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### The EUROSEISMIC project - providing access to marine geological data

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The European Commission Fifth Framework project is funding a project to compile metadata for offshore seismic and sonar survey information. The EUROSEISMIC (European Marine Seismic Metadata and Information Centre) project started in January 2002 and will end in December 2004. Initially, the project had 16 partners, principally the marine geology departments of the geological surveys of the EU member states, however in 2003 the project was joined by partners from Lithuania, Latvia, Estonia, Poland, Romania and Bulgaria to provide representation from 20 countries. EUROSEISMIC will present metadata for over 2 million line kilometres of survey information held by the project partners and, when possible, other organisations in each country such as universities and government research departments.

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## INTRODUCTION

The scientific study of the marine environment and the sustainable development of resources are increasingly the subject of international co-operation. Research into marine habitats, climate change, pollution control, coastal development, commercial activities such as hydrocarbon exploitation, cable and pipeline surveys, marine aggregate extraction and offshore structures such as windfarms, all require access to existing marine data resources.

Until recently, many of these data resources were available only in widely dispersed research organisations and information centres, which focussed mainly on national requirements. During the last 30 years, the marine geology departments of the European geological surveys have acquired a vast data resource of seabed samples, cores and seismic survey information. In the late 1990's the geological surveys of the 14 maritime member states of the European Union participated in two proposals that aimed to address the issue of providing knowledge of existing seabed sample and core data.

One proposal, the European Marine Sediment Information Network (EUMARSIN) proposed to compile metadata for all samples and cores held by the geological surveys in European seas. The other,

EUROCORE, proposed to collect metadata for samples and cores from anywhere in the world, provided they were held by a European institution. During 1998, both proposals were accepted and funded by the Marine Science and Technology (MAST) programme of the Science, Research and Development Directorate General within the European Commission's Fourth Framework Programme.

The two projects were integrated to form the EU-SEASED Website (<http://www.eu-seased.net>) which makes use of a single Internet-access database presently holding information for over 220,000 sea-bed samples and cores from around the world, acquired by over 60 marine organisations from Europe. The searchable database provides information on the sample location, equipment type, sub-sample analyses, storage conditions and the organisation that should be contacted for access to the sample material and/or data. In addition to the metadatabase, the Website has an area for end-users to contribute feedback, a Newsletter with articles on the activities of the project partners and other marine organisations with interests in sea-floor sediments, and links to other marine organisations and data centres. As such, the EU-SEASED Website aims to provide access to as wide a range of sea-floor geoscience data and information resources as possible.

## The EUROSEISMIC Project

At the beginning of 2002, the Research Directorate of the European Commission's Fifth Framework Programme granted funding to support a project to compile metadata for available seismic survey information held by the 22 data source holders who are participating in the project. The project will continue until December 2004 and estimates indicate that over 2 million line kilometres of seismic and sonar survey metadata will be contributed to the existing EU-SEASED system.

The data are mainly publicly accessible information, but in some cases commercial information that can be accessed on a negotiable basis will also be included. The metadata describe attributes used on each survey; examples are equipment types, frequency of the source, penetration depth of the seismic record and positioning system. The search can be made for both individual lines, and in cases where survey data are densely spaced, a polygon that defines a survey area. The users of the system will also be provided with contact details for the data source holder and conditions of access to the information.

Figure 1 gives an example of the GIS interface to the metadata; areas numbered 1 to 7 are explained as follows. The main map (1) shows shapes or polygons, which delineate the areas of all seismic surveys held in

the database. The users are able to display other layers of information such as bathymetry, seabed samples/cores, geographical grid lines and labels identifying the surveys or samples by ticking the check boxes in area (5) of the diagram.

The legend (area (3)) gives a key for each layer. A series of tools (area (2)) are provided to allow users to zoom in or out from the main map to help identify the surveys present in their area of interest. It is possible to select an area by defining a box on the main map or by entering the specific co-ordinates of the area of interest (area (6)). Additional tools allow the map to be displayed at a larger size for printing purposes and a small index map locates the area on a small map of Europe, a feature which is particularly useful when the user has zoomed in to a small area showing only lines or polygons, with no coastline as a reference point.

The search layer (area (4)) is where the user decides whether they wish to search on surveys or individual lines within the surveys identified on the main map. Once 'line' or 'survey' is selected, only these types of data will be found in the detailed search. Figure 2 shows an area that has been selected using 'surveys'. The map on the left shows all surveys that have been carried out within the search area, while the map on the right provides the location and detailed metadata for a specific survey that has been selected. A useful function of the GIS is that each survey or line of interest

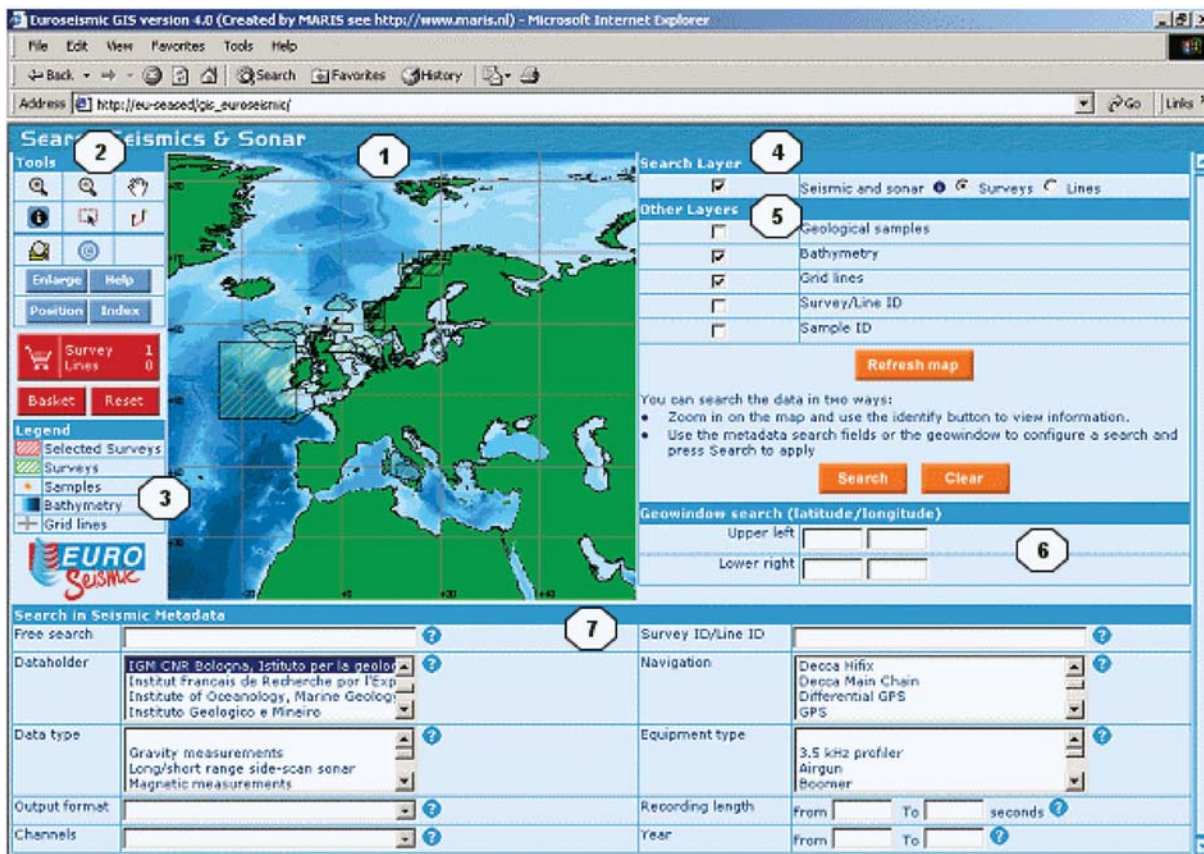


Fig. 1. The opening page of the EUROSEISMIC metadatabase. The numbered areas of the page are explained in the text.

may be added to a 'basket', which can then be exported to the users own computer for use with different datasets.

At the foot of the opening page within the EUROSEISMIC metadatabase (area (7)), there are search criteria that allow specific queries. These may include searches on a specific data holder, data type (e.g. side-scan sonar information), equipment type (e.g. airgun, sparker etc.) or, if the identification number of a specific survey or line is known, the metadata can be individually retrieved. The search fields also include a 'free search' facility that enables the user to search on any word or phrase of their own choice, which then scans the entire metadatabase for matching records. These search fields can also be combined with the geographical search of a specific area selected in area (6) or by defining a box on the map using the GIS tools.

The search for seismic and sonar survey metadata may also be combined with the information held in the EUMARSIN and EUROCORE metadatabases. As a result it is possible to search for a seismic track that has samples nearby and vice versa. This is of particular use in identifying seismic data that has ground truth information that can assist in the interpretation of the seismic stratigraphy.

The EU-SEASED website also acts as a host for a regular newsletter that includes a range of articles of interest to marine scientists and describes the activities of the project partners, such as future seismic/sampling surveys, meetings or conferences. The site links to other geological metadatabases worldwide and includes a comprehensive directory of organisations involved in marine geology, biology and oceanography. A questionnaire invites users of the metadatabase to provide suggestions as to how the system could be improved, to ensure that it is adapted to fulfil customer requirements. Website statistics show that during 2002, the EU-SEASED site was accessed by an average of about 2,000 different clients each month, and that about 9,000 data searches were made. The clients are from all sectors of the marine community, in particular the offshore industry and university and government research departments.

The EUROSEISMIC project, in conjunction with other metadata held on the EU-SEASED website, provides a valuable source of information for marine scientists. It is hoped that the system will continue to expand both geographically and in the types of metadata that it provides.

The screenshot displays the EUROSEISMIC GIS version 4.0 interface. The main window is titled "EUROSEISMIC Survey mode" and shows a map of the Baltic Sea region with several survey tracks overlaid. The position is set to 61.61/22.83. The interface includes a "Tools" menu, a "Data Types" section, and a "Positioning method" section. The "Data Types" section lists "Single-beam echosounding, Single-channel seismic reflection" and "GPS". The "Positioning method" section shows a detailed map of the selected survey area, with coordinates 1993, 61.61, 22.83, and "South-eastern Baltic Sea" listed. The "Data holder" section lists "Vejas6/48" and "Vejas". The "Data holder" section lists "Institute of Oceanology, Marine Geology and".

Survey ID	Data holder	Year	Data type	Add
AraJan2001_1	Geological Survey of Finland	2001	• Single-beam echosounding	
AraJan2001_3	Geological Survey of Finland	2001	• Single-beam echosounding	
AraJan2001_4	Geological Survey of Finland	2001	• Single-beam echosounding	
BAS'96-PQ2	Bundesanstalt fuer Geowissenschaften und Rohstoffe	1996	• Multi-channel seismic reflection	
DL	Institute of Oceanology, Marine Geology and Underwater Archaeology Department	1997	• Single-beam echosounding • Multi-channel seismic reflection	
GE93	Ministry of Environment and Wate, Department of Geology and Permits for Exploration	1993	• Single-channel seismic reflection	
GE94	Ministry of Environment and Wate, Department of Geology and Permits for Exploration	1994	• Single-channel seismic reflection	
GE95	Ministry of Environment and Wate, Department of Geology and Permits for Exploration	1995	• Single-channel seismic reflection	
GE98	Ministry of Environment and Wate, Department of Geology and Permits for Exploration	1998	• Single-channel seismic reflection	

Fig. 2. Search results from the EUROSEISMIC metadatabase. The map on the left shows all surveys within the search area (currently held in the metadatabase); the map on the right shows the individual survey that is highlighted and the associated metadata.

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