

# Finding Better Direction of the Development of Global Datasets/Databases

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## **Abstract:**

In this short report, two activities by the author are introduced to promote the participation in them. One is the activity by the International Society for Photogrammetry and Remote Sensing(ISPRS) Working Group IV/6 (Global databases supporting environmental monitoring). This activity aims to identify problems in global database development and to find the better direction to go. The working period is until July 2000. The other one is by Data and Information System(DIS) sub-committee of Japan national committee for IGBP. The Asia-Wide Land use and Cover(AWLC) meta-database was developed by this sub-committee. Anyone can access and register land use/land cover data in AWLC meta-database through internet. The AWLC will be the first step to share the local reliable data for continental/global land cover data development.

## **1. Activity by the ISPRS WG IV/6**

### **1.1 Introduction**

Global datasets of geospatial environmental variables are necessary input to global environmental studies. They are also necessary for policy decision making and environmental education. In turn, global data are developed from satellite remote sensing, ground measurement, or social survey like census. Among them, satellite remote sensing is most powerful tool for global data acquisition. Global dataset development is now the main purpose of satellite remote sensing, for example EOS series, ADEOS-II, SPOT-4, ENVISAT. The recently available global datasets are DEM(GLOBE, GTOPO30), population, land cover, in-site observation data(TEMS by GTOS).

### **1.2 Global datasets or databases of geospatial environmental variables**

The ISPRS WG IV/6 deals with global datasets or databases of geospatial environmental variables. The environmental variables consists of physical variables including land variables, ocean variables, and atmospheric variables, and socio-economic variables. They do not include satellite image data. The environmental variables cover, according scientific classification, the following fields: atmosphere, land surface, biosphere, oceans, cryosphere, paleoclimate, human dimensions,

solar physics, hydrosphere, solid earth. The term "Global" means geographic coverage of data. It may be truly global or global land or global ocean. The needs of global datasets/databases come from global change research, political decision making, environmental education.

### **1.3 Events related to "Global Change"**

The main needs for global data is from global change research. The awareness on global change started apparently in 1970s though a part of scientists had noticed before that time. The following events are milestones of the global change related events.

1972 The United Nations Conference on the Human Environment at Stockholm

1985 Global Resource Information Database (GRID)  
in the United Nations Environment Programme (UNEP) was established

1986 International Geosphere-Biosphere Program(IGBP)  
in the International Council of Scientific Unions'(ICSU)

1987 The idea of "Sustainable Development"  
by the UN sponsored Brundtland Commission

1988 Earth system science by NASA, USA

1989-90 the US Global Change Research Program (USGCRP)

1992 Agenda 21 at the United Nations Conference on Environment and Development (UNCED)  
A program of international research and policy on global "biodiversity" also began

1999 Launch of EOS AM1 by NASA

2000 Launch of ADEOS II by NASDA

### **1.4 Examples of global datasets**

What global datasets have been produced? The followings are the examples of global datasets.

- basic map data

Digital Chart of the World(DCW) Ed.2

World Vector Shoreline Plus(WVS+)

- elevation

Global Land One-kilometer Base Elevation (GLOBE)

Global 30 Arc-second Elevation Data (GTOPO30)

- Digital Terrain Elevation Data (DTED) level 1
- land cover
  - DISCOVER, IGBP
  - AARS Global 4-minute Land Cover Data Set
- population
  - Global demography, CIESIN
- soil
  - SOil and TERrain Digital Database (SOTER), ISSS
- runoff
  - Global runoff data, the Global Runoff Data Centre
- evapotranspiration
  - Global land 30-minute evapotranspiration data
- Other data (atmosphere, biosphere, cryosphere, human dimensions, hydrosphere, land surface, oceans, paleoclimate, solar physics, solid earth)

### 1.5 On-going projects to develop global datasets

There are many on-going projects to develop global datasets. The followings are a few examples.

- Global Observations of Forest Cover(GOFC)
  - in Committee of Earth Observing System(CEOS)
  - one of Integrated Global Observation System(IGOS)
  - 5 year project from 1998
  - cooperation among existing forest related projects
  - expected data set production
    - Coarse land cover
    - Fine land cover
    - Fire scars
    - Forest harvest
    - Forest biomass
    - Forest functioning(LAI, PAR, FPAR)
    - Land cover change in areas of rapid change
- DTED level 2
  - 1 arc-second grid
  - interferometric SAR in shuttle mission between 60N and 60S latitude region
  - funded by NIMA, launched by NASA in 1999
  - may be classified or distributed by 3 second grid
- Space Agencies
  - NASA
    - EOS AM-1 / MODIS
      - aerosol concentration and optical properties, cloud properties, vegetation and land

cover, sea ice and snow cover, surface temperature, ocean color,  
concentration of chlorophyll-a

NASDA

ADEOS-II / GLI

cloud properties(- optical thickness, - effective particle radius, - top temperature, -  
top height, column water vapor, aerosol optical thickness)  
chlorophyll-a, suspended solid, attenuation coefficient at 490nm, sea ice, snow  
cover

## 1.6 What the ISPRS WG IV/6 tries to do

The WG does not aim to develop a specific global dataset. The WG aims to summarize various on-going global dataset development efforts, to identify obstacles for better development and usage of global environmental datasets, to propose measures or methodology to cope with these obstacles, and to disseminate these survey and proposal to researchers and related peoples through publication.

The WG decided to start discussion through virtual and real workshop(15-18 Nov. 1999 at Hawaii) with almost all related key organizations/groups to the development of global datasets such as scientific group(ex. IGBP, IHDP, LUCC), international organizations(ex. UNEP, FAO, World Bank), space agencies under CEOS. Subjects of discussion are divided into thematic subjects and generic subjects. The thematic subjects are obstacles for the development of a specific global data and measures to reduce it. This discussion will be done for each data type such as land surface data, oceanographic data, hydrographic data, etc. The generic subjects are common problems in the development and usage of global datasets. Any person who has an interest in the workshop can contact to the author. The goal of the WG in the term 1996-2000 is to disseminate the WG discussion in a style of book in 2000 to record the present stage of global geospatial environmental database and the state of the art of the technology for global dataset/database development.  
(ISPRS WG IV/6 URL <http://www.ngdc.noaa.gov/seg/tools/gis/isprs46.html> )

## 2. Asia-Wide Land use and Cover (AWLC) meta-database

--- Request your contribution to global change studies by sending meta-data of your land use/cover and related data ---

DIS(Data and Information System) sub-committee of the Japan National Committee for IGBP (International Geosphere and Biosphere Program) under the Science Council of Japan has developed AWLC(Asia-Wide Land use and Cover) meta-database.

### 2.1 What is the AWLC meta-database?

The AWLC meta-database is a database of meta-data of land use, land cover, and other land surface

variables in Asia. Land use is a social classification of land which describes how a man utilize land. Land cover is a physical classification of land which describes what type of surface, especially vegetation type, covers a land. Other land surface variables include vegetation cover percentage, forest cover percentage, area of land cover change, area of desertification etc. They are any kinds of variables which describe land surface characteristics. They may be category-type discrete representation of land or continuous variables of land.

## **2.2 Why do we need the AWLC meta-database?**

Land surface characteristics is one of key environmental variables for global change studies and local environmental studies. However we do not have unified detail knowledge about land use and land cover of global area which meets the needs for global change studies. Since land cover of global area varies a lot by continent, land use and land cover of each continent should be investigated first. The AWLC meta-database is focused on Asia. Though we can get land use and land cover information from satellite image, the lack of more reliable information (or ground truth) than satellite extracted one is a common problem. On the other hand, there are many projects and individual studies which provide land use or land cover information as a final product or by-product. But, unfortunately, in most cases, these information can not be accessed by other researchers just because producer of these products think that they are only for their own project, organization or sponsor. The main reason of the development of the AWLC meta-database is to remove barrier which avoid to use the pre-acquired knowledge of land use and land cover of Asia. In other words, the AWLC meta-database changes closed knowledge of land use and land cover to open or common knowledge for Asian scientists. This common knowledge is a common property of Asian scientists and it promotes the understanding of the environment of Asia. Your contribution would be highly appreciated not only by the initiator of this project but also by Asian people who live in Asian environment.

## **2.3 Web-site address of AWLC meta-database**

**<http://oblwww.cv.noda.sut.ac.jp/awlc/index2.htm>**

## **2.4 Method of registration of your meta-data**

You can contribute to the AWLC meta-database by sending meta-data of land use, land cover, or other land surface variables in Asia by the method described below. It would be appreciated if you could send the image data or browse image data of land use/cover or other land surface variable.

Methods to send meta-data or image data:

(Either of the following three methods is acceptable.)

### **a. From web site**

Meta-data and image data could be directly registered from the web site:

<http://oblwww.cv.noda.sut.ac.jp/awlc/index2.htm>

The file name of image data can be registered at the above web site, but the image data itself should be sent by the method (2) or (3).

#### **b. By E-mail or ordinary mail**

Meta-data written in English language in a TEXT file (file name: xxxxx.txt) or HTML file (file name: xxxxx.htm) and image data as a GIF file (file name: xxxxx.gif) or a JPEG file (file name: xxxxx.jpg) are acceptable. These data can be sent to the address at the bottom of this page by data media such as a DOS format floppy disk, a 8mm tape, a MO, or a CD-ROM. These data can be also sent by e-mail message or its attached file to the address at the bottom.

#### **c. From your FTP site**

We can also directly download both meta-data and image data from your FTP site. For this method, please let us know the IP address of your FTP site and the file name of the meta-data and the image data beforehand by e-mail to the bottom address.

Address for sending data and for questions:

Dr. Hirohito Kojima  
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Phone : +81-471-24-1501(ext.5014)  
Fax : +81-471-23-9766  
e-mail : kojima@ir.noda.sut.ac.jp

## **2.5 Example of meta-data**

Example

- |                           |   |
|---------------------------|---|
| 1. Name of the dataset    | (Example) Land cover dataset of Gifu prefecture |
| 2. Location               |   |
| Latitude of the north end | (Example) 36 deg 30 min N                       |
| Latitude of the south end | (Example) 35 deg 00 min N                       |
| Longitude of the west end | (Example) 136 deg 15 min E                      |
| Longitude of the east end | (Example) 137 deg 45 min E                      |
| Name of the place         | (Example) Gifu prefecture, Japan                |
| 3. Attribute              |   |

- Land use / land cover class  
 Land surface variable (Example) Land cover class  
 Forest, Paddy field, Agricultural field, Grass land,  
 Urban area, Bare ground, Water  
 "the detail definition of land cover class" (\*\*\*\*\*.txt)
4. Source information (Example) Landsat TM, 28 July 1995
5. Data
- |        |                |   |
|--------|----------------|---|
| Raster | Grid size      |   |
| Vector | Original scale | (Example) Grid size : 30 meter and 1 second |
6. Any description about the dataset (Example) This dataset was produced as one of the products sponsored by xxxxxxx.
7. Availability (Example) Available
8. Contact (Example)  
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 URL: [http://\\*\\*\\*\\*\\*](http://*****)
9. Documentation/Web site about this dataset  
 (Example 1)  
 Hirohito Kojima, Land cover classification of Gifu  
 prefecture, International Journal of Remote Sensing,  
 Vol.xx, No.xx, pp.xx-xx, 1998  
 (Example 2) "Related report" ( [http://\\*\\*\\*\\*\\*](http://*****) )
10. This dataset is produced by (Example)  
 Obayashi Shigeyuki  
 Remote Sensing Laboratory  
 Science University of Tokyo
11. This meta-data is contributed by (Example)  
 Hirohito Kojima  
 Remote Sensing Laboratory  
 Science University of Tokyo
12. "Browse image of the dataset" (\*\*\*\*\*.gif)