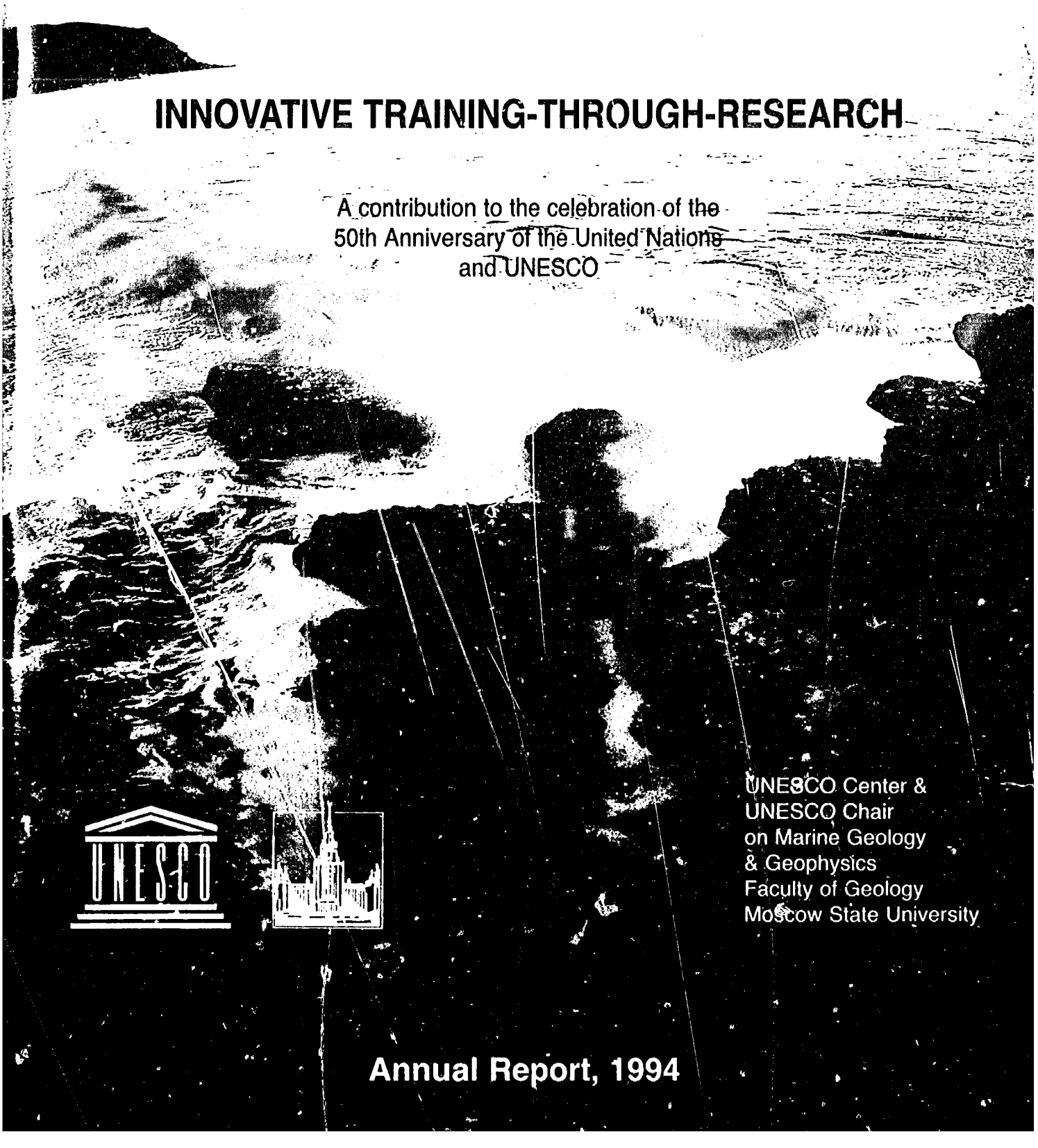
"FLOATING UNIVERSITY" FACILITY

INNOVATIVE TRAINING-THROUGH-RESEARCH

A contribution to the celebration of the
50th Anniversary of the United Nations
and UNESCO



UNESCO Center &
UNESCO Chair
on Marine Geology
& Geophysics
Faculty of Geology
Moscow State University

Annual Report, 1994

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The UNESCO-ESF "Floating university" project's 5th cruise (1995) has been included on the List of Events for the celebration of the 50th Anniversary of the United Nations.
This annual report is issued as a contribution to the above event.

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Alexei Suzyumov (UNESCO)

Front cover: from EXPO'98 brochure
Back cover: Launching of the MAK-1 deep-tow sidescan sonar from the R/V Gelendzhik. Photo A. Suzyumov

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1995

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Foreword

To foster an international community of young scientists, well trained, open to the outer world, coming from various societies and cultures but appreciating these differences and gaining from them, speaking openly to each other, capable of handling advanced equipment manufactured in various countries of the world, managing high-quality scientific data, collected and interpreted under the guidance of leading professionals from universities and academic institutions - this was the basic idea behind the "Training-through-Research" approach, which UNESCO started implementing from 1989, in particular through the "Floating university" Project, involving counterparts from East and West Europe, the Arab States, as well as Africa and Latin America, with support of the European Science Foundation and possibly to be co-sponsored by the Helsinki Commission in the future

Since the beginning of the programme, several hundred students, scientists and professors have become involved in the project's operations, which include yearly scientific expeditions, mid-cruise and post-cruise workshops for data discussion and reduction, specialized shipboard and land-based training courses, fellowships for students and exchange of senior staff for joint research activities. Over 70 institutions took part in these operations, resulting in nearly 200 research papers and presentations at various international fora.

The present report summarizes the "Floating university" activities undertaken in 1994 by the UNESCO Center at the Moscow State University, one of principal executors for the "Floating university" Project in the Mediterranean and Black Seas. Additional "Training-through-Research" activities were carried out by leading universities and research centers in other regions.

The United Nations included the Project and specially the 5th TREDMAR cruise (1995) in the List of Events for the celebration of the UN 50th Anniversary, in view of the results in general and the Project's contribution to international peace and tolerance building in particular.

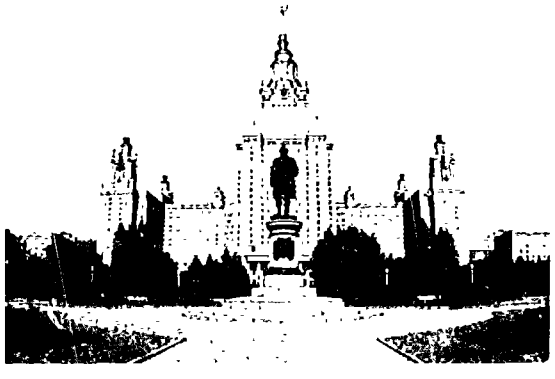
Training and Education in Marine Sciences Programme
(TREDMAR) of UNESCO

UNESCO-MSU Research and Training Center on Marine Geology and Geophysics: an overview

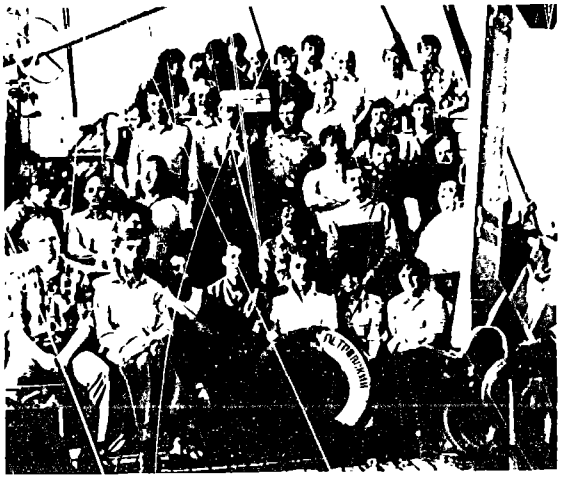
The scientific and educational programmes of the UNESCO Research and Training Center on Marine Geology and Geophysics, affiliated to the Faculty of Geology, Moscow State University (MSU) are aimed at advanced ***"Training-through-Research"*** for undergraduate and post-graduate students, based on international cooperation programmes with the involvement of universities and research institutions of Europe, the Arab States and, most recently, Latin America.

The activities of the Center are inspirited by the *"Year 2000 Challenges for Marine Science Training and Education World-wide"* meeting, 1986 (1) and in particular follow the recommendations of the UNESCO workshop on *"The University Field Courses in Marine Sciences", 1989 (2)*, organized by MSU.

The Center, officially established with the support of UNESCO in 1993, has been active de facto since 1990, when a test of the "Training- through- Research" approach was made aboard the R/V "Academic Petrovsky" of MSU in the Mediterranean. The following year (1991), the 1st TREDMAR cruise and associated post-cruise field workshop were organized in the Black and Mediterranean Seas and the Crimea peninsula, respectively; thus the "Floating university" project was launched.



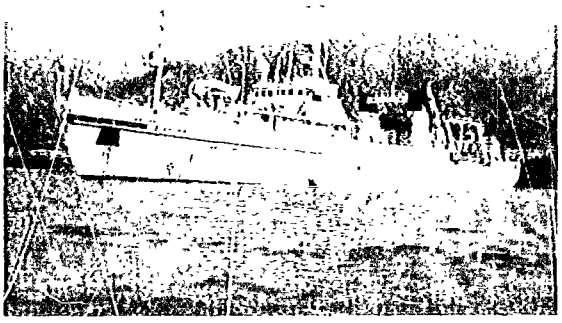
Moscow State University. The Faculty of Geology occupies floors 3 through 8 and part of the basement in the central part of the building



Dr. M. Marani (Italy, 1st row, 4th from the left) and Dr. M. Ivanov (Russia, 1st row, 2nd from the left) testing the "Training-through-Research" approach in cooperation with the MSU team aboard the R/V Academic Petrovsky in the Mediterranean, 1990

The activities of the Center are based on a long-term cooperation (since 1986) with the marine science programmes of UNESCO: Training and Education in Marine Science (TREDMAR) and in particular its "Floating university" facility (for the training component) and Promotion of Marine Science (PROMAR) for the research component. The Coastal Marine Programme (COMAR) is in assistance as far as marine-land links are concerned. The activities are also implemented through the Network on Advanced Study Workshops on Mediterranean Marine Geosciences of the European Science Foundation (ESF) (1992-1995).

Its research programmes are focused on studies of recent and ancient marine depositional systems and geotectonics of the Alpine belt. Special attention



The R/V Gelendzhik, a platform for the "Floating university" programme
Photo YUZHMORGEOLOGIA

is paid to the Mediterranean and Black Sea regions. This also includes studies of processes related to mud volcanism and diapirism in association with gas and oil formation.

The Center operates under the following arrangements. The Moscow State University provides the staff of the Center (currently 8 persons). 25 students from the Geology Faculty, both undergraduate and postgraduate, are involved in various programmes of the Center. Funds for research and training activities related to the "Floating university" programme are being provided by MSU, the Ministry for Science and Technological Policy, as well as (for sea-going operations) the Committee on Geology of the Russian Federation, UNESCO, ESF and the Netherlands (under a bilateral agreement). Other funds (including in-kind support) were contributed in 1994 by Italy, Monaco, Spain, Turkey and the United Kingdom. Additional funds for research and short- and medium-term fellowships came from various sources, including the University of Wales (Cardiff), the Free university of Amsterdam, the Ruhr University of Bohum, the National Commission for UNESCO of the Netherlands, the European Commission (through an INTAS-supported project).

The Center has two branches: *Marine Geology and Sedimentology*, and *Geophysics and Geoacoustics*. It provides various laboratories for research needs as well as computer services, the latter through a network which links several 486 PCs and the central SUN workstation for geophysical data processing.

The UNESCO-MSU Center is supported in its work by a series of central services provided by MSU, such as libraries, Science Park, central E-mail service, analytical laboratories, etc. It enjoys close cooperation with several Departments of the Geology Faculty, including Geology and Geochemistry of Fuel Deposits; Lithology and Marine Geology; Paleontology; Historical and Regional Geology; Geodynamics; Geophysics; Seismometry and Geoacoustics, ensuring the necessary marine-related training for the students. It cooperates with several institutions of the Russian Academy of Sciences such as Geological Institute, Paleontological Institute, Institute of Lithosphere, as well as YUZHMORGEOLOGIA Co. of the Committee on Geology.

Research and training activities carried out by the Center are supported by the efficient work of the Office of the Dean and Administration of the Geology Faculty (personnel, accounting, budget) and that of the Office of the Rector of MSU.

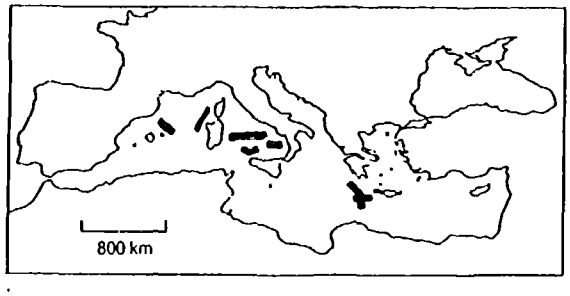
RESEARCH AND TRAINING ACTIVITIES OF THE UNESCO-MSU CENTER in 1994

1. Scientific projects at the Center

A number of research projects mostly of a regional character are currently being executed at the Center by the MSU research staff and students, in particular:

in the Mediterranean:

- Late Quaternary calcareous nannofossils in sediments from the Alboran Sea as an index of paleoenvironments;
- Planktonic foraminifera from the Quaternary sediments of the Alboran sea as an index of climatic and oceanographic changes in the Late Pleistocene- Holocene time;
- Late Quaternary Evolution of the Rhone Neofan;
- Morphology of the Valencia Channel;
- Mud volcanism and diapirism of the Mediterranean Ridge;
- Comparative Characteristics of the Mediterranean and the Black Sea mud volcanoes and possible mechanism of their emplacement;
- Modeling and geological interpretation of sidescan sonar data for an area of development of mud diapirism on the Mediterranean Ridge;
- Composition of mud breccia clasts from the Mediterranean Ridge;
- Shallow structure of the Eratosthenes Seamount area;
- The Neogene-Quaternary basins of the Eastern Mediterranean: seismic stratigraphy, structure and geodynamics;
- Geochemistry of organic matter in sediments and rocks of the Mediterranean and Black Seas;



Mediterranean and Black Seas: a region of major research and training activities of the UNESCO-MSU Center. (Thick lines show the areas studied during the 4th TREDMAR cruise, 1994)

in the Black Sea :

- The Black Sea mud volcanism: its origin, geochemistry and composition of mud breccia;
- Nature of acoustic anomalies on seismic and 5.5 kHz profiler records in the Deep Black Sea;
- Gases and gas hydrates in the Black Sea;
- Structure and evolution of the Danube deep-sea fan.

Projects of general nature and studies in non-Mediterranean regions:

- Comparative analysis of deep-sea fans, their structure and evolution;
- A contribution of calcareous nannofossils to the total paleoproductivity signal, in view of reconstructing paleocarbon fluxes over the last 160 ka, especially during the Terminations II and I in the NE Atlantic;
- Upwelling systems in the geological history as an application of ocean-climate/productivity proxies in view of reconstructing Late Quaternary climate changes in the NW Indian Ocean.
- Gases and gas hydrates in the Sea of Okhotsk;
- Guiots and atolls of the W.Pacific, their origin, structure and development.

2. Field work and expeditions

2.1 4th Training-through-Research "Floating university" cruise and Mid-cruise workshop

The 4th TREDMAR cruise aboard the R/V *Gelendzhik* took place between 1 June- 16 July 1994. The focus of the cruise was to study deep-sea depositional systems of the Tyrrhenian Sea and Balearic basin, as for the 2nd cruise (1992); also, the questions raised during previous joint research on the Rhone neofan (3) were addressed as one of the goals of the

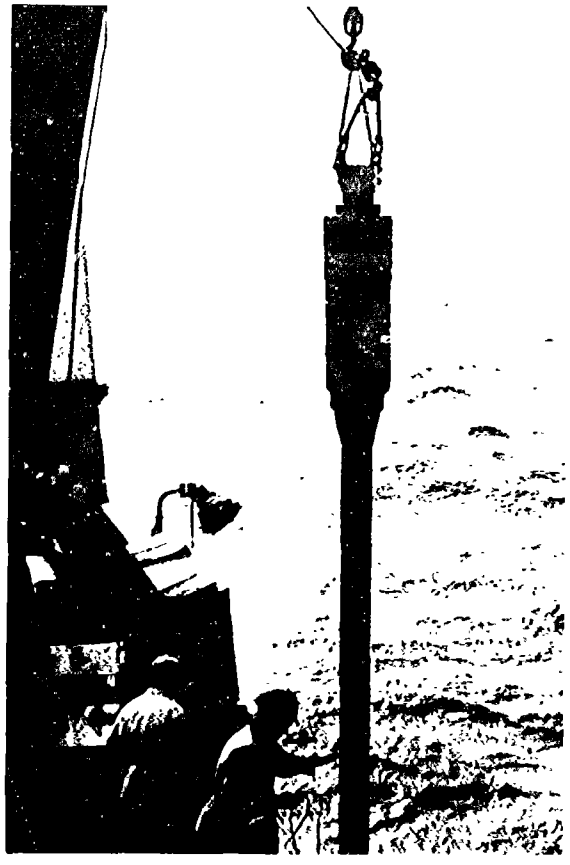
cruise to study sedimentation and erosion processes in the distal parts of siliciclastic and volcanoclastic systems. Additionally, mud volcanism of the Mediterranean Ridge was also studied.

The training objectives of the cruise were to train the international team of students in advanced methodologies of marine geological and geophysical investigations and to involve them in the process of collecting, processing and interpreting the data obtained during the cruise: an approach defined as *"Training-through-Research"*.

The Floating university project's Core Group appointed the representatives of Italy, the Netherlands and Russia (Drs. M. Marani, J. Woodside and M. Ivanov respectively) as co-organizers of the 4th TREDMAR cruise. Its Co-chief Scientists for the various legs were: Dr. N. Kenyon (United Kingdom), Dr. M. Marani (Italy), Dr. M. Ivanov and Dr. A. Limonov (Russia). Dr. J. Woodside (the Netherlands) coordinated this "Training-through-Research" programme. The overall organization of the cruise, as before, was entrusted to the UNESCO-MSU Center, which acted in close collaboration with the ship's owner, YUZHMORGEOLOGIA Co. (Committee on Geology of the Russian Federation).

The cruise and Mid-cruise workshop were supported by the Government of Russia (through its Ministry for Science and Technological Policy, Ministry of Fuel and Committee on Geology), MSU, UNESCO, ESF, the Netherlands Organization for Scientific Research (NWO), the Netherlands Foundation for Geological, Oceano-graphic and Atmospheric Research (GOA), the universities of Barcelona, Bologna, Granada, Jaen, Naples, Palermo, Wales, the Marine Geology Institute (Bologna), GEOMARE-Sud (Naples), the Institute of Oceano-graphic Sciences Deacon Laboratory (IOS, the UK), the Free university of Amsterdam. The overall financial input to the cruise from the international sources was close to US$ 120,000, which represented nearly 50% of the total cost of the expedition. As previously, the overall financial coordination was entrusted to GOA.

The equipment used aboard the R/V *Gelendzhik*, mostly provided by YUZHMORGEOLOGIA Co., but also by the Netherlands and the UK participants, included: 6-channel seismic with a 3-liters airgun; long-range sidescan sonar "OKEAN" and deep-towed sidescan sonar "MAK-1M" with a 6.0 kHz profiler; middle-range sidescan sonar "OKO" with a 3.5 kHz profiler; various types of bottom samplers, such as a 147 mm gravity corer, kasten corer and box corer. GPS navigational system ensures the positioning of the ship.



Heavy gravity core used to sample coarse deposits
Photo M. Leybov

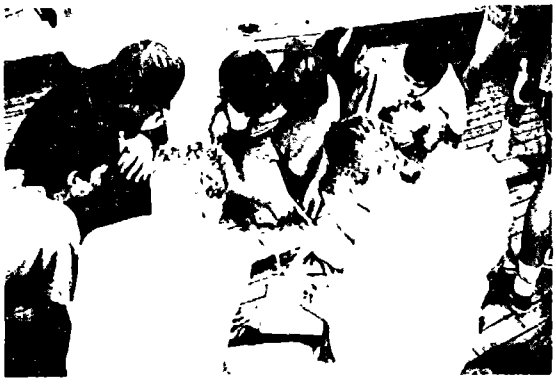
Students at work 4th TREDMAR cruise
Photo I Bringmann

The list of participants in the 4th TREDMAR cruise included 83 specialists and students from 21 universities and research institutions of 7 countries (Chile, Italy, The Netherlands, Russia, Saudi Arabia, Spain and UK) (Annex 1). Out of 37 participants from Russia, 15 students came from MSU. Two additional countries (Morocco and Turkey) were represented at the Mid cruise workshop in Naples (20-22 June 1994, Italy). Specialists from YUZHMORGEOLOGIA Co ensured the functioning of a variety of scientific instruments aboard.

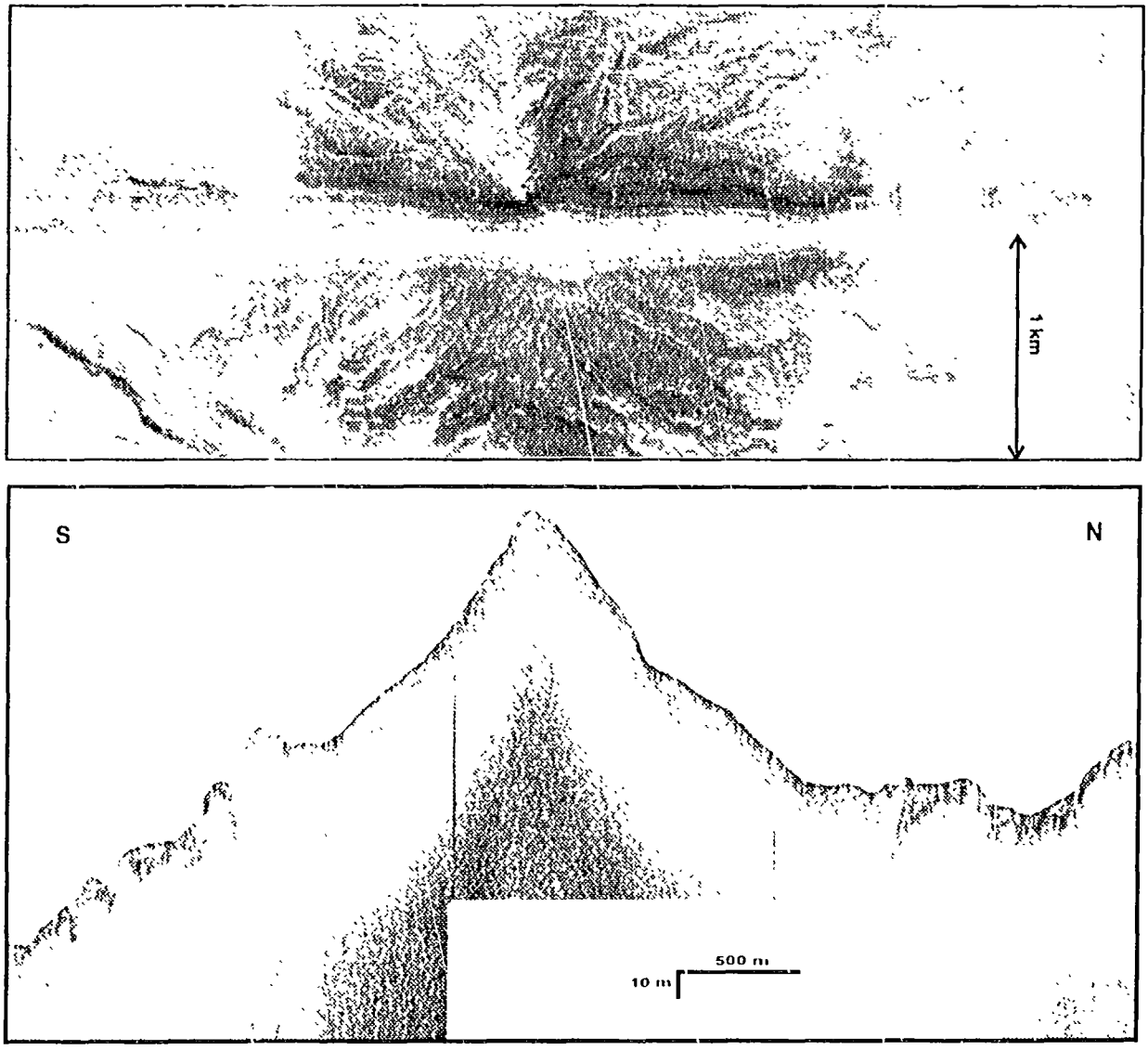
During the cruise, lectures and seminars were given to students by the research staff of the expedition. Students also presented their research results for discussion (Annex 2)

Among the scientific results of the cruise are (4).

- the confirmation, through many new data, of the conclusions of the 2nd (1992) cruise about the geographical position of the deep Valencia fan, which as became known, situates within the limits of the Balearic Abyssal plain much to the South-East of its position indicated by previous researchers;
- observation of unusual bedforms on the excellent sidescan sonar images of the seafloor in the distal part of the Valencia/Rhona area, that seem never to have been registered anywhere else before. A field of chevron-shaped dunes of up to 1 m height and tens of meters in length appears to point up-current. The changing location of different types of bedforms observed possibly reflects changes in the flow velocity and sediment composition in an active near-bottom currents and sediment reworking environment,
- the discovery of six mud volcanoes at the Mediterranean Ridge, this bringing the number of mud volcanoes newly discovered by TREDMAR cruises (between 1991-1994) to about 25 . Mud volcanoes, found during the 1994 cruise, represent either old and inactive features, buried in marine sediments, or recent and probably active centers. As a result of the cruise it became even clearer that mud volcanism and diapirism represent a characteristic feature of the crestal part of the above ridge, which itself is a compressional complex between the African and the Eurasian lithospheric



Studying geological history of the Mediterranean
Photo I Bringmann



Novorossiysk mud volcano in the Coiblestone area, Eastern Mediterranean, discovered during the 4th TREDMAR cruise (30kHz MAK-1 sonograph- upper graph- demonstrates multiple mud flows descending from the crater, and 5 5 kHz profiler basically shows the relief of this underwater volcano)

plates. Mud breccia contains fragments of underlying rocks (between Cretaceous and Pliocene age), this bringing new information on earlier stages of the development of the Mediterranean Basin;
- new data were also obtained on the recent geological evolution of the Western Mediterranean.

As previously, a 3-day Mid-cruise training workshop was organized (20-22 June). The cruise results were discussed, and analogous geological features on land examined, thanks to a very interesting geological excursion organized by the University of Naples.

2.2 Linking marine-land geology: field studies on the geology of mud volcanoes of Tamanskiy peninsula

In July-August 1994 in view of comparing deep-sea mud volcanoes with the ones on land, field work at the Tamanskiy peninsula (separating the Black and Azov Seas) was undertaken by the Center, in cooperation with YUZHMORGEOLOGIA Co.

Geological excursion for TREDMAR students off Naples. Photo J. Woodside

The Tamanskiy peninsula is known for an active development there of various types of mud volcanoes, always situated in crestal parts of anticlines. Currently active mud volcanoes are located in the northern part of the peninsula, while ancient ones are associated with its southern part. Twelve out of over 30 major mud volcanoes known in the region were inspected. Sampling was made of ancient and recent mud flows, mud breccia with fragments of underlying rocks; gases and mineral oil associated with mud volcanoes were sampled as will. Out of the numerous drill holes in the region, some were also sampled, to compare their lithology with mud breccia, in view of studying the source of the material.

2.3 Research and training cruise of the R/V *Stvor* in the Black Sea

Between 28 August-6 September 1994, a national "Training- through- Research" cruise was organized by the Center to the NW part of the Black Sea, as an addition to the 4th TREDMAR cruise, as well as a contribution to one of the research projects of the Center. Five specialists and ten MSU undergraduate students were involved in studying the Danube deep-sea fan, one of the biggest in Europe. Studies of this feature, previously carried out by MSU (1986-1988), as well as a joint German/Rumanian/Russian expedition aboard the R/V *Gelendzhik* (1993) have demonstrated that the structure of the fan is extremely complex; it consists of numerous overlapping channel-levee systems dating back to different periods. An area with the most complex structure, located in the central part of the fan, and thus being important for understanding the geological history (migration, changes in sedimentation conditions, etc.) of the Danube fan, was investigated in detail using an echosounder and a single-channel high-resolution seismic system. Geological samples were taken by gravity cores on various morphological elements of the fan.

2.4 International Sea of Okhotsk expedition

Between September 23 and October 22, 1994 an international expedition took place aboard the R/V *Bogorov* (of the Russian Academy of Sciences) in the Sea of Okhotsk, supported through the INTAS project 93-1881 entitled "A Joint Russian-European Expedition to Paramushir Island: Reconnaissance Mapping of Giant Deep-Sea Vent in the Sea of Okhotsk". The main goal of the expedition, in which the Center participated, together with several institutions of Russia and GEOMAR

(Germany) was the mapping of gas vents on the western slope off Paramushir Is. Detailed seismic survey, geochemical and sedimentological sampling were carried out. Gas seeping leads to methane concentration in bottom water of the studied region. Two more areas were investigated, as secondary priority. The data obtained during the expedition are being processed at NIOZ (the Netherlands) by Mr. E. Basov, whose participation was ensured through arrangements between GEOMAR, NIOZ (the Netherlands) and the UNESCO-MSU Center.

3. UNESCO Chair in Marine Geology and Geophysics

3.1 Meeting with the Director General of UNESCO

On February 9, 1994, upon invitation by UNESCO, Prof. V. Trofimov, Vice-Rector of MSU and Dr. M. Ivanov, Director of the UNESCO-MSU Center, paid a visit to UNESCO's Director General Mr. Federico Mayor. Major results of the "Floating university" programme were presented and cooperation between the Center, UNESCO, ESF, Ocean Drilling Program (ODP) and participating institutions was discussed. A proposal to establish a UNESCO Chair in Marine Geology and Geophysics at the Faculty of Geology, MSU was introduced. Mr. Mayor pledged UNESCO's support to the above programme, which he said represents not only a scientific but also a social experiment through the participation of a few hundred researchers and students from Europe, the Arab States, Latin America and Africa. The program thus contributes to UNESCO's fundamental mission to promote peace and tolerance in international relations and facilitate knowledge sharing. Later in 1994 it became known that the United Nations had included the project, and its 5th TREDMAR cruise in the list of activities for the celebration of the UN 50th Anniversary (1995).

UNESCO's Director General Mr. Federico Mayor meeting Prof. V. Trofimov, MSU Vice-Rector (left), and Dr. M. Ivanov, Director, UNESCO-MSU Center (center). Photo A. Suzyumov

3.2 UNESCO-MSU Agreement

In mid-1994, an Agreement was signed between MSU and UNESCO on the creation of a UNESCO Chair in Marine Geology and Geophysics as part of the Center.

The general objectives of the activities of the UNESCO Chair in Marine Geology and Geophysics, as described in the above Agreement, are:

- further development, twinning and other types of inter-university cooperation, in particular between universities and other academic institutions in Eastern and Western Europe, Africa and Asia;
- to promote the further development of educational programmes in marine geosciences, as recommended by the UNESCO "Year 2000 Challenges in Marine Science Education World-wide" plan;
- to develop joint research programmes between universities and research centers of cooperating countries.

The practical organization of the Chair is underway. It is clear, however, that its functioning will depend on a continuous international cooperation with the countries involved in the "Floating university" programme, including the creation of a network under the umbrella of UNESCO.

3.3 Examples of the UNESCO Chair activities in 1994

(a) The selection of MSU students for TREDMAR cruises is one of the important activities of the Chair. The Faculty of Geology, MSU has fourteen Departments with some 1300 undergraduate and postgraduate students. TREDMAR cruises are open to all interested in marine geology and geophysics, but as the number of places onboard is limited, only those most qualified may participate. Upon presentation by the Departments, the Chair sets up informal exams (including one in the English language); it makes a further selection of the potential participants and reports the results back to the Departments. The final selection of the participants is made upon consultation between the Chair and the Departments.

(b) The Chair regularly has seminars for students in marine geology and geophysics, subjects on which specialized advanced courses are given by MSU and Academy of Sciences professional staff. Students report back on their research (Annex 3). Among international visiting professors, who gave lectures and seminars in the fall 1994 were Prof. J. van Hinte, Dr. J. Woodside (both from the Free university of Amsterdam) and Dr. A. Roberston (University of Edinburgh).

(c) A contest for students was organized in November-December 1994, in view of selecting the Russian participants in the 3rd Post-cruise Conference of TREDMAR students (Cardiff, January-February 1995). Four winners have been awarded travel grants.

(d) The program of the Chair also includes short- and mid-term study grants for students enabling them to participate in the activities of leading European laboratories on data processing and analyzing and get the supervision necessary for undergraduate and postgraduate projects. Currently about 25 research projects of undergraduate and postgraduate students come under the Chair programme.

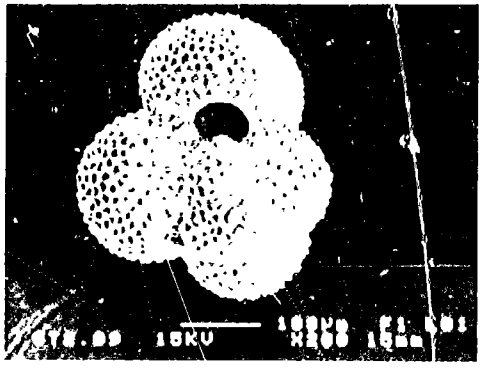
(e) In 1994, an Agreement was signed with NIOZ (the Netherlands) on cooperation in data processing and analysis and exchange of students and professional staff.

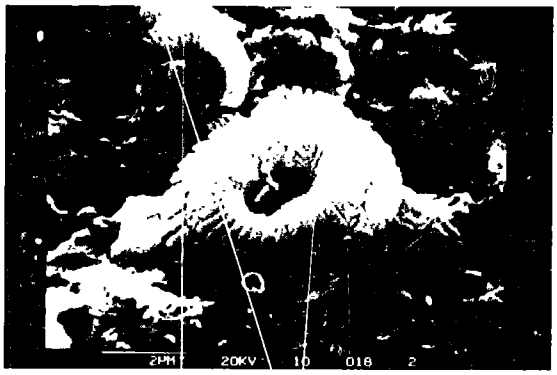
4. Fellowships

4.1 Short-term and medium-term fellowships

In 1994, four undergraduate and postgraduate students were granted fellowships enabling them to receive training and/or process their data in leading laboratories in Europe in view of meeting training and research needs of the Center.

Taxonomy of Lower and Upper Cretaceous calcareous nannofossils from the North Atlantic was studied by Ms. A. Lototskaya (then an undergraduate student at MSU) at the Ruhr University of Bohum (Germany, 10-29 January 1994) under the guidance of Prof. J. Mutterlose in view of an identification of redeposited taxa in Quaternary sediments and age determination of the Mediterranean mud volcanoes breccia. A quantitative analysis of Quaternary calcareous nannofossils from cores taken during the 1993 TREDMAR cruise in the Alboran Sea (Western Mediterranean) was also carried out at the Ruhr university of Bohum and, later (30 January-12 February), at the Free university of Amsterdam under the





Foraminifera (left, photo made at the Free university of Amsterdam, the Netherlands) and a coccolithoforid (right, photo made at IOS, UK) from the Alboran Sea Quaternary sediments. These tiny creatures give geologists an indication on the age of deposited material

supervision of Dr. M. Knappertsbusch and Dr. S. Troelstra respectively. The results were reported at the 2nd Post-cruise meeting (Amsterdam, 1994) and presented for publication.

A quantitative analysis of planktonic foraminifera assemblages from the Quaternary sediments of two cores from the Alboran sea was made by Ms. E. Ivanova, a post-graduate student at MSU, who visited the universities of Wales, Edinburgh and the Free University of Amsterdam between December 14, 1993 and February 14, 1994 and worked under the supervision of Prof. R. Kidd, Prof. A. Robertson and Dr. S. Troelstra of the above universities, respectively. The results obtained were used (i) as an index of climatic and oceanographic changes in that region in the Late Pleistocene-Holocene time, and (ii) to determine the age of the sediments and the accumulation rates in the area. The results were presented at the 2nd Post-cruise meeting.

Processing, modeling and geological interpretation of sidescan sonar data obtained from an area of development of mud diapirism on the Mediterranean Ridge (Eastern Mediterranean) during Legs 2 and 3 of the 3rd TREDMAR cruise (1993) were made by Mr. A. Volgin, a MSU junior scientist, at the Free university of Amsterdam (January-May 1994) under the guidance of Dr. J. Woodside. The aim of this work was to compare sonographs from the two different sidescan systems- the OKEAN long range and MAK-1M deep-tow sonars-, to interpret them together with subbottom profiler records, underwater TV and bottom sampling data, and to determine the relationship of the acoustic images with the morphology of the sea-floor, and the physical properties of sediments. The results were presented at the 2nd Post-cruise meeting, and two papers were submitted for publication. Mr. Volgin has also come to certain conclusions on ways to improving geological and geophysical surveys to make their quantitative and qualitative co-interpretation better, and evaluating quantitatively geological parameters from sidescan sonar data. This new approach will be taken up during future TREDMAR cruises.

Compilation and interpretation of the results of two TREDMAR cruises (1991 and 1993), as well as earlier MSU cruises (1988-1990), related to studies of mud volcanoes in the Black Sea were carried out under the guidance of Dr. Tj. van Weering by Mr. E. Basov, a MSU postgraduate student, at NIOZ, the Netherlands (January-May 1994). Based

on analytical, as well as geophysical data, the morphological feature, depositional environment, geochemistry, lithology, grainsize and mineralogical composition of bottom sediments and mud volcano breccia were studied.

4.2 Long-term fellowships

In 1994, two long-term fellowships leading to Ph.D diplomas were granted to MSU students by the Free University of Amsterdam.

Tracing an upwelling system as an application of ocean-climate/productivity proxies to reconstruct Late Quaternary changes is the aim of a Ph.D project of Ms. E. Ivanova (as of September 1, 1994 with the Free university of Amsterdam). The project aims at a high resolution bio- and isotope-stratigraphic analysis of selected box- and piston-cores from the Somalia-Yemen/Oman upwelling area with the purpose of determining the Late Quaternary timing, magnitudes and rates of changes of the upwelling/monsoonal systems. It will hopefully result in a reconstruction of past variations in the NW Indian Ocean surface water temperature, salinity and productivity on a 100 to 1000 year time scale for the past 150,000 years approximately, and in the relation of these variations to orbital forcing.

A contribution of calcareous nannofossils to the total paleoproductivity signal, in view of reconstructing paleocarbon fluxes over the last 160 ka, especially during the Terminations II and I in the NE Atlantic is the subject of a Ph.D project of Ms. A. Lototskaya. As of September 1, 1994 she is attending the Free University of Amsterdam and working in the framework of Paleo-JGOFS Project "Deglaciations as natural experiment to model future scenarios of Earth systems" as part of the Dutch national programme "Disturbances of the Earth system". This hopefully will make it possible to evaluate whether evolutionary or ecological patterns of calcareous nannoplancton could have an influence on climate change.

5. Research visits: a tool for cooperation

The data obtained in the Black Sea mud volcano area were processed and prepared for publication, jointly with Dr. Tj. van Weering of NIOZ, by Dr. A. Limonov, who continued in January-February 1994 his research visit to the Netherlands, started late 1993. He also finalized at the Free university of Amsterdam in cooperation with Dr. J. Woodside, one of the Co-chief Scientists of the 3rd TREDMAR cruise, the cruise report, published by UNESCO later the same year (5).

A research visit by Dr. M. Ivanov to the University of Hamburg (January 1994) was devoted to the discussion of geological and seismic data earlier obtained by the two parties, independently, in the region of the Danube delta. MSU disposes with excellent data for the above area, published in Russian and for this reason rarely known to researchers in the West. The visit stimulated preparation of a joint publication with Prof. R. Wong of the above university. Research targets for future joint operations were discussed. Within the same visit, Dr. Ivanov met with Prof. J. Mutterlose at the Ruhr university of Bohum and discussed possible cooperation program to study Cretaceous-Neogene deposits of the North Caucasus and the Crimea. He also gave a lecture on mud volcanism of deep sea basins.

The Center assisted with the participation of Prof. I. Glumov, Chief, Marine Department, Committee on Geology, and Prof. V. Trofimov, Vice-Rector, MSU in the 1994 Mid-cruise workshop (20-22 June, Italy). After the workshop, both professors took part in the UNESCO-ESF consultations on the future of the 'Floating

university' programme. These consultations have demonstrated that a more formal agreement would be needed between the cooperating institutions, in order to ensure a more stable financing of the program. A circular letter was sent to this end by UNESCO to potential donors.

MEETINGS AND WORKSHOPS

1. International meetings

1.1 Second Post-cruise meeting and UNESCO- ESF planning and coordination meeting (31 January-5 February 1994)

Following the success of the 1st Post-cruise meeting in Moscow (January 1993), it was decided during the 3rd "Training-through-Research" cruise to convene the 2nd Post-cruise meeting, this time in the Netherlands. The meeting was organized and hosted by the Geomarine Centrum, at the Free University of Amsterdam. It was mostly devoted to discussions on the results of the 1993 cruise, but some results of the 1991 and 1992 cruises, as well as those of some other research cruises in the Mediterranean carried out by German and Italian scientists were also presented.

The meeting gathered 45 students and researchers from 7 countries, including those who participated in the 3rd (1993) and previous cruises, as well as others interested in the subject. 28 presentations were made and discussed. Among the participants, 11 came from MSU (E. Akentieva, G. Akhmanov, R. Almendinger, E. Basov, S. Buriak, M. Ivanov, E. Ivanova, A. Limonov, A. Lototskaya, E. Terentieva and A. Volgin). They presented, in cooperation with their foreign colleagues, 12 papers. A Volume of Abstracts, along with the meeting's recommendations, was published by UNESCO (6). Among the recommendations were the publication of a special volume of *Marine Geology*, summarizing the excellent results of the 3rd TREDMAR cruise, as well as concrete recommendations to students to analyze the 1993 data in various cooperating laboratories.

The conference was held in conjunction with a UNESCO-ESF planning and coordination meeting, which determined major research targets for the 1994 operations: the 4th TREDMAR cruise.

1.2 European Research Conference on Deep Sea Floor as a Changing Environment (18-23 February 1994, San Feliu de Guixols, Spain)

The Conference was devoted to the preparation of a major programme on studies of fluxes from the deep ocean floor, exchange of material between the lithosphere, hydrosphere and atmosphere and their input to local and global environmental changes. Two participants from the "Floating university" programme, Dr. J. Woodside and Dr. M. Ivanov, attended. M. Ivanov reported on mud volcanoes, gases and gas hydrates of the Deep Black Sea. Video records of gas seeps from the crater of Napoli mud volcano (Mediterranean Ridge), resulting from the 3rd TREDMAR cruise (1993) were shown. A proposal was made on comparative studies of the Mediterranean and Black Sea mud volcanism. M. Ivanov participated in a working group (chaired by Prof. G. Westbrook, Birmingham) which formulated a research proposal for the programme entitled GEOFLOW (Geologically Induced Flow Through the Seabed). The project proposal is aimed at MAST-III funding.

1.3 XIXth Assembly of the European Geophysical Society (25-29 April 1994, Grenoble, France)

The Assembly was attended by two researchers (Dr. M. Ivanov and Dr. O. Krylov) and one student (Ms. E. Terentieva) from MSU, who presented one oral communication and two posters. The presentations were based on the data of the 1991-1993 "Floating university" cruises, as well as on studies of the Kamchatka continental shelf (the Okhotsk Sea). An exhibit, including panels and various publications, related to the project, was set up.

1.4 XIXth International Sedimentological Congress (20-26 August 1994, Recife, Brazil)

Two papers related to the results of TREDMAR cruises were presented on behalf of the UNESCO-MSU Center at the above Congress, on (i) Upper Quaternary Sedimentation in the North Aegean Sea, and (ii) Composition of the Black Sea mud volcano breccia. The Congress gathered about 400 participants.

1.5 Third International Conference Gas in Marine Sediments (25-28 September 1994, Texel, the Netherlands)

The Center organized and partially supported the participation at the above meeting of two researchers from MSU (Dr. M. Ivanov, Dr. A. Limonov) and one scientist (Ms R. Kruglyakova) from YUZHMORGEOLOGIA Co. One MSU undergraduate student (Mr. S. Bouriak) also attended. Two papers and two posters were presented by the group. The Conference was aimed at a multidisciplinary approach to the problem of gases in marine sediments. The materials presented by the Center representatives were related to studies of mud volcanism, gases and gas hydrates in the Mediterranean and Black Seas. Dr. Ivanov also served as convener to one of the conference's session.

1.6 Advanced Course on Paleoceanography (18 September-1 October 1994, Bremen, Germany)

The above course, organized by the European Commission through the program "Advanced Study Courses in Marine Science and Technology" was held at the Department of Geosciences at the University of Bremen. Lectures and practical courses were both provided to some 40 students from Europe, including one from the Center. The lectures were given by leading scientists from Europe and the USA. The participants reported on their current research projects by way of posters and/or oral presentations.

1.7 "Floating university" Core Group consultations on the future of the programme (25-27 November, Villefranche-sur-Mer, France)

The Core Group discussed the future of the programme, in view of the preparation of a project document for submission for MAST-III funding, as well as another project document, which is being developed for submission as an ESF programme.

The Letter of Intent for MAST-III participation was finalized. It summarizes the major accomplishments of the 4-year research within the "Floating university" and points to important scientific subjects for future studies.

Participants came from France, Italy, the Netherlands, Russia and the UK; expression of interest was also received from Germany and Spain. UNESCO is interested in being associated in the project as well.

2. Meeting of the National Oceanographic Committee of the Russian Federation

On October 17, 1994 the results of the Floating university project (1991-1994) were presented to the National Oceanographic Committee of the Russian Federation (NOC). The report, submitted by the Director of the UNESCO-MSU Center as the National Coordinator of the above project included the history of the project's establishing since 1987.

> At the national level, the "Floating university" operations include three complementary components: geological-geophysical research and training in the Mediterranean and Black Seas, physical oceanography/marine ecology-oriented "Training-through-Research" in the Baltic Sea and marine biology studies in the White and Barents Seas.

Discussed at the meeting were the 1991-1994 operations of the Center in the Mediterranean and Black Seas, the 1993-1994 operations of the Russian State Hydrometeorological Institute, RSHI in the Gulf of Finland, Baltic Sea (both being executed under the UNESCO's TREDMAR programme) and the 1994 studies of MSU (Biology Faculty), RSHI and Polar Institute of Fishery and Oceanography, PINRO in the coastal zone of the White and Barents Seas (UNESCO's COMAR-North programme) undertaken by international groups of geologists/geophysicists, oceanographers and marine biologists/ecologists applying a "Training-through-Research" approach to their cooperative programs. International participants in the two latter expeditions came from Estonia, Finland, Latvia, the Netherlands and the Ukraine. NOC agreed to support and further promote the "Floating university" programme.

Learning about our planet together. Photo J. Woodside

VISITS

In March 1994 the Center was visited by a Dutch Parliamentary delegation, as part of their reconnaissance visit to Russian educational organizations of various levels. The Center was selected for the visit in view of its close cooperation with several universities and institutions in the Netherlands. A general discussion with staff members and students took place. Members of the group, under the Chairmanship of Mr. G. van Leijenhorst, were: Mr. A.J. Hermes, Mrs. M.J.A. van der Hoeven, Mrs. T. Netelenbos, Mr. W.J. van Gelder, Mr. J. Franssen, Mr. A. Nuis, Mrs. L. Sipkes, Mr. Ch. J. M. Roovers.

Among the international visiting professors in 1994 were: Prof. J. van Hinte, Dr. J. Woodside (both from the Netherlands), Dr. A. Robertson (the UK), Prof. O. Larchenkov (the Ukraine).

REFERENCES

1. Year 2000 Challenges in Marine Science Education World-wide; UNESCO Reports in Marine Science No. 52. UNESCO, 1988.

2. University Field Courses in Marine Science; MARINF/79. UNESCO, 1990.

3. Geological and Geophysical investigations of Western Mediterranean deep sea fans; UNESCO Reports in Marine Science No. 62. UNESCO, 1993.

4. J. Woodside et al. 4th TREDMAR cruise. In: IMS Newsletter No 72, special supplement, 1994 (in Russian).

5. Mud volcanism in the Mediterranean and Black Seas and Shallow structure of the Eratosthenes Seamount. UNESCO Reports in Marine Science No 64. UNESCO, 1994.

6. Recent Marine Geological Research in the Mediterranean and Black Seas. MARINF/94, UNESCO, 1994.

Annex 1

FOURTH 'TRAINING-THROUGH-RESEARCH' CRUISE

LIST OF PARTICIPANTS

Russia

	Vladimir Fomenko (Yuzhmorgeologiya)
	Vitaly Tsyganenkov (Yuzhmorgeologiya)
	Andrey Pavlov (Yuzhmorgeologiya)
	Gennady Potapov (Yuzhmorgeologiya)
	Alexander Matveenko (Yuzhmorgeologiya)
	Andrey Guselnikov (Yuzhmorgeologiya)
	Valery Podshuveit (Yuzhmorgeologiya)
	Vladimir Boldirev (Yuzhmorgeologiya)
	Boris Rubtsov (Yuzhmorgeologiya)
	Andrey Shanin (Yuzhmorgeologiya)
	Alexander Ovcharov (Yuzhmorgeologiya)
	Victor Pryadilov (FLIP LTD)
	Victor Vasilyev (Yuzhmorgeologiya)
	Alexey Koshman (Yuzhmorgeologiya)
	Petr Lygin (Yuzhmorgeologiya)
	Dmitry Shilyaev (Yuzhmorgeologiya)
	Michael Ivanov (Moscow State University)
	Anatoly Limonov (Moscow State University)
	Alexander Volgin (Moscow State University)
	Dmitry Ivanov (Moscow State University)
	Valery Gaynanov (Moscow State University)
	Elena Kozlova (Moscow State University)
Stud.	Ilya Korotkov (Moscow State University)
Stud.	Ekaterina Ivanova (Moscow State University)
Stud.	Grigory Akhmanov (Moscow State University)
Stud.	Anna Lototskaya (Moscow State University)
Stud.	Evgenyia Terentieva (Moscow State University)
Stud.	Evgenyia Shelavina (Moscow State University)
Stud.	Alexander Shishkin (Moscow State University)
Stud.	Pavel Shashkin (Moscow State University)
Stud.	Dmitry Vladov (Moscow State University)
Stud.	Ekaterina Milashina (Moscow State University)
Stud.	Andrey Akhmetjanov (Moscow State University)
Stud.	Ekaterina Nezlina (Moscow State University)
Stud.	Tatyana Rodionova (Moscow State University)
Stud.	Konstantin Kunin (Moscow State University)
Stud.	Kirill Svinarenko (Moscow State University)

The Netherlands

	John Woodside (Free University)
	Simon Troelstra (Free University)

Eldrid Bringmann (G.O.A.)
Jan van Hinte (Free University)
Stud. Johan de Koning (Technical University of Delft)
Stud. Henk de Haas (Nederlands Instituut voor Onderzoek der Zee (NIOZ)
Stud. Anja Oosting (Free University)
Stud. Jasper van der Hoef (Free University)
Stud. Eelco Felser (Free University)
Stud. Goof Buijs (Free University)
Stud. Olaf Duizendstra (Free University)
Stud. Geert de Vries (Erasmus student from Genoa at Free University)
Stud. Paul Verweij (Free University)

United Kingdom

Robert Kidd (University of Wales, Cardiff)
Simon Wakefield (University of Wales, Cardiff)
Neil Kenyon (I.O.S.)
Bryan Kronin (University of Wales, Cardiff)
Stud. Renata Lucchi (University of Wales, Cardiff)
Stud. John Millington (University Leicester)
Stud. Julian Clark (University Leicester)
Stud. Rebecca Rendle (University of Wales, Cardiff)
Stud. Steven Morris (University of Wales, Cardiff)
Stud. Martin Gee (University of Wales, Cardiff)
Stud. Julie Herniman (University of Wales, Cardiff)
Stud. Alison Jones (University of Wales, Cardiff)

Italy

Michael Marani (Inst. for Marine Geology, Bologna)
Marco Sacchi (GEOMARE-Sud, Napoli)
Francesca Budillon (GEOMARE-Sud, Napoli)
Mauro Agate (University Palermo)
Salvina Infuso (University Palermo)
Massimo De Lauro (GEOMARE-Sud, Napoli)
Attilio Sulli (University Palermo)
Fabiano Gamberi (University Bologna)
Michele Lucido (University Palermo)
Claudia Romagnoli (University Bologna)
Carlo Savelli (Inst. for Marine Geology, Bologna)
Luciana Ferraro (GEOMARE-Sud, Napoli)
Daniela Penitenti (Inst. for Marine Geology, Bologna)

Spain

Fernando Perez (University Barcelona)
Javier Rey (University Jaen)
Juan Soto Hermoso (University Granada)
Cesar Viseras Alarcon (University Granada)
Francisca Martinez Ruiz (University Granada)
Stud. Joaquin De la Linde Rubio (University Granada)

Chile

Juan Diaz (University Valparaiso)

Saudi Arabia

Samir Mutvally

Mid-cruise Workshop (Naples, June 20-22, 1994)
Additional participants non-members of the cruise party

Morocco

A. Khalek (Geological Survey of Morocco)

Russia

I. Glumov (Moscow State University)
V. Trofimov (Moscow State University)

Turkey

M. Eugun (Piri Reis Foundation, Izmir)

Annex 2.

LIST OF SEMINAR PRESENTATIONS
DURING THE 4TH TRAINING-THROUGH-RESEARCH CRUISE, 1 JUNE-15 JULY 1994, R/V 'GELENDZHIK', MEDITERRANEAN SEA

Leg 1

4 June

Woodside, J. (The Netherlands) and Limonov, A. (Russia). Geological Setting of the Mediterranean.

5 June

Troelstra, S. (The Netherlands). Anoxic Events: Mediterranean, Skagerrak, Spain, Indian Ocean.

6 June

Marani, M. (Italy) Geophysics-Geology Combined Application to Southern Adriatic Geodynamics.

7 June

Woodside, J. (The Netherlands). The Cyprus Arc.

8 June

Troelstra, S. (The Netherlands). Climatostratigraphy; Tectonics and Ocean Climate.

Leg 2

11 June

Savelli, C. (Italy). Cenozoicarc Volcanism Migration if the South Tyrrhenian Sea.

12 June

Wakefield, S. (U.K.). Geochemistry of a Core from the Eratosthenes Seamount.

Gainanov, V. (Russia). Videofilm '3rd Training-Through-Research Cruise'.

13 June

Discussion on the new obtained material.

14 June

Romagnoli, C. (Italy). Marine Geological Data on the Eastern Sector of the Aeolian Islands.

15 June

Marani, M. (Italy). Bottom Current Activity in the Central Mediterranean.

Savelli, C. (Italy). Videofilm 'A Submersible Dive (MIR-2) on the Marsili Volcano.

16 June

Gamberi, F. (Italy). Geology of the Tyrrhenian Sea.

Kidd, R. (U.K.). Videofilm 'The Ocean Drilling Program'.

17 June

Viseras, C. (Spain). Sequence Stratigraphy in relation to Alluvial Architecture.

18 June

Diaz, J. (Chile). Tsunamis and Some Applications of Tsunami Data.

19 June

Meeting of all the Participants.

Leg 3

23 June

General Meeting of all the Participants of the Leg 3.
Meeting of the Sedimentological Team.

24 June

Infuso, S. (Italy). Plio-Pleistocene Sequence Stratigraphy and Structural Evolution in Offshore Sicily and Correlation with the Eastern Sardinia Margin.

25 June

Kenyon, N. (U.K.). Modern Sandy Lobes on Turbidite Systems.

26 June

Lucchi, R. (U.K.). Core TTR-3 107G: A Sedimentological Investigation along the Northern Slope of the Eratosthenes Seamount (Eastern Mediterranean Sea).

27 June

De Kaas, I. (The Netherlands). Sediment and Organic Carbon Deposition in the North Sea.

28 June

Morris, S.A. (U.K.). Turbidite Thickness Variations Caused by Obstacles and Changes in Slope.

29 June

Clark, J. and Millington, J. (U.K.). Ancient Submarine Fan Deposits from the South Central Pyrenees, Spain.

1. Slope, Canyon and Channel Deposits.
2. Channel-'Lobe' Transition, and 'Lobe' Deposits.

30 June

Sacchi, M. (Italy). From Eastern Sardinia Continental Margin to the Tyrrhenian Bathyal Plain: Introduction and Discussion on Preliminary Interpretation of Seismiic Lines (1st Part of Leg 3).

1 July

Terentieva, E. (Russia). Plio-Quaternary Evolution of the Rhone Neofan Area.

2 July

Van Hinte, J. (The Netherlands). Triple 'M' of Global Climate.

3 July

Newly Obtained Data Presentation.

4 July

Cronin, B. (U.K.) and Ivanova, E. (Russia). Core Data from Western Sardinia/Corsican Margin.

5 July

Woodside, J. (The Netherlands) and Ivanov, M. (Russia). 'The Past is the Key to the Present is a Key to the Future' (Post-cruise Meeting and Pre-cruise Planning for 1995).

6 July

Meeting of all the Participants.

Annex 3.

LIST OF SEMINARS AT THE UNESCO-MSU CENTER, 1994

10 March 1994

Ivanov, M.K. Report on the Meeting with Mr F. Mayor, Director-General of UNESCO and on the Participation in the Conference on 'The Deep-sea Floor as a Changing Environment' (Spain).

Ivanov, A.A and Limonov, A.F. The Programme of the 4th TTR Cruise in the Mediterranean Sea.

Ivanova, A. and Terentieva, E.B. Discussion of the Results of the 2nd Post-cruise Meeting in Amsterdam.

24 March 1994

Koronovskiy, N.V. The Late Cenozoic Magmatism of the Mediterranean Region.

7 April 1994

Nikishin, A.M., Bolotov, S.N. and Ershov, A.V. The Computer Modelling of Sedimentary Basins Evolution.

20 October 1994

Ivanov, M.K. The Workplan of the UNESCO Center for the 1994-1995 Academic Year.

Limonov, A.F. Results of the 3rd International Conference on 'Gas in Marine Sediments' (NIOZ, Texel, The Netherlands, 25-28 September 1994).

Sychev, V.I. Results of the 'Baltic Floating University' Regional Programme (summer 1994).

Volgin, A.V. The Analysis of the Sonographs from the Mud Volcano Area of the Mediterranean Ridge. Report on the Special Course given at the Free University of Amsterdam (The Netherlands).

3 November 1994

Basov, I.E.I. Some Results of the Investigations of the Black Sea Mud Volcanoes. Report on the Special Course given at NIOZ (Texel, The Netherlands).

Basov, E.I. Report on the Fieldwork performed in the Region of Mud Volcanism on the Tamanskiy Peninsula.

Yutsis, V.V. and Akhmanov, G.G. Preliminary Results of the Investigations of the Danube Deep-sea Fan during the "Training-through-Research" cruise (September 1994, R/V *'Stvor'*).

17 November 1994

Basov, E.I. Information about the International Expedition onboard the R/V 'Professor Bogorov' in the Sea of Okhotsk (September-October 1994).

Bogdanov, N.A. The New Tectonic Map of the Mediterranean Region.

Students'presentations prepared for the 3rd Post-cruise Meeting at the University of Wales (Cardiff, U.K., 1995):

a. Shelavina, E. Analysis of Seismic Data: Its Application to the Reconstruction of Evolution of the Tyrrhenian Sea.

b. Vladov, D. Digital Processing and Interpretation of Sidescan Sonar Data.

Woodside, J.M. ANAXIPROBE - The National Netherlands Programme in 1995.

26-30 November 1994

Van Hinte, J. Main Principles and Applications of Sequence Stratigraphy: a course of five lectures and practical training.

29 November 1994

Students'presentations prapared for the 3rd Post-cruise Meeting at the University of Wales (Cardiff, U.K., 1995):

a. Akhmatzhanov, A. Grain Size Distribution and Composition of Silts and Sands from the Tyrrhenian Sea.

b. Kunin, K. Grain Size, Mineralogical Composition of Sediments in the Balearic Sea and their Relation to Intensity of Backscatter.

c. Nezlina, E. Analysis of the Late Quaternary Deep-sea Benthic Foraminifera from Corsico-Sardinia Region related to Some Paleoceanographic Changes.

d. Rodionova, T. Organic Carbon Quantitative Study in Marine Sediments.

e. Shashkin, P. Processing of Seismic Data from the Southeastern Part of the Tyrrhenian Sea.

Van Hinte, J. Sequence Stratigraphy: Main Principles and Applications (Summary).

1 December 1994

Nikishin, A.M. Computer Modelling of the Black Sea History.

Student's presentations prepared for the 3rd Post-cruise Meeting at the University of Wales (Cardiff, U.K., 1995):

a. Akentieva, E. A Detailed Study of Mud Volcanoes and Associated Features: their Morphology and Distribution on the Mediterranean Ridge (according to Sidescan Sonar Data).

b. Akhmanov, G. Lithology of the Mud Breccia from the New Western Mediterranean Ridge Mud Volcanoes.

c. Bouriak, S. The Black Sea Deep-water Mud Volcano Area: Seismic and Acoustic Images probably Connected with Gas Occurrence. The Evidence for Gas Responsibility for Bright Spots.

d. Kozlova, E. The Results of Grain Size and Mineralogical Analyses in Turbidites from the Central Part of the Black Sea.

e. Svinarenko, K. The Results of Grain Size and Mineralogical Analyses of Sediments in the Distal Part of the Ajaccio Canyon.

15 December 1994

Bouriak, S. Information about the Preparation for the 3rd Post-cruise Meeting at the University of Wales (Cardiff, U.K.).

Ivanov, M.K. Report on the Activities of the UNESCO Research and Training Center on Marine Geology and Geophysics in 1994.

Limonov, A.F. The Programme of the 5th TTR Cruise of the R/V Gelendzhik in 1995.

Robertson, A.H.F. Some Geological Problems of the Eastern Mediterranean.

17 December 1994

Robertson, A.H.F. ODP operations in the Mediterranean, 1995.

Annex 4

LIST OF PUBLICATIONS DERIVED FROM THE FLOATING UNIVERSITY PROGRAMME, 1991-1994

Akentieva, E. Morphology of Mud Volcanoes of the Olimpi area in the Eastern Mediterranean and some Tectonic Features of the Region (according to geophysical data from the 1993 Cruise). - *Recent Marine Geological Research in the Mediterranean and Black Seas through the UNESCO/TREDMAR Programme and its "Floating University" Project, Abstracts, Free University, Amsterdam, 31 January-4 February 1994. - MARINF/94, UNESCO, June 1994*, p.13.

Akhmanov, G. Mud Breccia Clasts from the Mediterranean Sea: Results of a Study of their Composition. - *Recent Marine Geological Research in the Mediterranean and Black Seas through the UNESCO/TREDMAR Programme and its "Floating University" Project, Abstracts, Free University, Amsterdam, 31 January-4 February 1994. - MARINF/94, UNESCO, June 1994*, p.14.

Akhmanov, G. The Mud Breccia Clasts from the Mediterranean Ridge: The results of Study of Substantional Composition. - *XXXIV Congress of C.I.E.S.M., Abstracts, Malta, 1995* (submitted).

Akhmanov, G. Lithology of the Mud Breccia Clasts from the Mediterranean Ridge - *Marine Geology, 1995* (submitted).

Almendinger, R. Some Features of the Tectonic Structure of the Eratosthenes Seamount Area. - *Recent Marine Geological Research in the Mediterranean and Black Seas through the UNESCO/TREDMAR Programme and its "Floating University" Project, Abstracts, Free University, Amsterdam, 31 January-4 February 1994. - MARINF/94, UNESCO, June 1994*, p.22.

Ben-Avraham, Z., Tibor, G., Limonov, A.F., Leybov, M.B., Ivanov, M.K., Tokarev, M.Yu., and Woodside, J.M. Structure and Tectonics of the Eastern Cyprean Arc. - *Marine and Petroleum Geology* (submitted).

Ben-Avraham, Z. and Tibor, G. 1993. Structure and tectonics of the Eastern Cyprean Arc. *European Union of Geosciences, Strasbourg, 4-8 April 1993, Terra Nova, vol. 5, abstract supplement no.1, p. 254.*

Basov, E. The Lithological Composition and Origin of the Black Sea Mud Volcano Breccia. - *Recent Marine Geological Research in the Mediterranean and Black Seas through the UNESCO/TREDMAR Programme and its "Floating University" Project, Abstracts, Free University, Amsterdam, 31 January-4 February 1994. - MARINF/94, UNESCO, June 1994*, pp.23-24.

Basov, E.J. The Black Sea Mud Volcanism. Its Lithology, Geochemistry and Origin. - *XXXIV Congress of C.I.E.S.M., Abstracts, Malta, 1995* (submitted).

Bouriak, S. Bright Spots on Seismic Profiles of the Deepest Part of the Black Sea Mud Volcano Area. - *Third International Conference "Gas in Marine Sediments", Abstracts, NIOZ, Texel, The Netherlands, 1994*, p.p.25-26.

Bouriak, S. Mud Volcanoes of the Deepest Part of the Black Sea: Some Special Structures Connected with Mud Volcanism of the Region (according to seismic data of the Cruises of 1991 and 1993). - *Recent Marine Geological Research in the Mediterranean and Black Seas through the UNESCO/TREDMAR Programme and its "Floating University" Project, Abstracts, Free University, Amsterdam, 31 January-4 February 1994. - MARINF/94, UNESCO, June 1994*, p.25.

Bouriak, S. Mud Volcanoes and Some Features connected with Mud Volcano Activity in the Deepest Part of the Black Sea. *XXXIV Congress of C.I.E.S.M., Abstracts, Malta, 1995* (submitted).

Cita, M.B. The Mediterranean Ridge Diapiric Belt: A Progress Report. - *Recent Marine Geological Research in the Mediterranean and Black Seas through the UNESCO/ TREDMAR Programme and its "Floating University" Project, Abstracts, Free University, Amsterdam, 31 January-4 February 1994. - MARINF/94, UNESCO, June 1994*, p.l2.

Cita, M.B., Woodside, J.M., Ivanov, M.K., Kidd, R.B., Limonov, A.F., and Scientific Staff of Cruise TTR3 - Leg 2. Fluid Venting, Mud Volcanoes and Mud Diapirs on the Mediterranean Ridge. - *Rend. Fis. Acc. Lincei, Roma, 1994, ser. IX, vol. V, fas. 2*, pp.l61-169.

Cita, M., and Camerlenghu, A. Mud diapirism in the Mediterranean Ridge: State of Art pre-Training-through-Research 1993 activities. *Marine Geology, 1995* (submitted).

Cita, M., Erba, E. and Premoli Silva. Age and provenance of the mud breccia. - *Marine Geology, 1995* (submitted).

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Annex 5

LIST OF INSTITUTIONS WHICH TOOK PART IN THE 'FLOATING UNIVERSITY' PROJECT and/or OTHER COOPERATION ACTIVITIES WITH THE UNESCO-MSU CENTER AND THE ESF NETWORK IN 1991-1994

Chile

University of Valparaiso

France

University Pierre and Marie Curie (Paris-6)
French Institute for Oil
IFREMER
University of Perpignan

Germany

Kiel University
GEOMAR (Christian Albrechts University)
Ruhr University of Bochum
University of Hamburg

Greece

University of Patras
University of Athens

Israel

Tel Aviv University
National Institute of Oceanography (Haifa)

Italy

Experimental Geophysical Observatory (Trieste)
GEOMARE-Sud (Napoli)
Institute for Marine Geology (Bologna)
University of Bologna
University of Genova
University of Milan
University of Naples
University of Palermo

Morocco

Service of Structural and Marine Geology, Geological Survey of Morocco

The Netherlands

The Netherlands Organization for Scientific Research (NWO)
Geosciences Research Foundation (GOA)
Free University of Amsterdam
Netherlands Institute for Sea Research (NIOZ)
Technical University of Delft
University of Amsterdam
University of Utrecht

Russian Federation

Committee on Geology
Geological Institute, Academy of Sciences
Institute of Lithosphere, Academy of Sciences
Institute of Paleontology, Academy of Sciences
Ministry of Science and Technological Policy
Ministry of Fuel
YUZHMORGEOLOGIA Co. (Gelendzhik)
Departments of the Geology Faculty, Moscow State University
Biology Faculty, Moscow State University
Russian State Hydrometeorological Institute (St. Petersburg)

Saudi Arabia

University

Spain

University of Barcelona
University of Cadiz
University of Granada
University of Jaen
Institute for Marine Sciences (Barcelona)

Switzerland

Eidgen Ussische Technische Hochschule (ETH) (Zurich)
Geological Institute (Zurich)

Tunisia

University Tunis-2

Turkey

Dokuz-Eylul University (Izmir)
Piris Reis Foundation for Maritime and Marine Resources Development (Izmir)
Turkish Petroleum Corporation

The Ukraine

University of Odessa

United Kingdom

University of Edinburgh
University of Leicester
University of Manchester
University of Newcastle
University of Southampton
University of Wales
Institute of Oceanographic Sciences Deacon Laboratory (Wormley)

United States of America

Ocean Drilling Programme
United States Geological Survey (USGS), Menlo Park

European Science Foundation

Scientific Networks Committee

UNESCO

Science Sector (programmes COMAR, PROMAR & TREDMAR)
Education Sector (UNESCO Chairs & UNITWIN programmes)
National Commissions and Permanent Delegations of the participating countries

Annex 6

TRAINING COURSES AND RESEARCH PRESENTATIONS WITHIN FIELD CAMPAINS, MID-CRUISE AND POST-CRUISE MEETINGS, 1992- EARLY 1994 (A HISTORICAL BACKGROUND OF THE PROGRAMME)

Selection of Lectures and Seminars during 1992 Field Season (2nd TREDMAR cruise) and mid-cruise Workshop (Villefranche-sur- Mer), 4 June-18 July 1992

M.Leybov (Russia)- Marine gravimetric survey, principles & equipment
A.Shamaro (Russia)- Marine magnetic survey and data interpretation.
M.Tokarev (Russia)- Digital processing of seismoacoustic data.
A.Starovoitov (Russia)- Geological interpretation of seismic data.
M.Ivanov (Russia)- Methods and equipment of marine geological sampling.
V.Gaynanov (Russia)-Marine seismic survey.
V.Gaynanov (Russia)- Methods and parameters of seismoacoustic profiling.
G.Ferentinos (Greece)- Offshore geological hazards in a tectonically active region: the Hellenic trench/arc system.
M.Ouakad (Tunisia)- Sedimentary and transport processes offshore Tunisia.
J.Woodside (The Netherlands)- Tectonics of the Alboran Sea.
M.Ivanov (Russia)- Deep-water structures in the Black-sea area.
A.Palanques (Spain)- Morphological and sedimentary evolution of the Valencia valley and fan.
B.Cronin (U.K.)- Some ancient deep-sea channels from Spain.
N.Kenyon (U.K.)- Sandy lobes on deep-sea siliciclastic depositional systems and the TREDMAR programme.
A.Starovoitov (Russia)- Lithodynamic processes on the Black Sea continental slope.
G.Ferentinos (Greece)-Interpretation of seismic and sonar records
M.Tokarev (Russia)- Seismic learning modules (SeisStart)
G. Bellaiche (France)- Canyons and deep-sea fans of the northwestern margin of the Mediterranean.
A.Palanques (Spain)- Ebro deep-sea fan.
L.Droz (France)- Indus deep-sea fan.
N.Kenyon (U.K.)- Sidescan sonars images of the sedimentary bodies.
C. Ravenne (France)- Dynamics of the sedimentary bodies
G.Ferentinos (Greece)- Small scale turbidity flows and their significance in basin filling: an example from the Gulf of Corinth (Greece) an active asymmetric graben.
C. Ravenne (France)- Field excursion to the inner part of the Alpes Maritimes on the general theme the "Annot sandstone"
A.Maldonado (Spain)- The westernmost segment of the Mediterranean Sea and the alpine-belts: paleoceanographic and tectonic evolution of the Alboran Sea and Gulf of Cadiz.

S.v.d.Brenk (The Netherlands)- Alternative models for the evolution of the Alboran Sea.

J.Woodside (The Netherlands)- Brief review of results of Dutch cruise to the Alboran Sea in November 1991.

G.O'Sullivan (U.K.)- Organic rich sediments in the modern and ancient record, a product of or a cause of anoxia?

1st Post Cruise Student Meeting, Moscow, January 22-30 1993

J. Woodside (The Netjerlands) - Summary of the aims and achievements of the first Training Through Research cruise and the ESF Network on Advanced Study Workshops on Mediterranean Marine Geosciences

A. Bobatchev (Russia) - Marine magnetic gradient data from the Black Sea and Eastern Mediterranean

E. Ivanova (Russia) - Stratigraphic analysis of Eastern Mediterranean sediments on the basis of foraminiferal study

D. Voronina & J. Demidenko (Russia) - The distribution of diatom assemblages in the Late Quaternary deposits of the Black Sea

I. Chumakov (Russia) - Absolute datings of the principal Cenozoic events in the Mediterranean

N. Kenyon (Russia)- Aims and research of the second cruise

J. Millington (U.K.)- Rhone Neofan surface morphology: A conceptual framework for a channel-lobe transition and its implications for the ancient rock record

B. Cronin (U.K.)- Comparative analysis of modern and ancient turbidite systems of the Western Mediterranean region

E. Terentieva (Russia) - Processing and geological interpretation of seismic data from the Rhone Neofan

S. Penteley (Russia) - Comparative analysis of sidescan and seismic data from the Rhone Neofan

T. den Bezemer (The Netherlands) - Channel parameters of the main feeder channel of the Andarax Fan

I. Chumakov (Russia) - The problem of the "Lago-Mare" in the Eastern Mediterranean and correlation with the events in the Paratethys

A. van der Wal (The Netherlands)- A reconstruction of the recent Andarax Fan System

A. Lototskaya (Russia) - Foraminifera-based stratigraphic interpretation of Western Mediterranean sediments

Selection of Lectures and Seminars during 1993 Field Season (3rd TREDMAR cruise) and mid-cruise Workshop (Izmir), 1 June-15 July 1993

A. Limonov and L. Meisner (Russia) - Geological structure of the Black Sea and its surroundings.

T. Van Weering (The Nerherlands) and M.Ivanov (Russia)- What are mud volcanoes?
M. Ozeler (Turkey)- Application of fluorescence microscopy for the carbonate petrografic.
N. Kenyon (U.K.)- Sidescan sonar interpretation.
A. Pierrot-Bults (The Netherlands)- Zooplancton research.
M. Ozeler (Turkey)- Sample freezing and freeze-drying techiques for sem stadies.
E. Ramos and P. Busquet (Spain)- Evolution of the Ebro basin.
P. Busquet and E. Ramos (Spain)- C annibalistic processes in a turbiditic foredeep: the Vallfogona formation (Ebro basin, NE Spain).
G. O'Sullivan (U.K.)- Black Sea sedimentology.
A. Husnu Eronat (Turkey)- Images from european remote sensing satellite (ERS1).
T. Van Weering (The Netherlands)- More on gas in sediments.
M. Ouakad (Tunisia)- sedimentology of lagoonal and near-coastal deposits of the tunesian shelf.
V. Gaynanov Russia)- Some aspects of seismic data processing.
M. Ivanov (Russia)- mud volcanoes in the Black Sea and their geological implications.
T. Van Weering (The Netherlands)- Present geological studies for the Black Sea mud volcanoes.
A. Camerlenghi (Italy)- Geophysical evidence of mud diapirism on the Mediterranean Ridge.
M. K. Duzbastilar (Turkey)- Geology of the Karaburun peninsula
M. K. Duzbastilar (Turkey)- Field excusion (23 june) to the Karaburun peninsula
N. Kenyon (U.K.)- Evolving miogeanticlines of the East Mediterranean (Hellenic, Calabrian and Cyprus outer ridges).
M. B. Cita (Italy)- Geological evidence of the mud diapirism on the Mediterranean Ridge.
J. Woodside (The Netherlands)- Summary of 1991 Training through Research results for the Eastern Mediterranean.
R. Kidd (U.K.)- Ocean drilling project (ODP) in the Mditerranean.
R. Kidd (U.K.)- Core handing and shipboard sampling.
S. Wakefield (U.K.)- Problems for geochemistry from sampling methods.
M. B. Cita (Italy)- The messinian event in the Mediterranean.
E. Erba (Italy)- Deep-water bacterial mats from anoxic basin of the Eastern Mediterranean.
R. Lucchi (Italy)- Upslope turbiditic sedimentation in the southeastern flank of the Mediterranean Ridge.
J. Woodside (The Nertherlands)- What is the Eratosthenes Seamount?
W. Van Der Werf (The Netherlands)- Forearc development and arc/continent collision in the Eastern Sunda Arc (Indonesia).
L. Nieto (Spain)- Stratigraphy and paleogeography of subbetic domain, Betic Cordilleras (south of Spain).

J. Galindo-Zaldivar (Spain)- Main tectonic features of the betic-rif Cordilleras (Western Mediterranean).

R. Kidd (U.K.)- Debris flows on Atlantic continental margins.

S. Wakefield (U.K.)- Shallow burial diagenesis beneath an upwelling area, NW Africa.

A. Robertson (U.K.)- Eratosthenes and its relationship with Cyprus geology.

J. Woodside (The Netherlands)- Tectonic control of the Andarax canyon, eastern Alboran Sea.

R. Flecker (U.K.)- A subsidence event in the miocene of the manavgat basin, SW Turkey, and it's possible correlation to the Adana basin and northern Cyprus: in search of a mechanism.

C. Glover (U.K.)- Pliocene and Quaternary sediments of the Antalya region, southern Turkey.

T. Van Soest and P. Bogaard (The Netherlands)- Fieldwork on the Troodos ophiolite in Cyprus: intrusion directions of magma in sheeted dikes.

L. McMurray (U.K.)- Delta architecture in the sequences: gulf of Corinth, central Greece and Thermaikos Gulf, NW Aegean Sea.

A. Robertson (U.K.)- Tectonic evolution of Tethys in northern Turkey and relationship to opening of the Black Sea.

2nd Post Cruise Student Meeting, Amsterdam 31 January - 4 February 1994

M. Cita (Italy) - The Mediterranean Ridge Diapiric belt; A progress report.

R. Kidd (U.K.)- Update on ODP use of TTR-3 survey data and projected drilling in TTR-3 survey area.

A. Robertson (U.K.) - Eratosthenes Seamount, Easternmost Mediterranean; Evidence of active underthrusting beneath Cyprus.

C. Glover (U.K.) - Recent sediments of the Eratosthenes Seamount.

R. Lucchi *(Italy)* - Sedimentological investigation of the turbiditic sequence recovered along the north slope of the Eratosthenes Seamount.

A. Volgin (Russia) - Analysis of mud volcano sidescan sonar images from the Mediterranean Ridge.

W. Hieke (Germany) - Swath mapping and side-scan sonar surveys in the Olimpi area.

A. Limonov (Russia) - Comparison of mud diapirs on the Mediterranean Ridge and the Black Sea and possible mechanisms of their formation.

G. de Lange (The Netherlands) - Napoli Dome pore-water study on salinity fluxes.

S. Wakefield (U.K.) - Geochemistry and diagenesis in Mediterranean sediments.

G. O'Sullivan (U.K.) - Solid phase of pore water geochemistry of a core from the Eratosthenes Seamount, implications for the formation of sapropels.

L. McMurray (U.K.) - The location and geological setting of core 104G and its significance for ODP-drilling.

E. Akentieva (Russia) - Interpretation of geophysical data from the Olimpi area in the Eastern Mediterranean region.

R. Almendinger (Russia) - Tectonic interpretation of seismic and side-scan data from the Eratosthenes Seamount.

G. Akhmanov (Russia) - The mud-breccia from the Mediterranean Sea; the results of study of substantial composition.

L. Nieto (Spain) - Fracture systems and syn-sedimentary deformation structures in the Eratosthenes Seamount.

J. Galindo-Zaldivar (Spain) - Morphological and structural features of mud volcanoes in he Mediterranean Ridge.

A. Hoen (The Netherlands) - Seismic analysis on the genesis of the Anaximander Mountains (TTR-1 cruise 1991).

E. Ivanova (Russia) - Micropaleontology and stratigraphy of two cores from the Alboran Sea (Western Mediterranean, TTR-2 cruise 1992).

A. Lototskaya (Russia) - Calcareous nannofossils as an index of paleoenvironments for Quaternary sediments. Stratigraphic study of one of the cores from the Alboran Sea (Western Mediterranean, TTR-2 cruise 1992).

E. Terentieva (Russia) - Pliocene-Quaternary evolution of the Rhone Neofan area according to the high resolution multi and single channel seismic data (TTR-2 cruise 1992).

B. Cronin (U.K.) - The Almeria Canyon, Western Mediterranean: Comparison with ancient deep-water channels in SE Spain.

E. Basov (Russia) - Lithological composition and the origin of the Black Sea mud volcano breccia.

S. Bouriak (Russia) - Mud volcanoes of the deepest part of the Black Sea and bright spots.

A. Limonov (Russia) - Evidence of shallow gas occurrence in the Black Sea mud volcano area.

Tj. van Weering (The Netherlands) - Gas occurrences

J. van Hinte (The Netherlands) - Triple M

R. van der Meer (The Netherlands) - Grading in diapiric mud breccia.