Intergovernmental Oceanographic Commission **9**
Training Course Reports

IOC/Unesco Summer School on Oceanographic Data Collection and Management

Institute of Marine Sciences
Middle East Technical University
Erdemli, ICEL, Turkey, 21 September-3 October 1987

SC.88/WS/48

Unesco

PREFACE

Within the framework of co-operation between the Intergovernmental Oceanographic Commission and the Division of Marine Sciences of Unesco, a scientific research programme, Physical Oceanography of the Eastern Mediterranean (POEM), was agreed upon and supported since 1984. An important component of this programme is the collection and management of oceanographic data.

To increase the capacity and capability of the Member States of the Mediterranean and the Black Sea, especially the developing countries, in oceanographic data collection and management, to assist these Member States in participating effectively in scientific research in the region, the Summer school on Oceanographic Data Collection and Management was organized at the Institute of Marine Sciences (IMS) of the Middle East Technical University, Erdemli - ICEL, Turkey from 21 September to 3 October 1987.

This Summer School was a good opportunity to increase the awareness of Member States of the region of the importance for them to develop marine research potential and to establish infrastructures needed for oceanographic data collection, processing and exchange.

This Report, prepared by the local Organizing Committee, gives an outline of the course, which included lectures, practical work and on-board training, as well as scientific discussions. It also provides an evaluation of the course in the light of the assessments made by the instructors and trainees, and a set of recommendations for the improvement of future courses of this type.

IOC and Unesco are greatly indebted to the Turkish National Oceanographic Committee and the local organizer, the National Institute of Marine Sciences, for this excellent course and consider that such courses can be an effective means of transferring marine scientific knowledge and experience about marine scientists in the countries of the region.

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1. INTRODUCTION

The Summer School on Oceanographic Data Collection and Management was held in Erdemli, Icel, Turkey, from 21 September to 3 October 1987 at the Institute of Marine Sciences, Middle East Technical University.

This Summer School was conducted in response to the recommendations of the IOC Technical Committee on International Oceanographic Data and Information Exchange (IODE) and was co-sponsored by the Turkish Authorities, IOC and the Unesco Division of Marine Sciences. Accommodation in the Erdemli Campus and facilities for training, lodging, computation and R/V "Bilim" onboard cruises were provided by the Institute of Marine Sciences. The Description of the facilities is presented in Annex Vi, VII, and VIII of this Report.

The IOC and the Division of Marine Sciences provided financial support to the trainees and lecturers outside Turkey and contributed towards the organizational arrangements.

The Summer School was designed to meet the following specific objectives:

- to train scientists from Member States of the Eastern Mediterranean and the Black Sea on sampling procedures and methods of oceanographic data collection, analysis, interpretation and presentation with a view to enable them to execute more effectively research programmes in their countries;

- to get participants acquainted through delivering a number of lectures with the progress in scientific research of different oceanographic phenomena in the Eastern Mediterranean and the Black Sea;

- to provide training in methods of planning marine expeditions and train participants on observation techniques, maintenance of oceanographic equipment and IODE methodologies and schemes which need to be followed in marine research institutions in data collection and exchange;

- to establish working contacts between scientists from different Member States in the region and to encourage their full participation in regional oceanographic research and in the IODE system.

The Summer School was directed by Prof. Umit Uluata, Director of the Institute of Marine Sciences. The staff of the Institute assisted effectively in organizing and delivering lectures and with all types of routine arrangements for the conduct of the School.

Special thanks are due to Mr. Huseyin Yuce, the Chief of the Oceanographic Division of the Hydrographic and Oceanographic Service of Turkey whose efforts in arranging the School and in establishing liaison with IOC and Unesco contributed strongly to the success of the Summer School.

2. PARTICIPANTS

More than 25 applications from the Member States of the Eastern Mediterranean and the Black Sea were received in response to the announcements of the Summer School. Following consultations with IOC and Unesco with IMS, 18 participants were selected. They included those who were directly involved in making oceanographic observations at sea, in the processing of collected data and the preparation of products. They were from 6 Member States: Algeria, Bulgaria, Egypt, Greece, Turkey and Yugoslavia (a list of names and addresses of the participants is given in Annex I.

Seventeen participants arrived as scheduled, attending the Opening Ceremony, one of the participants was not able to attend the School.

In addition to the selected participants, several graduate research assistants of the IMS also attended the lectures at their own wish, and a number of research personnel were available on board the R/V BILIM during the open-sea training.

All participants were scientifically qualified and had reasonably good command of English.

The lecturers were invited by IOC/Unesco in consultation with IMS. A total of 7 high qualified professionals in different fields of oceanography and data management (4 from outside Turkey and 3 from IMS) contributed to the planning of the course programme and provided lectures in their areas of specialization. A list of Instructors is given in Annex II.

3. SUMMER SCHOOL PROGRAMME

3.1 OPENING

The formal opening of the Summer School took place at the Auditorium of the Institute of Marine Sciences, Erdemli, Turkey, on 21 September 1987. The Summer School was inaugurated by Prof. Umit Unluata, the Director of the IMS-METU, who welcomed the participants to the school.

In his welcome address, Prof. Unluata emphasized the importance of the School for the Member States of the Eastern Mediterranean and for Turkey itself. He stressed that the Mediterranean Sea does not only influence the economy of the coastal Member States but also unites them in their scientific, technological and political efforts, with the final objective to ensure peaceful co-operation in the study of the Mediterranean and national use of living and non-living resources of the sea, for the common good of all Member States of the region.

Informing the participants about research activities of the Institute of Marine Sciences, Prof. Unluata described a series of long-term scientific projects directed to a better understanding of oceanographic processes in the Eastern Mediterranean in association with these long-term projects, physical, chemical, biological and geological data are collected with

monthly and/or seasonal sampling intervals. It is anticipated that these data should have important contributions within an international context and for national development.

Finally, Prof. Unluata expressed his wishes for the success of the Training Course and provided information on local arrangements.

Speaking on behalf of the Chairman and the Secretary of the Intergovernmental Oceanographic Commission and the Director of the Unesco Division of Marine Sciences, Dr. Iouri Oliounine, IOC Senior Assistant Secretary (Ocean Services) expressed his appreciation and most sincere thanks of the IOC and Unesco for the fruitful co-operation with the National Oceanographic Commission of Turkey and the Institute of Marine Sciences which made the Summer School possible.

Dr. Oliounine specially stressed that the Summer School gives a good opportunity to increase the awareness of the Member States of the region, of the importance for them to develop their required research potential and to establish infrastructures needed for oceanographic data and information collection, processing and exchange. The Summer School also helps to establish working contacts between each other and to encourage and initiate full participation of the countries of the Mediterranean in oceanographic research and in co-operative monitoring programmes. The Eastern part of the Mediterranean Sea and the Black Sea is bordered by a number of States which for many centuries were dependant on the sea and in which the sea played an important role in their socio-economic development. The huge potential of ocean resources - largely located in areas corresponding to exclusive economic zones and on the continental shelf - is seen to be the obvious means of helping to solve many of the serious social and economic problems confronting Member States in the region.

Dr. Oliounine then reflected on the activities carried out by the IOC and the Division of Marine Sciences in the region, and in the framework of the objectives of the Summer School. He described IOC and Unesco's long experience and dedication to the cause of training marine scientists from developing countries and concluded by saying that the IOC and Division of Marine Sciences will always be attentive to the efforts of Member States, that they remain receptive to the aspirations, and placed great hopes in the Summer School.

In closing, he wished the participants every possible success and expressed hope that the participants of the Summer School will make an important contribution to development in their countries in both the practical and scientific aspects of marine research, as well as form bonds of friendship amongst themselves which will endure for a long time and will link them both scientifically and culturally.

After the welcome speeches, the trainees and lecturers introduced themselves to the audience by providing a brief statement on their experience and interests.

3.2 OUTLINE OF THE PROGRAMME

The Summer School was developed jointly by the IOC/Unesco and IUS-METU. Minor modifications were made during the first few days of training in order to satisfy fully the interests and needs of the trainees. The School programme and time-schedule are given in Annex III.

The duration of the Summer School was 2 weeks with Saturday and Sunday used for on-board training.

The School programme consisted of:

(i) theoretical lectures with discussions;
(ii) field work on board R/V "Bilim";
(iii) practical work in oceanographic data processing and management;

The programme for the first phase of the course consisted of introductory and scientific lectures. Normally two-to-three 45-minute lectures were given in the morning from 9h00 to 12h00 with 15-minute discussions after each lecture, and 2-3 lectures in the evening. In the second phase, the trainees worked for 5 days on board R/V "Bilim". The cruise was aimed to provide practical experience with methods of oceanographic collection and analysis. In the third phase of the course, the participants were introduced to computing on the IMS computer and to the methods of data processing and exchange adopted by the IODE system. A series of lectures addressed data center functions, preparation of cruise reports, analysis of fine series of observations, etc.

3.3 SCIENTIFIC LECTURE

The lectures were organized to give an outline of the IOC and Unesco/OCE functions and introductory reviews in physical, chemical, biological and geological oceanography with the application to regional studies. Due to time constraints, the lecturers avoided very detailed treatment. A series of scientific talks were designed to develop the ability of the participants to appreciate the purpose and to apply techniques of oceanographic data collection and processing.

Various aspects of physical oceanography of the Eastern Mediterranean, including circulation and water masses were described with emphasis on recent results. Problems of sea-floor spreading, plate collisions and ocean crust formation with emphasis on recent seismic and drilling results were then discussed in view of the complex processes in the western and eastern basins of the Mediterranean and the Aegean Seas. Chemical oceanographic variables and associated pollution problems were assessed. Fisheries development and stock assessment studies of the Turkish Mediterranean coast were reviewed. Problems of data acquisition, analysis and interpretation were approximately addressed in these lectures within the context of describing experimental results. A special session addressed experimental design and methods/instruments used in oceanographic expeditions.

3.4 ON-BOARD TRAINING

An open-sea cruise was made on board the R/V "Bilim" research ship of the IMS-METU between the 24-28 September. Technical characteristics of the ship and description of equipment are given in Annex VIII.

A total of 28 drop (1,000 m) stations were implemented between the Gulf of Iskenderum and Cyprus. CTD (temperature, salinity, oxygen) profiles and water transparency measurements were obtained at all of these stations. Measurements of the nutrients, pH, Mercury, chlorinated hydrocarbons, chlorophyll-a, humic matter and dissolved organic matter were made at 7 stations.

The participants collaborated with the research staff and technicians of the R/V "Bilim" in collecting, validating and analyzing the data.

3.5 CLOSING CEREMONY

The Summer School on Oceanographic Data Collection and Management terminated on 3 October 1987. At the ceremony, Prof. Unluata, Director of IMS-METU, expressed his warm congratulations to all participants on the fruitful completion of the Course. The participants thanked the local organizers, IOC and OCE/Unesco for the opportunity provided and expressed their satisfaction of the Training Course.

It was decided that the Summer School Certificate (Annex V) prepared by the Institute of Marine Sciences, indicating the successful completion of the School, signed by the hosting Institute and sponsoring organizations, IOC and OCE/Unesco, would be mailed to all participants at a later date.

4. COURSE EVALUATION

At the beginning of the Course, the trainees and instructors received questionnaires(see Annex IV) designed to obtain their opinions regarding the various aspects of the Summer School. Given below is an assessment of the School based on the questionnaire survey.

4.1 ASSESSMENT BY PARTICIPANTS

The participants considered local arrangements as very good from the time of their reception at the airport to the moment of their departure. With regard to the teaching facilities, the majority of the participants agreed that they were adequate. However, it was noted that they expected a better variety of instruments for oceanographic measurements while working onboard ship. It was also mentioned that the length on the onboard training may be shortened to 2 days, while making it intensive.

There was also a need expressed for a telephone booth or other arrangements to make automatic long-distance calls possible.

The study of the participants replies to the questionnaires showed that

they all benefitted from the Course, that the objectives of the Course were clearly formulated and met by the lectures given to them during the Course. Only 2 trainees from Turkey expressed concern that they had not been acquainted with the objectives of the Course in advance.

The duration of the Course was considered as optional though there were a few proposals to modify the schedule of the programme by giving more time for practical computer training, shortening onboard training and giving, at least, one recreation day to go sightseeing to get acquainted with the history of the country.

Opinions on the quality of the lectures were high but some were considered too specific and too long. Because of the different experience and scientific background, it was suggested in future to have few introductory lectures for all participants and then split the Group of Trainees in accordance with their interests into sub-groups for lecturing in specific fields of, for example, marine biology, marine geology, dynamics, etc. Much time should be given for discussions. They all thought that there is a need for more practical work to gain knowledge which later can be effectively applied to the implementation of national or regional prospects, as a positive example, reference has been made to the training on the methods of spectral and objective analyses.

Only four participants had had an opportunity to attend some type of short-term training course before, and it was the general feeling that the Course was important, interesting and gave a valuable chance to meet and work with people from other Member States of the region.

4.2 ASSESSMENT BY THE TEACHING STAFF

The Questionnaire as presented in Annex IV was distributed to the local and invited lecturers, for response. The answers indicated that local arrangements were considered as very good, and the Course as well organized. The majority of the instructors thought that the trainees adequately absorbed the material of the lectures. Few modifications had been suggested to the future programme which are summarized in the next Chapter of this Report. The instructors had not experienced any language barrier, and though, from their point of view, the trainees benefitted from the Course, there was an opinion expressed that the background knowledge and experience of the participants should be more homogenous, e.g., it turned out that very few had experience in computer data management. Such an approach could give better opportunity for deep consideration and discussions of presented scientific lecturers.

The general view was that though the objectives of the Course were well specified, in future they should be narrowed and oriented to a more specific topic, or 2-3 topics. It was noted that the advance period for the preparation of the Course should be increased, this led to the lack of lecture notes. The instructors shared the opinion expressed by some trainees that probably in future Summer Schools, it will be useful to have few lectures of general nature and split the Group into smaller sub-groups to

train these participants in some special fields of direct interest. The instructors appreciated the good spirit of comradeship established between the participants, and thought that the social festivities arranged by the hosts in the evenings were extremely useful for establishing bonds of good collaboration and mutual respect. The entire teaching staff agreed that the continuation of such courses on some regular basis would contribute to the research potential of the Member States of the region, and expressed readiness to contribute to future courses if their time permitted. It was disappointing to learn from some of the participants that their chances to use the knowledge and skills gained during the Course were limited, due to the lack of necessary research activities and instruments at home.

5. CONCLUSIONS AND RECOMMENDATIONS

The IOC/Unesco Summer School on Oceanographic Data Collection and Management, held at the IMS-METU, Erdemli, Turkey, from 21 September to 3 October 1987 was successfully completed. Everything went smoothly according to schedule in the spirit of friendship. The School was extremely important for improving the links between different institutions in the region and for increasing efficiency. The combination of training people in know-how and of informing them on the last achievements in regional oceanography and data management was considered very useful.

There was a general opinion that the Course will facilitate the data exchange in the region and participants of the Member States of the region in the IODE projects.

Locally, the arrangements within the IMS-METU worked out well. The improvement of telephone connections will be required.

As a result of the experience gained in the Summer School of 1987, it is recommended that the IOC and Unesco consider the organization of a next School in the coming 2-3 years in order to make this a regular venture.

It was recommended that the following observations be taken into account when making preparations for the next Summer School:

(i) adequate advance time is needed for the selection of trainees and invitation of lecturers;

(ii) while making the selection of candidates, special attention should be given to the homogeneity of their knowledge and experience;

(iii) lecturers should be informed about the background of the trainees in advance, in order to adapt the texts of lectures and teaching materials to their background.

(iv) the preparation of the text-book with the lectures or, at least, extended notes, should be a necessity;

(v) in the new programme, more attention should be paid to the content

of the lectures and practical training, so as to contain information and furnish skills which can be effectively applied at home;

(vi) there might be a need to condense the future programme on one or two specific subjects, e.g., physical oceanography and marine geology; pollution and marine biology. Oceanographic data management should continue to be an essential part of the future programme with more practical training involved;

(vii) the Summer School programme should be oriented towards a more scientific and professional one. This may give an opportunity to draw larger participation at the professional level in order to facilitate the exchange of knowledge on new methods and standard procedures used in different countries, for data processing.

ANNEX I

LIST OF PARTICIPANTS

Mr. Faith ADATEPE
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ANNEX II

LIST OF INSTRUCTORS

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ANNEX III

SUMMER SCHOOL PROGRAMME AND TIME SCHEDULE

Monday, 21 September

Registration	08.30 - 10.00
Official Opening	10.00 - 11.00
Information on Local Arrangements	11.00 - 11.15
Mutual Introduction	11.15 - 12.30
Lunch	12.30 - 15.00
Role of IOC and Unesco in Promoting Marine Research with a Special Emphasis on Research Activities in the Mediterranean Sea	15.00 - 16.00 Dr. I. Oliounine (IOC/Unesco)
Introduction to Basic Physical Oceanography	16.00 - 17.00 Dr. T. Oguz (Turkey)
General Chemical Oceanography Major Elements and Nutrients Eutrophication	17.00 - 18.00 Dr. Y. Jensen (Denmark)
Official Reception	19.30 - 22.00

Tuesday, 22 September

Circulation and Large Scale Processes in the Eastern Mediterranean, Water Masses	09.00 - 10.00 Dr. T. Oguz (Turkey)
Trace Metals, Processes, Speciation and Concentrations, Problems in Sampling and Analysis	10.00 - 11.00 Dr. Y. Jensen (Denmark)
Introduction to Marine Biology and and Fisheries	11.00 - 12.00 Dr. F. Bingel (Turkey)
Lunch	12.00 - 15.00
Organic Pollutants, Hydrocarbons, Processes and Mass Balance. PCB in	15.00 - 16.00 Dr. Y. Jensen

Water, Sediments and Biota	(Denmark)
Lecture on Marine Biology and Fisheries	16.00 - 17.00 Dr. F. Bingel (Turkey)
Oceanographic Data Collection and Management - How IGOSS and IODE Systems Operate	17.00 - 18.00 Dr. I. Oliounine (IOC/Unesco)

Wednesday, 23 September

Introduction to Marine Geology and Geophysics	09.00 - 10.00 Dr. J. Mascle (France)
Planning of Scientific Expeditions with Respect to the Measurements of Different Oceanographic Parameters (Exchange of Views, Round Table Discussions)	10.00 - 12.00 Introductory talk by Dr. E. Ozsoy All Lecturers
Lunch	12.00 - 15.00
Marine Geology and Geophysics of the Mediterranean Basins	15.00 - 16.00 Dr. J. Mascle (France)
Equipment used for the Collection of Oceanographic Data	16.00 - 18.00 Introductory talk by Dr. E. Ozsoy All Instructors

Thursday, 24 September

Evolution of the Mediterranean Basins Drilling Results	09.00 - 10.00 Dr. J. Mascle (France)
Methods of Observation of Oceanographic Parameters	10.00 - 12.00 Introductory talk by Dr. E. Ozsoy All Instructors
Lunch	12.00 - 15.00
Onboard Training	16.00 -

Thursday, 24 September to	16.00 Onboard R/V "Bilim"
Monday, 28 September	18.00

ONBOARD TRAINING

1. CTD Data Acquisition - Working Principles Preliminary Processing

2. Aanderaa RCM4 Current Meters Demonstration
   - Working principles
   - Tape Reading - Input to Computer
   - Plotting Analysis

3. Auto-analyzer
   - Analyses, Calibration

4. Navigation Principles (Captain)

5. Nansen Bottles - Reversing Thermometers
   - Principles and Operation

Tuesday, 29 September

Basics of Instrumentation	09.00 - 12.00 Dr. E. Ozsoy (Turkey)
Lunch	12.00 - 15.00
Introduction to Oceanographic Data Management	15.00 - 17.00 Mr. H. Hecht (Germany, Federal Republic of)

Wednesday, 30 September

CTD Functional Description and Data Processing	09.00 - 11.00 Dr. E. Ozsoy (Turkey)
Demonstration and Practical Work on CTD Data Processing	11.00 - 12.30
Lunch	12.30 - 15.00
Introduction to GF3 Format, Existing Subsets and CTD Subsets	15.00 - 17.00 Mr. H. Hecht (Germany, Federal Republic of)

Thursday, 1 October

Time-Series and Spectral Analyses	09.00 - 11.00 Dr. E. Ozsoy (Turkey)
Practical Work on Time-Series Analyses	11.00 - 12.00
Lunch	12.00 - 15.00
Objective Analyses and Applications in the Eastern Mediterranean	15.00 - 17.00 Dr. E. Ozsoy (Turkey)

Friday, 2 October

Data Center Functions, Introduction to the ROSCOP System	09.00 - 11.00 Mr. H. Hecht (Germany, Federal Republic of)
Preparation of Cruise Reports	11.00 - 12.00
Lunch	12.00 - 15.00
Closure of Summer School	15.00 - 17.00

ANNEX IV

SUMMER SCHOOL QUESTIONNAIRE

THE PURPOSE OF THIS QUESTIONNAIRE IS TO COLLECT INFORMATION FOR OVERALL ASSESSMENT OF THE COURSE AND TO ASSIST IN THE FOLLOW-UP OF FUTURE ACTION TO BE TAKEN TO STRENGTHEN THE MARINE SCIENCE CAPABILITY OF TRAINEES AND THEIR NATIVE COUNTRIES IN VARIOUS ASPECTS OF OCEANOGRAPHIC DATA COLLECTION AND MANAGEMENT IN THE REGION OF THE MEDITERRANEAN SEA.

PLEASE ANSWER QUESTIONS AND COMMENT AS REQUESTED. DON'T FORGET TO WRITE YOUR NAME IN THE RIGHT-HAND CORNER BOX OF THE QUESTIONNAIRE.

Name of Instructor

QUESTIONNAIRE FOR ASSESSMENT
BY INSTRUCTORS

1. Do you have any suggestions for improvement of local arrangements?
   - accommodation;
   - teaching conditions and teaching aids (classroom, ship, laboratory);
   - meals;
   - transportation, etc.

2. Was there a language barrier with the trainees? Had the trainees sufficient background knowledge to benefit from the course?

3. To what extent did the trainees absorb what you were teaching?

   FULLY ( ) ADEQUATELY ( ) NOT AT ALL ( )

   Do you have any suggestions for improvement?

4. Do you feel the Summer School was too broadly based or was it narrowed down to very specific items? Do you have any suggestions for improvement?

5. Have the objectives of the Summer School been well specified? Have they been successfully met? What are your suggestions for improvement?

6. In regions where marine science infrastructure are relatively poorly developed, short-term training courses may not prove to be effective. In such cases, long-term individual training of scientists in foreign institutions may prove useful. What is your opinion?

7. Do you think there is a need to separate the Course with appropriate phasing to allow gradual development of research potentials in the countries of the region? May we rely on you for future courses?

8. What are your suggestions to IOC taking into consideration future planning and assessment of regional training courses?

_____
Name of Trainee

QUESTIONNAIRE FOR ASSESSMENT BY TRAINEES

1. Do you have any suggestions for improvement of local arrangements?
   - accommodation;
   - teaching conditions (classroom, ship, laboratory);
   - meals;
   - transportation, etc.

2. Are the objectives of the Summer School well specified? Have they been successfully met? What are your suggestions for improvement?

3. Were the lectures given by instructors, and field work adequate to meet this objective?

4. Was the Training Course useful to you? Did you learn anything that is new for you? Do you think that theoretical information was too advanced or adequate for you, to embark upon planning future oceanographic activities? Please comment.

5. Do you feel a need for any teaching material (manuals, text-books, text of lectures, etc.)? If yes, identify what type of teaching material is needed?

6. Is the duration of the Summer School optimal? If too long or short, explain why?

7. Do you feel a need for the modification of the programme? If yes, is what way?

8. Have you attended any short-term courses before? Any suggestions to improve future training courses?

9. In what way do you plan to apply the knowledge and experience gained

during the Summer School when you go back home? Any suggestions for the improvement of co-operative activities in the region (scientific studies, intercalibration exercises, data exchange, etc.)?

10. Do you have adequate facilities in terms of equipment, trained personnel, publications, etc.? If no, what are the needs of your country?

ANNEX V

SUMMER SCHOOL CERTIFICATE

THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
AND
THE DIVISION OF MARINE SCIENCES
OF UNESCO

This is to certify that

attended and successfully completed
the Summer School on Oceanographic Data Collection and Management
organized with the support of
the IOC and the Division of Marine Sciences of UNESCO
at the Institute of Marine Sciences,
Middle East Technical University, Erdemli, Icel, Turkey,
21 September - 3 October 1987

SIGNED:	SIGNED:	SIGNED:
Dr. Mario RUIVO Secretary of the Intergovernmental Oceanographic Comission, UNESCO	Prof. Dale C. KRAUSE Director, Division of Marine Sciences, UNESCO	Prof. Ümit ÜNLÜATA Director, Institute of Marine Sciences, Middle East Technical University, TURKEY

ANNEX VI

PLAN OF THE CAMPUS AREA

1. Biology Lab.
2. Garage
3. Guesthouse
4. Unidata Residence
5. House No: 4
6. House No: 3
7. Library,
   Plenary Session Room; Tea and Coffee Room,
8. Registration office, Secreteriat
9. Cafeteria,
10. House No: 2
11. House No: 1
12. Market

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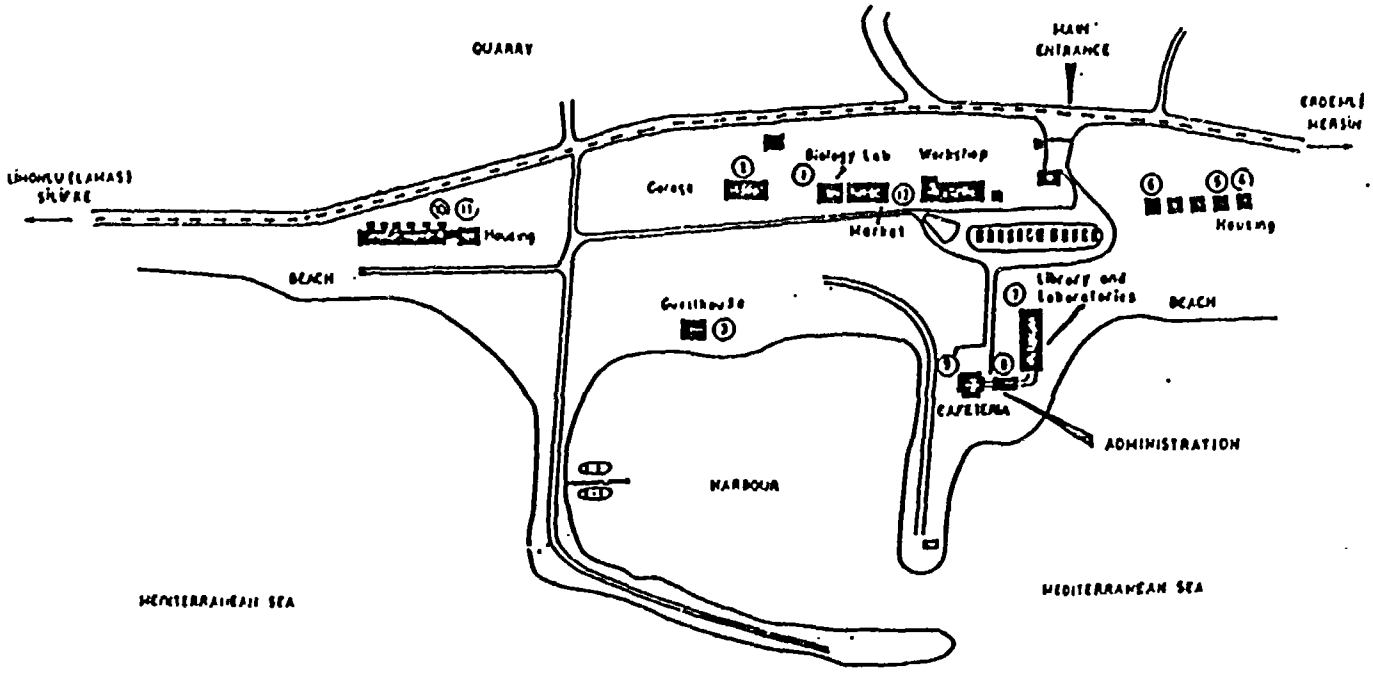

ANNEX VII

IMS - METU COMPUTER FACILITIES

1. IBM-XT/256

   640 kB memory
   20 MB disk drive
   1.2 MB diskette driver
   Monochrome screen

2. IBM-XT

   640 kB memory
   10 MB disk drive
   2x360 kB diskette driver
   8087 math co-processor
   colour/graphics screen

3. IBM-PC (2)

   256 kB memory
   2x360 kB diskette drivers
   8087 math co-processor
   1 x monochrome and enhanced graphics adapter (EGA)

4. Printers

   Epson Fx-100
   Epson Fx-1000
   Epson Lx-86
   C-Itoh M-1550

5. Nicolet-Zeta 1453 4 pen plotter

6. Interfaces

   a. RS-232 (4)
   b. IEEE-488
   c. A/D, D/A, D/D converter (Tecmar PC-Mate.)

7. Software

a. DOS 2.1, DOS 3.2
b. IBM Fortran Compiler
c. Microsoft Fortran 77 Compiler
d. Microsoft Macro Assembler
e. Microsoft basic
f. HBasic
g. Turbo Pascal V2.0
h. Turbo Graphic Toolbox
i. Lattice C Compiler V2.1
j. DBase III
k. Fundamental and Functional Plotting Routines for Zeta 1453 plotter

ANNEX VIII

R/V "BILIM". TECHNICAL CHARACTERISTICS AND OCEANOGRAPHIC EQUIPMENT

The Institute's main research ship, R/V "Bilim" was designed as an oceanographic vessel and was launched in 1983.

Steel hull, length: 40.36 m, Beam: 9.47 m, Tonnage 433 gross, 190 net tons, Draft: 3.80 m, Speed: 11.5 knots max, 9.5 knots cruising, 1.0 knots min, Endurance: 45 days, Crew: 13, Scientists: 14, Range: 6,500 miles, Propulsion: MWM diesel, 820 HP, variable pitch propeller, SCHAFRAN bridge control unit: fuel capacity 120 m3, Electrical power, two 200 HP (each) MWM diesel generators, 12 Kw MWM diesel generator for emergency power supply.

The ship is equipped with central heating and air conditioning.

Laboratories:

9x8 m lab. space on the main deck for analytical and wet labs. A data collection and processing room is located adjacent to the labs. Electrophysical, optical labs, darkroom and a fully equipped machine-shop are located below the deck.

Winches and Cranes:

LEBUS oceanographic winch (single drum 4,000 m) Electrohydraulic articulated boom crane (3 t. SWL). CTD probe winch 1,000 m (InterOcean M-1673).

Oceanographic Instruments:

- Seabird Electronics SBE-9 CTD Profiler (+ oxygen sensor) Lebus oceanographic winch, 1,000 m cable, 2 IBM PC computers;
- Aanderaa RCM4 current meters and interpreter;
- Nansen bottles and thermometers;
- Technicon III Auto-analyzer, phosphate, nitrite, nitrate and silicate kits;
- Continuous flow centrifuge;
- Sub-sea photometer;
- Magnavox Satellite navigator;
- Atlas DESA 1,000 echo-sounder.