

China's Global Land Cover Mapping at 30 M Resolution

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Lisbon, Portugal , May 28, 2015

GlobeLand30 Video

?



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Introduction

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POK_based operational mapping

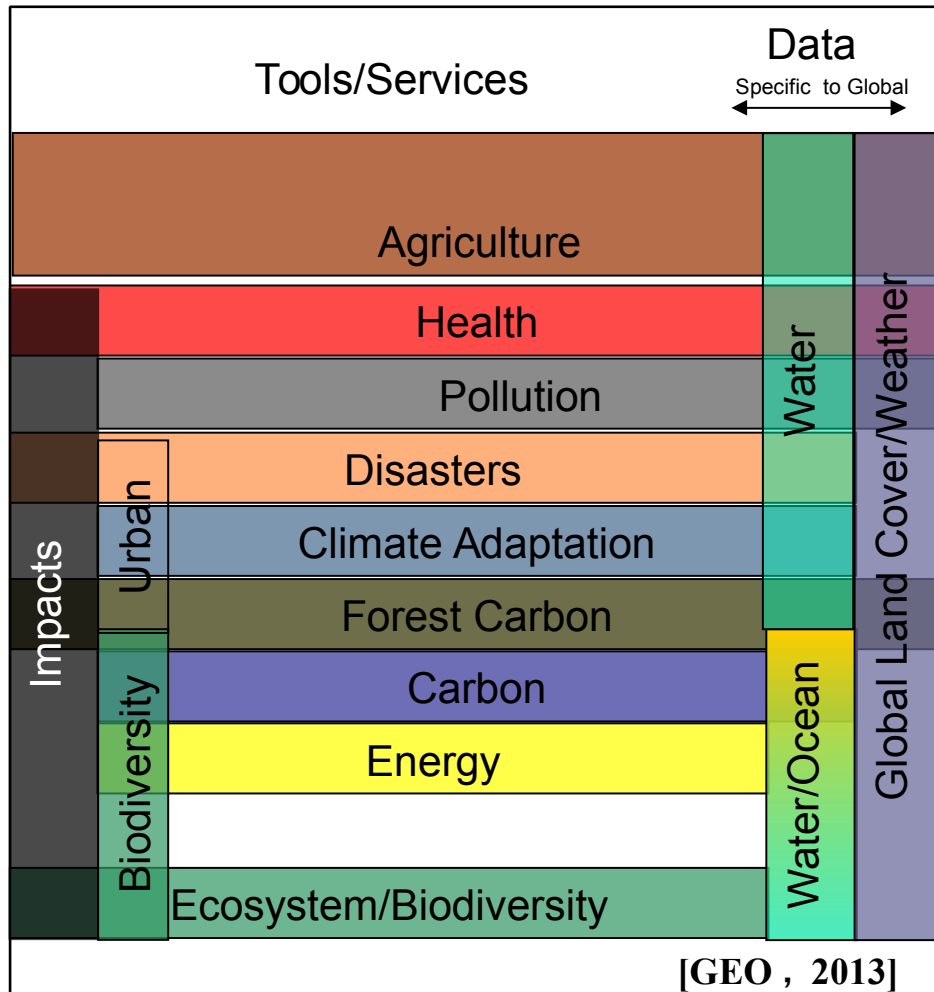
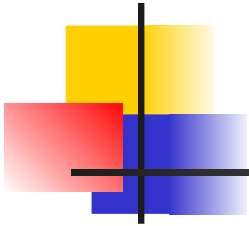


Data product and service



Further works

Land Cover and Change Information



- Natural attributes /characteristics of a variety of material types covering the surface of the globe

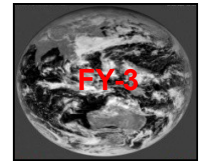
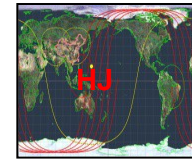
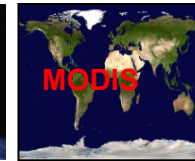
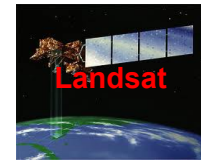
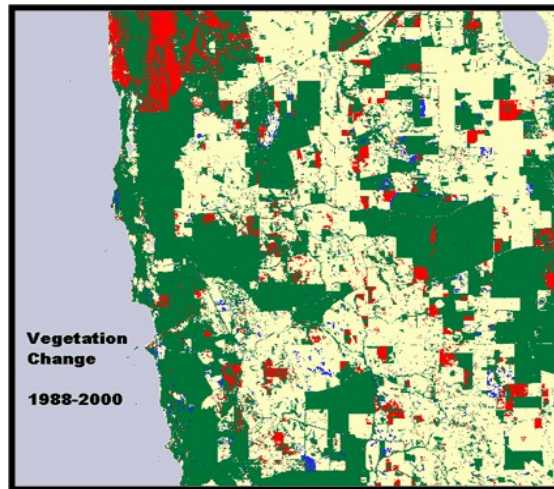
- Requested by all the nine SBAs as identified by GEO

Global Land Cover Data Products

Level	Data Products	Spatial Resolution	Temporal Resolution
Global	USGS	1km	One year
	UMD	1km	One year
	BU	1km	One year
	GLC2000	1km	One year
	GLC2005	300m	One year
Regional	EU- Corine	1:100,000/ 100m	
National	USGS	30m	
	China	30m	
	Spain		
...			

- Coarse spatial and temporal resolution
- Low spatial accuracy and consistency

Global Land Cover Mapping at 30 m Resolution



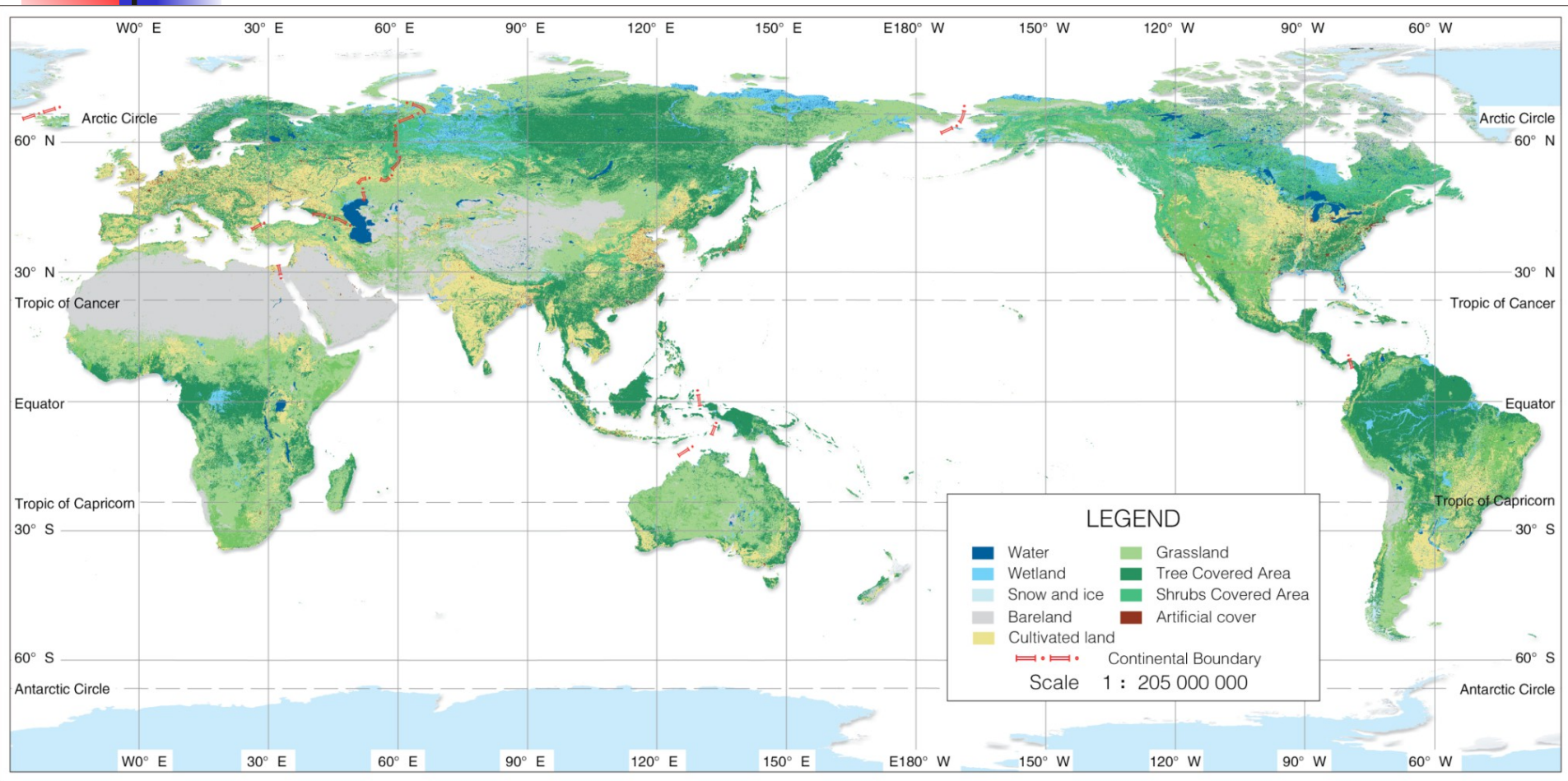
30m Imagery
(2000)

30m Imagery
(2010)

Image
classification

GlobeLand30
(2000/2010)

GlobeLand30- 30m Global Land Cover Data Sets



Chen Jun, et.al., 2014, China: Open access to Earth land-cover map, Nature, 514:434, 23 Oct. 2014



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POK_based operational mapping



Data product-GlobeLand30



Further works



Experiential/ Operational Mapping

Experimental and operational classifications are two different approaches for large area land cover mapping and monitoring (Hansen and Loveland, 2012).

Experimental : development and performance testing of **novel algorithms and models**

Operational : development and delivery of **reliable data products** within a pre-defined time schedule.

Challenges raised by the Global Scale

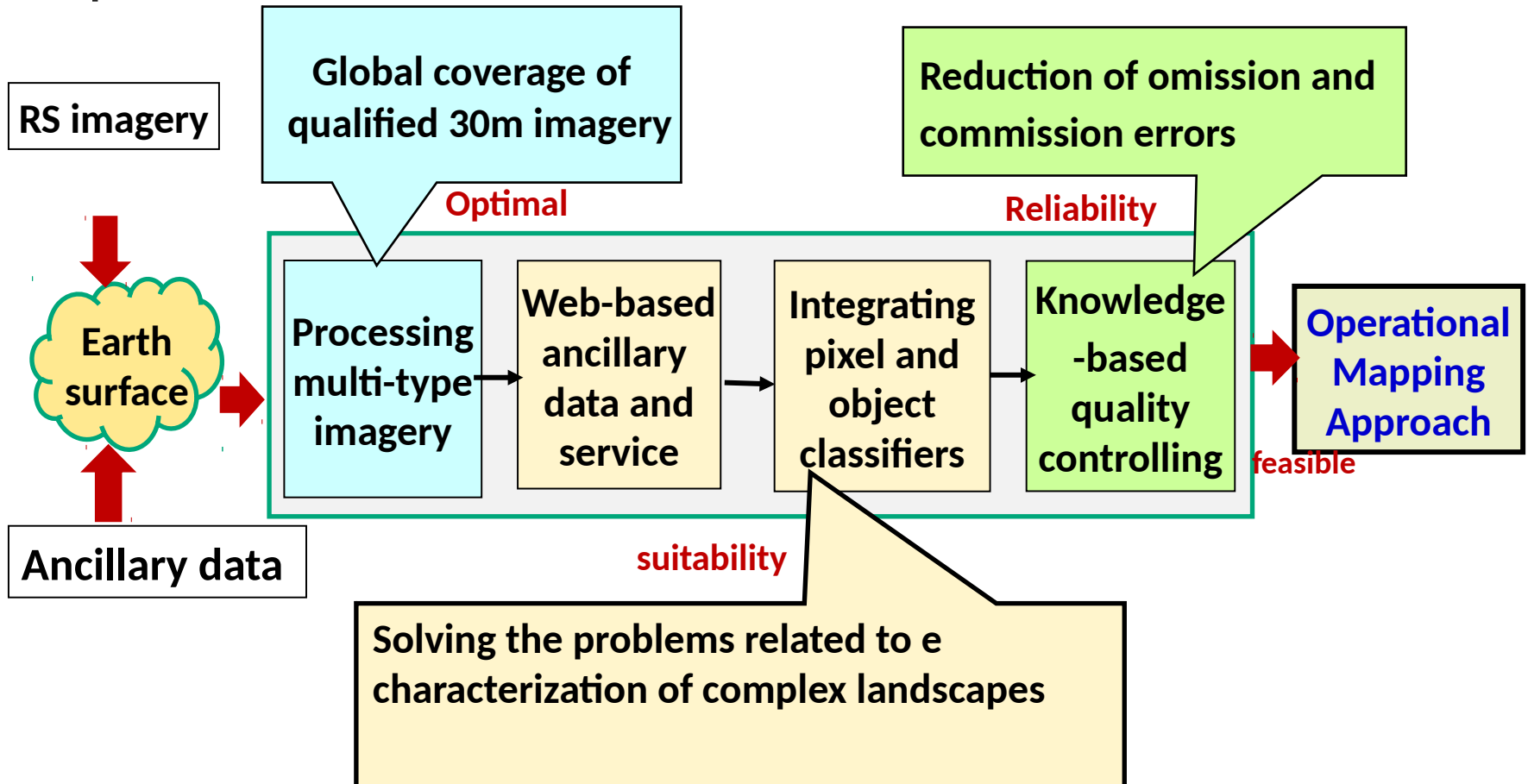
30m GLC mapping project

- Data products for 2010 and 2000
- 2010.1- 2013.12

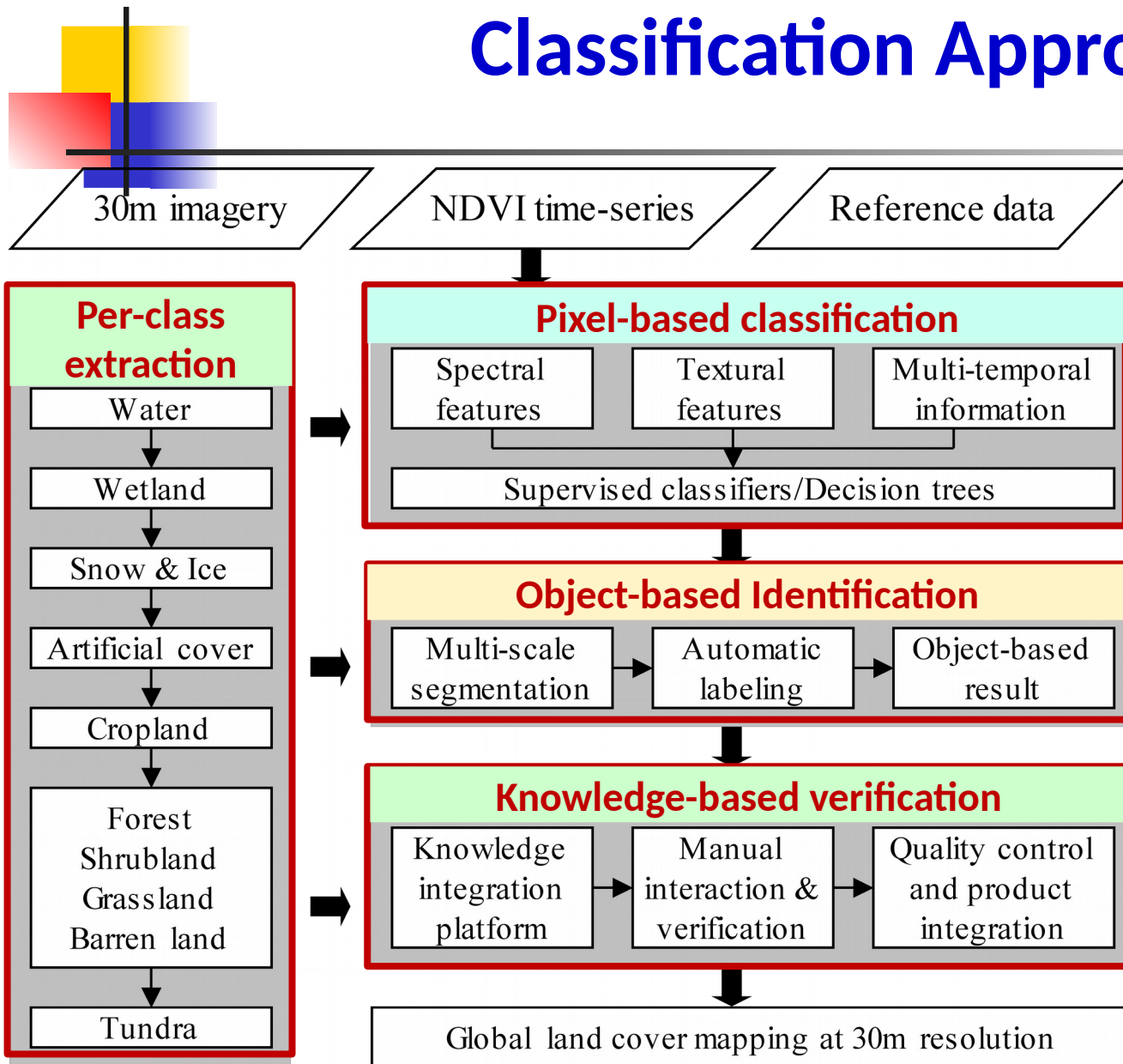
Three Major Challenges from Global Scale

	Local Scale	Global Scale	Major Challenges
Data Acquisition	<ul style="list-style-type: none"> Easy access of remotely sensed data with full coverage 	<ul style="list-style-type: none"> Difficult access of remotely sensed data with global coverage 	<p>1. Geometric and radiometric reconstruction for global 30m imagery coverage</p> <p>2. Appropriate classifiers for handling spectral confusion and diversity</p> <p>3. Assurance of data product quality</p>
Data Processing	<ul style="list-style-type: none"> Consistent acquisition season, being easy for geometric and radiometric correction 	<ul style="list-style-type: none"> Various acquisition season, arising difficulty in geometric and radiometric correction 	
Land Cover Classification	<ul style="list-style-type: none"> Single classifier is enough 	<ul style="list-style-type: none"> Single classifier is not widely applicable 	
Sampling and Validation	<ul style="list-style-type: none"> Low cost for acquiring training and test samples 	<ul style="list-style-type: none"> High cost for sampling, and samples are generally incomplete 	
Classification scheme	<ul style="list-style-type: none"> Available scheme could be selected from existing schemes under specific requirement 	<ul style="list-style-type: none"> Not only satisfy the requirement of global change research, but also be crosswalkable to existing schemes 	

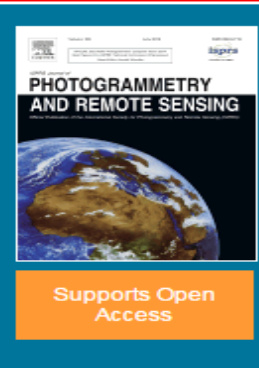
POK based Operational Approach



Integrating Pixel OK-based Classification Approach



- Decomposing into per-class classification and then integrating the results
- Combining computer classification and expert knowledge for handling spectral confusion and diversity across the globe



ISPRS Journal of Photogrammetry and Remote Sensing

Official Publication of the International Society for Photogrammetry and Remote Sensing (ISPRS)

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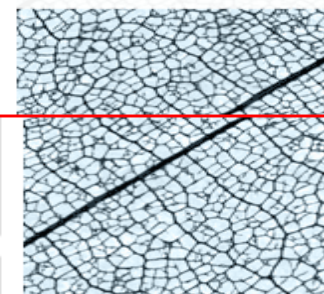
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Chen et.al., ISPRS J., 2015(6)

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Jun Chen | Jin Chen | ...



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Data product and service



Further works





Four Characteristics

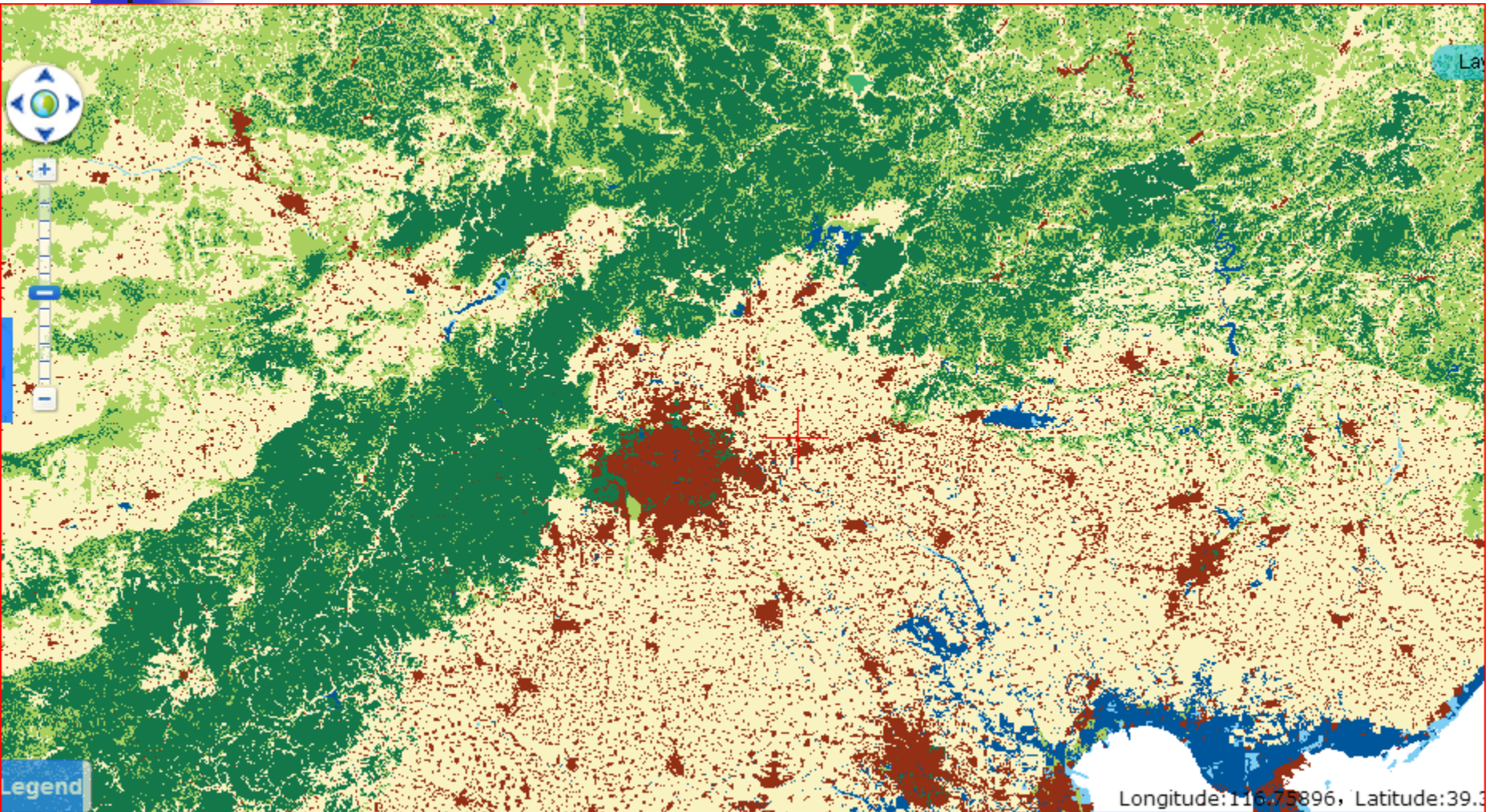
- **Spatial resolution: 10 times higher**
- **Temporal dimension: 2000/2010**
- **Accuracy: 83% given by 3rd party**
- **Open Access: donated to UN and**
...

1st 30m Global Land Cover Data Product

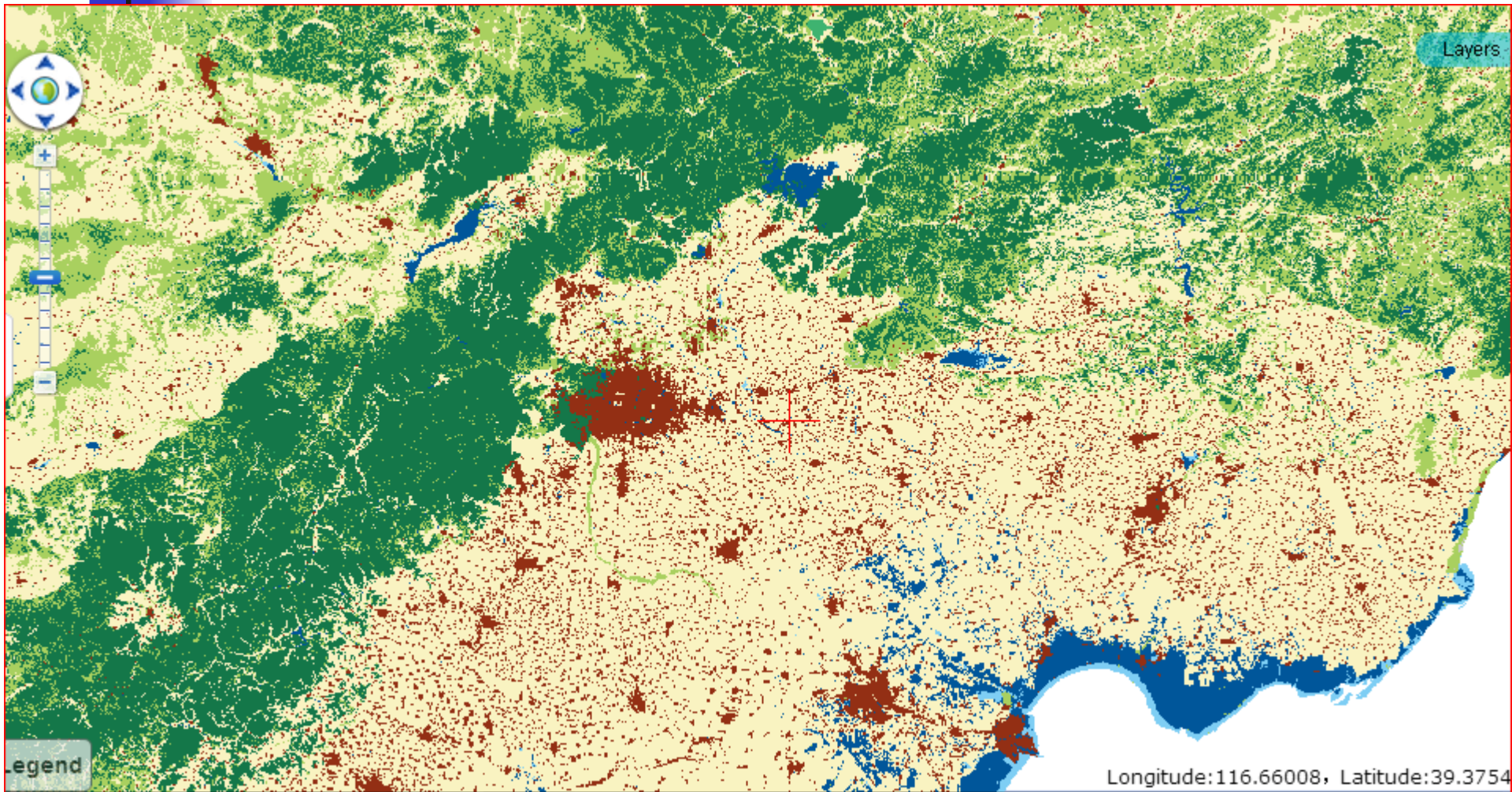
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	GLC2005	300m	One year
	GlobeLand30	30m	2000/2010
Regional	EU- Corine	1:100,000/ 100m	
National	USGS	30m	
	China	30m	
	Spain		
		...	

30m permits detection of land change at the scale of most human activity [Loveland, 2010]

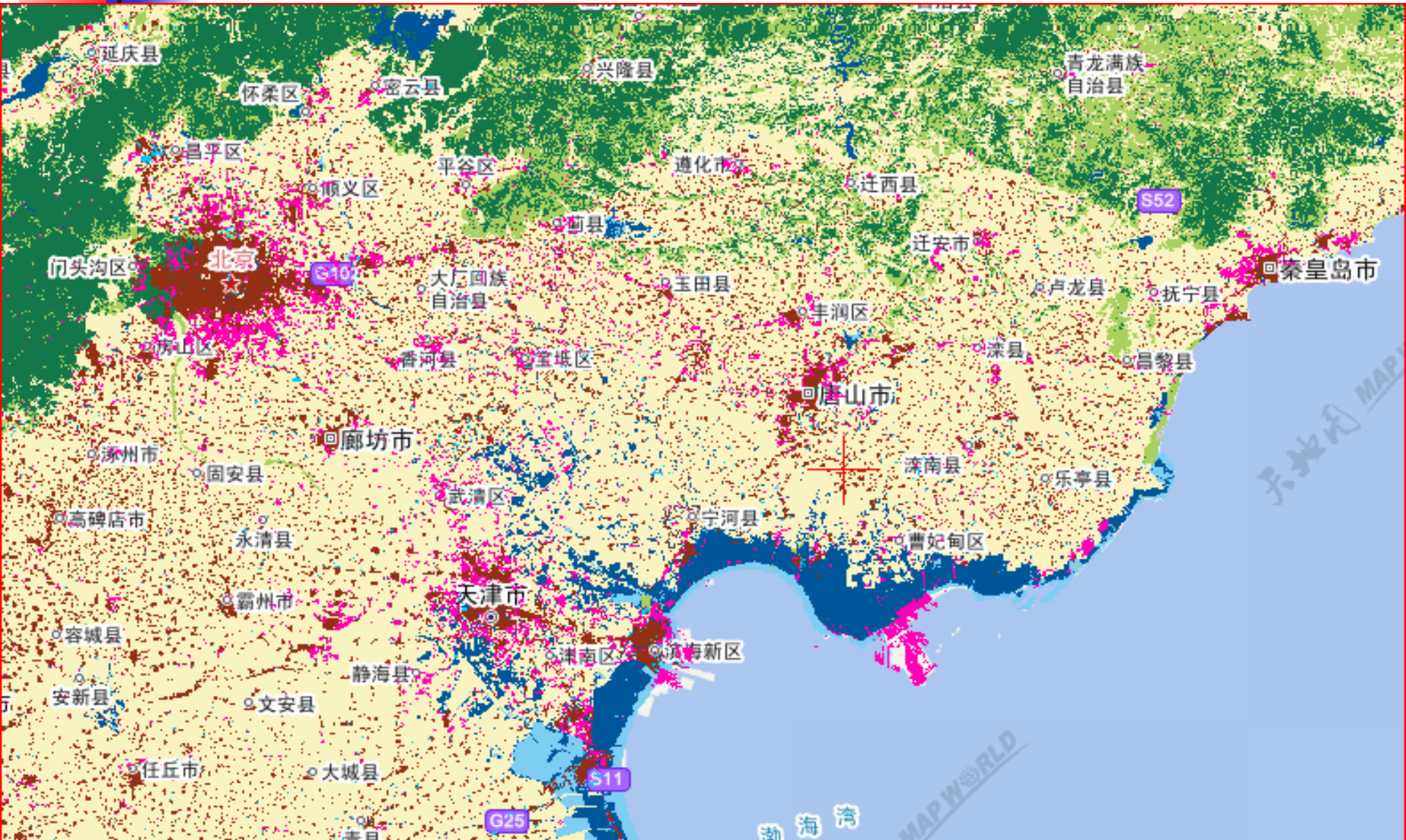
Beijing- 2010



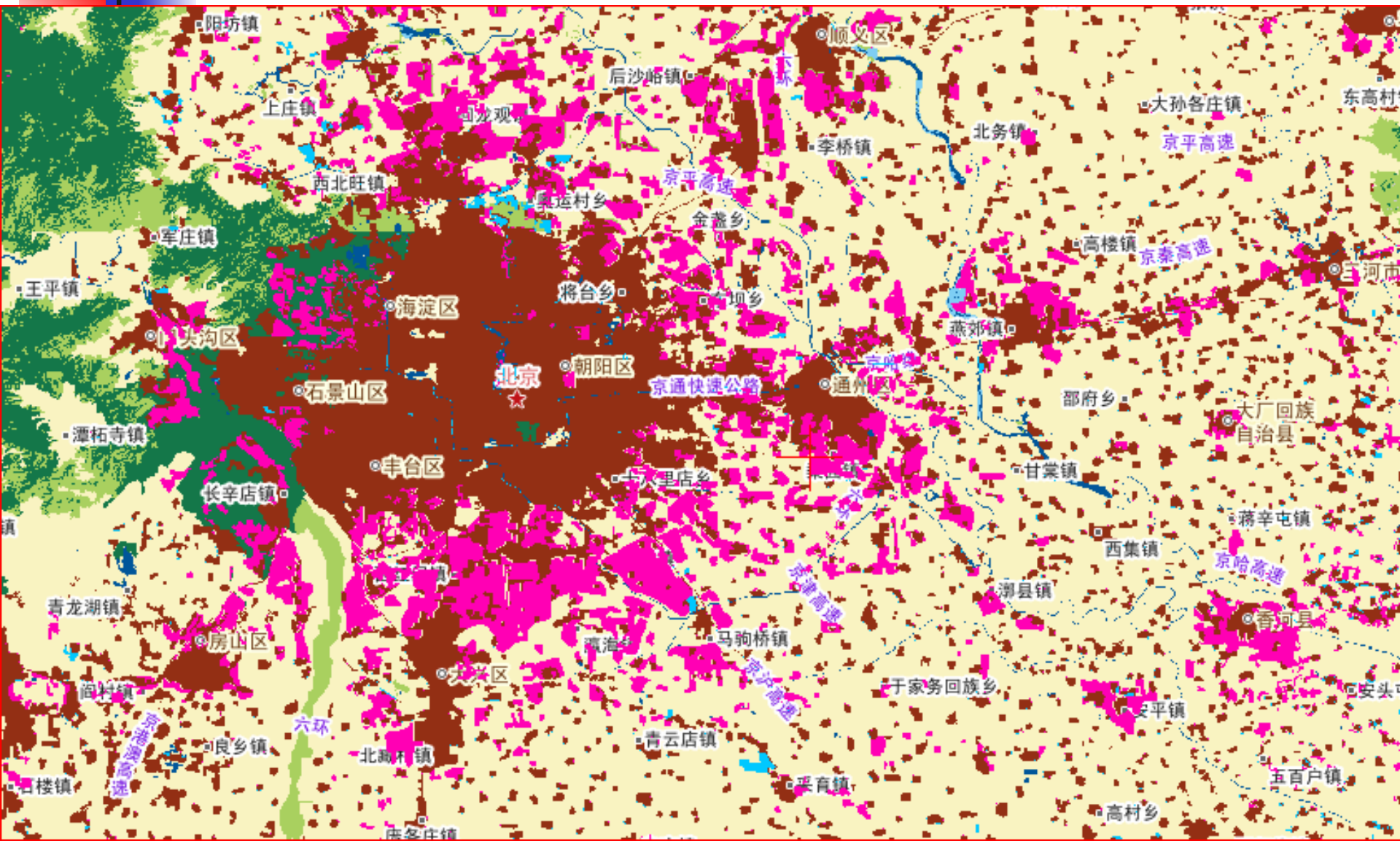
Beijing- 2000



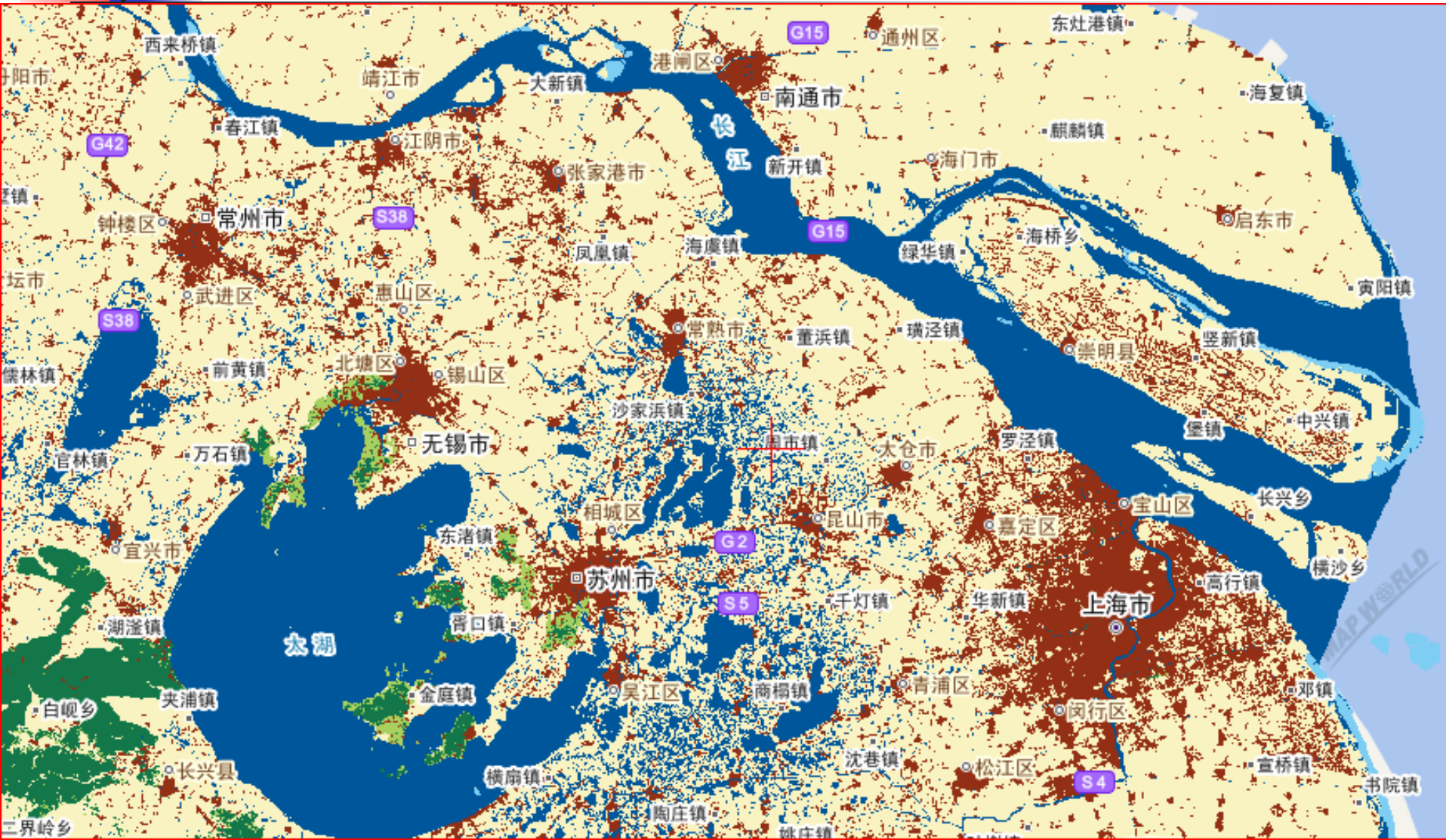
Beijing-2000+10



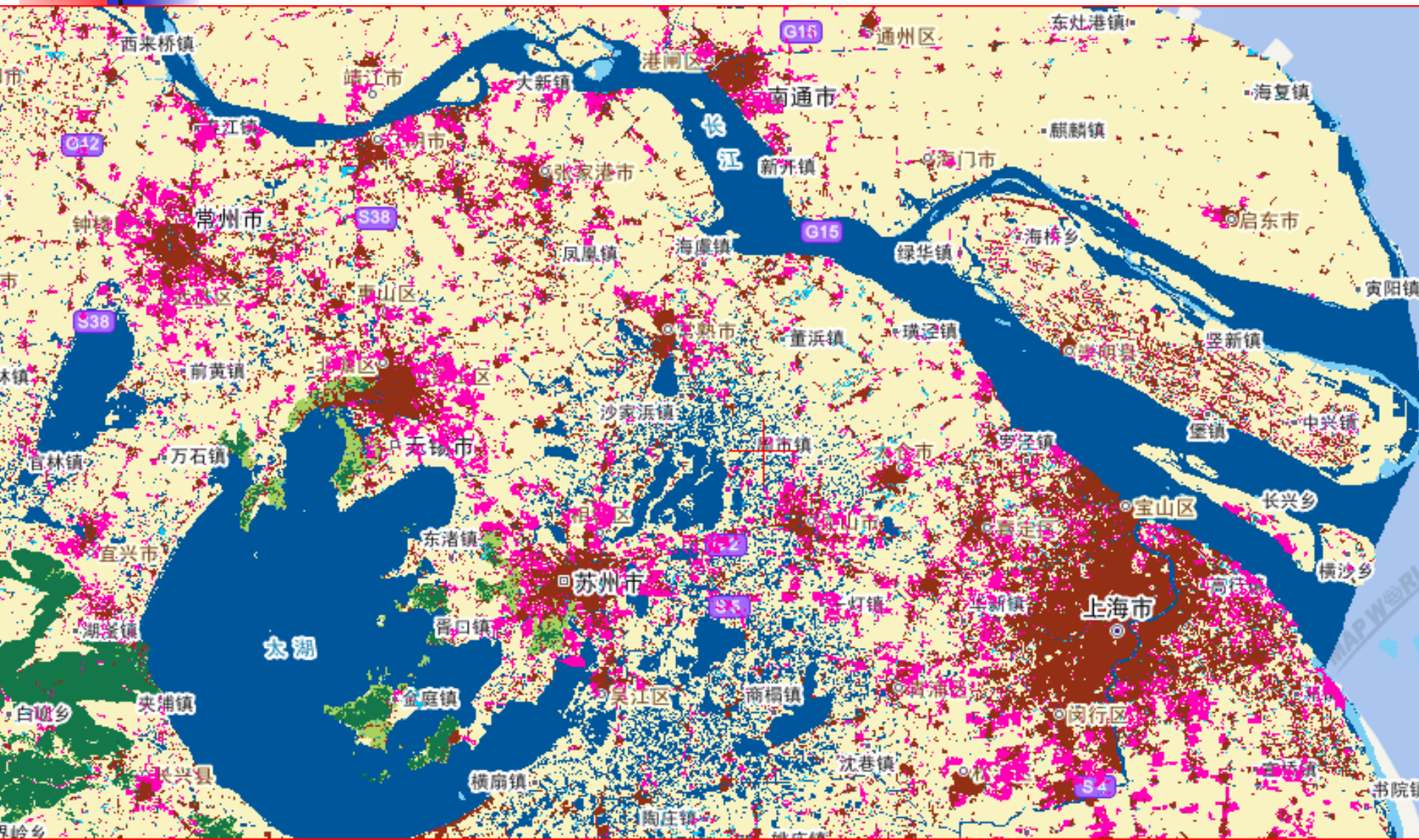
Beijing - 2000+10



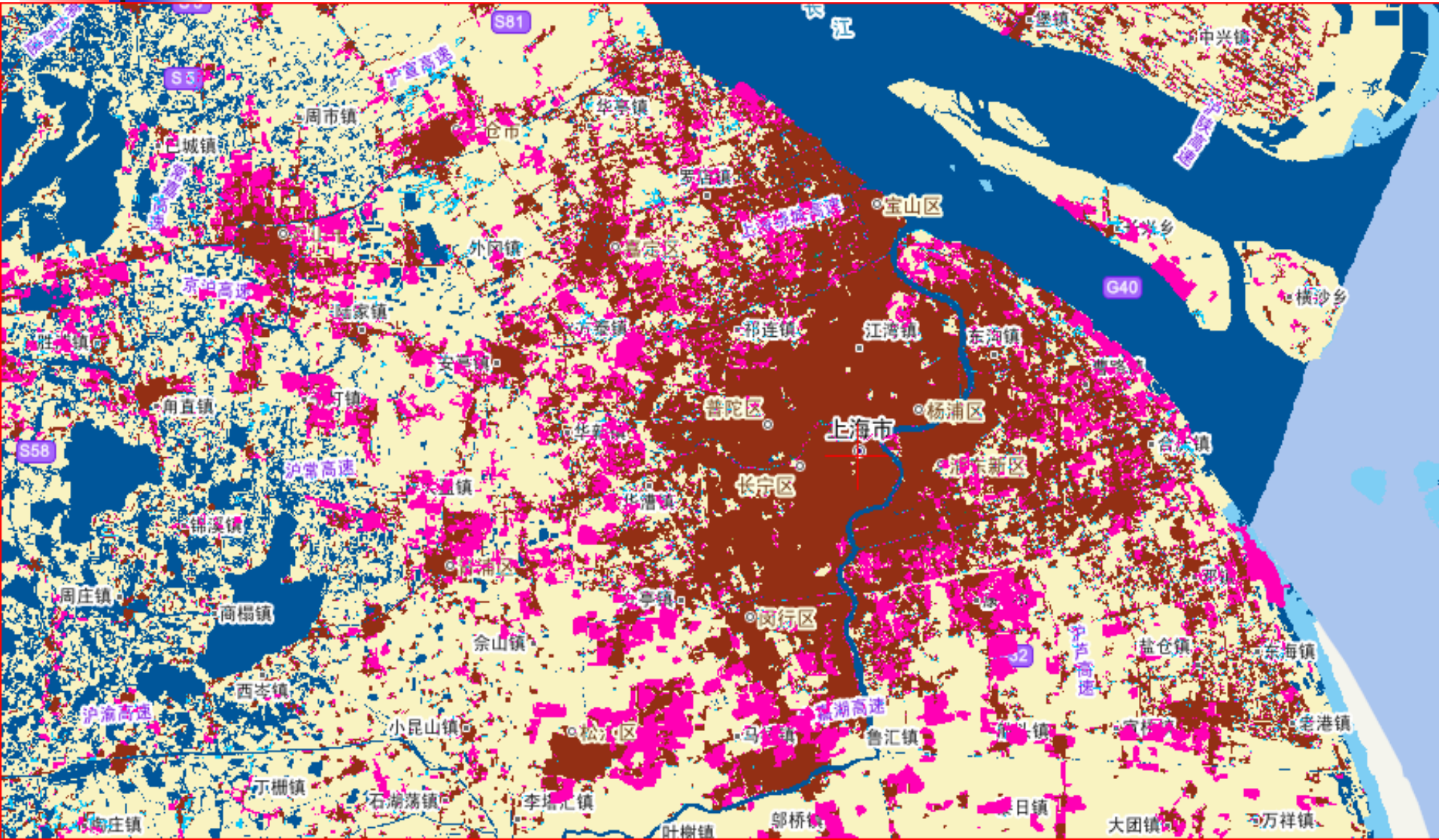
Shanghai - 2000



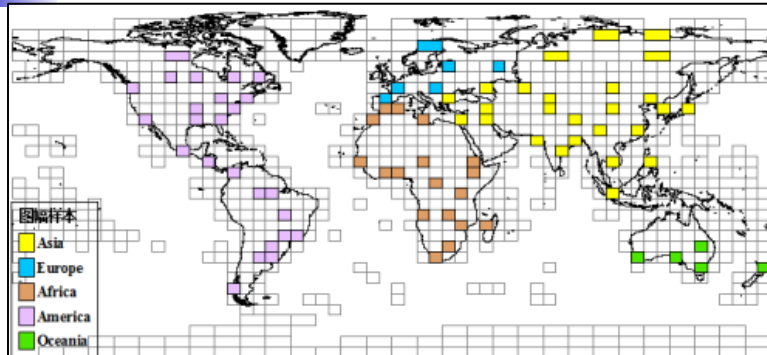
Shanghai - 2000+10



Shanghai - 2000+10

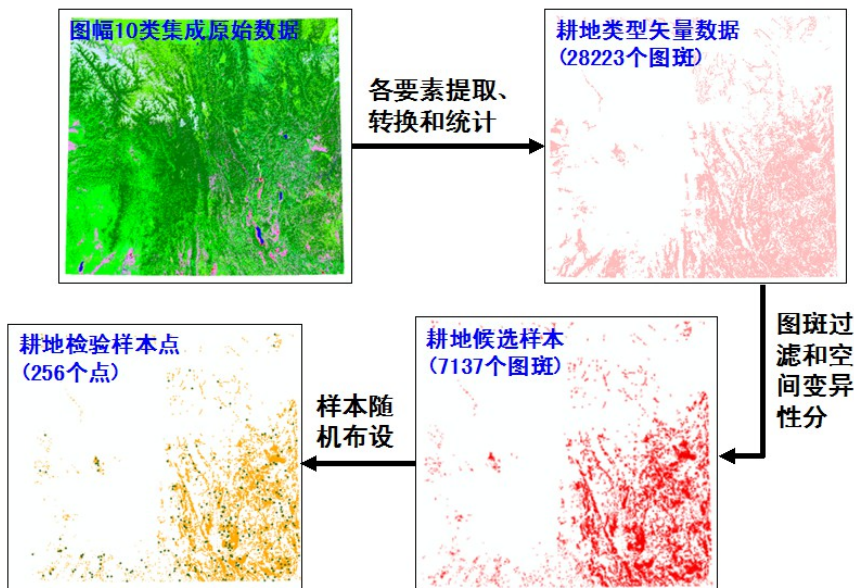


Accuracy Assessment



Map sheets and smapling

- Map sheets selected: 80
- Total samples: 154,070



Region	Map sheet s	smaple s
Asia	26	60165
Europe	6	12792
Africa	18	25656
Americ a	25	45822
Oceani c	5	9635
Total	80	154070

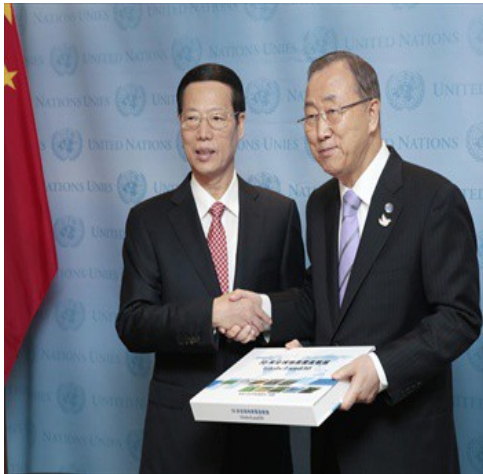


Accuracy Assessment

	2010		
Class	User acc.	Area %	Total accur.
croplands	83.06%	0.1619	83.50% ±0.18%
forest	89.00%	0.0174	
grass	76.88%	0.2910	
shrub	72.52%	0.0869	
wetland	79.63%	0.0340	
water	92.09%	0.0264	
artificial	86.97%	0.0100	
bareland	77.33%	0.1830	
Ice	75.86%	0.0203	

Donated to United Nations

Sept.22 2014, New York, donation ceremony of GlobeLand30



UN SG Ban Ki-moon said:

- The World needs solid, science-based information for making wise decisions for sustainable development.
- These detailed data sets will help us to better understand, monitor and manage changes in land cover and land use all over our planet

On Line Service

www.globeLand30.org

The screenshot displays the globeLand30.org web application interface. At the top, the browser address bar shows the URL www.globeLand30.org. The page header includes the "OPENLANDSERVICE" logo, navigation links for "GLC30", "Download", "Online Tagging", and "About", a "LOGIN" button, and a language selector for "简体中文".

The main interface features a world map with land cover data. The map is color-coded by land cover type, with a legend on the left side. The legend is organized into two sections: "Land Cover Types" and "Water bodies".

Land Cover Types:

- Water bodies: Represented by a blue wavy icon.
- Wetland: Represented by a green grass icon.
- Artificial Surfaces: Represented by a brown building icon.
- Tundra: Represented by a green grass icon.
- Permanent snow and ice: Represented by a white mountain icon.
- Grass lands: Represented by a green grass icon.
- Barren lands: Represented by a brown soil icon.
- Cultivated land: Represented by a green field icon.
- Shrub lands: Represented by a green tree icon.
- Forests: Represented by a green tree icon.

Water bodies:

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

The map interface includes navigation tools such as "Global view", "Zoom in", "Zoom out", "Pan", "Measure area", "Measure distance", and "Split screen". A search bar is located in the top right corner. The map shows various countries and regions, with a red crosshair indicating the current location. The coordinates at the bottom right are Longitude: 64.58750, Latitude: -12.95051.

Nature Published a Letter

(514:434, 23 Oct. 2014)

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NATURE | CORRESPONDENCE

China: Open access to Earth land-cover map

Chen Jun, Yifang Ban & Songnian Li

Affiliations | Corresponding author

Nature **514**, 434 (23 October 2014) | doi:10.1038/514434c

Published online 22 October 2014

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Subject terms: Environmental sciences

China last month donated to the United Nations the first open-access, high-resolution map of Earth's land cover, as a contribution towards global sustainable development and combating climate change

The map, known as GlobeLand30, comprises data sets collected at 30-metre resolution — more than ten times that of previous data sets. These data sets will be valuable for monitoring environmental changes and for resource management at global, regional and local scales (see also M. A. Wulder and N. C. Coops *Nature* **513**, 30–31; 2014).

The GlobeLand30 data sets are freely available and comprise ten types of land cover, including forests, artificial surfaces and wetlands, for the years 2000 and 2010. They were extracted from more than 20,000 Landsat and Chinese HJ-1 satellite images (see www.globallandcover.com).

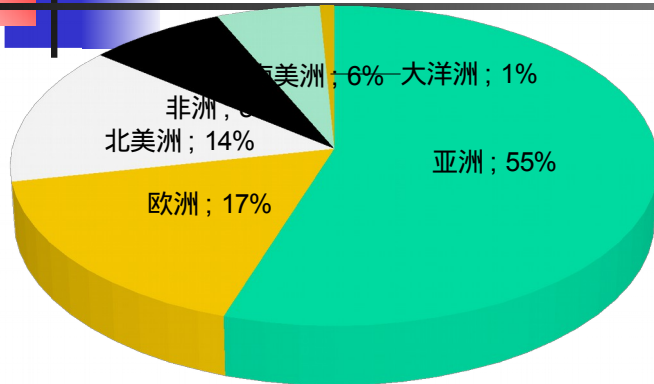
GlobeLand30 will promote scientific data sharing in the fields of Earth observation and geospatial sciences.

China: Open access to Earth land-cover map

- The map, known as GlobeLand30, comprises data sets collected at 30-metre resolution — more than ten times that of previous data sets.
- The GlobeLand30 data sets are freely available and comprise ten types of land cover, including forests, artificial surfaces and wetlands, for the years 2000 and 2010.

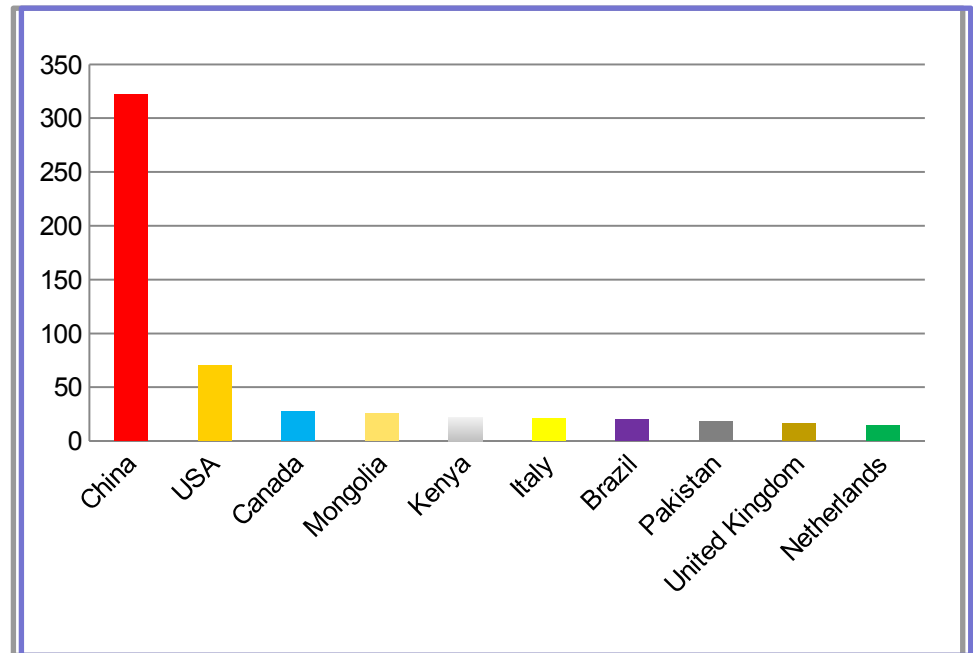
Academic Gastroenterologists |
Hepatologists
Greenville Health System

Downloading- Up to May 25, 2015



- More than 5000 users from 90 countries
- 120, 0,000 map sheets downloaded

国家	申请次数	下载次数
中国 China	322	7695
美国 USA	70	808
加拿大 Canada	27	537
蒙古 Mongolia	26	134
肯尼亚 Kenya	22	248
意大利 Italy	21	1241
巴西 Brasil	20	123
巴基斯坦 Pakistan	18	83
英国 UK	16	288
荷兰 Netherlands	15	562





Example of Users

Users	Name of Organisations
UN systems	FAO 、 UNEP 、 UN-Habitat 、 UNMIS) 、 UNDESA 、 ESCAP 、 UN Unit in Mali 、 UNESCO Islamabad,...
NGO	WWF 、 TNC, The Nature Conservancy) 、 Conservation International,...
GO	NASA GSFC 、 USGS 、 European Commission,...
Research institutes	JRC 、 DFZ 、 IIASA 、 INPE 、 Indian Institute of Science 、 Space Research Institute of Ukraine 、 IERSD/NOA,...
Universities	Harvard 、 Yale 、 Un. Maryland 、 Glombia Uni., ...



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POK_based operational mapping

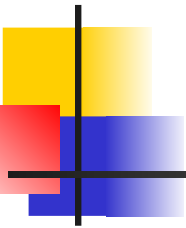


Data product and service



Further works

Supporting Post-2015 Agenda and Future Earth



Users

Future Earth/Post-2015 Agenda

- Ecolog accounting
- Dyna monitoring
- ...

Application

Measure

Monitoring

Manage

- Big data analysis
- Geospat statistics
- Open source software

Service

UN Service Platform

Data Service

Processing service

Push service

...

- Refinement
- Updating
- Validation

Data

GlobeLand30

...

- Integrating with
- Socio-economic
- environmental information

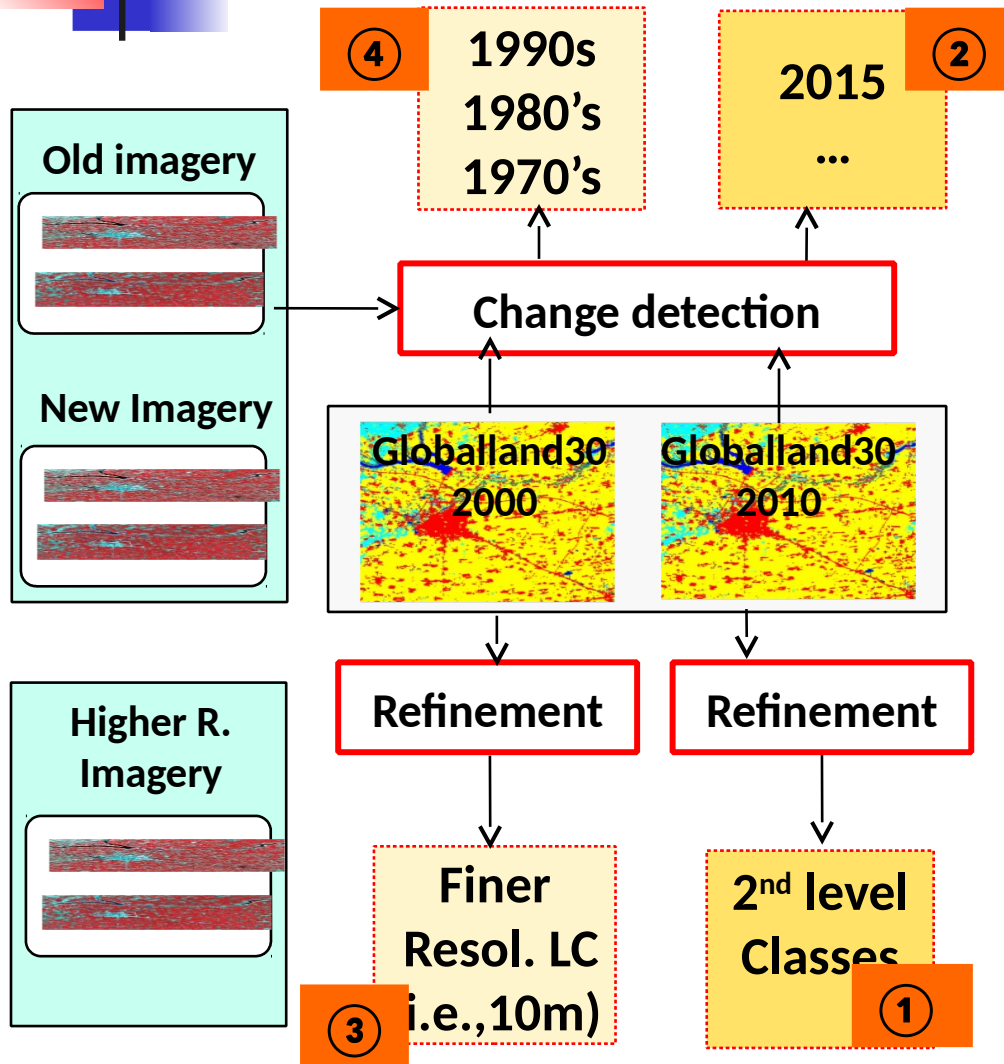
Supporting

Servers

...

Standards

Continuous Updating and Refinement



- ① 2nd level classification (for certain classes)
- ② Globalland30-2015
- ③ Finer resolution (10m) mapping (hot spot areas)
- ④ Historical mapping (backward)

A composite background image featuring a satellite in the upper left corner and a satellite view of the Earth's surface in the lower half. The top half has a light blue background with a faint grid pattern. The text is centered in the middle of the image.

Thanks for Your Attention!

www.globeLand30.org

chenjun@nsdi.gov.cn