

Cybercartographic Atlas of Antarctica Main Issues

Main Principle and Target

Cybercartographic Atlas of Antarctica is an integrated and multifunctional system by which the Antarctica information can be served and shared all over the world in order to playing an important role in research and application. Its main functions are logging on, sorting, storage, query, reducing, statistic, mapping, analysis, estimating, management and exporting Antarctica information. Potential methods of data representation are maps, text, charts, images, time series animation, 3D visualization, audio and video etc. Data query, browsing, explore, dynamic mapping, statistical analysis etc. can be realized on the Internet by users.

Potential Method of Data Representation

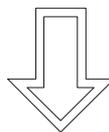
- (1) Various types of dynamic maps. Some dynamic maps are tense maps that represent Meta -map variation along with time, such as moving of coastline of Fildes Peninsula, variation of snowfall and rainfall and snowline variation. Further some dynamic sketch map show the direction and path of sea current and wind.
- (2) 3D map browsing function. The atlas have 3D map browsing function including scale variation of 3D map, 3D map cruising and turning around axes X, Y, Z. Besides this 3D thematic maps is another form which is a kind of virtual 3D map on which the attribute values can be displayed as value Z. for example, 3D icecap thickness map, 3D snowfall map etc.
- (3) Vivid virtual 3D relief fly browsing. The system develops vivid virtual 3D relief fly of Antarctica. The virtual 3D relief will be founded on DEM with real color texture on them. The 3D maps can fly along different lines such as along shorelines, Zhongshan Station to Great wall Station.

System Structure

The Cybercartographic Atlas of Antarctic includes data, software, multimedia material, model and methods, and also its four functions, i.e., the function module of atlas browsing, display and simulation, query as well as analysis. Data are main contents including vector map, raster map attribute data. Multimedia material is auxiliary contents of data such as illustrative text, object pictures, scene video and audio etc. Model and methods are essential driving tools to represent, analyze, and simulate information including symbol model, color model, representative methods and analysis and simulation model. Software is used for organizing, linking, packing and handling data, multimedia material, model and methods including interactive interface, map and image handling and database handling. The atlas consists of the function modules of atlas browsing, display and simulation, query as well as analysis. The function module of atlas browsing is first met when user opens

the atlas. It includes catalogue browsing, sheets map browsing and switching between different maps. The function module of display and simulation is the most basic module. Besides displaying and simulating 2D maps it can display index and contrast between all area map in small scale and partial area map in large scale, interactive legend and 3D map and can simulate animation. The module of query is another basic module of Cybermap. It serves for database handling and can realize the query according to keywords and expression, fuzzy and user-defined query besides bi-direction query. The module of analysis includes length and acreage measure, section analysis and thematic analysis.

<p>Data</p> <p>Vector map, Raster map Attribute data.</p>	<p>Software</p> <p>Interactive interface, Map and image handling Database handling.</p>
<p>Multimedia material</p> <p>Illustrative text, Object pictures, Scene video and audio</p>	<p>Model and methods</p> <p>Symbol model, Color model, Representative methods Analysis and simulation model.</p>



<p>Atlas browsing,</p> <p>Catalogue browsing, Sheets map browsing Switching between different maps.</p>	<p>Display and simulation,</p> <p>Display index and contrast Display interactive legend Simulate animation. Display 3D map</p>
<p>Query</p> <p>Bi-direction query Query according to keywords and expression, Fuzzy and user-defined query</p>	<p>Analysis.</p> <p>Length And Acreage measure, Section analysis Thematic analysis.</p>

System Structure of Cybercartographic Atlas of Antarctic

Data Preparation

1. Because data sources and kinds are various and adopted scale, projection and data accuracy are different, all data must be put into only one coordinate system in order to develop again based on it. We can think over geographic coordinate system, that is to say, the position is described by longitude and latitude.
2. It is necessary to establish unitive standards that used for vector data, raster data and attribute data of format change and other geographic information. The corresponding software needs to be produced.
3. Data quality control is an important issue. First, data accuracy includes position accuracy that means difference between position on map and real geographic position and attribute accuracy. Second, data logicity means the logistic relation between data elements. Thirdly, data integrality means integrality of data semantics, data quantity and data classes. Finally, data timeliness and renewing is another important thing that can ensure the Atlas' quality.

Key Technical Problems

1. Choice platform to develop the Atlas. GEOSTAR is GIS software developed by Wuhan University. King George Island WebGIS has been built based on it. In China, the Electronic、Internet version of National Physical Atlas of China has been produced. The technical platform includes Director 8, Visual C++ and Flash. The browser technology adopted Java Script and server technology adopted VB, MapObjects and MapObjects IMS. Atlas 2000 is an E-Map software developed by Wuhan University. We have produced the E-map of Shenzhen city and the Arctic E-map.

Atlas2000 has strong function in following of:

- Vivid virtual 3D relief flying,
- Making Color relief map,
- Data representation using various media,
- Display and cruise based on vector and raster map,
- Defining dynamic hot points and many kinds of interface effect,
- Defining communication net and the best path query,
- Linkages of current data format map of vector data or raster data,
- Query according Attributes,
- ODBC and access in bi-direction from attribute to map or map to attribute,
- Display, cruise and zoom of alterable scale vector and raster map,
- Design and define first and last page and background music and voice,
- Linkages of hot words, multimedia information and map,
- Defining hot points, lines and areas and linking them with multimedia information and map,
- Navigation function by connecting with GPS.

Its advantages are following:

Better Map Quality—Add vector map onto raster image (Satellite Photo, Picture from DEM, etc) easily, 3 Dimension maps, Virtual reality maps.

Human Interface—Interactive Manipulation

Flexible Multimedia Link—Integrate almost all kinds of fashionable media in maps and Link each other through multimedia database.

Web Support—Connect with INTERNET, Develop Web GIS, Set up and maintain special map website, Provide spatial information query design by INTERNET,

GPS Satellite Navigation—Receive satellite signals and Display mobile position in high precision maps.

High Efficiency—Produce CD-ROM map in a very short time.

Stylish Products—CD-ROM maps, Web Active, GIS system, Software related with maps.

Atlas-3D is the serious software of Atlas2000. It is used for build DEM based on small and middle scale maps. It also can join and compress DEM and make color relief map and 3D simulate fly. Its five function modules are DEM, color relief map, 3D simulate fly, virtual city model and map edit.

2. Establishing 3D model and dynamic data model.

The 3D topographical data model can adopt GRID model and object model. The model to represent thematic contents adopt linear tree model. The tense data model is more important too.

3. Integrating various source and kind data.

4. Building of Cyberspace.

5. WebGis resolution on Internet.

Proposal of New Subject Areas

1. Seabirds.

2. Vegetation, Such as lichen and moss.

3. Impact of human activity in the Antarctic Ecosystem. The supporting research is in progress. The research is a cooperative study of JENA University German and Third Institute of Oceanography State Oceanic Administration.