

The Earthquake Case Study and Disasters Information System Based on the GIS

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Abstract: The Earthquake Case Study and Disasters Information System based on GIS (MapECDIS 2002 for Windows), sponsored by Science and Technique Ministry of CHINA, is a GIS system developed to provide a tool for the government and the public to query and comprehend the disaster information (since 2221BC) and case study results (since 1966) of destructive earthquakes occurred in China. The system is expected to be useful for the earthquake forecast practice, the seismology research and earthquake disasters research as an applied assistant tool. The design idea and main functions of the system are introduced in the paper.

Key Words: Earthquake, Case Study, Disaster, GIS

1. Introduction

The Earthquake Case Study and Disasters Information System based on GIS is an application system with the data collected from 11 published books. It is expected to be useful for the earthquake prediction and prevention. The design aim and main functions of the system are introduced in the paper.

2. Object and Functions of MapECDIS

The main object of MapECDIS is to establish databank of the case studies and disaster information of destructive earthquakes occurred in China; Based on the databank, The Earthquake Case Study and Disasters Information System based on GIS was developed. Under the integration control environment, the system has the following functions:

1) Databank management function

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The system manages information in a MS Access databank.

2) Information query function

Various query functions were developed in the system. The main query methods are as following:

(a) Basic query. The case study information can be simply queried according to district or event occurrence time.

(b) Advanced queries. The earthquake cases can be queried according to the occurrence interval, spatial region or magnitude range of earthquakes; The seismic observatory stations can be queried by distribution area and observatory method and linked to the cases records. The cases can also queried from the information of tectonic background records, the earthquake sequence, the seismic mechanism records, the precursory data, the anomaly statistical data or historical earthquake records.

(c) Map queries. Query can also be directly performed with spatial rectangle, circle, polygon or boundary selection on the map.

3) Theme map creation and display functions

User queried spatial features and attributes can be created to the theme map and shown on the map windows.

4) Basic Map manipulation function

The created map can be zoomed in/out, full extended, panned, clipped et al.

5) Attribute data browser function

The queried attribute data can be browsed in HTML format. User can also browse them through information button provided by MapInfo.

6) Information statistical function

Some basic functions for earthquake disaster

statistics under different condition were provided by the system.

7) Document hyperlink and browser function

When a user select a case study content of a queried event, the system will linked to the electronic document which provides very detailed description in HTML format.

8) Output function

The map, table or document in HTML format can be outputted in file(s).

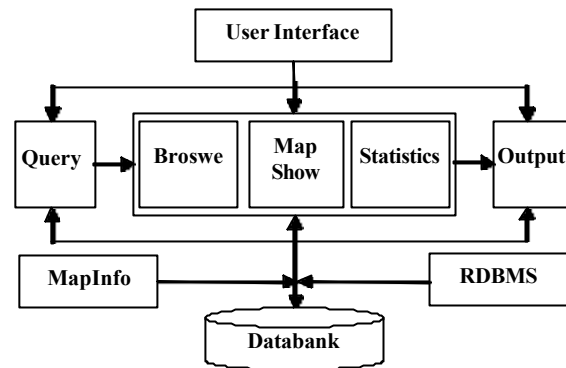


Fig. 1. System scheme of MapECDIS

3. Databank of MapECDIS

Different kinds of data are used in MapECDIS, which include the earthquake case study data, the historical earthquake disaster data, basic geographical information and **theme** data et al. Most of them are stored in database and accessed through ODBC. They can be queried and transformed into map layers.

1) The earthquake case study databank

The earthquake case study data are main information as following:

(a) Basic information of earthquake events and seismic stations, such as earthquake basic parameters, earthquake sequences, **seismic mechanisms** and references et al.

(b) Background information of **seismic source** region including geological structure and tectonics.

(c) Historical earthquake activity.

(d) Earthquake precursory information, including precursory events and statistical tables for stations and statistical tables for different observation items et al.

(e) The information of disasters caused by earthquakes.

The total case study events are 189 during 1966-1996^[1-6] (Figure 2).

2) The earthquake disaster databank

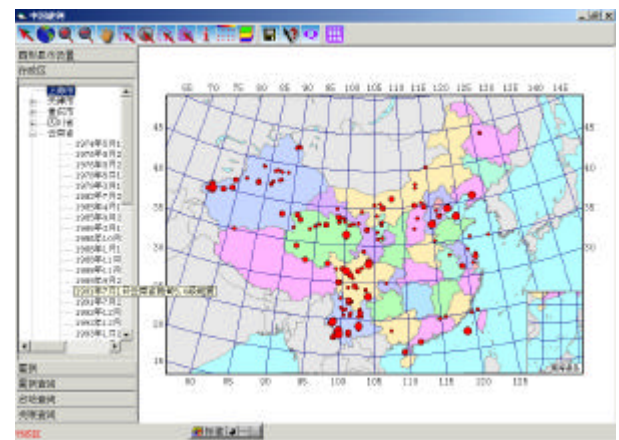


Fig. 2. Map of earthquakes for case study in China (1966-1996)

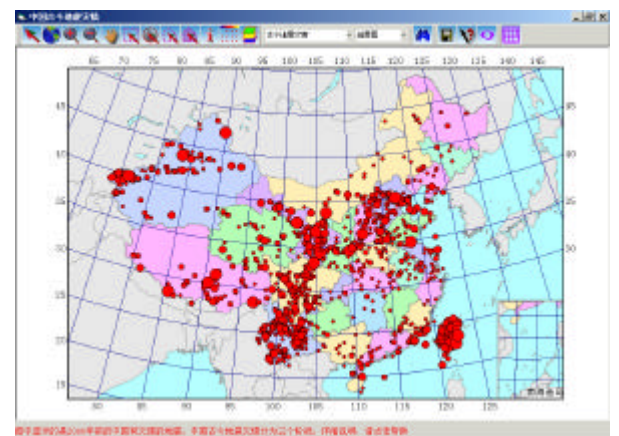


Fig. 3. Map of historical destructive earthquakes with damage recorded in China (2221BC-2000 AD)

(a) The earthquake disaster table in different period. Because of difference in completeness, details, description of disaster events in different historical period, three tables were designed to record the

disaster event in different historical periods (1949 and before, 1950-1992, 1992 and after).

(b) The earthquake disaster table in all historical period. In order to display, compare and make statistics for earthquake disasters, an assemble table is designed to record all destructive events with basic disaster information such as deaths and economic losses et al.

The total of destructive events recorded since 2221BC are 1481^[7-9] (Figure 3)。

3) The electronic earthquake case study documents

The case study documents of earthquake (1966-1996) in 6 published books were compiled in HTML format. The MapECDIS can select a case by querying and link



Fig. 4. Case study document in HTML format

to the relative case study documents, tables or figures to get detailed information of the earthquakes.

4. Conclusion

The MapECDIS is a system easy to use, it is based on MapInfo and ODBC with various query functions,

rich data and documents coming from 11 published books. As a successful example applying GIS, it is expected to provide some ideas for the similar software development.

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