

DESIGN GIS DATABASE OF WATER RESOURCES

Nguyen Dinh HOA

Deputy Director, Vietnam National University, Hanoi.
Information Technology Institute, E3 Bldg, 144 XuanThuy Road, Hanoi, Vietnam
Fax: 84-4-8361192, Phone: 84-4- 7681347, Email: hoand@vnu.edu.vn

ABSTRACT

The report present the analysis and designing of database for the water resouces inventory system. After making the ER diagram, we clarify the dependency of data fields, define the structure of tables and establish the relationship between the tables. Basing on structures of tables we propose the XML template files for collecting the data

NUMERICAL SIMULATION OF THE GEOLOGICAL AND GEOMECHANICAL PROCESSES

Nguyen Quang PHICH, Heinz KONIETZKY

Hanoi University of Mining and Geology, Vietnam
161 To Hieu, Cau Giay, Hanoi, Vietnam
Fax: 844 7567809, Phone: 844 7567809, Email: nqphich@yahoo.com, phichthuy@hotmail.com

ABSTRACT

Geological bodies are very complicated. In order to investigate and simulate the geological and geomechanical processes going in and on the earth a lot of mechanical-mathematical methods are developed and the numerical methods are in fact the most adequate tool. The presentation will give firstly an overview about the numerical methods; especially those developed by Itasca and then show through some examples the capabilities of numerical modeling to solve the problems in rock engineering and geosciences.

PREDICTION OF LAND SUBSIDENCE IN THAN TRI AREA- HANOI DUE TO GROUNDWATER EXPLOITATION HA NOI DUE TO GROUNDWATER EXPLOITATION

Nguyen Huy PHUONG, Ta DucTHINH, Bui HOC

University of Mining and Geology, Dong Ngac, Tu Li, Vietnam, (84.4)8364810,

Email: longquynh@hn.vnn.vn

ABSTRACT

Thanh Tri is an area with complicated engineering geological conditions. Here occurs land subsidence due to groundwater exploitation, causing adverse impacts on the stability of engineering structures and the life of the community. The task set forth is to research and predict the development of this hazard. The following main research components have been carried out:

- *Application of the systems theory for differentiating engineering geological structures in the area. Each type of structure is characterized by the rule of stratigraphic arrangement of soil and rock layers with specific age, genesis and composition..*
- *Application of variation theory for analyzing the law of variation in thickness of soft soil layers of Hai Hung and Thai Binh formations which are responsible for the land subsidence.*
- *Application of hydro-geodynamic theory for predicting the change of groundwater level and land subsidence due to groundwater exploitation.*

In performing the above research activities, we have applied the MODFLOW, SURFER, GEO-SLOP software programs for data processing and calculation.

GEOSCIENCE INFORMATICS - A NEW CURRICULUM AT FREIBERG UNIVERSITY OF MINING AND TECHNOLOGY

Helmut SCHAEBEN

Freiberg University of Mining and Technology
Geomathematics and Geoscience Informatics, D 09596, Germany

Tel: +49 3731 392784 Fax: +49 3731 394067

schaeben@geo.tu-freiberg.de

ABSTRACT

The new diploma curriculum Geoscience Informatics introduced at Freiberg University of Mining and Technology in fall 2001 will be presented in terms of its objectives, its contents and subjects.

FROM GEOGRAPHIC TOWARDS GEOSCIENCE INFORMATION SYSTEMS

Helmut SCHAEBEN and Marcus APEL

Freiberg University of Mining and Technology, Germ

Geomathematics and Geoscience Informatics, D 09596, Germany

Fax: +49 3731 394067, Phone: +49 3731 392784, Email: schaeben@geo.tu-freiberg.de

ABSTRACT

Geographical information systems are being implemented for input, management, analysis, and presentation of two dimensional geographical data. However, the Earth is three dimensional, and her evolution takes place in four dimensional space-time. The common general objective of the geosciences is the analysis of spatio-temporal and geological relationships of geo-objects modeling reality. To this end query functions are required (i) to sort or filter geo-objects subject to their location, their geometry (e.g. volume, surface area, orientation), their topology (e.g. neighborhood, enclosures, contacts), their physical, geochemical or geological attributes, and (ii) to check the model for consistency and validity.

The basic prerequisite to realize and implement such queries is that the geo-objects have been modeled before. We use the three dimensional geo-modeler gOcad developed at the Ecole Nationale Supérieure de Géologie of Nancy, France, by Jean-Laurent Mallet and his group. At the base of gOcad is a unique data model logically organizing multidimensional data according to a scheme, and a data structure representing the data model, including topological information. Geoscience information systems functions are being developed as plug-ins and use gOcad's 3d geometrical modeling and visualization tools. Queries concerning the topology, geometry, age, type and numerical attributes of gOcad's geo-objects have successfully been implemented and tested.

Geoscience information systems should not be designed according to a given virtual modeling environment, but should rather develop a general and unique data model for either kind of geo-data, raw primary and interpreted secondary data. Thus, it develops a general solution for the storage and management of semi-structured and highly involved geo-data in an appropriate data-base form where the data can be retrieved to be processed by all kinds of software. Our favorite is a XML database with network and query capabilities. Being self-explaining, XML documents seem to guarantee a long life span.

Geoscience information technologies will not be confined to the sole management of geodata, but will also provide functions to model processes in the geosphere and to communicate knowledge with digital media. Thus, the generalization of pure geographic to more general geoscience information systems will carry the geosciences themselves into the communication age.

GIS AND GROUNDWATER MANAGEMENT IN GERMANY

Harro STOLPE

E E+E Environmental Engineering+Ecology, Faculty of Civil Engineering

Ruhr- University Bochum, D - 44780 Bochum, Germany

Fon: +49 234 – 3227995, Fax: +49 234 – 3214701,

Harro.Stolpe@ruhr-uni-bochum.de

ABSTRACT

Geoinformation systems in Germany among other things are used by water authorities, consulting companies and scientific institutions for the purpose of ground water protection, ground water management, investigation of contaminated sites, environmental impact studies etc.

Examples for applications of GIS in Germany are given. A main example is a GIS application in connection with an environmental impact study for brown coal mining and its effects on groundwater and ecology.

Finally the lecture gives an overview of the state and the conditions of GIS application in the field of ground water protection and groundwater management in Germany.

CHALLENGES OF USING OPEN SOURCE GIS EXPERIENCES OF THAILAND

Phisan SANTITAMONT
Survey Engineering Department
Chulalongkorn University
Phayathai Rd., Patumwan,
Bangkok 10330, Thailand
Email: Phisan.S@eng.chula.ac.th

ABSTRACT

The article reports experiences in using open source GIS software for research and development at Chulalongkorn university, Bangkok Thailand. Open source software cuts off budgets, gives freedom to student and researcher to work and to support in-depth learning and training. Spin-off research from open source GIS is now accepted and used in the real practice. Several prototype and operational information systems are developed based on integration of various open source technology. Some interesting projects based open source will be briefly overviewed and demonstrated. A conclusion on benefits and pitfalls of using open source GIS software will drawn at the end.

INTEGRATION OF REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM FOR PREDICTION OF NATURAL HAZARDS IN HOA BINH PROVINCE

Nguyen Ngoc THACH
Faculty of Geography, University of science, Vietnam National University, Hanoi
mthach@yahoo.com

ABSTRACT

Locating in North West direction of the Hanoi Capital, Hoa Binh is a mountainous province with multitypes of landform and climate condition. Hoa Binh - a biggest hydro-electric power station of was built on the Da river, supplying annually about 9 billion kW/hour of electric power but it also causes a lot of effects to lower parts of the dam as flooding, river bank erosion, etc. During process of land exploitation, original forests has been seriously cut off. Therefore natural hazards have been increasing, especially landslide and swept flood in upper parts of the area. The study has been carried with the purpose to zoning where landslide and flood will appear in the future.

By using Remote sensing with SPOT and Landsat –TM data, combined with ground checking, map and related information about natural hazards in the region are created such as: landslide, flood,... The ILWIS (Integrated Land and Water Information System) software package was used for multilayer operation to assess sensitivity values of natural components such as: geology, lineament, soil, engineering, vegetation, drainage network, slope,...which related to natural hazards especially to flood, swept flood and landslide. The software is also used with difference weighting values to create integrated maps and the zoning map for natural hazard prediction. Results of the study content of GIS data base, natural component maps and prediction maps in medium scale and then these maps are confirmed by field checking. The results can be used for planning purposes of regional planning and environmental planning for the local authority. Other results are to establish a suitable procedure for natural hazard prediction in the mountainous region of Viet Nam.

GIS APPLICATION FOR THE GEOSIENTIFIC MAP OF HANOI CITY

Tran Hoang THIEN, Le Tuan ANH

Department of Geology and Minerals of Vietnam

Nghiataan Quarter Caugiay District- Hanoi- Vietnam

Phone: 84-4-7543061, Fax: 84-4- 7560035, E mail: tht1968@yahoo.com

ABSTRACT

Hanoi is the capital, political, economic technical and cultural center of Vietnam. Its appropriate development is not only the hope of its citizens but also of the country, considering that it is merging to the active economic development of Asia and the World. Such wish have become an urgent requirement.

In view of this need for development, the city authority has establish a master plan with priority given to the upgrading of infrastructure facilities, including roads, electricity, water supply, sewerage, telecommunication, and others.

To carry out the master plan, construction of spatial database design for Hanoi city has been carried out to provide urban information. Geological information such as mineral and water resources, landuse, geological hazards (i.e., landslide, flooding, and subsidence) are very useful for planners or decision makers. In this study, GIS software was used to design and construct the spatial database.

MODIS DATA FOR TERRESTRIAL ECOSYSTEM MONITORING IN INDOCHINA REGION: A STUDY WITH TEMPERATURE-VEGETATION DRYNESS INDEX

TRAN Hung, Shiro OCHI and Yoshifumi YASUOKA

Institute of Industrial Science, University of Tokyo

4-6-1, Komaba, Meguro-ku, Tokyo 153-8505, Japan

Tel: +81-3-5452-6415 Fax: +81-3-5452-6410 E-mail: tranhung@iis.u-tokyo.ac.jp

ABSTRACT

The Moderate Resolution Imaging Spectroradiometers (MODIS) on the TERRA satellite can provide information about the Earth's surface in various wavebands: solar spectrum, SWIR and in thermal range. The vegetation index (NDVI) has long been successfully used to monitor the vegetation status, while the land surface temperature (T_s) in a tropical area is largely an indicator of the latent heat flux. Thus, T_s and NDVI combination could be a better indicator of vegetation and moisture conditions at the Earth's surface. This paper attempts to explore T_s /NDVI space and utilize the Temperature-Vegetation Dryness Index (TVDI) proposed by Sandholt et al. (2002) to the time series of MODIS 8-day composite data. High-resolution satellite images such as ETM+ and ASTER are used in some hot-spot areas as validation. The Indochina region, where increasing deforestation, intensive cultivation and rapid urbanization together with extreme climatic events are reported to cause flood, droughts, forest fire during the last few years, are chosen as the study area. The result of this research demonstrates the capability of high-temporal resolution MODIS data in monitoring terrestrial ecosystems in tropical areas. With more MODIS data accumulating everyday and available ground observation data, TVDI could be analyzed over the years and used on the inter-annual basis to develop agricultural disasters early warning system for the region.

INTEGRATION OF GEOLOGICAL DATA SETS USING INFORMATION TECHNOLOGY, A RENOVATIVE APPROACH TO IMPROVE THE QUALITY OF GEOLOGICAL MAPPING AND INTERPRETATION: A CASE OF APPLICATION FROM CANADA AND VIETNAM

Tran Thanh HAI, Dang Van BAT, Pham Duc TY, Ha Van HAI, Pham Nguyen PHUONG, Hoang Van LONG, and Nguyen Quoc VIET

Department of Geology, Faculty of Geology, Hanoi University of Mining and Geology, Dong Ngac, Tu Liem, Hanoi, Vietnam Fax: 84-4-8385840, Phone: 84-4-8384048, Email: bichhai@fpt.vn

ABSTRACT

The rapid advance of information technology during last twenty years has driven great changes in all aspects of human society and created both opportunity and challenge to improve the quality of scientific works, including geology. In geological study the achievements brought about by the application of information technology are numerous, notablign quantitative, qualitative, and time-saving semi-GIS management of geological database (field, remote sensing, geophysical, geochemical, and geochronological data), data processing and integration, production of digital maps, modeling, presentation, and data exchange via GIS. Thus, information technology has become an effective and a 'must' tool in geological study around the world. Presently, the application of information technology in geological works in Vietnam, however, is still very limited, lagging far behind from that of the world. Such a shortcoming requires significant attention and investment of the geological community in Vietnam in order to make information technology a truly effective and modern tool in geological study. In this paper we present our initial attempts in applying information technology to geological mapping using various field databases collected from north-central Saskatchewan, Canada and Lang Son Town (i.e., a geological field school of the Faculty of Geology, Hanoi University of Mining and Geology) in northeastern Vietnam. The products are high quality, multi-layered digital geological maps and tectonic models, which result from a systematic procedure from data management, data processing and integration, digitally producing geological and/or structural maps, to modeling and presenting the results on the basis of various PC-based programs. We hope similar approaches, with the help of suitable computer programs, will become routine procedures in geological mapping in Vietnam in the near future.

DESIGNING AND MANUFACTURING PC-BASED GROUND STATION HRS-200

Bui Doan TRONG, Bui Trong TUYEN, Tran Minh VAN
STAC, Inst. of Physics, NCST of Vietnam Email: srg@hn.vnn.vn

ABSTRACT

This paper will present a system, which is named HRS-200, has been developed at STAC, Inst. of Physics, National Centre of Natural Science of Vietnam for receiving and processing S-VISSR (high resolution image) from geo-synchronous weather satellites GMS-5 (Japan), FY-2B (China). This system also is able to reach HiRID data from MT-SAT that is new series of Japanese geo-synchronous weather satellite. The system is based on PC computer and WIN-software is user-friendly. The station consists of an antenna; a low noise amplifier; a down-converter; a receiver; bit and frame synchronizer; and ingestor card. The software contains service image processing functions that could be divided into four main modules: receiving module, preprocessing and displaying module, conventional image processing and application. One of a local area network maybe set up in order to enhance whole capability service of system. The station has operated since 6/2000 and registered in MDUS list of Japan Meteorological Agency (JMA).

RESEARCH FOR THE BASES AND METHOD OF CREATING GIS GEOTECHNICAL DATABANK OF HANOI

Pham Van TY, Trinh Quoc HIEN

Hanoi University of Mining and Geology
Hanoi Urban Architectural Consultant Company(UAC)
Dong Ngac, Tu Liem, Hanoi , Vietnam
Fax: 84-4-8385840, Phone: 84-4-8387570, Email: ttenth@hn.vnn.vn

ABSTRACT

A digital spatial Geotechnical relational data model had been designed, in which Geological, HydroGeological, engineering geological and Geotechnical data, including text descriptions and spatial objects, had been fundamentally taken into account from the spatial point of view that classifying data into three interrelating categories: Map's, legend's and description's. The purpose of the design is to develop a digital data model to supply user with structure for computer organization, store and exploration of mentioned information, including maps.

The data model defines formal grammar of GeoData. This grammar is independent of GeoVocabulary. For a fully information potentiality, both grammar and vocabulary had been taken into account. The main purpose of the design is to develop a digital data model for GeoInformation. Second purpose is to develop as much as possible related vocabulary. This vocabulary not only help understanding better the data model, but also can help process of creating a corresponding GIS system.

The created data model is entity - relational, clear conception of which is: spatial data to be managed by GIS management system and non-spatial - by RDBMS. This approach is independent of both softwares and hardwares.

At first steps of the modeling process, some criteria, that the model must meet, had been defined as follows: 1- The model must be easy to apply and must be comfortable for digitizing persons or organizations; 2- There must be a set of corn requests; 3- The model must be opened; 4- There must be a mechanism for store of field data. 5- The model does not fully define standard vocabulary, but must have ability to combine vocabulary standards. 6- The model must control errors of dictionary coding when compiling GeoVocabulary. This work, if necessary, could be simplified by built-in tools. 7- Attributes of commonly related spatial objects must be stored together in order to make suitable GeoProfessional analysis.

Base on this model, an experimentalised GIS application software have being developed, using visual basic, visual C++, visual FoxPro 6.0 programming languages and a very simple graphic environment such as of MapInfo. It would much more better if authors could access a truly GIS environment(s) or tools. Anyway, the developing software seems to be good for the basic database functionality (store, update and attribute and/or spatial query MapObjects) that planned for it. The functionality that not included yet in this software is: data analysis and map digitizing.