

# THE NATIONAL INSTITUTE OF RESEARCH AND DEVELOPMENT FOR MARINE GEOLOGY AND GEOECOLOGY – GeoEcoMar: TWENTY YEARS OF SCIENTIFIC ACTIVITY

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The National Institute of Research and Development for Marine Geology and Geoecology – GeoEcoMar was created in 1996 according to the Governmental Decision 1315/25.11.1996, by reorganizing the Romanian Centre for Marine Geology and Geo-ecology CRGGM (founded in 1993).

Presently the National Institute of Marine Geology and Geoecology - GeoEcoMar is the Romanian pole of excellence for research in marine, coastal and fluvial geology, geophysics and geo-ecology, as well as an international reference centre for Marine and Earth Sciences in the Black Sea region.

In the last twenty years, GeoEcoMar has experienced a continuous scientific and financial growth, both at national and international levels.

Since 1996 an “institute of national interest” due to its technical potential and scientific performances, GeoEcoMar’s main objective is to perform complex and multidisciplinary researches of sea – delta – river macro-systems, having as key focus the Black Sea – Danube Delta – Danube River system.

Headquarters (Fig. 1) and a part of laboratories are in Bucharest. Constanta Branch (Fig. 2) hosts the marine geochemistry, mineralogy, grain size distribution, biology and geo-ecology laboratories.



Fig. 1 - GeoEcoMar headquarters in Bucharest



**Fig. 2** - GeoEcoMar Constanta branch

The main scientific activities and expert services of GeoEcoMar are focused on geology (paleo-environmental studies – sedimentology, stratigraphy, paleontology, sediment investigation - geochemistry, mineralogy, grain size analysis; carbon capture and storage, etc.), coastal researches and integrated management, geophysics (seismo-acoustics, 2D marine seismics, magnetometry, gravimetry, electrometry), environmental quality investigations (hydro-chemistry, gas chromatography, eco-toxicology, greenhouse gas emissions), real time monitoring and study of marine geo-hazards, geo-archaeology and geological mapping of the Romanian Black Sea continental shelf.

The institute actively participated in different Framework Programmes of the European Union. For example, in the 7<sup>th</sup> Framework Programme GeoEcoMar participates in projects as PERSEUS (Policy-oriented marine environmental research in the Southern European Seas), EUROFLEETS-1 (Towards an alliance of European research fleets; 2009 – 2013), EUROFLEETS-2 (New operational steps towards an alliance of European research fleets; 2013 – 2016), COCONET, ARCH, CGS EUROPE, DANCERS, UP-GRADE BLACK SEA SCENE, HYDRAL-AB IV, FAST, RISES-AM, etc. In earlier Framework Programmes, GeoEcoMar had participated in numerous projects. Among those projects have to be mentioned: The interaction between the river Danube and the North-Western Black Sea - EROS 2000; Biogeochemical Interactions between the Danube River and the North-Western Black Sea – EROS 21; Assessment of the Black Sea sedimentary system since the Last Glacial Extreme (2003-2006) – ASSEMBLAGE; Contribution of high-intensity gas seeps in the Black Sea to methane emission to the atmosphere (2003-2006) – CRIMEA; Methane fluxes in ocean margin sediments: microbiological and geochemical control (2003-2006) – Metrol; Southern European Seas: Assessing and Modelling Ecosystem Changes – SESAME; International Action for Sustainability of the Mediterranean and Black Sea Environment – IASON; Assessing European Capacity for Geological Storage of Carbon Dioxide - EU- GeoCapacity and many others.

A major achievement for GeoEcoMar was the status of “European Centre of Excellence for environmental and geoecological studies on river –delta – sea systems in Europe. Case study: River Danube – Danube Delta –Black Sea System (2003-2006) - Euro-EcoGeoCentre – romania” awarded by the European Commission.

GeoEcoMar has a very successful activity in the Romanian – Bulgarian Cross Border Cooperation Programme (Projects MARINEGEOHAZARD, HERAS) and in the Black Sea Joint Operational Program 2007 – 2013 (MAREAS).

The institute has important bilateral and multilateral cooperation with France, Italy, England, Ireland, Switzerland, Germany, Austria, Bulgaria and other countries.

Large projects are performed in the framework of the 2nd National Plan for Research, Development and Innovation and in the Core Programme of the institute. These projects refer to the assessment of the Romanian section of the Danube River (more than 1 000 km long), the study and monitoring of the Danube Delta and the coastal zone and the Black Sea, mainly the area entering in the Romanian jurisdiction.

Extensive studies were carried out independently and in cooperation with Ecoh Corporation Japan – JICA (The Study on Protection and Rehabilitation of the Southern Romanian Black Sea Shore, 2007), Black & Veatch USA (Romania COASTEROSION Program, 2009) and Halcrow Group Ltd. United Kingdom (Coastal Dynamics and Sedimentology Studies, 2011) regarding the Romanian Coastal Zone rehabilitation and drafting an official Master Plan for the Black Sea littoral.

Since 2011 GeoEcoMar has been deeply involved in Romanian contribution to the European Union Strategy for the Danube Region. The institute leads projects preparing the establishment of the Danube International Centre for Advanced Studies in the River – Delta – Sea systems: a Pan-European Research Infrastructure. *Case study: Danube River – Danube Delta – Black Sea System* (DANUBIUS).

This is a national priority objective answering to priority areas of the E.U. Strategy for the Danube Region: the Priority Area 7 - Specific Action of the Danube Strategic Action Plan: “To strengthen the capacities of research infrastructure: To establish joint international research centres for advanced studies”; Connecting the Danube Region (added value – interconnection with all Europe); Protecting the Environment in the Danube Region; Building prosperity in the Danube Region; Strengthening the Danube Region. The objective is answering also to Europe 2020 Strategy, to all its 5 major goals (employment, innovation, education, poverty reduction and climate/energy).

The projects under the coordination of the GeoEcoMar that contribute to the Danubius objective are:

DANCERS (*Danube macro-region: Capacity building and excellence in river systems: basin, delta and sea*). This is a FP7

Project. It aims to develop new instruments and tools that will enhance environmental research and promote innovation in Danube Region, including the Danube Delta and the Black Sea. Importantly, the new instruments and tools do not start *ab initio* but will build on existing projects which will be identified and clustered. The project undertakes a critical analysis of what has been achieved so far in the region and builds upon results of achievements to-date, to design innovative solutions to strengthen knowledge transfer in this area. This is achieved by gathering top level representatives of the academia and business communities, as well as decision makers specialized in various sectors of integrated management of the Danube –Black Sea macro-system. The specific objectives of the project are: critical analysis of achievements in integrated river- delta –sea management in the Danube Region; understanding of links between the achievements, deliverables and results of the work performed; to define a set of instruments to enhance environmental research and innovation in Danube Region.

MARINEGEOHAZARD Project (*Set-up and implementation of key core components of regional early-warning system for marine geohazards of risk to the Romanian-Bulgarian Black Sea coastal area*) represented the first major initiative to address in an integrated and coordinated manner the establishment of a geo-hazard early-warning system for the Black Sea (the system is called “The Black Sea Security System”). Having as strategic objectives to develop in the Romanian – Bulgarian cross-border area the early-warning capabilities for marine geo-hazards, the project stimulates regional collaboration, underpinning the development of a Black Sea regional system in-line with on-going European and intergovernmental initiatives. As a final result of the project, two national centres dedicated to the monitoring and *in situ* early warning system for Black Sea geo-hazards (submarine landslides, Earthquakes, active faults, tsunamis) are now operational in Constanta (Romania) and Varna (Bulgaria), as well as a network of GNSS stations for geo-dynamic surveillance of the Western Black Sea coastal area.

DANUBIUS Project (*Danube International Centre for Advanced Studies for River-Delta-Sea systems*), financially supported by Romanian Government (Ministry of National Education), is aiming at developing a pan-European research infrastructure, led by Romania with support from other EU Member States. It will provide a multidisciplinary approach to understanding large river basins and connected coastal seas, using as case study the Danube River – Danube Delta – Black Sea system. DANUBIUS will represent a new world leading novel science and innovation infrastructure, providing a Hub for a new Pan-European Research Infrastructure European focused to characterize a complex river-delta-sea system of continental importance (Danube – Black Sea) and interconnect centres dealing with other complex systems across Europe (Nodes). DANUBIUS will be a good example of Smart Specialisation that will gather and integrate excellent expertise and facilities in Europe by providing world class

services through accessibility to the most important natural laboratory in Europe: Lower Danube – Danube Delta – Black Sea. The Centre will be a focal point to develop joint R&D programmes for monitoring, identifying best practice and promoting international collaboration. Romania’s unique geostrategic position in the Danube basin will help increase the collaboration with EU countries, including those from the Black Sea – Caucasus Region. DANUBIUS uses the Romanian governmental support, with provision of land (Danube Delta area), and commitment of funding for design and construction costs. Research institutions from other nine Member States have expressed interest in joining DANUBIUS so far. An international committee is working with the GeoEcoMar, as Project Coordinator, and providing advice and help in preparing an application for inclusion in the ESFRI Roadmap in 2015.

GeoEcoMar has a specialized research infrastructure, dedicated to the aquatic fluvial, deltaic, coastal and marine areas. The main components of the infrastructure are:

1. multidisciplinary marine research vessel Mare Nigrum (length-82 m., breadth -13.6 m, max draft -5 m, gross tonnage -2495 t) (Fig. 3), which represents a research infrastructure of national interest;



Fig. 3 - R/V Mare Nigrum

2. fluvial and coastal research vessel Istros (length -32 m, breadth – 6,80 m, max draft 1,25 m, gross tonnage- 143 t) (Fig. 4);



Fig. 4 - R/V Istros

3. “The Black Sea Security System” for the Western Black Sea Earth Crust and Sea continuous observation and monitoring composed of: EUXINUS network – automatic marine gauge stations (Fig. 5, 6), as an early warning system for marine geohazards and GeoPontica network - with 18 GNSS stations (13 on Romanian territory and 5 in Bulgaria) for the geodynamic surveillance of the Western Black Sea coastal area);
4. Diversified scientific equipment for submarine measurements (bathymetry, seismo-acoustics, 2D seismics, ACDP etc.), for water, sediment and biota sampling and for direct underwater investigation (Remotely operated underwater vehicle - ROV “Geos”).

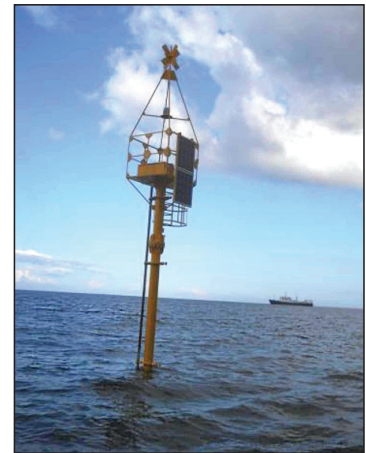
The main beneficiaries of the expert services of GeoEcoMar are: Ministries (Education, Environment, Development, Economy and Business), national administrations (Danube Delta Biosphere Reserve, Lower Danube Fluvial Administration, Romanian Waters National Administration, National Agency for Mineral Resources), Romanian or European private companies (OMV-PETROM, ExxonMobil, Melrose, Midia Resources, Peter Gas, Marexin BV etc.).

Strong points of GeoEcoMar are the following:

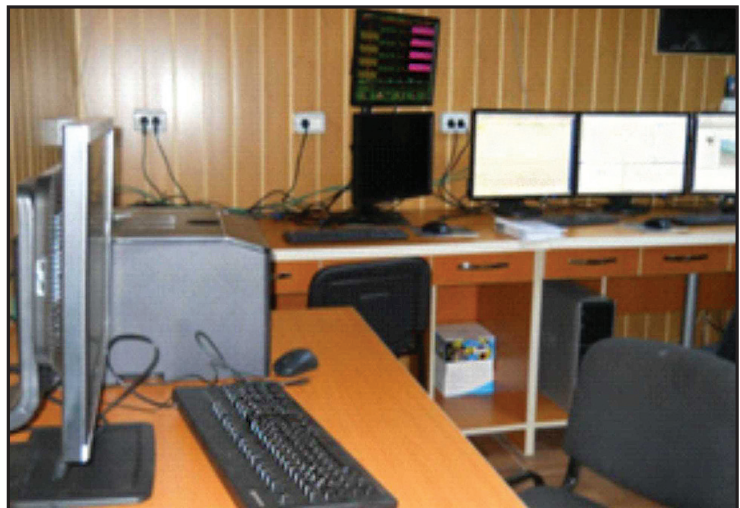
1. over 40 years of tradition and experience in marine geological and geophysical research;
2. staff with expertise in geological, geophysical, biological and geo-ecological research in aquatic environment;
3. research infrastructure specialized in investigation of marine, coastal, lacustrine and fluvial aquatic environments;
4. flexibility and dynamism in national and international collaboration;
5. high rate of success within national and international project competitions;
6. very good relationship with educational and business environment.



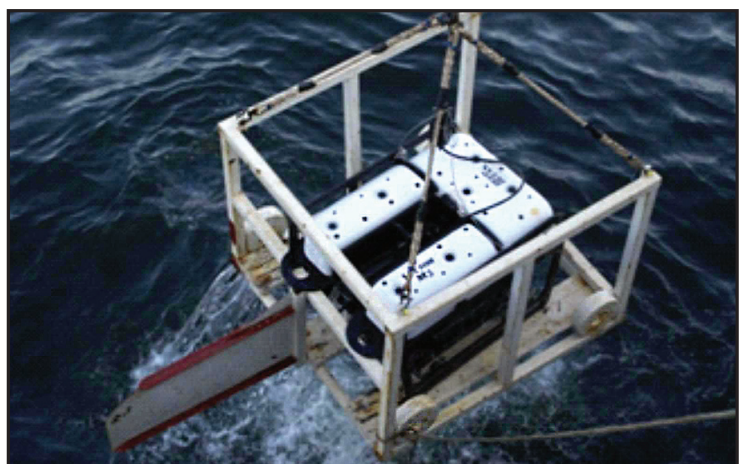
**Fig. 5** - EUXINUS network - Automatic marine gauge



**Fig. 6** - Coastal automatic marine gauge station (Location – Mangalia, Romania)



**Fig. 7** - 2D seismic operational room, on-board of the R/V Mare Nigrum



**Fig. 8** – Remotely operated underwater vehicle ROV “Geos”

**For more information, please visit GeoEcoMar’s homepage: [www.geoecomar.ro](http://www.geoecomar.ro)**