Integrated data management system of Korean marine geological and geophysical data

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An integrated database system was developed to manage and provide marine geological data and marine geophysical data obtained by several Korean institutes. The system consists of two sub systems. One is the archive DB system which manages original data submitted by research scientists, the other is geographic information system which manages GIS data and provides information to the users. We established data management procedure for the data collection, processing, quality control and DB input for continuous data collection. According to the procedure, we collect data from Korean institutes every year and update DB system.

Establishment of the archive DB system was accomplished through 7 steps, (1) checking the format of submitted data files (2) grouping data files by data items and research (3) retrieving metadata (position, date and time, etc.) from the submitted data files (4) validation of metadata and observation data (5) making the connection between metadata and observed data (6) rearrange matched metadata and observation data according to the DB structure (7) storing rearranged data into DB system. To make a reliable DB of system, we spent much time to validate submitted marine geological data and geophysical data. In case of marine geological data, we collected size analysis data, columnar section image, photographic data, X-ray data, heavy metal analysis data, organic carbon analysis data obtained from surface sediment samples and core sediment samples. The data formats were image file, ASCII text file and Microsoft Excel file. In case of marine geophysical data, seismic data, magnetic data and gravity data were collected in formats of SEG-Y binary file, image file and ASCII text file. We could retrieve metadata from ASCII files and Excel files directly and specialized software (Seisview2 software or BATHY2000) was used to retrieve metadata from SEG-Y data files. After validation work which checks the observation location and time using the positioning maps, some of the submitted data were excluded from collected data files. Finally we could establish the integrated DB system contains 4,522 seismic data files, 14,189,005 magnetic data, 3,515,831 gravity data, 1,638 surface sediment data and 9,023 core sediment data. Oracle RDBMS was adopted to manage the collected data and Oracle 11g was installed on UNIX system. Considering the data characteristics, DB structure was designed and 38 DB tables were created in the DB system. All data was stored into DB system using Oracle SQL Loader.

The geographic information system was introduced to manage spatial information of oceanographic data and provide data effectively using map interface. All collected position data of the marine geological data and geophysical data was converted to Esri shapefile format using UTM coordination system based on WGS 84 datum. ArcGIS desktop software was utilized to import position data from ASCII files, manipulate data and produce shapefile data. To save and manage shapefile data systematically, a GeoDatabse was devloped using the Oracle RDBMS and ArcGIS SDE (Spatial Database Engine). Total 40 DB tables were created in the Oracle 11g and all shapefile data was stored into DB system. We made the linkage between data of the GeoDatabase and data of the Archive DB for comprephensive data and information provision.

A GIS application based on ArcGIS Engine was developed to provide geographic information and observed values of oceanogrpahic data. The window of the GIS application consists of map window, image viewer, graph viewer and SEG-Y viewer.