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Progress of Global Mapping Project to Build Geospatial Infrastructure*

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Progress of Global Mapping Project to Build Geospatial Infrastructure

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Summary

The Global Mapping Project aims to develop digital geo-information framework datasets of the total land area of the globe through international cooperation of National Mapping Organizations (NMOs). The project is coordinated by the International Steering Committee for Global Mapping (ISCGM), and Global Map version 1 was released in June 2008. ISCGM is now making efforts to revise specifications for Global Map version 2 and to promote further use of Global Map to build Geospatial Infrastructure.

Acronyms

GLCNMO: Global Land Cover by National Mapping Organizations
GML: Geography Markup Language
GSI: Geographical Survey Institute of Japan
ISCGM: International Steering Committee for Global Mapping
ISO: International Organization for Standardization
JICA: Japan International Cooperation Agency
KML: Keyhole Markup Language
LCCS: Land Cover Classification System
MLIT: Ministry of Land, Infrastructure, Transport and Tourism of Japan
MODIS: MODerate resolution Imaging Spectroradiometer
NMO: National Mapping Organization
PCGIAP: Permanent Committee on GIS Infrastructure for Asia and the Pacific
PDF: Portable Document Format
SDI: Spatial Data Infrastructure
TICAD: Tokyo International Conference on African Development
TIFF: Tagged Image File Format
UNFCCC: United Nations Framework Convention on Climate Change
UNCED: United Nations Conference on Environment and Development
WMS: Web Map Service
WSSD: World Summit on Sustainable Development

1．OUTLINE OF GLOBAL MAPPING PROJECT

1.1 Introduction

The Global Mapping Project is an international cooperation initiative through voluntary participation of National Mapping Organizations (NMOs) of the world with the aim of developing digital geo-information framework datasets with a spatial resolution of 1 km. The primary objective of the Project is to contribute to sustainable development, environmental conservation and natural disaster mitigation through provision of basic geo-information framework datasets.

The Project was initially proposed by Ministry of Construction of Japan (present Ministry of Land, Infrastructure, Transport and Tourism of Japan) in 1992, in conjunction with the adoption of Agenda 21 at United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. Preparatory works to implement the proposal eventually resulted in the establishment of the International Steering Committee for Global Mapping (ISCGM) in 1996.

In 1998, ISCGM sent a letter to all NMOs in the world with the recommendation of Mr. Habermann, the Director of the United Nations Statistics Division inviting them to participate in the Global Mapping project. This resulted in many organizations choosing to participate in the project, and the development of Global Map was began.

The Committee is chaired by Prof. D. R. F. Taylor of Carleton University, Canada, and it consists of twenty members (as of May 2009) representing NMOs and regional geographic information organizations. The secretariat of ISCGM has been hosted by Geographical Survey Institute (GSI), the National Mapping Organization of Japan.

Global Mapping was notably referred to in paragraph 132 of “the Plan of Implementation” adopted at World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 (United Nations, 2002). The project was registered as a WSSD Type 2 initiative with the goal of completion of global coverage by the year 2007 since its inception

Thanks to the efforts of participating NMOs and supporting stakeholders, the first global coverage was achieved by releasing Global Map version 1 on the occasion of Global Mapping Forum in Tokyo in June 2008.

1.2 Specifications of Global Map

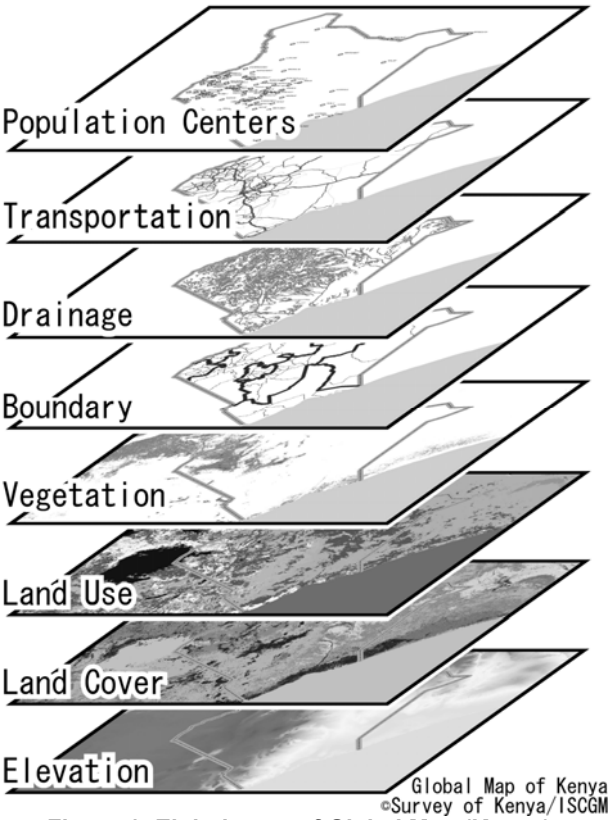

Figure 1: Eight layers of Global Map (Kenya)

Global Map is digital information with the resolution at 1km (or approximately 1:1 million scale) covering the whole land area of the globe based on consistent specifications. It is composed of 4 layers in vector format such as population centers, transportation, drainage and boundary and 4 layers in raster format such as vegetation, land use, land cover and elevation (Figure 1).

Global Map datasets are developed by the efforts of respective NMOs. However, land cover layer and vegetation layer were developed in a unified manner in international cooperation with NMOs under an ISCGM initiative. All Global Map datasets are approved by respective governments and are to be updated every 5 years.

1.3 Status of the Global Mapping Project

As of May 2009, 164 countries and 16 regions, which collectively correspond to 97% of the total land area of the Earth, participate in the Project. While Global Map version 1 (national and country versions) consists of Global Map datasets for 70 countries and 4 regions, collectively covering 60% of the whole land area. Figure 2 shows the status of the project on a country and regional basis. Global Map version 1 (global version) for land cover and vegetation layer covers the total land area of the globe.

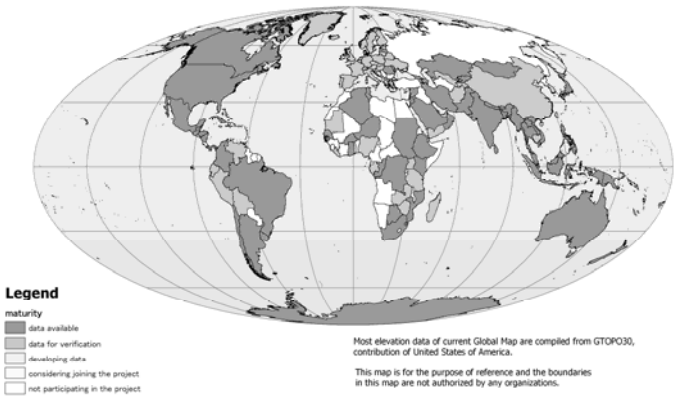

Figure 2: Status of Global Mapping Project (as of May 2009)

Figure 3 shows the progress of participation and data development of countries and regions. The number of participating organizations dramatically increased immediately after the ISCGM sent invitation letters with the recommendation of the United Nations in 1998 and has steadily increased until the present time. While the number of countries and regions which released Global Map datasets has slowly increased since 2000, however, a rapid increase is took place after 2007.

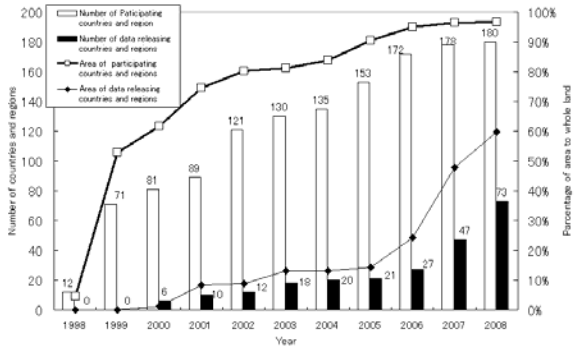

Figure 3: Progress of participation and data development

1.4 GLCNMO and Global Percent Tree Cover

The highlight of Global Map version 1 is the completion of global coverage of land cover layer and tree cover. The two datasets are entitled the Global Land Cover by National Mapping Organizations (GLCNMO) and Global Percent Tree Cover respectively. GLCNMO has twenty land cover classes, based on a land cover classification system (LCCS) (Figure 4). Meanwhile Global Percent Tree Cover describes the tree coverage ratio ranging from 0 to 100%(Figure 5). Under the ISCGM initiative, two datasets derived from MODIS data obtained in 2003 were developed by GSI and the Center for Environmental Remote Sensing (CEReS), Chiba University with the contribution of many of NMOs for training data identification and data verification.

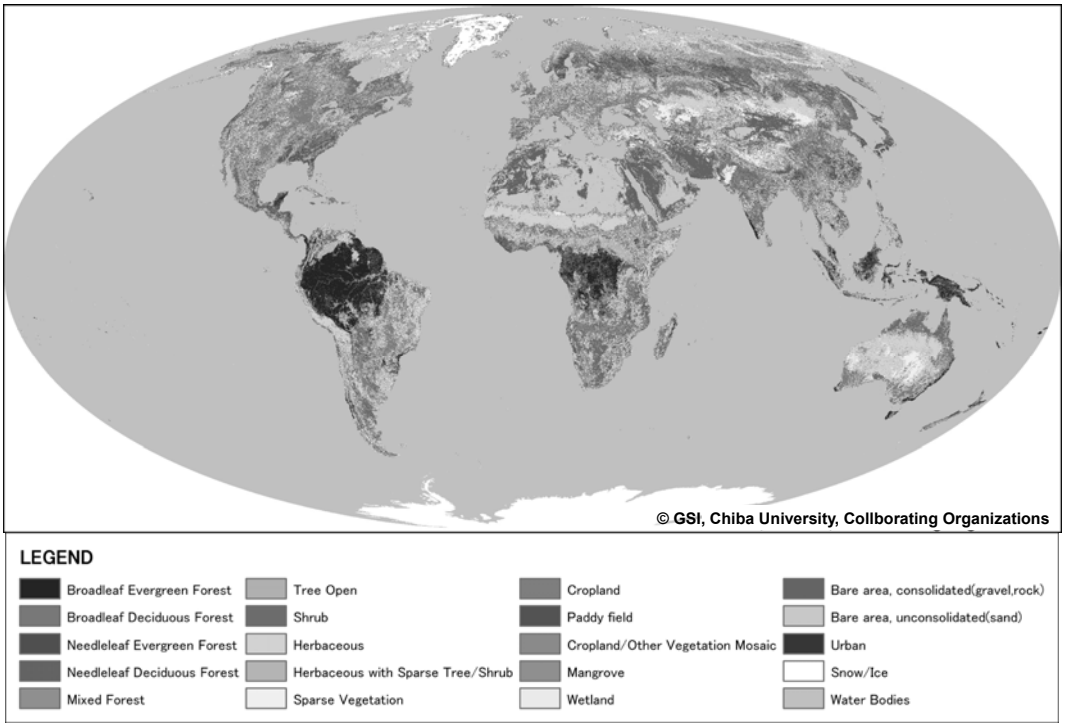

Figure 4: GLCNMO Image

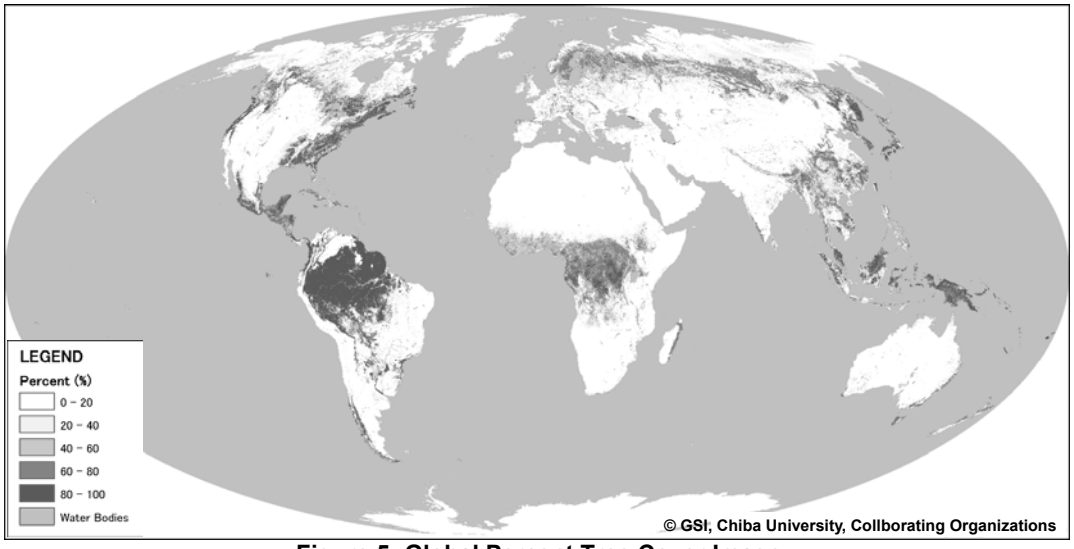

Figure 5: Global Percent Tree Cover Image

2．ACCESS AND USE OF GLOBAL MAP

2.1 Access to Global Map

ISCGM provides Global Map version 1 as well as previously released datasets through the Internet from the ISCGM website (http://www.iscgm.org) together with some national websites. All datasets are basically free of charge for non-commercial use. For commercial use, users are asked to contact the copyright holders of each country or region, indicated on the download site. In case of GLCNMO and Global Percent Tree Cover (Figure 4 and 5), all use including commercial use is free of charge to encourage private sector to fully utilize these datasets.

2.2 Specifications and Data Release

Global Map needs to be further developed and made more user-friendly. ISCGM is considering revising data specifications for Global Map version 2, to be developed in phase 3 (2008-2012). Adoption of ISO19136 (Geography Markup Language, GML) as well as ISO19115 for metadata is being considered. Discussion is also underway on the use of technologies such as Web Map Services (WMS). A technical workshop for the specifications for Global Map version 2 will be held at Tsukuba, Japan from 8-10, September. Participation of those who are interested in the revision of Global Map specifications is welcomed. The aim is to adopt the new specifications at the 16th ISCGM meeting in Bangkok in October 2009.

Another action already taken is providing Global Map datasets in user friendly formats, namely shape format for vector data and TIFF format for raster data, from October 2008. Other kinds of formats such as KML and PDF might be possible candidate ones for diversifying data provision channels.

It is hoped that these actions will collectively facilitate both development and use of Global Map and ensure interoperability of Global Map datasets in the context of a Global SDI implementation framework.

3．UNDERTAKINGS OF JAPANESE GOVERNMENT

Japanese government promotes this project which they have advocated primarily as mentioned above. As one of governmental agencies of Japan, Geographical Survey Institute (GSI) enacts a secretariat of the secretariat of ISCGM and tackles various activities energetically as follows.

3.1 Fourth International Conference on African Development

The Global Map was introduced at the Fourth Tokyo International Conference on African Development (TICAD IV, May 28-30, 2008), the Global Map of the African area was introduced on the screen during the conference. Government leaders from various countries, including H.E. Mr. Yasuo Fukuda, Prime Minister of Japan, were present. The Global Map was also mentioned in the "TICAD IV Yokohama Action Plan" as "promote technical assistance such as establishing and updating the Global Map data for the Africa, describing the status of its environment in five years" in the actions to be taken in the next 5 years under the TICAD process (chapter 2 of "Addressing Environmental / Climate Change issues" section).

3.2 14th Session of the Conference of the Parties (COP14) of UNFCCC in Poznań, Poland

Venue: Poznań International Fair, Poznań, Poland

COP14 of United Nations Framework Convention on Climate Change (UNFCCC) took place in Poznań, Poland from 1 to 12 December 2008 to discuss international policy framework to cope with climate change. More than 9,000 people from governments, international organizations, NGOs, researchers and press attended the Conference.

MLIT and the ISCGM secretariat jointly participated in the Conference to promote the use of Global Map version 1 to facilitate the discussions on measures against climate change.

At the side seminar on 9 December hosted by the Japanese Government, one of the authors of this report, Takayuki Nakamura made a presentation entitled "Utilizing Global Map for Addressing Climate Change."

Global Map presentation at the side seminar

In addition to the outline of Global Map, the presentation drew interest of an audience of 150 on the possibility of use of Global Map in climate change fields: formulating adaptation measures in response to adverse effects of climate change such as sea level rise; grasping forest areas and forest distribution in an effort to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD); and calculation of greenhouse gases (GHGs) emissions and removals from Land Use, Land-Use Change and Forestry sector (LULUCF).

3.3 Global Mapping Forum 2008

"Global Mapping Forum 2008", a three-day-long forum was held in Tokyo and Yokohama, Japan from 5-7 June 2008 jointly organized by the GSI, ISCGM, and the United Nations University (UNU) for the producers and users of Global map to discuss the expansion of user of Global Map data. It was attended by 346 participants from 26 countries who are mainly heads of National Mapping Organizations of the world and experts of the global environmental field.

In this forum, a panel discussion was held titled as “Discussion towards the Development of Global Map Version 2” and adopted “Global Map Tokyo Declaration”.

Presentation by Dr.Yoshio Tsukio, Professor Emeritus o
The University of Tokyo

The Tokyo Declaration states that producers and users of Global Map should further strengthen coordination, including capacity building, so that Global Map, which accurately shows the reality of the situation and influence of human activities.

3.4 Global Mapping Seminars in Africa

As a part of Global Mapping Partnership Program (GMPP) inviting people of National Mapping Organizations (NMOs) to promote the development of Global Map in the developing and other countries, Global Mapping Seminars in Africa were held with the cooperation of Survey, Kenya and Direction des Travaux Geographiques et Cartographiques (DTGC), Senegal since 2002 to 2007. These seminars were organized by MLIT, ISCGM and SOK/DTGC with the support of the Japan International Cooperation Agency (JICA).

It has been held in Nairobi, Kenya from 2002- 2004 and in Dakar, Senegal from 2005 - 2006, annually and respectively. The objectives of these seminars are as follows:

1. To enlighten the significance of the Global Mapping project and facilitate the project participation
2. Technological transfer for creating Global Map data and facilitation of the data development
3. Promotion of the development of National Spatial Data Infrastructure (NSDI) started from developing Global Map data. Information exchange among NMOs in the African Region

3.5 JICA Training Course

GSI has conducted a JICA group training course on Global Mapping for technology transfer to developing countries. This course was attended by 94 participants from 57 countries in 15 years from 1994 to 2008.

4 CONCLUSIONS

Global Mapping Project is to develop geographic information of the whole land area of the globe with consistent specifications through international cooperation of respective NMOs. The project has completed the first goal of “Global Map version 1”, including GLCNMO and Global Percent Tree Cover. Global Map version 1 is expected to accelerate the use of Global Map. Global Mapping Project is collaborating in the broad range of cooperative frameworks as global geospatial infrastructure. At the same time, it is revising the specification and diversifying data formats for the benefit of producers and users of Global Map. Through these approaches, it is expected that Global Map more used to address Global Challenges in the broader range including the field of disaster prevention and management.

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