

A satellite with solar panels is shown in orbit above a stylized Earth with a grid overlay.

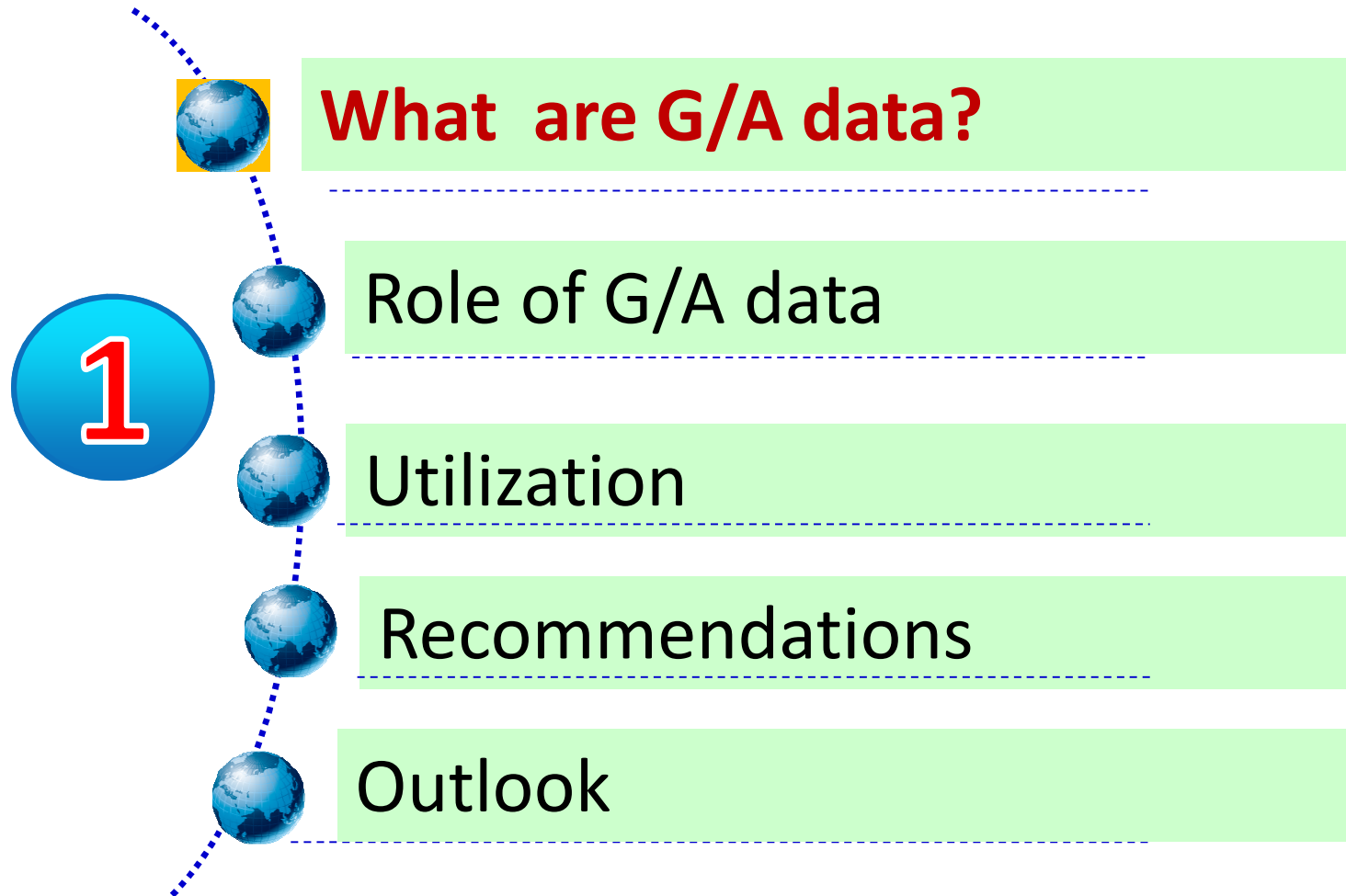
Global and Alternative Geospatial Data - Role and Utilisation

IAEG-SDGs WGGI Task Team

Dec. 7, 2017, New York

A satellite view of North America, showing the continent and surrounding oceans.

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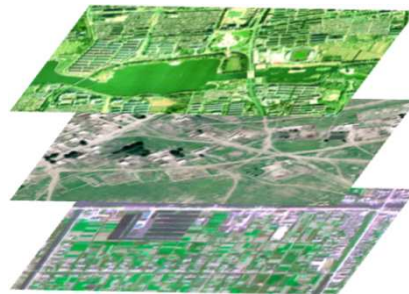


National Geospatial Data for SDGs

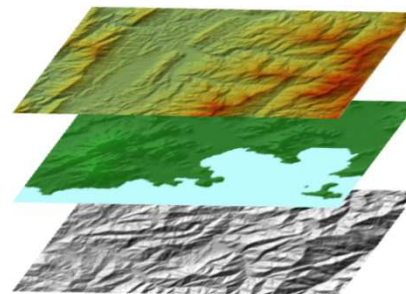
Official data products generated by authoritative agencies of a nation and covering the nation's territory, with a set of technical requirements (i.e., spatial resolutions, thematic accuracy and temporal periodicity)



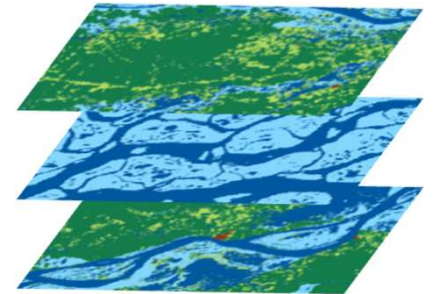
Maps



Imagery



DEM



Land Cover

- Some countries may have a shortage of these core data
- while some others might lack the requisite data capture capacities.

National Data: Topography

Topographic map is the most fundamental data, and a joint survey was completed by UN-GGIM and ISPRS in 2015.

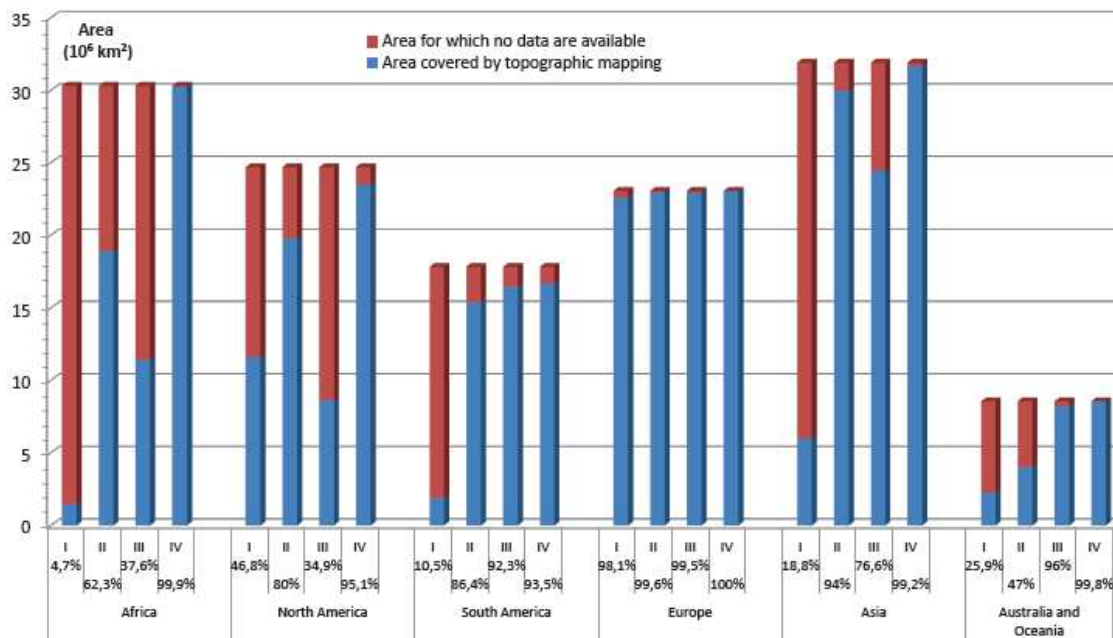


Chart 2: Area covered by topographic mapping on four scale ranges, by geographical region, 2012

Estimated global coverage

- 30% for 1:25,000 topographic map
- 75% for 1:50 000 mapping.

A number of countries are capable of updating their national topographic data at one- to two-year cycle, some other countries may be from 10 to 30 years old.

National versus Global/ Alternative Data

International (Global) Data

- Developed by international/national organizations and private companies
- Covering the whole earth or large regions
- May not collected by a national authority or a statistical institution

Alternative Data

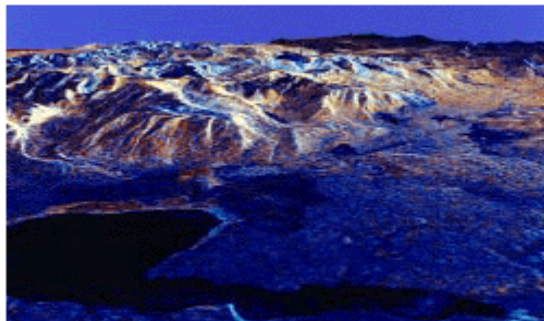
- Volunteered Geographic Information (VGI) and Crowd-Sourced Data (CSD), or data coming from social media.
- Might not be available for the entire requested area or on a regular time basis. Examples

Global Data: DEM

DEM datasets have been collected at a global scale with the help of earth observation sensors

Global DEM data sets available

Product	Spacing	Vertical accuracy	Year	Remarks
SRTM	30m/90m	10–15 m	2000	Generated by Shuttle IfSAR, covering 56° N to 60°
ASTER GDEM	30m	7–14 m	2009–2011	Generated by ASTER and gaps filled with SRTM
World DEM	12m	2m (rel) 4m (abs)	2014	Generated by TanDEM-X; DSM and DTM commercially available at cost
ALOS World 3D	30m	5 m	2016	Generated by LOS PRISM; freely available and based on 5 m global DEM which is available commercially at cost



Dowman, 2017, Digital Earth

Global Data: Land Cover

Global land cover mapping has witnessed significant progress in spatial and temporal resolutions, as well as thematic accuracy,

Global Land Cover data sets with fine resolution

Product	Spatial resolution	Coverage of years	Contents/ accuracy
GlobeLand30	30 m	2000, 2010	10 classes/ 80.3%
Global tree cover	30m	Annual (2000-)	One class(forest)/
ESA Land Cover CCI	300m	1998-2002, 2003-2007 and 2008-2012	22 classes/ 74%(2008-2012)

National versus International (Global) Data

Global Data: may have higher consistency across space, thereby allowing a better comparability across countries and easier data handling as a single dataset.

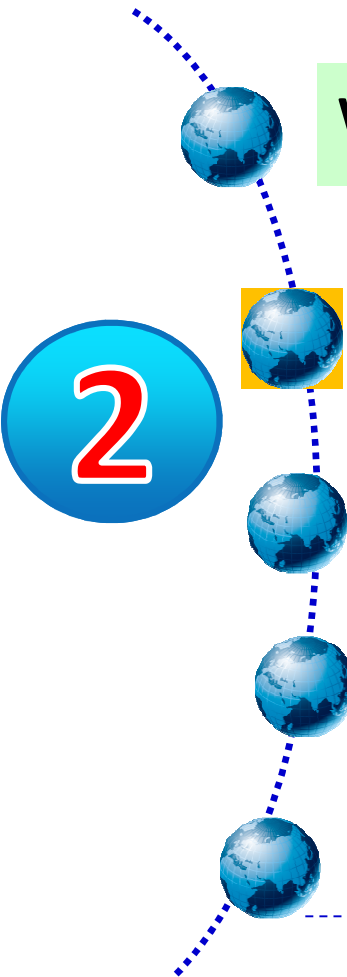
Alternative data: VGI, and Crowd-Sourced Data (CSD), or data coming from social media.

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graph LR; A[Global Data] --- B[ ]; C[Alternative data] --- B; B --> D[National data]
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National data

- Examine possible contribution of international (global and alternative data

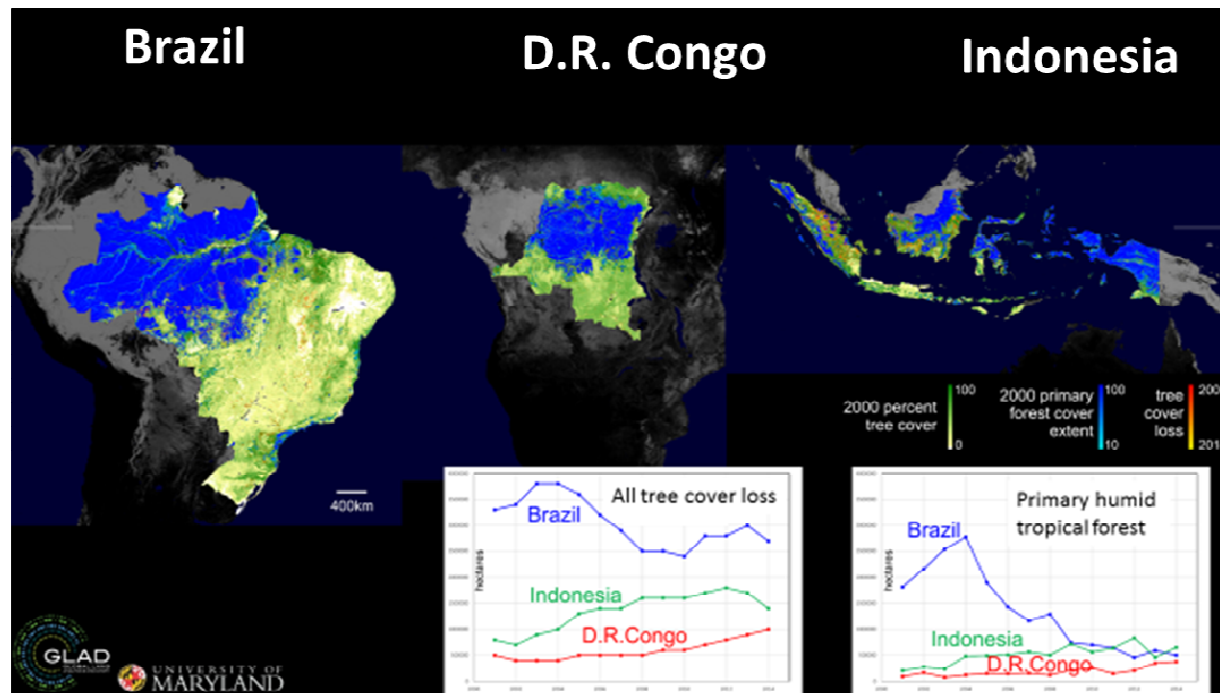
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2.1 Supplementing National Data

Global datasets with relatively fine spatial resolution can offer a potential alternative when reliable national data not available

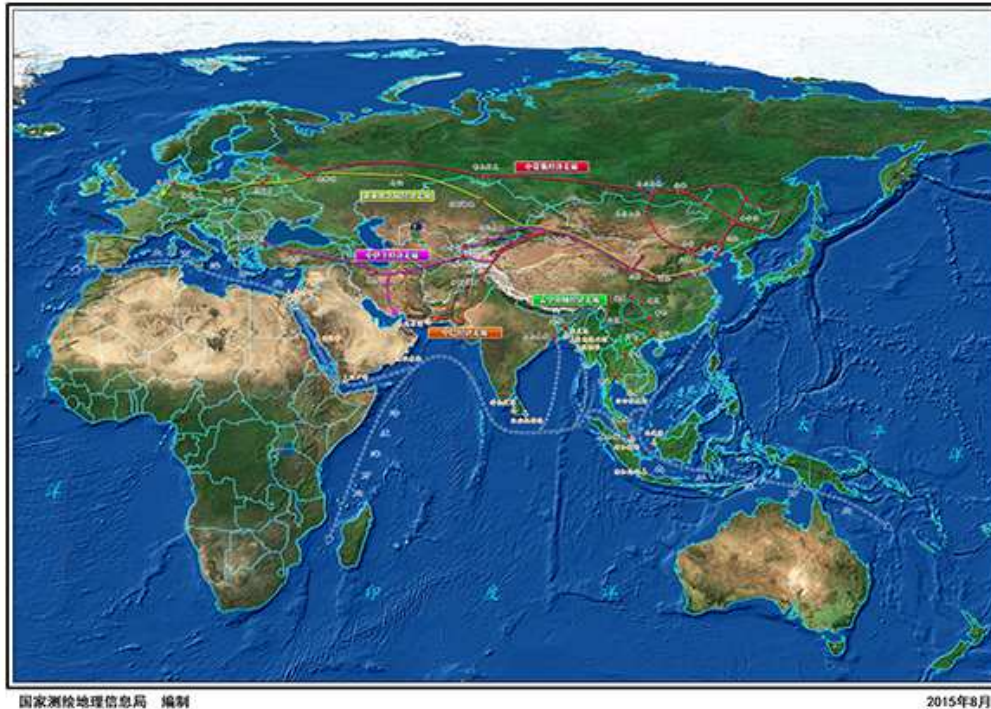


It is also possible to integrate national and global data sets for more effective SDGs monitoring, especially if the data have similar spatial resolutions

2.2 Covering Trans-boundary or Cross-border areas

High quality global data sets facilitate operations that cover the trans-boundary or cross-border area

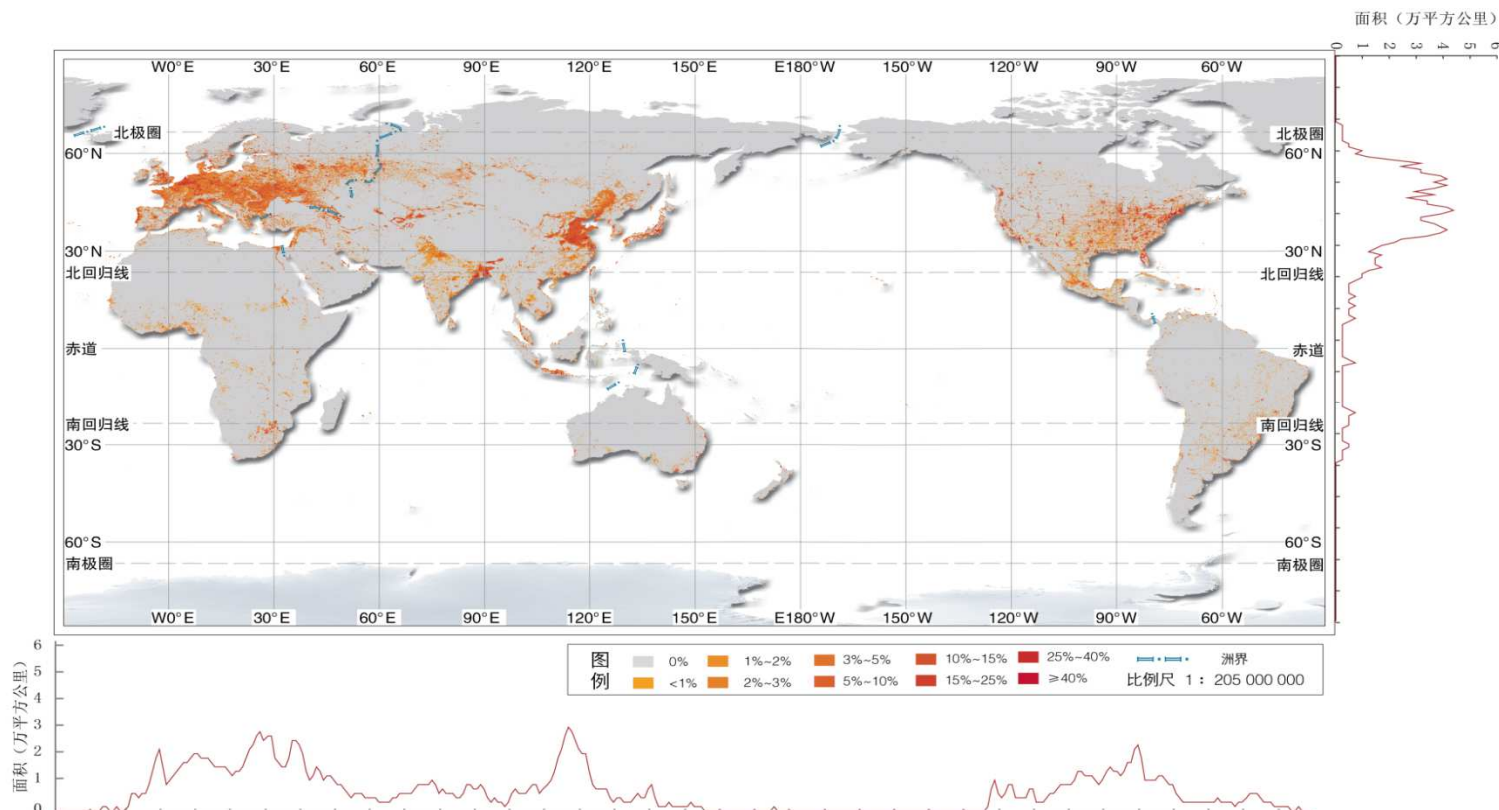
One Belt and one road



Natural disasters, displaced populations, environmental change, water shortages, pandemics, and widespread malnutrition do not stop at national borders or the water's edge.

2.3 Supporting Global Reporting


Global data sets can serve as a sound basis for supporting the preparation of global reporting.



High quality global data sets are required for informing some SDG indicators at a global scale.

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Utilisation of G/A Data

There are several issues to be considered when selecting suitable G/A data sources for use in the computation of SDG indicators and national reporting:

- Data quality
- Data conversion/ augmentation
- Scale and integration
- Measure issues
- Securing national ownership

3.1 Data Quality Issue

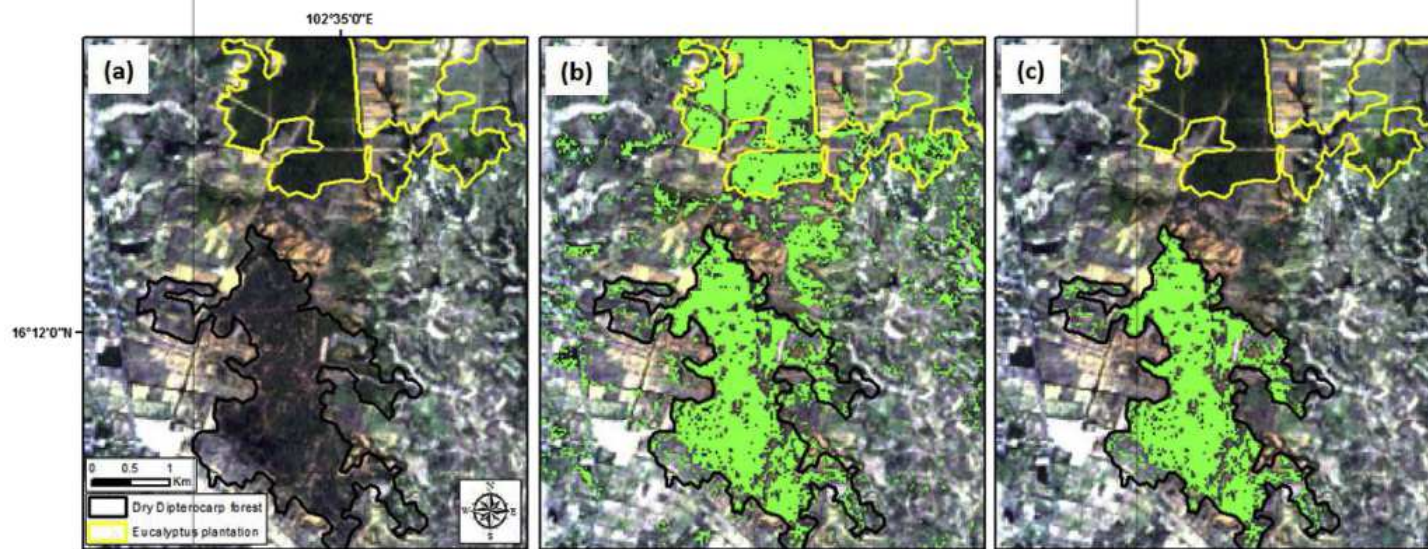
Data quality refers to geometric, thematic accuracy, as well as temporal aspects, and has significant influence on reliability of measures for SDG indicators

	LIDAR	Image Matching	Sar Interferometry
Accuracy	0.1-1.0m	0.1-100m	0.5-100m
Observation	DSM and DTM	DSM only	DSM and (DTM)
Disadvantages	Cloud	Cloud, darkness	-
From.....	Aircraft	Aircraft, space	Mainly space, but also aircraft
Coverage	Small areas only	Global	Global
Cost	\$\$\$	\$ GDEM - free	SRTM - free

It is necessary to conduct a thorough evaluation of the uncertainty of the data before utilisation

3.2 Data Conversion/ Augmentation

- **Data conversion:** different geo-referencing systems, vector / vector format, different classes (land cover)
- **Data augmentation:** improve the quality of existing national data by adding international (global) data



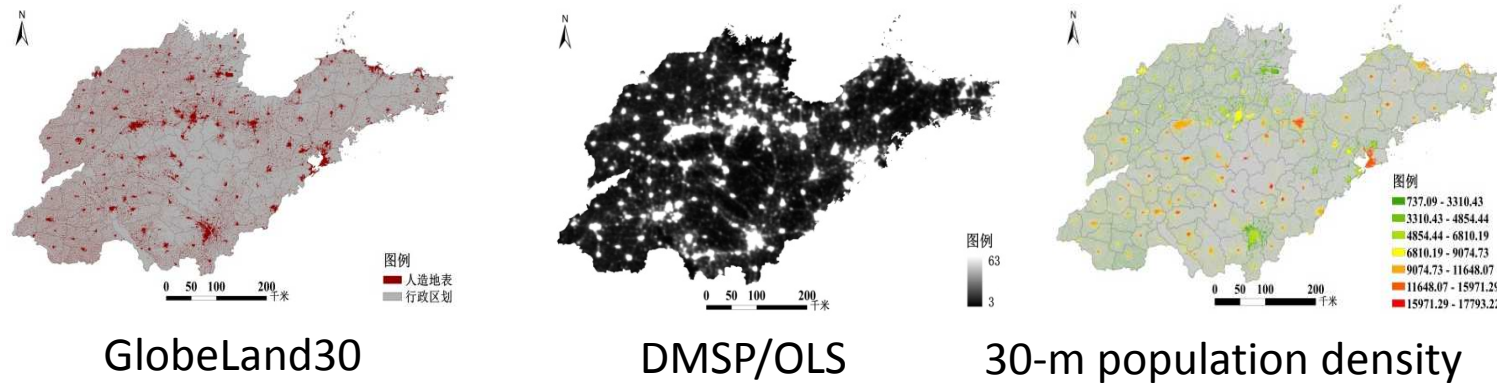
(a) Dry Dipterocarp forest and Eucalyptus plantation in the year 2000 (from the national land use map)
(b) tree cover map for the year 2000 (from the annual global tree cover maps) shown in light green
(c) extracted natural forest tree cover after integrating the national land use map and the annual global tree cover maps

3.3 Scale and integration

Some data sets might not be in the appropriate scale for a particular SDG indicator, and aggregation /disaggregation processes are required to translate them into multi-scale datasets.

- Disaggregation: generate a dataset with a more refined thematic content by combining global data and ancillary data sources.

Estimation of 30-m resolution population density for Shandong Province

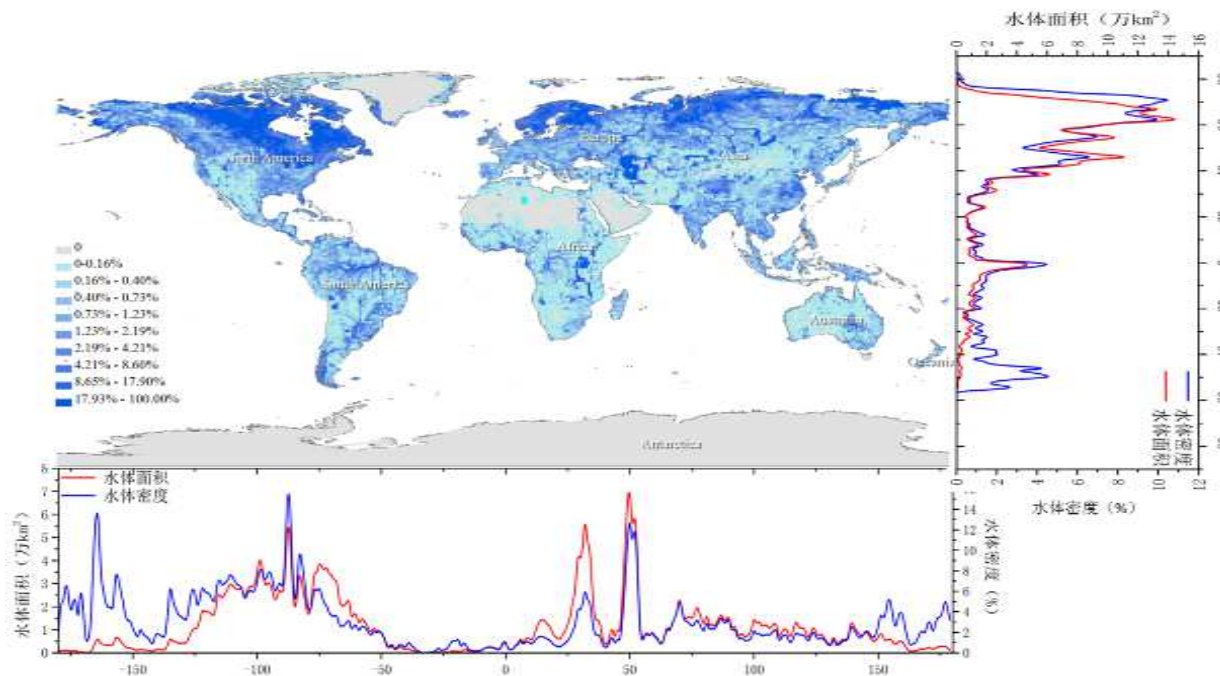


Lu Nan, Acta Geodaetica et Cartographica Sinica, 2015,44(12)

3.3 Scale and integration

- **Aggregation** : downscale high-resolution national and international datasets into desirable scales. This process is also called generalization in cartographic community.

Global water ratio and distribution along latitude and longitude in 2010

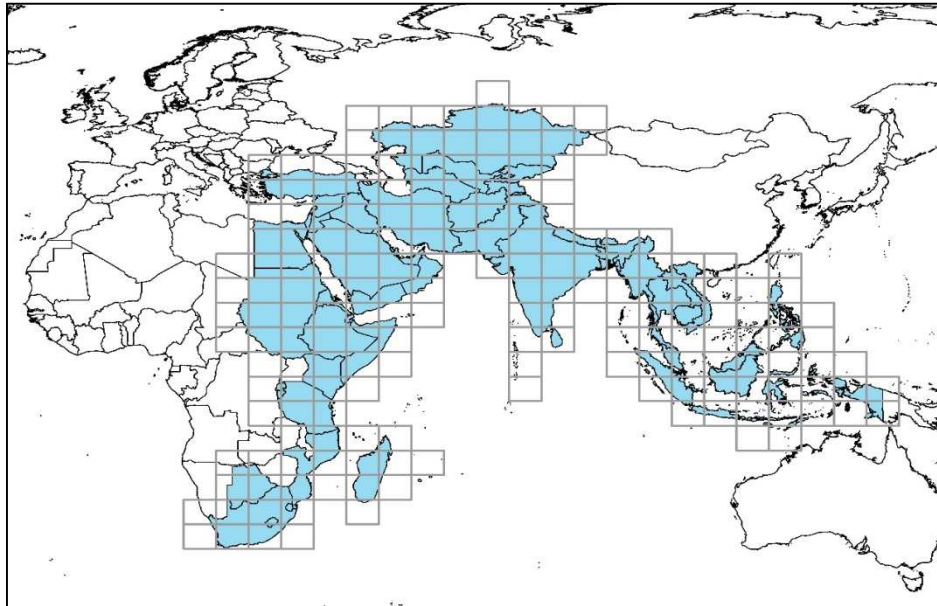


Cao X, et al. 2014. Preliminary analysis of spatiotemporal pattern of global land surface water. Science China: Earth Sciences, 57:2330–2339

3.4 Securing national ownership

In cases of unavailability of national data sources, national involvement needs to be secured in the information flow


- Set up Internet based services to allow custodians and the national authorities share the data related to the monitoring process, and to collaborate on the results and finding in relation to the indicators.



- Encourage and support national authorities to join the validation and even production of the international (global) data

ASEAN(10 Countries), South Asia(8Countries), Central Asia (5 Countries),
Western Asia(15 Countries), Eastern Africa (18 Countries)

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Recommendation 1

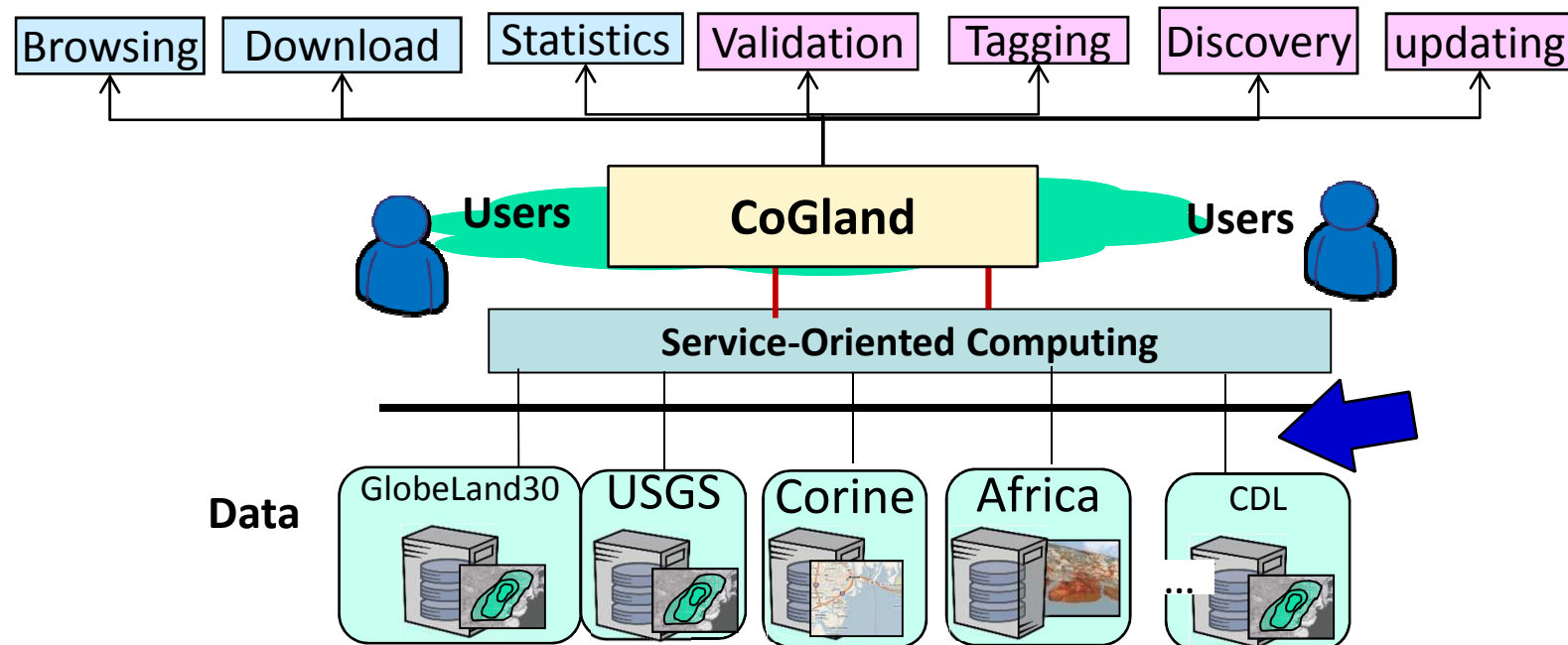
Undertake surveys regarding the status of core data sets useful for SDGs, and the first survey should focus on national-level land cover mapping and data products

- A questionnaire should be formulated and sent to all UN nation members, and relevant national and international organizations.
- This survey be conducted as a joint activity of UN-GGIM, GEO, the International Society for Photogrammetry and Remote Sensing (ISPRS), and GOFC/GOLD.


Recommendation 2

A 'one-stop' community-based collaborative information service needs to be set up by connecting all available global, regional and national geospatial data services.

- An implementation could be started developed from a collaborative global land cover information service (CoGland).



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Future Works

- Prepare a technical document addressing both global and alternative data, and prepare a technical paper for a peer-reviewed journal ?
- Examine possible geographic areas for case studies and present the results at the 2018 UN-GGIM geospstial Congress