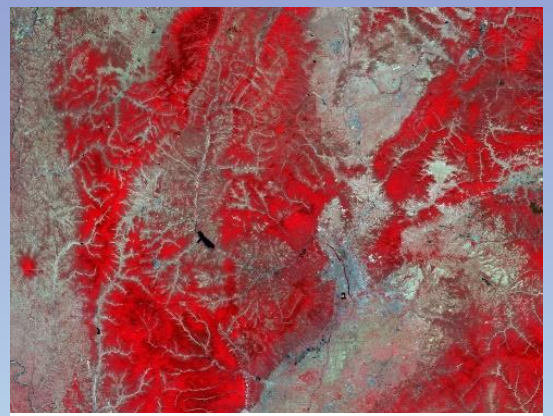
New LC

Updating Strategy

The next version of GlobeLand30 will be finished in 2019



Landsat8 30m

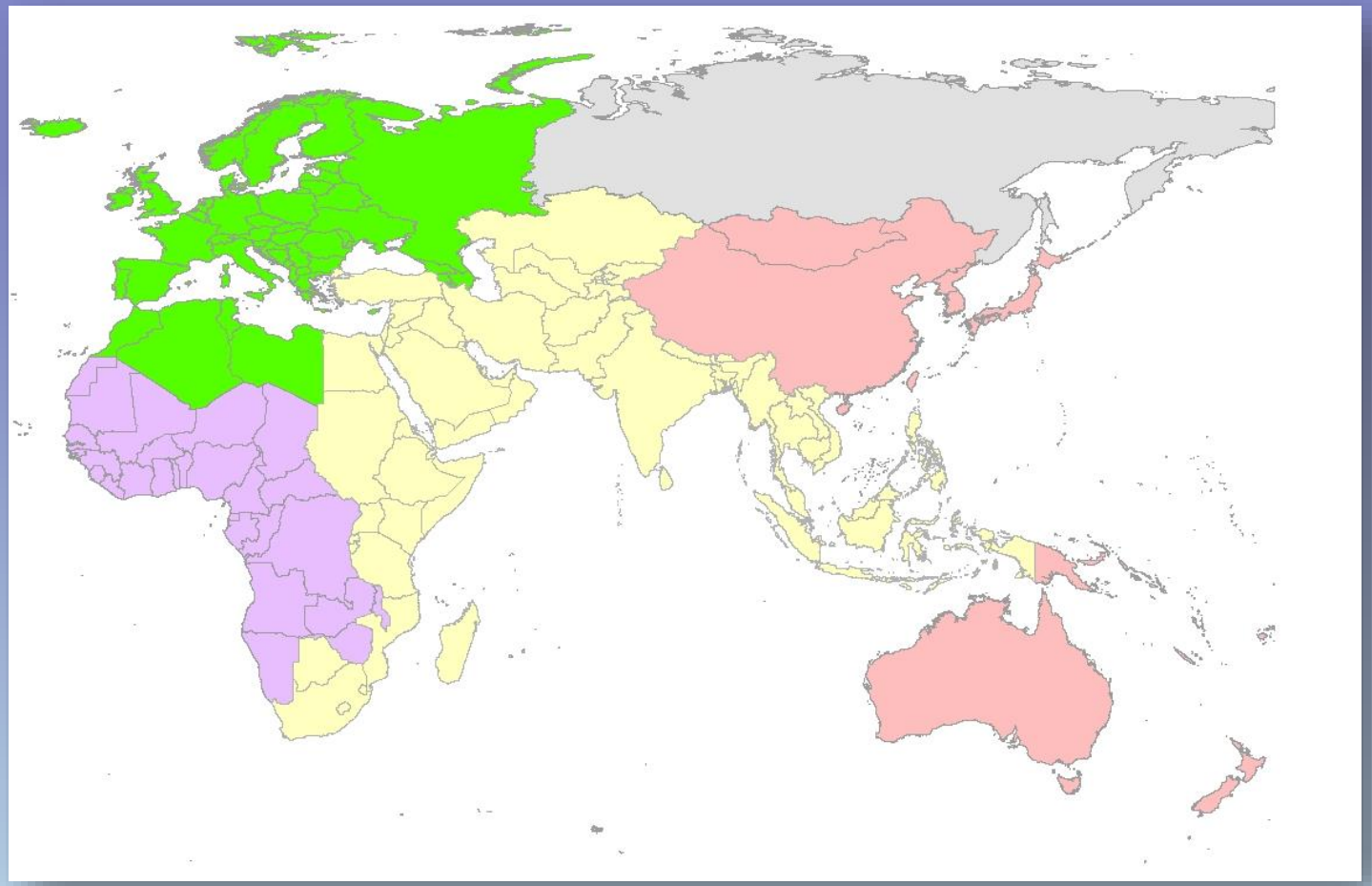


GF 1 16m

2017

2018

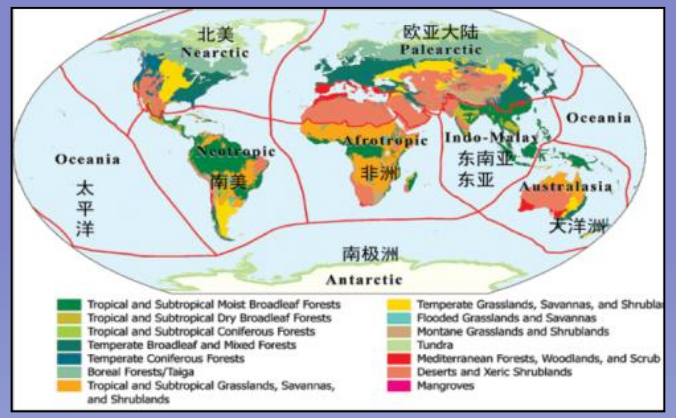
Rest of part 2019

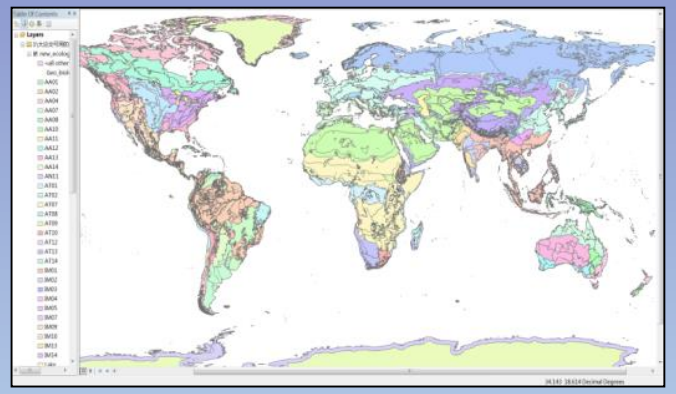


Contents

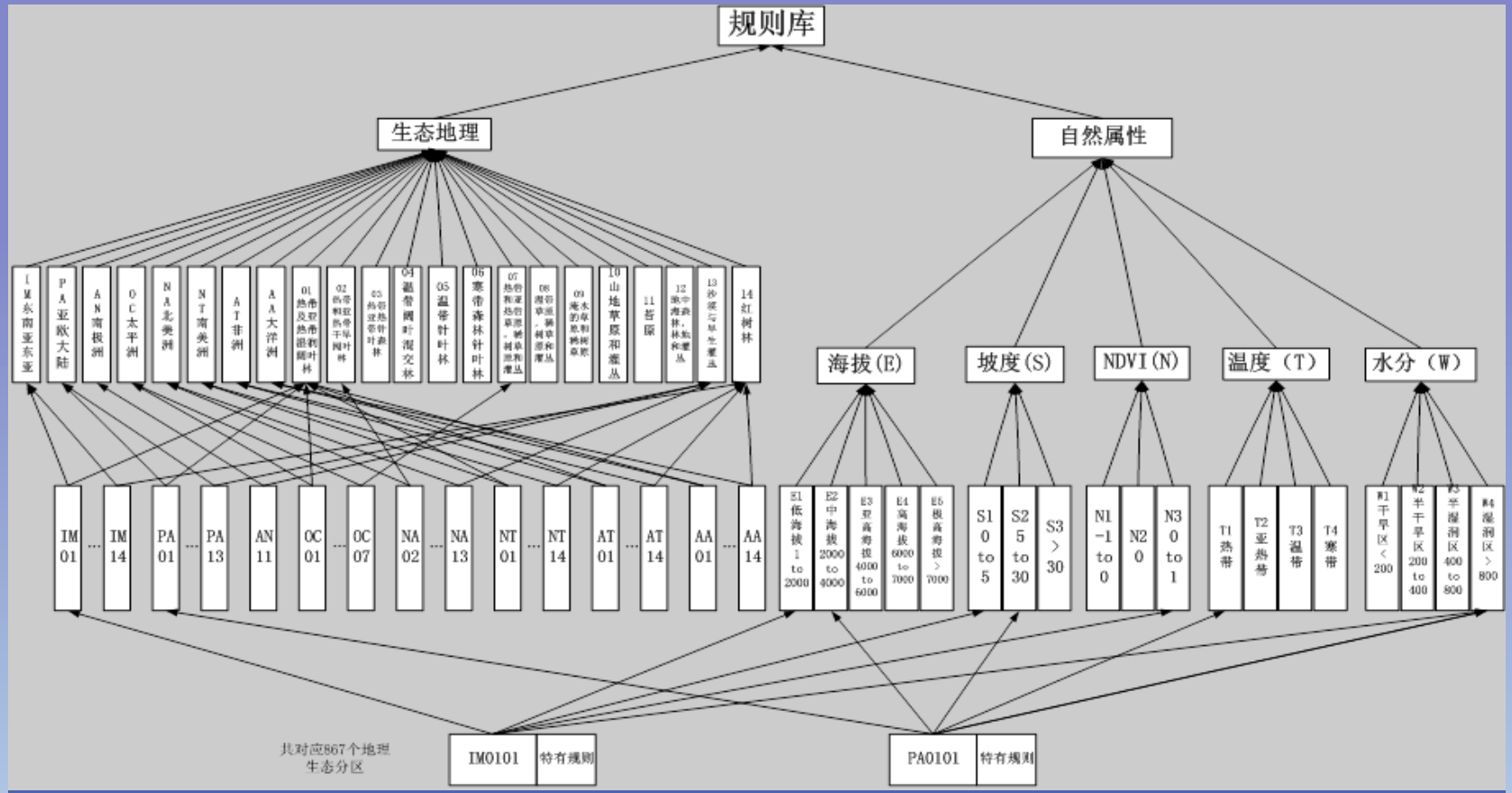
Quality Control

Knowledge rule framework based on Eco-regions has been built





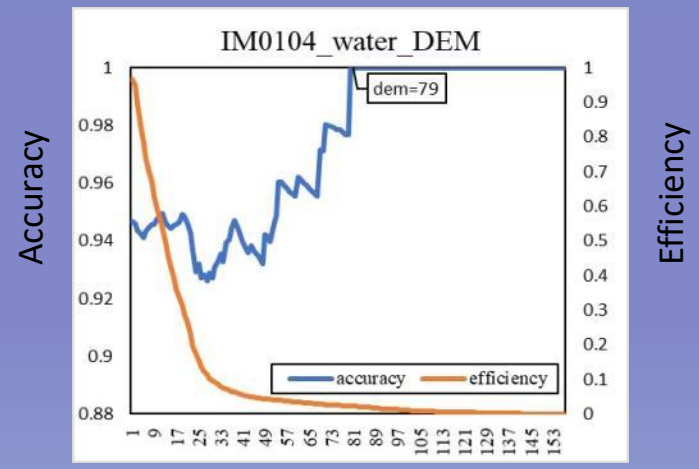
867 eco-regions



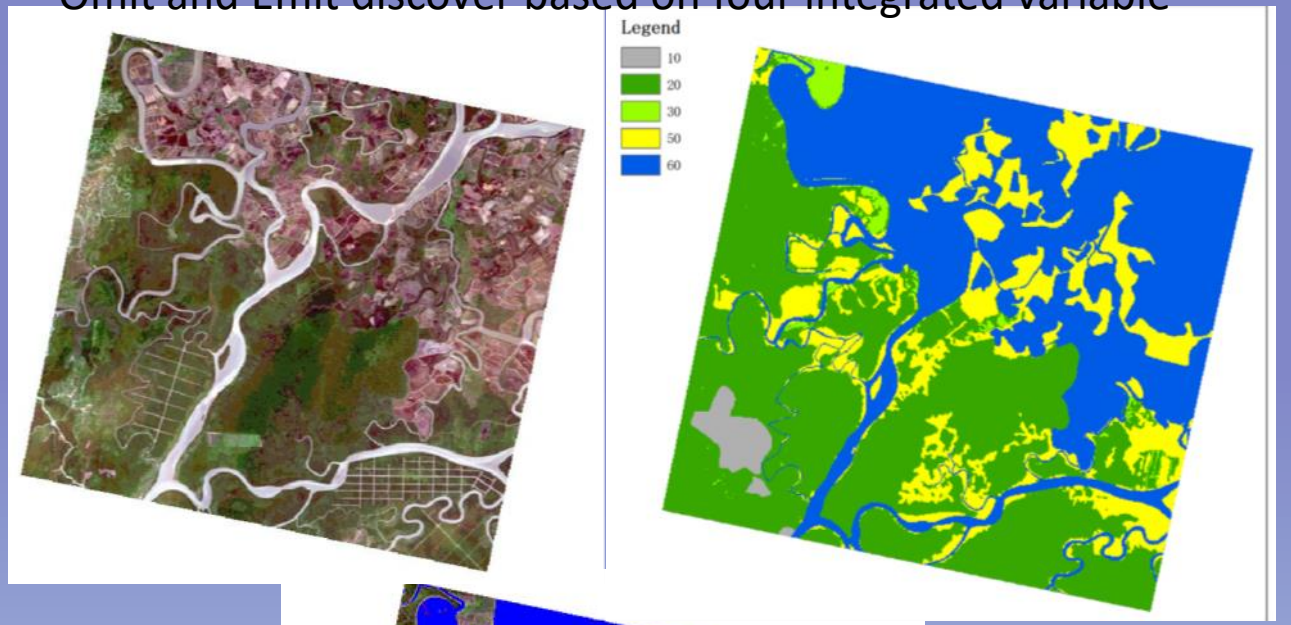
Word Wild Fund, WWF Eco-regions with dem NDVI Temperature etc.

Quality Control

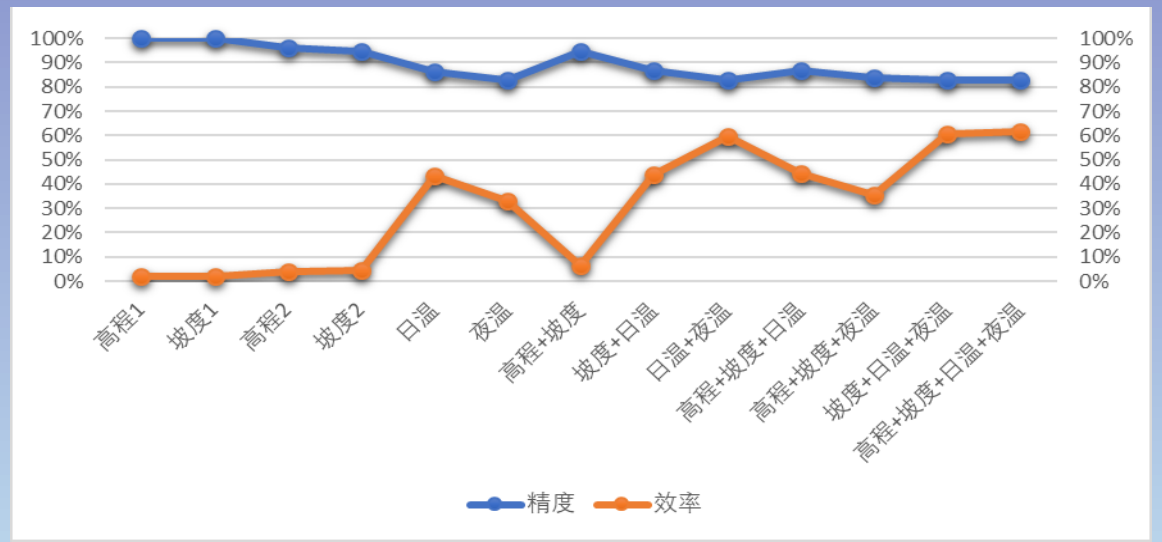
Single Variable-Threshold change of elevation

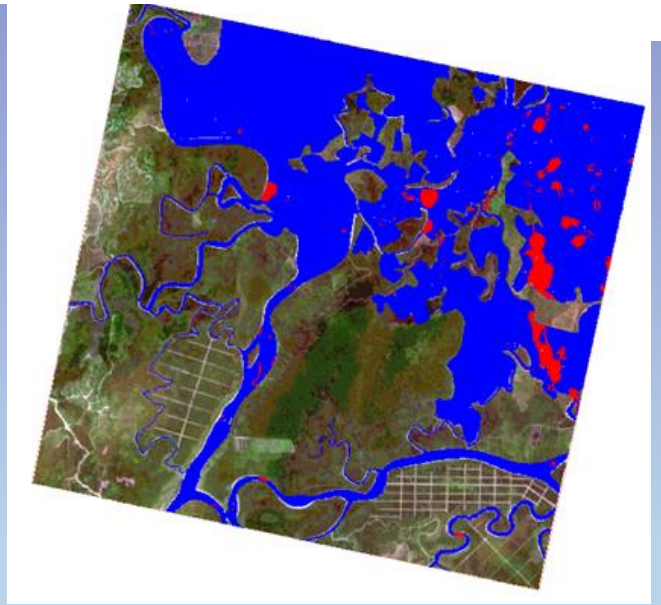


Omit and Emit discover based on four integrated variable



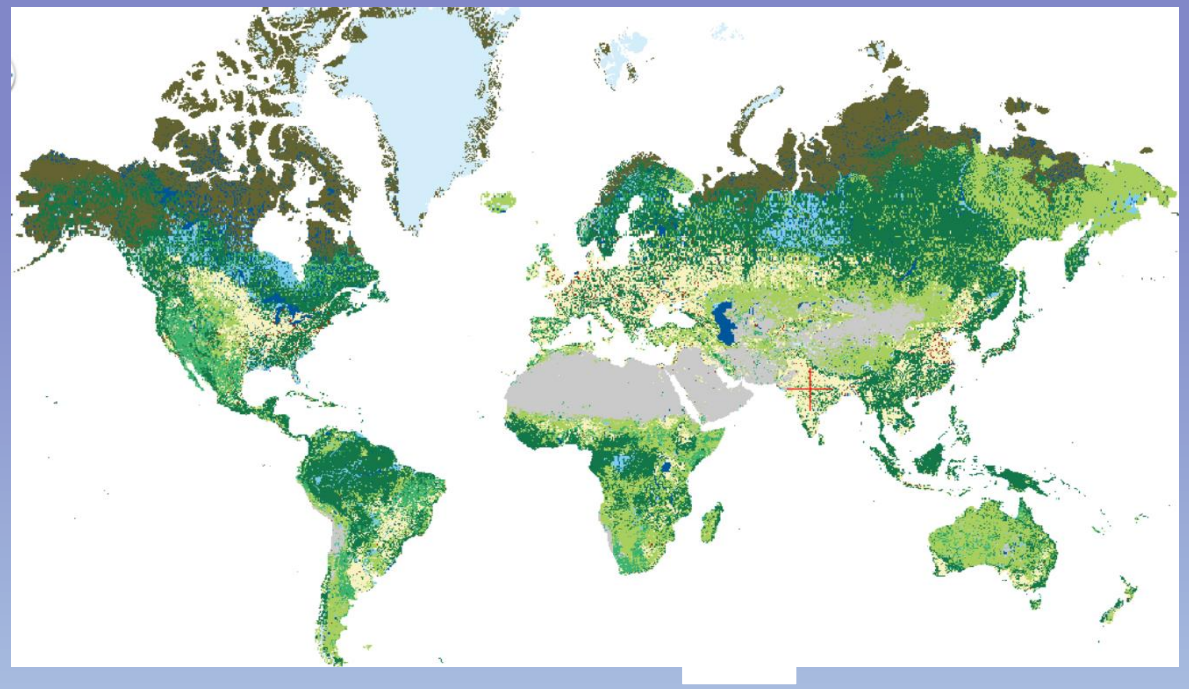
Four eco-variable combination improve accuracy and efficiency

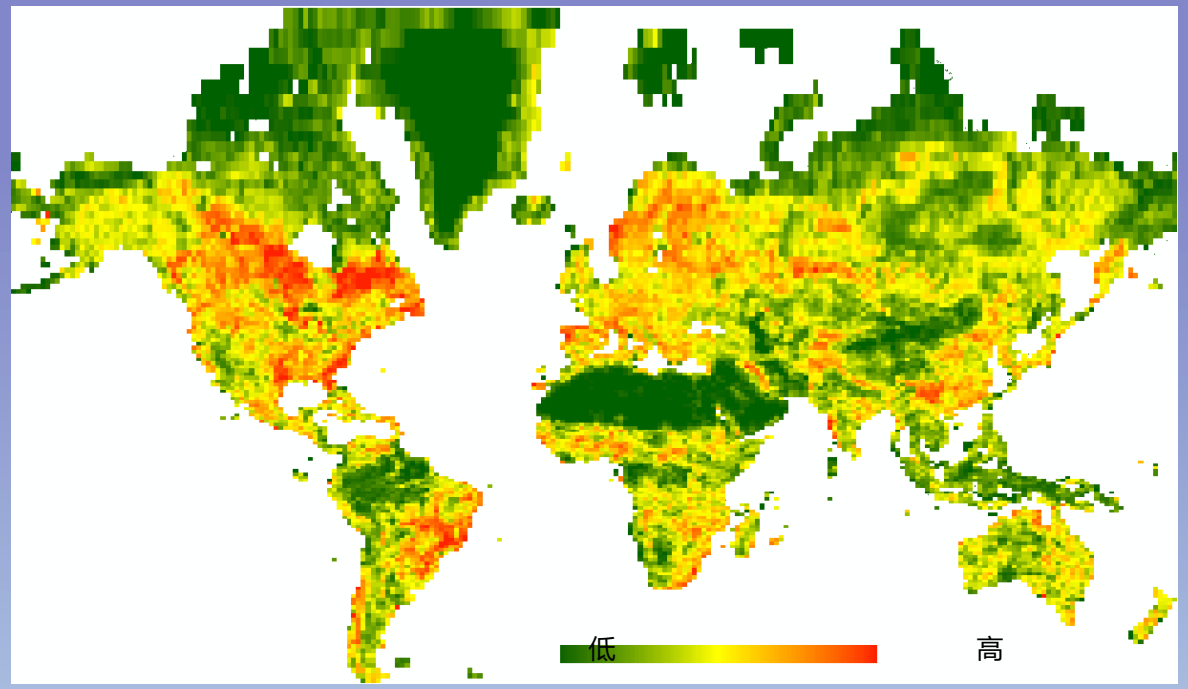




Quality Control

Global surface heterogeneity calculation

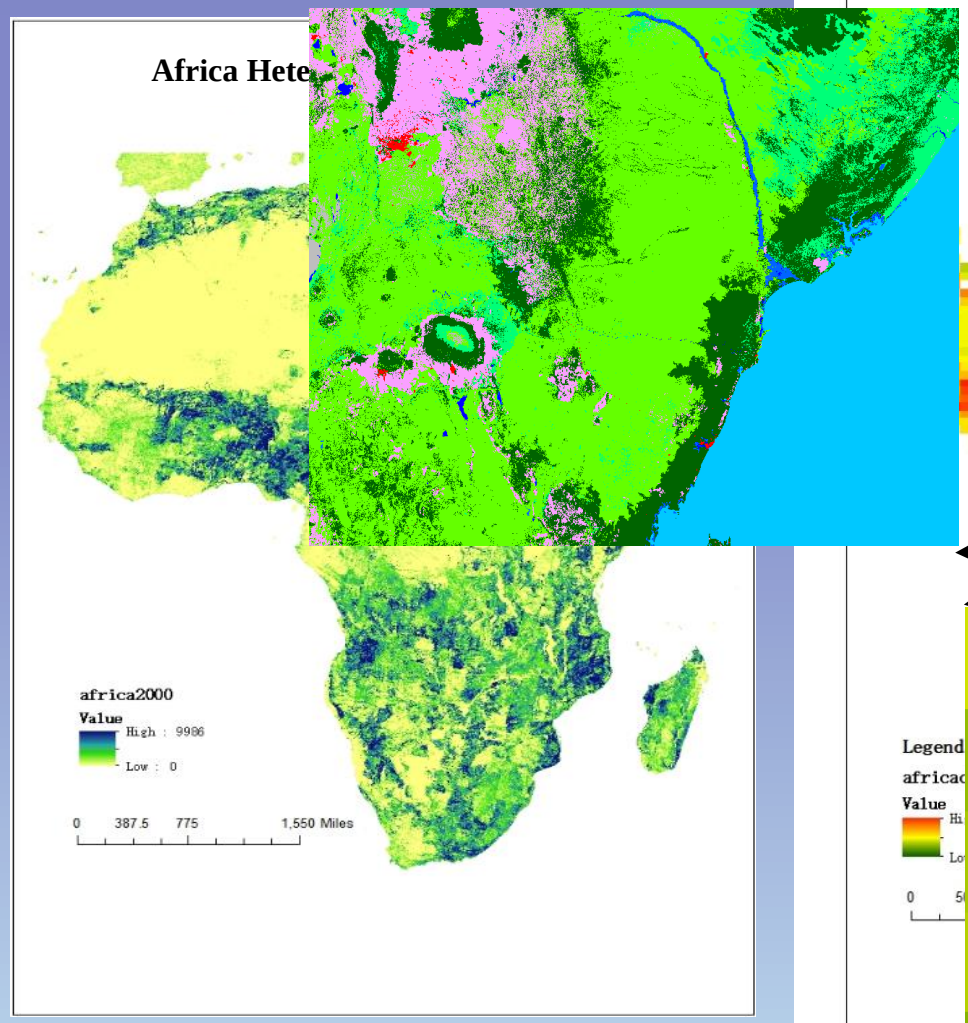


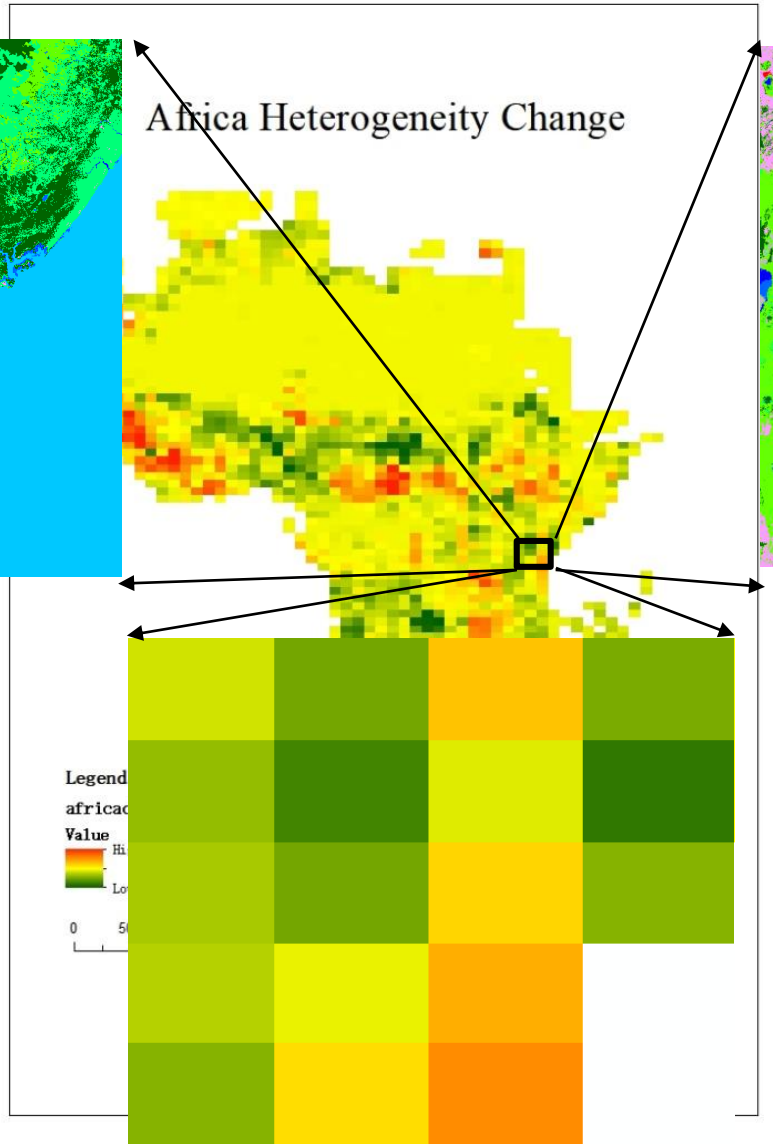


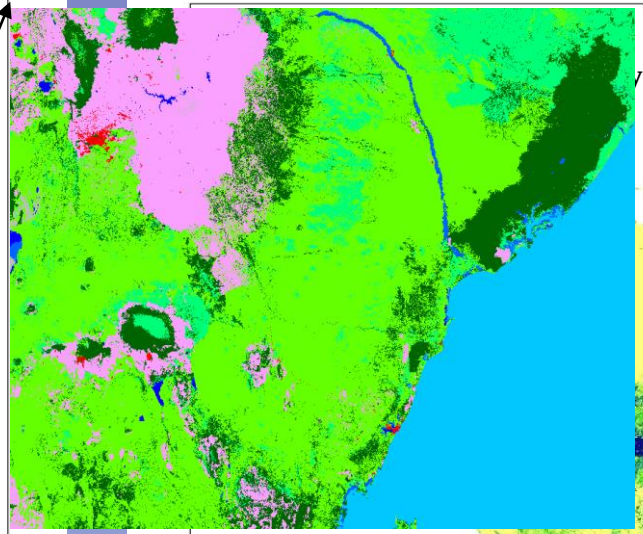
Edge length calculation with 3km grid using Mean, then integrate to 1:250000 map sheet grid

Quality Control

- 2000 Kenya







- 2010Kenya

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Introduction

Updating Strategy

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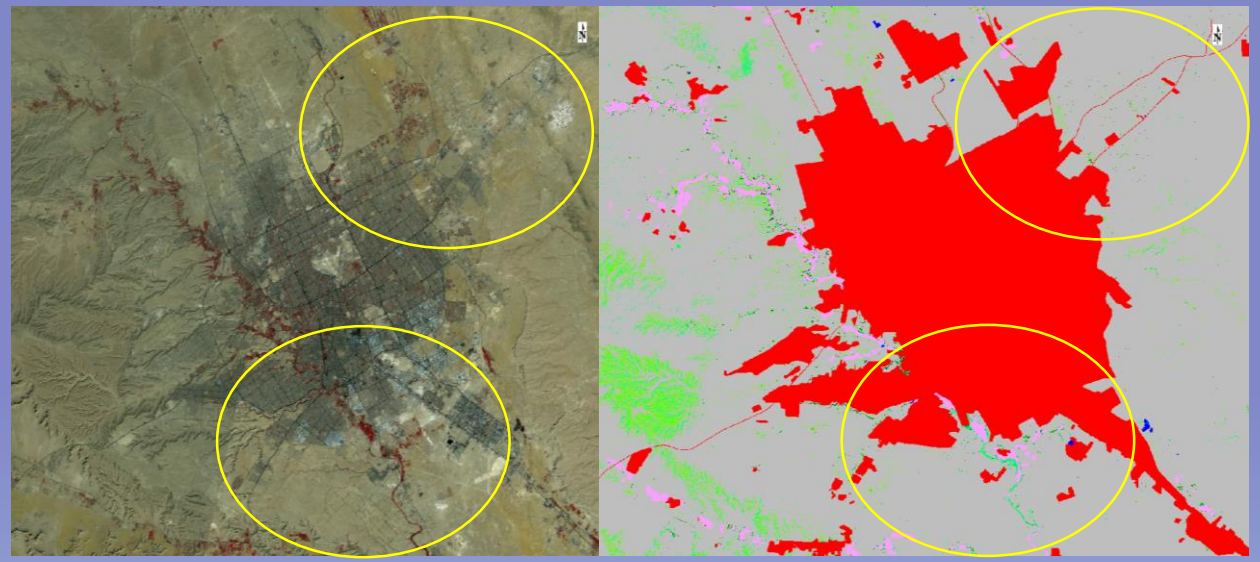
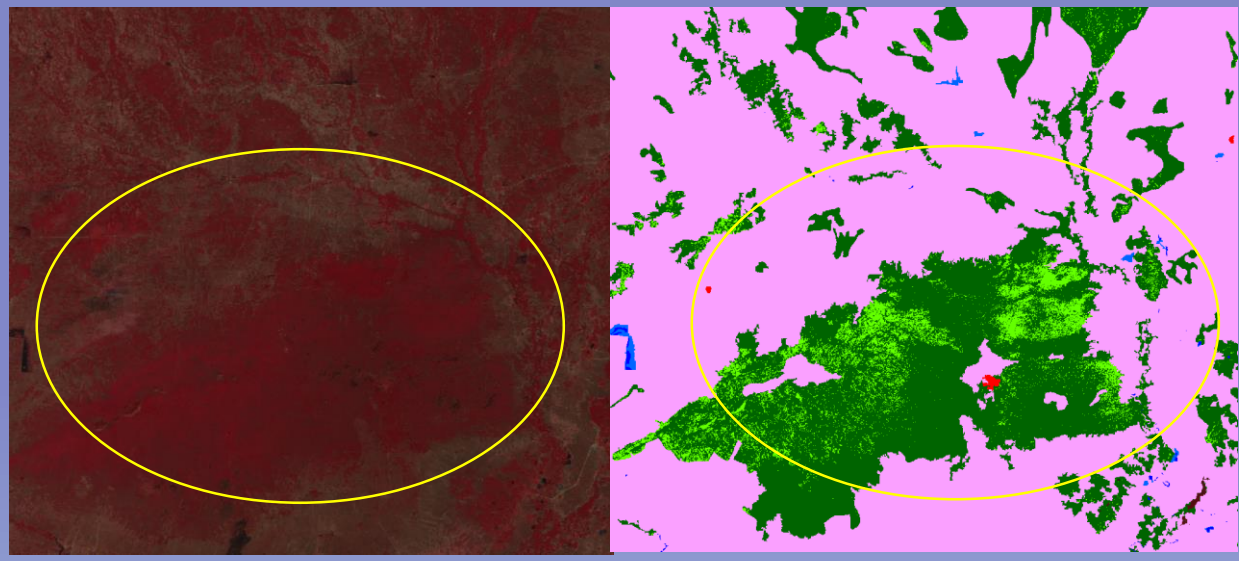
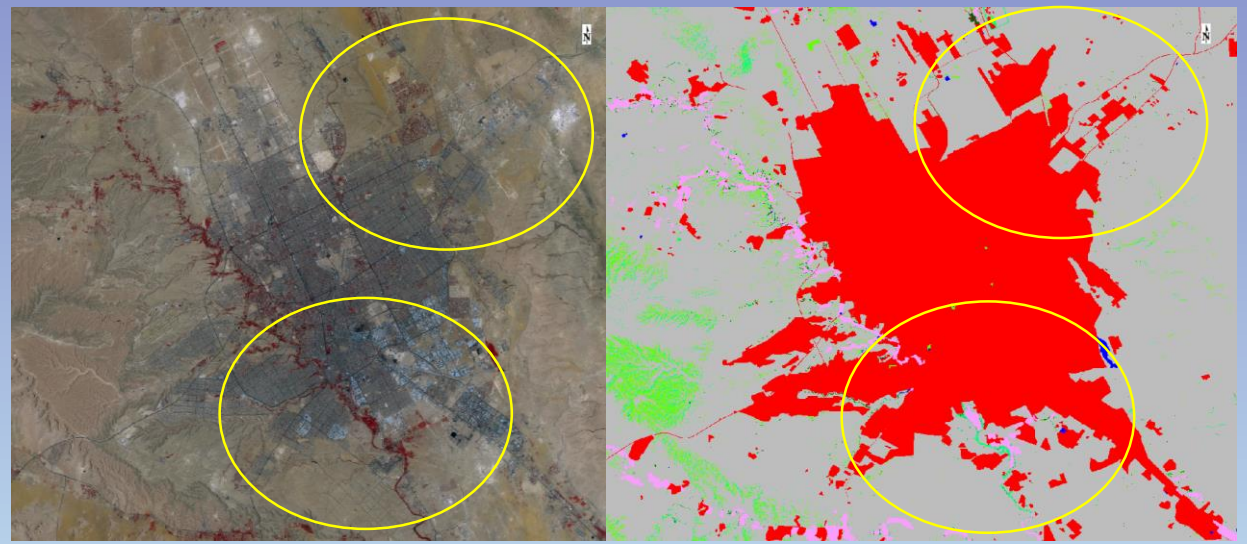
Conclusion

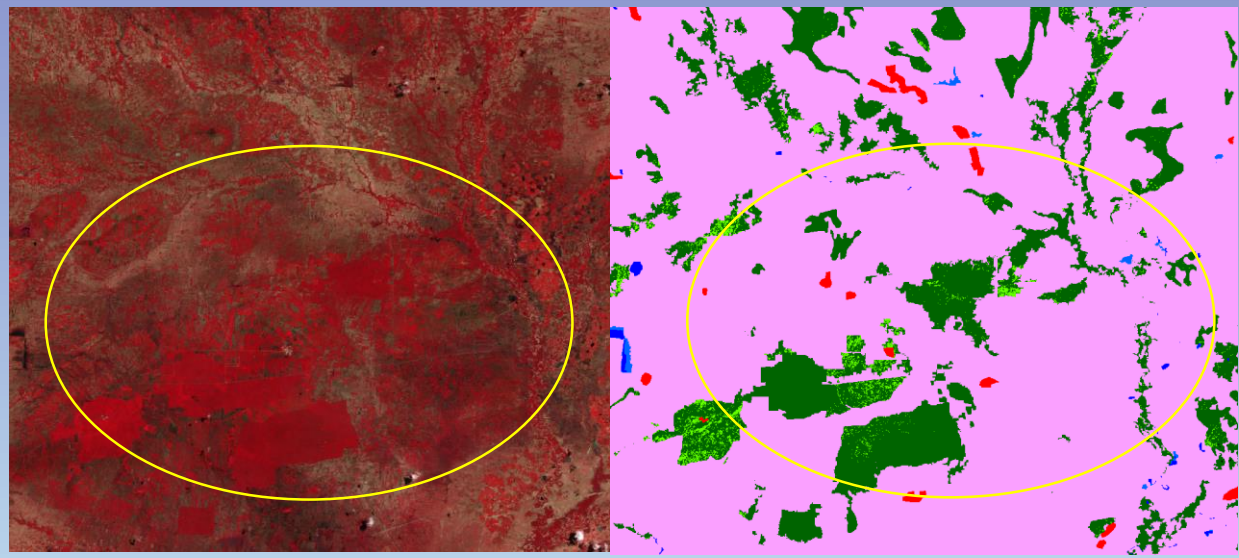
2010





2015





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.**

NGCC

19-21 November 2018
Deqing, Zhejiang Province, China

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

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Contents

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：

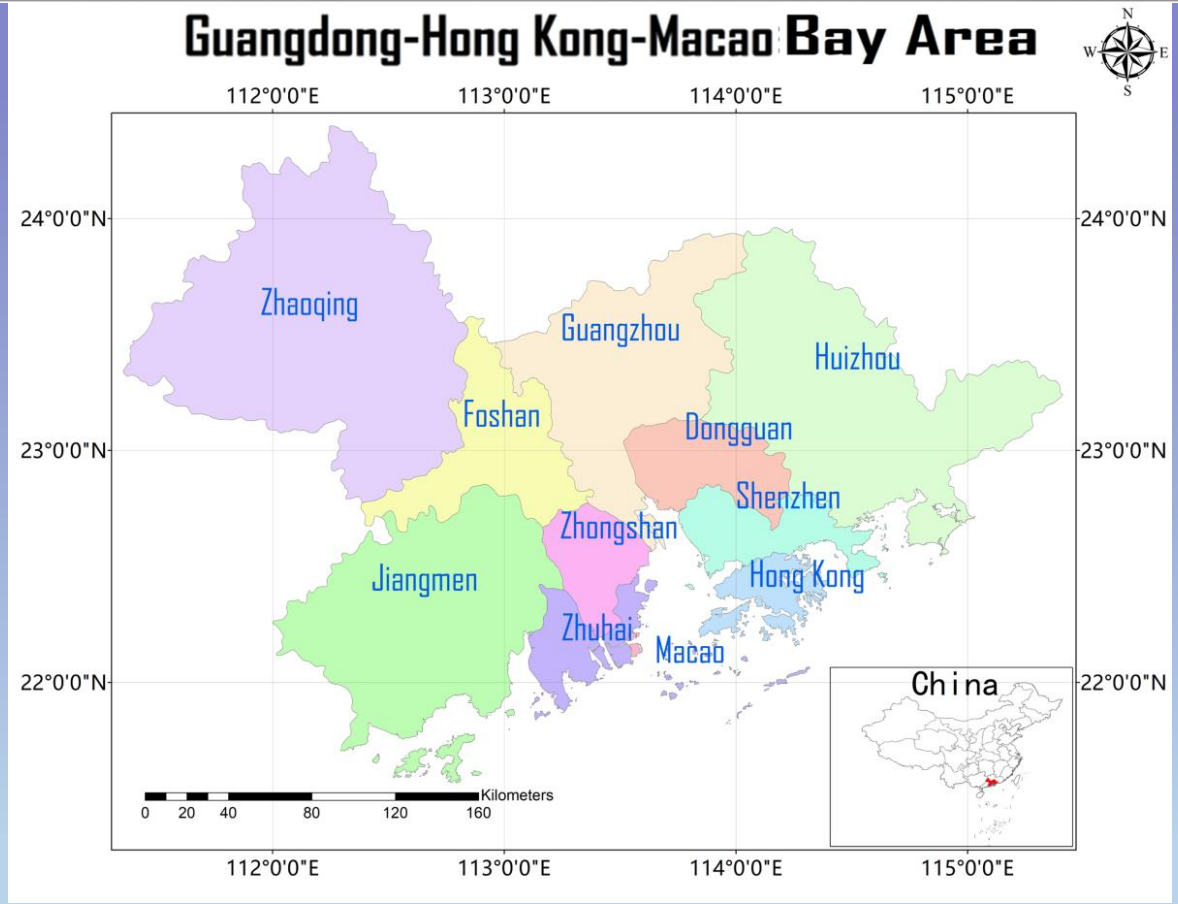
- The spatiotemporal features of urban expansion in 1987-2017
- The rationalities of urban expansion within this bay area .
- The driving forces of urban expansion.

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.

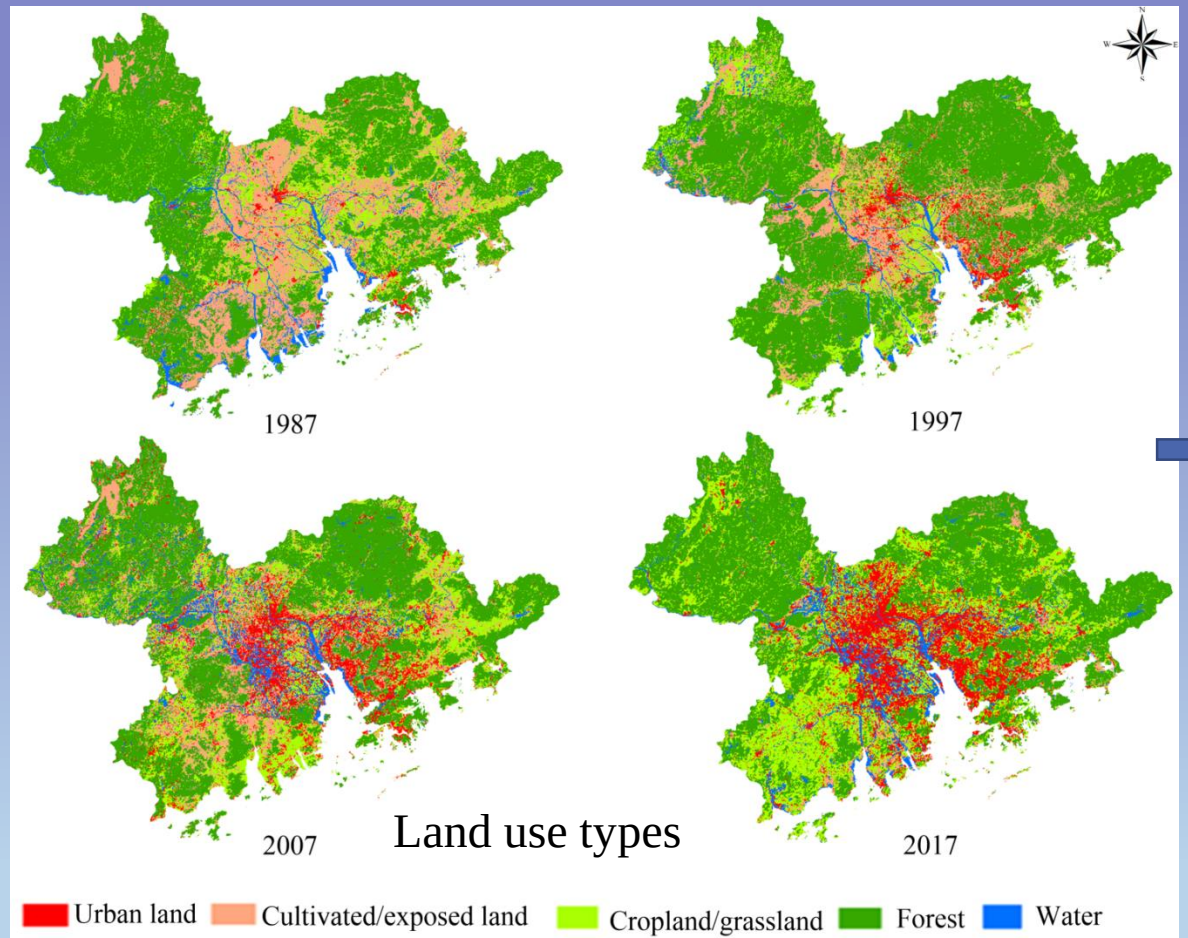
Methods:

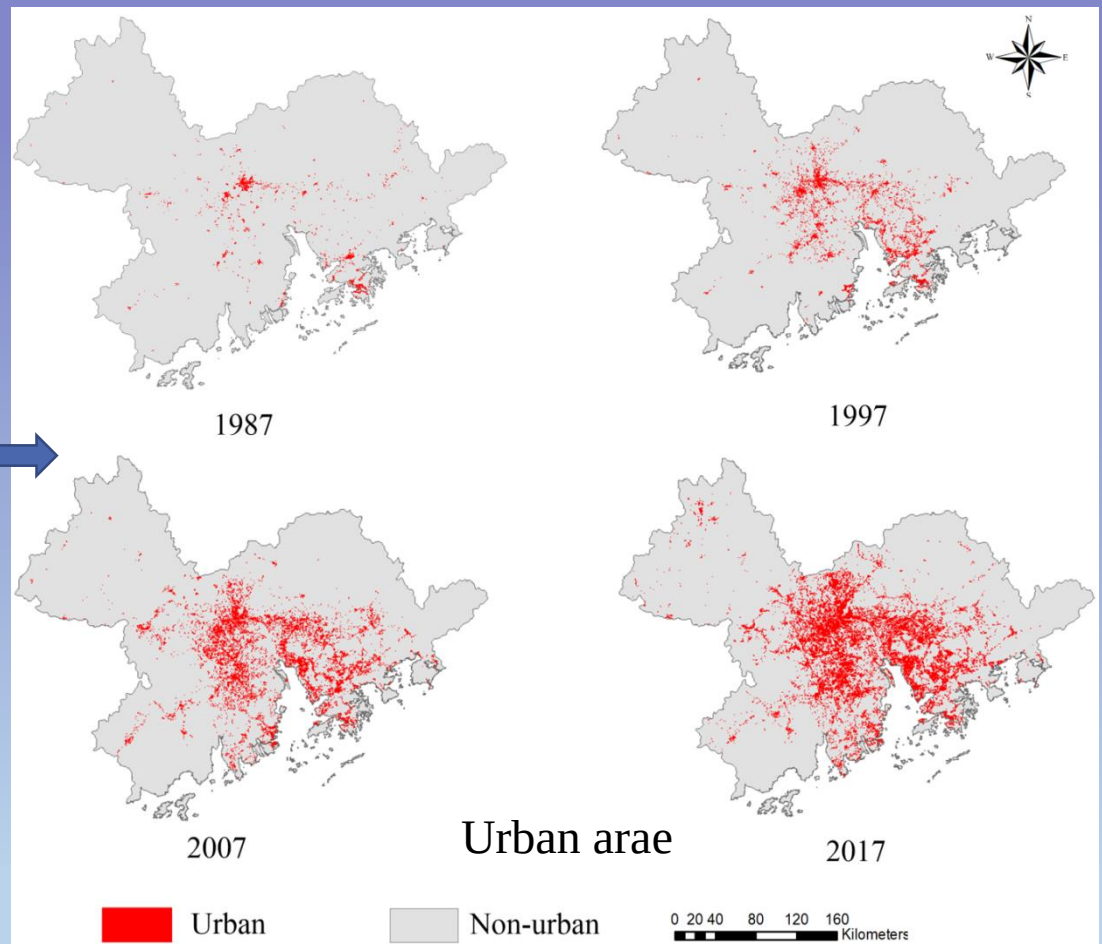
- ✓ Spatiotemporal evolution of urban: Integrating remote sensing, landscape analysis and geographic information system (GIS) techniques.
- ✓ Rationality of urban expansion: Using urban area-population elastic coefficient (UPEC) and urban area-GDP elastic coefficient (UGEC).

Results and discussion

Spatiotemporal evolution of urban agglomeration

	Urban areas (km^2)				Urban area changes (km^2)		
Guangdong-Hong Kong-Macau Bay Area	1987	1997	2007	2017	1987-1997	1997-2007	2007-2017
	605.71	1996.27	4481.96	7568.19	1390.56	2485.69	3086.23

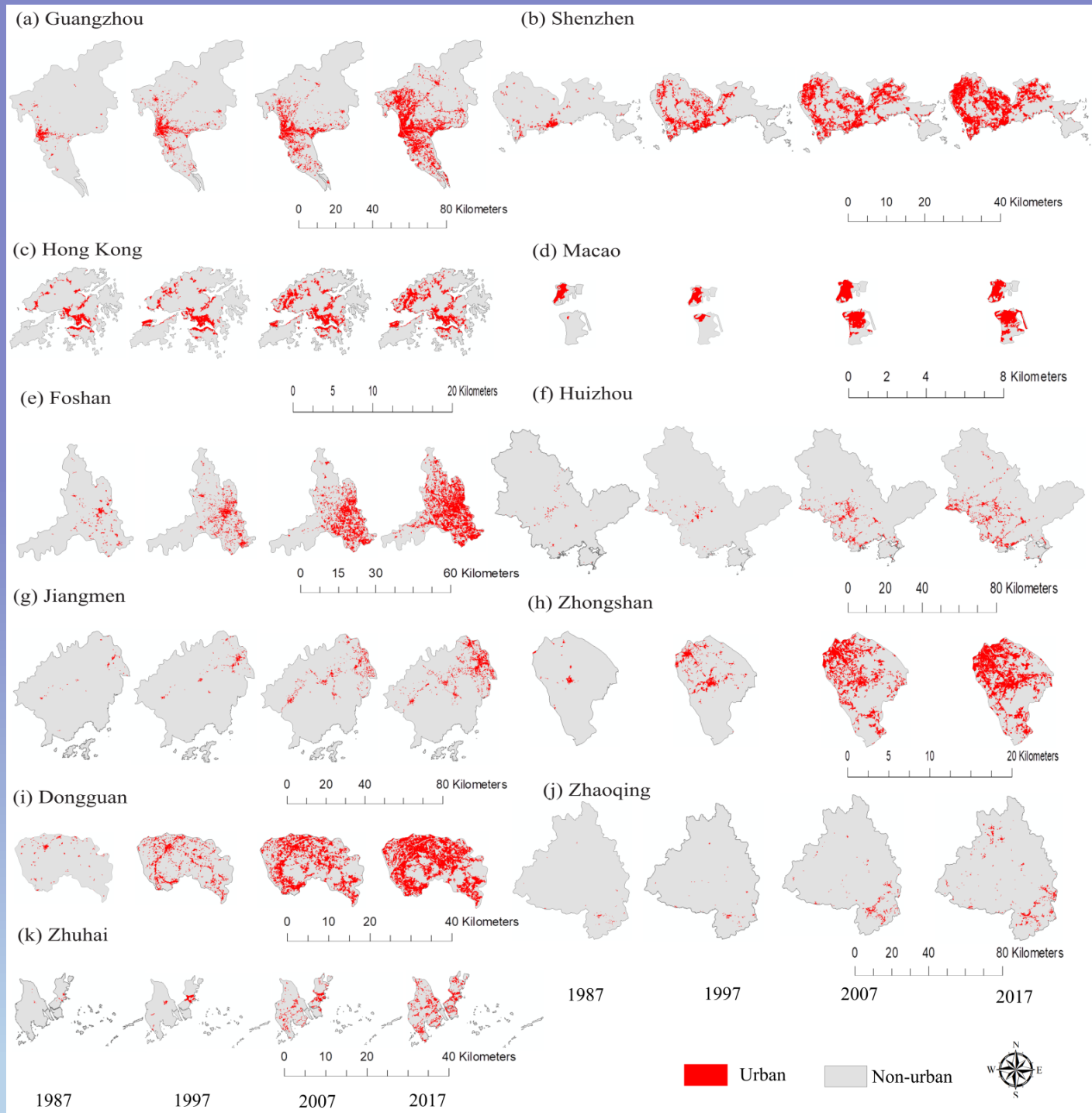




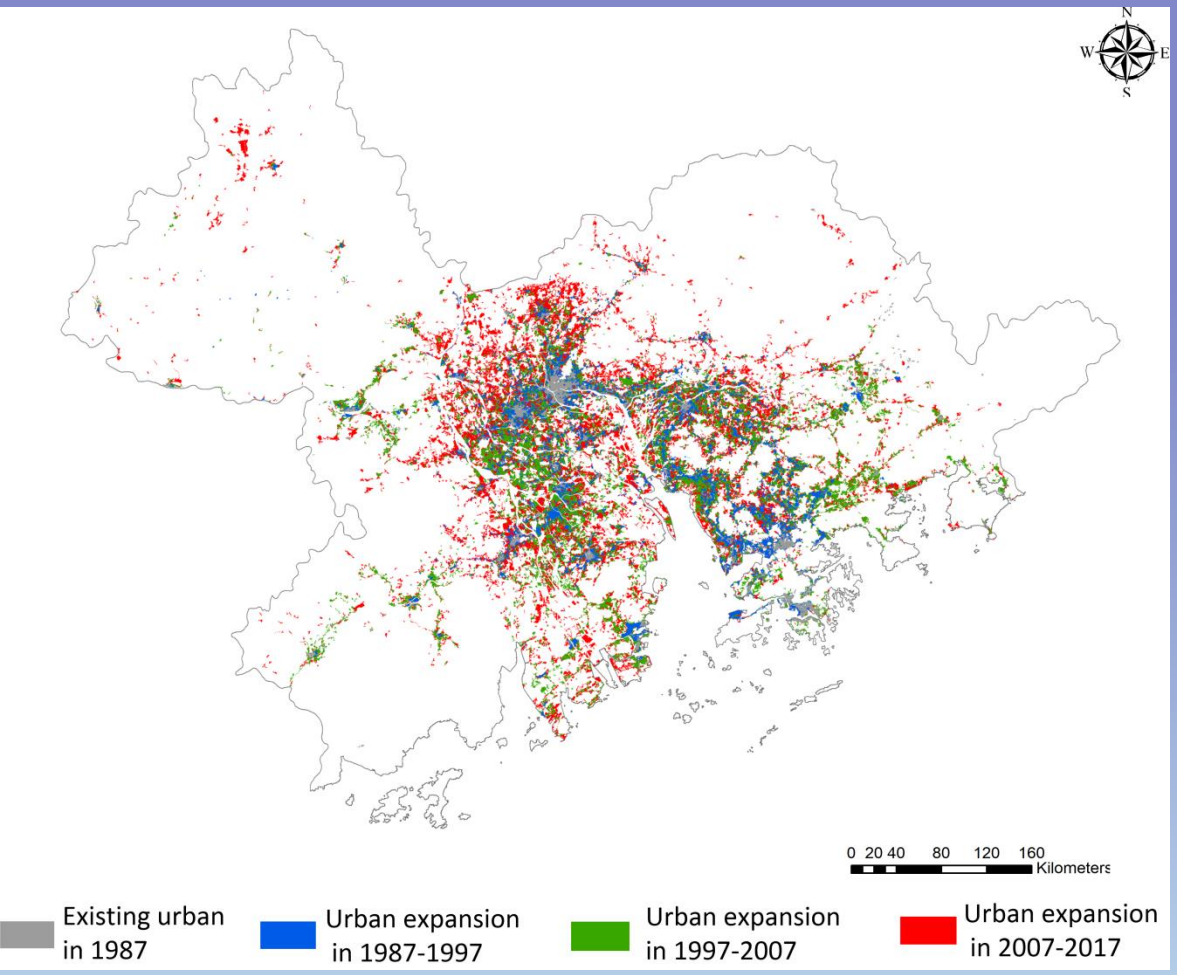
Spatiotemporal evolution of eleven cities

Study areas	Urban areas (km^2)			
	1987	1997	2007	2017
Guangzhou	146.90	422.96	693.44	1486.24
Shenzhen	67.67	337.32	583.04	776.77
Hong Kong	91.29	124.92	183.56	203.42
Macau	4.87	7.32	17.23	18.45
Foshan	104.52	379.77	784.34	1485.32
Huizhou	46.12	60.27	337.54	535.37
Jiangmen	41.56	103.2	305.59	598.09
Zhongshan	17.03	123.67	426.09	631.22
Dongguan	46.15	336.93	764.48	1148.98
Zhaoqing	28.84	49.8	208.87	366.12
Zhuhai	10.50	49.78	176.77	316.58

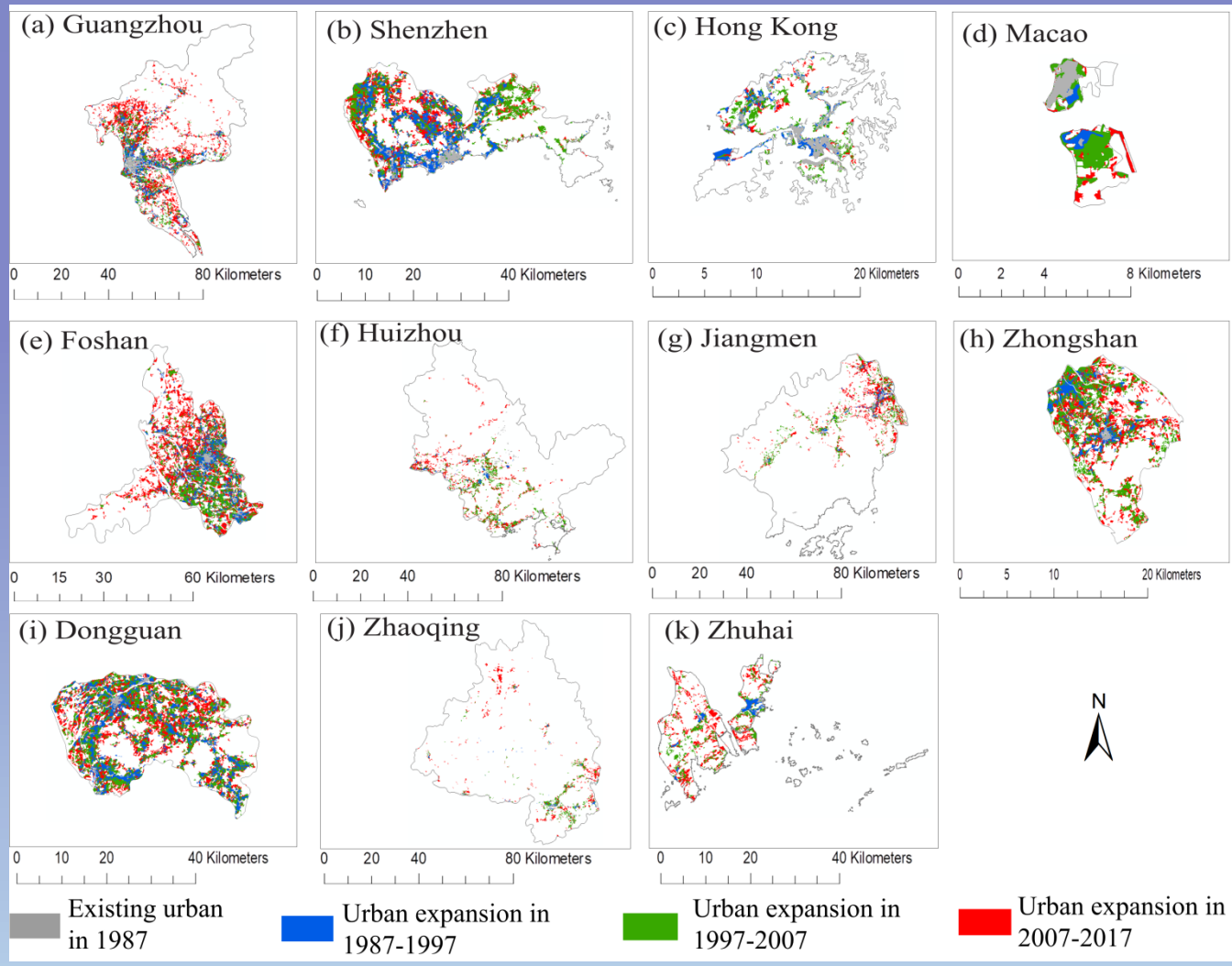
Study areas	Urban area changes (km^2)		
	1987-1997	1997-2007	2007-2017
Guangzhou	276.06	270.48	792.8
Shenzhen	269.65	245.72	193.73
Hong Kong	33.63	58.64	19.86
Macau	2.45	9.91	1.22
Foshan	275.25	404.57	700.98
Huizhou	14.15	277.27	197.83
Jiangmen	61.64	202.39	292.5
Zhongshan	106.64	302.42	205.13
Dongguan	290.78	427.55	384.5
Zhaoqing	20.96	159.07	157.25
Zhuhai	39.28	126.99	139.81



urban agglomeration level



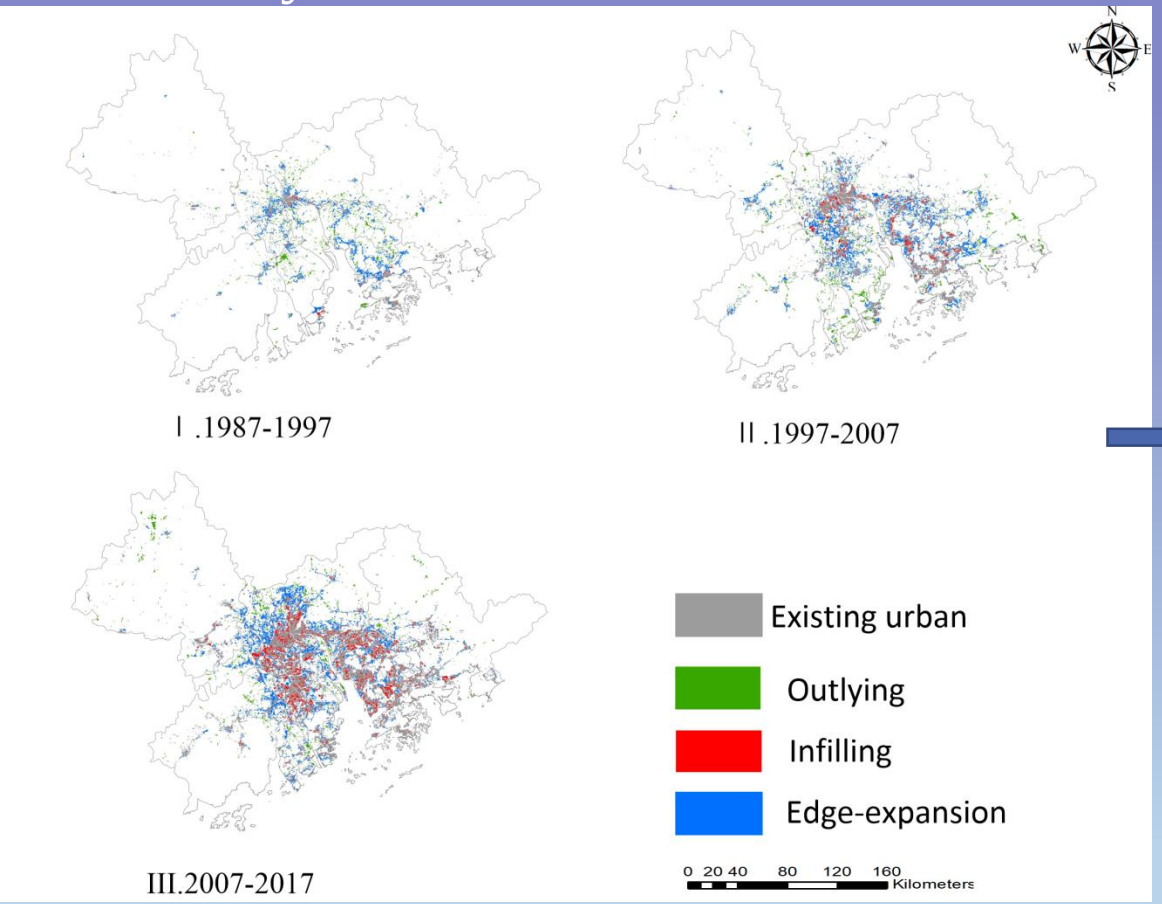
city level

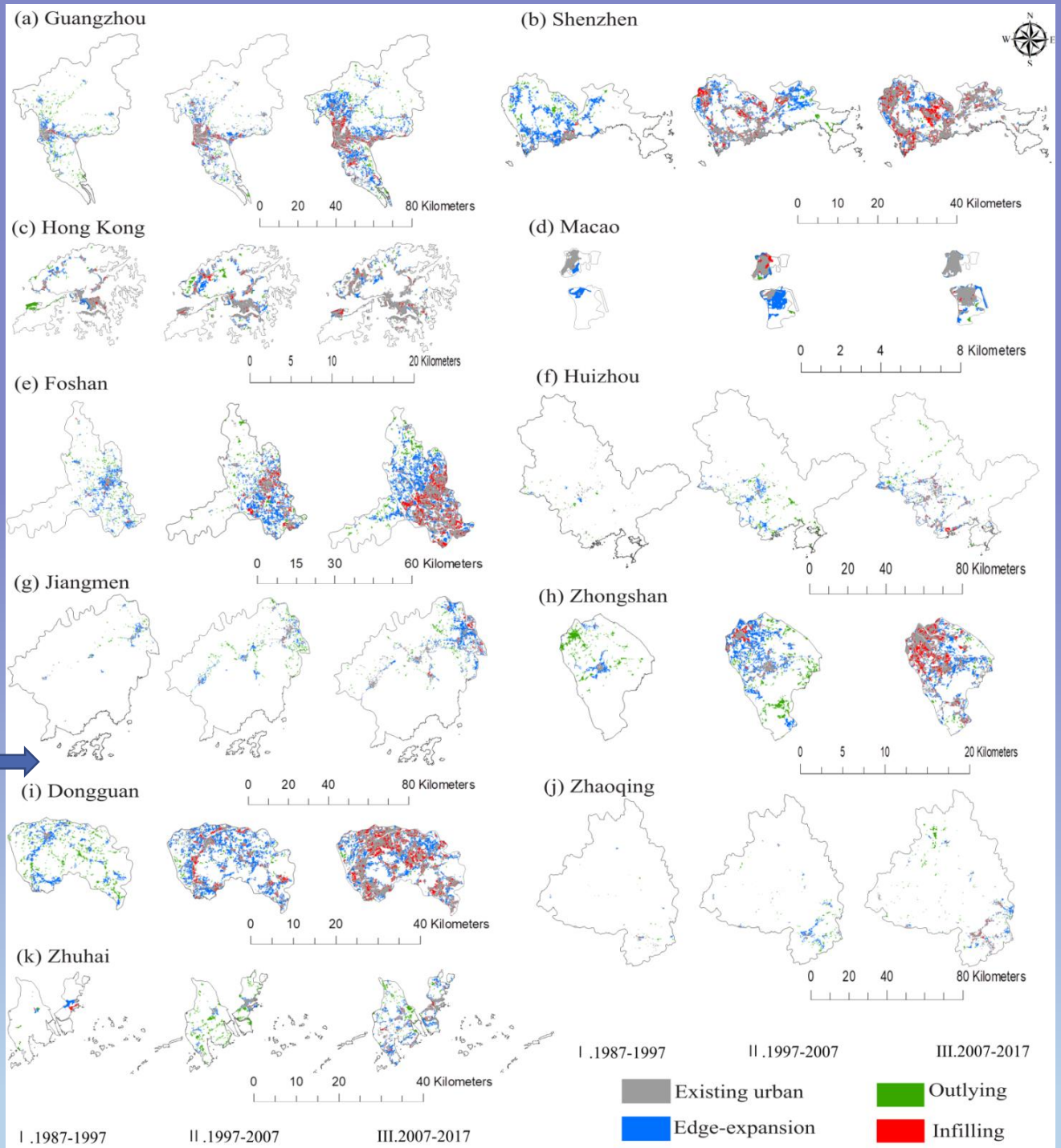


urban agglomeration level

city level

Outlying, edge-expansion and infilling are three types used for descripting urban growth types of Guangdong-Hong Kong-Macau Bay Area .



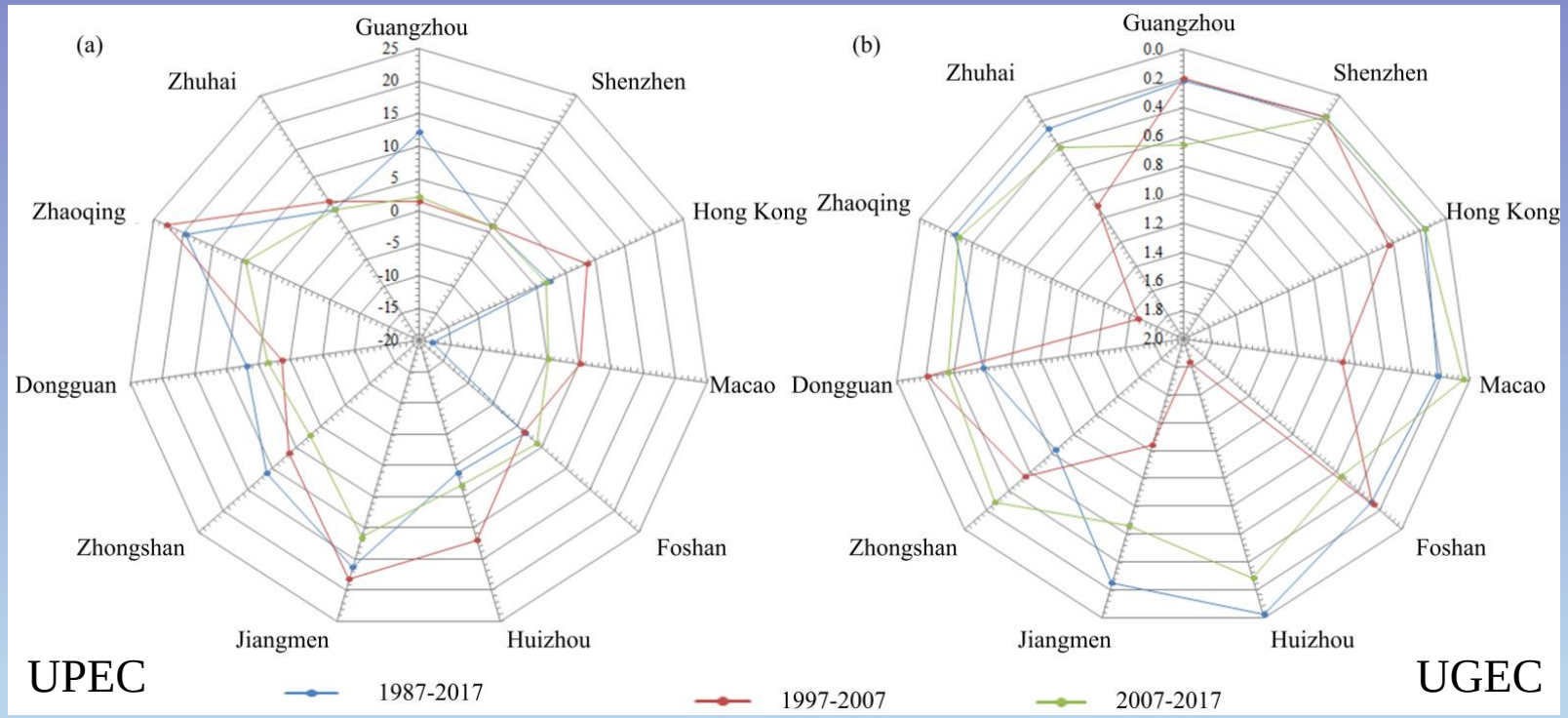


Rationality of urban expansion

(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.

City	UPEC			UGEC		
	1987-1997	1997-2007	2007-2017	1987-1997	1997-2007	2007-2017
Guangzhou	12.10	1.51	2.17	0.22	0.20	0.66
Shenzhen	0.99	1.00	1.09	0.18	0.17	0.18
Hong Kong	2.23	8.60	1.55	0.16	0.44	0.16
Macau	-17.91	5.21	0.31	0.23	0.89	0.04
Foshan	1.73	1.49	4.14	0.28	0.26	0.56
Huizhou	1.18	12.02	3.25	0.02	1.84	0.29
Jiangmen	16.34	18.33	11.57	0.25	1.24	0.66
Zhongshan	11.13	6.50	2.26	0.83	0.56	0.28
Dongguan	6.88	1.34	3.53	0.60	0.21	0.36
Zhaoqing	19.67	22.86	9.45	0.27	1.66	0.30
Zhuhai	4.03	5.63	4.01	0.27	0.90	0.42



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.

③ Most cities' expansions exceeded rational level, except for Guangzhou (1997-2007), Hong Kong (2007-2017), Foshan (1987-2007), Huizhou (1987-1997) and Dongguan (1997-2007).

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（中国的改革开放政策） and local urban planning policies), terrain , transportation, population and GDP scale.

Thank you!
Questions?

Global Land Cover Validation Capacity Building

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POLITECNICO MILANO 1863

The context

- **High-resolution LC maps** are rapidly increasing due to the continuous advances in Remote Sensing sensors and geospatial technologies
    - Several countries (e.g. EU, USA, Australia) and political organizations have their own high-resolution LC maps
    - Developing countries do not have their own high-resolution datasets but **they can benefits 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:
    - **Awareness** of the existence and importance of global high-resolution LC maps
    - **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

Desktop solution

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

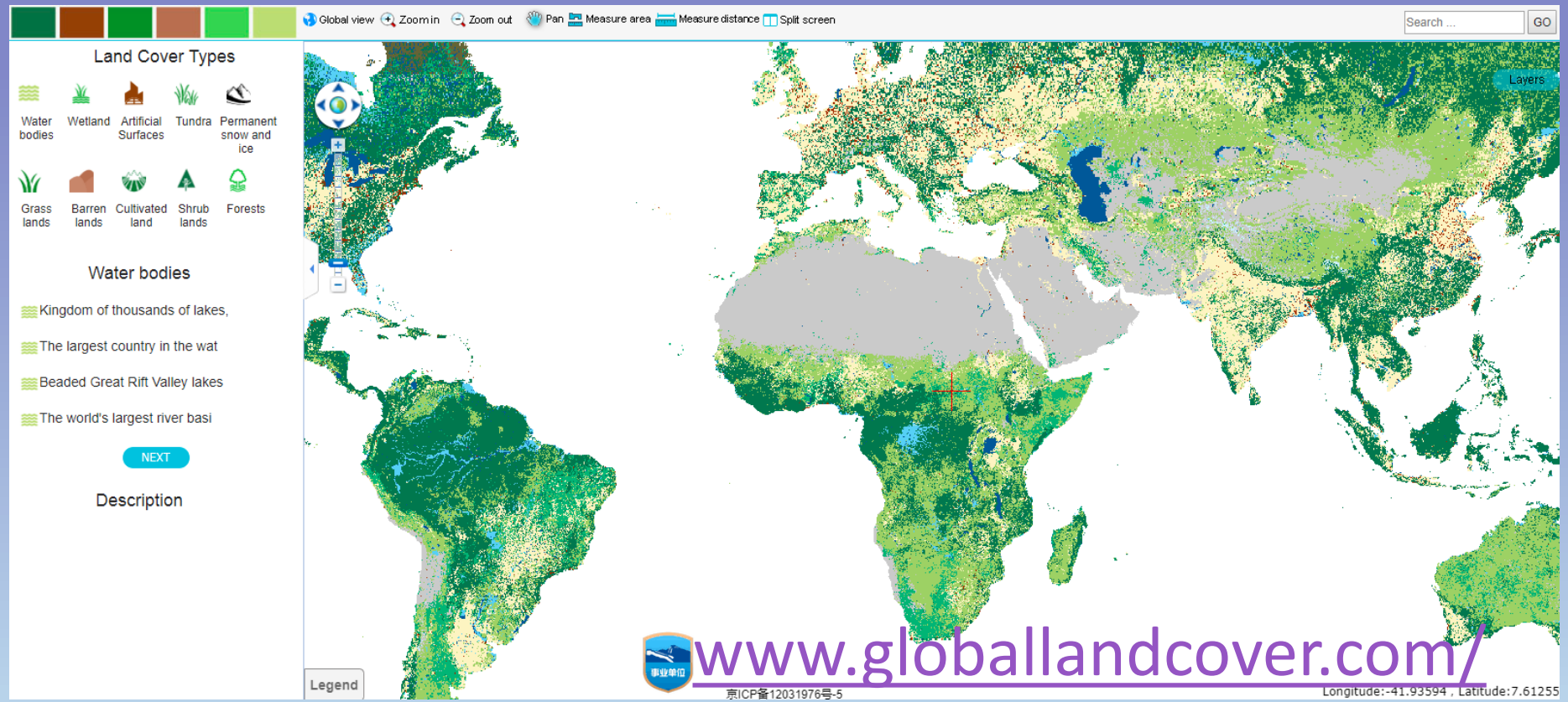
- **GlobeLand30 2010** raster map covering the Como Province area: N32_45_2010LC030 (available in DATA\GL30_Italy folder). The map is provided in the WGS84/UTM 32N coordinate system (EPSG: 32632)
- **DUSAF 4.0 – Use of soil 2012** database consists of vector maps for every province in Lombardy Region, 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%

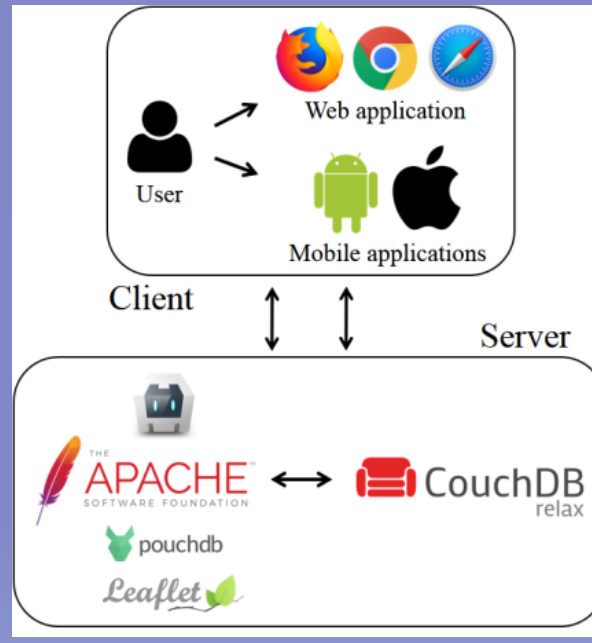
Selection method: Random sampling

LC Type	Count
Cultivated land	53
Forest	50
Grasslands	50
Artificial surfaces	46
Water bodies	39
Wetland	31
Shrublands	30
Bareland	11

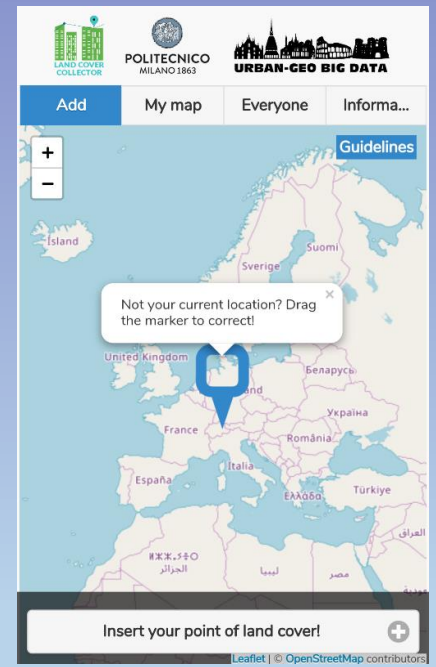
Download samples dataset

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
- 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.

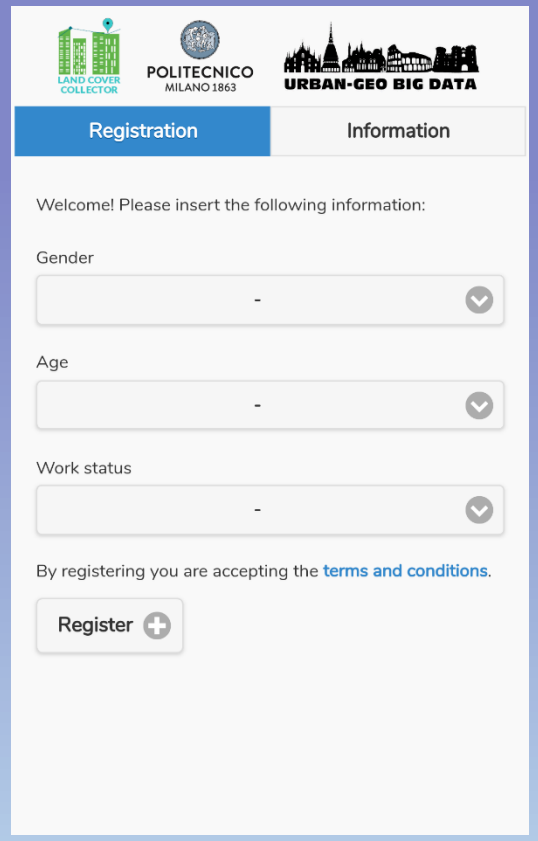


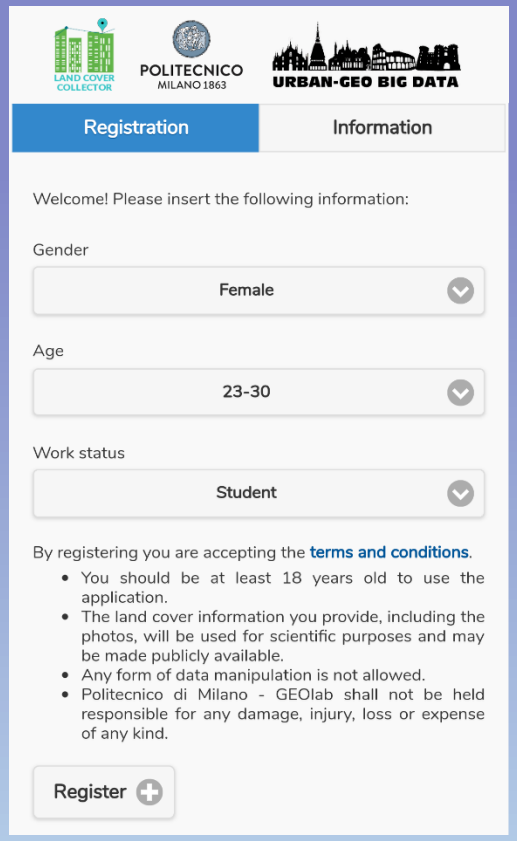
- You can access the application on Web at https://landcover.como.polimi.it/collector/.
- You can install it on your iOS or Android mobile device, using App Store or Google Play respectively. Search for "Land Cover Collector".
- You can also download the apk for installing it on Android devices from https://landcover.como.polimi.it/collector/land-cover-collector.apk.

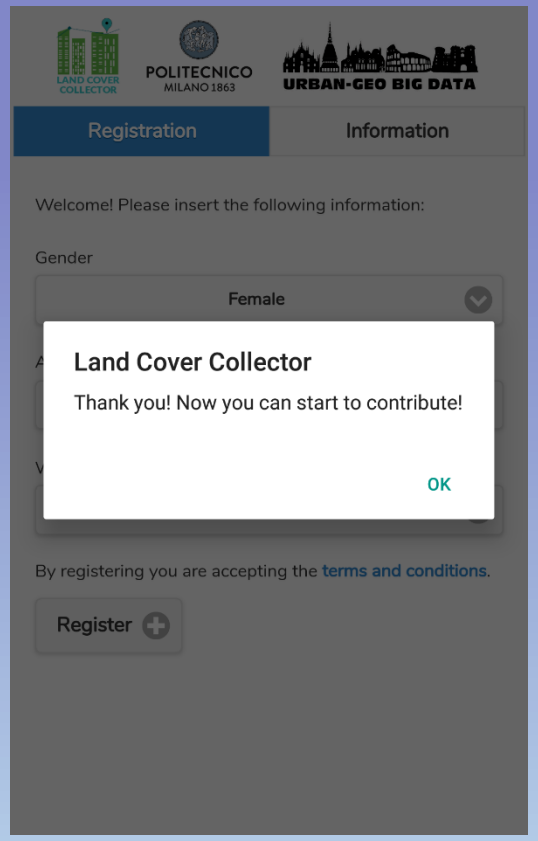


Register

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

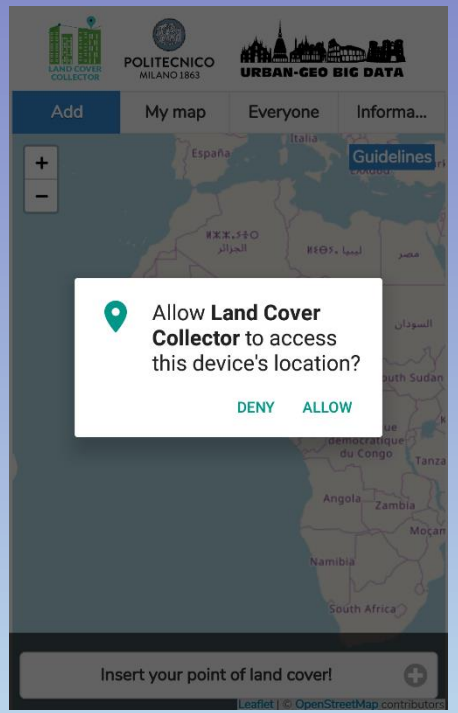


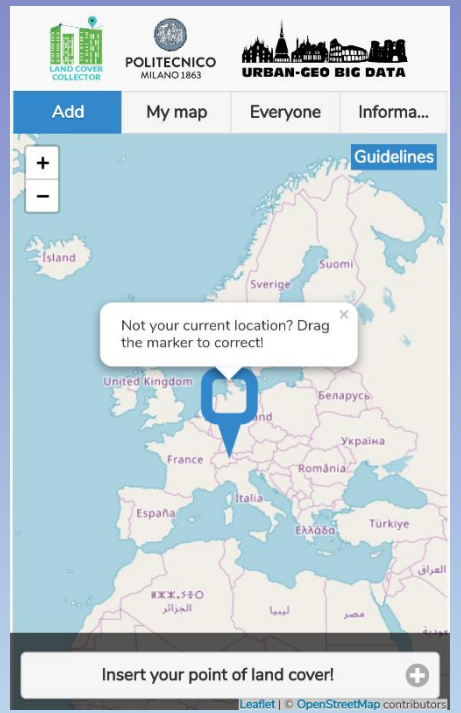




Collect data

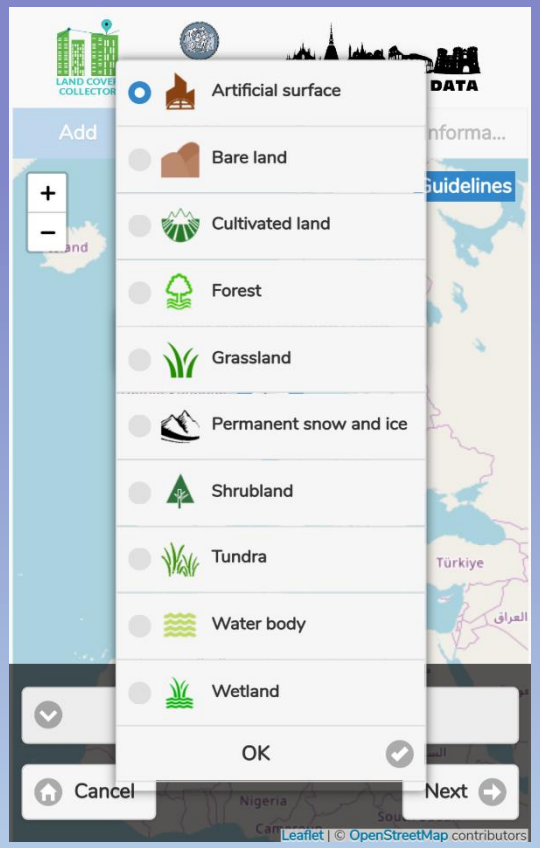
On mobile devices turn on your GPS, start the application, and allow it to access the device's location to place the marker in your position. Instead, desktop browsers ask you to access your location. In this case, allow location access. Then move the marker to fine-tune its position.

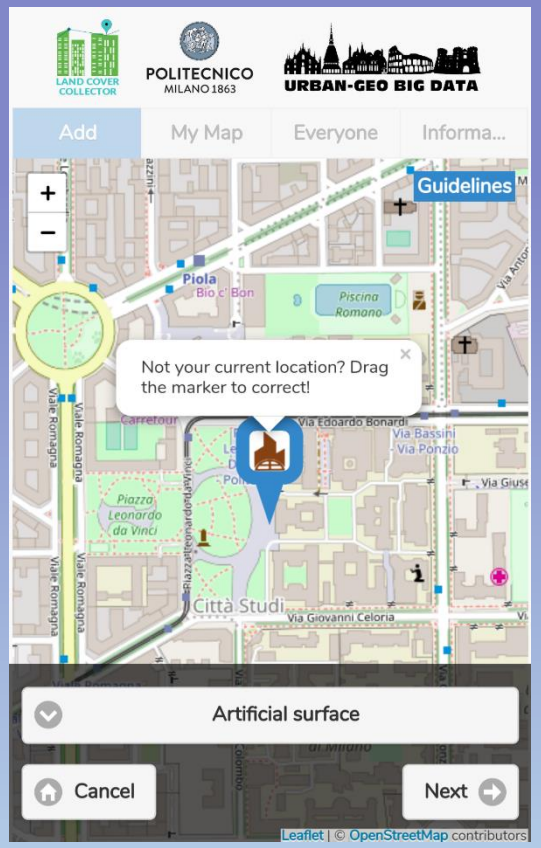




Collect data

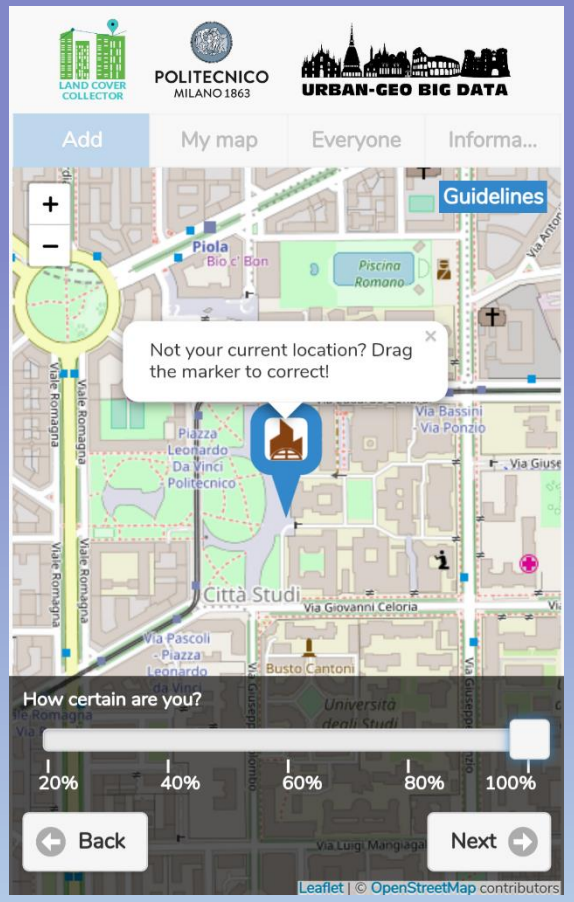
Click on “Insert you point of land cover!” button and select the classification of your point.

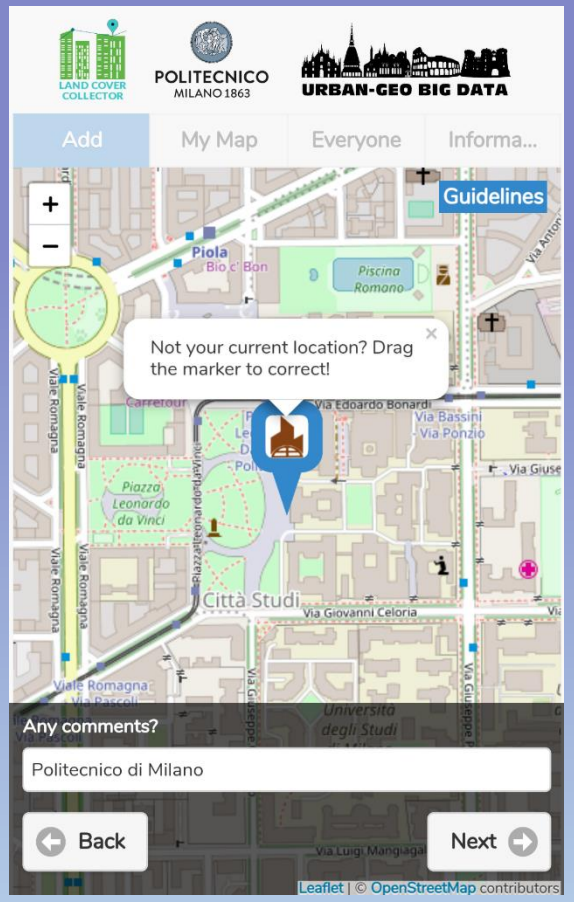




Collect data

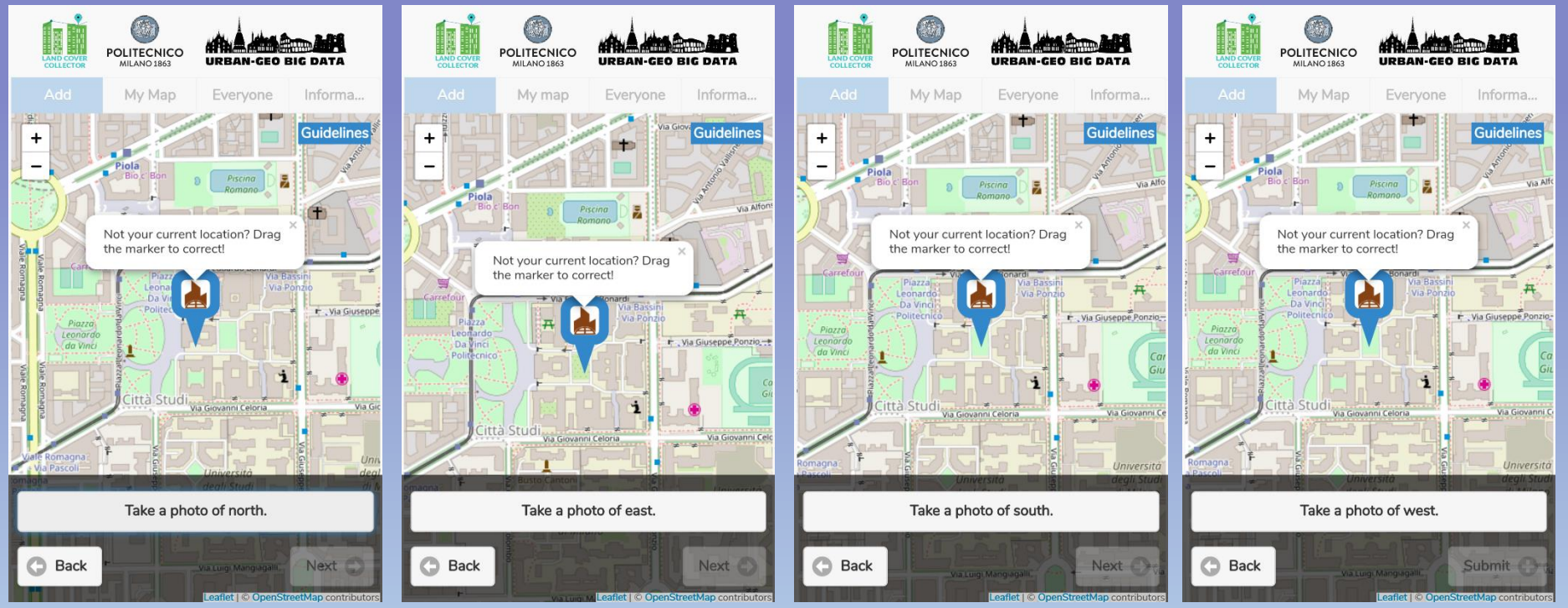
State your certainty and then optionally add a comment.





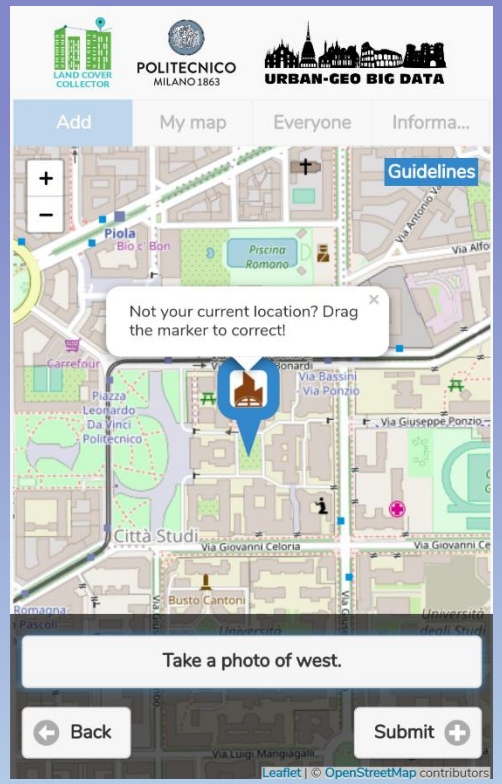
Collect data

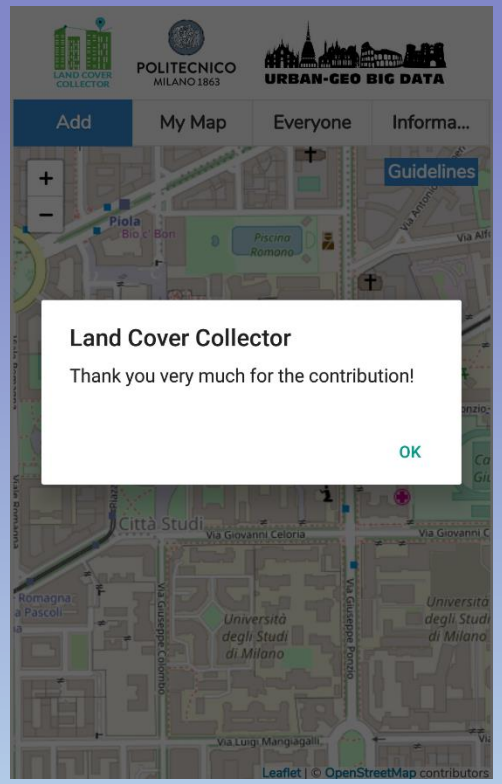
Take a photo of north, east, south and west. While taking photo, hold your device vertical to the ground.



Collect data

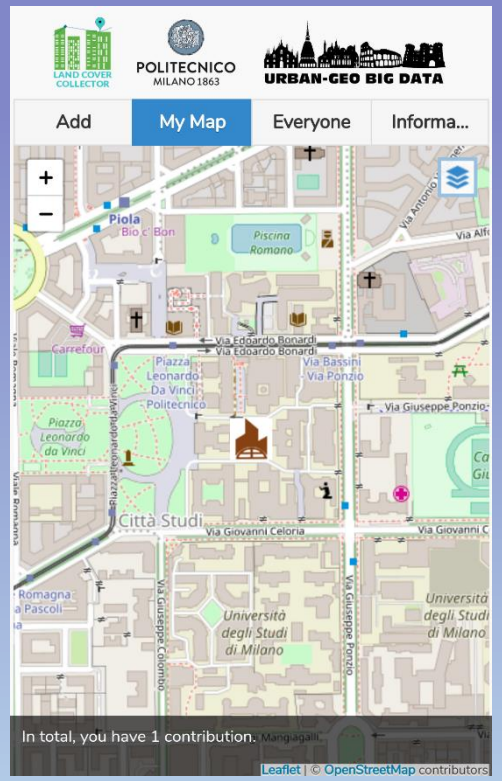
Submit the information you entered. While adding your point, if you want to cancel, you need to click on “Back” until “Cancel” button appears, and then “Cancel”.

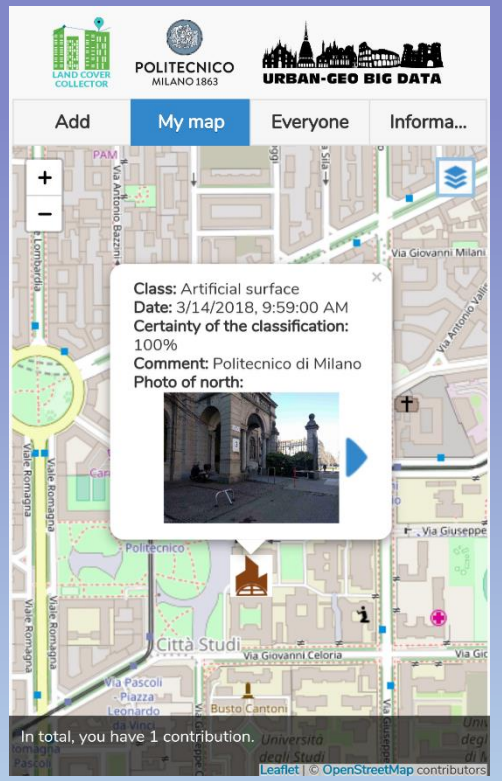




Visualize & query data

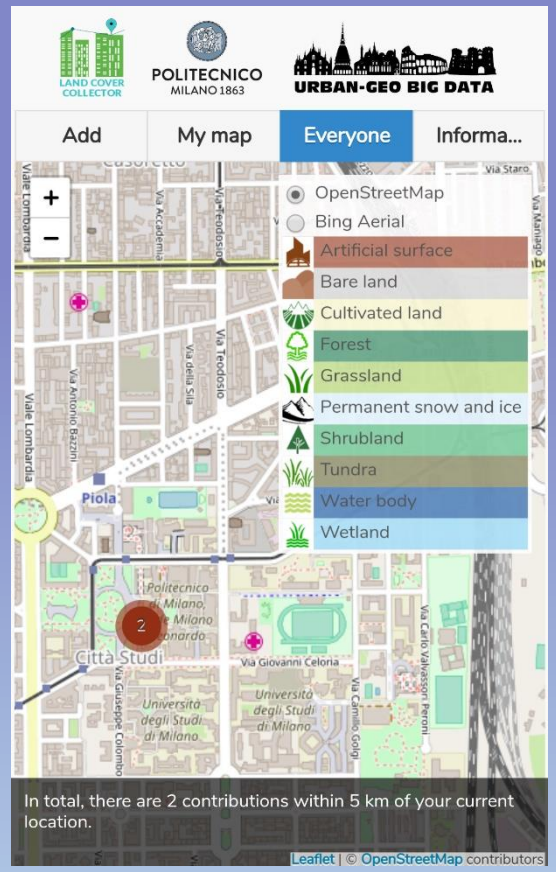
The point you added will be visible in the “My map” as a marker, with an icon of its corresponding classification. The point can be queried to see the inserted information.





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”.



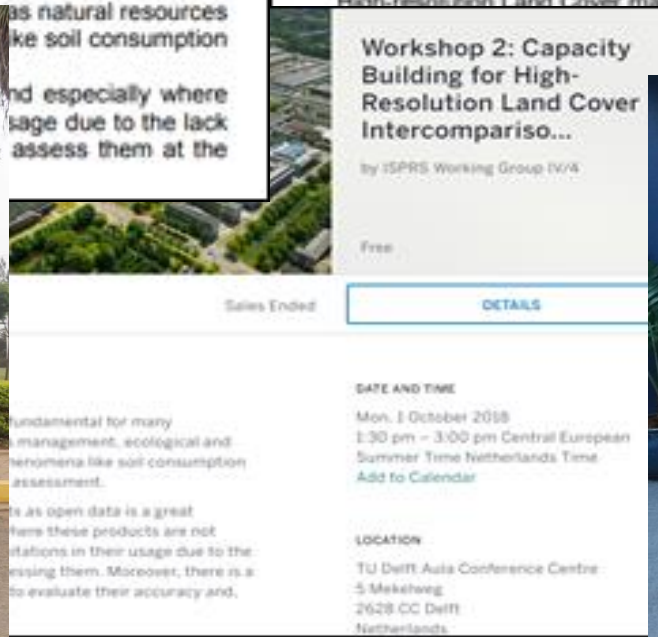
Land Cover Validation Capacity Building (ISPRS)

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 Brovelli, 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 Brovelli, Mr. Peng Shu, Dr. Marco Minghini
Local Organizers: Mr. Msilikale Msilanga, Miss. Devotha Laurent



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

POLITECNICO MILANO 1863

GEOLAB Geomatics and Earth Observation lab

Home | Topics | Projects | Applications | Team | Publications | Affiliations | Software

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.

isprs information from imagery

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

Centre for Geoinformation Science, Department of Geography, Geoinformatics and Meteorology

University of Pretoria – Pretoria – South Africa

serena.coetzee@up.ac.za

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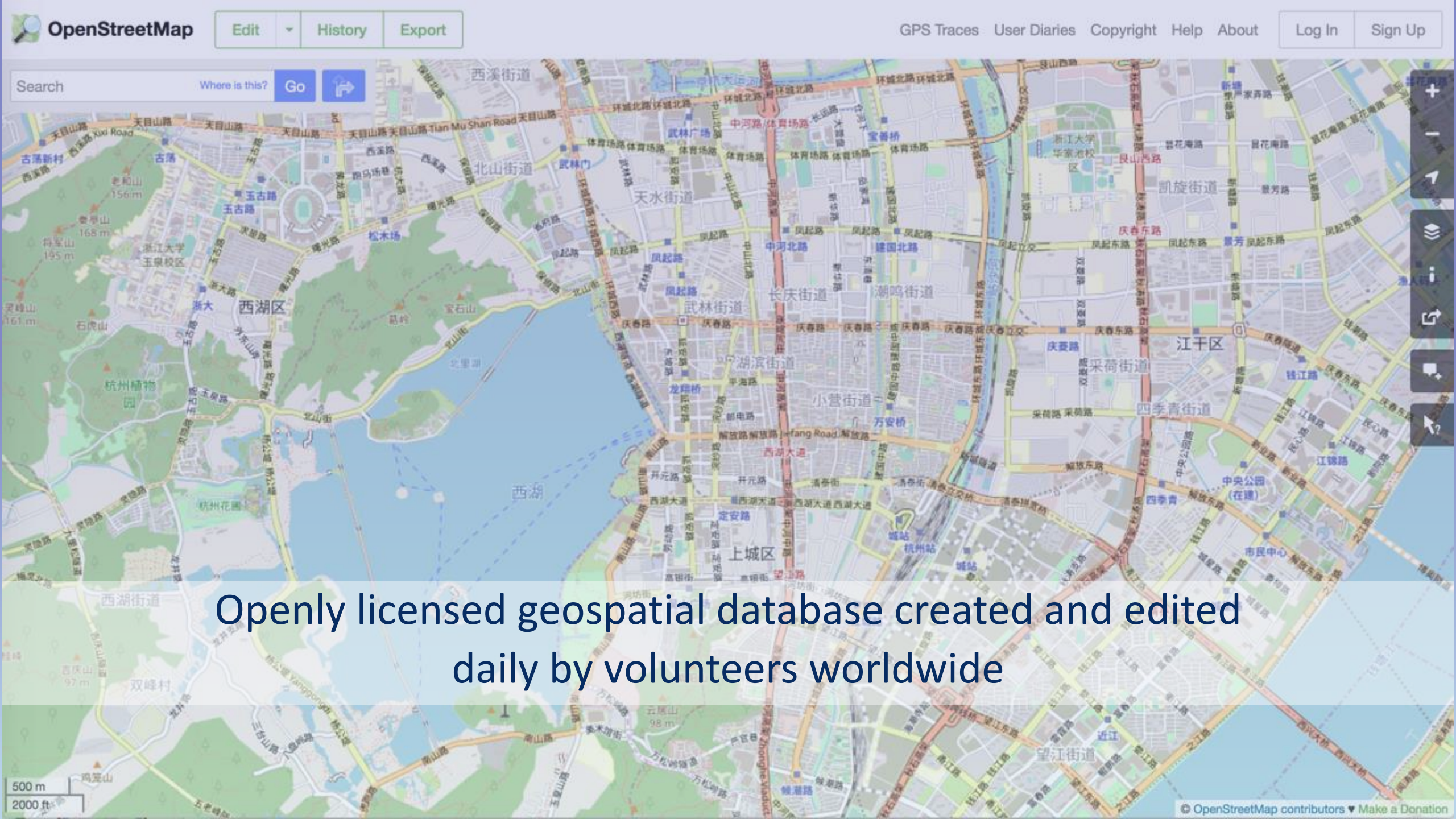
Introduction

- 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…


OpenStreetMap
Edit
History
Export
GPS Traces
User Diaries
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About
Log In
Sign Up
Search
Where is this?
Go
Openly licensed geospatial database created and edited daily by volunteers worldwide
500 m
2000 ft
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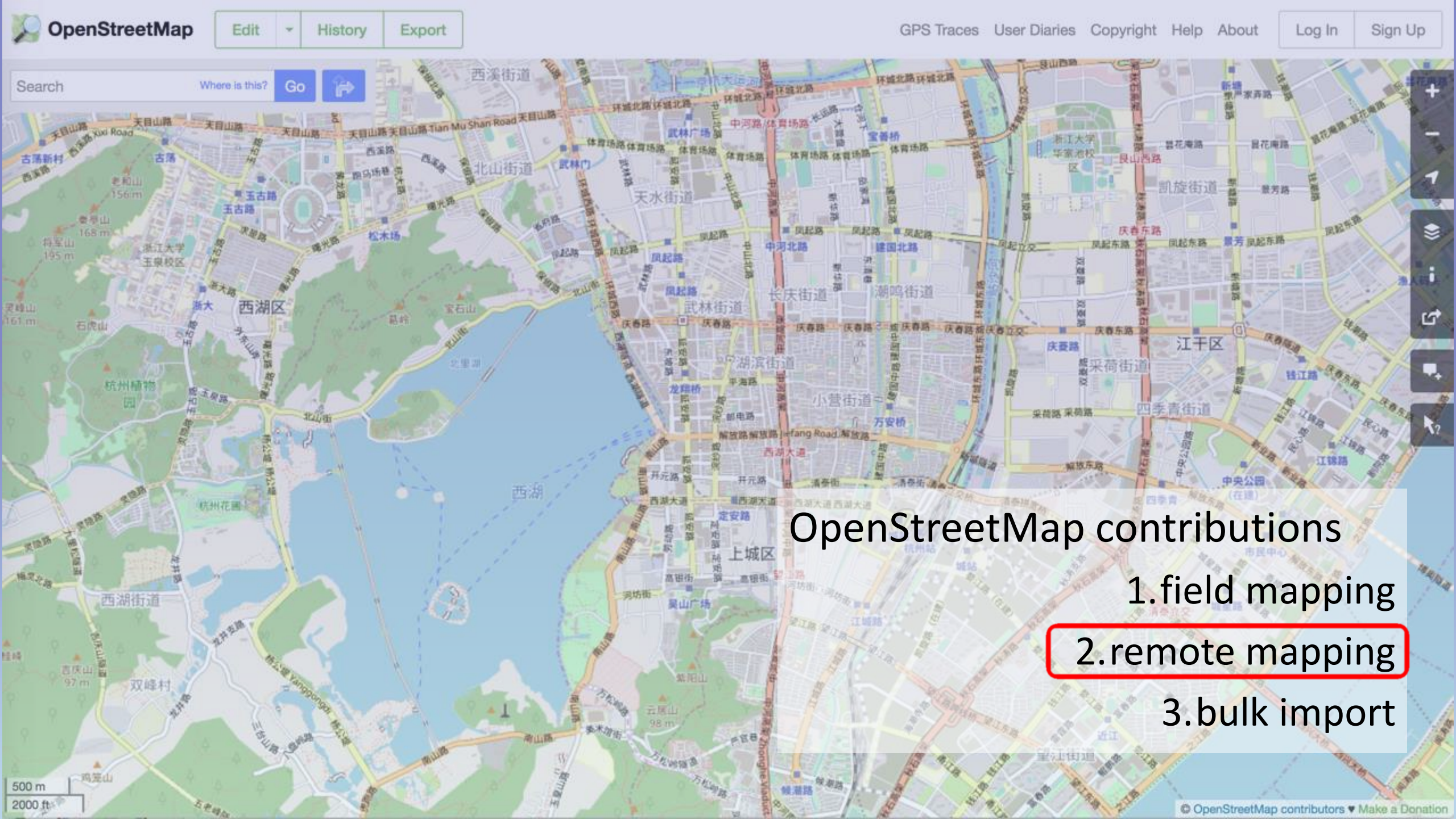
OpenStreetMap
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User Diaries
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Log In
Sign Up
Search
Where is this?
Go
OpenStreetMap contributions
1.field mapping
2.remote mapping
3.bulk import
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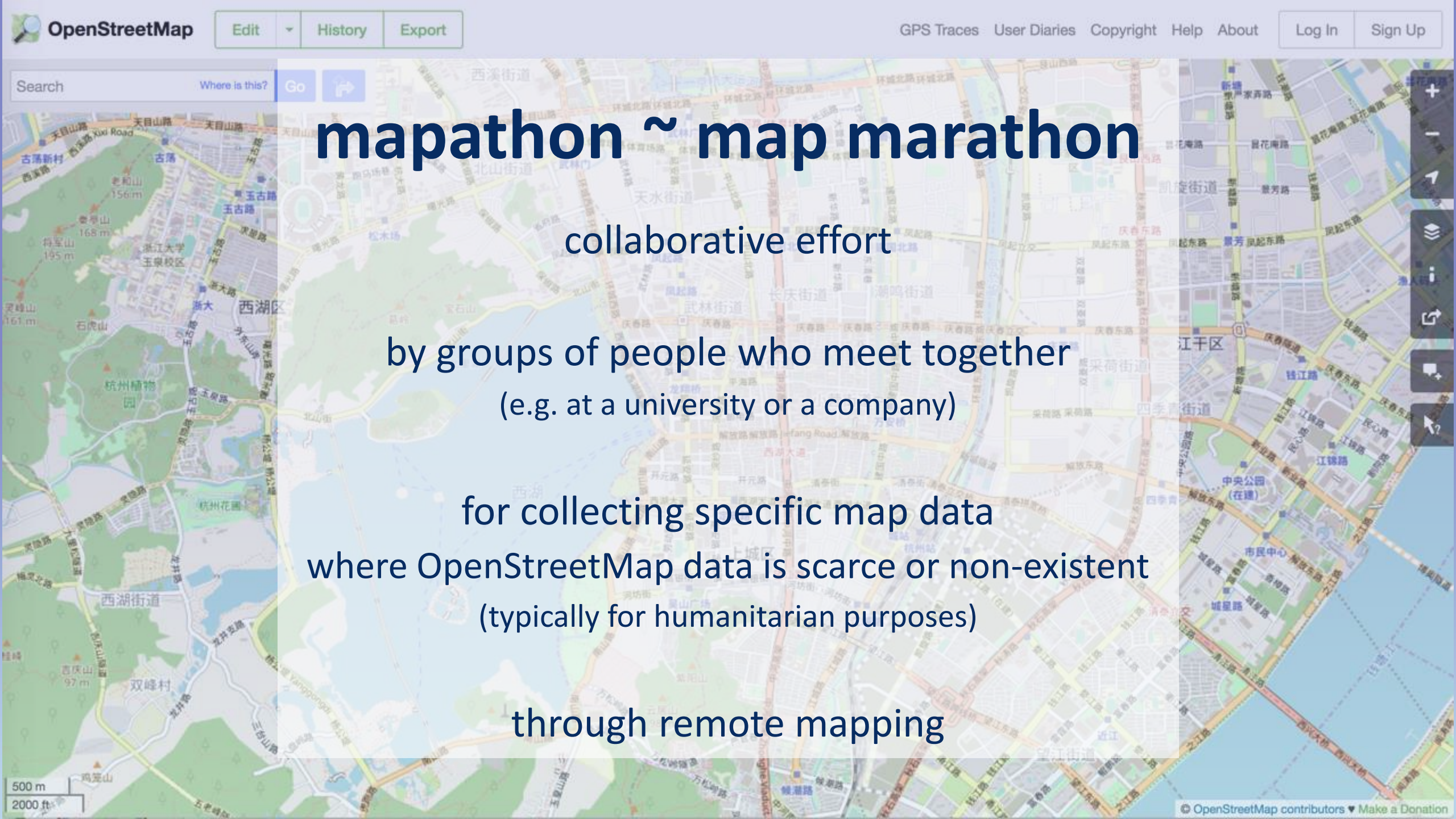
OpenStreetMap
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Sign Up
Search
Where is this?
Go
mapathon ~ map marathon
collaborative effort
by groups of people who meet together
(e.g. at a university or a company)
for collecting specific map data
where OpenStreetMap data is scarce or non-existent
(typically for humanitarian purposes)
through remote mapping
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2000 ft
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Supports university efforts to offer meaningful global learning experiences,

build a socially engaged citizenry,

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STEP 1 STEP 2 STEP 3 STEP 4 STEP 5

Step 4: Trim Project

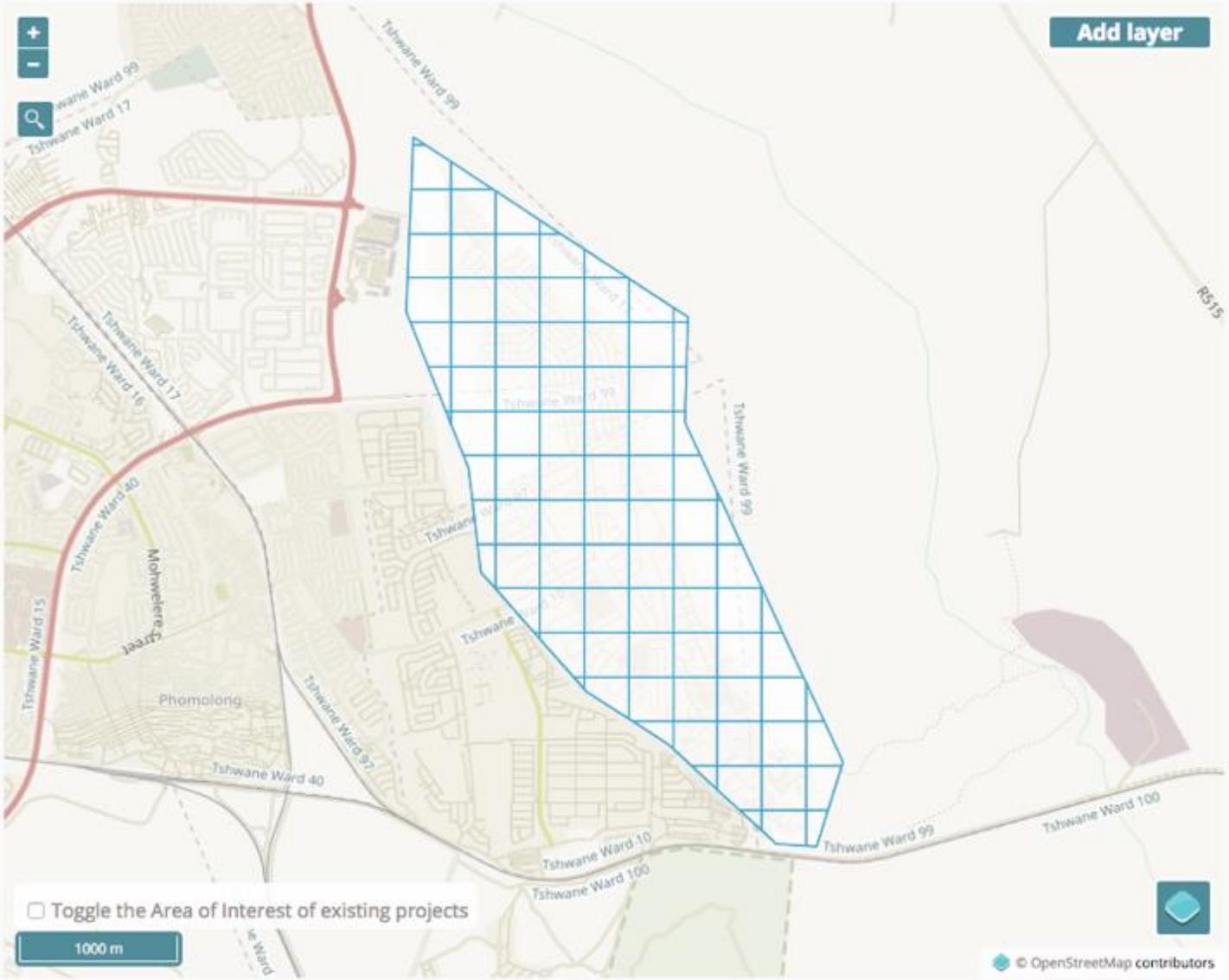
Trim the task grid to the Area of Interest (optional). You can keep task squares complete, or clip them to the AOI. This could take some time.

Clip tasks to Area of Interest

TRIM

NEXT

BACK TO PREVIOUS



Mapping

Get started by choosing your editor of choice.

iD Editor START 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

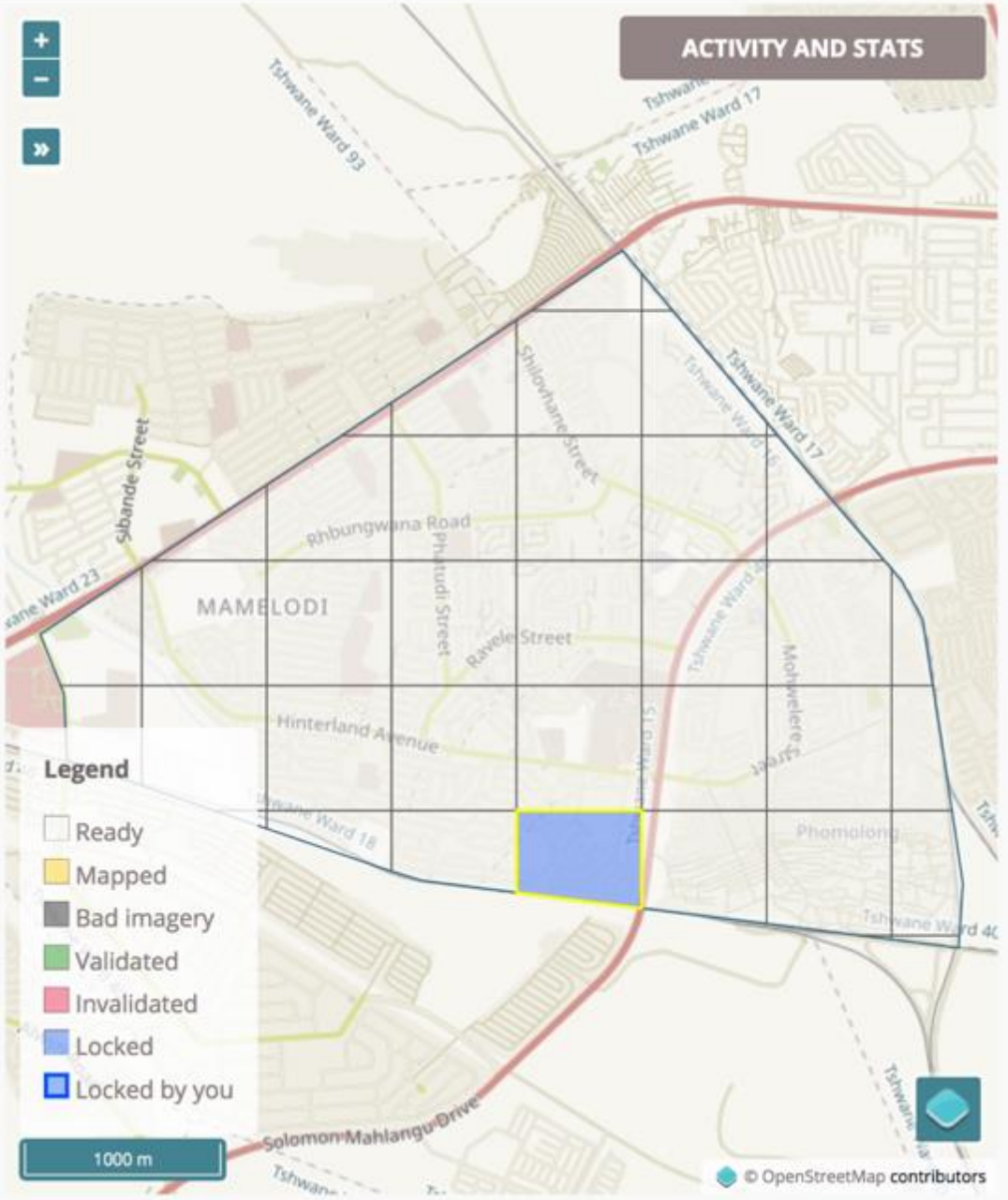
Leave a comment

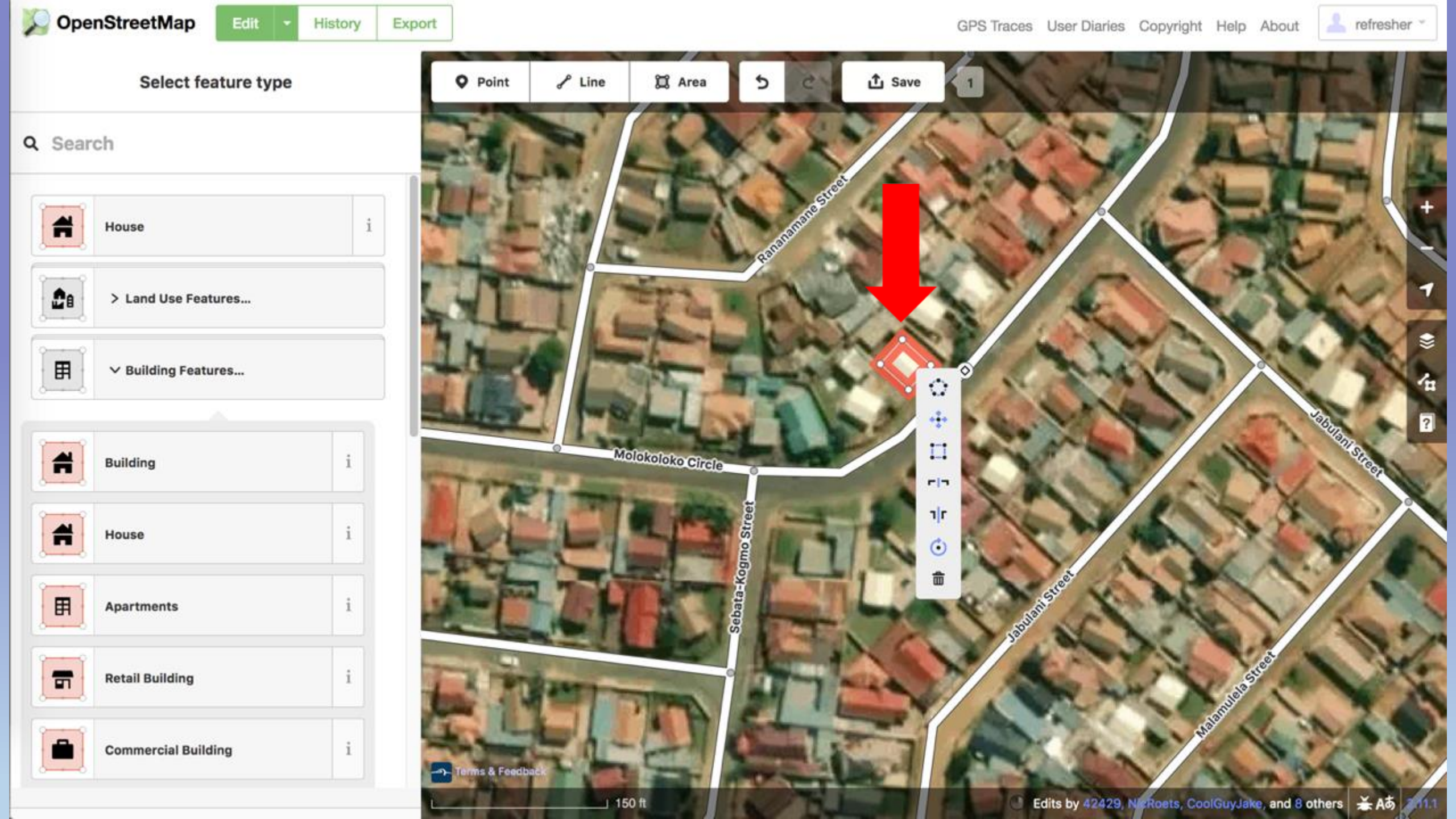
500 characters remaining

MARK AS COMPLETELY MAPPED

MARK AS BAD IMAGERY STOP MAPPING

History




OpenStreetMap
Edit
History
Export
GPS Traces
User Diaries
Copyright
Help
About
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Select feature type
Search
House
Land Use Features...
Building Features...
Building
House
Apartments
Retail Building
Commercial Building
Point
Line
Area
Save
1
Rananamane Street
Molokoloko Circle
Sebata-Kgomo Street
Jabulani Street
Jabulani Street
Malamulela Street
Terms & Feedback
150 ft
Edits by 42429, NickRoets, CoolGuyJake, and 8 others

youthmappers

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?

Global view | Zoom in | Zoom out | Pan | Measure area | Measure distance

Select the year of GlobeLand30

Years: 2010

Enter an envelope to select the data tiles

Tile | coordinate | Geometry

Tile numbers:

(For example: S51_20,S52_20)

Preview | submit

Results

Layers

Base map

- MapWorld Vector
- MapWorld Imagery
- MapWorld Annotation
- CGLC MapSheet

GLC30-2010

- All classes
- Water bodies
- Wetland
- Artificial Surfaces
- Cultivated land
- Permanent snow and ice
- Forests
- Grasslands
- Shrublands
- Bareland
- Tundra

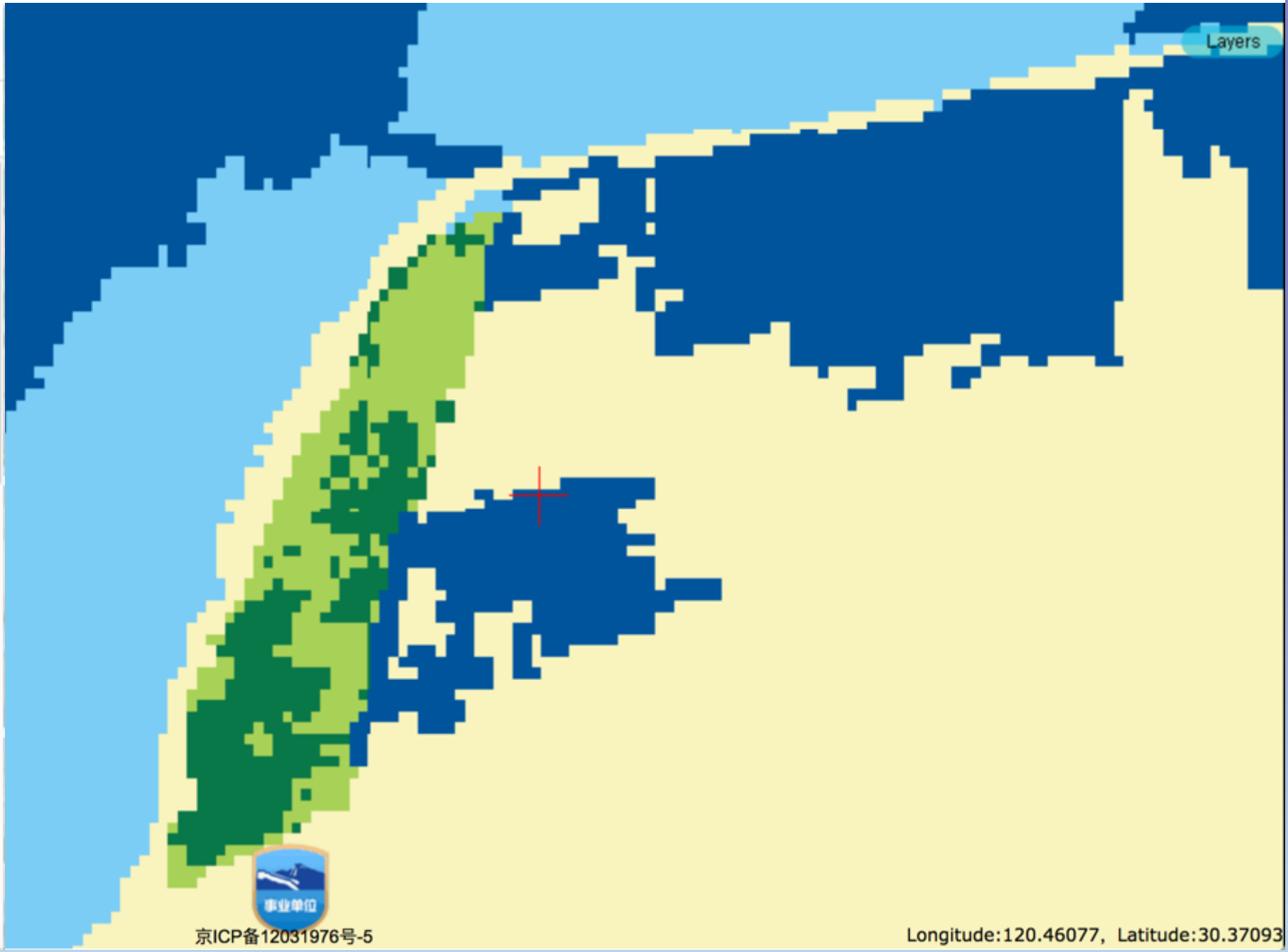
Cultivated land | Forest
Grasslands | Shrublands
Wetland | Water bodies
Tundra | Artificial Surfaces
Bareland | Permanent snow and ice

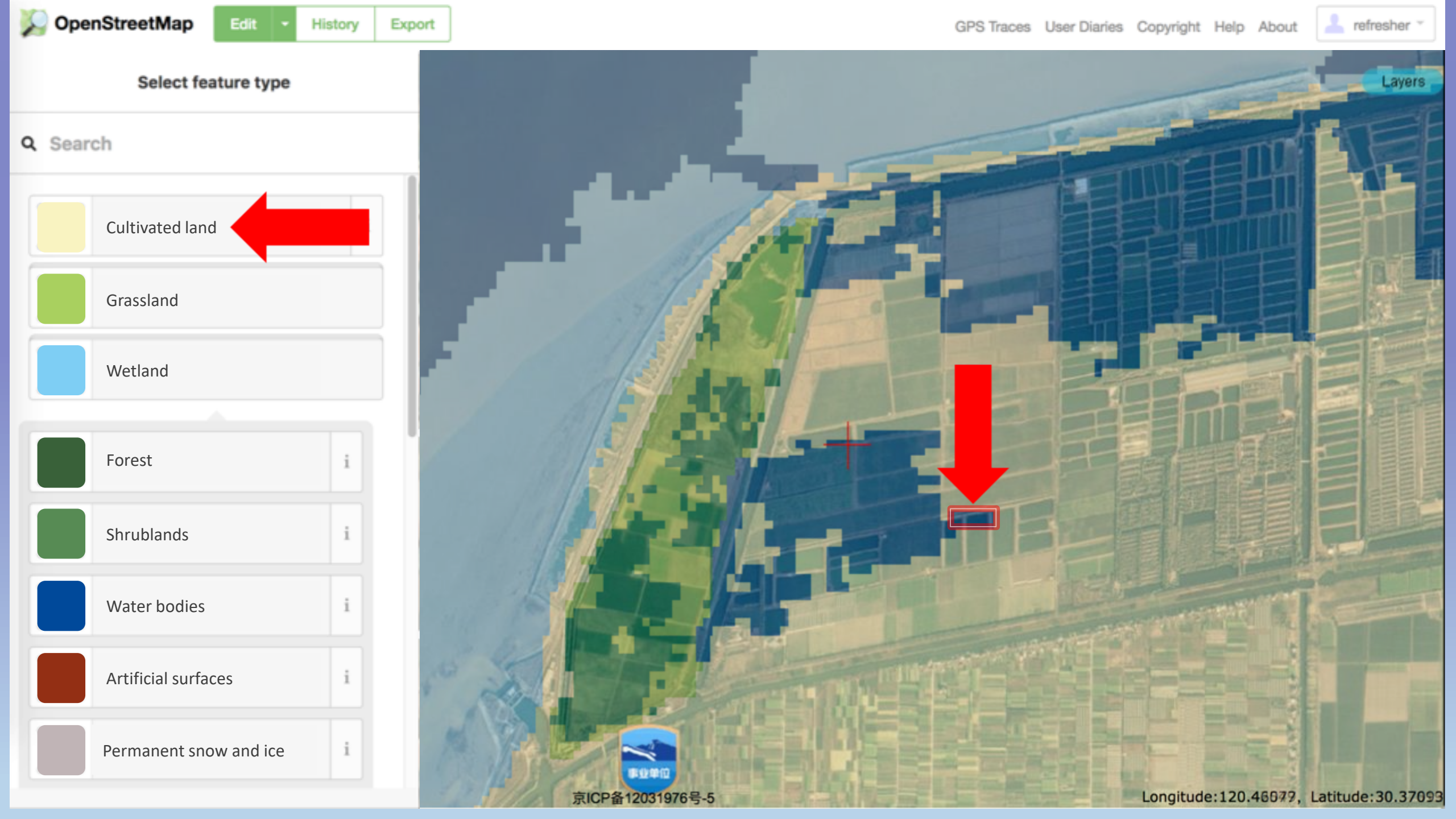
Longitude:120.42553, Latitude:30.37278

Select feature type

Search

- Cultivated land
- Grassland
- Wetland
- Forest
- Shrublands
- Water bodies
- Artificial surfaces
- Permanent snow and ice




OpenStreetMap
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refresher
Select feature type
Search
Cultivated land
Grassland
Wetland
Forest
Shrublands
Water bodies
Artificial surfaces
Permanent snow and ice
Layers
京ICP备12031976号-5
Longitude:120.46077, Latitude:30.37093

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?

UN World Geospatial Information Congress

Questions, Comments and suggestions