Global Mapping Based On GIS

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Abstract

Global mapping is an international collaborative initiative through voluntary participation of national mapping organizations of the world, aiming to develop globally homogeneous geographic data set at the ground resolution of 1km, and to establish concrete partnership among governments, NGOs, private sectors, data providers and users to share information and knowledge for sound decision-making.

The primary objective of Global Map project is to contribute to the sustainable development through the provision of base framework geographic dataset, which is necessary to understand the current situation and changes of environment of the world.

The purpose of the Global Map is to accurately describe the present status of the global environment in international cooperation of respective National Mapping Organizations (NMOs) of the world.

International Steering Committee for Global Mapping (ISCGM) has been playing a central role in the development of the Global Map data sets. It was established in February 13th 1996 in Tsukuba in Japan by the participants of the Preparatory Meeting of the ISCGM, and its First Meeting was held in February 14th, 1996.

The Global Map data sets produced by converting existing geographic information into Global Map Specifications and country-specific data sets for 23 countries developed by respective NMOs are currently distributed to the public through internet web site (ISCGM Web p.)

At March 08th 2006, at the web page of International Steering Committee for Global Mapping was published the Global Map data of Macedonia as the first European country. This data is open for all governmental institutions, private sector and other users, only for non-commercial uses.

Key words

Global Mapping, Global Mapping project, GIS

Özet

Küresel harita yapımı; dünyadaki ulusal harita üreten organizasyonların gönüllü katılımıyla oluşturulan bir uluslararası işbirliği girişimi olup, yeryüzündeki çözünürlüğü 1 km olan küresel homojen coğrafi veri kümesi geliştirmeyi ve sağlam kararlar alabilmek için bilgi ve birikimleri paylaşmak düşüncesiyle hükümetler, sivil toplum örgütleri, özel sektör, veri sağlayıcıları ve kullanıcılar arasında sağlam ortaklıklar kurmayı amaçlamaktadır.

Küresel Harita projesinin temel hedefi, dünyanın mevcut çevresel durumunu ve değişimlerini anlamak için gerekli olan temel altlık coğrafi veri kümesini sağlayarak sürdürülebilir gelişime katkıda bulunmaktır.

Küresel Harita'nın amacı, dünyadaki ilgili Ulusal Harita Üreten Organizasyonların (UHÜO) uluslararası işbirliği ile küresel çevrenin günümüzdeki durumunu doğru biçimde tanımlamaktır.

Küresel Haritalama Uluslararası Yönetim Kurulu (KHUYK), Küresel Harita veri kümelerinin geliştirilmesinde merkezi bir rol oynamaktadır ve 13 Şubat 1996 tarihinde Japonya'nın Tsukuba kentinde KHUYK'nın Hazırlık Toplantısına katılanlar tarafından kurulmuştur. İlk Toplantı 14 Şubat 1996'da yapılmıştır.

Mevcut coğrafi bilgilerin Küresel Harita Şartnamesine uygun hale ve 23 ülkenin ilgili UHÜO'ları tarafından geliştirilen ülkelere-özgü veri kümelerine dönüştürülmesiyle elde edilen Küresel Harita veri kümeleri, internet sitesi (ISCGM Web p.) yoluyla günümüzde kamuya dağıtılmaktadır.

İlk Avrupa ülkesi olarak Makedonya'nın Küresel Harita verileri, 8 Mart 2006 tarihinde Küresel Harita Uluslararası Yönetim Kurulu'nun internet sitesinde yayınlanmıştır. Bu veriler tüm resmi kuruluşlara, özel sektöre ve diğer kullanıcılara açık olup, sadece ticari olmayan uygulamalar içindir.

Anahtar Sözcükler

Küresel harita yapımı,Küresel harita projesi,CBS

1. PREFACE

Global Mapping is both a project and a process for developing a group of digital geographical information datasets. Global Map covers the whole land of the earth in 1km ground resolution with consistent specifications and is available to everyone at marginal cost, by the cooperation among the voluntary participation of NMOs.

Partnership among various levels of stakeholders that is essential to realize sound decision - making for sustainable development will be facilitated through the sharing Global Map data, also related information and knowledge.

Global Map data set is applicable for:

- Monitoring and early warning systems for natural disasters;
- Monitoring and management of natural resources such as inland water, land use/cover and land use/cover changes such as vegetation;
- Assessment of the trends of environment changes such as desertification and deforestation;
- Local, national and multi-national physical development planning;
- Informed decision-making of policy makers with a strategic database.

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For these reasons, international organizations and institutions around the globe provide and share global map information about the state of the globe and its changes. The "Earth Summit" - the United Nations Conference on Environment and Development (UNCED) - in Rio in June 1992 also addressed the issue of information access. The report of this session includes mention of the need for global mapping, stressing the importance of public access to information and international cooperation in making it available. It is therefore essential that we have access to the most accurate and up-to-date maps of important environmental features, if we are to properly understand our global environment. At present, available maps of the entire globe originate from various sources and therefore their accuracy is inconsistent, mainly because of irregularities in source material, lack of up-to-date data, gaps in the data, etc. Insufficient circulation of existing map information and a concern for national security have also reduced the availability of maps at a global scale.

The concept of Global Mapping, also including the establishment of an international body for Global Mapping, was first proposed by the Ministry of Construction (MOC) of Japan in 1992, in the same year as the landmark UNCED. The MOC concept was to build global scale geographic information through international cooperation. In the last seven years many countries have embraced the Global Mapping concept. The Geographical Survey Institute (GSI) of Japan provides the International Steering Committee coordinates the Global Mapping initiative for Global Mapping (ISCGM).

The International Steering Committee for Global Mapping (ISCGM) comprises heads of National Mapping Agencies (NMA's), international organizations, and academic institutions. A key to the future success of ISCGM lies in its ability to continue to engage NMA's.

Participation in Global Mapping project is voluntary. Involvement by an organization in the project can generally be categorized as Level A, B and C:

Level A – institution will prepare the data set of own country and other countries,

Level B – institution will prepare the data set of own country,

Level C – institution will give all necessary data, preparation will be done by ISCGM.

State Authority for Geodetic Works as NMO of Macedonia, is involved in Global Mapping project by level B.

In the following map can be shown the progress of Global Mapping project.

2. Short History Of Global Mapping Project

- In 1992 Global Map was proposed.
- In 1994 the first international workshop on global mapping, in Izumo, Japan. The workshop resolved that global map development should proceed with a goal of completion by the year 2000.
- In 1996 the second international workshop on global mapping, in Tsukuba, Japan, the international steering committee was established.

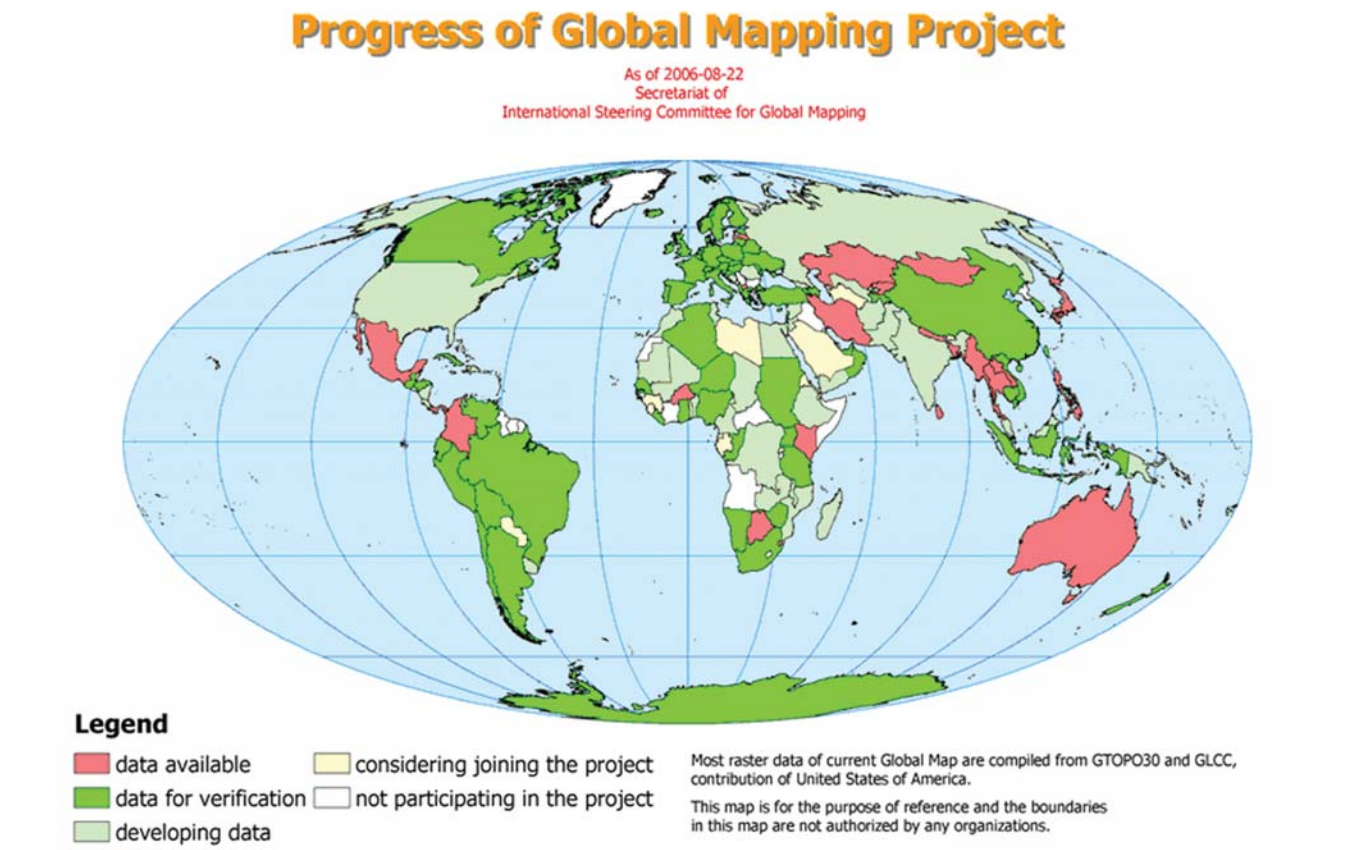

Figure 1: Progress of Global Mapping project up to August 22nd 2006 (ISCGM Web p.)

- In 1997 a general assembly, 19th special session, in New York, USA the adopted document includes a paragraph that states the necessity of global mapping
- In 1998 Global mapping forum, 98, in Sioux Falls, USA with a recommendatory letter of the united stated nations, ISCGM invited National Mapping Organizations around the world, with a recommendatory letter of the United Nations, to participate in the global mapping project.
- In 2000 the first edition of the global map was completed and distributed to the entire world.
- In 2002 "Plan of implementation" of world summit on sustainable development of the Global Map data, Johannesburg.
- In 2005 start of land cover development.
- In 2007 Global Map data of the whole land area to be completed.

3. Organızer-Internatıonal Steerıng Commıttee For Global Mappıng (ISCGM)

The Global Mapping project and its activities are organized and coordinated by International Steering Committee for Global Mapping, a body of professionals from various countries with secretariat at Geographical Survey Institute, in Tsukuba, Japan.

(ISCGM) was established in 13th February 1996 in Tsukuba, Japan by the participants of the Preparatory Meeting of the ISCGM. The first meeting of the ISCGM was held in 14th February 1996.

ISCGM has 20 members from 17 countries and 8 advisors. The primary purpose of this Committee is to examine measures that concerned national, regional and international organizations can take to foster the development of Global Mapping in order to facilitate the implementation of global agreements and conventions for environmental protection as well as the mitigation of natural disasters and to encourage economic growth within the context of sustainable development. This Committee also advocates the importance of Global Mapping, exchanges views, facilitates coordination and give recommendations on Global Mapping. Apart from the above it also conducts various studies and research and makes public the results of its activities.

The Geographical Survey Institute is actively involved in the ISCGM and provides technical assistance among others for the development of the Global Map. ISCGM Secretariat is placed at GSI, and functions as a center for the Global Mapping project.

After the establishment of the committee with its headquarters at GSI, ISCGM invited the National Mapping Organizations around the world to participate in the global mapping project through developing global map of their countries under certain specifications already notified by the secretariat. Under this program, Japan International Cooperation Agency (JICA) arranges group-training courses for the participants from different countries with an objective to train the participants in development and preparation of global map of their respective regions after training at GSI. The first training course started at GSI in 1998 after the fifth meeting of ISCGM in Canberra, Australia besides adopting global map specifications initially.

ISCGM has approved and released specifications for Global Map version 1. Through its continuous efforts ISCGM has succeeded in making "Global Mapping" as part of the "Plan of Implementation" of World Summit on Sustainable Development (WSSD) held in Johannesburg, Aug-Sep 2002. In that meeting has been decided that the Global Mapping project should be finished by the end of the year 2007, as well as to up-to-date every five years.

4. Data Sources

Global Map dataset can be acquired through various types of sources. Typical sources are: analogue and/or digital maps produced by participating organizations, *Vector Map* VMap level 0, GTOPO30 and GLCC.

Analogue and/or digital maps produced by participating organizations – which are the maps at scales of 1:200 000 to 1:million scale would be the appropriate base materials for Global Mapping. Other maps can also be used if the maps are appropriate sources for Global Mapping Project under political, technical or other conditions in each organization.

VMap Level 0 - is an updated and improved version of the National Imagery and Mapping Agency's (NIMA) Digital Chart of the World. VMap0 database provides worldwide coverage of vector-based geo-spatial data which can be viewed at 1: 1million scale, i.e. 1 cm = 10 km. VMap Level 0 includes major road and rail networks, hydrologic drainage systems, utility networks (cross-country pipelines and communication lines), major airports, elevation contours, coastlines, international boundaries and populated places. VMap0 also includes an index of geographic names to aid in locating areas of interest. Application software called VPFVIEW V2.1 has been developed by NIMA and allows users to access and view VMap Level 0 data.

GTOPO30 - is a global digital elevation model. Elevations in GTOPO30 are regularly placed at 30-arc- seconds (approximately 1 kilometer). The horizontal coordinate system is decimal degrees of latitude and longitude referenced to WGS84. The Vertical units represent elevation in meters above the mean sea level. The elevation value ranges from –407 to 8 752 meters. In the DEM, ocean areas have been masked as "no data" and have been assigned a value of –9999 and the lowland coastal areas have an elevation of at least 1 meter. The input data used in the development of GTOPO30 are Digital Terrain Elevation Data (50%), Digital Chart of the World (30%), USGS 1 Degree DEM (7%), Antarctic Digital Database (8%) and the other sources. It was developed over a period of 3 years and completed in 1996 through the collaborative effort led by U.S. Geological Survey's EROS Data Center (EDC). The other participating organizations are NASA, United Nations Environment Programme/Global

Resource Information Database (UNEP/GRID), the U.S. Agency for International Development (USAID), the Instituto Nacional de Estadistica Geografica Informatica (INEGI) of Mexico, the Geographical Survey Institute of Japan, Manaaki Whenua Landcare research of New Zealand, and the Scientific Committee on Antarctic Research (SCAR).

The *Global Land Cover Characteristics (GLCC)* - database has 1 km resolution raster layers developed for use in wide range of environmental and modeling applications. This dataset is derived from 1-km Advanced Very High Resolution Radiometer (AVHRR) data spanning a 12 month period (April 1992-March 1993) and is based on a flexible database on a flexible database structure and seasonal land cover regions concepts. Seasonal land cover regions provide a framework for presenting the temporal and spatial patterns of vegetation in the database. Rather than being based on precisely defined mapping units in a predefined land cover classification scheme, the seasonal and land cover regions serve as summary units for both descriptive and quantitative attributes. The attributes may be considered as spreadsheets of region characteristics and permit updating, calculating, or transforming the entities into new parameters on classes. This provides flexibility for using the land cover characteristics database in a variety of models without extensive modification of model inputs. GLCC version 1.2 is being developed by USGS Earth Resources Observation Data Center, the University of Nebraska-Lincoln (UNL) and the Joint Research Center of the European Commission.

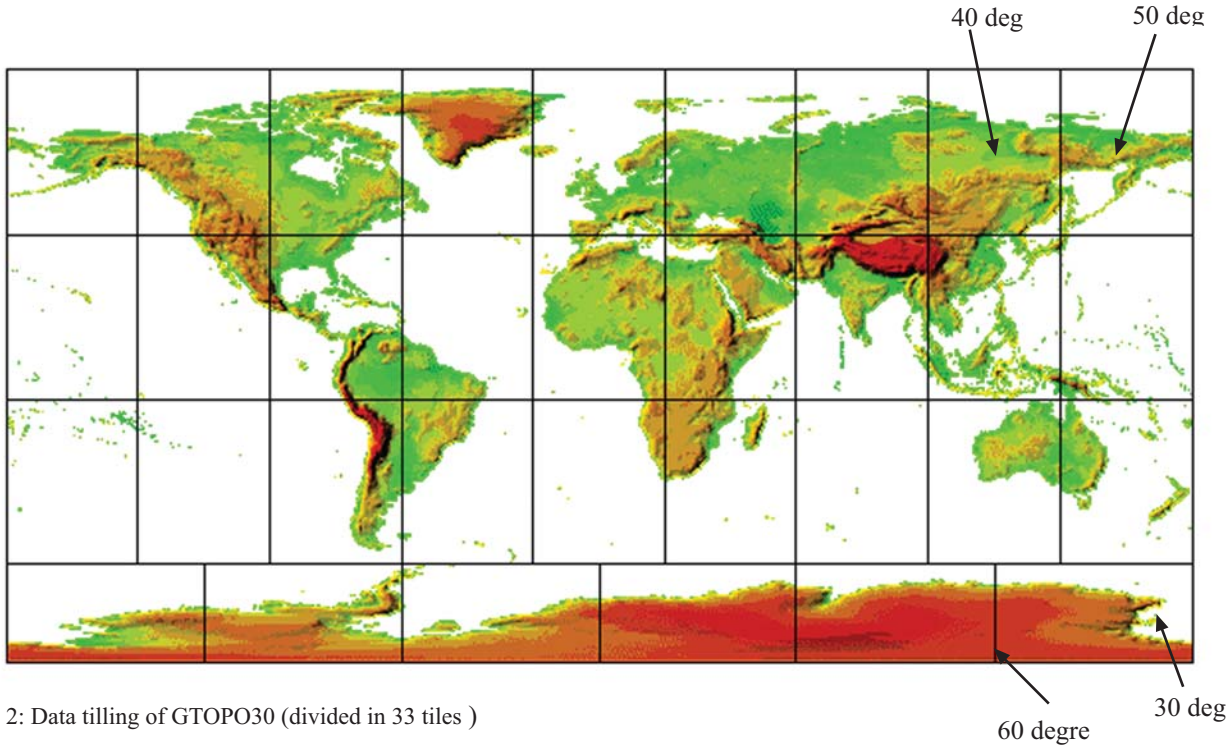

Figure 2: Data tilling of GTOPO30 (divided in 33 tiles)

5. Global Map Data Set

Significant data already exists on a global scale like VMap0, GTOPO30, GLCC etc. To make the initial GM project efficient and achievable, Global Map Specifications Version 1.2 is built around the use of these data and is consistent with ISO TC211 recommendations for geographic data standards.

The Global Map datasets encompass the entire globe at a scale of 1:1 000 000 (equivalent 1 km resolution) and consistent with Global Map specifications. Spatial features are organized into thematic layers in either vector or raster formats with each layer containing logically related geographic information.

Global Map dataset includes eight layers, i.e. four vector layers and four raster layers. Vector layers include the data of transportations, boundaries, drainage (hydrography) and population centers, and raster layers include the elevation, vegetation, land cover and land use data. (INTERNATİONAL STEERİNG COMMİTTEE FOR GLOBAL MAPPİNG 2000)

Table 1. Global map data set layers

Vector Layers	Raster Layers
Transportation	Elevation
Boundaries	Land Cover
Drainage	Land Use
Population Centers	Vegetation

5.1. Vector data

The features of the vector data are represented by the three basic spatial objects viz. points, edges and faces. Each map feature is allocated a category number that is used to link the geometrical data with descriptive, attribute data. Vector data are most efficient for features which can be described by lines with simple geometry, such as roads, utility network, property boundaries, building footprint, etc. In vector data model text

features may also be included but they are optional. Vector layers and the associated feature types are shown in the following table (INTERNATİONAL STEERİNG COMMİTTEE FOR GLOBAL MAPPİNG 2006):

The vector data of GM is in Vector Product Format (VPF). VPF is a standard format, structure, and organization for large geographic databases that are based on a geo-relational data model, combinatorial topology and set theory, and are intended for direct use. VPF is designed to be compatible with a wide variety of applications and products. VPF allows application software to read data directly from computer-readable media without prior conversion to an intermediate form. VPF uses tables and indexes that permit direct access by spatial location and thematic content and is designed to be used with any digital geographic data in vector format that can be represented using nodes, edges and faces.

Table 2. Feature class, name, type and inclusion of vector layers

Layer	Feature Class	Feature Name	Feature Type	Inclusion Macedonia	GM data of
Transportation	Airport	Airport/Airfield	Point	Optional	Yes
	Rail yard	Railroad yard/Marshalling yard	Point	Optional	No
	Railroad	Railroad	Edge	Mandatory	Yes
	Road	Road	Edge	Mandatory	Yes
	Trails and Tracks line	Trail (Vehicle Tracks)	Edge	Mandatory	No
	Structures	Bridge/Overpass/Viaduct	Edge	Optional	No
		Ferry route	Edge	Optional	No
		Tunnel	Edge	Optional	No
	Transportation Text	Text	Text	Optional	Yes
Boundaries	Political Boundary	Administrative area	Point	Mandatory	No
	Coast Line	Coastline/Shoreline	Edge	Mandatory	No
	Political Boundary Line	Administrative Boundary	Edge	Mandatory	Yes
	Ocean/Sea	Water (except inland)	Face	Mandatory	No
	Political Boundary	Administrative area	Face	Mandatory	Yes
	Political Entity Text	Text	Text	Optional	Yes
Drainage (Hydrography)	Miscellaneous	Dam/Weir	Point	Optional	Yes
		Island	Point	Optional	Yes
		Spring/Water-hole	Point	Optional	No
	Aqueduct/Canal/Flume/Penstock	Inland Water	Edge	Optional	No
	Miscellaneous	Dam/Weir	Edge	Optional	No
	Water Course	River/Stream	Edge	Mandatory	Yes
	Inland Water	Inland Water	Face	Mandatory	Yes
	Water Text	Text	Text	Optional	Yes
Population Centers	Built-up area	Built-up area	Point	Optional	Yes
	Miscellaneous	Settlement	Point	Optional	Yes
	Population				
	Built-up area	Built-up area	Face	Optional	Yes
	Population Text	Text	Text	Optional	Yes

VPF defines the format of data objects, and the geo-relational data model provides a data organization within which software can manipulate the VPF data objects. A product specification corresponding to a specific database product determines the precise contents of feature tables and their relationships in the database. In this context, each separate product or application is defined by a product specification and implemented using VPF structures (SOPHANARA et all. 2004)

5.2. Raster Date

The raster data (elevation, land use, land cover and vegetation layers) grid cells are organized and accessed by rows and columns and its cell size is 30" by 30". Its area represented by a square grid cell is computed from the length of its side called resolution. The characteristics of the raster layers of GM data will be shown in the following text.

Elevation Layer - The vertical distance between the surface of the earth and the standard sea level that the nation has defined. Vertical units represent the elevation in meters above Mean Sea Level (MSL). The elevation layer is a Band Interleaved Line (BIL) format with 16 bit elevation value and 30 arc seconds (0.0083..) horizontal grid spacing.

Land Cover Layer - Land cover is the observed (bio) physical cover on the earth's surface (FAO 2000). In Global Map specification version 1.1 the codes of Land Cover

Characteristics adopted for International Geosphere-Biosphere Programme (IGBP) is adopted. IGBP has 17 Land Cover classes. For Global Map version 2, this Land Cover classification legend will be modified by WG4 within the framework of WG2 on specifications.

Land Use Layer - Land Use is a series of operations on land, carried out by humans, with the intention of obtaining products and/or benefits through using land resources (de Bie 2000). For Land Use legend, simplified GLLC with 9 classes is adopted. There is a proposal by WG4 to drop this legend for the next version as this being almost derived from Land Cover data.

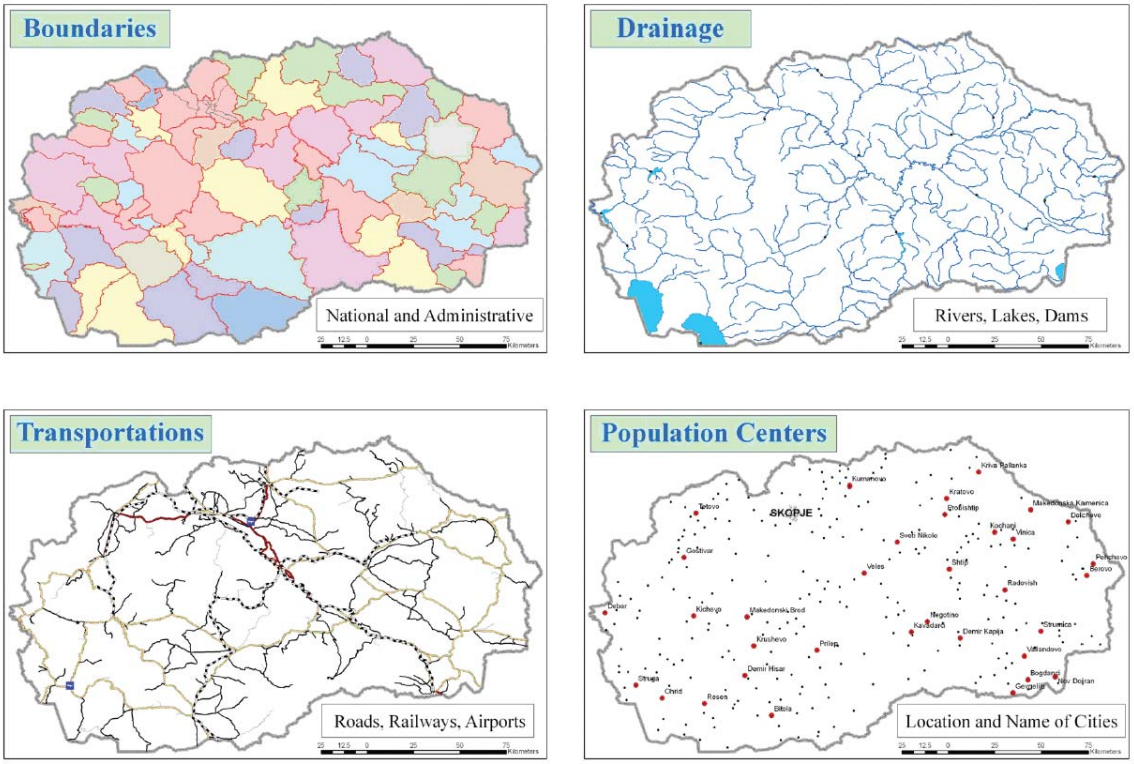

Figure 3: Vector global map data of Macedonia

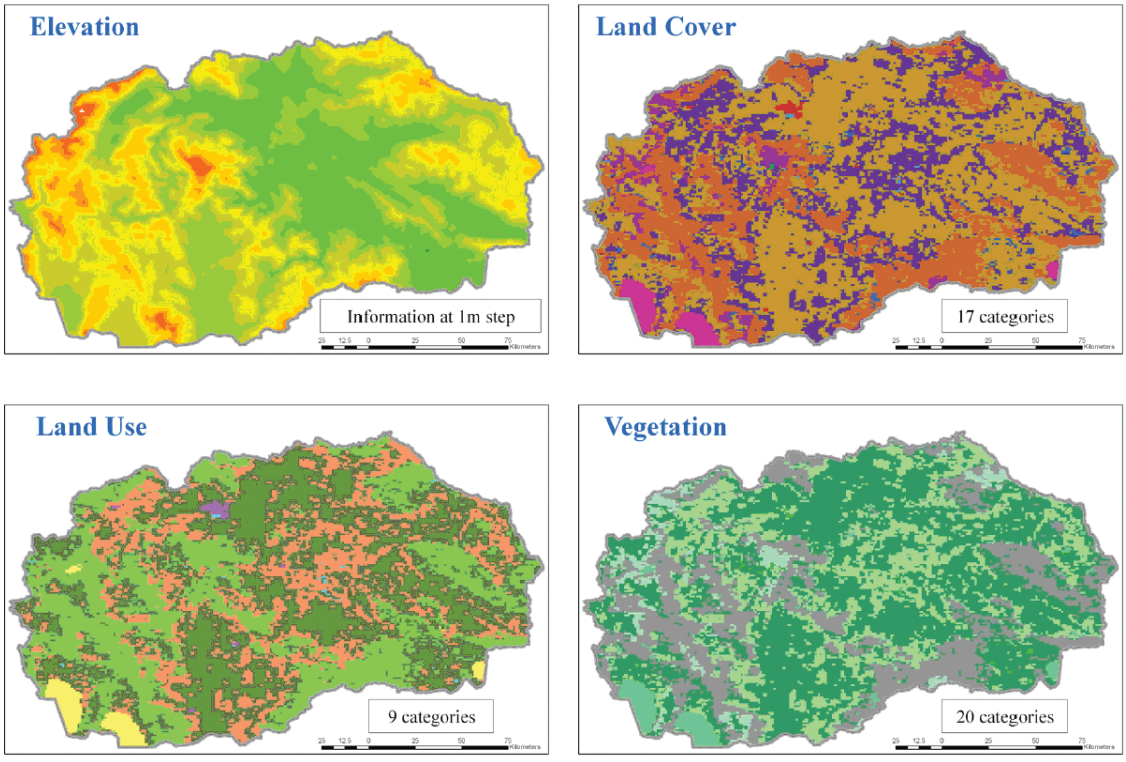

Figure 4: Raster global map data of Macedonia

Vegetation Layer - For Vegetation layer, a modified water legend with 20 classes is adopted. WG4 is working on changing this legend based on percent tree cover for Global Map Version 2.

GM raster data is in simple binary raster format without the embedded header – BIL (Band Interleaved by Line) format. This type of data stores pixel information band by band for each line, or row, of the image. Vegetation, Land Cover and Land Use are in 8 bit unsigned data and the elevation data in 16 bit signed. The elevation data are in Motorola (big-endian) byte order, that is, the most significant byte stored first. A header file accompanies each raster file. *(ISCGM Web p.)*

6. Mathematıcal Elements Of Global Map Data Set

The *reference coordinate system* of Global Map is ITRF94, and its longitudes and latitudes are defined in GRS80 Ellipsoid. Since the difference between ITRF94+GRS80 and WGS84 is negligible in spatial resolution of Global Map, WGS84 can be adopted also (INTERNATİONAL STEERİNG COMMİTTEE FOR GLOBAL MAPPİNG 2000)

A pair of longitude and latitude values describes the position of spatial objects. The data shall be stored in decimal degrees to a minimum of three decimal points as geographic coordinates with southern and western hemispheres having a negative sign for latitude and longitude, respectively.

Resolution of vertical values is 1 meter.

The *positional accuracy* of spatial data based on the composite errors from three sources which are the positional accuracy of source material, errors due to conversion processes, and errors due to the manipulation processes.

For *horizontal accuracy*, 90% of points need to 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 (INTERNATİONAL STEERİNG COMMİTTEE FOR GLOBAL MAPPİNG 2006).

Vertical accuracy is notionally ±150 m 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 (INTERNATİONAL STEERİNG COMMİTTEE FOR GLOBAL MAPPİNG 2006).

Tiling is used in Global map to manage the large amounts of data. All thematic coverages in the global map product share the same tiling structure and coordinate system. There is no overlap or gap between tiles. A naming system called GEOREF is adopted in identification of tiles.

Tiles identify the usage of the GEOREF naming system. The GEOREF system uses two pairs of letters. The first pair of letters represents the coarsest, 15° by 15° standard GEOREF division, and represents the first coordinate pair identifying the tile name.

The first letter represents the first tile partition of the southwest coordinate in the x direction (longitude). There is a maximum of 24 letters to choose from A to Z (omitting I and O), for the 15° bands of GEOREF longitude zones. Longitude zones are lettered from the zone with 180° west as its western edge. The second letter represents the second partition of the southwest coordinate in the y-direction (latitude). There is a maximum of 12 subdirectories lettered from A to M (omitting 1 and 0), for the 15° GEOREF latitude zones. Latitude zones are lettered from the zone with 90° south as its southern extent.

The second pair of letters represents the 1° by 1° standard GEOREF divisions, and represents the second coordinate pair of the tile name. The first letter represents the x-coordinate (longitude) of the southwest corner of tile. There is a maximum of 15 letters to select from A to Q (omitting I and O), for the 1° bands of GEOREF longitude zones. The second letter represents the "y" coordinate (latitude) of the southwest corner of the tile. There is again a maximum of 15 letters from A to Q (omitting I and O) for the 1° bands of GEOREF latitude zones. These letters partition each 15° by 15° GEOREF cell into a total of 225 1° by 1° cells. The following diagram illustrates this arrangement.

Table 3. Dimensions of the Global Map tiling scheme

Latitude	Tile Size (Degrees Latitude by Degrees Longitude)	Origin (Latitude north and south, Longitude)
0º - 40º	5º x 5º	0º, 0º
40º - 50º	5º x 6º	40º, 0º
50º - 60º	5º x 8º	50º, 0º
60º - 65º	5º x 10º	60º, 0º
65º - 70º	5º x 12º	65º, 0º
70º - 75º	5º x 15º	70º, 0º
75º - 80º	5º x 20º	75º, 0º
80º - 90º	5º x 90º	80º, 0º

Thus, the GEOREF system identifies a grid of 1°x1° grid. Tiles take the reference for their southwest corner. So the shaded area in the below diagram represents a tile with the reference FJLA (INTERNATİONAL STEERİNG COMMİTTEE FOR GLOBAL MAPPİNG 2006).

According to this tiling scheme, the tile of the Republic of Macedonia is "*PJDL*".(OBAID et.all 2005)

7. Metadata

Metadata is data about the contents, quality, condition and other characteristics of the data. It also describes the lineage, process and accuracy of the data set. Metadata for the vector layers support by and relate to the quality layer.

A metadata file accompanies each layer within each library. This file is in ASCII file. This file will be named after the relevant theme and have the extension '.met'.

Metadata supplies separately for each layer in the data set. The contents of metadata follow the ISO standard of metadata

(ISO 15046) at conformance level 1: Title; Edition; Issue identification; Initiative identification information; Initiative identification name; Reference date; Responsible party information; Responsible party organization name; Responsible party role code; Postal address; City; Administrative Area; Postal Code; Country; On-line resource linkage;

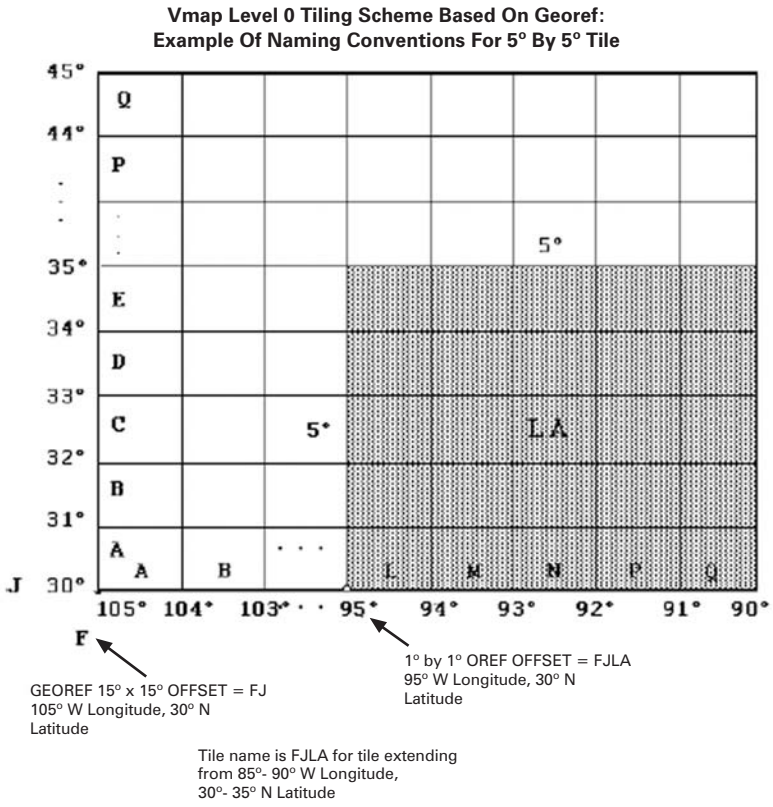

Figure 5: Example of tiling of Global Map data set

Dataset extent; Geographic extent coordinates; West bounding coordinate;

East bounding coordinate; North bounding coordinate; South bounding coordinate; Temporal date/time; Resolution level code; Language of dataset code; Abstract; Purpose; Category; Theme code; Access constraints; Use constraints; Spatial representation type code; Spatial reference system type code; Distribution format name; Distribution media; Distribution resource UTL; Level of conformance code; Language of metadata code; & Metadata date.

8. Utılızatıon Of Global Map Dataset

Environmental issues are closely interlinked one leading to another. A local environmental problem may grow into regional or even global environmental problem, and a global environmental degradation may create a new environmental problem in various other parts of the globe hitherto unaffected by it or it may aggravate the existing local problems. This is precisely because a global outlook is essential to understand the environmental problems affecting our surroundings and to provide a holistic solution towards the same.

Advanced capabilities of researching based on Global Map data set are:

- all data of Earth is in one place,
- with the same attributes,
- in the same format,
- in the same coordinate system
- in the same scale, and
- with similar accuracy (OBAID a.o 2005).

Majority of environmental issues could be referenced to changes in Land Cover, Land Use due to man made and natural causes (deforestation, desertification and loss of biodiversity), and industrial activities (air and water pollution, toxic wastes etc.). Due to the geographic nature of the majority of environmental issues, spatial analysis becomes an essential tool for environmental assessment, monitoring and integrating environment, and development concerns for addressing such questions as: what is happening where, why, and how the problem is being solved. In the past, assessment and monitoring of anything on a global scale were practically impossible due to lack of globally consistent and comprehensive spatial datasets and of the ability to effectively analyze and use such large volume of datasets. Consequently, most of the monitoring and assessment activities were concentrated over small areas and the results derived often generalized for larger areas. The lack of suitable geographical dataset was one of the most serious impediments to the integrated spatial analysis and modeling.

Global Map with its consistent quality and data standards is a handy tool to monitor the environmental status at regional and global scale. With the GM dataset being in digital form, it lends itself to various data manipulation and for modeling real life situations. GM dataset may have limited uses at national and local scales. However, GM dataset is needed to address global, regional, trans-boundary and in many cases national concerns. The following are some of the potential applications of GM datasets:

- Global Environmental Assessments (Ozone, Intergovernmental panel on climate change IPCC, Global Climate Models etc.)
- Global/Regional/National perspective and contextual information
- Developing ecosystem, drainage basins framework for environmental assessment
- Quantifying transboundary issues
- Rapid Response capability/Early warning (Success in predicting El Nino, forest fire)
- Environmental priority setting, analytical studies over large areas (where to invest?)

GM dataset when combined with other data can yield future estimation in various fields like water resources, floods, land use in model calculation so that preventive measures can be taken. It also provides a framework within which the local environmental problems can be modeled and analyzed with appropriate data. Disaster prevention is also possible, if adequate measures are taken based on the information through modeling. Disaster mitigation is another area wherein global map data can be used to effectively address the issues of relief measures. It is helpful in preserving Biodiversity and in promoting re-generation processes of the ecosystem.

The Global Map data sets produced by converting of existing geographic information into Global Map Specifications (Global Map version 0), as well as country specific data sets developed by respective NMOs (Global Map version 1) are currently distributed to the public through internet web site (ISCGM Web p.). Actualy in the web site of ISCGM are available downloading of GM version 0 and GM Version 1 data of 23 countries which have already finished the GM V1 data of their own. These countries are: Japan, Lao P.D.R., Nepal, Thailand, Sri Lanka, and Philippines (in the year 2000), Colombia, Australia, Bangladesh, and Mongolia (2001), Panama, and Kenya (2002), Botswana, Burkina Faso, Kazakhstan, Kyrgyzstan, Mexico, and Myanmar (2003), Swaziland, and Samoa (2004), Iran (2005 year), and Macedonia and Latvia (2006).

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