



Economic and Social Council

Distr.
LIMITED

E/CONF.92/BP.3
12 April 2000

ORIGINAL: ENGLISH

FIFTEENTH UNITED NATIONS REGIONAL
CARTOGRAPHIC CONFERENCE FOR
ASIA AND THE PACIFIC

Kuala Lumpur, 11 - 14 April 2000
Item 9(i) of the Provisional Agenda *

REPORTS ON ACHIEVEMENTS IN SURVEYING, MAPPING AND CHARTING IN
ADDRESSING NATIONAL, SUBREGIONAL, REGIONAL AND GLOBAL ISSUES, INCLUDING:
NEW NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI) AND ASIA AND THE PACIFIC
SPATIAL DATA INFRASTRUCTURE (APSDI)

The International Steering Committee for Global Mapping - Current Status
and Future Plans and Challenges**

(Submitted by International Steering Committee for Global Mapping (ISGM))

* E/CON.92/INF.1

** Prepared by Professor John B. Estes, Chair, International Steering Committee for Global Mapping

The International Steering Committee for Global Mapping: Current Status and Future Plans and Challenges

John E. Estes, Karen D. Kline
Remote Sensing Research Unit
Department of Geography
University of California
Santa Barbara, CA 93106-4060 USA

Introduction

Many people cannot believe that accurate, up to date, global scale map data do not exist. They believe that such products are already widely available. That the products they do see are accurate, up to date, and are inexpensive and simple to make (Estes and Mooneyhan, 1994). This is so even though we, attending this conference, know that none of the above are true. We collectively do not effectively communicate to policy decision makers at appropriate levels the problems with the maps that do exist. That producing high quality map products in a timely fashion is an expensive process. That as technology has advanced, the fundamental science underpinning mapping must advance as well. We have not "spread the word" that among other things, the lack of accurate, up to date, global geospatial data in map form should be of concern at many levels. Without such data, compliance with international accords is difficult to assess. Without such data, relief efforts, in cases of natural disasters, can be impacted. Without such data, planning required for economic development and/or for the preservation of diversity can be affected.

The paper that follows discusses the Global Map project of the International Steering Committee for Global Mapping (ISCGM). In addition to conducting this project, ISCGM members are working to educate people on the importance and difficulties associated with the creation of global map products. The paper that follows describes the current status of the project, plans for the future, and challenges we face as we attempt to further develop global map products and to create more informed consumers and funding agencies.

Current Status

Global Map is a product of the International Steering Committee for Global Mapping (ISCGM). The concept for the development of Global Map was originally presented by the Geographical Survey Institute of Japan as a result of the call for global data in Agenda 21, the document resulting from the 1992 United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro. The plan is for a global database that consists of elevation, vegetation, land use, drainage systems, transportation, and administrative boundaries layers. The sources for these data include the Vector Map Level 0 (drainage, transportation, populated places, and administrative units), GTOPO30 (elevation), and the International Geosphere Biosphere Program's global 1 km land characteristics data product (DISCover) which was produced from the 1 km AVHRR land cover data (vegetation, land cover, and land use). An important characteristic of this project is the involvement of National Mapping Agencies/Organizations (NMA/NMOs) and other interested organizations in the production and contribution of data sets and the validation of their accuracy.

In 1994, global mapping, as defined by Kunio Nonomura, of the Geographical Survey Institute of Japan, and one of the primary instigators of the Global Map project, is a group of global geographic data sets of known and verified quality, with consistent specifications which will be open to the public, considered a common asset of mankind and distributed worldwide at marginal cost (Nonomura, 1994). This definition has continued, in effect, to the present (Nonomura, 1996; Kidokoro, 1999).

What makes the product of the Global Map Project so unique is the level of active participation by NMA/NMOs, and the frequent calls for additional NMA/NMO participation. Below, figure 1 shows the status of participation as of February 8, 2000. Basically NMA/NMOs can choose from three levels of participation in the Global Map Project. These national levels of participation are defined as follows:

- Level A: provide, process, and validate data for the globe and/or your own country, and assist one or more Level C countries
- Level B: provide, process, and validate data for your own country
- Level C: provide data for your country and/or work with a level A country to provide, process, and validate data of your country.

Level of Participation in ISCGM Global Map Project

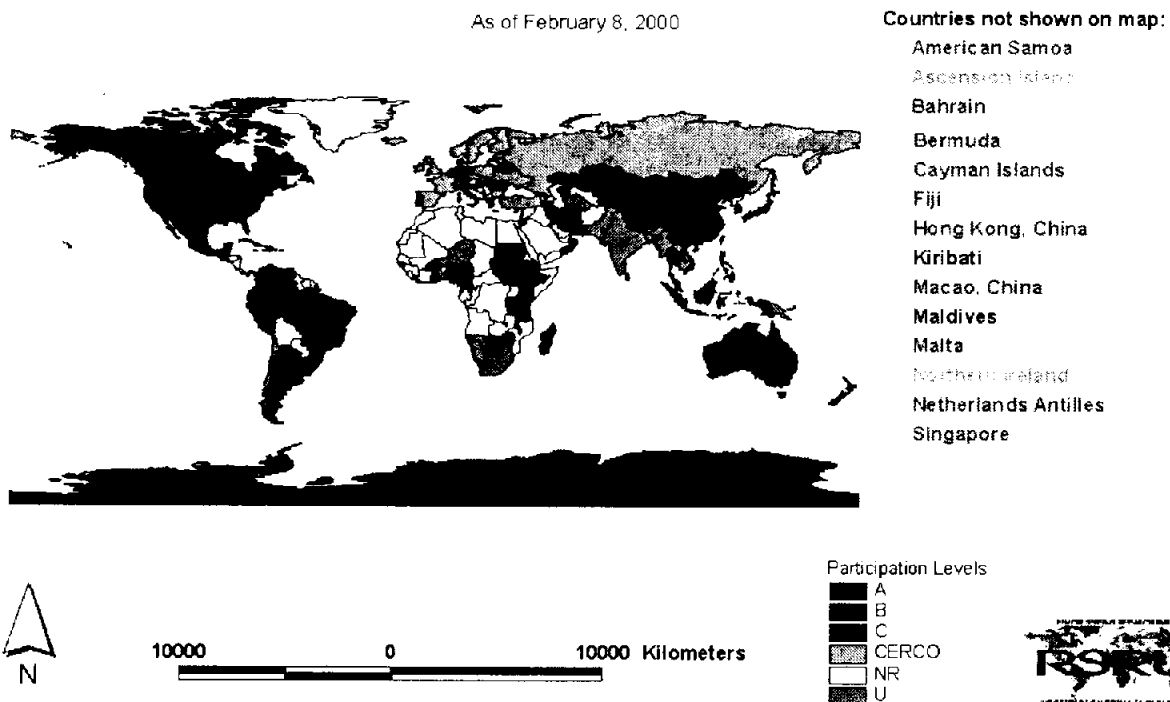


Figure 1 Participation in Global Map project

In addition to NMOs, a number of other organizations with interest in better global map products are participating as either full members or observers. SCAR, the Scientific Committee on Antarctic Research, is participating as the representative for Antarctica.

CERCO, the Comité Européen Des Responsables de la Cartographie Officielle, the organization of European national mapping agencies, will be representing its approximately 35 members in the Global Map project. Additional organizations that are represented at ISCGM in an advisory capacity include the United Nations and the United Nations Environment Programme, the United Nations University, the National Geographic Society, the International Cartographic Association. Liaison status has also been accorded the International Standards Organization (ISO) and CEOS. Other organizations are added to the list as they indicate their interest in participating.

To date, the effort put into this project by all participants, and in particular, the personnel of the Geographical Survey Institute (GSI), Ministry of Construction, Japan, has been tremendous. Meetings of the ISCGM have been held, often in conjunction with Global Mapping forums or other related conferences, since 1994 (Tsukuba, Japan, 1994; Santa Barbara, California, 1996; Gifu, Japan, 1997; Sioux Falls, South Dakota, 1998; Canberra, Australia, 1998; Cambridge, United Kingdom, 1999; Cape Town, South Africa, 2000; Colombia, 2001 (planned)). During this time period between 1994 and the present, within ISCGM, a number of working groups have been formed to focus on specific issues, including standards and specifications. Some of these have subsequently been disbanded as their assigned tasks are completed.

These working groups have been formed within the International Steering Committee for Global Mapping to focus on the development of a strategic plan, to develop specifications for the Global Map product, and to develop data policy. These have produced draft specifications and strategic plans, which are being followed by the Global Map project in the creation of the product. The resulting product will use ITRF94 as the reference coordinate system and the GRS80 ellipsoid. To manage the vast amounts of data, a tiling system will be used, with 5° latitude tiles with varying longitude (Secretariat of International Steering Committee for Global Mapping, 1998).

Currently, data from the GTOPO30, Digital Chart of the World, and the DISCover data sets are being distributed to participating countries. These countries' national mapping agencies have the option of validating the data as it currently exists, or contribute more up to date validated national level data at the 1:1,000,000 scale. As of the writing of this paper, the expected completion date of Global Map version 1.0 is March 2000.

Figure 2 is an example of the Global Map product, presented by Motoyuki Kidokoro at the Cambridge Conference, July 1999.

What are the basic concept and specifications of Global Map?

Example of Global Map

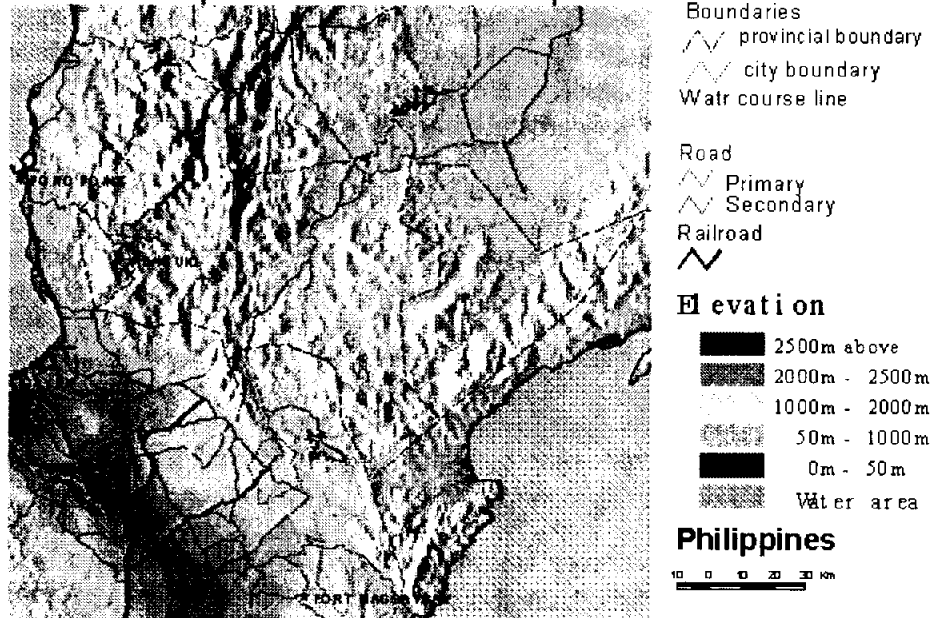


Figure 2 Example of Global Map (Kidokoro, 1999)

Plans for the Future

Now that Global Map Version 1.0 is being released, Phase 1 of this effort is essentially complete and Phase 2 planning has begun. Phase 2 of Global Mapping was originally outlined at the 3rd ISCGM meeting in Gifu, Japan in Nov. 1997. Phase 2 plans were also presented in some detail at the 6th ISCGM meeting in Cambridge, England. ISCGM members are in the process of coming to an agreement on the elements and activities covered by this plan. This will be done at the 7th ISCGM Meeting in Cape Town, South Africa and/or at a date in the year 2000 to be decided upon at the Cape Town ISCGM meeting. The following material then can only be seen as draft for discussion by the ISCGM membership, and is included here for information purposes only.

Goals of Phase 2

Before discussing goals of Phase 2, the overall guiding principles we have followed in the development of Global Map (GM) Version 1.0, as well as the resolution (scale) and agreement regarding cooperation should be both reconfirmed and reaffirmed by the ISCGM membership. As they now stand these items can be briefly summarized as follows:

- Global Coverage
- Consistent Specification
- Open & Worldwide distribution for research, academic, not for profit and government use. Restrictions on commercial use of the data conditioned by the requirements of NMO's providing copyrighted data.

- 1 km resolution for raster
- 1:1,000,000 for vector

The conditions relating to capacity, technology, national security and copyright will not be significantly changed if the resolution/scale of the GM product is not revised. The potential of improving the resolution/scale of the product will be discussed. However, unless there is unanimous agreement among the ISCGM membership that a smaller resolution cell/scale e.g., ½ km or 1:500,000, is feasible, the resolution/scale will remain unchanged

The fundamental scheme for cooperation among participants in Global Map will remain essentially the same as Phase 1. However, some level C countries in Phase 1 may achieve the capability to revise, validate and update GM by themselves. If this is the case, then level A, B and C countries will be re-categorized depending upon their ability to participate in Phase 2 (the production, revision and update of Version 2.0 of Global Map).

The original levels of participation are:

- Level A countries agree to provide national and/or global data, validate data of their national territory and to Assist Level C countries in the validation of data of their national territory
- Level B countries agree to provide/validate data of their national territory
- Level C countries will work with level A countries to provide and/or validate GM data for their national territory

Phase 1 will be achieved by substituting existing improved quality and/or validated datasets in some countries. Follow up actions will be required by these countries to provide their national data or to validate the existing GM framework data layers to ISCGM for inclusion in any updates/revision of the Version 1.0 GM product. (Note: this activity will be contingent upon what ISCGM decides regarding any update of the Version 1.0 product e.g. V. 1.1, V. 1.2) in advance of the production of a Version 2.0 product.

In this follow up period after the production of the Version 1.0 Global Map product, ISCGM would continue actions it has directed and coordinated during Phase 1 as follows:

- Calling for and encouraging participation in GM project by qualified interested parties;
- Providing information and materials for use in justifying NMO and other organizations participation in the Global Map Project;
- Facilitating coordination between Level A and C participating organizations;
- Assisting as required Level B organizations with GM development;
- Keeping watch over activities related to GM Specifications and Data Policies.

The Global Map version 1.0 framework layers will be reconfirmed, and possible additions identified. Currently existing GM Phase 1 (V. 1.0) thematic framework data layers are as follows:

- Transportation
- Drainage
- Boundaries
- Population Centers
- Elevation
- Vegetation
- Land use
- Land cover.

The following material presents an overview of each of the GM 2000 framework data layers. Also included here are what we assume will be the goal for each of these data layers in Phase 2 of the Global Map Project. These should be regarded as proposals that will be discussed by ISCGM members.

Transportation and Drainage

For Global Map Version 1.0, some countries will have provided up-to-date data. For other countries, data came from existing data sets. During Phase 2, these layers will be revised and updated, particularly in the case if some of the data employed in Version 1.0 came from previously existing data sets (i.e., VMap Level 0). While this may not be as high a priority as other data sets at this time, we should still strive to provide users with the best available data practical. Yet, if we are using as a major rationale for Global Map its use in cases of natural disaster, then these two data layers become all the more critical. In addition, when the time comes to move to 1:500,000, the need for the best available data becomes imperative.

Boundaries and Population Centers

For Global Map Version 1.0, again, some countries will have provided up-to-date data. For other countries, data from pre-existing data sets were substituted. All participating countries should be prepared to update these thematic layers as part of any agreed upon revision cycle of Version 2.0 of GM. ISCGM members will discuss the time schedule and methods to be employed in this activity.

Elevation

For Global Map Version 1.0, most of the data for this thematic layer will be derived from GTOPO30. For Phase 2, the validation of the accuracy of elevation for each country will be accomplished. If, in the course of the validation effort the accuracy of GTOPO30 data is found not to be acceptable, ISCGM members will consider development or use of new data sets. The Shuttle Radar Topographic Mapping (SRTM) mission data set would be one possible candidate digital elevation data source.

Vegetation, Land Cover and Land use

Most of the GM Version 1.0 land cover and land use layers will be a transformation of the data contained in the DISCover database produced by the United States Geological Surveys (USGS) EROS Data Center (EDC). The GLCC was compiled from NOAA/AVHRR 10-day NDVI composites from 1992-1993. Some areas, particularly urban boundaries will be revised by interpretation of satellite imagery or

through the use of other country or local level geospatial data products by participating Level A, B, and C countries. During Phase 2, EOS-AM1/MODIS would be able to be used for better classification of land cover. ISCGM, through its Secretariat and its members, might also wish to become more involved in a new project for vegetation and land cover/use classification using MODIS and/or other sensors. In addition to the MODIS land cover mapping efforts there are discussions beginning between the USGS and the European Communities Joint Research Center in Ispra, Italy concerning a new land cover effort.

Additional Layers

The following proposed layers are candidates for Phase 2. The ISCGM members will discuss the proposed additional layers at either the Cape Town meeting or another future meeting to be determined. These are the currently proposed layers:

- Landform classification: A landform classification data layer would be useful for personnel examining how to advance the goals and objectives laid out in AGENDA21. This data layer would be closely linked to the elevation layer. A survey of existing landform data sets will be conducted with an eye to their relationship to AGENDA21 goals and objects. The final categories of landforms (i.e. the classification scheme) would need to be developed, either through the secretariat or interested ISCGM member organizations, then discussed and agreed to by the ISCGM membership.
- Watershed boundaries: This data set would also be valuable for those involved with Agenda 21 and the Kyoto Protocol. It is also a very significant data set that becomes involved in both policy and geopolitical discussion concerning shared watershed (e.g. the Mekong and the Zambezi). A significant part of the watershed layer is already available through UNEP/GRID. This data set is basically the 1K hydro data set, which is essentially a derivative of GTOPO30. There may be regions where the data set needs improvement. Again here a survey of existing data sets will be required.
- Plant ecosystem/landform boundaries: A plant ecosystem/landform/land cover boundary layer related to the vegetation and landform layers can be developed. Such a data layer would be very important for those nations, organizations and individuals interested in preserving and enhancing global biodiversity. It could allow for more reasoned trade-offs to be made between development needs and environmental concerns.

Challenges

A number of challenges face ISCGM as we move forward with Phase 2 planning. A number of these challenges revolve around questions the ISCGM membership must resolve if we are to continue to effectively move forward towards our goal of producing better global geospatial data products.

Basic questions, as we move forward toward Phase 2, include:

- Is ISCGM an effective mechanism with respect to Global Mapping activities or should another international organization be established to carry on what ISCGM has begun?
- If ISCGM continues, how should we work with other international initiatives?
- What time frame is appropriate to direct Phase 2 activities?

- What will be the target year for Phase 2 completion?
- What are the major tasks in Phase 2?
- What amendments shall be required in Global Map (GM) specifications?

As we move forward to address these challenges, we should remember that in Phase 1 of the GM project, we already have a number of important accomplishments that we can point to. These accomplishments include:

- The establishment of ISCGM itself;
- Our ability to gain recognition of the importance of GM and ISCGM at both national and international levels;
- Our ability to attract a large number of nations and organizations to participate in the GM project;
- Agreement among members on the GM specifications and GM data policy;
- The assembly and production of GM itself; and
- The formulation of plans to validate and update GM.

ISCGM members keep in mind the following challenges and issues with particular respect to Phase 2 of the Global Map (GM) Project. The Earth Summit + 10 will be held in 2002 to examine progress being made towards meeting the goals laid out in AGENDA 21. The Santa Barbara Statement, the result of the Interregional Seminar on Global Mapping for Implementation of Multinational Environmental Agreements, November 1996, was presented to the United Nations General Assembly, and Global Map was included in the Programme for Further Implementing Agenda 21. COP3, Kyoto Protocol, decided that by 2005, each country should achieve clear progress towards meeting the guidelines laid out in the Kyoto Protocol. The time frame between 2008 and 2012 are the target years when nations agreeing to the terms of the Protocol agree to achieve a 5% decrease in the loss of carbon stocks when compared to the base year of 1990.

In addition, ISCGM members are aware that they have already agreed to that:

1. Global Map (GM) Version 1.0 will be available in 2000;
2. Updates of GM based on input from participating Level A, B, and C countries are expected (Note: as yet there is no agreement on the details and timelines associated with any form of country level verification/validation update activity)
3. Phase 2 begins 2001. Therefore the first full update (the production of Version 2.0) could come as early as 2005.

ISCGM members are already aware that it will be difficult to achieve all the goals that we have laid out for completion of Phase 1 of the Global Map Project by the end of the year 2000. As stated here, it is a major challenge. ISCGM is in the process of considering whether or not to move some Phase 1 activities into Phase 2.

ISCGM members and participants in the Global Map project have accomplished much, but there is still much to be done. Indeed, more than enough. As ISCGM continues to move forward, we must continue to strive to educate persons at all levels of the need for and difficult challenges associated with the creation of global map products. Framework data, an infrastructure for storing, processing, and delivering data, and technology advances are required on many levels. Our baseline is, however, the

mapping organizations must communicate, cooperate, coordinate, and collaborate (C⁴) if we are to be successful in our efforts to create better products for the benefit of all the peoples of the world.

References

- Estes, J. E. and D. W. Mooneyhan (1994). "Of Maps and Myths." Photogrammetric Engineering and Remote Sensing 60(5): 517-524.
- Kidokoro, M. (1999). Needs of the Global Map for Global Environment Problems. Cambridge Conference, Cambridge, UK.
- Nonomura, K. (1994). Concept of Global Mapping. International Workshop on Global Mapping, Tsukuba, Japan, Geographical Survey Institute, Ministry of Construction.
- Nonomura, K. (1996). History of the Global Mapping Concept and A Perspective on the Future. Interregional Seminar on Global Mapping for the Implementation of Multinational Environmental Agreements, Santa Barbara, CA, RSRU.
- Secretariat of International Steering Committee for Global Mapping (1998). Report of the Fifth Meeting of International Steering Committee for Global Mapping. Canberra, Australia, Geographical Survey Institute: 118.