

APPLICATION OF GLOBAL GEOGRAPHIC FRAMEWORK DATA FOR EDUCATION — GLOBAL MAP —

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ABSTRACT:

Global Mapping project intends to develop and update global digital framework geoinformation under the cooperation of National Mapping Organizations (NMOs) of all over the world. The project seeks to develop global geographic framework data to contribute to solving global environmental problems and realising sustainable development. In spite of the serious efforts made for promoting the project, it has not gained recognition by the public. In view of the importance of publication, the Ministry of Land, Infrastructure and Transport (MLIT) set up a Committee on Application Strategy for Global Maps in 2003. In a plan developed in 2004 by this committee, six projects were proposed as appropriate activities to publicize the applications of Global Map. Among others, "Global Map School" is considered to be the most practicable. The "Global Map School" is a project to apply Global Map to educational field. Execution of this project is expected to become a touchstone for the successful application of geographic information developed by using remote sensing and other technologies, in international communication in education.

1. INTRODUCTION

The Global Mapping project intends to develop and update global digital framework geoinformation under the cooperation of National Mapping Organizations (NMOs) of all over the world. The project seeks to develop global geographic framework data to contribute to solving global environmental problems and realising sustainable development. In spite of the serious efforts made for promoting the project, Global Map has not gained recognition by the public, therefore, further efforts for the publication is indispensable to make Global Map into a real contributor.

Firstly, this paper summarizes establishment and development of the Global Mapping project, then introduces efforts to publicize Global Map, and at last introduces a project of Global Map application in educational field.

2. ESTABLISHMENT AND DEVELOPMENT OF GLOBAL MAPPING PROJECT

2.1 Background of Global Mapping Project

The United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, 1992, adopted Agenda 21 as a programme for addressing global environmental challenges and setting out measures to be implemented. Agenda 21 states that the availability of geographical information is critical for environmental decision making (Agenda21. 40. a).

It has been recognized that global geoinformation framework is needed for solving global environmental problems. To this end, the Global Mapping project intends to develop this framework named as "Global Map" under international cooperation. The concept of the Global Mapping project was first advocated in 1992 by the Ministry of Construction (now reorganized as the Ministry of Land, Infrastructure and Transport: MLIT) and the Geographical Survey Institute (GSI) of Japan, in response to

growing concern about global environment and as a contribution from mapping and surveying sector.

Primary objective of the Global Mapping project is to contribute to solving global environmental problems and realization of sustainable development through the provision of base framework geographic dataset. The Global Map data are developed by NMOs in accordance with the common data specifications. In order to promote and implement the Global Mapping project, the International Steering Committee for Global Mapping (ISCGM) was set up in 1996 and GSI of Japan serves as its secretariat since its inception.

As of March 2006, 160 countries and regions that cover 91% of land area of the Earth participate in the project. Among them, data of 22 countries have been completed. These data are downloadable freely for non-commercial use through the Internet from ISCGM website at <http://www.iscgm.org/>. (See Figure 1.)

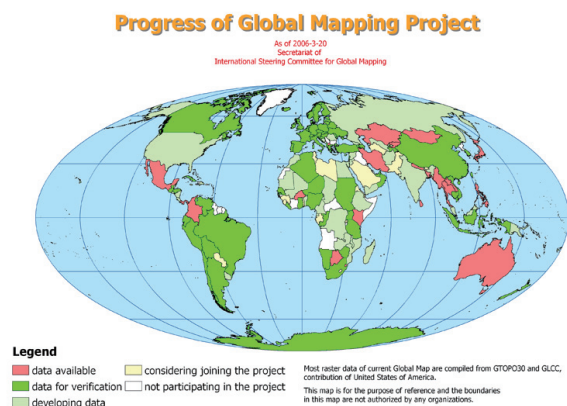


Figure 1. Progress of Global Mapping Project

2.2 Promoting Body of the Global Mapping Project – ISCGM-

The primary purpose of ISCGM is to examine measures for facilitating Global Map data development, with a view to better implement MEAS (Multilateral Environmental Agreements), mitigate natural disasters and encourage economic growth within the context of sustainable development.

ISCGM consists of twenty members (as of March 2006) who represent NMOs and regional geographic information organizations; namely, Antarctica (SCAR), Australia, Bangladesh, Canada, China, Europe (EuroGeographics), France, India, Iran, Japan, Kenya, Republic of Korea, Malaysia, Mexico, New Zealand, Niger, South Africa, United Kingdom and United States of America (in alphabetical order). The committee is currently chaired by Professor D. R. F. Taylor of Carlton University, Canada.

ISCGM has held its meetings nearly once a year at places all around the world. The Twelfth ISCGM Meeting was held in Cairo, Egypt in 2005. It has 4 Working Groups. Working Group 2 deals with specifications of Global Map and Working Group 4 works on global raster data development.

2.3 Outline of Global Map Data

Global Map is digital global spatio-temporal data in the following format:

- 1) In 1km resolution (at 1:1,000,000 scale)
- 2) Covering the whole land area of the globe with consistent specification
- 3) Composed of 8 layers (shown in Figure 2. and 3.)

For 1), the specifications define accuracy of Global Map data as follows:

“For horizontal accuracy, 90% of points will be within ± 2 km of their actual location. In the case of data obtained from satellite images, the maximum error is less than or equal to 0.5km. Vertical accuracy is notionally ± 150 metres for 90% of points. This figure may need to be reviewed once the data are available, as sources to this accuracy may not be available in areas of high relief.”

For 2), everyone can see the features and attributes that are included in the Global Map Specifications on the Global Map Website (<http://www.iscgm.org/>).

For 3), Global Map data consist of following 8 layers:

- a) Transportation (i.e. Railroad, Road...)
- b) Boundary (i.e. Political Boundary, Coast Line...)
- c) Drainage (i.e. Water Course, Inland Water...)
- d) Population Centers (Built-up Area, Miscellaneous Population...)
- e) Elevation
- f) Vegetation
- g) Land Cover
- h) Land Use.

The former four layers are vector data and the latter four layers are in raster format. Everyone can download the data freely for non-commercial use through the Global Map Website mentioned above.

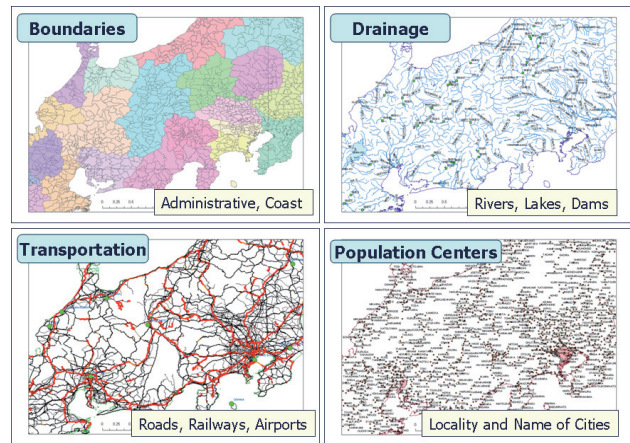


Figure 2. Contents of vector layers

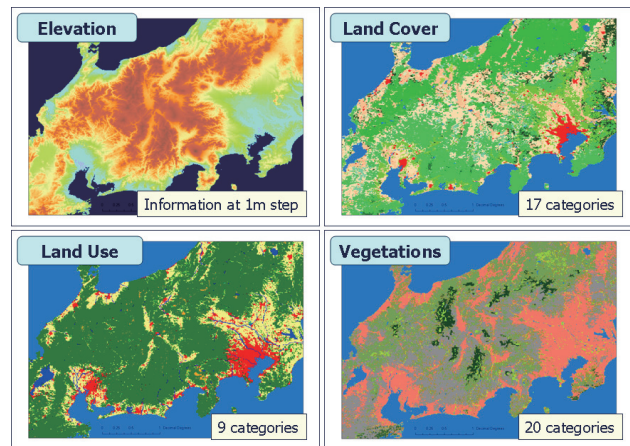


Figure 3. Contents of raster layers

These data are produced mainly from existing geographic information, such as topographical maps, earth observation data and satellite imagery with remote sensing technology, combined with analysis of existing data (Figure 4.).

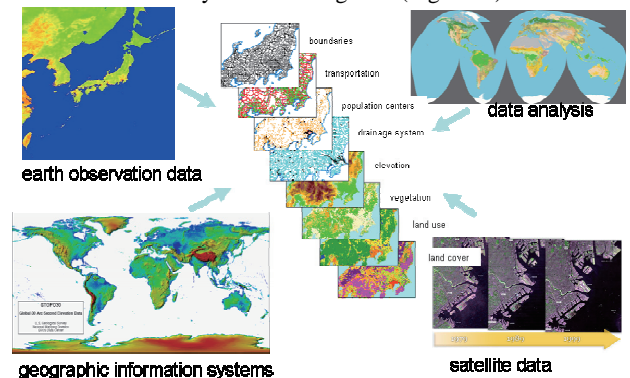


Figure 4. Best use of technologies for developing Global Map

Although Global Map data are expected to contribute to solving various global problems through their applications, only few applications are recognized by now as Global Mapping project is not well known to the public.

In the next chapter, we are going to mention about efforts for publicizing the project.

3. EFFORTS TO PUBLICIZE GLOBAL MAPPING PROJECT

Efforts to publicize Global Map are crucial to enhance the applications to make Global Map contribute to solving various global problems. These efforts need to be made both internationally and domestically. This paper deals with undertakings mainly in Japan, because they can be applied to other countries.

3.1 Establishment of “the Committee on Application Strategy for Global Maps”

In view of the importance of publication, MLIT organized a Committee on Application Strategy for Global Maps in 2003 chaired by Emeritus Prof. Yoshio Tsukio, University of Tokyo.

This is a national committee consists of distinguished national experts in various fields, such as geographic information, education, environment, and mass media.

The objective of this committee is to formulate an application strategy to gain more recognition of Global Maps and to promote practical application in Japan as well as in global community.

Through four meetings held in 2003 – 2004, various application plans were proposed and discussed. Then Application Strategy for Global Maps was formulated in September 2004.

The contents of the strategy are as follows:

- 1) Basic concepts of the application strategy for Global Maps
- 2) Proposed plans for the application strategy for Global Maps
 - Execution of pioneering application plans -
- 3) Proposed plans for the application strategy for Global Maps
 - General improvement on application -

At 1), The strategy mentions about the outline of Global Mapping project, considerable merits and problems of the project, concepts and directions for the publicity, proposed applications in line with the publicity of the project and solution of current problems, and relationship among proposed strategies.

At 2), The strategy proposes plans for developing application. The plans are divided into two main branches, a plan for information sharing and model plans for application.

For the information sharing, development of portal site is proposed. The purpose of this portal site is to share outcomes of Global Map applications. The portal site aims at promoting further applications of Global Map data through collecting various outcomes of Global Map applications and sharing them. For the model applications, following six plans are proposed:

a) Cooperation with Other International Projects

In cooperation with other international research projects including environmental field and by integrating various geographic information, Global Map provides a base map for analysing various problems. Outcomes of these research works will be released.

Through the application of Global Map to environmental field, which is considered to be the most important area for Global Map applications, Global Map can really contribute to solving environmental problems, and thus gains recognition that the data are indispensable for researches and policy making aiming to solve such problems.

b) Regional Disaster Prevention Maps

In cooperation with other organizations which have information on disaster prevention, an Internet site is developed to effectively supply information on disaster prevention. This site will be used for the planning of disaster prevention by national and local governments.

In cooperation with various organizations as well, it is expected that specifications for disaster information databases, which is planned to be developed, will be harmonized with Global Map Specifications.

c) Global Map School

By communicating with both domestic and foreign schools, a scheme for learning will be developed through an exchange of mutual ideas in a global perspective. Through this learning, an international understanding among students will be improved. This plan could be a valuable tool for international exchange in educational field.

d) World History Observed through Global Map

A digital map that can be used for researching and studying world history in an easy manner is made by Global Map and related materials. People can grasp world history, such as historical change of international boundaries and the relationship of historical events in various areas at the same era, visually by mapping various historical events on the digital map.

e) My Global Map Contest

Contests that employ Global Map data as their sources are executed. Through the utilization of Global Map data by many users, publicity of Global Map will be improved and arising new applications.

f) Flight Navigation / Global Sightseeing Map Developed by Everyone

A “Flight Navigation” aiming at learning the earth is developed. By improving this tool, a sightseeing information sharing service can be developed with users’ participation.

At 3), The strategy proposed plans for general improvement in application. These plans aim at promoting applications by improving current situations of Global Map data supply. Proposed plans are as follows:

a) Expansion of Coverage of Global Map Data

It is needed to achieve participation from the whole world; improve data development of Global Map; realize integrated utilization of both land and ocean data; and strengthen system of international promotion.

b) Improvement in Data Utilization

It is needed to establish portal site; improve data format; support users; and develop an environment that enables utilization of maps besides original Global Maps (1:1,000,000).

c) Establishment of Promoting System for Easier Applications

Commercial use of Global Map data is considered to be a breakthrough at present, however, such use requires permissions of all the countries included in the Global Map to be used. It is needed to improve this situation to accelerate applications of Global Map.

Every plan shown in this document will play an important role for improving utilizations and applications of Global Map data. We are going to explain, among others, “Global Map School” that is planned to be executed soon as one of the most effective plans for promoting applications of Global Map data.

4. MODEL APPLICATION “GLOBAL MAP SCHOOL”

As mentioned above, “Global Map School” is considered to be one of the most feasible applications. This application aims at:

“By communicating with both domestic and foreign schools, a scheme for learning will be developed through an exchange of mutual ideas in a global perspective. Through this learning, an international understanding among students will be improved. This plan could be a valuable tool for international exchange in educational field.”

“Global Map School” project is executed according to the following process (also shown in Figure 5.):

- a) At first, discussion theme has to be decided. Then, Global Map data, application tool and data related to discussion theme will be provided to model schools. With these tools, all the model schools will create maps according to the same theme.
- b) Second, ideas among model schools will be exchanged through e-mail and bulletin boards prepared on the Internet environment. Every student and teacher can see the outcomes from other model schools by uploading the results of learning in text or image files.
- c) Then, at an event of exchanging the knowledge, students of each model school will exchange their understanding through teleconference system.

proposed as appropriate activities for applications of Global Map.

“Global Map School” is a project to apply Global Map to educational field as it was considered to be the most practicable. It is expected that the project could become a touchstone for application of geographic information developed by remote sensing and other technologies, in international communication in education.

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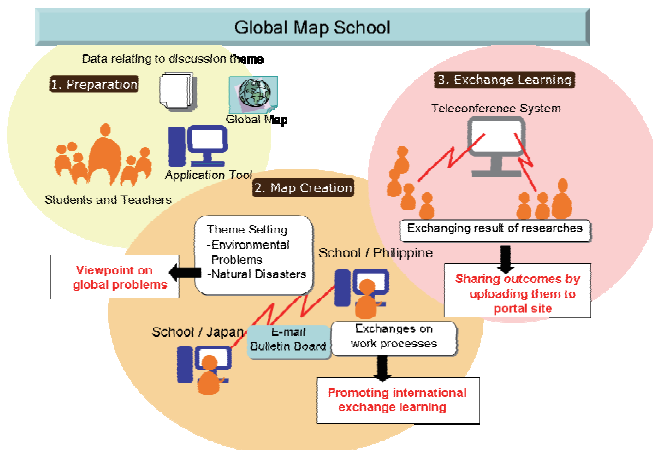


Figure 5. Process of “Global Mapping School” project

Actually, the first “Global Mapping School” project is in progress. Currently, a certain school in Japan and in the Philippine are due to join in this project as model schools. The first event to exchange learning will be scheduled in this September.

Although this attempt might be a simple case study for applying geographic information in the educational field, we hope that the project will be executed as a touchstone for the application of geographic information developed by remote sensing and other technologies, in international communication in education.

5. CONCLUSION

Global Mapping project is a worldwide project with 160 participating NMOs. The project has already released Global Map data of 22 countries. A lot of efforts have been made for promoting the project, however, the project is not so well known to the public.

In view of the importance of publicity, MLIT organized a Committee on Application Strategy for Global Maps in 2003. In a plan developed in 2004 by this committee, six projects were