Intergovernmental Oceanographic Commission
Reports of Governing and Major Subsidiary Bodies

IOC Black Sea Regional Committee

Second Session
Istanbul, Turkey
5–6 May 1999

UNESCO

IOC-BSRC-II-3
Paris, 1 September 1999
English only

SC-2000/WS/4

TABLE OF CONTENTS

SUMMARY REPORT

ANNEXES

1. OPENING

The Second Session of the Black Sea Regional Committee for the Black Sea was opened at 10:00 on 5 May 1999. The Capt. Hüseyin Yüce, National Co-ordinator of Turkey Head of the Department of Navigation, Hydrography and Oceanography of Navy (DNHO), welcomed the participants. He wished the Session every success.

The Session continued under the chairmanship of the acting Chairman, Dr. Valery Eremeev. He expressed the gratitude of all participants to the host of the Session, DNHO of the Turkish Navy.

The text of both opening addresses is given in Annex IV.

2. ADMINISTRATIVE ARRANGEMENTS

2.1. ADOPTION OF THE AGENDA

The Chairman outlined the Provisional Agenda of the meeting which was adopted by the participants. The adopted agenda is given in Annex I.

2.2. DESIGNATION OF THE RAPPORTEUR

Following a proposal by Dr. Yüce, Dr. E. Okus (Turkey) was unanimously elected as Rapporteur for the Session.

2.3. NOMINATION OF A DRAFTING GROUP

The Session nominated a drafting group including participants from all the countries represented. The group was in charge of editing the final versions of the working documents.

3. REPORT OF THE BSRC EXECUTIVE SECRETARY ON THE IMPLEMENTATION OF THE WORK PLAN FOR THE PERIOD 1997-1998

The Executive Secretary, Michael Ganchev, informed the BSRC Session of the activities carried out during 1997-1998. These activities resulted in:

(i) A signed Memorandum of Understanding of co-operation between BSRC and Programme Coordination Unit (PCU) of GEF on the joint project "open Sea Observing System" (November 1996);
(ii) A Seminar and Workshop on "Black Sea Fluxes" (Istanbul, May 1997);
(iii) A Workshop on "Black Sea GOOS" (Erdemli, October 1997);
(iv) International expeditions on R/Vs A*kvanavt* (August 1999); *Prof. Vodjanitsky*, organized by IAEA with the participation of the BSRC (September 1999); and *Adm. Br. Ormanov* (October 1999);
(v) A number of initiatives in the framework of the UN 1998 InternationalYear of the Ocean, held in the riparian countries (such as: summer schools, conferences and exhibitions);
(vi) Participation in the international conference "oceanography of the Eastern Mediterranean and Black Sea" (Athens, February 1999).

The full text of this report is given in Annex V.

4. REPORTS BY THE NATIONAL CO-ORDINATORS

The National Co-ordinators from Bulgaria, Georgia, Romania, the Russian Federation, Ukraine, and Turkey presented their reports on the national activities in 1997-1998. These reports are given in Annex VI.

5. DISCUSSION

During the discussions, the Representative of Turkey, Dr. Yüce regretted that there was few information about activities on Pilot Project 1 "Black Sea GOOS" during the intersessional period. Further on, Dr. Yüce informed the participants that the international co-coordinator of the Pilot Project 1 had been changed to Dr. Salihodlu. Further discussions were devoted to procedures for an international oceanographic data exchange within the Black Sea region. In particular, it was suggested that the existing IODE mechanism could be used for this purpose. On request of the Chairman, Dr. Salihodlu, Director of the NATO/BSTU Project, informed the Session about the activities carried out in the framework of the NATO/TU Project in the Black Sea region. The Representative of Ukraine stressed the need for a close interaction between the IOC/BSRC, NATO, GEF and other international organizations. Members of the Black Sea Regional Committee stressed the great interest to develop close co-operation with the Black Sea Economic Co-operation (BSEC) in the implementation of the Black Sea Regional Programme, especially the "black Sea GOOS" project. The BSRC agreed to participate in the Black Sea Hydrological Cycle Observing System supported by WMO and BSEC.

6. SCIENTIFIC AND IMPLEMENTATION PLAN FOR PILOT PROJECT 1 "BLACK SEA GOOS"

Dr. Popova (Bulgaria) and Dr. Korataev (Ukraine) introduced a draft plan for Pilot Project 1 (Annex VIII). The BSRC agreed with the proposal of the Russian delegation to accept the document in general and requested that the National Co-ordinators of the Project revise the latter, and provide their comments to Dr. Popova, International Co-ordinator of the Black Sea GOOS Project. The Executive Secretary was requested to submit the reviewed document at the BSRC Officers' meeting, to be held during the Twentieth Session of the IOC Assembly. The Committee was informed on an initiative by the WMO Secretary General to establish a new project "black Sea HYCOS" which is related to Pilot Project 1.

7. SCIENTIFIC AND IMPLEMENTATION PLAN FOR PILOT PROJECT 2 "BLACK SEA FLUXES"

Dr. Shimkus (Russia) introduced the guidelines for the Pilot Project 2 (Annex VI). During the discussion it was recognized that the information provided by Dr. Shimkus was insufficient for the plan to be approved at this stage. It was recommended that Dr. Shimkus, with the assistance of the National Project Co-ordinators, prepare a more detailed scientific and implementation plan for PP2, and distribute it among the participants not later than 1 June 1999, in order to be presented to the BSRC Officers' meeting, to be held during the forthcoming Session of the IOC Assembly. The BSRC expressed satisfaction about the co-operation between the BSRC and IAEA. The Committee invited the International Atomic Energy Agency (IAEA) to organize a joint scientific conference on "sediment Fluxes and Radionuclides in the Black Sea" (Varna, September 2000). The BSRC intends to support the expedition planned by IAEA for 2000 in the Eastern Black Sea. The Representative of IAEA, Dr. I. Osvath, informed the participants about IAEA activities in the Black Sea, and stressed the great interest for co-operation between both agencies. The Representative of Georgia, Dr. Khomeriki, pointed out the importance of the development of the GLOSS System for the Black Sea. The Delegate of Romania, Dr. Bologa, invited the BSRC to maintain a close co-operation with the Regional Operational Centre of the International Ocean Institute (IOI) in Constanza.

8. ADOPTION OF THE BSRC WORK PLAN FOR 1999-2001

The Session reviewed the work plan of the BSRC for 1999-2001 submitted by the Executive Secretary. After these discussions, the revised plan and draft of the programme and relevant budget were approved by the Session. The adopted work plan is given in Annex XI.

9. RULES AND PROCEDURES FOR BSRC – TERMS OF REFERENCE

The Executive Secretary reported that the proposals regarding the structure and responsibilities of the BSRC and the Terms of Reference of the BSRC Chairman, Vice-Chairman and Executive Secretary were prepared in accordance with the IOC Manual and IOC Resolutions XVIII-17 and EC-XXIX.7.

After a discussion, the meeting revised and approved the presented documents (Annex XII).

10. MEMORANDUM OF UNDERSTANDING ON THE IMPLEMENTATION OF "BLACK SEA GOOS"

Having reviewed the draft memorandum, the Committee decided that the time was not appropriate to consider the adoption of this document. Therefore, it was decided to revise the document during the BSRC Officers' meeting and distribute it to the Delegates during the IOC Assembly

11. ELECTION OF THE BSRC CHAIRMAN AND VICE-CHAIRMAN

The elections of the Chairman and Vice-Chairman of the Committee were conducted. Dr. V. Eremeev and Dr. H. Yüce were respectively elected Chairman and Vice-Chairman of the BSRC.

12. ADOPTION OF THE DRAFT RESOLUTION

The BSRC considered the draft resolution "Black Sea Regional Committee" and recommended the Chairman to submit it to the Twentieth Session of the IOC Assembly (29 June – 9 July 1999).

13. DATE AND PLACE OF THE NEXT BSRC MEETING

On behalf of Ukraine, Dr. Eremeev offered to host the Third Session of the BSRC in Kiev, Ukraine, during the spring 2001. The offer was gratefully accepted by the participants.

14. ADOPTION OF THE REPORT AND CLOSURE

It was decided that the report of the Session would be adopted by correspondence. On behalf of all participants, the Representative of IOC, Dr. Travin, thanked Dr. Yüce and his staff for the excellent arrangements for the Session. The Session was closed at 17:30, on 6 May 1999 .

ANNEX I

AGENDA

1. **OPENING**

2. **ADMINISTRATIVE ARRANGEMENTS**

   2.1. ADOPTION OF THE AGENDA
   2.2. DESIGNATION OF THE RAPPORTEUR
   2.3. NOMINATION OF THE DRAFTING GROUP

3. **REPORT OF THE BSRC EXECUTIVE SECRETARY ON THE IMPLEMENTATION OF THE WORK PLAN FOR THE PERIOD 1997-1998**

4. **REPORTS BY THE NATIONAL CO-ORDINATORS**

5. **DISCUSSION**

6. **SCIENTIFIC AND IMPLEMENTATION PLAN FOR THE PILOT PROJECT 1 "BLACK SEA GOOS"**

7. **SCIENTIFIC AND IMPLEMENTATION PLAN FOR THE PILOT PROJECT 2 "BLACK SEA FLUXES"**

8. **ADOPTION OF THE BSRC WORK PLAN FOR 1999-2001**

9. **RULES AND PROCEDURES FOR BSRC – BSRC TERMS OF REFERENCE**

10. **MEMORANDUM OF UNDERSTANDING ON THE IMPLEMENTATION OF "BLACK SEA GOOS"**

11. **ELECTION OF THE BSRC CHAIRMAN AND VICE-CHAIRMAN**

12. **ADOPTION OF THE DRAFT RESOLUTION**

13. **DATE AND PLACE OF THE NEXT SESSION**

14. **ADOPTION OF THE REPORT AND CLOSURE**

ANNEX II

PROGRAMME OF THE SESSION

Wednesday, 5 May

09:30 Opening of the Session

10:00 Administrative arrangements

10:15 Report of the BSRC Executive Secretary on the implementation of the Work Plan for the Period 1997-1998
Reports of National Co-ordinators

11:40 Discussions

14:30 Scientific and Implementation Plan for Pilot Project No: 2 "black Sea Fluxes"

15:40 Discussions

17:30 Adjournment for the Day

Thursday, 6 May

09:30 Scientific and Implementation Plan for Pilot Project No: 1 "black Sea GOOS"

11:40 BSRC Work Plan for 1999-2001

14:30 Memorandum of Understanding on the implementation of "black Sea GOOS"

15:40 Election of the BSRC Chairman

16:00 Proposals for the 20th Assembly
Adoption of the Draft Resolution

16:30 Provisional Agenda for the Third Meeting

17:30 Adjournment for the Day

ANNEX III

LIST OF PARTICIPANTS

Chairman:

Prof. Valery EREMEEV
Marine Hydrophysical Institute
Ukrainian National Academy of Sciences
2, Kapitanskaya St.
Sevastopol 335000, Crimea, Ukraine
Tel: (380-692) 54 04 52
Fax: (380-692) 44 42 53
E-mail: EREMEEV@mhi2.sebastopol.ua
EREMEEV@alpha.mhi.iuf.net
(also representing Ukraine)

Executive Secretary:

Michael GANCHEV
National Oceanographic Committee
Tzazigradsko Shosse 125, bl.5
Sofia, Bulgaria
Tel: (359-2) 71 80 77
Fax: (359-2) 71 80 77
E-mail: balarew@ipchp.ipc.bas.bg
(also representing Bulgaria)

Bulgaria

Michael GANCHEV
(see above)
(also Executive Secretary)

Christo BALAREW
Bulgarian Academy of Sciences
Institute of General & Inorganic Chemistry
Acad. G. Bonchev stre. Bl.11
Tel: (359-2) 979-3925/3226
Fax: (359-2) 70 50 24
E-mail: balarew@ipchp.ipc.bas.bg

Ms. Maria POPOVA
National Institute of Meteorology & Hydrology
66, Tzarigradsko chaussee
Sofia, 1784
Tel: (359-2) 87 38 05
Fax: (359-2) 88 44 94
E-mail: maria.popova@meteo.bg

Georgia

Irakli KHOMERIKI
Faculty of Geography
Tbilisi State University I
Chavchavadze avenue, 380028
Tbilisi
Tel: (995-32) 25-01-49
Fax: (995-32) 23-22-93/25-01-49
E-mail: wocean@iberia.pac.ge

Shalva JOASHVILI
Institute of Coastal Dynamics
Nutsubidze st. 56. (office)
D. Agmashenebeliav. 86/90, ap. 20. (home)
Tel: (995-32) 39-05-31 (off)
(995-32) 95-22-09 (home)
Fax: (995-32) 23-22-93/95-79-65
E-mail: wocean@iberia.pac.ge
shjao@hotmail.com

Romania

Alexandru S. BOLOGA
Romanian Marine Research Institute
300, Bd. Mamaia
Constanta 3, RO-8700
Tel: (40-41) 543-288 / 540-870
Fax: (40-41) 831-274
E-mail: abologa@alpha.rmri.ro

Danut I. DIACONEASA
Romanian Marine Research Institute
300, Bd. Mamaia
Constanta 3, RO-8700
Tel: (40-41) 540-870
Fax : (40-41) 831-274
E-mail :dan@algha.rmri.ro

Russian Federation

Alexander POSTNOV
State Oceanographic Institute
6, Kropotkinskii Lane
Moscow
Tel: (7-095) 246-28-89
Fax: (7-095) 246-72-88
E-mail: vasýllev@SOI.MSK.ru

Vasily ZHIVAGO
Ministry of Science and Technology
of the Russian Federation
11, Tverskaya Street
103905, Moscow
Tel: (7-095) 229-03-64
Fax: (7-095) 925-96-09

Kazimieras SHIMKUS
Institute of Oceanology – Southern Branch
Gelendzhik 7
Tel: (7-861) 412 32 61
Fax: (7-861) 412 31 89
E-mail: kosyan@sdios.sea.ru

Turkey

Hüseyin YÜCE
Dept. of Navigation, Hydrography & Oceanography
81647 Çubuklu-Ystanbul
Tel: (90-216) 331 17 98
Fax: (90-216) 331 05 25
E-mail: huseyin.yuce@shodb.mil.tr

Yük. Müh. Kd. Üt0m. Mustafa ÖZYALVAÇ
Dept. of Navigation, Hydrography & Oceanography
81647 Çubuklu-Ystanbul
Tel: (90-216) 331 17 98
Fax: (90-216) 331 05 25
E-mail: `ineral@shodb.mil.tr

A. Cemal SAYDAM
Scientific & Technical Research Council of Turkey
Tel: (90-312) 427 51 95
Fax: (90-312) 427 05 36
E-mail: saydam@tubitak.gov.tr
saydam@metu.edu.tr

Ylkay SALYHOÐLU
METU, Institute of Marine Sciences
P.O. BOX 28
Erdemli 33731 Yçel
Tel: (90-324) 521 21 50
Fax: (90-324) 521 23 27
E-mail: ilkay@ims.metu.edu.tr

Bülent TOPALOÐLU
Faculty of Fisheries
University of Istanbul
Ordu cad. No: 200
Laleli-Istanbul
&
Turkish Marine Research Foundation (TÜDAV)
Pk. 10 Beykoz-Istanbul
Tel: (90-212) 519 04 84 (univ)
(90-216) 424 07 71 (TÜDAV)
Fax: (90-212) 514 03 79 (univ)
(90-216) 424 07 71 (TÜDAV)
E-mail: opalbl@istanbul.edu.tr

Erdogan OKUF
University of Istanbul
Marine Sciences & Management Institute
Müfküle Sok. No: 1
34470 Vefa-Istanbul
Tel: (90-212) 528 25 39
Fax: (90-216) 526 84 33
E-mail: erokus@superonline.com.tr

Tamer GÜRSOY
MTA Gn. Md. Lügü
Jefizik Etüdler Daire B.
06520 Ankara
Tel: (90-312) 287 91 75
Fax: (90-312) 287 87 49

Gürkan TUNAY
MTA Gn. Md. Lügü
Jefizik Etüdler Daire B.
06520 Ankara
Tel: (90-312) 287 91 75
Fax: (90-312) 287 87 49

Ukraine

Prof. Valery EREMEEV *(also Chairman)*
(see address above)

Gennedy KORATAEV
Marine Hydrophysical Institute
Kapitanskaya 2
335000 Sevastopol, Crimea
Tel: (380-692) 54 04 52
Fax : (380-692) 44 42 53
E-mail : ipdop@fossil.ukrcom.sebastopol.ua

Victor E. ZAIKA
National Academy of Sciences of Ukraine
The A.O. Kovalevsky Institute of Biology
of the Southern Seas
2, Nahimov Av.
335011, Sevastopol, Crimea
Tel: (380-692)544110
Fax: (380-692) 59 28 13 / 44 44 77
E-mail: vzaika@ibss.iuf.net

ORGANIZATIONS

Global Environment Facility (GEF)

Radu MIHNEA
Black Sea Environmental Programme
Black Sea Programme Implementation Unit
Dolmabahçe Sarayý II.
Harekat Köskü, 86680 Besiktas-Istanbul
Turkey
Tel: (90-212) 227 99 27/8/9
Fax: (90-212) 227 99 33
E-mail: blacksea@dominet.in.com.tr
rmihnea@dominet.in.com.tr

International Atomic Energy Agency (IAEA)

Ms. Iolanda OSVATH
International Atomic Energy Agency
Marine Environment Laboratory
B.P. 800
MC-98000 Monaco
Tel: (377) 97 97 72 72
Fax: (377) 97 97 72 73
E-mail: y.osvath@iaea.org

Intergovernmental Oceanographic Commission (IOC)

Dmitri TRAVIN
Intergovernmental Oceanographic Commission
(IOC) of UNESCO
1, Rue Miollis
75732 Paris Cedex 75015
Tel: (33-1) 45 68 40 44
Fax: (33-1) 45 68 58 12
E-mail: d.travin@unesco.org

Black Sea Economic Co-operation (BSEC)

Andrei KONENKO
Black Sea Economic Co-operation
Istinye Cad.
Musir Fuad Pasa Yalýsý
Eski Tersane
Istinye-Istanbul, Turkey
Tel: (90-212) 229 63 30-35
Fax: (90-212) 229 63 36
E-mail : bsec@turk.net

Oleg SKOROPAD
Black Sea Economic Cooperation Business Council
Istiklal cad. 286/8
Beyoðlu 80050
Istanbul
Tel: (90-212) 243 41 80 / 2435111
Fax: (90-212) 243 41 84 / 2520468

PIRI REIS Foundation

Prof. K. Erol DIZDAR
Piri reis Foundation for Maritime and Marine
Resources, Research, Development and Education
Atatürk Cad. No: 178/7
35210 Izmir
Tel: (90-232) 421 70 93
Fax: (90-232) 463 63 68
E-mail: ocean@pirireis.org.tr

Society of Peace with Nature

Ümit ÇILINGIROGLU
Küme Sk. No: 8/4
81060 Göztepe, Kadiköy.
Doga ile Baris Dernegi (Peace with Nature)
UN.BSEP Int. NGO Forum Representative
Tel: (90-216) 350 60 53
Fax: (90-216) 368 27 26
E-mail: dib@prizma.net.tr

ANNEX IV

OPENING ADDRESSES

A. Opening Address by Capt. Hüseyin Yüce
National Co-ordinator for Turkey, Head, DNHO

Mr. Chairman, distinguished Representatives, Ladies and Gentlemen,

I would like to welcome you all at the Department of Navigation, Hydrography and Oceanography of the Turkish Navy in Istanbul.

My staff and myself are very happy to host the second meeting of the Intergovernmental Oceanographic Commission Black Sea Regional Oceanographic Committee.

We are also very pleased to meet distinguished marine scientists from the Black Sea, the IOC Senior Secretary Dr. Dmitri Travin and the Representatives of the International Atomic Energy Agency (IAEA), GEF and BSEC: Ms. Iolanta Osvath, Dr. Radu Mihnea, and Dr. Andrei Konenko.

Mr. Chairman, distinguished Representatives, for the sake of safety of navigation, as well as collection of the required information for the exploration and exploitation of marine resources, as neighbouring countries, we all, should co-operate and collaborate in the field of oceanography and hydrography.

Our wish is that this regional co-operation in the field of oceanography work be the first step in new international multidisciplinary projects.

Within this scope, Turkey would like to develop strong relations with the neighbouring countries as well as with the competent international organizations.

As we all know, the Black Sea has been facing the threat of pollution, mismanagement and overuse of its natural resources.

The best way to protect this invaluable source of life definitely depends upon how well you know it. This requires oceanographic surveys and studies, which call upon co-ordinated collaborative efforts at institutional, national, regional and international levels.

We still believe that this Committee may play an important role to co-ordinate oceanographic research and develop long-term research programmes in the region.

We strongly support regional approach and implementation of policies applied by the Intergovernmental Oceanographic Commission and other competent international organizations. As a consequence, in order to draw attention to the region and to get financial support from international bodies pooling resources in the region, we supported the establishment of the IOC Black Sea Regional Committee.

We, Black Sea countries, have an urgent need to unite in the sense of exchanging experience, technology, and data. I believe that developing sound scientific plans and implementing programmes endorsed by member governments can be achieved through co-operation and collaboration.

We, Black Sea countries need to: (i) develop observing networks to collect high core instrumental data and implement sound data management systems, deliver products and build services with necessary capacity; (ii) develop models to evaluate the processed data and forecast the changes in the environment and (iii) build a network that allow the participants to have access to the information.

I will not take more of your time, you have a heavy agenda before you. Since I am a naval officer, let me finish with a joke about ship. Passenger to captain: "do you generate your own electricity on board?"Captain answers: "no, we have this really long extension cord". I always feel very comfortable on board because of the vessel's absolute independence upon self-generated power.

B. Opening Address by Dr. Valery Eremeev Acting Chairman BSRC

Distinguished Delegates, Representatives of Governmental and Non-governmental Organizations, Ladies and Gentlemen:

It is my honour to formally open the Second Session of the IOC Black Sea Regional Committee and to warmly welcome all participants to this regional meeting.

It is very appropriate that the Second Session of the Regional Committee take place in Turkey, in the beautiful and dynamical Istanbul. On behalf of the BSRC of IOC, I wish to thank the Government of Turkey for hosting this session and the Head of the Department of Navigation, Hydrography and Oceanography of the Turkey Navy and his staff, for making all the local arrangements and for their frank hospitality.

At last, I would like to thank the IOC Secretariat, first of all the Executive Secretary, Dr. Patricio Bernal, for their support in the organization of this meeting.

Dear Colleagues!

I wish to remind you that the BSRC was formally established on the basis of Resolution XVIII-17 of the Eighteenth Session of the IOC Assembly (1995) and that its first session was hosted by the Government of Bulgaria in Varna, in September 1996. The Committee adopted a rather ambitious programme which we will look at during this meeting. In the framework of two Pilot Projects ("The Black Sea GOOS" and "The Black Sea fluxes") this programme covered very important practical positions and scientific problems for our region: their main goals are:

- to improve and develop regional capabilities in operational oceanography including observational, predictive and services aspects of multidisciplinary applications for an integrated coastal area and open sea area management;

- multidisciplinary investigation and identification of the biogeochemical processes and fluxes as well as reconstruction of recent geological history of the basin for the development of the long-term ecological forecasting.

During the intersessional period, many successful actions have been undertaken to implement parts of this programme. A considerable part of the work plan agreed upon at the first session was carried out.

The Executive Secretary, Dr. Ganchev, will be presenting his detailed report on this activity of the BSRC and those details do not need to be repeated here.

In the next two days, we have many agenda items to cover. Most important, we will analyze our activities over the past three years and then elaborate the scientific and implementation plans for the nearest future or more correctly for the following biannual period. In this context, I wish to recall the need to identify the up-to-date priorities in our actions. Let me also emphasize that it is very important today to try to find a new mechanism for the provision of the BSRC projects implementation by obtaining funds from outside IOC and UNESCO. Are we capable to use right approaches? Can we increase our cost-benefit? Can we produce a synthesis of the basic results and present it to governments and decision-makers? At least, we now understand very well what must be done, and we will do it!

Dear Colleagues!

Since we met last time in September 1996 in Varna, almost three years ago, there has been a very considerable development and strengthening of IOC in UNESCO system. This objective fact reflects the adequate understanding of the up-to-date role of the IOC, because the IOC is the only intergovernmental organization dedicated exclusively to the oceans and responsible for the development of the marine sciences and services.

I think this really achieving progress in our mother organization and its practical experience of the self realization must be used by the BSRC for the enlargement of the influence for the BS scientific and economical community. We need to confront our sea and coastal areas research to actual, practical and strategic issues of the regional society and show our usefulness. Taking into account the perspectives of development of a number of new international programmes and projects for the Black Sea sponsored by NATO, GEF, IAEA and other authoritative international bodies during the last years, it is desirable that the BSRC of IOC becomes the informal leader and real co-ordinator of these important initiatives. In conclusion, I should like to express once again our gratitude to our host, the DNHO of the Turkey Navy for the excellent arrangements and wish all of us a successful Session.

ANNEX V

REPORT OF ACTIVITIES OF THE BLACK SEA REGIONAL COMMITTEE (BSRC) FOR 1997-98

by Dr. M. Ganchev, Executive Secretary BSRC

As it is well known, during the First Session of the Black Sea Regional Committee, held in Varna, 10 - 13 September 1996, the Black Sea Regional Programme was discussed. Through Resolution EC-XXIX .7, IOC approved the Summary Report of the First Session of the Black Sea Regional Committee (BSRC) and the work plan for 1996-97. By the same Resolution, IOC invited GEF, WMO, IAEA, UNEF, EU and NATO to consider ways and means to strengthen co-operation with the IOC/BSRC, particularly within the framework of GOOS, JGOFS, GIPME, including the exchange of environmental data and information on the Black Sea ecology and marine living resources. The IOC Executive Council urged the Member States of IOC to participate in the activities of the Regional Committee and designate official contacts for the BSRC.

Taking into account Resolution EC-XXIX.7 and the BSRC work plan, the following actions have been taken during the past two years:

- The BSRC reviewed the present knowledge, gaps and needs for future Black Sea research and related services in the region, as well as the international framework for a co-operation between GEF, WMO, UNEP, EU, NATO and some other governmental and non-governmental organizations. The Executive Secretary of IOC invited all Danube and other countries interested in co-operation in the Black Sea including international organizations, to take part in planning activities in the framework of the Regional Programme and urged their support.

- The Executive Secretary of IOC, in his capacity of chairman of the Regional Committee, already requested the IOC Member States to investigate their possibilities of financial and technical support for the Black Sea regional programme. Unfortunately, up to now we only received positive replies from regional countries and none from other Member States of IOC. Through personal contacts during the XIXth Session of the IOC Assembly, some delegates from the non-regional countries expressed in due time their interest in the BSRP. It will be very useful to invite them to participate in our initiatives, such as scientific seminars, expeditions, and workshops. GIPME expressed its strong interests in Pilot Project 2.

- A Memorandum of Understanding on co-operation between BSRC and PCU of GEF supporting the Black Sea environmental programme was signed in November 1996. In this context and in the framework of the PP1, the common project "Open sea observing system for meteorological and oceanographic observations on board the voluntary and research ships in the Black Sea" was proposed. The main objective of the project is *"the restoration and development of the open sea observing system over main meteorological and oceanographic characteristic of the Black Sea"*. As a first step, it was investigated to provide two ferries (lines Varna-Novorosiisk-Poti-Varna and Burgas-Poti-Burgas) and two research vessels for tourist cruises (Odessa-Istanbul-Odessa and Sevastopol-Istanbul-Sevastopol). The programme includes observations on parameters of the atmosphere and the sea needed for generating the operational messages SYNOP SHIP and later, BATHY-TESAC. The observing programme has to be performed in combination with two types of observations:

(i) Observations by meteorological stations such as BATOS developed by METEOFRAN. The observed parameters are:

- Direction and speed of the wind; atmospheric pressure; air temperature and humidity; seawater temperature;
- Visual observations: clouds, visibility and wind wave characteristics;
- The ship owners are ready to provide appropriate sites and staff for implementation of the following:

- Training of observers (visual observations);
- Collecting, processing and distribution of observed data;
- Creation and distribution of specialized marine forecast for the Black Sea;
- Distribution of data and products to all interested users.

Unfortunately, up to now we have not been successful in finding sponsors to provide equipment in form of automatic meteorological stations - such as BATOS - which costs 21500 US dollars by station. From our viewpoint, the proposed project will represent a very useful step towards restoration and development of the open sea observing system. It is necessary to invite some other international organizations and institutes in view of co-operation and financial support.

In the framework of the PP1 "Black Sea GOOS", a workshop was held in Erdemli-Turkey, at the beginning of October 1997. The experts from regional countries and from France, have prepared a science draft implementation plan, namely Black Mars (The Black Sea Marine Services). This document aims at implementing a research and technological development programme for operational marine services on a regional basis oriented to life and property safety as well as assisting in the protection of marine environment of the Black Sea and its sustainable development. The plan defines the scientific and technological activities and the strategy to be adopted for developing a Black Sea Marine Meteorological and Oceanographic Operational Services (BLAMOOS), as a realization of the GOOS module for the entire basin, its coast and shelf over a five-year period.

The purpose of BLAMOOS is to create a regional operational marine service for the Black Sea and an operational oceanographic information system based on the cooperation between the surrounding countries. This will help all kind of research activities in the region regarding monitoring and prediction on the state of the sea, including its ecosystems.

The required resources for BLAMOOS will consist of two parts: (i) those resources already committed and identified for ongoing and planned operational programmes such as those of WMO, IGOSS, GEF, NATO, etc. and (ii) those additional resources required for establishing the adequate capability for operational services of the Black Sea marine environment. Unfortunately, this project did not receive any positive development until now.

IOC and BSRC as its subsidiary body, together with the Institute of Marine Sciences and Management of the University of Istanbul organized a workshop and a scientific seminar (10-12 June 1997) in the framework of Pilot Project 2 "Black Sea Fluxes". The methods and work plan of common research for the next two years have been agreed. During the seminar, the scientists from all regional countries presented 22 reports, and proposed that UNESCO would print them.

The main results of the presentations can be summarized as follows:

(i) Data on riverine sediment and pollutant loads and the flux calculations through the Straight of Istanbul indicate that the riverine inputs and in particular the loads *via* the river Danube, constitute a major part of the total fluxes into the Black Sea. The new results also show a significant sediment input by Turkish rivers, which by far exceeds the previous estimate.

(ii) The data also show that the input of atmospheric pollutants is higher in the western part of the Black Sea.

(iii) The study of sedimentary organic matter in the oxic, sub-oxic and anoxic zones of the water column and the research in its early diagnoses in the sea floor sediments is essential for understanding the biogeochemical cycles and organic fluxes.

(iv) The flux calculations concerning nutrients and heavy metals through the Straight of Istanbul indicate that there is a net pollutant input of metals and nutrient from the Black Sea into the Sea of Marmara and the Aegean Sea, causing nutrification problems in those neighbouring seas.

- The participants of the workshop agreed to establish regular exchange of data based on the national researches in the coastal zone. They also agreed on the experimental works being a very important input to the implementation of PP 2.

In 1997, a first contact was established with the Secretariat of the Black Sea Economic Co-operation (BSEC) in Istanbul.

We will need to chose the future tasks of common interest and develop the possible collaboration with the BSEC as well as the International Centre for Black Sea studies. One of the real possibilities for 1999-2000 is to use the new "ecofond", which may be established from the BSEC and the BS bank.

With the participation of the BSRC, the international conference "Black Sea´97" took place in Varna (20-22 May, 97) which approved the initiative to declare 1998 "Year of the Black Sea", as an extension of the UN "1998 International Year of the Ocean".

On 15-20 June I997, the Marine Hydrophysical Institute in Crimea-Ukraine hosted, with the financial support of IOC, a workshop in the framework of the BSRC and CoMSBlack . The participants of the workshop discussed the scientific approach of the Black Sea GOOS (BSGOOS) project and the possible co-operation with some other projects including Black Sea GLOSS, as component of MEDGLOSS.

The Executive Secretary of the BSRC presented a report on the implementation of the regional programme at the Nineteenth Session of the IOC Assembly (2-18 July 1997). The Delegates of Ukraine, Turkey, Georgia, Russian Federation and Bulgaria expressed the great interest of their countries in the implementation of the Black Sea regional programme and also in the development of BSRC as an IOC subsidiary body. The Delegate of Ukraine, Prof. V. Eremeev, underlined as a very important task to restore the Black Sea System and networks of observation. He proposed IOC to be the main co-ordinator of all on-going scientific programmes in the region.

The Delegate of Turkey, Prof. U. Unluata, underlined that many of the Black Sea programmes will be implemented in 1997-98. He stressed the need to continue the work for the creation of a model of Black Sea ecosystem.

The Delegate of Georgia, Prof. I. Khomeriki, proposed to include in the Black Sea GOOS project some elements from the MedGLOSS programme.

The Delegate of the Russian Federation, Dr. V. Riabinin, supported very strongly the development of the Black Sea GOOS project. He proposed to use some voluntary ships for meteorological and oceanographic observations. For this purpose, the BS-GOOS project needs urgently to receive financial support for buying some automatic stations and equipment for voluntary cargo and research vessels.

The idea of creating a voluntary observing system in the Black Sea was strongly supported by Dr. N. Andersen, Representative of GIPME.

Dr. V. Mamayev, Representative of GEF, asked IOC to ensure financial support for 1998-1999 in view of the implementation of two Pilot Projects in the frame or of the Black Sea Regional Programme.

In conclusion of the discussions Dr. G. Kullenberg, in his capacity of Chairman BSRC, expressed his gratitude to all regional countries for their facilities in view of supporting the successful start of the co-operation. He underlined that the problems of the Black Sea may be decided upon, only in the framework of international collaboration, as they cannot be tackled only with national resources.

The Assembly approved the report of the Executive Secretary of BSRC and expressed its strong support to the Black Sea Regional Programme.

In the course of three Russian expeditions onboard R/V *Akvanavt* (December 1997; August 1998) and R/V *Yousmorgeologiy,* many undisturbed sediment cores were recovered for study of fine scale geochronology and pollution history as well as for assessment of ancient sediment fluxes in some areas of the Black Sea: the Gelendzhik Bay, near the shallow and deep-sea zones of the Caucasus and the continental rise of the northwestern Black Sea.

By now, fine scale geochronology and pollution history were revealed by complex studies of sediment in some cores recovered from the Gelendzhik Bay and the Caucasian shelf, continental slope and continental rise. Rates of sediment accumulation and ancient sediment and pollutant fluxes were calculated in the mentioned places on the bases of the sediment dating by radinuclides and radioisotopes.

Detailed studies of sediment lithology and geochemistry have been carried out in four sediment cores (Vd-4, -10, -13, -17) collected from the Danube avandelta and deep basin. A detailed history of the Mercury accumulation is revealed in the sediment section from the southern continental rise of the western Black Sea. Sediment datings using radionuclides have been made in the sediment core (Vd-40 from the Danube avandelta).

The participants collected sediment core to study the geochronology, stratigraphy and composition of sediments, including content of radionuclides and heavy metals. The investigations of the IOC participants are directed towards revealing fine scale sedimentation and contamination of the western Black Sea.

In accordance with the work plan of the BSRC, an international expedition was organized with the financial support of IOC on board the Bulgarian survey vessel *Admiral Br. Ormanov,* from 21 September 98 to 5 October 98 in the western part of the Black Sea, with the purpose to carry out investigations on the shelf of the western part of the Black Sea. The following main tasks have been implemented during the 15 day cruise:

(i) study of the main sea water parameters;
(ii) grab sampling for studying of sediments and benthos;
(iii) seismo-acoustic profiling for diagnosis of ancient coastal lines and rate of sedimentation:
(iv) deep water surveys at the bottom and bottom sediment sampling by an underwater submersible vehicle PC-8;
(v) on board the S/V *Adm. Ormanov,* a workshop was held in connection with the Oceanographic Data Exchange and the future development of the co-operation in the region. In the framework of the United Nations idea for the Year of the Ocean during 1998, many initiatives have been carried out in the regional countries, such as: summer schools for young scientists and students, workshops, conferences, round tables, research cruises ant others. Some of the regional countries took part in "EXPO´98" – Lisbon. The delegates have presented information on these initiatives during the 31st Session of the Executive Council of IOC (November 1998).

On 23-26 February 1999, an international conference on "Oceanography of the Eastern Mediterranean and Black Sea" was held in Athens, Greece, with the participation of scientists from some regional countries of the Black Sea. This very successful conference was organized by the Institute of Oceanography of Greece and supported by the European Commission and the IOC of UNESCO. 250 participants from 23 countries have presented more than 200 reports and posters in the field of:

- Eastern Mediterranean and Black Sea comparative studies;
- Black Sea and Eastern Mediterranean ecosystems;
- Water masses formation, circulation and exchange between basins;
- Modeling of physical dynamics and ecosystem processes;
- Pelagic and benthic structure and dynamics;
- Structure, geological formation and sedimentology;

- Coastal zone and shelf sea processes and their interactions;
- Oceanographic data and information management.

It can be underlined that for the implementation of the two pilot projects and the work plan of the BSRC, an efficient organization and co-ordination was established in the regional countries.

We have now a good communication between BSRC and IOC on one hand, and between BSRC project leaders and national co-ordinators, on the other side. The regional countries have good structure for management and co-operation as regards the implementation of the regional programmes at national level.

The BSRC has established a good co-operation with some international organizations interested in the region. Some regional programmes have been completed (CoMSBlack, GEF, EROS, NATO-TU Black Sea). It is very important for BSRC to develop in the future a good co-operation and exchange of data and information with the on-going regional programmes supported by NATO, IAEA and GEF.

The future co-operation shall be actively explored in the following main areas:

- Promotion of improved systematic observations of the Black Sea GOOS programme.
- Information and data gathering as well as free exchange of data.
- Activities organized under the umbrella of the interested international organizations and programmes, such as: IAEA, NATO, GEF, UNEP, GIPME and its group of experts, BSEC.
- Capacity building programmes including training courses, summer schools, etc.
- Joint programming of relevant activities. Examples of these may include: joint workshops, pilot monitoring, joint expeditions.

The BSRC established co-operation with the UNESCO-IOC "Black Sea Mussel Watch Pilot Study". This project included two components: chemical analysis of key contaminants and measurement of a cellular pathological indicator of the harmful biological effect of toxic chemicals. The results of the "Mussel Watch Pilot Study" clearly showed that there were harmful effects at sites where anthropogenic inputs were known.

The draft work plan of the BSRC for 1999-2001 is attached as Annex XI. The most important problem for its implementation is the need for financial support. We need to propose during the Twentieth Session of the IOC Assembly, a draft Resolution with financial implication regarding the implementation of the work plan.

We should also mobilize the national resources and to ask financial and technical support from some international organizations. It will be very important to agree on some common proposals in the framework of the Fifth EU Framework Programme.

The BSRC has established an efficient co-ordination of facilities with other on-going scientific programmes in the Black Sea.

The Black Sea Regional Committee may ensure during the next two years the successful development of the regional co-operation in order to be established as a useful IOC subsidiary body with the task to implement with priority the approved Pilot Projects "Black Sea GOOS" and "Black Sea Fluxes" in the framework of the Black Sea Regional Programme.

Finally, I would like to thank Dr. G. Kullenberg for his support to the development of the Black Sea Regional Co-operation. I would like also to express many thanks to Dr. Travin for his very useful assistance in the implementation of the work plan and other activities of the BSRC.

ANNEX VI

PRESENTATIONS BY NATIONAL CO-ORDINATORS AND REPRESENTATIVES OF INTERNATIONAL ORGANIZATIONS

A. PROGRAMME OF THE INTERNATIONAL EXPEDITION "BARRIER FLUXES" on board the Russian R/V *Akvanavt* (August, 1999) in the framework of the IOC-UNESCO Pilot Project and RER/2/003 IAEA.

(prepared by K. M. Shimkus, Chief scientist of the expedition)

1. Introduction

The expeditions carried out in 1998 on board R/V *Admiral Ormonov, Prof. Vodionitskiy* and *Akvanavt* in the west and north-east Black Sea, represented an excellent start for the implementation of the marine studies programmes envisaged by the IOC Pilot Project-2 and the IAEA Project RER/2/003. Important results about modern and ancient fluxes both of sediments and radionuclides were obtained.

The execution of the programme of both Projects required extensive studies of fluxes and the realization of special investigations on sediments and radionuclides on natural interfaces associated with sharp changes of water density, biological productivity, and hydrochemical composition. Characteristic areas, such as estuaries, cyclonic and anticyclonic gyres, divergence and convergence zones are to be considered as preferential subjects of studies. Among the existing interfaces of the Black Sea water column, the oxic-anoxic boarder is of special interest, since it is a specific feature of anoxic sedimentary basin.

2. Main Goals

Water studies

- To reveal the quantitative changes and transformation of sediments and elements on the existing physical, biological, hydrochemical barrier zones (interfaces) in the Black Sea estuaries and deep water areas.

- To understand the mechanism of fast and slow penetration of sediments and contaminants from the surface water layer to the sea floor, using Chernobyl products as tracers.

- Study of biofiltration and pellet transport in oxic and anoxic waters.

- Study of elements cycling on the oxic-anoxic interface of water column and their behaviour in the redox zone.

- Investigation on the role of suspended matters to absorb Cs137 from marine waters and its contribution into Cs137 budget in seawaters and marine sediments

- Investigations of quantitative distribution of Pu in oxic and anoxic waters and sediments.

- Study of chemical components cycling on the interface: sediment bottom waters.

Aerosols

- Assessment of fluxes of sediments and pollutants, including radionuclides in aerosols over the near Caucasus Black Sea area.

Sediments

- Working out a fine scale geochronology of sea-floor sediments using man-made radionuclides and

Fb-210 for estimation of rates of accumulation of sediments and their main components (2^{nd} elements) during the Middle and Late Holocene and assessment of fluxes of sediments and pollutants during historical time.

- Assessment of fluxes of man-made radionuclides on the basis of their distribution in sediment cores, and mapping their spatial distribution on the sea floor and in sediment cares for clearing up the picture of radionuclides fallout associated bath with Chernobyl breakdown and global nuclear weapons testing.

Paleoreconstruction of anoxic basin history

- Study of fluctuations of oxic-anoxic boundary during the last 7 k.yr with special accent on the historical times (on the basis of detail geochemical, isotopic and geochronological studies of sediments in the lower shelf and upper continental slope).

3. Participants

- Russia: Southern Branch P.P. Shirshov Institute of Oceanology and Institute of Oceanology RAS; Scientific Production Association "Typhoon" of Roshydroment; Radiochemical Chair of Moscow State University.

- Ukraine: Hydrometeorological and Geological Institutes (Kiev).

- Representatives from Georgia, Bulgaria, Romania and Turkey (one by country).

Russia and Ukraine will provide the expedition with equipment. Representatives of other countries will take part in marine studies and have a possibility to collect materials for on-shore laboratory studies in their institutes, according to the co-ordinated programme of complex investigations.

4. Area of studies

Studies will be carried out in the Black Sea near Caucasus region in its shallow and deep water areas within the limits of the Russian exclusive economic zone. Water column and sediments will be investigated in some peripheral anticyclonic eddies, central cyclonic gyre and in estuaries of some Caucasus rivers (Fig.1).

5. Methods and equipment

Box-corers of some modifications, gravity corers with inner liner (115, 124 mm and 62 mm in diameter) and grab sampler "Okeon-0.25" will be used for sediment sampling from the sea-floor.

Filtration of suspended matters and absorption of radionuclides will be made with the help of unit "Midia" and tangential filtration system provided by pumping equipment which allow to make continued filtration from different horizons of the water column down to 200 m. More deeper layers will be sampled by batometers up to 300 L in CTD "Sea bird" set with transmitter and 12 bottles of 5 L will be used for hydrophysical, hydrochemical and biological studies of water column and selection of the necessary horizons for water filtration.

Benthic chamber experiments in shallow water area will be made by lender for study of chemical cycling on the sediment-water interface.

Aerosols will be collected on Petriyanov filters with help of System "CESSIA" used for this kind of work in the Hydrometeorological Institute of Ukraine.

Multicup sediment traps produced in Moscow will be used for redeployment and new cycle of measurements of sediment fluxes at existing station in the deep-sea area (1,850 m), opposite to Gelendzhik.

6. Strategy of marine investigations

- Special sediment sampling on the lower shelf and upper continental slope to catch oxic-anoxic interface fluctuations during Holocene, recorded in sediment cores.

- Sediment sampling on the shelf, continental rise and abyssal plain to get materials for sediment dating and calculation of ancient fluxes of sediments and for assessment of pollutants fluxes during historical time.

- Special hydrophysical, hydrochemical or biological studies along the profile Gelendzhik-Cyclonic gyre for clearing up of water column structure of the area of investigations in summer. "Seabird" soundings at each station will be used for exact detection of the horizons to be undergone with complex studies.

- Complex studies of water column and sediments along cross sections in river estuaries will be carried out in the Tuapse-Sochi area to reveal specific features of settling down of sediments and pollutants and their accumulation on the shelf floor near the river mouth.

7. Different kinds of studies and scope of work

Water filtration – 12 stations, 5 horizons at each station: (surface waters, layer of photosynthesis, oxic-anoxic interface, upper anoxic layer, bottom waters). Sediment sampling – 15 stations. Complex studies of estuaries- 1-2 areas. Redeployment of sediment traps – 1 station. Aerosols – continued measurements along the route. Bottom echosounding along the route and within polygons of studies.

8. Term and course of the expedition

3-17 August, 1999.

1-2 August – mobilization of the expedition; 3-7 August – marine studies in the Gelendzhik-Arkhipo-Osipovka area; 8-9 August – standby in Gelendzhik (change of scientific staff, on-shore laboratory studies, discussion on the results and plan of future marine investigations; 10-14 August – marine studies in the Tuapse-Sochi area; 15-17 August – demobilization of the expedition, discussion of the results, working out the plan of technical and scientific reports, collecting materials for the technical report, working out a co-ordinated programme of laboratory studies by the participants.

Time budget of marine studies:

Stage I:	- passage (230 miles)	= 31 h (1.3 days)
	- studies (6 stations)	= 89 h (3.7 days)
Stage II:	- passage (310 miles)	= 42 h (1.75 days)
	- studies (8 stations)	= 78 h (3.25 days)

9. Results

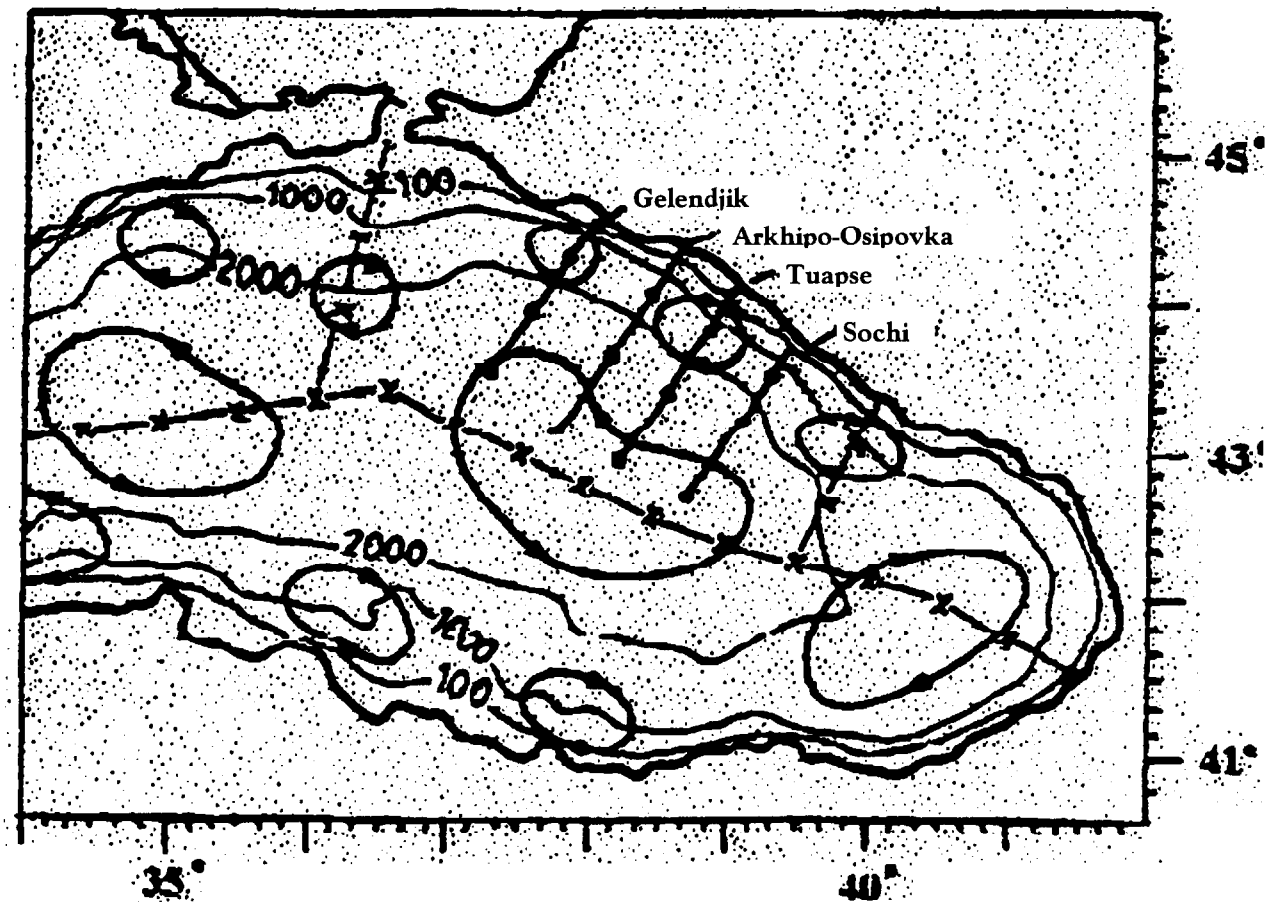
- Preliminary (technical) cruise report - November 1999.

- Final cruise report – June 2000.

- Collection of scientific papers – December 2000.

Figure 1.

Area of studies during the planning expedition on board R/V *Akvanavt* (3-15 August 1999)



1- Profiles of studies and stations

2- Isobaths, m.

3- Cyclonic gyre

4- Anticyclonic vortices

5- Boundaries of economic zones

B. "ASSESSMENT OF SEDIMENT FLUX IN THE BLACK SEA: MECHANISMS OF FORMATION, TRANSFORMATION AND DISPERSION AND ECOLOGICAL SIGNIFICANCE" ("BLACK SEA FLUXES")
(Prepared by K.M. Shimkus, International co-ordinator PP2)

1. Main Goals

Multidisciplinary investigations of sediment flux, its time-space variability and identification of the key processes of transformation and sedimentation for assessment of the influence on an ecological status of the Black Sea ecosystem.

Reconstruction of recent geological history as a basis for ecological forecasting.

2. Duration: 1997-2000.

3. Participants: Bulgaria, Georgia, Romania, Russia, Turkey and Ukraine.

4. Activity

International activities

- Organizing and holding the Istanbul Workshop "Black Sea fluxes-97" (June, 1997).
  Participants: Bulgaria, Georgia, Romania, Russia, Turkey, Ukraine.
  Organizers: IOC UNESCO Black Sea Regional Committee (M.V. Ganchev);
  BSRC National Co-ordinator of Turkey Capt. H.Yüce;
  Institute of Marine Sciences and Management of Istanbul University (Prof. Dr. E. Dogan and Prof. Dr. N. Cagatay);
  International co-ordinator of PP2: Dr. K.M. Shimkus (SBIORAS, Russia).
  Collection and preparation of the Istanbul Workshop scientific papers for publication (Prof. Dr. N. Cagatay (IMSMIU) and Dr. M. Shimkus (SBIORAS) (1998);
  Publication of the Istanbul Workshop scientific papers (IOC UNESCO Publishing House, Dr. D. Travin,1999).

- Carrying out the international expedition on board R/V *Admiral Bronemir Ormanov* on the Bulgarian shelf area (Participants of PP2 from: Bulgaria, Georgia, Romania, Russia, Ukraine) and holding on board seminar.

- Participation in the IAEA expedition Sea on board R/V *Prof. Vodianitskiy* (Radeux cruise) in the West Black Sea (Participants of PP2 from: Bulgaria, Russia, Turkey).

National activities

Russia

- Collecting undisturbed sediment cores by IAEA multicorer from the three sites of the West Black Sea on board R/V *Youzmorgeologiya* (September 1996). Financing by SBIORAS.

- Carrying out the expedition on board R/V *Akvanavt* in Gelendzhik: Bay and sediment sampling at 29 sites in the area (7 days, December1997, SBIORA5). Financial support provided by the Russian Ministry of Sciences and Technology.

- Carrying out the expedition on board R/V *Akvanavt* and sediment sampling at 37 sites in the Black Sea near the Caucasus zone (shallow and deep waters of the Russian economic Zone) (10 days, August 1998) (SBIORAS). Funded by the Russian Ministry of Sciences and Technology.

- Collecting suspended matters by sediments traps at one site of the near- Caucasus deep-sea area

(170 m and 180 m depth in water column) during 1998 (SBIORAS and IORAS).

- Working out the programme of the international expedition "Barrier-fluxes", on board R/V *Akvanavt* (August 1998) (SBIORAS).

Ukaine

- Carrying out the expedition on board R/V *Horizon* and sampling of bottom sediments and suspended matters on the Black Sea north-western shelf (1998).

- Continued collecting of suspended matters and aerosols on the oceanographic platform in Katsiveli (Crimea).

5. Main results

(i) In the Istanbul Workshop, fourteen scientific papers were presented by scientists from the six countries of the Black Sea to clarify the modern picture of sediment matter supply from the Black Sea catchment area. The data presented allow to realize a more accurate and exact assessment of solid and dissolved river matter discharge into the Black Sea. This is the basis for the new budget of sediment matter calculations in the Basin.

(ii) In the course of three Russian expeditions on board R/V *Akvanavt* (December 1997, August 1998) and R/V *Youzmorgeologiya*, many undisturbed sediment cores were recovered for study of fine scale geochronology and pollution history as well as for assessment of ancient sediment fluxes ín some areas of the Black Sea Gelendzhik Bay, near the Caucasus shallow and deep-sea zones and the continental rise of the north-western Black Sea.

By now, fine scale geochronology and pollution history were revealed by complex studies of sediments in same cores recovered from the Gelendzhik Bay and the Caucasian shelf; the continental slope and continental rise. Rates of sediment accumulation and ancient sediment and pollutant fluxes were calculated in the mentioned places, on the basis of sediment dating by radionuclides and radioisotopes.

(iii) In 1998, continued annual studies of suspended matter were started in the Black Sea near the Caucasus deep-sea area by Russian sediment traps, and data upon its fluxes variation during winter and spring time were obtained first.

(iv) Grab sampling of bottom sediments and benthos, seismo-acoustic profiling, geological hydrophysical and biological studies were carried out on the Bulgarian shelf during the international expedition on board R/V *Admiral B.Ormanov* (September 1998). Besides, problems of collecting and exchanging oceanographic data were discussed during the on board workshop. The results of investigations are summarized in the Cruise Report. Sediment samplings were taken at 21 stations on the shelf area by grab sampler, for study of modern sedimentation processes. In addition, four dives of manned submersible vehicle were performed in various places of the shelf edge (at 80-120 mm water depth), to visually diagnostic ancient coastal lines. Beside this, spatial distribution of buried ancient coastal lines and routes of estuary sedimentation on the lower shelf area were detected by seismo-acoustic profiling. Romanian scientists have studied magnetic susceptibility of sediments in 18 stations to identify their anthropogenic contamination by metallic articles.

(v) 18 sediment cores were recovered from the western Black Sea shelf and deep basin by multicorer during the IAEA international cruise on board R/V *Prof. Vadianitskiy* (September 1998). Representatives of PP2 from Bulgaria, Russia and Turkey have collected cores for studies of sediments in the national laboratories. All the investigations are directed towards revealing fine scale sedimentation and pollution history of the western Black Sea.

In Russia, detailed studies of sediments lithology and geochemistry were completed in four sediment cores (Vd-4, -10,-13,-17) collected from the Danube avandelta and deep basin. A detailed

history of the Mercury accumulation is revealed in the sediment section from the southern continental rise of the western Black Sea. Sediment dating using radionuclides were made in the sediment core (Vd-4) from the Danube avandelta.

In Bulgaria, detailed macrofauna studies were carried out for biostratigraphic division of sediment cores recovered from the north-western shelf (Vd-1, -10, -12,). Besides, biostratigraphy of sediments and the peculiarities of palaeoclimate evolution in the south-western Black Sea region during the Holocene is cleared up by detailed palaeological studies of the sediment section recovered from the southern continental slope (Vd-18). The data obtained may be considered as good ground for elucidating the variation of ancient sediment fluxes into the Black Sea in relation with the palaeoclimate evolution.

The results of complex studies of the sediment cores collected in the IAEA cruise on board *Prof. Vodianitskiy* are partially presented in the "Cruise Preliminary Report". All the information will be summarized in the Final Report of the cruise. The most interesting data will be published.

6. Conclusions

(i) The marine studies performed during some national and international expeditions over the period 1996-1998 as well as the Istanbul Workshop on "Black Sea Fluxes" held in 1997, display the successful development of the IOC/BSRC Pilot Project 2. By now, some important new data were obtained in various scientific fields: on sediment geochronology; modern and ancient sediment fluxes in various areas of the shallow and deep-sea basin; and sediments supply by rivers from the catchment area in the Black Sea.

By now, some important new data were obtained in various scientific fields: on sediments geochronology; modern and ancien sediment fluxes in various areas of the shallow and deep-sea basins; and sediments supply by rivers from the catchment area into the Black Sea.

(ii) A complete implementation of the PP2 may be successful, provided that new expeditions be performed to carry out studies of sediments and pollutants in the water column as well as on the sea-floor of the river avandeltas and characteristic areas of the deep-sea basin such as continental rice, cyclonic and anticyclonic gyres. In addition, observations of sediment fluxes at coastal standpoints and on the existing oceanographic platforms are to be continued. The introduction of advanced methods of investigations and modern techniques in marine and on-shore laboratory studies is of paramount importance.

In marine studies, this approach can be realized in good conditions by organizing co-operative studies in the framework of international expeditions, and enlisting the best equipment for the participants.

Besides this, financial support is necessary for purchasing the modern equipment, both for marine and laboratory studies.

(iii) Co-operation of IOC-UNESCO/BSRC with IAEA in the Black Sea marine studies have permitted to obtain very good results for PP2. It allowed using modern IAEA equipment for solution of the PP2 scientific problems. In addition, it opened an opportunity for expanded use of high quality data on evolution of Black Sea fine-scale sedimentation during the Upper Holocene and pollution history of the Basin as well. The co-operation is welcomed in the future.

C. PILOT PROJECT 2 "BLACK SEA FLUXES" PROPOSALS FOR THE PLAN 1999-2001

(prepared by K.M. Shimkus)

1. Organization of international expeditions on board the Russian R/V *Akvanavt* in the northeast Black Sea (10 days in August) (SBIORAS, Russia).

2. Organization of the co-operative IAEA-IOC international expedition in the east Black Sea (Summer 2000).

3. Co-ordinated laboratory studies of materials collected during the expeditions of R/V *Akvanavt*, *Ad. Ormanov*, and *Prof. Vodianitsky*.

4. Continued observations on river solid discharge, aerosols, suspended matter at the standpoints (study of grain size, chemical/mineralogical composition of sediments and pollutants) according to the national programmes.

5. International Symposium "Fluxes and Black Sea history" to discuss the results of the expeditions performed in 1996-1998 and in earlier times.

Problems to be discussed in the Symposium:

(i) Modern sediment fluxes (new data):
- from the watershed area,
- in aerosols,
- in the sea water area (water column, sea floor);

(ii) Fine scale geochronology (based on radio-isotopes and radionuclides) and fine scale biostratigraphy of sediments;

(iii) Rates of sediment accumulation (modern and during the Holocene);

(iv) Fine scale history of Holocene sedimentation in relation with climate changes and the evolution of the Black Sea environment;

(v) Black Sea contamination history (tendencies of pollutants accumulation in well dated sediment sections);

(vi) Radionuclides as tracers of the age of sediments and pollution history.

6. Preparation of the Black Sea´98 Symposium papers for publication.

D. PROJECT STATUS REPORT OF THE RUSSIAN STUDIES
(prepared by K. M. Shimkus)

1. Main Goals

- Studies of sediment fluxes in recent times, during the historical period and the Holocene.

- Reconstruction of fine scale history of sedimentation and anthropogenic pollution of the Black Sea using radionuclides and radio-isotopes for dating of sediments.

2. Region

Russian economic zone, as area of priority, and other regions of the Black Sea area.

3. Strategy

Investigations carried out by national and international expeditions. Co-operative studies in the framework of the IOC/BSRC Pilot Project 2 and the IAEA Project RER/2/003: "Marine Environmental Assessment of the Black Sea Region".

4. Participants

- Southern Branch, P.P. Shirshov Institute of Oceanology, RAS (SBIORAS).
- P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences (IORAS);
- Moscow State University (MSU);
- Rostov State University (RSU).

5. Activity

- Active participation in working out the IOC-UNESCO/BSRC Pilot Project 2 (September 1996, BSRC Session in Varna).

- Organizing and holding the workshop "Black Sea fluxes´97" in Istanbul (June 1997); working out its programme; preparation of scientific collection of the Workshop (in co-operation with the Institute of Marine Sciences and Management of the University of Istanbul); presentation of scientific report and scientific paper: "Fluxes of sediments and pollutants in the Black Sea" (K.M. Shimkus, SBIORAS).

- Continuation of suspended matter studies collected by sediment traps in many places of the northwestern Crimean and Caucasian coastal zone during the period 1984-1990 (RSU).

- Extension of the complex study of suspended matters collected during the period 1989-1994 in the near bottom waters (3-5 m above the sea floor) of the Caucasian shelf area (water depths –7-40 m) (SBIORAS).

- Collecting undisturbed sediment cores by IAEA multicorer on three sites of the west Black Sea (northwestern continental rise) on board R/V *Youzhmorgeologiya* (September 1996), for study of fine scale sedimentation history and reconstruction of the history of contamination of the Basin (SBIORAS).

- Carrying out the Russian expedition on board R/V *Akvanavt* in the Gelendzhik Bay (December 1997), which was financed by the Russian Ministry of Sciences and Technology (chief scientist: K.M. Shimkus). Bottom sediments were recovered at 29 stations from all the Bay area for study of displacement of most polluted sediments and revealing pollution history. Grab sampler and gravity corer of 62 mm diameter with inner liner, were used for sediment sampling.

- Carrying out the Russian expedition on board R/V *Akvanavt* in shallow and deep-sea areas of the Russian economic zone (10 days in August 1998) (chief scientist: K.M. Shimkus, SBIORAS). Bottom sediments were recovered at 37 stations using various sampling equipments: IAEA box-corer, gravity corers 62 mm and 124 mm diameter, with inner liners and grab sampler for:

. Dating of sediments using radionuclides radio-isotopes and working out a fine scale geochronology of the Upper Holocene sediments;

. Assessment of ancient fluxes of sediments and pollutants;

. Reconstruction of the northeast Black Sea contamination history;

- Suspended matters were firstly collected by sediment traps at 170 m and 1800 m of the water column in the Black Sea near the Caucasus area during winter and spring 1998 (K.M. Shimkus, V. Yu. Rusakov; SBIORAS, IORAS).

- Participation of the Russian Representatives (K.M. Shimkus, L.V. Voronov, SBIORAS) in sediment studies of the west Black Sea during the IAEA international expedition on board *Prof. Vodianitskiy* (Radeux cruise, September 1998). Four sediment cores from the shelf and deep-sea areas were collected by multicorer for complex detailed sediment studies in Russia and to get data for assessment of ancient sediment fluxes and revealing contamination history of the Western basin.

- Participation of the Russian Representatives (V.N. Efremov, MSU) in seismo-acoustic profiling of the Bulgarian shelf area during the international expedition on board R/V *Admiral Bronemir Ormanov* (September 1998).

- Working out the programme of the international expedition "Barrier fluxes" on board R/V *Akvanavt* (August 1999, K.M. Shimkus, SBIOFAS).

6. Main results

(i) In the course of three Russian expeditions (on board R/V *Akvanavt*, December 1997; August, 1998) and R/V *Youzmorgeologiya*, many undisturbed sediment cores were recovered for study of fine scale geochronology and pollution history, as well as for the assessment of ancient sediment fluxes in some areas of the Black Sea: the Gelendzhik Bay, near the Caucasus shallow and deep-sea zone and the continental rise of the north-western Black Sea.

By now, fine scale geochronology and pollution history were revealed by complex studies of sediments in same cores recovered from the Gelendzhik Bay and the Caucasian shelf, continental slope and continental rise. The rates of sediment accumulation and ancient sediment and pollutant fluxes were calculated in the above-mentioned places, on the basis of sediment dating by radionuclides and radio-isotopes.

(ii) In 1998, continued annual studies of suspended matters were started in the Black Sea near the Caucasus deep area by Russian sediment traps, and data upon its fluxes variation during winter and spring time were obtained first.

(iii) 18 sediment cores were recovered from the west Black Sea shelf and deep basin by multicorer during the IAEA international cruise on board R/V *Prof. Vodianitskiy* (September, 1998).The Representatives of PP2 from Russia collected 4 cores for studies of sediments in the national laboratories. All the investigations are directed towards revealing fine scale sedimentation and pollution history of the west Black Sea. Detailed studies of sediments lithology and geochemistry were completed in four sediment cores: Vd-4, -10, -13, -17, collected from the Danube avandelta and deep basin. A detailed history of the Mercury accumulation is revealed in the sediment section from the southern continental rise of the west Black Sea. Sediment dating using radionuclides were made in the sediment core (Vd-7), from the Danube avandelta.

E. ROMANIA NATIONAL REPORT 1998

(presented by Dr. K.M. Shimkus, on behalf of the Marine Research Institute or Romania)

MARINE RESEARCH INSTITUTE OF ROMANIA

I. Results

1. *Expeditions*

In the framework of the IOC Pilot Project 2 related to "Black Sea Fluxes´98", the senior scientist Danut Diaconeasa, from the Marine Research Institute of Romania (RMRI) of the Bulgarian Navy, participated in the research cruise organized on board the Hydrographic Vessel *Admiral Branimir Ormanov*, between 25 September and 5 October 1998. His main activity consisted in carrying out bottom sediment sampling and survey of the sea-bottom using a submersible underwater vehicle PC-8.

A preliminary report on the Black Sea sediment contents of organic matter (Dr. I. Pecheanu), gross beta activity (Dr. V. Patrascu) and marine fungi (Dr. M. Apas) was transmitted to IOBAS/Varna, in November 1998, to be included in the Cruise Technical Report for UNESCO-IOC.

Further analyses on the size of particles and heavy metal contamination of sampled sediments will be carried out until May 1999.

PUBLICATIONS

The RMRI contributed to the International IOC/BSRC Workshop on "Black Sea Fluxes", Istanbul, 10-12 June 1997, by submitting the paper: "Riverine input of pollutants in the sediments collected along the Romanian Black Sea coast" (V. Piescu, A.S. Bologa, A. Cociasu, E. Cuingioglu, R. Mihnea, V. Patrascu, I. Pecheanu), UNESCO-IOC, Paris, in press.

II. Proposals for 1999-2001

1. Please, send us more detailed information about the RN *Akvanavt* cruise, planned in July-August 1999, and inform whether it would be possible to take a RMRI specialist on board.

2. The RMRI participation in the International Symposium on "Fluxes and Black Sea History" will consist in a paper regarding offshore sediment distribution in the western part of the Black Sea.

3. The above-mentioned paper is in preparation.

4. Proposals for the future regional co-operation in the implementation of PP2 have been debated during a workshop on board *Admiral Branimir Ormanov* (cf. I.A.).

All participants including the RMRI Representative, supported the involvement of their national institutes and the need for some financial and technical support for equipment. In this respect, a co-operation between UNESCO/IOC and BSRC with IAEA Vienna was proposed, taking into account their very close interests and motivations in the Black Sea; e.g., the results following the cruise investigations by HN *Admiral Branimir Ormanov* (UNESCO/IOC, 21 September – 3 October) and RN *Professor Vodianitsky* (IAEA, 9-23 September) may be used by all interested institutions in the region.

The participants in the workshop made some proposals to UNESCO/IOC and BSRC for 1999:

(i) planning of a scientific seminar on "Black Sea Sediment Fluxes" in June or September 1999, to discuss the reported results after the cruises performed in 1998;

(ii) planning of a joint UNESCO/IOC and IAEA deep-sea expedition in 2000 (15 days) for investigations using specialized equipment and instruments, including box-corers and sediment traps;

(iii) assistance for publishing the scientific results obtained in 1998 and reported at the seminar in 1999.

5. As to our national research programme/involvement in this matter, the study of littoral dynamics along the Romanian shore includes since 1980 periodical surveys of beach morphology changes.

Some bathymetric transects have been carried out up to 10-15 m deep. Sediments have been sampled and analyzed for grain size and chemical content distribution.

F. NATIONAL INSTITUTE OF MARINE GEOLOGY AND GEO-ECOLOGY (GEOECOMAR)

(prepared by Dr. Eng. Simion Nicolaev, Director, and Dr. Alexandru S. Bologa, National co-ordinator)

According to the work plan of the BSRC of IOC/UNESCO, an international expedition has been organized between 21 September and 5 October 1998 in the framework of the Pilot Project.2: "Black Sea Sediment Fluxes". The main objective of the cruise was to carry out investigations on the western part of

the Black Sea shelf. The scientific programme took place on board the HN *Admiral Branimir Ormanov*, and consisted in two parts: 22-27 September and 29 September – 3 October. Specialists from Bulgaria (28), Georgia (2), Romania (2), Russia (1) and Ukraine (2) participated in the expedition.

The first part of the cruise was devoted to hydrophysical, hydrochemical and biological investigations and to grab sampling of shelf sediments and benthos between 20-103 meters deep. The main tasks of the second part of the expedition consisted in seismo-acoustic GEOECOMAR was represented by one specialist who attended the scientific programme and the workshop organized at the end of the expedition, and collected sediment samples for chemical and mineralogical analyses, magnetic susceptibility measurements and diatom population studies. Due to financial reasons, at this time only the results concerning the magnetic susceptibility of sediments have been obtained. The chemical analyses are now in progress in the laboratories of GEOECOMAR – Constantza branch. X-ray analyses and diatom studies will be achieved in co-operation with specialists of the Geological Institute.

The preliminary results of the magnetic susceptibility investigations are presented below.

Magnetic susceptibility of the Black Sea sediments
(by Silviu RADAN (GeoEcoMar); Sorin Corneliu RADAN and Maria RADAN, Geological Institute of Romania)

Among various physical parameters of the bottom sediments, the magnetic susceptibility (MS) can show a peculiar distribution pattern, which may be related to some sedimentological and environmental problems, such as sediment origin differentiation, and even metallic pollution.

Methods

Sediment samples of bottom sediments have been collected in 18 stations, during the cruise of the HN *Admiral Branimir Ormanov*, in the framework of the Pilot Project 2: "Black Sea Sediment Fluxes". Each sample was sub-sampled on board and collected separately within two intervals: the uppermost part of the sediment usually consisting usually of 1-2 cm of grey-yellowish, oxidized, fluffy mud (layer "a") and the underlying part, with variable thickness, more cohesive, represented by grey to grey-blackish muds, frequently bioturbated, and sometimes containing shells and shell fragments (layer "b"). Measurements of magnetic susceptibility have been carried out for each sub-sample, and an average value has been calculated for the whole sample (Table 1).

Results and discussion

As a rule, the magnetic susceptibility shows good correlations with magnetic mineral contents, grain size and even metallic pollutant concentration. These parameters are more or less interrelated. The most evident control is extorted by the grain size, the maximal MS values being recorded mainly in the silty to coarse silty sediments, which are usually richer in magnetic mineral fractions.

The distribution pattern of magnetic susceptibility values on the investigated area shows a clear decreasing trend for both groups of sub-samples ("a" and "b") and for the whole samples as well, from the seashore to the deeper areas of the open sea. So far, we have not obtained any data concerning the grain size of the sediment samples, but a transition from coarse to finer sediments in this direction is obvious, so the above-mentioned tendency confirms the good correlation between grain size and magnetic susceptibility. The maximal average values have been recorded in front of the main tributary valleys at Varna (446.64x10 SI u.), Burgas (345.08 x10 SI u.) and Kamchya (287.83 x10 SI u.), suggesting the importance of the grain size and maybe, the pollutant control.

There are also some differences between the layers "a" and "b", controlled by grain size variation, or possibly by other factors (metallic pollution).

In fact, comparable values and similar trends were found on the Romanian shelf, in the framework of the EROS 2000I21 Programme.

Table 1. Magnetic susceptibility of the Black Sea sediments (x10^{-6} SI u.)

No.	Sample No.	Layer "a"	Layer "b"	Whole sample (Average "a+b")
1	PP2-101	156.14	154.57	155.36
2	PP2-102	109.51	48.64	79.08
3	PP2-201	210.20	302.14	256.17
4	PP2-301	388.64	504.64	446.64
5	PP2-302	262.76	221.57	242.17
6	PP2-303	202.45	240.14	221.30
7	PP2-304	89.94	90.46	90.20
8	PP2-305	90.96	60.99	75.98
9	PP2-401	183.64	290.51	237.08
10	PP2-402	110.51	144.76	127.64
11	PP2-500			65.45
12	PP2-501	322.64	367.51	345.08
13	PP2-502	132.01	270.26	201.14
14	PP2-503	152:83	201.45	177.14
15	PP2-504	116.76	46.41	81.59
16	PP2-555	186.01	226.95	206.48
17	PP2-901	254.64	321.01	287.83
18	PP2-902	149.51	228.82	189.17

G. CONTRIBUTION OF THE RUSSIAN FEDERATION TO PILOT PROJECT 1 IN 1996-1999
(A Summary of presentations by Dr. Posnov)

In 1996-1999, Russia continued meteorological observations (air and sea-surface temperatures, direction and speed of wind, height, period and direction of waves, atmospheric pressure, clouds, precipitation, humidity) at three-hour intervals at 5 coastal stations along the national coast of the Black Sea. At 9 sites, the sea level was measured every 6 hours (including 2 sites with continuous sea level recording). The pollution monitoring has been carried out at 29 sites. The data from these observations have been accumulated along with the data from satellite-base altimeter.

The products prepared are the following:

- Routine meteorological surface analysis disseminated from the Hydrometeorological Centre of Russia, Moscow;
- The "Marine Yearbook on Hydrometeorology", prepared annually by the Centre for Hydrometeorology of the Black Sea and Azov Sea, based in Sochi, Russia;
- Data catalogues on monthly mean sea level at nine stations;
- The "Marine Yearbook of Hydrochemical Pollution", prepared by the State Oceanographic Institute (Roshydromet).

In 1997, the Head Department of Navigation and Oceanography prepared a CD-Rom containing an atlas entitled "Black Sea Geographic Information System" including maps on geology, meteorology, biology, physical and chemical oceanography, and fisheries. The data used for maps were collected during

oceanographic surveys carried out in the Black Sea from 1990 to 1993.

A remark during "DISCUSSIONS" on accumulated data and exchange:

In Russia, the World Data Centre-B in Obninsk (for Hydrometeorology) and Gelendzik (for Marine Geology and Geophysics) collect all the national data from civil vessels. Now, the Head Department of Navigation and Oceanography (Hydrographic Service of the Russian Navy) offers a contribution of additional data from 100 cruise surveys carried out on board vessels of the Navy.

As for biological data (relevant to Living Marine Resources Module), the P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow holds biological data on the Black Sea ecosystem, collected during 12 cruises in the open sea. The Southern Branch of the Institute holds a continuously accumulated data bank of hydrological observations in the Black Sea for the period 1897-1990 and a data set of high-resolution hydrological observations for the period 1960-1998.

H. WORKS REALIZED IN THE FRAMEWORK OF THE INTERNATIONAL PILOT PROJECT 2 "BLACK SEA SEDIMENT FLUXES" IN 1998

In Ukraine, the Institute of Geological Sciences of the National Academy of Sciences of Ukraine (main organization), the Marine Hydrophysical Institute, the Experimental Division of MHII, the Institute of Biology of the Southern Sea, the Institute of Hydromechanics, the Institute of Geophysics, the Division of Marine Geology and Sediments have been taking part in works, according to the International Project «Sediment» in 1998.

In the framework of the Project "Sediment", the budget studies related to theme «Investigation of geological structure and lithological peculiarities of sediment stoutness of the Black and Azov Seas», and the contract works related to the theme "Investigations of the structure of the Black and Azov Seas by geologico-geochemical methods, aiming at the maintenance of a reconnaissance perspective and exploitation of non living resources of marine bottom" have been carried out. The works related to the theme "Working out theoretical and practical principles of protection and rational use of subterranean and surface waters of the southwestern Crimea and region of Sevastopol" - which is part of the complex project "Ecological safety of the coastal zone of the Black and Azov Seas and complex use of the shelf resources" - have been continued.

In the framework of the Project "Sediment", two scientific research cruises have been carried out. The expedition works were fulfilled in the western part of the Black Sea, and in the Mediterranean Sea on the R/V *Horizon* (May 1998). During the cruise on route, the probes of suspended matters and bottom sediments have been selected and the survey of geo-ecological situation of the bottom of the bottom of the northwestern shelf has been repeated. The participants of the cruise took part in the Exhibition "Ocean EXPO´98" in Lisbon (Portugal), which was dedicated to the International Year of the Ocean. Geological, geophysical and hydrophysical studies have been carried out on the R/V *Admiral Ormanov* (September 1998) on the Bulgarian shelf during the international cruise. Besides these two cruises, regular (monthly) investigations with selection of water and air suspended matter have been fulfilled on the oceanographic platform located in the Blue Bay (Kaciveli).

The results obtained have been published in items of: the 1st Symposium «Ecological aspect of reconnaissance mining and transportation of oil and gas in and through the Black Sea» (Bulgaria, Varna); the XVIth Congress of Carpathian – Balkan geological association (Austria; Viena); the Conference on oil geology and carbon hydrogen potential of the Black and Caspian Seas (Romania, Constanza); the International Meeting on mastering of energetic resources of the Black Sea on the Programme TACIS (Georgia, Batumi); and the Conference «Ecological problems and peculiarities of use of coastal objects of marine complex of Ukraine (Ukraine, Izmail).

I. PROPOSALS REGARDING THE IMPLEMENTATION OF PROJECT PP2 FOR 1999 – 2001

1. To continue stationary observations of suspended matters and aerosol on the oceanographic platform in Kaciveli; supply the question to IOC/UNESCO and the World Weather Watch (WWW/WMO) about including the oceanographic platform (Kaciveli) in the world network of monitoring stations.

2. To plan a number of cruises in the river mouths of the northwestern part of the Black Sea, aimed at collecting sediments and dragging solid flowing in various seasons.

3. To carry out a scientific and technical seminar «Erosion of the Black and Azov Seas coasts» in May (Kiev), and publish an issue of papers.

4. To extend the project field by including the study of biogeochemical processes influencing sedimentation, particularly biofiltration.

J. INFORMATION FROM BULGARIA

(By Prof. Christo Balarew, National Co-ordinator of the IOC Regional Black Sea Programme)

Under the UN initiative "1998 – International Year of the Ocean", a number of national and regional activities have been carried out in Bulgaria:

- International Conference "Black Sea 1997", where a decision was taken to declare 1998 as a "Year of the Black Sea";

- Participation in the World Exhibition for exploration of the radio-active pollution of the western part of the Black Sea (September 1998);

- Summer School and Workshop on the problems of the Black Sea pollution (June 1998, Shkorylovtsky);

- International Conference on topics related to the development of the marine ecosystem and the exploitation of the Black Sea resources (November 1998, Varna).

- Programmes for the development of a national system for oceanographic data and for complex monitoring of the Black Sea, closely linked with the regional project "Black Sea GOOS" were elaborated under a contract with the Ministry of Education and Science, in 1998 and the beginning of 1999.

- Through the coastal monitoring network, regular observations of the environmental changes were carried out, and hydrobiologic and hydrochemical investigations were performed quarterly in the gulfs of Varna and Bourgas, using the research vessel *Prof. Volkanov.*

- The samples accumulated during the expedition carried out during the autumn 1998 in the western part of the Black Sea are being processed in the Institute of Oceanology in Varna. The results will be presented at a workshop which will take place during the autumn 1999 in Varna, with the financial support of IOC and IAEA.

- The Ministry of Education and Science of the Republic of Bulgaria actively collaborates with the Executive Secretary of the Black Sea Regional Committee for the continuous development of the regional co-operation in the Black Sea research.

K. THE UKRAINIAN NATIONAL PROGRAMME "GLOBAL OBSERVING SYSTEM OF THE BLACK SEA": (Researches conducted in 1997-99)

The Ukrainian National Programme "Global Observing System of the Black Sea" was established in 1997 as a result of the understanding that the Black Sea ecosystem has gone through strong changes during the last two decades. The potential increase of human activity in the region will provide stronger pressure on the environment, and management efforts to prevent the environmental collapse should be based on systematic observations. The previous kind of observing system of the Black Sea, which was mainly supported by Ukraine and Russia, was economically inefficient since it was based on ship surveys, at present too expensive for the Black Sea countries. However, modern technologies of oceanographic observations have been available during the last years, and the main goal of the programme is to design and develop a new observing system for the Black Sea basin. The new observing system should be cost-efficient, use a modern technology and match the previous observations. The duration of the programme is five years. It is funded by the Ministry of Science and Technology of Ukraine and considered as an input of the country to the IOC regional project.

The strategy of the programme is issued from demands regarding the observing system. The cost-efficiency is supposed to be achieved by optimization of *in situ* observations, broad use of remote sensing from near-operational satellites (for example, AVHRR for observations of SST and mesoscale dynamics; OCTS, MOS, SeaWIFS for observations of the surface concentration of phytoplankton and primary production; NSCAT for the observation of surface win; TOPEX/POSEIDON and ERS altimetry for the observation of sea surface elevation and the surface geostrophic currents) and assimilation of satellite observations at OGCM and BGCM for space-time interpolation and extrapolation to the depth. *In situ* observations should be used for controlling the deep-sea processes, air-sea interaction in the basin, for the development of regional algorithms of satellite data processing, validation of remote sensing and model extrapolation products.

Three types of *in situ* observations are considered: coastal observations, repeated observations of the coastal zone from small ships and repeated observations of the open sea from ships-of-opportunity and episodic scientific cruises. Aside from traditional hydrometeorological observations, a special set of chemical and biological observations is planned for the coastal zone together with pollution observations. The observations at coastal stations and along the coastal zone are carried out in few critical regions with the goal to precise and broaden remote observations. The experimental launch of surface free-floating buoys is considered as a base for further use, as a part of the observing system. Analyses of trends based on archive data is an essential part of the programme which should permit to match the data collected in the past with new observations.

The Ukrainian National programme "Global Observing System of the Black Sea" consists in six projects:

1. **"Prediction"** (System of observation of long-term variations of the marine environment induced by anthropogenic and natural causes. Leading oceanographic center: the Marine Hydrophysical Institute of the National Academy of Sciences of Ukraine).

2. **"Coastal zone"** (System of observation of variability of the marine environment in the coastal zone. Leading oceanographic center: Marine Hydrophysical Institute of the National Academy of Sciences of Ukraine).

3. **"Biota"** (System of observation and assessment of the Black Sea living resources. Leading oceanographic center: Institute of Biology of the Southern Seas, National Academy of Sciences of Ukraine).

4. **"Health of the sea"** (System of estimation, diagnosis and prognosis of the health of the sea. Leading oceanographic center: Ukrainian Science and Technology Center of Marine Ecology of the Ministry of Natural Environment and Nuclear Safety).

5. **"Control"** (Integrated system of operational collection and distribution of data about the state of marine environment and overlying atmosphere. Leading oceanographic center: Marine Hydro physical Institute of the National Academy of Sciences of Ukraine).

6. **"Design"** (Design and support of oceanographic equipment for coastal and marine observations and meteorological complexes. Leading oceanographic center: Marine Hydrophysical Institute of the National Academy of Sciences of Ukraine).

The first and the second projects concern observations related to the state of the deep-sea area and coastal zone correspondingly. The third and fourth projects have a thematic direction dealing with living resources and pollution. The sixth and the seventh represent information problems, design, support and meteorological service of the oceanographic equipment.

The Marine Branch of the Ukrainian Research Institute of the State Committee of Hydrometeorology, and the Southern Research Institute of Fisheries and Oceanography of the State Committee of Fisheries are also among the basic participants of the programme.

The following works have been carried out in the framework of the programme during 1997-99:

- Estimations of trends of different fields, using the archive data;
- Collection and storage of satellite remote-sensing data for the region;
- Design of equipment for systematic measurements on coastal stations and ships-of-opportunity;
- Field observations in the open sea, using ships-of-opportunity and scientific cruises;
- Multidisciplinary observations in the coastal zone of Ukraine;
- Improvement of OGCM and methods of assimilation of observations for the nowcast and hindcast of three-dimensional circulation in the basin;
- Improvement of BGCM for the northwestern shelf of the Black Sea.

The Ministry of Sciences and Technology of Ukraine mostly fund the programme, but the National Academy of Sciences of Ukraine, the State Committee of Hydrometeorology of Ukraine, the State Committee of Fisheries of Ukraine and the Ministry of Natural Environment and Nuclear Safety also supported an essential part of the investigations. The total funding of the programme is estimated in US$400K in 1997-99.

L. THE SCIENTIFIC AND TECHNICAL RESEARCH COUNCIL OF TURKEY

(presented by Prof. Dr. A. Cemal Saydam, Scientific and Technical Research Council of Turkey)

The Scientific and Technical Research Council of Turkey is responsible for the implementation of the scientific research in Turkey. These activities are carried out through eight research grant groups on "Earth, Marine, Atmospherical Sciences and Environmental Researches Grant Group". As the name implies, my group is in charge of co-ordinating the marine-related research activities. The Marine Research Programme encompassing the years 1997-2001 has regulated these activities. Oceanographic investigations in the Black Sea are mainly carried out by the Institute of Marine Sciences of the Middle-East Technical University; the Institute of Marine Sciences and Management of the University of Istanbul; and by the Institute of Marine Sciences and Technology/Izmir of the Nine September University, as well as by various NGOs.

TUBITAK is also responsible to establish scientific co-operation or take part in the activities of various international organizations, programmes, etc.

In line with this objective, we are looking forward to be part of the EURO-GOOS programme and Black Sea GOOS activities. However, this time, we are looking for a bottom-up approach rather than *vice versa*. Therefore, we are eagerly encouraging our institutions to take part in the activities of EURO-GOOS. We are happy to know that two of our institutions are already running programmes within the framework of BSRC programmes.

M. THE INTERNATIONAL ATOMIC ENERGY AGENCY
(presented by Iolanda Osvath, IAEA Representative)

1. Purpose: To summarize objectives, achievements and plans of the IAEA Black Sea Regional Technical Co-operation Project RER/2/003, highlighting collaboration with IOC's Black Sea activities.

The IAEA Technical Co-operation Programme provides technical assistance to 26 recipient countries in Europe, including all Black Sea riparian countries, in areas like nuclear safety and nuclear energy, human health, environment and human resources development. The RER/2/003 Technical Co-operation Project for "Environmental Assessment in the Black Sea Region", implemented in the period 1995-2000 with a budget of US$1.5 M, assists the Black Sea riparian Member States in developing capabilities for assessment and co-ordinated monitoring of radionuclides in the marine environment and for application of radiotracers in studies of pollution and oceanographic processes in the Black Sea. The project contributes, along with other co-operation programmes in the region, to the completion of an assessment of the status of Black Sea pollution and to the issue of recommendations for future activities related to marine protection.

The RER/2/003 Project has a strong capacity building component, in support of national programmes, including provision of equipment, training and visits of experts. The main objectives of the project include a methodological harmonization amongst participating laboratories and improvement of data quality. Radiometric and sampling equipment and laboratory supplies (total cost US$0.9 M.) have been provided, and two training courses, a workshop, five fellowships and scientific visits and four planning and co-ordination meetings have been implemented in 1995-1998. Six main institutes, one in each of the Black Sea countries, and thirteen involved institutes participated in the project. Several of these are also taking part in the IOC Black Sea programmes, in EC´s EROS 21or in the GEF Black Sea Environmental Programme. Thus, capabilities developed by these complementary programmes in the region have been on several occasions used to common benefit.

1998, UN's International Year of the Ocean, was marked by two major RER/2/003 project activities:

(i) Ministerial Meeting of Black Sea countries. A Declaration was signed defining the framework for a sustainable implementation of RER/2/003 and for the project's effective contribution to the Black Sea rehabilitation and protection.°

(ii) Cruise to the western Black Sea (2 weeks, 31 participants). The objectives included proficiency tests and collection of samples of sediment, water and biota for radioactivity assessment, radiotracer studies and intercomparison materials. Methodologies for sample collection and processing were demonstrated, compared and discussed.

IOC was represented in both these activities. One member of the IOC Secretariat attended the Ministerial Meeting. Three scientists proposed by IOC/BSRC participated in the cruise. The support of Cpt.Yüce of the BSRC for carrying out scientific work in the Turkish EZ during the cruise is gratefully acknowledged.

The 1999-2001 RER/2/003 project highlights:

(i) Enhancing analytical data quality by training (Advanced Training Course on Quality Management in Environmental Applications of Nuclear Analytical Techniques, fellowships), QA/QC and technical missions to laboratories.

(ii) Issuing methodological guidelines.

(iii) Publishing co-ordinated monitoring and assessment reports, including the 1999 IAEA Western Black Sea cruise report.

(iv) Organizing a cruise to the Eastern Black Sea (summer 2000).

(v) Developing project database.

The continued exchange of information and joint participation of scientists involved in IAEA and IOC Black Sea programmes in activities of common interest is highly desirable for an optimal use of resources. In this context, IOC was invited at the latest RER/2/003 Planning and Co-ordination Meeting to propose 2-3 participants in the RER/2/003 cruise planned for the year 2000. IOC kindly extended an invitation to two RER/2/003 participants to join its Black Sea cruise in the Russian EZ in 1999, in case this cruise would be carried out. Four of the RER/2/003 participating institutes expressed interest in this cruise. When more detailed information on the cruise will be made available, it will be possible to nominate the RER/2/003 participants.

The IOC/BSRC proposal to hold a joint IOC-IAEA seminar to discuss the results from recent cruises is welcome. We should aim to define the details and submit the proposal to IAEA and IOC for consideration of its inclusion in the programme of activities for the year 2000 of RER/2/003 and BSRC respectively.

During the Nineteenth Session of the IOC Assembly, IAEA was invited to consider a co-operation with the IOC/BSRC in the "Black Sea GOOS" (PP-1 programme). To achieve this, an obvious mechanism would be including radionuclide analyses in the observation programme for some of the profiles, with an adequate frequency. The common participants in IOC and IAEA programmes have the capabilities required to carry out these analyses if needed. The selection of sites and sampling frequency can be made following consultation between the IOC PP-1 Co-ordinator and the RER/2/003 Technical Officer, based on discussions with participants.

To conclude, the IOC-IAEA agreement to collaborate in the Black Sea activities was already successfully implemented for a training course and a cruise, and may continue with the planned 1999-2000 cruises and the GOOS.

ANNEX VII

DRAFT RESOLUTION TO BE SUBMITTED TO THE IOC ASSEMBLY

Black Sea Regional Committee
(IOC - BSRC)

The Intergovernmental Oceanographic Commission,

Recalling Resolution IOC-XVIII-17,

Recalling also Resolution EC-XXIX-7,

Noting the Summary Report of the Second Session of the IOC Black Sea Regional Committee, held in Istanbul, Turkey, 5-6 May 1999,

Noting with satisfaction that the IOC Black Sea Regional Committee has established an effective organization and co-ordination in implementation of the Black Sea Regional Programme with the approved pilot projects "Black Sea GOOS" and "Black Sea Fluxes",

Emphasizing the new ecological problems of Black Sea, such as: progressive height of the marine transport of oil and gas; social and economic changes in the regional countries specially in the coastal areas; building of new terminals and work of the oil and gas platforms in the coastal zone,

Adopts the Summary Report, approves the Recommendations of the 2nd Session of the IOC Black Sea Regional Committee and notes the work plan for I999-2000;

Decides to approve the terms of references of the IOC/BSRC and of the Chairman and Executive Secretary of the BSRC, proposed by the Second Session of the Regional Committee;

Invites the regional countries to mobilize the national resources for the implementation of the approved pilot projects "Black Sea GOOS" and "Black Sea fluxes";

Urges the Executive Secretary to consider possibilities to strengthen co-operation with the IOC/BSRC including with financial and technical support of it activities;

Invites EU, NATO, GEF, WMO, IAEA to support the BSRC.

Activities particularly in the framework of the BSRC programme,

Financial implication for the IOC: US$ .....

ANNEX VIII

SCIENTIFIC AND IMPLEMENTATION PLAN FOR THE" BLACK SEA GOOS"

1. *How to consider the scientific and implementation approach to the "Black Sea GOOS"?*

Following the GOOS main documents of IOC, *Towards Operational Oceanography: The Global Ocean Observing System (GOOS)* (IOC/INF-1028) and *Strategic Plan and Principles for the Global Ocean Observing System (GOOS)* (GOOS Report No.41, IOC/INF-1091), it is recommended to consider the following aspects:

- Concept of the "Black Sea GOOS";
- Objectives of the "Black Sea GOOS";
- What is essential in the "Black Sea GOOS" observations;
- "Black Sea GOOS" modules;
- Assessment of the Black Sea users' needs and requirements for data and products;
- Scientific plan;
- Implementation plan;
- Resources for the "Black Sea GOOS" activities.

Concept of the "Black Sea GOOS"

The "Black Sea GOOS" aims at developing an evolving permanent system able to acquire, integrate and distribute oceanic observations and data, and to generate analyses, forecasts and other useful products to provide information for decision-makers at governmental level, as well as for industry, science and general public to deal with marine related issues, including the effects of the global climate change on the Black Sea region.

Main goals:

(i) To serve the marine data and information needs of the Black Sea community for the efficient, safe, rational and responsible use and protection of the marine environment, as well as for climate prediction and coastal management, especially in matters requiring information beyond those likely to be efficiently provided by individual national observation systems of every Black Sea country;

(ii) To establish a reliable infrastructure for an international system to provide the required co-ordination and sharing of data and products in the Black Sea area;

(iii) To consolidate the scientific researchers in the region in order to solve together the most crucial problems of the Black Sea environment.

Main objectives:

(i) To specify in terms of space, time, quality and other relevant factors, the marine observational data needed on a continuing basis to meet the common and identifiable requirements of the Black Sea community of users;

(ii) To develop and implement an internationally co-ordinated strategy for gathering or acquiring and archiving these data and synthesizing them for common use and practical applications;

(iii) To facilitate the development of uses and products of these data, and encourage and widen their application in the sustainable use and protection of the Black Sea marine environment.

2. *What should be essential in the "Black Sea GOOS" observation?*

In conformity with GOOS principles, the "Black Sea GOOS" observations should be:

- **on a long-term** basis, i.e. measurements when started, should be continued in the indefinite future (continuity in the observed quantity is to be sought rather than the method, as it is anticipated that more effective methods may become available in the future);

- **systematic**, i.e. measurements should be made in a rational way, with spatial and temporal sampling as well as the precision and accuracy tuned up to address specific aspects of GOOS;

- **relevant to the overall objectives**, i.e. measurements should be made in view of the end products required;

- **cost-effective**, i.e. efforts should be made to maximize the return to available resources (financial and manpower) by applying economic and efficient obervational methods;

- **routine**, i.e. the observations should be considered as an operational responsibility, with the acquisition, quality control, and dissemination of products to be carried out with regularity.

The design of the "Black Sea GOOS" and the use of GOOS data, need to be closely linked with the recent and continuing advances in numerical modeling of the ocean and coupled ocean-atmosphere system. The "Black Sea GOOS" could utilize remote sensing of the marine environment from satellites (some satellite observations are already available in all National Meteorological centers in the area) and *in situ* measurements using ship-borne observations, towed and anchored instrument systems, drifting buoys and sub-surface floats in case the above mentioned principles are implemented.

Much of the data collected for local, national or regional interests will not form part of GOOS. Data will be acceptable for GOOS if they adhere to the GOOS data policy and standards, are long-term, systematic, and relevant to the overall objectives. Using the experience of EuroGOOS, it is possible to establish a list of the most frequently required key variables observed in the European seas and oceans:

- Chlorophyll,
- Currents,
- Salinity,
- Temperature, sea surface,
- Humidity,
- Cloudiness,
- Precipitations,
- Wind stress,
- Rivers runoff,
- Sun photometer optical depth measurements,
- Bathymetry,
- Evaporation,
- Oxygen,
- H_2S,
- Phytoplankton,
- Sea ice,
- Temperature profiles.

To select the most representative parameters of the Black Sea, we should investigate the determining characteristics identifying the Black Sea region.

The Black Sea is a semi-enclosed ocean basin where the vertical stratification is dominated by: salinity and the cold intermediate layer; positive water balance; very small exchange with the Mediterranean Sea; high freshwater input from large rivers; a net balance between precipitation and

evaporation; frequent winter storms; minimal tide; oceanic-type thermohaline circulation; severe ecosystem degradation and local eutrophication.

3. Black Sea GOOS modules:

- Climate monitoring, assessment and prediction (the *Climate Module*);
- Monitoring and assessment of marine living resources (the *Living Marine Resources Module)*;
- Monitoring and prediction of the coastal marine environment (the *Coastal Module*);
- Assessment and prediction of the health of the ocean (the *Health of the Ocean Module)*;
- Marine meteorological and oceanographic operational services (the *Ocean Services Module*).

These modules are necessarily interrelated and intersecting, and they will share observations, data networks and facilities as needed, within one integrated system. The first four modules have to meet the scientific and technical requirements of definable subset of users, and a fifth module is concerned with the development of products and services.

Climate Module - The objectives of this module are:

- To monitor, describe and understand the physical and bio-geochemical processes which determine the Black Sea circulation and the climate change in the region;

- To provide the observations needed for the prediction of climate variability and climate change.

Marine Living Resources Module - The objective of this module is to develop a system to monitor marine ecosystems and the biological, chemical and physical parameters controlling their variability. The plans for the Black Sea should include specifications and determine the framework for an adequate package of observations and research to understand and forecast major change and variability over time scale of seasons to decades.

Coastal Module - This module must take into account the needs of a wider range of users, for instance the communities involved in coastal management, environmental protection, ports and shipping. Monitoring, documentation and forecasting change in this environment will require integration of physical, chemical, biological and geological observations, and consideration of socio-economic requirements.

Health of the Ocean (HOTO) Module - The primary objective of this module is to provide information on the nature and extent of adverse effects, including increased risks for human health, marine resources, natural change and ocean health. The Black Sea data collection, bio-monitoring, and biological effects assessment should be carried out using commonly agreed standards and methodologies, emphasizing:

- Development of a set of reliable, relatively easily applicable biological distress indicators of the health of the environment;
- Monitoring concentrations and trends of contaminant loading in coastal regions in relation to ecological responses;
- Development methodologies for evaluating the capacities of assimilation of coastal regions regarding contaminant loads.

Service Module - The aim of GOOS is to capture and process information about the ocean and convert it into products required by a wide range of end users. In some Black Sea countries (Bulgaria, Ukraine), this activity is already being carried out by the National Meteorological Services who provide a large range of marine meteorological and oceanographic services in support of shipping, fisheries, coastal zone management, tourism and recreation, and improving the safety of life at sea. The intention should be to increase the number and value of services and products available to end-users.

Modules will not be implemented uniformly or in parallel, and implementation will depend to a great extent on needs as they become identified, not necessarily according to the module. For example, the physical data associated with coastal observations may become linked with physical observations within the Climate Module.

4. Assessment of the Black Sea users´ needs and requirements for data and products

The assessment of the Black Sea users´ needs and requirements for data and products should be achieved by a step-by-step "GOOS marketing" strategy. The successful assessment needs very strong interactions between oceanographers and end-users as the end users are not aware what could be the real benefit of GOOS and the oceanographers are not familiar with end-users' needs.

It is important to demonstrate the eventual effectiveness of the Black Sea GOOS as soon as possible. GOOS data products should be generated, developed and integrated, beginning with GOOS operational demonstrations which are urgently needed. Early products could be primarily based on single variables or types of observations, such as wave conditions, sea-surface temperature, sea ice or depth of the termocline. More sophisticated products will be based on the synthesis of several variables. Such a flow of products will demonstrate in every country of the Black Sea area early and continuing economic and social benefits, so that applications and interpretations can be made for local and national planning and decision-making purposes.

The first step of the assessment of users´ needs could be the identification of already provided services in the Black Sea region or the more often provided services in developed oceanographic countries, i.e. winds and waves forecasts for marine transport, ports, etc.; bulletins with environmental and meteorological data for tourist resorts; specialized forecasts for the oil platforms; storm warnings for all marine industries, etc; and to provide operative creation and distribution of these products to the end-users in the Black Sea countries. After six or eight months, a public demonstration with discussions should be organized in every Black Sea country to show to decision-makers dealing with marine dependent activities and to the general public what are and what could be the Black Sea GOOS benefits. The discussion has to become the base for the next step of the user´ needs assessment.

The second and every next step will depend on the successful results and discussions during demonstration of the previous one. Figure 1 shows the Black Sea GOOS concept and strategy.

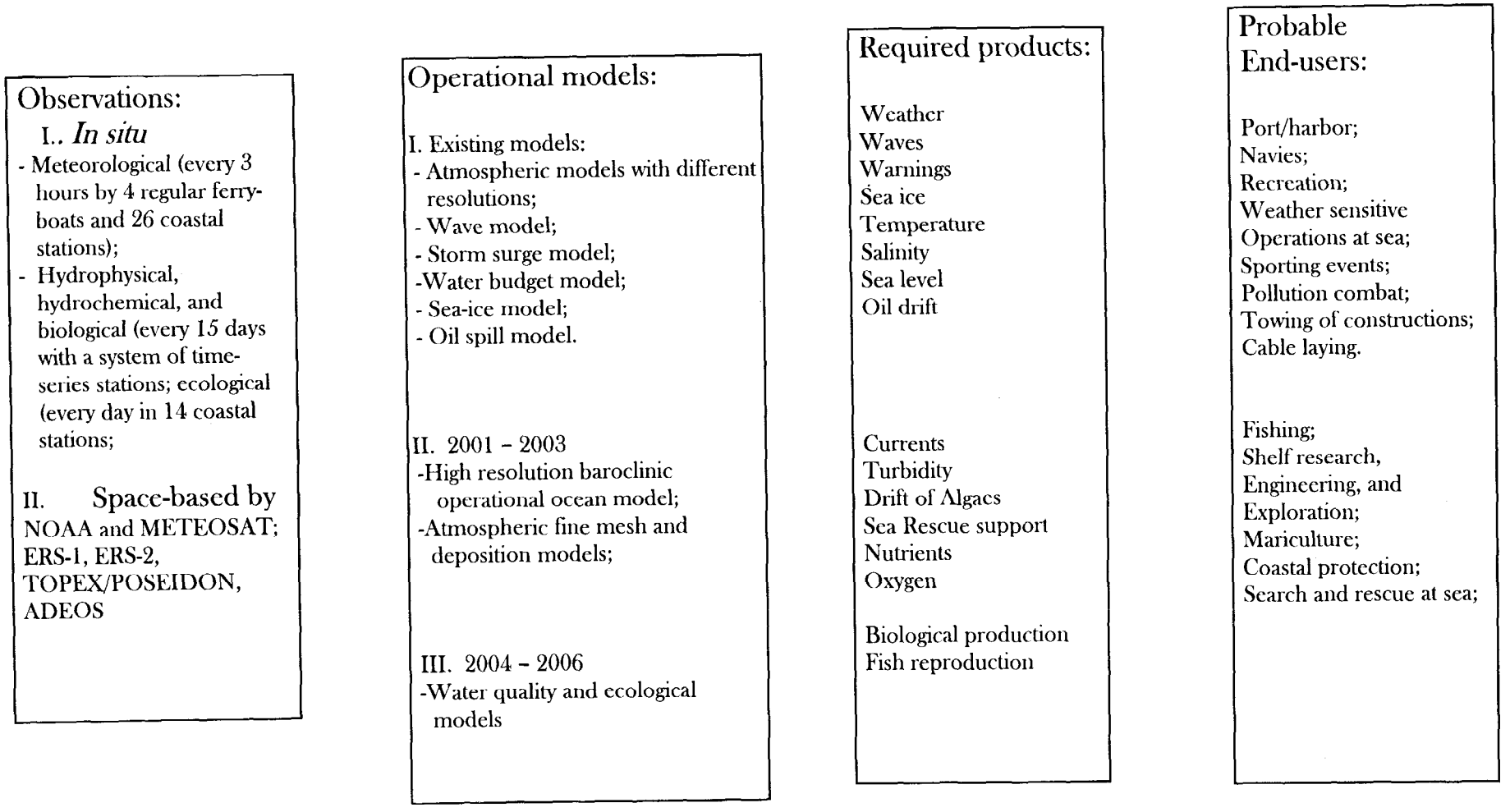


Fig.1. Information flow in Black Sea GOOS

Black Sea GOOS modules	Necessary GOOS scientific activities
Climate module	- Climate regional studies and seasonal forecasts; - Assessment and prediction of climate variability and climate change and its influence upon the physical and bio-geo-chemical processes inn the sea; - General Black Sea circulation studies and creation of high resolution oceanographic models.
Living Marine Resources Module	- Development of a system to monitor marine ecosystems and the biological, chemical and physical parameters controlling their variability. - Research to understand and forecast major change and time variability.
Coastal Module	- Description of atmospheric and marine water conditions for coastal management; - Environmental protection; - Monitoring and forecasting the expected changes in the coastal environment;
Health of the Ocean Module	- Development of a set of reliable, relatively easily applicable biological distress indicators of the health of the environment; - Monitoring concentrations and trends of contaminant loading in coastal regions in relation to ecological responses; - Developing methodologies for evaluating assimilative capacities of coastal regions for contaminant loads
Ocean Services Module	Development of a large range of marine meteorological and oceanographic models for the provision of services in support of shipping, fisheries, coastal zone management, tourism and recreation, and improving the safety of life at sea: 1,2 and 3 dimensional ocean models; high resolution baroclinic operational ocean model; atmospheric fine mesh and deposition models; water quality and ecological models.

5. *Scientific Plan*

The Black Sea GOOS Scientific Plan should help the oceanographers not only to convert the regular operational Black Sea observations required by end-users data and products but also to find out the most efficient new services and products to save the Black Sea environment. The scientists should answer the question for what useful product (forecast, warning bulletin, regular report to the governments, etc.) they are able to propose preliminary research, analysis, modeling and technology. Table 1 shows the main scientific tasks of the Black Sea GOOS modules.

6. Implementation Plan

From the outset, the implementation of GOOS must be recognized as a long-term undertaking. While some parts can be activated immediately, others may take decades. A guiding principle of the design of GOOS is that it will follow the "end-to-end concept", meaning that there will be a known or definable pathway of connection between each initial measurement and the end uses to which it (or information derived from it) is applied.

The implementation of the Black Sea GOOS should be an evolutionary process; as greater understanding and technological capability is achieved, this knowledge will be applied to continuously redefine the path of implementation.

The Black Sea GOOS should be implemented by steps, and each step should include the following phases:

Phase 1: *Planning and Design.*

The planning system is a basic principle of GOOS. Observations, data management, modeling and product creation should be planned if possible with similar technologies in all the Black Sea countries. The actual experience in marine services of the hydrometeorological services of Bulgaria and Ukraine and the Black Sea Emergency Centre could be a good basis of planning. It will be highly appreciated if the end-users are specified for every proposed product. Table 2 shows the possible implementation plan for the Black Sea GOOS - Phase 1, the purpose of which is the creation of an infrastructure for the Black Sea GOOS. This infrastructure includes all kind of regular observations, information technology for telecommunications and data management, as well as technologies for data processing and creation of real products for the end-users. The proposed duration of Phase I is three years, although there are already many existing paths between measurement and uses.

Table 2. Implementation Plan of Phase 1

Phase	Activities	Duration	Expected Results
Phase 1		3 years 2000-2002	Creation of the infrastructure of the Black Sea GOOS
1.1.	Creation of the Black sea operational observing network	18 months	1. Regular observations along 4 routes in open sea including the sea temperature and salinity and atmospheric element; 2. Developed marine observations in coastal marine observing stations; 3. Observations by regular time-series stations; 4. Small vessels observations in the coastal zone.
1.2.	Creation of the operational oceanographic information system (Intranet) for the Black Sea region	24 months	1. Real-time telecommunications between operational observing stations and processing centres and agencies; 2. Access of most important end-users to up-to-date operational oceanographic services.
1.3.	Study, research and creation of the most appropriate operational models	36 months	Forecast and prediction concerning weather, waves, warnings, sea ice, tempera-ture, salinity, sea level, oil drift available and distributed.
1.4.	Capacity Building Workshop and Demonstration Activities		

Phase 2: *Operational Demonstrations and Pilot Projects*

Pilot projects and demonstrations are an important development stage of every step:

- to test how the Black Sea GOOS will work as a comprehensive and integrated system of data collection and exchange through modeling and product delivery, and
- to give impetus to key technology areas such as instrumentation, sensors, or communication, model development or data assimilation. Pilot projects are very essential to convince the authorities that GOOS is a worthwhile investment.

Phase 3: *Immediate Implementation Using Existing Systems.*

- Many activities capable to become part of GOOS are already operational at present in the Black Sea area through national observing systems, international organizations and bodies, or through large-scale scientific programmes. These components need to be effectively used to implement Black Sea GOOS. The following actions are therefore required:

- Combine and enhance observations already being made routinely, such as surface meteorology and nutrients, sea-level, sea-surface temperature, etc. and jointly address their incorporation within a common plan;

- Identify existing ocean observing activities **relevant to Black Sea GOOS** that are or will be of

limited duration and/or geographical extent, and develop and promote strategies to encourage their continuation;

- Develop the most appropriate numerical models. Meteorological forcing is required for operational ocean models. Operational weather prediction models would be a key source for assimilation of atmospheric and surface marine data. Research is needed for the selection of the most appropriate global scale model needed to provide boundary conditions for prediction at the local level in the Black Sea area. Additional researches are necessary for the assimilation of data in models, in order to make accurate forecasts feasible.

- Taking into account that the access to data, information and products is the lifeblood of GOOS, it is very important to establish the most appropriate data management with up-to-date distribution technologies;

- Secure appropriate Black Sea GOOS infrastructure for data distribution and delivery. It is advisable to distribute data and products by the most appropriate communication media, such as special communication lines, the WMO Global Telecommunication System (GTS), Internet servers, CD-ROMs and printed reports. With some external sponsorship, maybe we could create an Intranet of the Black Sea oceanographic community, as main infrastructure of the Black Sea GOOS;

- In parallel, to devote efforts to the generation of computational and interpretation tools, the implementation of appropriate training, the provision of basic infrastructure (PCs, application software, creation of Web servers, models) to broaden the hands-on usage of Black Sea GOOS data and products;

- Encourage the production of GOOS "demonstration" end-products of relevance to identified target user communities (e.g. shipping, oil production, fishing, coastal protection).

It will be desirable to pay direct attention in early stages on observations which could: be quickly and easily implemented; obtain the participation of many countries; and be converted into products of immediate application.

It is recommended that all oceanographic institutions in the region investigate their possibility to contribute in Black Sea GOOS by proposing their visions of possible pathways between measurement and uses. Table 3 shows the readiness of the Black Sea countries to implement GOOS modules.

Table 3. Existing Systems for immediate implementation of the GOOS Module

Country	Observations	Products	Frequency of delivering	End Users
1. BULGARIA				
1.1. NIMH	Coastal meteorological stations	1.Warnings	If necessary	Ports Varna and Bourgas;
	Ferries: Varna-Poti; Bourgas-Poti; Varna-Ilitchovsk	2. Forecasts - Weather; - Wind; - Wind waves;	6 hours " " "	Navtex; Oil platforms; Resorts: Albena; Elenite; Slantchev briag
	METEOSAT and NOAA	- Storm surges; - Oil drift; - UV radiation;	If necessary " "	
		3. Forecasts - Algae bloom;	Every week in spring and summer	Ministry of environment; Tourist resorts
1.2. IO	Small Vessel Observations	-Beach dynamic;	Seasonal	Tourist resorts
		-Biological resources;	Seasonal	Fishing industry
2. GEORGIA				
3. ROMANIA				
4. RUSSIA				
5. TURKEY				
6. UKRAINE 6.1. State Hydrometeo. Committee	Coastal meteorological station; Voluntary ships; METEOSAT and NOAA satellites; Radar	1.Warnings 2. Forecasts - Weather; - Wind; - Wind waves - Storm surges; - Ice;	If necessary 6 hours If necessary. Everyday in winter	Ports; Navy; Military navy; Ferryboats; Oil Terminals; Fishing

7. Resources for the Black Sea GOOS

The design, implementation and management of GOOS will require a long-term commitment of substantial resources. Black Sea GOOS should be mainly carried out and funded by nations. Some activities will be supported by state national meteorological and oceanographic institutions, the others (as Demonstration Workshops or Training Courses) by international organizations, such as IOC or WMO, where nations participate with their contributions. Industries or the Navy could also provide their sponsorship by capturing and transmitting some kind of data or in quality of donors of specialized Black Sea GOOS projects. Research and development of the most appropriate technologies could be realized as for the scientific projects of EU or NATO.

ANNEX IX

WORK PLAN OF THE BLACK SEA GOOS PROJECT FOR 1999-2001

1. Establishment of three "end-to-end" working groups on:

   - Operational marine services (October 1999);
   - Up-to-date forecast and prediction models for the sea-atmospheric circulation (January 2000)
   - Water quality and ecological models (April 2000).

2. Establishment of regular XBT and BATOS measurements on ferryboats and ships-of-opportunity (two -three sections) (beginning 2000).

3. Establishment of small vessels observations in the coastal zone (every three months) (beginning 2000).

4. Design of infrastructure for information technology and experimental implementation of the operational data exchange and management in the region (Summer 2000);

5. Pilot project of the Black Sea circulation forecast in quasi-operational mode based on assimilation of remote sensing data and results of atmospheric model prediction (December 2000);

6. Organization of the Black Sea GOOS Web pages and edition of the Black Sea GOOS information bulletin with presentation of products and services, with special attention on the results of the Black Sea GOOS activities (December 2000);

7. Preparation of demonstration activities of the Black Sea GOOS main projects, at national and international levels (June 2000);

8. Organization of capacity building activities and demonstrative Workshop with participation of the main marine end-users (September 2000).

ANNEX X

PROGRAMME AND BUDGET ESTIMATION FOR PILOT PROJECT 2 (1999-2001)
"Black Sea Fluxes"

Project	Action	Objective	Date and Place	Funding Required In US$	Participation	Remarks
Pilot Project 2 "Black Sea Fluxes"	Organization of the international expedition on board the Russian R/V *Akvanavt* in the North-East Black Sea (10 days)	To start detail sediment studies on the interfaces of the seawater column and continue the modern and ancient sediment studies and Black Sea contamination history.	August 1999	15,000	All riparian countries	
	Participation in the IAEA international expedition in the East Black Sea	To make co-operative studies of geochronology of recent sediments	Summer 2000		2-3 participants of PP2	
	International Symposium "Sediment, Radionuclides in the Black Sea" (joint IOC-IAEA)	To present and discuss the results of the IOC and IAEA cruises	September 2000, Varna	15,000	All riparian countries	
	Publication of the collection of scientific papers on the results of studies during 1996-2000	To present the results for the World Community and to exchange the data	June 2001	5,000	All riparian countries	
	Expedition in the river mouths of the North-West Black Sea	Seasonal variation of sediment and pollutant supply	1999		Ukraine	
	Stationary observations of suspended matters in aerosols on the oceanographic platform near the Crimea coast	Seasonal and multiannual variation of sediments in aerosols; sediment fluxes in water column	1999-2000 Kaciveli Crimea		Ukraine	

PROGRAMME AND BUDGET ESTIMATION FOR PILOT PROJECT 2 (1999-2001)
"Black Sea Fluxes"
(contd.)

Project	Action	Objective	Date and Place	Funding Required	Participation	Remarks
	Stationary observations of river solid load and pollutants supply from the catchment area	seasonal and multiannual variations	1999-2000		All riparian countries	
	National data base building for assessments - Sediment supply from the catchment area; - Sediment supply in aerosols; - Sediment fluxes in the water column; - Modern and ancient sediment fluxes of the sea floor; - Sedimentation and pollution history.	For sediment budget assessment and data exchange	1999-2000		All riparian countries	
	Organization of the network of simultaneous studies of modern sediment fluxes in the Black Sea by sediment traps	For exact budget assessment of modern sediment fluxes	1999-2000		Russia, Turkey	

ANNEX XI

WORK PLAN OF THE BSRC FOR 1999-2001

1. Support in organizing the International Conference "Oceanography of the Eastern Mediterranean and Black Sea", held in Athens, 23-26 February 1999.

2. Second Session of the Black Sea Regional Committee, held in Istanbul, 4-7 May 1999. Approval of the Scientific and Implementation Plans for Pilot Projects N° 1 and N° 2 for 1999-2000.

3. Recognizing the possibility to propose a common project regarding the implementation of the Black Sea Regional Programme, to be supported by EU, in the framework of the fifth programme (4 October 1999).

4. Report of activity of the BSRC in 1997-99, and draft resolution regarding the implementation of the scientific plans for PP-1 and PP-2 for 1999-2000, to be presented at the Twentieth Session of the IOC Assembly (29 June - July 1999).

5. Support for the implementation of the scientific plans PP-1 and PP-2.

6. Establish and develop co-operation between the "Black Sea GOOS" project of IOC and "Black Sea ecosystem processes, prediction and operational data management" supported by NATO.

7. Regular contacts and co-operation with the IAEA programme for the Black Sea. Common facilities to prepare and organize:

   (i) A scientific seminar and workshop to discuss the results of the cruise investigations in 1998 on board R/V *Prof.Vodyanitski*, H/V *Adm. Ormanov* and R/V *Akvanavt* (September 2000). Proposed topic of the seminar: "Sediment fluxes, radionuclides in the Black Sea";

   (ii) An international expedition in the eastern part of the Black Sea (with common programme 2000).

8. Co-operation with the International Ocean Institute (IOI) in Malta and its Black Sea Operational Centre (BSOC) in Constza (Romania), to organize a leadership seminar: "Using today's scientific knowledge in the Black Sea Areas of Development Tomorrow" (Mangalia, Romania, 21-23 September 1999).

9. Co-operation with the "GEF-Black Sea" programme.

10. Initiative to prepare a proposal to organize in 2001 the Second International Conference: "Oceanography of the Eastern Mediterranean and Black Sea", supported by IOC and EU.

11. Co-operation between "Black Sea-GOOS" and "EuroGOOS" and "Black Sea GLOSS" (BSGLOS)" as part of "MedGLOSS".

12. Meetings of the BSRC officers during the IOC Assembly (June-July 1999) and the Executive Council session (~2000).

ANNEX XII

STRUCTURE AND RESPONSIBILITIES OF THE BLACK SEA REGIONAL COMMITTEE (BSRC) - TERMS OF REFERENCE

BSRC is an intergovernmental subsidiary body composed of National Co-ordinators designated by the IOC Member States, responsible for the co-ordination and supervision of the scientific and service activities of the Commission at the regional level.

BSRC is expected to take decisions and act when necessary to give effect to the Commission's policy decisions, within its Terms of Reference and allocated budget. BSRC makes recommendations to the Governing Bodies of the Commission on policy matters within its Terms of Reference, and on future actions required.

1. The IOC Black Sea Regional Committee shall promote, develop and co-ordinate the joint regional marine sciences and services programme, identify the requirements for resources, prepare the overview budgets and report to Governments and the IOC Assembly. Its work should be focalized as appropriate on IOC programmes.

2. The IOC Black Sea Regional Committee shall plan and co-ordinate the marine sciences and services activities of the IOC Black Sea Regional Programme, taking into account the relevant provisions of the Convention for Protection of the Black Sea against the Pollution, the Black Sea Fisheries Convention, and international programmes carried out by international institutions and organizations (UNESCO, UNEP, WMO, WHO, IMO, IAEA, FAO, UNDP, the World Bank, PHARE, the European Union, etc.), so as to avoid overlap and duplication of efforts and ensure co-ordination with other relevant activities.

3. The IOC Black Sea Regional Committee shall establish close connection with all existing relevant regional programmes, so as to avoid duplications and also maintain a link between science and management aspects.

4. The IOC Black Sea Regional Committee shall report on programme implementation, proposals and budget requirements to the IOC Assembly

TERMS OF REFERENCE OF THE BSRC CHAIRMAN

1. The Chairman of the BSRC shall conduct the sessions of the Committee. Extraordinary sessions and meetings of the BSRC shall be convened at the request of the Chairman.

2. Upon his own initiative or, at the request of any regional country, the Chairman may consult the BSRC by correspondence.

3. The Chairman shall represent the BSRC at IOC Executive Council and Assembly.

4. The Chairman makes all necessary arrangements, in co-operation with the Executive Secretary, for the implementation of the decisions of the IOC Executive Council and Assembly sessions.

5. The Chairman shall invite GEF, WMO, IAEA, NATO, EU to consider ways and means to strengthen co-operation with the BSRC.

6. The Chairman shall invite Members States of IOC to participate in the activities of the BSRC.

7. The Chairman shall investigate the possibilities of financial and technical support for the Regional programme from UNESCO-IOC, EU, NATO, IAEA and other international organizations, as well as interested institutes in countries not only located in the Black Sea region.

TERMS OF REFERENCE OF THE BSRC VICE-CHAIRMAN

1. To provide assistance to the Chairman and the Executive Secretary when required.

2. To assess the implementation of IOC Programmes in the region and provide guidance and recommendation.

3. To carry out scientific evaluation and co-ordination of the on-going project of the Black Sea Regional Programme.

4. To chair the BSRC when required.

TERMS OF REFERENCE OF THE EXECUTIVE SECRETARY OF THE BSRC

1. The Executive Secretary shall co-ordinate with the Chairman of the Committee for implementing the tasks and work plan of the Regional Committee.

2. The Executive Secretary shall endorse, by co-ordination with the national co-ordinator, the implementation of the BSRP projects.

3. The Executive Secretary shall investigate and propose initiatives for the Regional Committee to develop contacts and co-operation with other on-going programmes in the region.

4. The Executive Secretary shall prepare a report on the past activities, implementation of the work plan and other documents for the BSRC meetings. He shall report also to the IOC Assembly on the results of the BSRC activities and make a proposal regarding the financial implication for the next biennium.

5. The Executive Secretary shall establish close connection with all relevant regional programmes and appropriate bodies.

Co-ordinators

1. The national co-ordinators are members of the BSRC. They shall organize in their own countries the implementation of the BSRC work plan and other activities.

2. The international project co-ordinators are members of the BSRC. They shall co-ordinate with the assistance of the national project co-ordinators, the establishment and implementation of the proposed scientific plans. They shall develop contacts and co-operation within the framework of the BSRC projects with the other on-going regional projects.

In this Series | *Languages*

Reports of Governing and Major Subsidiary Bodies, which was initiated at the beginning of 1984, the reports of the following meetings have already been issued:

1.	Eleventh Session of the Working Committee on international Oceanographic Data Exchange	E, F, S, R
2.	Seventeenth Session of the Executive Council	E, F, S, R, Ar
3.	Fourth Session of the Working Committee for Training, Education and Mutual Assistance	E, F, S, R
4.	Fifth Session of the Working Committee for the Global Investigation of Pollution in the Marine Environment	E, F, S, R
5.	First Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions	E, F, S
6.	Third Session of the *ad hoc* Task team to Study the Implications, for the Commission, of the UN Convention on the Law of the Sea and the New Ocean Regime	E, F, S, R
7.	First Session of the Programme Group on Ocean Processes and Climate	E, F, S, R
8.	Eighteenth Session of the Executive Council	E, F, S, R, Ar
9.	Thirteenth Session of the Assembly	E, F, S, R, Ar
10.	Tenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific	
11.	Nineteenth Session of the Executive Council, Paris, 1986	E, F, S, R, Ar
12.	Sixth Session of the IOC Scientific Committee for the Global Investigation of Pollution in the Marine Environment	E, F, S
13.	Twelfth Session of the IOC Working Committee on International Oceanographic Data Exchange	E, F, S, R
14.	Second Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions, Havana, 1986	E, F, S
15.	First Session of the IOC Regional Committee for the Central Eastern Atlantic, Praia, 1987	E, F, S
16.	Second Session of the IOC Programme Group on Ocean Processes and Climate	E, F, S
17.	Twentieth Session of the Executive Council, Paris, 1987	E, F, S, R, Ar
18.	Fourteenth Session of the Assembly, Paris, 1987	E, F, S, R, Ar
19.	Fifth Session of the IOC Regional Committee for the Southern Ocean	E, F, S, R
20.	Eleventh Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Beijing, 1987	E, F, S, R
21.	Second Session of the IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean, Arusha, 1987	E, F
22.	Fourth Session of the IOC Regional Committee for the Western Pacific, Bangkok, 1987	English only
23.	Twenty-first Session of the Executive Council, Paris, 1988	E, F, S, R
24.	Twenty-second Session of the Executive Council, Paris, 1989	E, F, S, R
25.	Fifteenth Session of the Assembly, Paris, 1989	E, F, S, R
26.	Third Session of the IOC Committee on Ocean Processes and Climate, Paris, 1989	E, F, S, R
27.	Twelfth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Novosibirski, 1989	E, F, S, R
28.	Third Session of the Sub-Commission for the Caribbean and Adjacent Regions, Caracas, 1989	E, S
29.	First Session of the IOC Sub-Commission for the Western Pacific, Hangzhou, 1990	English only
30.	Fifth Session of the IOC Regional Committee for the Western Pacific, Hangzhou, 1990	English only
31.	Twenty-third Session of the Executive Council, Paris, 1990	E, F, S, R
32.	Thirteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange, New York, 1990	English only
33.	Seventh Session of the IOC Committee for the Global Investigation of Pollution in the Marine Environment, Paris, 1991	E, F, S, R
34.	Fifth Session of the IOC Committee for Training, Education and Mutual Assistance in Marine Sciences, Paris, 1991	E, F, S, R
35.	Fourth Session of the IOC Committee on Ocean Processes and Climate, Paris, 1991	E, F, S, R
36.	Twenty-fourth Session of the Executive Council, Paris, 1991	E, F, S, R
37.	Sixteenth Session of the Assembly, Paris, 1991	E, F, S, R, Ar
38.	Thirteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Baja California, 1991	E, F, S, R
39.	Second Session of the IOC-WMO Intergovernmental WOCE Panel, Paris, 1992	English only
40.	Twenty-fifth Session of the Executive Council, Paris, 1992	E, F, S, R
41.	Fifth Session of the IOC Committee on Ocean Processes and Climate, Paris, 1992	E, F, S, R
42.	Second Session of the IOC Regional Committee for the Central Eastern Atlantic, Lagos, 1990	E, F
43.	First Session of the Joint IOC-UNEP Intergovernmental Panel for the Global Investigation of Pollution in the Marine Environment, Paris, 1992	E, F, S, R
44.	First Session of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms, Paris, 1992	E, F, S
45.	Fourteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange, Paris, 1992	E, F, S, R
46.	Third Session of the IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean, Vascoas, 1992	E, F
47.	Second Session of the IOC Sub-Commission for the Western Pacific, Bangkok, 1993	English only
48.	Fourth Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions, Veracruz, 1992	E, S
49.	Third Session of the IOC Regional Committee for the Central Eastern Atlantic, Dakar, 1993	E, F
50.	First Session of the IOC Committee for the Global Ocean Observing System, Paris, 1993	E, F, S, R
51.	Twenty-sixth Session of the Executive Council, Paris, 1993	E, F, S, R
52.	Seventeenth Session of the Assembly, Paris, 1993	E, F, S, R
53.	Fourteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Tokyo, 1993	E, F, S, R
54.	Second Session of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms, Paris, 1993	E, F, S
55.	Twenty-seventh Session of the Executive Council, Paris, 1994	E, F, S, R
56.	First Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Melbourne, 1994	E, F, S, R
57.	Eighth Session of the IOC-UNEP-IMO Committee for the Global Investigation of Pollution in the Marine Environment, San José, Costa Rica, 1994	E, F, S
58.	Twenty-eighth Session of the Executive Council, Paris, 1995	E, F, S, R
59.	Eighteenth Session of the Assembly, Paris, 1995	E, F, S, R
60.	Second Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 1995	E, F, S, R

CONTINUED ON INSIDE OF BACK COVER

61.	Third Session of the IOC-WMO Intergovernmental WOCE Panel, Paris, 1995	E only
62.	Fifteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Papetee, 1995	E, F, S, R
63.	Third Session of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms, Paris, 1995	E, F, S
64.	Fifteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange	E, F, S, R
65.	Second Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 1995	English only
66.	Third Session of the IOC Sub-Commission for the Western Pacific	English only
67.	Fifth Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions	E, S
68.	Intergovernmental Meeting on the IOC Black Sea Regional Programme in Marine Sciences and Services	E, R
69.	Fourth Session of the IOC Regional Committee for the Central Eastern Atlantic, Las Palmas, 1995	E, F, S
70.	Twenty-ninth Session of the Executive Council, Paris, 1996	E, F, S, R
71.	Sixth Session for the IOC Regional Committee for the Southern Ocean and the First Southern Ocean Forum, Bremerhaven, 1996	E, F, S, R
72.	IOC Black Sea Regional Committee, First Session, Varna, 1996	E, R
73.	IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean, Fourth Session, Mombasa, 1997	E, F
74.	Nineteenth Session of the Assembly, Paris, 1997	E, F, S, R
75.	Third Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 1997	E, F, S, R
76.	Thirtieth Session of the Executive Council, Paris, 1997	E, F, S, R
77.	Second Session of the IOC Regional Committee for the Central Indian Ocean, Goa, 1996	E only
78.	Sixteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific	E, F, S, R
79.	Thirty-first Session of the Executive Council, Paris, 1998	E, F, S, R
80.	Thirty-second Session of the Executive Council, Paris, 1999	E, F, S, R
81.	Second Session of the IOC Black Sea Regional Committee, Istanbul, 1999	English only