

BLACK SEA DATA MANAGEMENT GUIDE

BLACK SEA DATA MANAGEMENT GUIDE

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariats of UNESCO and IOC concerning the legal status of any country, territory, or its authorities, or concerning the delimitation of the frontiers of any country or territory.

**For bibliographic purposes
this document should be cited as follows:**

Black Sea Data Management Guide
IOC Manuals and Guides No. 43. UNESCO 2002
(Original: English)

Published in 2002
by the United Nations Educational,
Scientific and Cultural Organization

Printed in UNESCO's Workshops
© UNESCO 2002
Printed in France

TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	NATIONAL OCEANOGRAPHIC DATA CENTRES, DESIGNATED NATIONAL AGENCIES, OTHER MARINE CENTRES AND INSTITUTIONS OF THE BLACK SEA REGION COUNTRIES DEALING WITH PROBLEMS OF OCEANOGRAPHIC DATA	1
2.1	NATIONAL OCEANOGRAPHIC DATA CENTRES, DESIGNATED NATIONAL AGENCIES	1
2.2	MARINE CENTRES AND INSTITUTIONS OF BLACK SEA REGION COUNTRIES DEALING WITH PROBLEMS OCEANOGRAPHIC DATA.....	7
3.	CURRENT INTERNATIONAL AND NATIONAL PROJECTS AND PROGRAMS OF THE BLACK SEA REGION COUNTRIES IN FRAMEWORK OF WHICH VARIOUS PROBLEMS CONCERNED OCEANOGRAPHIC AND DATA INFORMATION ARE DEVELOPED.....	8
3.1	MEDAR/MEDATLAS II PROJECT	8
3.2	PROGRAMME "THE BLACK SEA GOOS" OF IOC BLACK SEA REGIONAL COMMITTEE.....	9
3.3	PROJECT "BLACK SEA ECOSYSTEM PROCESSES AND FORECASTING/ OPERATIONAL DATABASE MANAGEMENT SYSTEM" OF NATO SCIENCE FOR PEACE SUB-PROGRAM.....	9
3.4	BLACK SEA INTEGRATED COASTAL AND SHELF ZONE MONITORING AND MODELING (INCOM) PROGRAM, NORTH ATLANTIC TREATY ORGANISATIONS (NATO), COMMITTEE ON THE CHALLENGES OF MODERN SOCIETY. SUBPROGRAM OF INCOM - DATABASE - MANAGEMENT PROGRAM	10
3.5	PROJECT "THE BLACK AND AEGEAN SEAS INTERACTION AND EXCHANGE: AND INTEGRATION OF IN-SITU MEASUREMENTS, SATELLITE DATA AND NUMERICAL MODELLING".....	11
3.6	PROJECT "NITROGEN CYCLING IN THE OXIC/ANOXIC ENVIRONMENT OF THE BLACK SEA: DATA ANALYSIS AND NUMERICAL SIMULATION"	11
3.7	PROJECT "THE DATABASE ON THE BIOLUMINESCENCE FIELD OF THE WORLD OCEAN".....	11

3.8	"UNITED INFORMATION SYSTEM ON THE WORLD OCEAN" SUBPROGRAM OF THE "THE WORLD OCEAN" PROGRAM OF THE RUSSIAN FEDERATION	12
3.9	THE UKRAINE NATIONAL PROJECTS AND PROGRAMS.....	12
4.	PRELIMINARY CATALOGUE OF MARINE OBSERVATIONS IN THE BLACK SEA.....	13
5.	BIBLIOGRAPHY OF PUBLICATIONS OF THE MARINE CENTRES AND INSTITUTES OF THE BLACK SEA REGION ON PROBLEMS OF THE BLACK SEA OCEANOGRAPHIC DATA AND INFORMATION.....	36
5.1	PUBLISHED PAPERS	36
6.	DIGITAL PUBLICATIONS AND PRODUCTS.....	44
7.	OTHER INFORMATION RELATED TO OCEANOGRAPHIC DATA AND INFORMATION ON THE BLACK SEA	45

1. INTRODUCTION

The material on the "Black Sea Data Management Guide" are prepared in accordance with the working plans of the IOC Committee on International Data and Information Exchange (IODE) and its regional component in the Black Sea region to assist specialists of the Black Sea countries in the field of Data Management. The Guide includes the following items:

- national oceanographic data centres, designated national agencies, other marine centres and institutions of the Black Sea region countries dealing with problems of oceanographic data;
- current international and national projects and programs of the Black Sea region countries;
- preliminary catalogue marine observation in the Black Sea;
- bibliography of publications of the marine centres and institute of the Black Sea region on problems of the Black Sea data and information published mainly during the past 5 years;
- other information related to oceanographic data and information on the Black Sea.

The compiler of the Guide is Alexander M. Suvorov, Deputy Director of the Marine Hydrophysical Institute of the Ukrainian National Academy of Sciences, national and regional (the Black Sea region) co-ordinator of the IOC IODE Committee, the editor-in-chief is Valery N. Eremeev, Director General of the Oceanological Centre of the Ukrainian National Academy of Sciences, the Chairman of the IOC UNESCO Black Sea Regional Committee, the Chairman of the Steering Committee of the Black Sea Global Observing Oceanographic System (BSGOOS).

2. NATIONAL OCEANOGRAPHIC DATA CENTRES, DESIGNATED NATIONAL AGENCIES, OTHER MARINE CENTRES AND INSTITUTIONS OF THE BLACK SEA REGION COUNTRIES DEALING WITH PROBLEMS OF OCEANOGRAPHIC DATA

2.1 NATIONAL OCEANOGRAPHIC DATA CENTRES, DESIGNATED NATIONAL AGENCIES

The section below contains information on national oceanographic data centres and designated national agencies operating in the Black Sea region, entering International Oceanographic Data and Information Exchange Committee of Intergovernmental Oceanographic Commission of UNESCO and considered to be national co-ordinators in the field of international oceanographic data and information exchange (Table I).

Table I. National Oceanographic Data Centres, Designated National Agencies for Black Sea Region

Country	National IODE Co-ordinator	National Data Centre Information	Added Information
BULGARIA	Mr. Stojan Haramiev Head, National Oceanographic Data Centre Institute of Meteorology & Hydrology 66, bd. Tsarigradsko chaussee Sofia 1184 BULGARIA Tel: +359 (2) 72 22 71/75 Ext. 359 Fax: +359 (2) 88 03 80	NODC 66, bd. Tsarigradsko chaussee Sofia 1184 BULGARIA Established: 1985 Data Centre URL: n/a	
GEORGIA	Asst. Prof. Kakhaber Bilashvili Irakli Abashidze Str. 50 Tbilisi 380079 GEORGIA Tel/Fax: <995> (32) 23 22 93 email: wocean@iberiapac.ge	DNA Irakli Abashidze Str. 50 Tbilisi 380079 GEORGIA Established: 2000 Data Centre URL: n/a	
ROMANIA	National IODE Co-ordinator Vasile Diaconu Romanian Marine Research Institute 300, Mamaia Blvd. RO - 8700 Constantza ROMANIA	NODC Romanian Marine Research Institute 300, Mamaia Blvd. RO - 8700 Constantza ROMANIA Established: 1970 Data Centre URL: http://www.alpha.rmri.ro phone: +40 41 543 288, +40 41 540 870 ext.46 fax: +40 41 831274	<p><u>Data Centre Description.</u> The Data Centre is a distributed structure within the different departments of the Romanian Marine Research Institute.</p> <p><u>Data Centre Services and Products.</u></p> <ul style="list-style-type: none"> • Collection, quality control and archiving of RMRI data; • Monthly statistical syntheses of the meteorological, physical and chemical parameters of the Shore waters, for internal and limited external use; • Oceanographic Year Book, restricted distribution; • Annual Report on the State of the Marine Environment, part of the National Report edited by Ministry of Waters, Forests, and Environmental Protection; • User access to the NATO OceanBase. <p><u>Data Centre Projects and Activities.</u></p> <ul style="list-style-type: none"> • Provide informational support for the projects included in the National Research and Development Programmes; • Maintain the databases for physical, chemical and biological oceanographic parameters; • Provide sea level data to the Permanent Service for Mean Sea Level; • Provide information for the Environmental Impact Assessment and Environmental Audit; • Maintain a bibliographic data base; • Collaboration with different partners within the frame of international projects;

<p>RUSSIAN FEDERATION</p>	<p>Mr. N.N. Michailov Director, National Oceanographic Data Centre All Russian Research Institute of Hydrometeorological Information (RIHMI) 6, Koroleva Str., Kaluga District Obninsk 249020 RUSSIAN FEDERATION Tel: <7> (08439) 74907 Fax: <7> (095) 255 22 25 Tlx: 412633 INFOR SU E-mail: nodc@meteo.ru</p>	<p>NODC 6, Koroleva Str., Kaluga District Obninsk 249020 RUSSIAN FEDERATION Established: 1964 Data Centre URL: http://www.meteo.ru/nodc/</p>	<ul style="list-style-type: none"> • Co-operation with environmental NGO's. <p>The NODC of the Russian Federation was established in 1964 and operated by the All-Russian Research Institute of Hydrometeorological Information - World Data Centre.</p> <p><u>Data Centre Services and Products.</u> The Russian NODC provides:</p> <ul style="list-style-type: none"> • Acquisition, archiving, processing and disseminating of oceanographic (water bottle - • Hydrology/hydro-chemistry, pollution, BT, CTD, current meter, coastal stations, marine ship) • Data from national and international sources, co-ordination of oceanographic data • Management among marine organisations of Russia; • Monitoring of national data flows involved in the international exchange and participation in • International programmes and projects such as IGOSS, GTSPP, GODAR, GLOSS/PSMSL. <p>The Russian NODC has the responsibility to provide the oceanographic data management under the WDC-B and plays the role of the RNODC for IGOSS to support the activities of IODE:</p> <ul style="list-style-type: none"> • Development of technologies for data acquisition, processing, archiving and dissemination; • Development of data formats for computer-compatible carriers; • Training activity for data management on national (3 training courses in 1994-1995) and • International (IODE training courses in 1991 and 1994) level. <p><u>Information products and services provided by the Russian NODC.</u> The Russian NODC supports the following products on user requests:</p> <ul style="list-style-type: none"> • Inventories for regions, institutes, parameters and time periods, and the supporting software (Electronic Reference, SHIP v.2.0) for management, sampling and viewing the summarized oceanographic metadata such as data distribution maps and tables, descriptions of marine institutions, R/V ships, results of statistical processing of the data, etc.; • Multi-level derived datasets to study climatic variability of the selected regions of the World Ocean and time-periods: <ul style="list-style-type: none"> ○ space-oriented and time-series data, ○ climatic characteristics using robust methods of statistical estimation, ○ climatic fields (average and deviation for 5- or 1-degree grid and a month) for
--------------------------------------	---	--	--

			<ul style="list-style-type: none"> ○ temperature and salinity. • Software for PCs (Information-Reference System, Oceanography v.4.1) for data input, QC, sampling, graphical and textual data viewing, preparing the derived datasets and statistical analysis of oceanographic (water-bottle, BT, current meter, coastal, marine ship) data in an interactive mode and selected oceanographic datasets to start the management the own regional oceanographic data. <p><u>Data Centre Projects and Activities.</u> Data Holdings. During 1964-1995, the Russian NODC received oceanographic data from over 30,000 R/V cruises for 1890-1995, from 64 countries (including the former Soviet republics). These contain data from over 1,850,000 oceanographic stations (among them 80,000 stations with chemical pollution), 565,000 BT profiles, 25,000 CTD profiles, 4,000 deep-sea current meters and 26,500,000 marine ship observations. The Russian NODC accumulated the coastal hydrometeorological data for 485 stations for 1977-1992 and 283 Russian stations for 1993-1995. In the last 3 years, the Centre began to accumulate new types of observations - surface temperature from satellites, derived maps from satellites, and aircraft observations. The above-mentioned data are placed in 12 archived datasets of the state holdings.</p>
TURKEY	Eng.Lt.CDR. Ahmet Türker Dept. of Navigation, Hydrography & Oceanography Seyir, ve Ocinoğrafi Hidrografi Daire si Başkanlığı 81647 Cubuklu-Istanbul TURKEY Tel: <90> (216) 331 17 98 Fax: <90> (216) 331 05 25 Tlx: 29783 DKSH TR E-mail: shod.d@servis.net.tr	NODC Established: 1993	
UKRAINE	Dr. Alexander Suvorov Head, Dept. of Marine Information Systems & Technologies (MIST Dept.) Marine Hydrophysical Institute of the Ukrainian National Academy of Sciences 2, Kapitanskaya Str., Sevastopol, 99011 UKRAINE	DNA 2, Kapitanskaya Str., Sevastopol, 99011 UKRAINE Established: 1993 Data Centre URL: http://www.mhi.iuf.net/DEPTS/mistdpt.html	<u>Profile.</u> <ul style="list-style-type: none"> • Developing & creation the national system for compiling, transfer, storage, analysis and dissemination of oceanographic data and information; • Developing & creation the multidisciplinary national marine geo-information system of the Ukraine; • Developing of the scientific basis, algorithms and software for the oceanographic data quality control, processing and database management systems; • Creation, loading and maintenance of the regional special and multidisciplinary oceanographic database; • Creation of computer knowledge and data-based systems, information and

	<p>Tel: +7 (380 692) 54 52 76 Fax: +7 (380 692) 55 42 95 E-mail: suvorov@alpha.mhi.iuf.net; suvorov@mhi2.sebastopol.ua</p>		<p>decision support systems for marine environmental management;</p> <ul style="list-style-type: none"> • Creation of computer marine atlas & reference book of the Black Sea and Sea of Azov and other regions of World Ocean; • Participating in international and national oceanographic data and information exchange; • Investigations of the climatic variability of marine environment; modelling of marine systems. <p><u>Staff.</u></p> <ul style="list-style-type: none"> • Scientists - 10 • Software engineers - 8 • Post-graduate students - 3 • Technician - 1 <p><u>Data Centre Services and Products.</u></p> <ul style="list-style-type: none"> • Catalogue of oceanographic data holdings in the Ukrainian Marine Centers for the Black Sea and Mediterranean Sea and other World Ocean regions; • The Black Sea multidisciplinary Digital Atlas; • Climatic Atlas of the Location of the Hydrogen Sulfide Contamination Zone Upper Boundary in the Black Sea; • Information & Analytical System on the Black Sea Level Investigations; • Database Management System for the Black Sea bibliography; • Black Sea Information System; • Oceanographic Database Management System. <p><u>Data Centre Projects and Activities.</u></p> <p>National Projects. The MIST Dpt is the leading department of the MHI and in the Ukraine of the following projects:</p> <ul style="list-style-type: none"> • Creation of national system for compiling, transfer, storage, analysis and dissemination of oceanographic data and information (project "National bank of oceanological data"); • Creation of Computer Marine Atlas & Reference book of the Black Sea and Sea of Azov and other regions of World Ocean (project "Computer marine atlas"); • Creation of computer knowledge and data base, marine support decision systems (project "Marine expert systems"); • Creation of national integrated systems and technologies of operative monitoring of marine environment (project "Monitoring") All these projects are running in frameworks of National programme of investigation and utilisation of resources of the Black Sea and Sea of Azov and other regions of World Ocean (State Committee of Science and Intellectual Property of the Ukraine)
--	---	--	--

			<ul style="list-style-type: none"> • Developing and creation of conception of national multidisciplinary national marine geo-information system of the Ukraine (State fund of fundamental Investigation of State Committee of Science and Intellectual Property of the Ukraine); • Principles of developing and creation new marine information systems and technologies (Programme of National Academy of Sciences of Ukraine). <p>International Projects. The MIST Dpt activities in the International Programmes and Projects:</p> <ul style="list-style-type: none"> • IOC International Oceanographic Data and Information Exchange (IODE); • IOC Global Oceanographic Data Archaeology and Rescue Project (GODAR); • MEDAR/ MEDATLAS II Mediterranean Data Archaeology and Rescue & Mediterranean Atlas; • IOC Black Sea Regional Programme in Marine Sciences and Services; • "Black Sea Ecosystem processes and Forecasting / Operational Database Management System" (The project NATO Science for Peace); • Co-operative Marine Science Programme for the Black Sea. <p>Main Data Holdings of MIST Dpt:</p> <ul style="list-style-type: none"> • All data of the cruises of MHI research vessels which were obtained in digital form or those which were digitised; • Copy of the oceanographic data set of the Soviet (Russian) NODC as for 1981; • Black Sea database, which is compiled from different national and international sources and which is the most complete database for this region; • Oceanological data sets for Mediterranean Sea and for the coastal zone of the Republic Guinea and Guinea sector of the Atlantic Ocean; • Full set of the databases of the CoMSBlack and NATO TU Black Sea Program international surveys in the Black Sea (1991-1995); • Data on CD-ROM's from US NODC, the MEDATLAS Consortium, BODC, MARIS and other sources.
--	--	--	--

2.2 MARINE CENTRES AND INSTITUTIONS OF BLACK SEA REGION COUNTRIES DEALING WITH PROBLEMS OCEANOGRAPHIC DATA

Table II. Marine Centres and Institutions of Black Sea Region Countries dealing with Oceanographic Data

Country	Marine Centres and Institutions	Location (Address)
UKRAINE	Marine Hydrophysical Institute (MHI) of the Ukrainian National Academy of Sciences	2, Kapitanskaya Str., Sevastopol, 99011, UKRAINE
	Institute of Biology of Southern Seas (IBSS) of the Ukrainian National Academy of Sciences	2, Nakhimov Av., Sevastopol, 99011, UKRAINE
	Institute of Geological Sciences (IGS) of the Ukrainian National Academy of Sciences	55, Gonchar Str., Kyiv, 01601, UKRAINE
	Ukrainian Scientific Centre of the Ecology of Sea (UkrSCES) of the Ministry of Nuclear Safety and Environment of the Ukraine	89, Frantsuzsky Blvd., Odessa, 65009, UKRAINE
	Southern Scientific Research Institute of Marine Fisheries and Oceanography (SSRIMFO) of the Ministry for Environmental Protection and Nuclear Safety of Ukraine	2, Sverdlov Str., Kerch, 98300, UKRAINE
	Marine Branch of Ukrainian Research Hydrometeorological Institute (MB of UkrRHMI) of the Ministry for Environmental Protection and Nuclear Safety of Ukraine	61, Sovetskaya Str., Sevastopol, 99011, UKRAINE
	Experimental Branch of Marine Hydrophysical Institute (EB of MHI) of the Ukrainian National Academy of Sciences	Katsiveli, Simeiz, Crimea, 98680 UKRAINE
	Odessa Branch of the Institute of Biology of Southern Seas (OB of IBSS) of the Ukrainian National Academy of Sciences (Odessa).	37, Pushkinskaya Str., Odessa, 65011, UKRAINE
RUSSIAN FEDERATION	All Russian Research Institute for Hydrometeorological Information (RIHMI)	6, Koroleva Str., Kaluga District, Obninsk, 249020, RUSSIA
	The P. P. Shirshov Institute of Oceanology of the Russian Academy of Sciences	23, Nakhimov Av., Moscow, 117850, RUSSIA
	The State Oceanographic Institute	6, Kropotkinsky Lane, Moscow, 119838, RUSSIA
	The Southern Branch of the P. P. Shirshov Institute of Oceanology of the Russian Academy of Sciences	Gelendzhik-7, Krasnodar Region, 353470, RUSSIA
	Moscow State University	Vorobjevy Gory, Moscow 117234, RUSSIA
	All-Russia Scientific Research Institute for Fishery and Oceanography	17/1, Verchne-Krasnoselskaya Str., Moscow, 107140, RUSSIA
	The Azov Research Institute of Fisheries of the Russian Federation State Committee for Fisheries	Rostov on Don RUSSIA
BULGARIA	The Institute of Oceanology of the Bulgarian Academy of Sciences	P.B. 152, 9000, Varna, BULGARIA
	Institute of Meteorology & Hydrology of the Bulgarian Academy of Sciences	66, bd. Tsarigradsko chaussee Sofia 1184, BULGARIA
GEORGIA	The Oceanographic Research Centre of the Tbilisi State University	Irakli Abashidze Str. 50 Tbilisi 380079, GEORGIA
ROMANIA	The Romanian Marine Research Institute (RMRI)	300, Mamaia Blvd. RO - 8700 Constantza, ROMANIA
TURKEY	The Institute of Marine Sciences of the Middle East Technical University	PO Box 28, Erdemli, 33731, Icel, TURKEY
	The Institute of Marine Sciences and Technology of the Dokuz Eylul University	PO Box 49, Izmir, 5211, TURKEY

3. CURRENT INTERNATIONAL AND NATIONAL PROJECTS AND PROGRAMS OF THE BLACK SEA REGION COUNTRIES IN FRAMEWORK OF WHICH VARIOUS PROBLEMS CONCERNED OCEANOGRAPHIC AND DATA INFORMATION ARE DEVELOPED

3.1 MEDAR/MEDATLAS II PROJECT

Mediterranean Data Archaeology and Rescue of Temperature, Salinity and Biochemical Parameters

The objective of the MEDAR/MEDATLAS II project (1998-2001) is to rescue, safeguard and make available a comprehensive data set of oceanographic parameters collected in the Mediterranean and Black Sea, through a wide co-operation of the Mediterranean and Black Sea countries. It is a European MAST/INCO concerted action and a regional contribution to UNESCO/IOC Global Ocean Data Archaeology and Rescue (GODAR) project.

Participating institutes of the consortium are:

- Institut français de recherche pour l'exploitation de la mer (IFREMER), France
- Instituto Español de Oceanografía (IEO), Spain
- Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), Italy
- National Centre for Marine Research, Hellenic National Oceanographic Data Centre (NCMR/IO-HNODC), Greece
- Universite de Liege, GeoHydrodynamics and Environment Research (GHER), Belgium
- Israel Oceanographic and Limnological Research, Department of Physical Oceanography (IOLR), Israel
- Intergovernmental Oceanographic Commission (IOC)
- Consiglio Nazionale Delle Ricerche, Institute of Atmospheric and Oceanic Sciences (CNR/ISAO), Italy
- Ente per le Nuove tecnologie l'Energia e l'Ambiente, Marine Environment Research Centre (ENEA/CRAM), Italy
- International Council for the Exploration of the Sea (ICES)
- Turkish Navy, Department of Navigation, Hydrography and Oceanography (TN-DNHO), Turkey
- Institut National de Recherche, Département d'Océanographie et des Technologies Marines (INRH/DOTM), Maroc
- Institut des Sciences de la Mer et de l'Aménagement du Littoral (ISMAL), Algeria
- University of Malta, Department of Biology, Physical Oceanography Unit, (UM-PO), Malta
- Ministry of Agriculture, Natural Resources and Environment, Cyprus National Oceanography Data Centre, (FD-MANRE/CyNODC), Cyprus
- National Council for Scientific Research, National Centre for Marine Sciences, (NCSR-NCMS), Lebanon
- National Institute of Oceanography and Fisheries, Egyptian National Oceanographic Data Centre, (NIOF/ENODC), Egypt
- All Russian Research Institute of Hydrometeorological Information (World Data Centre), Russian Federation
- Marine Hydrophysical Institute, Department of Marine Information Systems & Technologies, (MHI/MIST), Ukraine
- National Institute of Meteorology and Hydrology (NIMH), Bulgaria

Collaborations and scientific advisers:

GODAR Project (WDC-A), NODC-Croatia, INSTM Tunisia, DNA Georgia, EUROGOOS, IODE Network, SHOM

Tasks

1) To compile, safeguard and make available historical data sets of:

- Temperature
- Salinity
- Oxygen
- Nitrate
- Phosphate
- Alkalinity
- Nitrite
- Total P
- pH
- Ammonia
- Silicate
- H₂S
- Total Nitrogen
- Chlorophyll-a

The compilation of data from each source laboratory is done by the NODC/DNA of each country. Special attention is given to East, South and coastal areas of the region.

- 2) To make the archived data sets comparable and compatible by using the common MEDATLAS protocol for formatting and quality checking, in accordance with the internationally agreed standards.
- 3) To prepare and disseminate qualified value added products by using an efficient gridding and mapping methodology developed with the Variational Inverse Model of MODB (MAS2-CT93-0075-BE). The objectives analyses are qualified by two expert modelling centres.
- 4) To publish the observed data, gridded data, maps and related documentation on CDROM for further scientific, educational, industrial and governmental use.

3.2 PROGRAMME "THE BLACK SEA GOOS" OF IOC BLACK SEA REGIONAL COMMITTEE

Terms 2001-2005.

Project Participants States:

- TURKEY
- UKRAINE
- RUSSIAN FEDERATION
- BULGARIA
- ROMANIA
- GEORGIA

3.3 PROJECT "BLACK SEA ECOSYSTEM PROCESSES AND FORECASTING/ OPERATIONAL DATABASE MANAGEMENT SYSTEM" OF NATO SCIENCE FOR PEACE SUB-PROGRAM

Terms 1999-2002.

Project Participants:

TURKEY

- The Institute of Marine Sciences of the Middle East Technical University (Erdemli).

UKRAINE

- The Marine Hydrophysical Institute (MHI) of the Ukrainian National Academy of Sciences (Sevastopol);
- The Institute of Biology of Southern Seas (IBSS) of the Ukrainian National Academy of Sciences (Sevastopol).

RUSSIAN FEDERATION

- The P. P. Shirshov Institute of Oceanology of the Russian Academy of Sciences (Moscow);
- The Southern Branch of the P. P. Shirshov Institute of Oceanology of the Russian Academy of Sciences (Gelendjik).

BULGARIA

- The Institute of Oceanology of the Bulgarian Academy of Sciences (Varna).

ROMANIA

- The Romanian Marine Research Institute (RMRI) (Constantza).

GEORGIA

- The Tbilisi State University, (Tbilisi).

3.4 BLACK SEA INTEGRATED COASTAL AND SHELF ZONE MONITORING AND MODELING (INCOM) PROGRAM, NORTH ATLANTIC TREATY ORGANISATIONS (NATO), COMMITTEE ON THE CHALLENGES OF MODERN SOCIETY. SUBPROGRAM OF INCOM - DATABASE - MANAGEMENT PROGRAM

Participating Black Sea research states and institutions:

UKRAINE

- The Marine Hydrophysical Institute (MHI) of the Ukrainian National Academy of Sciences (Sevastopol);
- The Institute of Biology of Southern Seas (IBSS) of the Ukrainian National Academy of Sciences (Sevastopol);
- The Research Centre "State Oceanarium" of Ukraine (Sevastopol);
- The Ukrainian Scientific Centre of the Ecology of Sea (UkrSCES), (Odessa).

RUSSIAN FEDERATION

- The Southern Production Association for Marine Geological Operations (Yuzhmorgeologiya) of the Ministry of Natural Resources of the Russian Federation (Gelendjik);
- The Azov Research Institute of Fisheries of the Russian Federation State Committee for Fisheries (Rostov on Don)
- The P. P. Shirshov Institute of Oceanology of the Russian Academy of Sciences (Moscow);
- The Southern Branch of the P. P. Shirshov Institute of Oceanology of the Russian Academy of Sciences (Gelendjik);
- Centre "Dynamics of the Near-shore Zone" (Gelendjik).

ROMANIA

- The Romanian Marine Research Institute (RMRI) (Constantza).

BULGARIA

- The Institute of Oceanology of the Bulgarian Academy of Sciences (Varna).

- The Central Laboratory of General Ecology (Sofia).

GEORGIA

- The Oceanographic Research Centre of the Tbilisi State University

TURKEY

- The Institute of Marine Sciences of the Middle East Technical University (Erdemli).

3.5 PROJECT "THE BLACK AND AEGEAN SEAS INTERACTION AND EXCHANGE: AND INTEGRATION OF IN-SITU MEASUREMENTS, SATELLITE DATA AND NUMERICAL MODELLING"

Terms 2001-2002.

Project Participants:

GREECE

- National Centre for Marine Research, Institute of Oceanography

UKRAINE

- Marine Hydrophysical Institute of the Ukrainian National Academy of Sciences (Sevastopol).

3.6 PROJECT "NITROGEN CYCLING IN THE OXIC/ANOXIC ENVIRONMENT OF THE BLACK SEA: DATA ANALYSIS AND NUMERICAL SIMULATION"

Terms 2000-2001.

Project Participants:

USA

- Woods Hole Oceanographic Institute

UKRAINE

- Marine Hydrophysical Institute of the Ukrainian National Academy of Sciences (Sevastopol).

3.7 PROJECT "THE DATABASE ON THE BIOLUMINESCENCE FIELD OF THE WORLD OCEAN"

Terms 1999-2001.

Project Participants:

UNITED KINGDOM

- Plymouth Marine Laboratory

UKRAINE

- Marine Hydrophysical Institute of the Ukrainian National Academy of Sciences (Sevastopol);
- Institute of Biology of Southern Seas (IBSS) of the Ukrainian National Academy of Sciences (Sevastopol);

RUSSIAN FEDERATION

- Institute of Biophysics (Krasnoyarsk)

3.8 "UNITED INFORMATION SYSTEM ON THE WORLD OCEAN" SUBPROGRAM OF THE "THE WORLD OCEAN" PROGRAM OF THE RUSSIAN FEDERATION

A subprogram "United Information System on the World Ocean (UISWO) is realised in Russia in framework of Federal program "The World Ocean". The goal of the subprogram is to create and introduce into marine practice the United Information System on situation in the World Ocean based on the existing departmental systems and designated for information provision of scientific investigation, assimilation and exploitation of the World Ocean resources, support of making decision on the World Ocean Problems. The Subprogram supposes UISWO will also cover all the seas washing the coastline of Russia including the Black Sea.

Term of the Subprogram fulfilment is 1998-2007.

The main designers of the Subprogram are Hydrometeorological Centre, All Russian Research Institute of Hydrometeorological Information -WDC, and the State Oceanographic Institute.

The main UISWO directions

Direction 1. Construction of the basic elements of the United Information System on situation in the World Ocean, methodical accompaniment of its development and operation.

Direction 2. Development and introduction of methods, means and technologies of observation by direct and remote methods, metrological provision and standardization of observation on condition and contamination of the environment of the World Ocean and coastal territories.

Direction 3. Providing users with current information on situation in the World Ocean for direct implementation of activity of different kind in real time.

Direction 4. Providing consumers with generalized and specialized information on situation in the World Ocean and coastal territories for solution of a set of problems that do not demand an access to data in real time.

Direction 5. Integration, accompaniment and dissemination of information resources on the situation in the World Ocean, providing of telecommunication interaction between the System elements and users, its safety and stability.

Direction 6. Development of the UISWO specialized and regional components.

3.9 THE UKRAINE NATIONAL PROJECTS AND PROGRAMS

In Ukraine, activities aimed at the establishment of a national system for compiling, transfer, storage, analysis and dissemination of oceanologic data and information are being conducted in the framework of the projects:

- Creation of National system for compiling, transfer, storage, analysis and dissemination of oceanographic data and information (project "National bank of oceanological data");
- Creation of Computer Marine Atlas & Reference book of the Black Sea and Sea of Azov and other regions of World Ocean (project "Computer marine atlas");
- Creation of computer knowledge and database, marine support decision systems (project "Marine expert systems").

All these projects are running in frameworks of National programme of investigation and utilisation of resources of the Black Sea and Sea of Azov and other regions of World Ocean (Ministry of Education and Science of Ukraine).

The leading institution of the project is

- Marine Hydrophysical Institute (MHI) of the Ukrainian National Academy of Sciences (Sevastopol).

Other participants of the project are:

- Institute of Biology of Southern Seas (IBSS) of the Ukrainian National Academy of Sciences (Sevastopol);
- Institute of Geological Sciences (IGS) of the Ukrainian National Academy of Sciences (Kiev);
- Ukrainian Scientific Centre of the Ecology of Sea (UkrSCES) of the Ministry of Nuclear Safety and Environment of the Ukraine (Odessa);
- Southern Scientific Research Institute of Marine Fisheries and Oceanography (SSRIMFO) of the Ministry for Environmental Protection and Nuclear Safety of Ukraine (Kerch);
- Marine Branch of Ukrainian Research Hydrometeorological Institute (MB of UkrRHMI) of the Ministry for Environmental Protection and Nuclear Safety of Ukraine (Sevastopol);
- Odessa Branch of the Institute of Biology of Southern Seas (OB of IBSS) of the Ukrainian National Academy of Sciences (Odessa).

Programme of National Academy of Sciences of Ukraine.

- Principles of developing and creation new marine information systems and technologies.

Terms 2001-2005.

Project Participants:

- Marine Hydrophysical Institute (MHI) of the Ukrainian National Academy of Sciences (Sevastopol).
- Experimental Branch of MHI (Katsivele, Crimea)

4. PRELIMINARY CATALOGUE OF MARINE OBSERVATIONS IN THE BLACK SEA

This section includes a preliminary catalogue of cruises of research vessels from marine centres and institutes accomplished in the Black Sea and aimed to obtain hydrophysical, hydrochemical and hydrobiological data on the marine environment condition (Table III). This table contains information collected in framework of the international projects WOD98, MEDAR/MEDATLAS II and NATO TU BLACK SEA, supplemented with data we have obtained from different sources.

It should be also taken into account that probably not all the hydrological information on these cruises was kept safe. Data for the catalogue were selected from the cruises reports whereas primary data were held in separate printed volumes that could be either not kept safe or be damaged. Above that, the metadata set for historical cruised is limited. So the information on chiefs of expeditions, devices, etc. is absent practically everywhere.

Table III. The preliminary catalogue of data obtained from various sources.

Ship	Ship Code	Cruise	Start Date	Last Date
A. VAVILOV	90AV	8971	02.06.1957	05.06.1957
AELITA	90A8	8405	21.05.1984	03.06.1984
AK. KNIPOVICH	90KH	5	16.12.1964	16.12.1964
AKADEMIK	XXXX	1992	07.07.1992	17.07.1992
AKADEMIK A. KOVALYEVSKIY	90AK	100	01.07.1985	18.08.1985
AKADEMIK A. KOVALYEVSKIY	90AK	104	12.10.1986	22.11.1986
AKADEMIK A. KOVALYEVSKIY	90AK	119	01.09.1990	04.10.1990

AKADEMIK A. KOVALYEVSKIY	90AK	122	31.07.1991	09.08.1991
AKADEMIK A. KOVALYEVSKIY	90AK	8967	18.11.1957	04.12.1957
AKADEMIK A. KOVALYEVSKIY	90AK	8968	23.02.1957	01.03.1957
AKADEMIK A. KOVALYEVSKIY	90AK	91	21.04.1981	14.06.1981
ARIEL	90AE	8603	27.03.1986	12.04.1986
ARSHINTSEVO	URAR	9405	26.05.1994	30.05.1994
ARSHINTSEVO	URAR	9611	13.11.1996	30.11.1996
CANDARLI	89CA	1	11.04.1963	26.04.1963
CANDARLI	89CA	11	05.04.1965	10.04.1965
CANDARLI	89CA	122	17.11.1982	19.11.1982
CANDARLI	89CA	124	07.12.1982	09.12.1982
CANDARLI	89CA	134	20.03.1983	21.03.1983
CANDARLI	89CA	135	12.04.1983	13.04.1983
CANDARLI	89CA	150	21.04.1984	26.04.1984
CANDARLI	89CA	154	04.07.1984	09.07.1984
CANDARLI	89CA	17	22.05.1968	26.06.1968
CANDARLI	89CA	19	12.08.1968	16.08.1968
CANDARLI	89CA	4	10.10.1963	25.10.1963
CANDARLI	89CA	48	04.06.1973	05.06.1973
CANDARLI	89CA	7	24.07.1964	02.08.1964
CANDARLI	89CA	89	17.09.1978	11.10.1978
CANDARLI	89CA	94	20.08.1979	22.08.1979
CARSAMBA	89CR	10	16.01.1965	26.01.1965
CARSAMBA	89CR	100	21.08.1980	02.09.1980
CARSAMBA	89CR	12	08.03.1966	20.03.1966
CARSAMBA	89CR	129	18.01.1983	03.02.1983
CARSAMBA	89CR	139	18.05.1983	20.05.1983
CARSAMBA	89CR	16	12.04.1968	16.04.1968
CARSAMBA	89CR	18	05.06.1968	05.07.1968
CARSAMBA	89CR	2	15.07.1963	31.07.1963
CARSAMBA	89CR	22	06.12.1968	14.12.1968
CARSAMBA	89CR	35	20.01.1971	29.01.1971
CARSAMBA	89CR	47	23.11.1972	01.12.1972
CARSAMBA	89CR	6	05.04.1964	14.04.1964
CHELEKEN	90BH	1151	29.10.1980	30.10.1980
CHERNOMOR	90CH	8305	15.05.1983	08.06.1983
CHERNOMOR	90CH	8310	25.10.1983	17.11.1983
CHERNOMOR	90CH	8405	15.05.1984	01.06.1984
CHERNOMORETZ	90JN	1890	27.06.1890	04.08.1890
CONSTANTA	XXXX	1066	12.11.1974	15.05.1975
CONSTANTA	XXXX	1097	21.02.1973	06.11.1973
CONSTANTA	XXXX	1099	11.02.1974	08.08.1974
CONSTANTA	XXXX	1241	03.01.1979	06.02.1979
CONSTANTA	XXXX	1243	01.10.1979	13.11.1979
CONSTANTA	XXXX	1244	02.04.1979	09.05.1979
CONSTANTA	XXXX	1396	09.02.1982	09.02.1982
CONSTANTA	XXXX	6209	16.08.1966	21.11.1966
CONSTANTA	XXXX	6210	23.05.1968	01.12.1968
CONSTANTA	XXXX	6240	12.08.1969	02.10.1969
CONSTANTA	XXXX	6255	29.05.1970	17.02.1971
CONSTANTA	XXXX	6256	28.02.1972	28.02.1972
CUBUKLU	89CU	199	27.08.1987	31.08.1987
CUBUKLU	89CU	306	11.11.1992	23.11.1992
CUBUKLU	89CU	308	08.01.1993	12.01.1993
CUBUKLU	89CU	309	18.02.1993	22.02.1993
CUBUKLU	89CU	321	12.02.1995	17.02.1995
CUBUKLU	89CU	3221	18.03.1995	19.03.1995
CUBUKLU	89CU	329	03.07.1996	05.07.1996
DANILEVSKIY	XXXX	6905	17.05.1969	31.05.1969

DMITRY MENDELEYEV	90MD	1535	23.07.1989	09.09.1989
DMYTRY STEFANOV	9027	8804	02.04.1988	26.04.1988
DMYTRY STEFANOV	9027	8805	07.05.1988	20.05.1988
DMYTRY STEFANOV	9027	8810	08.10.1988	10.10.1988
DONETZ	90ED	1891	29.05.1891	22.06.1891
EKSPERIMENT	UREX	9606	03.06.1996	10.06.1996
ELSK	9028	8602	20.02.1986	17.03.1986
ERNST KRENKEL	90KE	201	18.10.1972	17.01.1973
ERNST KRENKEL	90KE	211	03.02.1973	02.05.1973
ERNST KRENKEL	90KE	483	29.01.1975	31.01.1975
ERNST KRENKEL	90KE	580	18.02.1975	18.04.1975
ERNST KRENKEL	90KE	1042	12.11.1978	25.11.1978
ERNST KRENKEL	90KE	1054	13.03.1979	22.05.1979
ERNST KRENKEL	90KE	1072	13.10.1979	21.12.1979
ERNST KRENKEL	90KE	1096	20.02.1980	20.06.1980
ERNST KRENKEL	90KE	1205	27.09.1982	28.09.1982
ERNST KRENKEL	90KE	1301	26.12.1984	14.03.1985
ERNST KRENKEL	90KE	1326	25.07.1985	10.10.1985
ERNST KRENKEL	90KE	1374	08.01.1987	09.01.1987
ERNST KRENKEL	90KE	1447	21.11.1987	08.03.1988
ERNST KRENKEL	90KE	1459	31.03.1988	17.07.1988
ERNST KRENKEL	90KE	1502	09.02.1989	06.05.1989
ERNST KRENKEL	90KE	1525	18.09.1989	18.09.1989
ERNST KRENKEL	90KE	1557	18.01.1990	07.04.1990
ERNST KRENKEL	90KE	1583	17.07.1990	18.07.1990
ERNST KRENKEL	90KE	45	02.02.1987	08.02.1987
ERNST KRENKEL	90KE	49a	26.09.1988	05.10.1988
ERNST KRENKEL	90KE	57	03.07.1992	27.07.1992
ERNST KRENKEL	90KE	58	11.09.1992	01.10.1992
ERNST KRENKEL	90KE	59	16.11.1992	10.12.1992
ERNST KRENKEL	90KE	6377	27.10.1973	09.11.1973
ERNST KRENKEL	90KE	7696	02.04.1974	28.04.1974
F. BELLINGGAUZEN	90FB	1150	29.10.1980	30.10.1980
FIOLENT	90CA	880	22.08.1980	23.08.1980
FIOLENT	90CA	8008	16.08.1980	21.08.1980
GALS	9065	88	24.03.1988	20.11.1988
GALS	9065	89	12.01.1989	19.11.1989
GALS	9065	90	19.02.1990	23.06.1990
GENERAL ARSHINTSEV	90B6	8205	15.05.1982	23.05.1982
GEORGY USHAKOV	90UG	218	19.05.1973	15.08.1973
GEORGY USHAKOV	90UG	240	25.12.1973	28.03.1974
GEORGY USHAKOV	90UG	298	27.07.1974	24.10.1974
GEORGY USHAKOV	90UG	870	25.12.1975	18.03.1976
GEORGY USHAKOV	90UG	955	29.03.1977	29.03.1977
GEORGY USHAKOV	90UG	1011	13.07.1977	21.09.1977
GEORGY USHAKOV	90UG	1050	05.02.1979	05.02.1979
GEORGY USHAKOV	90UG	1057	27.03.1979	21.06.1979
GEORGY USHAKOV	90UG	1091	07.02.1980	10.05.1980
GEORGY USHAKOV	90UG	1135	17.01.1981	19.05.1981
GEORGY USHAKOV	90UG	1145	10.06.1981	18.09.1981
GEORGY USHAKOV	90UG	1195	12.05.1982	12.05.1982
GEORGY USHAKOV	90UG	1238	19.07.1983	19.07.1983
GEORGY USHAKOV	90UG	1252	11.08.1983	17.11.1983
GEORGY USHAKOV	90UG	1263	17.02.1984	17.02.1984
GEORGY USHAKOV	90UG	1300	11.01.1985	10.03.1985
GEORGY USHAKOV	90UG	1345	08.01.1986	08.01.1986
GEORGY USHAKOV	90UG	1359	25.04.1986	01.08.1986
GEORGY USHAKOV	90UG	1365	19.08.1986	28.10.1986
GEORGY USHAKOV	90UG	1382	22.11.1986	10.02.1987

GEORGY USHAKOV	90UG	1421	09.10.1987	09.10.1987
GEORGY USHAKOV	90UG	1448	26.01.1988	06.04.1988
GEORGY USHAKOV	90UG	1508	13.04.1989	24.06.1989
GEORGY USHAKOV	90UG	1558	16.12.1989	02.03.1990
GEORGY USHAKOV	90UG	1570	10.06.1990	10.06.1990
GEORGY USHAKOV	90UG	59a	07.09.1991	01.10.1991
GEORGY USHAKOV	90UG	60	18.03.1992	07.04.1992
GEORGY USHAKOV	90UG	61	05.05.1992	28.05.1992
GEROI KERCHI	90B7	8111	19.11.1981	05.12.1981
GEROI KERCHI	90B7	8202	19.02.1982	18.03.1982
GIDROGRAF	XXXX	9148	04.03.1932	18.03.1932
GIDROGRAF	XXXX	9165	01.02.1935	26.03.1935
GIDROGRAF	XXXX	9205	26.05.1939	15.06.1939
GONETS	9067	5502	21.02.1955	17.03.1955
GONETS	9067	5505	05.05.1955	11.06.1955
GONETS	9067	5506	15.06.1955	16.06.1955
GONETS	9067	5605	21.05.1956	07.06.1956
GONETS	9067	5606	18.06.1956	11.07.1956
GONETS	9067	5705	16.05.1957	12.06.1957
GONETS	9067	5707	04.07.1957	15.07.1957
GONETS	9067	5708	21.08.1957	07.09.1957
GONETS	9067	5806	10.06.1958	22.06.1958
GONETS	9067	5807	08.07.1958	23.07.1958
GONETS	9067	5808	26.08.1958	30.08.1958
GONETS	9067	6111	12.11.1961	28.11.1961
GONETS	9067	6206	14.06.1962	26.06.1962
GONETS	9067	6207	11.07.1962	19.07.1962
GONETS	9067	6309	12.09.1963	02.10.1963
GONETS	9067	6705	11.05.1967	03.06.1967
GONETS	9067	6706	11.06.1967	21.06.1967
GONETS	9067	6708	14.08.1967	28.08.1967
GONETS	9067	6710	25.10.1967	31.10.1967
GONETS	9067	6711	15.11.1967	16.12.1967
GONETS	9067	6801	06.01.1968	16.01.1968
GONETS	9067	6804	18.04.1968	08.05.1968
GONETS	9067	6805	16.05.1968	24.05.1968
GONETS	9067	6806	01.06.1968	16.06.1968
GONETS	9067	6808	11.08.1968	21.08.1968
GONETS	9067	6811	13.11.1968	30.11.1968
GONETS	9067	6902	20.02.1969	29.03.1969
GONETS	9067	6905	07.05.1969	28.05.1969
GONETS	9067	6906	21.06.1969	03.07.1969
GONETS	9067	6907	10.07.1969	05.08.1969
GONETS	9067	6908	14.08.1969	26.08.1969
GONETS	9067	7002	13.02.1970	15.03.1970
GONETS	9067	8805	26.02.1960	31.05.1960
GONETS	9067	8806	13.07.1960	02.09.1960
GONETS	9067	8962	20.05.1958	24.05.1958
GONETS	9067	9703	26.02.1957	01.03.1957
GROT	90N1	5505	05.05.1955	06.05.1955
GROT	90N1	5507	07.07.1955	22.07.1955
GROT	90N1	5508	18.08.1955	29.08.1955
GROT	90N1	5512	08.12.1955	18.12.1955
GROT	90N1	5602	23.02.1956	15.03.1956
GROT	90N1	5604	20.04.1956	20.05.1956
GROT	90N1	5607	11.07.1956	13.07.1956
GROT	90N1	5608	24.08.1956	05.09.1956
GROT	90N1	5702	26.02.1957	24.03.1957
GROT	90N1	5706	19.06.1957	25.06.1957

GROT	90N1	5707	04.07.1957	27.07.1957
GROT	90N1	5708	09.08.1957	23.08.1957
GROT	90N1	5711	22.11.1957	24.11.1957
GROT	90N1	5802	16.02.1958	11.03.1958
GROT	90N1	5805	20.05.1958	24.05.1958
GROT	90N1	5806	01.06.1958	19.06.1958
GROT	90N1	5807	09.07.1958	24.07.1958
GROT	90N1	5808	21.08.1958	13.09.1958
GROT	90N1	6107	08.07.1961	22.07.1961
GROT	90N1	6108	12.08.1961	30.08.1961
GROT	90N1	6211	14.11.1962	23.11.1962
GROT	90N1	6306	12.06.1963	24.06.1963
GROT	90N1	6307	14.07.1963	25.07.1963
GROT	90N1	6801	21.01.1968	06.02.1968
GROT	90N1	6802	15.02.1968	13.03.1968
GROT	90N1	6804	02.04.1968	04.04.1968
GROT	90N1	6805	13.05.1968	26.05.1968
GROT	90N1	6806	18.06.1968	10.07.1968
GROT	90N1	6808	10.08.1968	28.08.1968
GROT	90N1	6904	12.04.1969	26.04.1969
GROT	90N1	6905	18.05.1969	31.05.1969
GROT	90N1	6906	16.06.1969	25.06.1969
GROT	90N1	6908	14.08.1968	24.08.1969
GROT	90N1	6911	05.11.1969	05.12.1969
GROT	90N1	7001	18.01.1970	26.01.1970
GROT	90N1	7005	12.05.1970	28.05.1970
GROT	90N1	7006	11.06.1970	21.06.1970
GROT	90N1	7007	14.07.1970	29.07.1970
GROT	90N1	7009	23.09.1970	14.10.1970
GROT	90N1	7105	14.05.1971	26.05.1971
GROT	90N1	7106	11.06.1971	16.06.1971
GROT	90N1	7108	13.08.1971	24.08.1971
GROT	90N1	7109	08.09.1971	02.10.1971
GROT	90N1	7305	14.05.1973	28.05.1973
GROT	90N1	7308	13.08.1973	24.08.1973
GROT	90N1	7502	14.02.1975	09.03.1975
GROT	90N1	7508	12.08.1975	22.08.1975
GROT	90N1	7605	14.05.1976	25.05.1976
GROT	90N1	7608	12.08.1976	21.08.1976
GROT	90N1	7705	18.05.1977	27.05.1977
GROT	90N1	7805	12.05.1978	21.05.1978
GROT	90N1	7807	10.07.1978	16.08.1978
GROT	90N1	7811	16.11.1978	03.12.1978
GROT	90N1	7905	12.05.1979	15.05.1979
GROT	90N1	7907	13.07.1979	17.07.1979
GROT	90N1	7911	15.11.1979	09.12.1979
GS-59	90N5	7606	25.06.1976	29.06.1976
IGNAT PAVLUCHENKOV	URGP	8709	05.09.1987	20.10.1987
IGNAT PAVLUCHENKOV	URGP	8711	15.11.1987	12.12.1987
IGNAT PAVLUCHENKOV	URGP	8905	21.05.1989	07.06.1989
IGNAT PAVLUCHENKOV	URGP	8906	17.06.1989	11.07.1989
IGNAT PAVLUCHENKOV	URGP	8907	24.07.1989	23.08.1989
IGNAT PAVLUCHENKOV	URGP	8909	08.09.1989	15.09.1989
IGNAT PAVLUCHENKOV	URGP	8910	14.10.1989	18.10.1989
IGNAT PAVLUCHENKOV	URGP	9209	13.09.1992	07.10.1992
INGUL	90IN	7197	15.02.1923	23.08.1923
JOHN PILLSBURY	31JP	73	30.07.1965	11.08.1965
KARA-DAG	90CG	8211	25.11.1982	22.12.1982
KERCHENSKY KOMSOMOLETS	9018	8607	25.07.1986	19.08.1986

KERCHENSKY KOMSOMOLETS	9018	8611	12.11.1986	11.12.1986
KERCHENSKY KOMSOMOLETS	9018	8702	02.02.1987	15.03.1987
KERCHENSKY KOMSOMOLETS	9018	8703	27.03.1987	01.04.1987
KERCHENSKY KOMSOMOLETS	9018	8704	07.04.1987	17.04.1987
KERCHENSKY KOMSOMOLETS	9018	8902	11.02.1989	06.03.1989
KERCHENSKY KOMSOMOLETS	9018	8905	11.05.1989	03.06.1989
KERCHENSKY KOMSOMOLETS	9018	8911	12.11.1989	04.12.1989
KERCHENSKY KOMSOMOLETS	9018	9006	18.06.1990	14.07.1990
KERCHENSKY KOMSOMOLETS	9018	9007	22.07.1990	20.08.1990
KERCHENSKY KOMSOMOLETS	9018	9108	10.08.1991	28.08.1991
KERCHENSKY RABOCHY	908E	8003	06.03.1980	25.04.1980
KERCHENSKY RABOCHY	908E	8005	23.05.1980	30.05.1980
KOMETA GALLEYA	9057	9007	25.07.1990	14.08.1990
KONSTANTIN BOLDYREV	90D7	6304	06.04.1963	16.04.1963
KONSTANTIN BOLDYREV	90D7	6408	14.08.1964	23.08.1964
KONSTANTIN BOLDYREV	90D7	6505	10.05.1965	23.05.1965
KONSTANTIN BOLDYREV	90D7	6506	10.06.1965	19.06.1965
KONSTANTIN BOLDYREV	90D7	6507	14.07.1965	04.08.1965
KONSTANTIN BOLDYREV	90D7	6508	15.08.1965	05.09.1965
KONSTANTIN BOLDYREV	90D7	6602	12.02.1966	08.03.1966
KONSTANTIN BOLDYREV	90D7	6603	24.03.1966	06.04.1966
KONSTANTIN BOLDYREV	90D7	6708	11.08.1967	23.08.1967
KONSTANTIN BOLDYREV	90D7	6904	26.04.1969	08.05.1969
KONSTANTIN BOLDYREV	90D7	6905	18.05.1969	21.05.1969
KONSTANTIN BOLDYREV	90D7	6909	03.09.1969	17.09.1969
KONSTANTIN BOLDYREV	90D7	7104	03.04.1971	27.04.1971
KONSTANTIN BOLDYREV	90D7	7105	11.05.1971	24.05.1971
KONSTANTIN BOLDYREV	90D7	7106	11.06.1971	26.06.1971
KONSTANTIN BOLDYREV	90D7	7108	12.08.1971	28.08.1971
KONSTANTIN BOLDYREV	90D7	7111	11.11.1971	28.11.1971
KONSTANTIN BOLDYREV	90D7	7202	13.02.1972	04.03.1972
KONSTANTIN BOLDYREV	90D7	7205	11.05.1972	25.05.1972
KONSTANTIN BOLDYREV	90D7	7206	17.06.1972	25.06.1972
KONSTANTIN BOLDYREV	90D7	7207	10.07.1972	21.07.1972
KONSTANTIN BOLDYREV	90D7	7208	12.08.1972	01.09.1972
KONSTANTIN BOLDYREV	90D7	7305	12.05.1973	23.05.1973
KONSTANTIN BOLDYREV	90D7	7306	13.06.1973	27.06.1973
KONSTANTIN BOLDYREV	90D7	7307	13.07.1973	28.07.1973
KONSTANTIN BOLDYREV	90D7	7308	13.08.1973	22.08.1973
KONSTANTIN BOLDYREV	90D7	7311	06.11.1973	30.11.1973
KONSTANTIN BOLDYREV	90D7	7402	13.02.1974	07.03.1974
KONSTANTIN BOLDYREV	90D7	7405	12.05.1974	26.05.1974
KONSTANTIN BOLDYREV	90D7	7406	10.06.1974	02.07.1974
KONSTANTIN BOLDYREV	90D7	7407	11.07.1974	24.07.1974
KONSTANTIN BOLDYREV	90D7	7408	09.08.1974	24.08.1974
KONSTANTIN BOLDYREV	90D7	7411	14.11.1974	06.12.1974
KONSTANTIN BOLDYREV	90D7	7508	13.08.1975	21.08.1975
KONSTANTIN BOLDYREV	90D7	7511	20.11.1975	14.12.1975
KONSTANTIN BOLDYREV	90D7	7602	01.02.1976	26.02.1976
KONSTANTIN BOLDYREV	90D7	7603	21.03.1976	31.03.1976
KONSTANTIN BOLDYREV	90D7	7604	01.04.1976	06.04.1976
KONSTANTIN BOLDYREV	90D7	7605	14.05.1976	24.05.1976
KONSTANTIN BOLDYREV	90D7	7611	11.11.1976	29.11.1976
KONSTANTIN BOLDYREV	90D7	7702	10.02.1977	02.03.1977
KONSTANTIN BOLDYREV	90D7	7711	19.11.1977	16.12.1977
KONSTANTIN BOLDYREV	90D7	7802	11.02.1978	01.03.1978
KONSTANTIN BOLDYREV	90D7	7805	12.05.1978	28.05.1978
KONSTANTIN BOLDYREV	90D7	7808	13.08.1978	24.08.1978
KONSTANTIN BOLDYREV	90D7	7905	13.05.1979	28.05.1979

KONSTANTIN BOLDYREV	90D7	7907	14.07.1979	23.07.1979
KONSTANTIN BOLDYREV	90D7	7908	10.08.1979	28.08.1979
KONSTANTIN BOLDYREV	90D7	8005	17.05.1980	31.05.1980
KONSTANTIN BOLDYREV	90D7	8011	18.11.1980	19.12.1980
KONSTANTIN BOLDYREV	90D7	8102	12.02.1981	10.03.1981
KONSTANTIN BOLDYREV	90D7	8105	19.05.1981	29.05.1981
KONSTANTIN BOLDYREV	90D7	8302	09.02.1983	26.03.1983
KONSTANTIN BOLDYREV	90D7	8305	23.05.1983	05.06.1983
KONSTANTIN BOLDYREV	90D7	8402	22.02.1984	19.03.1984
KONSTANTIN BOLDYREV	90D7	8407	16.07.1984	08.08.1984
KONSTANTIN BOLDYREV	90D7	8511	14.11.1985	12.12.1985
KONSTANTIN BOLDYREV	90D7	8605	14.05.1986	31.05.1986
KONTAKT	90Q1	6606	16.06.1966	30.06.1966
KONTAKT	90Q1	6607	13.07.1966	23.07.1966
KONTAKT	90Q1	6608	11.08.1966	24.08.1966
KONTAKT	90Q1	6702	14.02.1967	05.03.1967
KONTAKT	90Q1	6706	13.06.1967	22.06.1967
KONTAKT	90Q1	6707	12.07.1967	23.07.1967
KONTAKT	90Q1	7009	22.09.1970	18.10.1970
KONTAKT	90Q1	7101	18.01.1971	26.01.1971
KONTAKT	90Q1	7102	14.02.1971	02.03.1971
KONTAKT	90Q1	7205	12.05.1972	27.05.1972
KONTAKT	90Q1	7208	09.08.1972	20.08.1972
KONTAKT	90Q1	7405	15.05.1974	27.05.1974
KONTAKT	90Q1	7608	05.08.1976	26.08.1976
KONTAKT	90Q1	7707	15.07.1977	28.07.1977
KONTAKT	90Q1	8695	19.03.1963	21.05.1963
KONTAKT	90Q1	8716	20.07.1963	22.07.1963
KONTAKT	90Q1	8788	02.01.1960	25.05.1960
KONTAKT	90Q1	8792	17.02.1962	05.06.1962
KONTAKT	90Q1	8928	17.04.1959	31.05.1959
KONTAKT	90Q1	8929	06.04.1958	12.12.1958
KONTAKT	90Q1	8930	17.09.1958	29.10.1958
KONTAKT	90Q1	8931	26.05.1957	29.05.1957
KONTAKT	90Q1	9701	18.02.1957	05.03.1957
KONTUR	90KO	6405	10.05.1964	23.05.1964
KONTUR	90KO	6707	11.07.1967	20.07.1967
KONTUR	90KO	7004	03.04.1970	23.04.1970
KONTUR	90KO	7005	18.05.1970	25.05.1970
KONTUR	90KO	7011	13.11.1970	06.12.1970
KONTUR	90KO	7012	18.12.1970	19.12.1970
KONTUR	90KO	7206	13.06.1972	24.06.1972
KONTUR	90KO	7207	12.07.1972	26.07.1972
KONTUR	90KO	7211	12.11.1972	06.12.1972
KONTUR	90KO	7705	13.05.1977	27.05.1977
KOVALEVSKY	XXXX	1935	01.02.1935	15.08.1935
KOVALEVSKY	XXXX	9128	31.05.1926	31.05.1926
KRISTALL	90Q3	7103	13.03.1971	29.03.1971
KRISTALL	90Q3	7104	07.04.1971	18.04.1971
KRISTALL	90Q3	7302	16.02.1973	13.03.1973
KRISTALL	90Q3	7306	13.06.1973	20.06.1973
KRISTALL	90Q3	7307	11.07.1973	20.07.1973
KRISTALL	90Q3	7407	10.07.1974	22.07.1974
KRISTALL	90Q3	7408	10.08.1974	23.08.1974
KRISTALL	90Q3	7505	13.05.1975	26.05.1975
KRISTALL	90Q3	7708	18.08.1977	26.08.1977
KRISTALL	90Q3	7807	15.07.1978	30.07.1978
KRISTALL	90Q3	7808	13.08.1978	22.08.1978
KRISTALL	90Q3	7908	16.08.1979	23.08.1979

KRISTALL	90Q3	8782	11.01.1960	11.04.1960
KRISTALL	90Q3	8784	03.01.1961	25.10.1961
KRISTALL	90Q3	8786	26.01.1962	28.06.1962
KRISTALL	90Q3	8941	04.01.1959	04.01.1960
KUMACHEVO	908R	8605	21.05.1986	07.06.1986
KUMACHEVO	908R	9106	30.06.1991	15.07.1991
LEZAVA	909X	87	06.01.1987	28.12.1987
LEZAVA	909X	88	05.01.1988	27.10.1988
LUCH	90QB	8107	09.07.1981	07.08.1981
LUCH	90QB	8305	29.05.1983	06.06.1983
M.MAKLAI	90DK	1009	01.10.1977	20.10.1977
M.MAKLAI	90DK	101	04.10.1980	15.11.1980
M.MAKLAI	90DK	102	28.08.1981	05.09.1981
M.MAKLAI	90DK	103	21.05.1981	08.07.1981
M.MAKLAI	90DK	105	11.10.1981	23.11.1981
M.MAKLAI	90DK	109	22.07.1982	01.09.1982
M.MAKLAI	90DK	111	08.10.1982	10.12.1982
M.MAKLAI	90DK	112	24.03.1983	28.06.1987
M.MAKLAI	90DK	114	25.04.1983	09.06.1983
M.MAKLAI	90DK	115	16.07.1983	03.08.1983
M.MAKLAI	90DK	116	25.09.1983	28.10.1983
M.MAKLAI	90DK	119	09.03.1984	16.06.1984
M.MAKLAI	90DK	120	12.06.1984	22.07.1984
M.MAKLAI	90DK	121	16.05.1984	26.05.1984
M.MAKLAI	90DK	122	03.10.1985	05.11.1985
M.MAKLAI	90DK	128	28.07.1987	02.08.1987
M.MAKLAI	90DK	129	29.05.1987	27.06.1989
M.MAKLAI	90DK	130	12.08.1987	19.08.1987
M.MAKLAI	90DK	136	06.07.1988	13.07.1988
M.MAKLAI	90DK	139	16.09.1988	25.10.1988
M.MAKLAI	90DK	141	17.03.1989	25.04.1989
M.MAKLAI	90DK	142	02.06.1989	06.06.1989
M.MAKLAI	90DK	144	28.06.1989	08.08.1989
M.MAKLAI	90DK	42	09.12.1969	22.12.1969
M.MAKLAI	90DK	47	08.08.1970	13.09.1970
M.MAKLAI	90DK	48	20.10.1970	29.10.1970
M.MAKLAI	90DK	49	07.06.1971	24.06.1971
M.MAKLAI	90DK	51	20.08.1971	30.08.1971
M.MAKLAI	90DK	52	08.03.1972	21.03.1972
M.MAKLAI	90DK	54	23.08.1972	05.09.1972
M.MAKLAI	90DK	57	09.09.1973	09.09.1997
M.MAKLAI	90DK	58	18.11.1973	24.11.1973
M.MAKLAI	90DK	61	26.04.1974	28.04.1974
M.MAKLAI	90DK	62	16.05.1974	03.06.1974
M.MAKLAI	90DK	63	25.06.1974	28.09.1974
M.MAKLAI	90DK	64	25.11.1974	26.11.1974
M.MAKLAI	90DK	66	27.04.1972	27.04.1975
M.MAKLAI	90DK	67	16.05.1975	22.05.1975
M.MAKLAI	90DK	69	18.06.1975	25.06.1975
M.MAKLAI	90DK	70	10.07.1975	12.07.1975
M.MAKLAI	90DK	71	25.07.1975	31.07.1975
M.MAKLAI	90DK	72	18.08.1972	19.08.1975
M.MAKLAI	90DK	73	11.09.1975	20.09.1975
M.MAKLAI	90DK	75	18.09.1975	13.10.1976
M.MAKLAI	90DK	76	11.12.1976	21.12.1976
M.MAKLAI	90DK	77	17.04.1977	28.04.1977
M.MAKLAI	90DK	78	17.05.1977	22.05.1977
M.MAKLAI	90DK	79	13.06.1977	16.06.1977
M.MAKLAI	90DK	80	24.08.1977	03.09.1977

M.MAKLAI	90DK	82	23.11.1977	23.11.1977
M.MAKLAI	90DK	83	14.05.1978	19.05.1978
M.MAKLAI	90DK	84	28.05.1978	12.06.1978
M.MAKLAI	90DK	86	12.07.1978	13.07.1988
M.MAKLAI	90DK	89	21.04.1979	24.04.1979
M.MAKLAI	90DK	90	13.06.1979	24.07.1979
M.MAKLAI	90DK	92	28.09.1979	04.11.1979
M.MAKLAI	90DK	94	31.08.1979	08.09.1979
M.MAKLAI	90DK	97	25.06.1980	12.07.1980
MARLIN	90MR	8108	12.08.1981	22.08.1981
MECHNIKOV	URME	145	28.08.1990	30.09.1990
MECHNIKOV	URME	146	09.08.1991	29.08.1991
MECHNIKOV	URME	147	07.07.1992	12.07.1992
MECHNIKOV	URME	148	09.10.1992	14.10.1992
MERAC	908P	9002	15.02.1990	08.03.1990
MESAHA1	89M1	332	01.11.1996	02.11.1996
MESAHA1	89M1	335	24.01.1997	24.01.1997
MESAHA1	89M1	343	24.10.1997	27.10.1997
MESAHA2	89M2	327	11.04.1996	10.05.1996
MESAHA2	89M2	328	03.06.1996	03.06.1996
MESAHA2	89M2	333	15.12.1996	15.12.1996
MGLA	90MG	277	29.05.1973	01.06.1973
MGLA	90MG	749	15.03.1975	27.04.1975
MGLA	90MG	860	03.07.1975	11.08.1975
MGLA	90MG	77	21.01.1977	31.08.1977
MGLA	90MG	78	18.04.1978	02.10.1978
MGLA	90MG	79	14.03.1979	01.04.1979
MGLA	90MG	8303	08.02.1972	14.02.1972
MGLA	90MG	8586	19.01.1966	29.06.1966
MGLA	90MG	8588	12.08.1967	17.08.1967
MGLA	90MG	8685	10.04.1963	13.05.1963
MGLA	90MG	8687	25.07.1964	26.12.1964
MGLA	90MG	8813	13.01.1961	30.05.1961
MOKSHA	90QF	685	18.06.1985	26.06.1985
MOKSHA	90QF	785	03.07.1985	06.07.1985
MOKSHA	90QF	885	04.04.1985	05.08.1985
MOKSHA	90QF	8207	25.07.1982	22.08.1982
MOKSHA	90QF	8506	18.06.1985	06.07.1985
MOKSHA	90QF	9005	26.05.1990	07.06.1990
MOREVED	90MO	8937	17.06.1957	23.12.1957
MRSR	9099	8509	20.09.1985	30.09.1985
MRSR	9099	8608	02.08.1986	14.08.1986
MUSSON	90MU	200	26.01.1973	26.01.1973
MUSSON	90MU	283	06.05.1974	06.05.1974
MUSSON	90MU	484	13.11.1974	05.02.1975
MUSSON	90MU	648	19.02.1975	19.05.1975
MUSSON	90MU	805	11.06.1975	21.08.1975
MUSSON	90MU	861	09.09.1975	19.11.1975
MUSSON	90MU	918	24.09.1976	25.09.1976
MUSSON	90MU	1047	13.10.1978	21.12.1978
MUSSON	90MU	1085	13.11.1979	10.12.1979
MUSSON	90MU	1136	17.03.1981	22.06.1981
MUSSON	90MU	1153	15.07.1981	03.11.1981
MUSSON	90MU	1168	18.11.1981	23.02.1982
MUSSON	90MU	1268	11.01.1984	11.01.1984
MUSSON	90MU	1293	03.01.1985	03.01.1985
MUSSON	90MU	1303	30.01.1985	13.05.1985
MUSSON	90MU	1335	05.10.1985	22.12.1985
MUSSON	90MU	1360	08.08.1986	09.08.1986

MUSSON	90MU	1418	10.06.1987	26.08.1987
MUSSON	90MU	1450	16.01.1988	25.04.1988
MUSSON	90MU	1461	10.05.1988	11.05.1988
MUSSON	90MU	1490	27.02.1989	27.02.1989
MUSSON	90MU	1546	14.11.1989	14.11.1989
MUSSON	90MU	4142	25.11.1990	25.11.1990
MUSSON	90MU	51A	11.10.1986	19.10.1986
MUSSON	90MU	53	09.02.1987	15.02.1987
MUSSON	90MU	58a	18.03.1989	31.03.1989
MUSSON	90MU	9808	12.04.1977	25.04.1977
MYS OSTROVSKOGO	90DL	8309	13.09.1983	05.10.1983
NEON	XXXX	1.2	06.12.1990	07.12.1990
NEPTUN	URQH	89	04.07.1989	25.12.1989
NEPTUN	URQH	90	08.01.1990	27.12.1990
NEPTUN	URQH	91	08.07.1991	24.12.1991
NEPTUN	URQH	92	10.01.1992	22.12.1992
NEPTUN	URQH	93	05.01.1993	28.12.1993
NEPTUN	URQH	94	05.01.1994	28.12.1994
NEPTUN	URQH	95	05.01.1995	13.12.1995
NEPTUN	URQH	96	09.01.1996	27.12.1996
NEPTUN	URQH	97	08.01.1997	25.12.1997
NEPTUN	URQH	98	19.01.1998	30.06.1998
OKEANOGRAF	90OG	86	23.01.1986	27.12.1986
OSIPENKO	UROS	9205	25.05.1992	10.06.1992
OSIPENKO	UROS	9206	23.06.1992	04.07.1992
OSIPENKO	UROS	9210	22.10.1992	06.11.1992
OSIPENKO	UROS	9310	17.10.1993	21.10.1993
PAMIAT MERKURYA	90BI	7602	10.02.1976	23.02.1976
PASSAT	90PT	217	05.05.1973	01.08.1973
PASSAT	90PT	225	17.08.1973	24.10.1973
PASSAT	90PT	261	12.11.1973	09.02.1974
PASSAT	90PT	751	21.03.1975	17.06.1975
PASSAT	90PT	863	10.10.1975	18.12.1975
PASSAT	90PT	1018	29.11.1977	29.11.1977
PASSAT	90PT	1045	16.09.1978	16.09.1978
PASSAT	90PT	1066	15.05.1979	16.05.1979
PASSAT	90PT	1085	13.01.1980	13.01.1980
PASSAT	90PT	1133	12.02.1981	12.02.1981
PASSAT	90PT	1191	10.04.1982	10.04.1982
PASSAT	90PT	1201	29.06.1982	19.09.1982
PASSAT	90PT	1214	06.10.1982	06.10.1982
PASSAT	90PT	1249	29.07.1983	23.10.1983
PASSAT	90PT	1261	09.11.1983	22.01.1984
PASSAT	90PT	1292	04.10.1984	14.01.1985
PASSAT	90PT	1333	29.12.1985	29.12.1985
PASSAT	90PT	1466	15.09.1988	15.09.1988
PASSAT	90PT	1493	08.01.1989	22.03.1989
PASSAT	90PT	1565	22.02.1990	22.02.1990
PASSAT	90PT	1625	04.06.1991	04.06.1991
PATRIOT	90TB	8809	11.09.1988	19.09.1988
PATRIOT	90TB	8907	29.07.1989	17.08.1989
POISKOVIK	URD4	186	05.01.1986	13.01.1986
POISKOVIK	URD4	583	17.05.1983	08.06.1983
POISKOVIK	URD4	586	13.05.1986	10.06.1986
POISKOVIK	URD4	1185	24.11.1985	26.12.1985
POISKOVIK	URD4	8205	15.05.1982	05.06.1982
POISKOVIK	URD4	8505	15.05.1985	04.06.1985
POISKOVIK	URD4	8511	24.11.1985	13.01.1986
POISKOVIK	URD4	8605	16.05.1986	14.06.1986

POISKOVIK	URD4	8607	02.07.1986	25.07.1986
POISKOVIK	URD4	8708	01.08.1987	11.08.1987
POISKOVIK	URD4	8709	02.09.1987	07.10.1987
POISKOVIK	URD4	8711	27.11.1987	27.12.1987
POISKOVIK	URD4	8801	14.01.1988	05.02.1988
POISKOVIK	URD4	8805	21.05.1988	21.06.1988
POISKOVIK	URD4	8807	14.07.1988	31.07.1988
POISKOVIK	URD4	8811	27.11.1988	22.12.1988
POISKOVIK	URD4	8901	14.01.1989	16.01.1989
POISKOVIK	URD4	8904	06.04.1989	16.04.1989
POISKOVIK	URD4	8905	19.05.1989	13.07.1989
POISKOVIK	URD4	8907	23.07.1989	17.08.1989
POISKOVIK	URD4	9004	15.04.1990	25.04.1990
POISKOVIK	URD4	9005	20.05.1990	09.07.1990
POISKOVIK	URD4	9011	14.11.1990	23.12.1990
POISKOVIK	URD4	9101	15.01.1991	02.02.1991
POISKOVIK	URD4	9102	15.02.1991	09.03.1991
POISKOVIK	URD4	9104	06.04.1991	05.05.1991
POISKOVIK	URD4	9105	21.05.1991	03.07.1991
POISKOVIK	URD4	9201	03.01.1992	15.01.1992
POISKOVIK	URD4	9204	19.04.1992	07.05.1992
POISKOVIK	URD4	9205	16.05.1992	08.06.1992
POISKOVIK	URD4	9309	06.09.1993	14.09.1993
POISKOVIK	URD4	9410	11.10.1994	12.10.1994
POISKOVIK	URD4	9506	12.06.1995	04.07.1995
POISKOVIK	URD4	9507	22.07.1995	04.08.1995
POISKOVIK	URD4	9806	25.06.1998	14.07.1998
POISKOVIK	URD4	9809	08.09.1998	15.09.1998
PORYV	90PB	147	09.04.1972	07.07.1972
PORYV	90PB	213	23.03.1973	23.03.1973
PORYV	90PB	224	11.07.1973	07.10.1973
PRIBOY	90PY	87	24.04.1987	10.11.1987
PRIBOY	90PY	88	14.04.1988	12.11.1988
PRIBOY	90PY	89	25.04.1989	11.10.1989
PRIBOY	90PY	90	04.04.1990	18.10.1990
PRIBOY	90PY	91	02.04.1991	19.09.1991
PROFESSOR VODYANITSKY	90V2	12	12.05.1982	25.05.1982
PROFESSOR VODYANITSKY	90V2	17	07.06.1984	24.10.1984
PROFESSOR VODYANITSKY	90V2	19	07.07.1985	24.07.1985
PROFESSOR VODYANITSKY	90V2	22	08.12.1986	23.12.1986
PROFESSOR VODYANITSKY	90V2	23A	26.05.1987	16.06.1987
PROFESSOR VODYANITSKY	90V2	25	03.12.1987	18.01.1988
PROFESSOR VODYANITSKY	90V2	27	17.07.1988	08.09.1988
PROFESSOR VODYANITSKY	90V2	28	03.04.1989	29.08.1989
PROFESSOR VODYANITSKY	90V2	31	13.06.1990	07.08.1990
PROFESSOR VODYANITSKY	90V2	32	19.08.1990	12.09.1990
PROFESSOR VODYANITSKY	90V2	33	03.06.1991	19.06.1991
PROFESSOR VODYANITSKY	90V2	34	08.08.1991	31.08.1991
PROFESSOR VODYANITSKY	90V2	35	02.11.1991	23.11.1991
PROFESSOR VODYANITSKY	90V2	36	12.01.1992	12.01.1992
PROFESSOR VODYANITSKY	90V2	37	04.07.1992	22.07.1992
PROFESSOR VODYANITSKY	90V2	38	04.08.1991	16.08.1992
PROFESSOR VODYANITSKY	90V2	40	11.10.1991	17.10.1991
PROFESSOR VODYANITSKY	90V2	41	04.04.1993	13.04.1993
PROFESSOR VODYANITSKY	90V2	45	18.06.1994	27.06.1994
PROFESSOR VODYANITSKY	90V2	48	19.07.1995	26.08.1995
PROFESSOR VODYANITSKY	90V2	49	15.04.1997	24.05.1997
PROFESSOR VODYANITSKY	90V2	51	03.05.1998	07.06.1998
PROFESSOR VODYANITSKY	90V2	52	11.09.1998	21.09.1998

RAZVEDCHIKI	URD5	8606	30.06.1986	30.07.1986
RAZVEDCHIKI	URD5	9211	22.11.1992	22.11.1992
REYKA	90QS	74	25.01.1974	26.12.1974
RIFT	90C1	1366	23.09.1985	06.11.1985
RIFT	90C1	1367	19.05.1986	29.06.1986
SEMEN VOLKOV	908C	8802	18.02.1988	19.03.1988
SEVASTOPOLSKY RYBAK	902S	8105	12.05.1981	15.05.1981
SHKVAL	90SK	182	16.06.1972	12.09.1972
SKIF	90C4	683	30.06.1983	30.07.1983
SKIF	90C4	883	12.08.1983	31.08.1983
SKIF	90C4	1077	23.03.1979	29.04.1979
SKIF	90C4	8306	30.06.1983	28.07.1983
SKIF	90C4	8308	12.08.1983	29.08.1983
SREDNYAYA KOSA	9025	585	31.05.1985	19.06.1985
SREDNYAYA KOSA	9025	685	27.06.1985	02.07.1985
SREDNYAYA KOSA	9025	885	05.08.1985	25.08.1985
SREDNYAYA KOSA	9025	985	08.09.1985	04.10.1985
SREDNYAYA KOSA	9025	8408	24.08.1984	10.09.1984
SREDNYAYA KOSA	9025	8508	05.08.1985	25.08.1985
SREDNYAYA KOSA	9025	8509	08.09.1985	18.09.1985
SREDNYAYA KOSA	9025	8705	20.05.1987	09.06.1987
SREDNYAYA KOSA	9025	8707	22.07.1987	02.08.1987
SRTR	90D6	5905	17.05.1959	23.05.1959
SRTR	90D6	5906	29.06.1959	17.07.1959
SRTR	90D6	5911	14.11.1959	28.11.1959
THOMPSON T. G.	31TT	1140	20.02.1970	22.02.1970
THOR	06TA	9117	10.08.1910	11.08.1910
TSHCH-810	XXXX	8973	22.05.1957	29.05.1957
TSIKLON	90JH	90	15.10.1990	20.11.1990
TSIKLON	90JH	91	17.01.1991	17.10.1991
UNKNOWN TURKEY	XXXX	9398	13.09.1993	13.11.1998
V.VOROBYEV	90VV	6805	13.05.1968	22.05.1968
V.VOROBYEV	90VV	6807	01.07.1968	07.07.1968
V.VOROBYEV	90VV	7005	13.05.1970	28.05.1970
V.VOROBYEV	90VV	7006	11.06.1970	27.06.1970
V.VOROBYEV	90VV	7007	12.07.1970	24.07.1970
VICTOR BUGAEV	90VC	581	04.01.1975	01.04.1975
VICTOR BUGAEV	90VC	1012	07.06.1977	23.09.1977
VICTOR BUGAEV	90VC	1037	01.09.1978	01.09.1978
VICTOR BUGAEV	90VC	1056	21.12.1978	22.12.1978
VICTOR BUGAEV	90VC	1128	22.04.1981	22.04.1981
VICTOR BUGAEV	90VC	1206	11.08.1982	11.08.1982
VICTOR BUGAEV	90VC	1272	03.04.1984	04.04.1984
VICTOR BUGAEV	90VC	1286	24.10.1984	24.10.1984
VICTOR BUGAEV	90VC	1328	23.07.1985	24.09.1985
VICTOR BUGAEV	90VC	1387	17.02.1987	17.02.1987
VICTOR BUGAEV	90VC	1489	10.12.1988	10.12.1988
VICTOR BUGAEV	90VC	1507	13.03.1989	16.06.1989
VICTOR BUGAEV	90VC	1522	11.07.1989	22.09.1989
VICTOR BUGAEV	90VC	1543	27.01.1990	28.01.1990
VICTOR BUGAEV	90VC	30	24.04.1982	24.04.1982
VICTOR BUGAEV	90VC	39	29.03.1985	04.07.1985
VICTOR BUGAEV	90VC	4224	18.04.1988	19.04.1988
VICTOR BUGAEV	90VC	42a	01.07.1986	05.07.1986
VICTOR BUGAEV	90VC	54a	19.07.1990	29.07.1990
VICTOR BUGAEV	90VC	54b	21.09.1990	13.10.1990
VICTOR BUGAEV	90VC	56	25.01.1993	18.02.1993
VICTOR BUGAEV	90VC	57	15.09.1993	10.10.1993
VICTOR BUGAEV	90VC	8315	15.11.1974	03.12.1974

VIKHR	90VH	4003	03.02.1972	04.02.1972
VITYAZ	90VI	1085	26.09.1978	30.10.1978
VITYAZ	90VI	1287	22.04.1984	28.05.1984
VITYAZ	90VI	1640	07.11.1991	12.11.1991
VITYAZ	90VI	1670	28.09.1992	14.10.1992
VITYAZ	90VI	1671	28.09.1992	17.10.1992
VLADIMIR PARSHIN	902B	1	25.07.1989	29.07.1989
VLADIMIR PARSHIN	902B	10	30.11.1992	09.12.1992
VLADIMIR PARSHIN	902B	11	05.01.1993	13.01.1993
VLADIMIR PARSHIN	902B	15	20.08.1994	25.08.1994
VLADIMIR PARSHIN	902B	16	05.05.1995	09.05.1995
VLADIMIR PARSHIN	902B	1600	03.11.1990	15.11.1990
VLADIMIR PARSHIN	902B	1630	20.08.1991	23.08.1991
VLADIMIR PARSHIN	902B	2	03.09.1989	28.10.1989
VLADIMIR PARSHIN	902B	3	17.11.1989	23.12.1989
VLADIMIR PARSHIN	902B	4	07.04.1990	08.04.1990
VLADIMIR PARSHIN	902B	4141	11.06.1990	11.06.1990
VLADIMIR PARSHIN	902B	6a	19.12.1990	23.12.1990
VLADIMIR PARSHIN	902B	7b	25.02.1992	04.03.1992
VLADIMIR PARSHIN	902B	8	18.04.1992	30.04.1992
VOLNA	90VB	1362	22.10.1986	23.10.1986
VOLNA	90VB	1389	17.04.1987	19.04.1987
VOLNA	90VB	1417	12.05.1987	03.08.1987
VOLNA	90VB	1430	27.08.1987	24.12.1987
VOLNA	90VB	1451	20.01.1988	20.01.1988
VOLNA	90VB	1480	13.12.1988	13.12.1988
VOLNA	90VB	1506	06.05.1989	06.05.1989
VOLNA	90VB	1584	23.08.1990	25.08.1990
VYDVIZHENETZ	XXXX	735	05.06.1938	25.12.1938
YAKOV GAKKEL	90YG	1001	04.08.1976	07.10.1976
YAKOV GAKKEL	90YG	1010	01.07.1977	15.09.1977
YAKOV GAKKEL	90YG	1041	18.05.1978	15.07.1978
YAKOV GAKKEL	90YG	1043	21.09.1978	27.11.1978
YAKOV GAKKEL	90YG	1048	12.02.1977	09.04.1977
YAKOV GAKKEL	90YG	1086	25.08.1979	21.10.1979
YAKOV GAKKEL	90YG	1131	25.10.1980	22.12.1980
YAKOV GAKKEL	90YG	1142	04.02.1981	03.04.1981
YAKOV GAKKEL	90YG	1158	02.09.1981	30.10.1981
YAKOV GAKKEL	90YG	1192	18.02.1982	16.04.1982
YAKOV GAKKEL	90YG	1207	30.06.1982	12.08.1982
YAKOV GAKKEL	90YG	1212	30.10.1982	25.11.1982
YAKOV GAKKEL	90YG	1223	02.09.1982	14.10.1982
YAKOV GAKKEL	90YG	1253	02.08.1983	02.08.1983
YAKOV GAKKEL	90YG	1254	19.04.1983	13.06.1983
YAKOV GAKKEL	90YG	1280	10.07.1984	18.07.1984
YAKOV GAKKEL	90YG	1288	04.07.1981	14.08.1981
YAKOV GAKKEL	90YG	1291	03.01.1985	05.01.1985
YAKOV GAKKEL	90YG	1327	11.07.1985	11.07.1985
YAKOV GAKKEL	90YG	1330	27.11.1985	29.11.1985
YAKOV GAKKEL	90YG	1347	04.03.1986	06.03.1986
YAKOV GAKKEL	90YG	1361	09.08.1986	22.08.1986
YAKOV GAKKEL	90YG	1386	01.01.1987	10.02.1987
YAKOV GAKKEL	90YG	1409	02.07.1983	19.07.1983
YAKOV GAKKEL	90YG	1424	31.08.1987	26.10.1987
YAKOV GAKKEL	90YG	1432	13.11.1987	27.12.1987
YAKOV GAKKEL	90YG	1456	04.03.1988	24.06.1988
YAKOV GAKKEL	90YG	1559	26.01.1985	11.02.1985
YAKOV GAKKEL	90YG	1560	26.02.1985	24.03.1985
YAKOV GAKKEL	90YG	1561	18.05.1985	19.06.1985

YAKOV GAKKEL	90YG	1562	29.10.1985	12.11.1985
YAKOV GAKKEL	90YG	1563	08.02.1986	21.02.1986
YAKOV GAKKEL	90YG	1660	11.11.1989	12.11.1989
YAKOV GAKKEL	90YG	28B	18.06.1987	06.07.1987
YAKOV GAKKEL	90YG	33	22.02.1989	10.04.1989
YAKOV GAKKEL	90YG	34A	01.07.1989	26.07.1989
YAKOV GAKKEL	90YG	35a	02.12.1989	17.12.1989
YAKOV GAKKEL	90YG	36	23.01.1990	12.04.1990
YAKOV GAKKEL	90YG	38A	30.11.1990	14.12.1990
YAKOV GAKKEL	90YG	38B	07.09.1991	28.09.1991
YUNAUA SMENA	908Q	9005	17.05.1990	09.06.1990
ZAPOROZHETZ	90B5	1891	04.08.1891	27.08.1891
ZELEZNIY POTOK	90WE	8705	20.05.1987	19.06.1987
ZELEZNIY POTOK	90WE	8707	31.07.1987	27.08.1987
ZELEZNIY POTOK	90WE	8709	08.09.1987	11.09.1987
ZELEZNIY POTOK	90WE	8805	15.05.1988	06.06.1988
ZELEZNIY POTOK	90WE	8807	23.07.1988	19.08.1988
ZELEZNIY POTOK	90WE	8810	13.10.1988	03.11.1988
ZELEZNIY POTOK	90WE	8811	17.11.1988	11.12.1988
ZHELEZNYAKOV	9026	1283	18.12.1983	24.12.1983
ZHELEZNYAKOV	9026	8104	09.04.1981	19.04.1981
ZHELEZNYAKOV	9026	8105	11.05.1981	16.05.1981
ZHELEZNYAKOV	9026	8311	20.11.1983	27.12.1983
ZHELEZNYAKOV	9026	8401	14.01.1984	04.02.1984
ZHELEZNYAKOV	9026	8404	19.04.1984	05.05.1984
ZHELEZNYAKOV	9026	8502	14.02.1985	12.03.1985
ZHELEZNYAKOV	9026	8505	22.05.1985	07.06.1985
AKADEMIK VERNADSKY	90VE	13	13.06.1977	16.06.1977
AKADEMIK VERNADSKY	90VE	14	17.12.1976	19.12.1976
AKADEMIK VERNADSKY	90VE	14 1	20.03.1977	28.03.1977
AKADEMIK VERNADSKY	90VE	15	13.06.1977	17.06.1977
AKADEMIK VERNADSKY	90VE	23 1	05.11.1980	01.12.1980
AKADEMIK VERNADSKY	90VE	27 1	26.05.1983	29.06.1983
AKADEMIK VERNADSKY	90VE	28	29.11.1983	11.05.1984
AKADEMIK VERNADSKY	90VE	29 1	16.06.1984	14.07.1984
AKADEMIK VERNADSKY	90VE	31	12.10.1985	30.10.1985
AKADEMIK VERNADSKY	90VE	33	30.05.1986	30.05.1986
AKADEMIK VERNADSKY	90VE	34 1	14.06.1986	30.07.1986
AKADEMIK VERNADSKY	90VE	37 1	05.04.1988	19.04.1988
AKADEMIK VERNADSKY	90VE	37 2	27.04.1988	07.05.1988
AKADEMIK VERNADSKY	90VE	37 3	17.05.1988	23.05.1988
AKADEMIK VERNADSKY	90VE	37 4	08.06.1988	27.06.1988
AKADEMIK VERNADSKY	90VE	44	09.05.1992	16.05.1992
AKADEMIK VERNADSKY	90VE	6 1	11.07.1972	10.08.1972
AKADEMIK VERNADSKY	90VE	7 1	17.03.1973	05.04.1973
AKADEMIK VERNADSKY	90VE	8 1	03.11.1973	24.11.1973
AKADEMIK VERNADSKY	90VE	9	10.10.1974	11.10.1974
AYTODOR	90AY	2	06.06.1979	26.06.1979
AYTODOR	90AY	3 1	27.03.1982	25.04.1982
AYTODOR	90AY	3 A	15.07.1979	07.08.1979
AYTODOR	90AY	4	04.07.1982	07.08.1982
AYTODOR	90AY	5 1	02.09.1982	11.11.1982
EKSPERIMENT	UREX	1	01.09.1995	28.09.1995
KIEV	URKI	1	19.12.1994	20.12.1994
KIEV	URKI	2	20.01.1995	23.01.1995
KIEV	URKI	3	05.04.1995	09.04.1995
KIEV	URKI	4	02.08.1995	20.08.1995
KIEV	URKI	5	12.11.1995	01.12.1995
MIKHAIL LOMONOSOV	90ML	10	09.03.1961	09.03.1961

MIKHAIL LOMONOSOV	90ML	14	13.08.1963	27.11.1963
MIKHAIL LOMONOSOV	90ML	15	19.04.1964	01.08.1964
MIKHAIL LOMONOSOV	90ML	16	20.08.1964	16.09.1964
MIKHAIL LOMONOSOV	90ML	17	16.11.1964	16.11.1964
MIKHAIL LOMONOSOV	90ML	18	01.10.1965	02.10.1965
MIKHAIL LOMONOSOV	90ML	19	30.04.1966	01.05.1966
MIKHAIL LOMONOSOV	90ML	21 1	23.03.1968	05.04.1968
MIKHAIL LOMONOSOV	90ML	22	26.12.1968	26.12.1968
MIKHAIL LOMONOSOV	90ML	22 1	31.10.1968	03.11.1968
MIKHAIL LOMONOSOV	90ML	24	09.04.1970	09.04.1970
MIKHAIL LOMONOSOV	90ML	25	30.07.1970	30.07.1970
MIKHAIL LOMONOSOV	90ML	27	15.12.1972	15.12.1972
MIKHAIL LOMONOSOV	90ML	30	18.04.1976	25.08.1976
MIKHAIL LOMONOSOV	90ML	32	05.06.1977	29.09.1977
MIKHAIL LOMONOSOV	90ML	33	04.02.1978	10.02.1978
MIKHAIL LOMONOSOV	90ML	35	27.07.1978	21.08.1978
MIKHAIL LOMONOSOV	90ML	43 1	07.09.1984	16.09.1984
MIKHAIL LOMONOSOV	90ML	43 2	12.10.1984	17.11.1984
MIKHAIL LOMONOSOV	90ML	44 1	08.06.1985	17.06.1985
MIKHAIL LOMONOSOV	90ML	44 2	20.06.1985	01.08.1985
MIKHAIL LOMONOSOV	90ML	44 3	07.08.1985	14.09.1985
MIKHAIL LOMONOSOV	90ML	44 4	18.10.1985	29.10.1985
MIKHAIL LOMONOSOV	90ML	49 1	06.03.1988	27.03.1988
MIKHAIL LOMONOSOV	90ML	51	12.11.1989	14.12.1989
MIKHAIL LOMONOSOV	90ML	53	15.06.1990	25.06.1990
MIKHAIL LOMONOSOV	90ML	53 A	26.09.1990	02.11.1990
MIKHAIL LOMONOSOV	90ML	54	19.11.1991	12.12.1991
MIKHAIL LOMONOSOV	90ML	55	01.10.1992	05.10.1992
MIKHAIL LOMONOSOV	90ML	9	05.10.1960	25.10.1960
PROFESSOR KOLESNIKOV	90CK	10	03.02.1985	07.02.1985
PROFESSOR KOLESNIKOV	90CK	11	07.03.1985	15.03.1985
PROFESSOR KOLESNIKOV	90CK	12 1	27.07.1985	30.07.1985
PROFESSOR KOLESNIKOV	90CK	12 2	02.09.1985	14.10.1985
PROFESSOR KOLESNIKOV	90CK	14 1	08.08.1986	01.11.1986
PROFESSOR KOLESNIKOV	90CK	14 2	21.11.1986	25.12.1986
PROFESSOR KOLESNIKOV	90CK	16	08.07.1987	14.07.1987
PROFESSOR KOLESNIKOV	90CK	17 1	03.10.1987	25.10.1987
PROFESSOR KOLESNIKOV	90CK	17 2	13.11.1987	19.12.1987
PROFESSOR KOLESNIKOV	90CK	18	11.04.1988	25.05.1988
PROFESSOR KOLESNIKOV	90CK	19	03.08.1988	16.08.1988
PROFESSOR KOLESNIKOV	90CK	20	17.11.1988	03.03.1989
PROFESSOR KOLESNIKOV	90CK	21	01.04.1989	13.05.1989
PROFESSOR KOLESNIKOV	90CK	22 1	06.06.1989	14.06.1989
PROFESSOR KOLESNIKOV	90CK	22 2	17.06.1989	10.07.1989
PROFESSOR KOLESNIKOV	90CK	23	05.08.1989	01.10.1989
PROFESSOR KOLESNIKOV	90CK	25	29.08.1990	11.09.1990
PROFESSOR KOLESNIKOV	90CK	27 1	18.06.1991	23.06.1991
PROFESSOR KOLESNIKOV	90CK	27 2	05.07.1991	12.07.1991
PROFESSOR KOLESNIKOV	90CK	27 3	20.07.1991	23.08.1991
PROFESSOR KOLESNIKOV	90CK	28	08.09.1991	14.10.1991
PROFESSOR KOLESNIKOV	90CK	29	01.07.1992	02.08.1992
PROFESSOR KOLESNIKOV	90CK	30	04.04.1993	29.04.1993
PROFESSOR KOLESNIKOV	90CK	31	19.11.1993	12.01.1994
PROFESSOR KOLESNIKOV	90CK	32	26.11.1994	26.12.1994
PROFESSOR KOLESNIKOV	90CK	33	17.03.1995	05.04.1995
PROFESSOR KOLESNIKOV	90CK	5 2	30.12.1982	06.01.1983
PROFESSOR KOLESNIKOV	90CK	6 2	02.08.1983	22.08.1983
PROFESSOR KOLESNIKOV	90CK	7	02.09.1983	11.11.1983
PROFESSOR KOLESNIKOV	90CK	9	21.06.1984	21.09.1984

TREPANG	URTR	10	17.05.1992	23.05.1992
TREPANG	URTR	15	21.10.1993	07.11.1993
TREPANG	URTR	16	07.06.1996	22.06.1996
TREPANG	URTR	9	19.03.1992	28.03.1992
AKADEMIK SIDORENKO	XXXX	1993	30.04.1993	12.05.1993
AKVANAVT	90KC	10	24.08.1994	07.09.1994
AKVANAVT	90KC	11	11.09.1994	19.09.1994
AKVANAVT	90KC	12	30.09.1994	06.10.1994
AKVANAVT	90KC	12A	14.10.1994	19.10.1994
AKVANAVT	90KC	13	18.03.1995	31.03.1995
AKVANAVT	90KC	1988	20.04.1988	23.04.1988
AKVANAVT	90KC	2	27.03.1990	25.04.1990
AKVANAVT	90KC	3	13.05.1990	31.05.1990
AKVANAVT	90KC	4	15.08.1990	18.08.1990
AKVANAVT	90KC	5	13.06.1991	03.07.1991
AKVANAVT	90KC	6	03.10.1992	10.10.1992
AKVANAVT	90KC	7	26.05.1993	27.05.1993
AKVANAVT	90KC	8	16.06.1993	17.06.1993
AKVANAVT	90KC	9	26.05.1994	11.06.1994
ATLANTIS II	31AN	1969	22.03.1969	30.04.1969
BILIM	89BL	1986	25.01.1986	30.09.1986
BILIM	89BL	1987	21.04.1987	28.08.1987
BILIM	89BL	1988	07.06.1988	12.09.1988
BILIM	89BL	1989	10.01.1989	04.12.1989
BILIM	89BL	1990	08.02.1990	04.10.1990
BILIM	89BL	1991	01.06.1991	23.09.1991
BILIM	89BL	1992	06.01.1992	26.07.1992
BILIM	89BL	1993	02.04.1993	20.12.1993
BILIM	89BL	1994	24.04.1994	15.05.1994
BILIM	89BL	1995	18.03.1995	10.04.1995
DONUZLAV	XXXX	1995	23.07.1995	26.07.1995
GYDROOPTIK	90B8	25	02.05.1994	15.05.1994
KNORR	316N	1988	21.04.1988	27.07.1988
PEKTAS	XXXX	1957	30.06.1957	07.08.1957
PROFESSOR SHTOCKMAN	90P4	5	03.03.1981	23.03.1981
PROFESSOR VODYANITSKY	90V2	20	22.01.1986	27.01.1986
PROFESSOR VODYANITSKY	90V2	20B	14.03.1986	25.03.1986
RIFT	90C1	7	22.09.1985	08.11.1985
RIFT	90C1	8	28.05.1986	20.06.1986
RMRI	XXXX	1993	25.03.1993	15.04.1993
RMRI	XXXX	1994	15.04.1994	05.05.1994
RMRI	XXXX	1995	01.03.1995	31.03.1995
RMRI	XXXX	60E	18.02.1963	12.11.1969
RMRI	XXXX	7075E	20.04.1970	12.12.1975
RMRI	XXXX	70S	02.03.1971	14.10.1974
RMRI	XXXX	7680E	20.01.1976	12.12.1980
RMRI	XXXX	7780D	22.04.1977	02.09.1980
RMRI	XXXX	80S	11.02.1981	23.06.1985
RMRI	XXXX	8184E	11.02.1981	07.12.1984
RMRI	XXXX	8491L	14.05.1984	25.10.1989
RMRI	XXXX	8589E	01.02.1985	16.06.1989
RMRI	XXXX	9095D	10.07.1991	20.10.1995
RMRI	XXXX	90E	15.03.1990	28.06.1995
RMRI	XXXX	90S	20.03.1991	08.09.1995
RMRI	XXXX	9495	22.04.1994	26.04.1994
YANTAR	XXXX	1989	09.02.1989	23.03.1989
YANTAR	XXXX	1995	18.03.1995	07.09.1995
YANTAR	XXXX	1996A	25.06.1996	06.07.1996
YANTAR	XXXX	1996B	21.03.1996	06.04.1996

YANTAR	XXXX	1996C	29.08.1996	29.08.1996
YUGMORGEO	XXXX	1996	01.09.1996	08.09.1996
CALYPSO	35CA	1955	07.08.1955	08.08.1955
CHAIN	31CI	20	18.10.1961	18.10.1961
PIRI	XXXX	1992	04.07.1992	18.07.1992
PIRI	XXXX	1993	02.04.1993	15.04.1993
PIRI	XXXX	1995	19.03.1995	21.03.1995
THOR	06TA	1910	11.08.1910	11.08.1910
UNKNOWN	XXXX	1923	15.06.1923	25.11.1923
UNKNOWN	XXXX	1924	04.01.1924	02.12.1924
UNKNOWN	XXXX	1925	06.01.1925	28.12.1925
UNKNOWN	XXXX	1926	16.01.1926	22.12.1926
UNKNOWN	XXXX	1927	23.06.1927	03.11.1927
UNKNOWN	XXXX	1957	23.12.1957	24.12.1957
UNKNOWN	XXXX	1958	10.03.1958	11.03.1958
UNKNOWN	XXXX	1972	18.09.1972	16.12.1972
UNKNOWN	XXXX	1973	07.07.1973	22.12.1973
UNKNOWN	XXXX	1974	19.03.1974	16.11.1974
UNKNOWN	XXXX	1975	11.02.1975	12.02.1975
UNKNOWN	XXXX	1976	07.02.1976	10.09.1976
UNKNOWN	XXXX	1977	12.09.1977	21.12.1977
UNKNOWN	XXXX	1978	15.01.1978	06.12.1978
UNKNOWN	XXXX	1979	13.02.1979	18.10.1979
UNKNOWN	XXXX	1980	12.04.1980	21.10.1980
UNKNOWN	XXXX	1981	10.10.1981	22.10.1981
UNKNOWN	XXXX	1982	16.01.1982	21.01.1982
UNKNOWN	XXXX	1983	20.09.1983	22.12.1983
UNKNOWN	XXXX	1984	27.05.1984	10.09.1984
UNKNOWN	XXXX	1995	29.06.1995	07.08.1995
VITYAZ	90VI	15b	05.03.1988	25.03.1988
VITYAZ	90VI	21	09.02.1991	07.04.1991
VITYAZ	90VI	27	03.11.1993	16.11.1993
A.ZERNOV	XXXX	1937	09.05.1937	10.12.1937
A.ZERNOV	XXXX	1948	11.06.1948	25.07.1948
BEREZAN	XXXX	1975	15.02.1975	08.03.1975
BO201	XXXX	1949	24.08.1949	14.09.1949
CHEKIST	XXXX	1949	25.08.1949	30.11.1949
DANILEVSKIY	XXXX	1948	30.11.1948	30.11.1948
DELTA	XXXX	1948	03.12.1948	12.12.1948
DELTA	XXXX	1949	29.09.1949	27.12.1949
DONUZLAV	XXXX	1992	01.04.1992	10.08.1992
DONUZLAV	XXXX	1993	25.02.1993	16.07.1993
DOOB	XXXX	1954	18.06.1954	03.07.1954
DOROTEYA	XXXX	1929	11.02.1929	15.02.1929
DREIF	XXXX	1950	04.05.1950	27.09.1950
EKVATOR	90EK	1975	01.08.1975	21.08.1975
G727	XXXX	1958	12.08.1958	17.09.1958
G728	XXXX	1957	08.06.1957	10.06.1957
G731	XXXX	1952	04.07.1952	30.09.1952
G734	XXXX	1954	20.04.1954	14.10.1954
GARPUN	XXXX	1948	01.11.1948	03.12.1948
GIDROLOG	XXXX	1982	09.04.1982	02.07.1982
GK32	XXXX	1948	03.08.1948	12.08.1948
GLUBINA	XXXX	1938	30.06.1938	07.12.1938
GLUBINA	XXXX	1949	22.09.1949	27.12.1949
GLUBOMETR	XXXX	1948	19.08.1948	31.08.1948
GLUBOMETR	XXXX	1949	23.08.1949	18.09.1949
GMS42	XXXX	1945	17.07.1945	18.07.1945
GORIZONT	90GO	1963	28.09.1963	11.10.1963

GORIZONT	90GO	1965	05.03.1965	30.10.1965
GORIZONT	90GO	1975	08.08.1975	25.08.1975
GORIZONT	90GO	1976	19.11.1976	16.12.1976
GORIZONT	90GO	1979	09.05.1979	08.06.1979
GORIZONT	90GO	2	07.05.1998	04.06.1998
GPB165	XXXX	1957	30.10.1957	02.11.1957
GPB329	XXXX	1954	18.06.1954	13.07.1954
GPB512	XXXX	1954	26.07.1954	26.08.1954
GPB512	XXXX	1955	29.08.1955	10.09.1955
GPB512	XXXX	1956	08.08.1956	28.10.1956
GPB512	XXXX	1957	23.03.1957	24.03.1957
GRAD	XXXX	1940	11.06.1940	19.12.1940
GRAD	XXXX	1941	09.02.1941	19.06.1941
GRUNT	XXXX	1955	15.07.1955	19.07.1955
GS-402	XXXX	1982	09.02.1982	22.02.1982
GUIS	XXXX	1938	12.06.1938	28.11.1938
GUIS	XXXX	1939	14.04.1939	11.09.1939
GUIS	XXXX	1940	23.03.1940	13.07.1940
GUIS	XXXX	1941	23.03.1941	19.06.1941
GUIS	XXXX	1954	19.01.1954	21.12.1954
KOVALEVSKY	XXXX	1922	01.03.1922	25.11.1922
KOVALEVSKY	XXXX	1924	08.01.1924	27.12.1924
KOVALEVSKY	XXXX	1928	20.01.1928	15.12.1928
KOVALEVSKY	XXXX	1933	01.08.1933	19.10.1933
KT526	XXXX	1951	18.01.1951	03.02.1951
KT782	XXXX	1951	10.07.1951	26.08.1951
LIMAN	XXXX	1975	06.04.1975	13.04.1975
MK248	XXXX	1948	04.06.1948	15.07.1948
MO422	XXXX	1948	06.08.1948	12.08.1948
OGNEVOY	XXXX	1950	25.10.1950	30.10.1950
OKEAN	90OK	1975	07.08.1975	08.12.1975
OKEANOLOG	90OC	1950	16.06.1950	28.06.1950
PAMIAT MERKURYA	90BI	1976	20.11.1976	02.12.1976
PAMIAT MERKURYA	90BI	1982	05.06.1982	28.06.1982
PERVOYE MAYA	90PM	1923	25.11.1923	30.11.1923
PERVOYE MAYA	90PM	1929	03.05.1929	11.11.1929
PERVOYE MAYA	90PM	1930	29.04.1930	22.07.1930
PERVOYE MAYA	90PM	1931	11.06.1931	14.07.1931
PERVOYE MAYA	90PM	1932	06.06.1932	11.09.1932
RADUGA	90RA	1949	28.04.1949	26.07.1949
RATMANOV	XXXX	1950	01.08.1950	15.10.1950
REIS	XXXX	1950	21.07.1950	28.07.1950
RIF	XXXX	1947	26.06.1947	28.06.1947
RIF	XXXX	1948	05.03.1948	30.10.1948
RIF	XXXX	1949	27.09.1949	30.09.1949
RIF	XXXX	1963	07.01.1963	15.11.1963
RIF	XXXX	1965	07.05.1965	10.12.1965
RIF	XXXX	1967	25.03.1967	07.05.1967
RIF	XXXX	1970	09.01.1970	05.12.1970
RIF	XXXX	1971	21.01.1971	17.11.1971
RIF	XXXX	1972	03.08.1972	20.08.1972
RIF	XXXX	1978	10.09.1978	01.10.1978
RK715	XXXX	1951	08.09.1951	21.12.1951
RK715	XXXX	1952	04.01.1952	31.10.1952
RK715	XXXX	1953	12.01.1953	08.12.1953
RK715	XXXX	1954	23.04.1954	17.09.1954
RK727	XXXX	1953	16.07.1953	30.07.1953
RUMB	XXXX	1949	13.09.1949	27.12.1949
RUMB	XXXX	1950	24.04.1950	06.06.1950

RUMB	XXXX	1951	11.05.1951	30.06.1951
SAMORODOK	90SA	1923	24.05.1923	26.08.1923
SHKHUNA	XXXX	1940	15.05.1940	24.06.1940
T199	XXXX	1947	22.10.1947	12.12.1947
T202	XXXX	1951	26.07.1951	27.07.1951
T711	XXXX	1955	27.05.1955	27.12.1955
T914	XXXX	1949	13.09.1949	13.10.1949
T917	XXXX	1949	24.08.1949	14.09.1949
T924	XXXX	1950	14.09.1950	05.12.1950
TSHCH-190	XXXX	1950	23.10.1950	25.10.1950
TSHCH-743	XXXX	1955	14.09.1955	30.09.1955
TSHCH-783	XXXX	1955	22.05.1955	09.06.1955
TUMAN	XXXX	1948	02.11.1948	03.12.1948
TUMAN	XXXX	1949	16.08.1949	07.09.1949
VASILYI GOLOVNIN	90VG	1975	30.03.1975	24.08.1975
VOSTOK	XXXX	1948	12.11.1948	30.11.1948
VOSTOK	XXXX	1950	30.05.1950	30.12.1950
VOSTOK	XXXX	1951	10.02.1951	23.06.1951
ZAPAD	XXXX	1948	26.06.1948	23.07.1948
ZAPAD	XXXX	1949	09.07.1949	30.07.1949
ZAPAD	XXXX	1950	21.09.1950	26.09.1950
ZAPAD	XXXX	1951	20.04.1951	30.12.1951
ZAPAD	XXXX	1952	02.07.1952	03.07.1952
ZENIT	XXXX	1937	16.05.1937	18.09.1937
ZENIT	XXXX	1948	03.09.1948	11.09.1948
ZENIT	XXXX	1949	24.05.1949	30.05.1949
ZENIT	XXXX	1950	12.05.1950	25.10.1950
ZENIT	XXXX	1951	20.01.1951	02.04.1951
ZYUID-WEST	XXXX	1934	06.05.1934	20.09.1934
ZYUID-WEST	XXXX	1940	29.02.1940	31.12.1940
PROFESSOR VODYANITSKY	90V2	55	11.07.2000	10.10.2000
PROFESSOR VODYANITSKY	90V2	9	20.08.1980	18.09.1980
BATUMI HMS	XXXX	1935	28.03.1935	26.12.1935
BATUMI HMS	XXXX	1936	28.01.1936	15.10.1936
BATUMI HMS	XXXX	1937	25.03.1937	17.08.1937
BATUMI HMS	XXXX	1939	26.03.1939	27.12.1939
BATUMI HMS	XXXX	1940	07.02.1940	24.02.1940
BATUMI HMS	XXXX	1955	20.09.1955	29.09.1955
BURUN	XXXX	1980	18.05.1980	11.07.1980
BURUN	XXXX	1983	17.04.1983	25.10.1983
BURUN	XXXX	1986	29.05.1986	05.11.1986
GALS	9065	1938	02.04.1938	06.11.1938
GALS	9065	1939	01.09.1939	16.09.1939
GALS	9065	1953	03.10.1953	16.10.1953
GALS	9065	1954	27.05.1954	29.12.1954
GALS	9065	1955	16.01.1955	29.11.1955
GALS	9065	1970	20.05.1970	27.11.1970
GALS	9065	1971	19.05.1971	17.11.1971
GALS	9065	1973	23.03.1973	30.11.1973
GALS	9065	1974	12.02.1974	19.11.1974
GALS	9065	1975	02.01.1975	22.11.1975
GALS	9065	1976	28.01.1976	13.11.1976
GALS	9065	1977	11.01.1977	06.12.1977
GALS	9065	1978	15.02.1978	03.06.1978
GALS	9065	1979	31.01.1979	24.10.1979
GALS	9065	1980	19.03.1980	18.11.1980
GALS	9065	1981	13.01.1981	20.10.1981
GALS	9065	1982	30.03.1982	24.10.1982
GALS	9065	1983	12.01.1983	22.10.1983

GALS	9065	1984	14.05.1984	23.10.1984
GALS	9065	1985	25.05.1985	27.10.1985
GALS	9065	1986	13.05.1986	04.11.1986
GIDROZOND	XXXX	1963	30.01.1963	19.04.1963
GIDROZOND	XXXX	1967	19.08.1967	13.11.1967
GLOBUS	XXXX	1960	18.05.1960	16.11.1960
GORIZONT	XXXX	1957	01.11.1957	19.11.1957
GORIZONT	XXXX	1958	15.01.1958	24.06.1958
GORIZONT	XXXX	1960	08.01.1960	29.11.1960
GORIZONT	XXXX	1961	29.03.1961	07.12.1961
GROM	XXXX	1960	14.04.1960	12.12.1960
IHTIANDR	XXXX	1993	03.02.1993	18.02.1993
ISSLEDOVATEL	XXXX	1960	07.12.1960	22.12.1960
IZOGALINA	XXXX	1960	07.01.1960	23.12.1960
KERCH HMS	XXXX	1956	02.06.1956	23.09.1956
KRYMMORGEO	XXXX	2001	24.05.2001	26.05.2001
LEZAVA	909X	1981	13.06.1981	25.06.1981
LEZAVA	909X	1982	24.02.1982	15.12.1982
LEZAVA	909X	1984	05.01.1984	25.12.1984
LEZAVA	909X	1985	04.01.1985	27.12.1985
LEZAVA	909X	1986	06.01.1986	26.12.1986
MERIDIAN	XXXX	1980	25.03.1980	30.03.1980
MERKURIY	XXXX	1975	24.01.1975	24.12.1975
MERKURIY	XXXX	1976	06.01.1976	27.12.1976
MERKURIY	XXXX	1977	22.01.1977	17.12.1977
MERKURIY	XXXX	1978	04.01.1978	30.10.1978
METEL	XXXX	1988	05.07.1988	25.09.1988
MGLA	90MG	1960	23.02.1960	17.12.1960
MGLA	90MG	1963	28.09.1963	16.10.1963
MGLA	90MG	1965	21.01.1965	22.04.1965
MGLA	90MG	1969	17.02.1969	10.09.1969
MGLA	90MG	1972	02.08.1972	18.08.1972
MGLA	90MG	1973	12.03.1973	30.11.1973
MGLA	90MG	1974	02.06.1974	06.10.1974
MGLA	90MG	1975	06.03.1975	07.10.1975
MGLA	90MG	1976	16.12.1976	25.12.1976
MGLA	90MG	1977	19.11.1977	15.12.1977
MGLA	90MG	1978	12.01.1978	25.01.1978
MOREVED	90MO	1957	30.07.1957	02.10.1957
MOREVED	90MO	1969	03.01.1969	05.12.1969
MUKSUN	XXXX	1980	06.09.1980	30.09.1980
NAUKA	90NH	1970	10.02.1970	11.11.1970
NAUKA	90NH	1973	13.02.1973	13.11.1973
NAUKA	90NH	1974	13.02.1974	01.11.1974
NAUKA	90NH	1975	14.02.1975	19.11.1975
NAUKA	90NH	1976	22.01.1976	19.11.1976
NAUKA	90NH	1977	12.01.1977	08.12.1977
NAUKA	90NH	1978	19.01.1978	05.10.1978
NAUKA	90NH	1979	09.09.1979	22.11.1979
NAUKA	90NH	1980	14.01.1980	16.12.1980
NAUKA	90NH	1983	07.01.1983	23.12.1983
NEPTUN	URQH	1972	16.02.1972	13.10.1972
NEPTUN	URQH	1973	05.02.1973	26.10.1973
NEPTUN	URQH	1974	17.01.1974	20.12.1974
NEPTUN	URQH	1975	15.01.1975	17.11.1975
NEPTUN	URQH	1976	08.01.1976	20.11.1976
NEPTUN	URQH	1977	12.01.1977	17.12.1977
NEPTUN	URQH	1981	11.05.1981	27.12.1981
NEPTUN	URQH	1982	14.01.1982	22.12.1982

NEPTUN	URQH	1983	12.01.1983	16.09.1983
NEPTUN	URQH	1986	06.01.1986	25.12.1986
NEPTUN	URQH	2000	11.07.2000	15.07.2000
OCHAKOV HMS	XXXX	1940	23.07.1940	12.12.1940
ODESSA HMS	XXXX	1934	15.07.1934	16.09.1934
ODESSA HMS	XXXX	1935	29.09.1935	20.12.1935
ODESSA HMS	XXXX	1938	22.04.1938	23.09.1938
ODESSA HMS	XXXX	1939	17.04.1939	21.10.1939
ODESSA HMS	XXXX	1940	10.04.1940	11.12.1940
ODESSA HMS	XXXX	1947	27.05.1947	21.08.1947
ODESSA HMS	XXXX	1948	14.10.1948	14.10.1948
ODESSA HMS	XXXX	1949	05.03.1949	02.07.1949
ODESSA HMS	XXXX	1950	17.03.1950	28.03.1950
ODESSA HMS	XXXX	1951	21.06.1951	24.10.1951
ODESSA HMS	XXXX	1957	07.04.1957	29.10.1957
OKEANOGRAF	90OG	1960	03.06.1960	03.11.1960
OKEANOGRAF	90OG	1962	23.01.1962	14.12.1962
OKEANOGRAF	90OG	1973	29.01.1973	24.11.1973
OKEANOGRAF	90OG	1978	03.01.1978	31.05.1978
OKEANOGRAF	90OG	1980	11.08.1980	19.12.1980
OKEANOGRAF	90OG	1987	05.01.1987	20.12.1987
OKEANOGRAF	90OG	1988	04.01.1988	28.12.1988
PORYV	90PB	1975	24.04.1975	26.12.1975
PORYV	90PB	1976	29.01.1976	20.10.1976
PORYV	90PB	3	01.08.1972	30.10.1972
PRIBOY	90PY	1965	08.07.1965	18.11.1965
PRIBOY	90PY	1970	10.07.1970	08.12.1970
PRIBOY	90PY	1971	25.05.1971	29.10.1971
PRIBOY	90PY	1972	14.05.1972	29.05.1972
PRIBOY	90PY	1973	25.04.1973	30.10.1973
PRIBOY	90PY	1974	26.04.1974	14.11.1974
PRIBOY	90PY	1975	19.06.1975	02.10.1975
PRIBOY	90PY	1976	12.05.1976	19.11.1976
PRIBOY	90PY	1977	19.04.1977	28.11.1977
PRIBOY	90PY	1978	10.04.1978	23.11.1978
PRIBOY	90PY	1979	23.05.1979	30.11.1979
PRIBOY	90PY	1980	03.08.1980	21.08.1980
PRIBOY	90PY	1981	12.05.1981	17.10.1981
PRIBOY	90PY	1982	02.04.1982	10.11.1982
PRIBOY	90PY	1983	01.04.1983	27.11.1983
PRIBOY	90PY	1984	17.04.1984	15.11.1984
PRIBOY	90PY	1986	17.04.1986	17.11.1986
PRILIV	90PI	2	21.03.1970	21.03.1970
RASSVET	XXXX	1960	07.12.1960	19.12.1960
REYKA	90QS	1940	30.05.1940	29.12.1940
REYKA	90QS	1941	15.05.1941	19.06.1941
REYKA	90QS	1948	10.06.1948	25.11.1948
REYKA	90QS	1954	27.06.1954	13.07.1954
REYKA	90QS	1960	21.01.1960	27.12.1960
REYKA	90QS	1962	12.01.1962	30.11.1962
REYKA	90QS	1963	01.02.1963	10.04.1963
REYKA	90QS	1965	15.01.1965	22.12.1965
REYKA	90QS	1970	16.01.1970	28.12.1970
REYKA	90QS	1973	03.01.1973	25.12.1973
SEVASTOPOL HMS	XXXX	1922	14.10.1922	19.10.1922
SEVASTOPOL HMS	XXXX	1923	01.03.1923	28.12.1923
SEVASTOPOL HMS	XXXX	1926	05.01.1926	24.12.1926
SEVASTOPOL HMS	XXXX	1929	15.01.1929	27.12.1929
SEVASTOPOL HMS	XXXX	1930	17.01.1930	09.04.1930

SEVASTOPOL HMS	XXXX	1931	14.06.1931	21.10.1931
SEVASTOPOL HMS	XXXX	1934	29.01.1934	17.12.1934
SEVASTOPOL HMS	XXXX	1935	27.02.1935	02.10.1935
SEVASTOPOL HMS	XXXX	1936	20.04.1936	21.12.1936
SEVASTOPOL HMS	XXXX	1937	13.01.1937	02.02.1937
SEVASTOPOL HMS	XXXX	1939	18.02.1939	19.12.1939
SEVASTOPOL HMS	XXXX	1940	20.01.1940	19.11.1940
SEVASTOPOL HMS	XXXX	1941	21.02.1941	23.02.1941
SEVASTOPOL HMS	XXXX	1947	07.07.1947	08.07.1947
SEVASTOPOL HMS	XXXX	1956	17.08.1956	20.08.1956
SEVASTOPOL HMS	XXXX	1957	12.03.1957	13.03.1957
SEVASTOPOL HMS	XXXX	1958	02.07.1958	18.12.1958
TANTAL	90C7	1980	10.01.1980	08.12.1980
TANTAL	90C7	1981	12.08.1981	26.12.1981
TANTAL	90C7	1982	24.01.1982	21.09.1982
TANTAL	90C7	1984	23.05.1984	27.11.1984
TANTAL	90C7	1985	07.04.1985	22.12.1985
TAYFUN	90T3	1960	19.01.1960	21.01.1960
TAYFUN	90T3	1984	23.05.1984	30.10.1984
TAYFUN	90T3	1985	07.05.1985	02.11.1985
TAYFUN	90T3	1986	11.04.1986	17.11.1986
TAYFUN	90T3	1987	14.04.1987	22.11.1987
TAYFUN	90T3	1988	17.04.1988	03.11.1988
TAYFUN	90T3	1989	12.04.1989	03.11.1989
TAYFUN	90T3	1990	12.04.1990	13.11.1990
TAYFUN	90T3	1991	13.06.1991	14.11.1991
TSIKLON	90JH	1978	07.09.1978	01.10.1978
URAGAN	90U6	1975	18.05.1975	02.10.1975
URAGAN	90U6	1976	13.04.1976	22.10.1976
URAGAN	90U6	1978	07.09.1978	20.10.1978
URAGAN	90U6	1979	08.06.1979	01.11.1979
URAGAN	90U6	1980	04.09.1980	03.10.1980
URAGAN	90U6	1981	21.05.1981	03.10.1981
URAGAN	90U6	1982	22.04.1982	16.09.1982
URAGAN	90U6	1985	21.05.1985	25.12.1985
URAGAN	90U6	1986	06.01.1986	25.12.1986
URAGAN	90U6	1987	05.01.1987	22.12.1987
URAGAN	90U6	1988	05.01.1988	23.12.1988
VEGA	XXXX	1991	08.01.1991	24.06.1991
VLASOV	XXXX	1966	12.01.1966	21.12.1966
VOLNA	90VR	1974	04.01.1974	28.12.1974
VOLNA	90VR	1975	20.01.1975	23.10.1975
VOLNA	90VR	1976	11.05.1976	27.12.1976
VOLNA	90VR	1977	10.01.1977	16.12.1977
VOLNA	90VR	1978	09.06.1978	21.12.1978
VOLNA	90VR	1979	10.01.1979	20.12.1979
VOLNA	90VR	1980	03.01.1980	07.08.1980
VOLNA	90VR	1985	03.01.1985	26.12.1985
VOLNA	90VR	1986	20.03.1986	07.04.1986
VYDVIZHENETZ	XXXX	1938	16.10.1938	17.10.1938
MECHNIKOV	URME	9	02.04.1993	06.04.1993
GONETS	9067	1959	24.02.1959	26.11.1959
GONETS	9067	1960	15.06.1960	17.09.1960
GONETS	9067	1961	09.04.1961	20.08.1961
GONETS	9067	1962	09.08.1962	23.11.1962
GONETS	9067	1963	18.02.1963	01.09.1963
GONETS	9067	1964	12.05.1964	04.12.1964
GONETS	9067	1965	12.02.1965	28.08.1965
GROT	90N1	1959	11.05.1959	16.09.1959

GROT	90N1	1960	12.05.1960	26.07.1960
GROT	90N1	1961	18.02.1961	01.06.1961
GROT	90N1	1962	24.02.1962	29.06.1962
GROT	90N1	1963	10.05.1963	29.11.1963
GROT	90N1	1966	17.06.1966	26.08.1966
GROT	90N1	1977	15.07.1977	26.07.1977
GROT	90N1	1980	21.02.1980	13.03.1980
KERCHENSKY KOMSOMOLETS	9018	1986	06.08.1986	14.09.1986
KONSTANTIN BOLDYREV	90D7	7902	15.02.1979	03.03.1979
KONSTANTIN BOLDYREV	90D7	7903	12.03.1979	13.03.1979
KONSTANTIN BOLDYREV	90D7	7904	17.04.1979	22.04.1979
KONTAKT	90Q1	1960	11.02.1960	11.02.1960
KONTUR	90KO	1957	22.08.1957	23.08.1957
KONTUR	90KO	1960	16.06.1960	10.08.1960
KONTUR	90KO	1961	03.01.1961	24.12.1961
KONTUR	90KO	1962	07.07.1962	26.11.1962
KONTUR	90KO	1966	13.11.1966	01.12.1966
KRISTALL	90Q3	1960	29.09.1960	11.12.1960
KRISTALL	90Q3	1961	30.11.1961	08.12.1961
KRISTALL	90Q3	1962	11.05.1962	13.07.1962
KRISTALL	90Q3	1964	11.02.1964	05.03.1964
KRISTALL	90Q3	1965	11.11.1965	04.12.1965
KRISTALL	90Q3	1966	12.04.1966	30.05.1966
V.VOROBYEV	90VV	1948	01.07.1948	11.10.1948
ZHELEZNYAKOV	9026	1984	26.11.1984	29.11.1984
ZHELEZNYAKOV	9026	1985	27.07.1985	06.08.1985
ERNST KRENKEL	90KE	13a	13.06.1976	23.09.1976
ERNST KRENKEL	90KE	60	13.05.1997	14.05.1997
GEORGY USHAKOV	90UG	10a	05.06.1975	09.06.1975
GEORGY USHAKOV	90UG	10b	13.12.1975	18.12.1975
GEORGY USHAKOV	90UG	20a	13.02.1979	10.03.1979
GEORGY USHAKOV	90UG	38	22.06.1984	26.06.1984
GEORGY USHAKOV	90UG	59	13.06.1991	15.06.1991
MUSSON	90MU	12a	19.01.1974	05.02.1974
PASSAT	90PT	10	03.10.1972	27.11.1972
PASSAT	90PT	1977	29.11.1977	29.11.1977
PASSAT	90PT	19a	07.04.1976	21.04.1976
VLADIMIR PARSHIN	902B	4a	11.05.1990	15.05.1990
VOLNA	90VB	42a	12.06.1986	21.06.1986
YAKOV GAKKEL	90YG	11b	12.05.1981	06.06.1981
YAKOV GAKKEL	90YG	13a	19.11.1981	09.12.1981
YAKOV GAKKEL	90YG	14b	26.05.1982	12.06.1982
YAKOV GAKKEL	90YG	18	13.01.1983	16.01.1983
YAKOV GAKKEL	90YG	18a	11.03.1983	02.04.1983
YAKOV GAKKEL	90YG	20a	13.11.1983	23.11.1983
YAKOV GAKKEL	90YG	22V	07.04.1985	21.04.1985
YAKOV GAKKEL	90YG	28a	13.05.1987	03.06.1987
YAKOV GAKKEL	90YG	28v	25.07.1987	10.08.1987
YAKOV GAKKEL	90YG	30a	15.01.1988	30.01.1988
YAKOV GAKKEL	90YG	31	19.02.1988	21.02.1988
YAKOV GAKKEL	90YG	33a	13.04.1989	04.05.1989
YAKOV GAKKEL	90YG	34	29.05.1989	14.06.1989
YAKOV GAKKEL	90YG	36a	12.05.1990	19.05.1990
YAKOV GAKKEL	90YG	37	02.06.1990	12.07.1990
YAKOV GAKKEL	90YG	38	04.11.1990	05.11.1990
YAKOV GAKKEL	90YG	3a	07.05.1977	29.05.1977
YAKOV GAKKEL	90YG	4a	30.09.1977	03.12.1977
YAKOV GAKKEL	90YG	4g	15.02.1978	29.03.1978
YAKOV GAKKEL	90YG	5	09.08.1978	09.08.1978

YAKOV GAKKEL	90YG	5a	01.08.1978	31.08.1978
YAKOV GAKKEL	90YG	77	09.08.1992	16.08.1992
YAKOV GAKKEL	90YG	9a	28.11.1979	21.12.1979

5. BIBLIOGRAPHY OF PUBLICATIONS OF THE MARINE CENTRES AND INSTITUTES OF THE BLACK SEA REGION ON PROBLEMS OF THE BLACK SEA OCEANOGRAPHIC DATA AND INFORMATION

The section includes bibliography of publications of the marine centres and institutes of the Black Sea region on problems of the Black Sea oceanographic data and information published mainly during the past 5 years.

5.1 PUBLISHED PAPERS

1. Condition of information databases of observed oceanographic data on the seas of Russia and the World Ocean, 1994. RHMI - WDC, Obninsk, (in Russian).
2. Ereemeev V.N., Suvorov A.M., Vyazilov E.D., et al., 1995. Systems based on oceanological data and knowledge, MHI UAS, Sevastopol, 160 p., (in Russian).
3. IOC-ICSU-CEC Regional Workshop for Member States of the Mediterranean - GODAR-IV (Global Oceanographic Data Archeology and Rescue Project). IOC Workshop Report, 1995. UNESCO, 110 p.
4. Ereemeev V.N., Suvorov A.M., et al., 1995. Cataloguing of observed oceanological data in Ukraine, Preprint, Sevastopol, 78 p., (in Russian).
5. Guide for Establishing a National Oceanographic Data Centres IOC Manuals and Guides No.5, 1997. UNESCO, 38 p.
6. Suvorov A.M., 1997. Marine geo-information system of the Azov-Black Sea Basin as an element of the unified national GIS of Ukraine. In: Diagnosis of condition of the ecosystem of the Black Sea and sea-land conjunction zone. MHI UAS, Sevastopol, p. 118-119, (in Russian).
7. Suvorov A.M., Ereemeev V.N., Khaliulin A.Kh, Godin E.A., 1997 Oceanographic Data Development for Anoxic zone boundary in the Black Sea. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW, Kluwer Academic Publishers, Dordrecht, p. 487-494.
8. Vladimirov V.L., Miroshnichenko V.V., 1997. Multipurpose data base management systems for the marine environmental research. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW, Kluwer Academic Publishers, Dordrecht, p. 355-364.
9. Vladimirov V., Besiktepe S., Aubrey D., 1997. Database and Database Management System of the TU-Black Sea project. In: NATO TU-Black Sea Project, Symposium on Scientific Results, Abstracts, Crimea, Ukraine, June 15-19, 1997. p.1-5.
10. Vladimirov V.L., 1997. Ecological databanks. In: Concept of construction of an automated system of ecological monitoring on Ukrainian waters, MHI UAS, Sevastopol, p. 196-198, (in Russian).

11. Vladimirov V., Besiktepe S., Aubrey D., 1997. NATO TU-Black Sea interdisciplinary data base. In: NATO-ARW Environmental Degradation of the Black Sea: Challenges and Remedies, Romania, Constanta, October 6-11, 1997, Abstracts, p.2-5.
12. Vladimirov V.L., Besiktepe S.T., 1997. Creation of the Multidiscipline Historical Data Base of the Black Sea. In: Ocean Data Symposium. Ireland, Dublin 15-18 October, 1997, Summary of Proceedings, p.40-41.
13. Miroshnichenko V.V., Luybartsev V.G., Vladimirov V.L., Mishonov A.V., 1997. Multipurpose Multidiscipline Database Management Systems for the Ocean Data. In: Ocean Data Symposium. Ireland, Dublin 15-18 October 1997, Summary of Proceedings, p.88-89.
14. Luybartsev V.G., Vladimirov V.L., Mishonov A.V., 1997. Oceanographic Data Inventory System. In: Ocean Data Symposium, Ireland, Dublin 15-18 October 1997, Summary of Proceedings, p.116.
15. Vladimirov V.L., Miroshnichenko V.V., Luybartsev V.G., Mishonov A.V., 1997. Software for work on oceanological data and metadata. In: Diagnosis of condition of the ecosystem of the Black Sea and sea-land conjunction zone, MHI UAS, Sevastopol, p. 132-133, (in Russian).
16. Harmancioglu N.B., 1997. The need for integrated approaches to environmental data management. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW, Kluwer Academic Publishers, Dordrecht, p. 3-14.
17. Alpaslan M.N., 1997. Prevailing problems in environmental data management. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW, Kluwer Academic Publishers, Dordrecht, p. 15-24.
18. Villars M.T. and Groot S., 1997. Organisationsal aspects of environmental monitoring and information management – findings of the EU study “Monitoring water quality in the future”. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW, Kluwer Academic Publishers, Dordrecht, p. 25-34.
19. Santos M.A., 1997. Data management and the European Union information policy. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW, Kluwer Academic Publishers, Dordrecht, p. 35-48.
20. Geerders P.J.F., 1997. Nature’s data and data’s nature. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW, Kluwer Academic Publishers, Dordrecht, p. 49-60.
21. Oliounine I., 1997. Integrated approach – a key to solving global problems. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW, Kluwer Academic Publishers, Dordrecht, p.61-66.
22. Mayda J., 1997. Policy and desiong makin as a focus fro integrated data management. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW, Kluwer Academic Publishers, Dordrecht, p. 67-78.

23. Uslu O., 1997. Conceptual filters for data quality assurance – implementation of fuzzy logic in oceanographic data quality assurance. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), *Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW*, Kluwer Academic Publishers, Dordrecht, p. 215-230.
24. Ryabinin V.E., 1997. Organisations of marine data processing in real time mode. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), *Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW*, Kluwer Academic Publishers, Dordrecht, p. 231-236.
25. Mikhailov N.N., 1997. Marine environmental data formatting systems and formats for data collection, accumulation and dissemination including international exchange. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), *Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW*, Kluwer Academic Publishers, Dordrecht, p. 349-354.
26. Fedra K., 1997. Integrated environmental information systems: from data to information. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), *Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW*, Kluwer Academic Publishers, Dordrecht, p. 367-378.
27. Vyazilov E.D., 1997. Decision support and expert systems for evaluation of hydrometeorological conditions at sea. In: Nilgun B. Harmancioglu, M. Necdet Alpaslan, Sevinc D. Ozgul and Vijay P. Singh (Eds.), *Integrated Approach to Environmental Data Management Systems. Proceedings of the NATO ARW*, Kluwer Academic Publishers, Dordrecht, p. 401-410.
28. Cociasu A., Diaconu V., Popa L., Nae I., Dorogan L., and Malciu V., 1997. The nutrient stock of the Romanian shelf of the Black Sea during the last three decades. In: Emin Ozsoy and Alexander Mikaelyan (Eds.), *Sensitivity to Change: Black Sea, Baltic Sea and North Sea. Proceedings of the NATO ARW*, Kluwer Academic Publishers, Dordrecht, p. 49-64.
29. Andryushchenko E.G., Khaliulin A.Kh., 1998 Unified catalogue of oceanographic data of Ukraine. In: *Environmental Monitoring Systems*, MHI UAS, Sevastopol, p. 131-134, (in Russian).
30. Suvorov A.M., Khaliulin A.Kh., Godin E.A., 1998. Developing the use of advanced technology for data analysis and the implication of these developments on Black Sea studies. In: *Proc. of Ocean Data Symposium*, Dublin (Ireland), Irish Marine Data Centre, - p. 81-82.
31. Eremeev V.N., Suvorov A.M., Godin E.A., 1998. Development of a concept of the National multidisciplinary marine geo-information system of Ukraine. In: *Environmental Monitoring Systems*, MHI UAS, Sevastopol, p. 118-121, (in Russian).
32. Eremeev V.N., Suvorov A.M., Khaliulin A.Kh., Godin E.A., 1998. Multidisciplinary digital atlas of the Azov-Black Sea Basin with reference block. In: *Environmental Monitoring Systems*, MHI UAS, Sevastopol, p. 122-124, (in Russian)..
33. Suvorov A.M., Ingerov A.V., 1998. Information System of the Black Sea-level. In: *Environmental Monitoring Systems*, MHI UAS, Sevastopol, p. 128-130, (in Russian).
34. Suvorov A. M., Davydov A.V, Ingerov A.V., 1998. Information technology for analysis and prediction of sea level change. In: *International Symposium on Information Technology in Oceanography, ITO-98*, October 12-16, 1998, Abstracts, NIO, GOA, INDIA.

35. Suvorov A.M., Khaliulin A.Kh., Godin E.A., 1998. Information technology for investigation of the location of the oxic/anoxic interactive zone in the Black sea. In: International Conference Information Technologies in Oceanography, ITO-98, October 12-16, 1998, Abstracts, NIO, GOA, INDIA, p.78.
36. Vladimirov V., Miroshnichenko V., Lyubartsev V., Piontkovski S., 1998. Special data base management systems as a tool to store, process, and analyze marine biological and interdisciplinary data. In: GLOBEC. First open science meeting, Programme and abstracts, Paris, 17-20 March 1998, p.84-85.
37. Vladimirov V., Besiktepe S., 1998. Black Sea interdiscipline database: tool to study regional processes. In: TOS and IOC Jointly-sponsored Meeting "Coastal and Marginal Seas", June 1-4, 1998, UNESCO Headquarters, Paris, France, Oceanography, 11(2) Supplement, p.36.
38. Vladimirov V., Besiktepe S., Aubrey D., 1998. Database and Database Management System of the TU Black Sea Project. In: Leonid I. Ivanov and Temel Oguz (Eds.), Ecosystem Modeling as a Management Tool for the Black Sea. Proceedings of the NATO TU Black Sea Project, Kluwer Academic Publishers, Dordrecht, 1, p.1-10.
39. Miroshnichenko V., Vladimirov V., Mamaev V., 1998. Black Sea Information System. In: International Conference Information Technologies in Oceanography, ITO-98, October 12-16, Abstracts, NIO, GOA, INDIA, p.65.
40. Vladimirov V., Miroshnichenko V., Lyubartsev V., Mishonov A., Mamaev V., 1998. Creation of the Black Sea Environmental Internet Node. In: International Conference Information Technologies in Oceanography, ITO-98, October 12-16, 1998, Abstracts, NIO, GOA, INDIA, p. 44.
41. Miroshnichenko V., Vladimirov V., Konoplyanikov A., 1998. Database management systems for oceanographic and biological data. In: International Symposium on Information Technology in Oceanography, ITO-98, October 12-16, 1998, Abstracts, NIO, GOA, INDIA, p. 13.
42. Lyubartsev V., Miroshnichenko V., Vladimirov V., Besiktepe S., 1998. Software system for large historical interdisciplinary databases. In: International Symposium on Information Technology in Oceanography, ITO-98, October 12-16, 1998, Abstracts, NIO, GOA, INDIA, p. 66.
43. Mishonov A.V, Vladimirov V. L., Miroshnichenko V.V., Luybartsev V.G., 1998. Software Systems for Access to Oceanographic Data and Information. In: Proc. "Oceanology International 98. The Global Ocean" Exhibition and Conference. 10-13 March 1998, Brighton, UK, Conference Proc., 1 (Published by Spearhead Exhibitions Ltd. ISBN: 0 900254 20 3), p. 171-179.
44. Vladimirov V. L., Miroshnichenko V.V., Luybartsev V.G., Konoplyanikov A.O., 1998. Data base management systems for marine ecological research. In: Environmental Monitoring Systems, MHI UAS, Sevastopol, p. 134-135, (in Russian).
45. Vladimirov V., 1998. Description of the data base and management system. In: Ecosystem Modeling as a Management Tool for the Black Sea: a Regional Program of Multiinstitutional Cooperation (TU-Black Sea). NATO Science for Stability Program. Final Report. November 1998, IMS-METU, Erdemli, Turkey, p. 55-61.
46. Vladimirov V.L., Besiktepe S.T., Aubrey D.G., 1998. Database and database management system of the TU-Black Sea Project. In: Leonid I. Ivanov and Temel Oguz (Eds.), Ecosystem Modeling as a Management Tool for the Black Sea. Proceedings of the NATO TU Black Sea Project, Kluwer Academic Publishers, Dordrecht, 1, p. 1-10.

47. Ivanov L., Konovalov S., Melnikov V., Mikaelyan A., Yunev O., et al., 1998. Physical, chemical and biological data sets of the TU Black Sea data base: description and evaluation. In: Leonid I. Ivanov and Temel Oguz (Eds.), *Ecosystem Modeling as a Management Tool for the Black Sea*. Proceedings of the NATO TU Black Sea Project, Kluwer Academic Publishers, Dordrecht, 1, p.11-38.
48. Stelmakh L.V., Yunev O.A., Finenko Z.Z., Vedernikov V.I., Bologna A.S., and Churilova T.Yu., 1998. Peculiarities of seasonal variability of primary production in the Black Sea. In: Leonid I. Ivanov and Temel Oguz (Eds.), *Ecosystem Modeling as a Management Tool for the Black Sea*. Proceedings of the NATO TU Black Sea Project, Kluwer Academic Publishers, Dordrecht, 1, p. 93-104.
49. Konsulov A., Kamburska L., 1998. Zooplankton dynamics and variability off the Bulgarian Black Sea Coast during 1991-1995. In: Leonid I. Ivanov and Temel Oguz (Eds.), *Ecosystem Modeling as a Management Tool for the Black Sea*. Proceedings of the NATO TU Black Sea Project, Kluwer Academic Publishers, Dordrecht, 1, p. 281-292.
50. Moncheva S., Shtereva G., Krastev A., Bodeanu N., Kideus A.E., and Bayrakdar S., 1998. Vertical distribution of summer phytoplankton in the Western Black Sea during 1991-1995 with respects to some environmental factors. In: Leonid I. Ivanov and Temel Oguz (Eds.), *Ecosystem Modeling as a Management Tool for the Black Sea*. Proceedings of the NATO TU Black Sea Project, Kluwer Academic Publishers, Dordrecht, 1, p. 327-350.
51. Ozsoy E., Latif M.A., Besiktepe S., Getin N., Gregg M.C., Belokopytov V., Goryachkin Yu., and Diaconu V., 1998. The Bosphorus Strait: exchange fluxes, currents and sea-level changes. In: Leonid I. Ivanov and Temel Oguz (Eds.), *Ecosystem Modeling as a Management Tool for the Black Sea*. Proceedings of the NATO TU Black Sea Project, Kluwer Academic Publishers, Dordrecht, 2, p. 1-28.
52. Suvorov A.M., Ingerov A.V., 1999. Information and analytic system on sea-level. *Morskoj Hidrofiz. Zhurnal*, Sevastopol, 5, p. 70-77.
53. Eremeev V.N, Suvorov A.M., Khaliulin A.Kh., Godin E.A., 1999. Oceanological data on the Black Sea and development of the multidisciplinary digital atlas with reference block based on them. In: *Environmental Monitoring Systems*, MHI UAS, Sevastopol, p. 162-167).
54. Suvorov A.M., Andryushchenko E.G., Ostrovskaya I.G., Plastun T.V., Khaliulin A. Kh., 1999. Information database on oceanological observations conducted in the scientific cruises of MHI NASU since 1957 till 1998. In: *Environmental Monitoring Systems*, MHI UAS, Sevastopol, p. 177-180.
55. Vladimirov V., Besiktepe S., Aubrey D., 1999. Database and Database Management System of the TU Black Sea Project. In: Besiktepe, U. Unluata, A.S. Bologna (Eds.), *Environmental Degradation of the Black Sea: Challenges and Remedies*, NATO Science Series, Kluwer Academic Publishers, Dordrecht, p. 291-302.
56. Vladimirov V.L., Mankovsky V.I., Besiktepe S.T., Solov'ev M.V., Mishonov A.V., 1999. Hydro-optical studies of the Black Sea: History and Status. In: Besiktepe, U. Unluata, A.S. Bologna (Eds.), *Environmental Degradation of the Black Sea: Challenges and Remedies*, NATO Science Series, Kluwer Academic Publishers, Dordrecht, p. 245-256.
57. Vladimirov V.L., Besiktepe S.T., 1999. NATO TU-Black Sea Project Database and Database Management System. In: *Monitoring Black Sea Environmental Conditions*, Proceedings of the World Federation of Scientists, Working Group on Water pollution. Proceedings Series, WFS, Lausanne, 3, p.203-214.

58. Vladimirov V., Lyubartsev V., Miroshnichenko V., 1999. Special database management system for large historical interdisciplinary marine databases. In: International Conference on The Ocean Observing System for Climate. 18-22 October 1999, Proceedings, Saint-Raphael, France, p. 2.
59. Davis P., Schaap D., Vladimirov V., Miroshnichenko V., Musin O., Berle H., Laban C., Panin N., Ion G., Ion E., Mamaev V., 1999. Demonstrator for the Black Sea Marine Environmental Management Support System based on Telematics (Black Sea Web). In: Environmental Monitoring Systems, MHI UAS, Sevastopol, p. 156-161, (in Russian).
60. Vladimirov V.L., Sergeeva A.V., 1999. Internet-resources for the Black Sea: data and information sources. In: Environmental Monitoring Systems, MHI UAS, Sevastopol, p. 181-183, (in Russian).
61. Vladimirov V.L., Miroshnichenko V.V., Konoplyanikov A.O., 1999. Cruise databases management systems. In: Environmental Monitoring Systems, MHI UAS, Sevastopol, p. 184-190, (in Russian).
62. Salihoglu, Vladimirov V., Mikaelyan A., Oguz T., Kideys A., 1999. Black Sea Ecosystem Processes and Forecasting. In: Operational Database Management System. First progress report. 1 January - 31 October 1999, IMS METU, Erdemli, Turkey, 20 p.
63. Fischer J. and Flemming N.C., 1999. Operational Oceanography: Data Requirements Survey, EuroGOOS Publication No.12, Southampton Oceanography Centre, Southampton. ISBN 0-904175-36-7, p.60
64. Batakina S., Mikhailov N., Tuzhilkin V., Vorontsov A., 1999. Processing and analysis of the fields of climatic characteristics at the Black Sea. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 387-388.
65. Belokopytov V. N., 1999. Marine Information System in Oceanography and Meteorology of the Black Sea. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 389.
66. Ereemeev V.N., Mishonov A.V., Suvorov A.M., 1999. Thirty-five years of oceanographic research in the Mediterranean and Black Seas by MHI NASU (Ukraine). In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 391.
67. Ereemeev V.N., Suvorov A.M., Khaliulin A.Kh., Godin E.A., 1999. The Black Sea multidisciplinary Digital Atlas. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 392-393.
68. Ereemeev V.N., Suvorov A.M., Khaliulin A.Kh., Godin E.A., 1999. Oceanographic data holdings in Ukrainian marine centers for the Black and Mediterranean Seas. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 394-395.

69. Ignatyev S.M., 1999. Prospective structure of IBSS Hydrobiological Databank. Its importance for scientific cooperation. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 398.
70. Mamaev V., 1999. The Black Sea Geographic Information System. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 403.
71. Mikhailov N., Shaimardanov M., Vorontsov A., Vyazilov E., Tsventsinsky A.S., 1999. Integrated Information Technology for Marine Data Management: methodology and examples of realization. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 405.
72. Popova M., Simeonov P., Karakasheva R., Saparev S., 1999. Extranet and Distributed Data Bases for Oceanographic Data. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 406.
73. Schaap D.M.A., Davis P.G.J., 1999. New developments in Marine Data Management. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 407-408.
74. Suvorov A.M., Ingerov A.V., 1999. Information System on sea-level change investigations. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 409-410.
75. Suvorov A.M., Khaliulin A.Kh., Godin E.A., 1999. Information technology for analysis of the location of the oxic/anoxic interface in the Black Sea. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 411-412.
76. The MEDAR/MEDATLAS Group, 1999. Rescuing Oceanographic Data and strengthening the Mediterranean Data Management Structure: the MEDAR/MEDATLAS concerted action (MAS3-CT98-0174/IC20-CT98-0103). In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 413-414.
77. Vladimirov V., Miroshnichenko V., Lyubartsev V., 1999. Special Database Management System as a tool to study regional multidisciplinary marine data. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 415.

78. Vyazilov E., Mikhailov N., 1999. The technique of search and creation of the unified Oceanographic Data Catalogue for MEDAR/MEDATLAS II project. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 416-417.
79. Vyazilov E., Mikhailov N., 1999. History of expeditionary studies and information resources for the Black and Mediterranean Seas. In: Oceanography of the Eastern Mediterranean and Black Sea. Similarities and differences of two interconnected basins, International Conference. 23-24 February 1999 Zappeion International Centre, Athens, Greece, E. Th. Balopoulos, A. Iona, and D. Sakellariou, (Eds.), p. 418-419.
80. Vladimirov V., Miroshnichenko V., Lyubartsev V., 2000. Special database management system as a tool to study regional interdisciplinary marine data. In: International Conference Oceanography of the Eastern Mediterranean and Black Sea. Similarities and Differences of Two Interconnected Basins. 23-26 February 1999, Scientific report, European Commission, Community Research, EUR 19302, p.445.
81. Vladimirov V., Miroshnichenko V., Lyubartsev V., Besiktepe S., 2000. Special database management system and multidiscipline historical database of the Black Sea. In: Global system of the Black Sea observations: fundamental and applied aspects, MHI UAS, Sevastopol, p. 39 –44.
82. Davis P., Berle H., Miroshnichenko V., Vladimirov V., Kalinkin I., Musin O., Aliaoutdinov A., Panin N., Ion E., Ion G., Mamaev V., Laban C., 2000. Black Sea Web - new Internet technology for querying heterogeneous distributed databases. In: Supplement to Romanian Geophysics: International Geophysical Conference and Exposition - Bucharest, 10-14 April 2000, ISBN 973-98540-7-9, p. 206-209.
83. Vladimirov V., Miroshnichenko V., Lyubartsev V., Besiktepe S., 2000. Data Base Management activities within the framework of the NATO Sfp ODBMS Black Sea Project. In: Black Sea Ecosystem Processes And Forecasting, Operational Database Management System Report of the Workshop and Project Evaluation Meeting, Istanbul, 15-16 May 2000, IMS METU, Erdemli, July 2000.
84. Vladymyrov V., Myroshnychenko V., Lyubartsev V., Besiktepe S., 2000. Special Database Management And Processing Systems as a Tool To Integrate Marine Sciences Data Into ICAM. In: International Conference On Integrated Coastal Area Management And Its Integration with Marine Sciences, St. Petersburg, 25-30 September, 2000, Abstracts, p. 28.
85. Vladimirov V., Miroshnichenko V., Lyubartsev V., and Besiktepe V., 2000. Special database management system and multidiscipline historical data base of the Black Sea. In: Global system of the Black Sea observations: fundamental and applied aspects, MHI UAS, Sevastopol, p. 39- 44.
86. Davis P., Berle H., Miroshnichenko V., Vladimirov V., Kalinkin I., Musin V., Aliaoutdinov A., Panin N., Ion V., Ion V., Mamaev V., Laban V., 2000. Black Sea Web - new Internet technology for querying heterogeneous distributed databases. In: Supplement to Romanian Geophysics: International Geophysical Conference and Exposition, Bucharest, 10-14 April 2000, ISBN 973-98540-7-9, p. 206-209.
87. Mikhailov V., Gavrilova T., Lisovsky R., 2000. Some Problems of Pollution, Rational Uses of the Black Sea Resources and Exchange of Data, The Black Sea Ecological Problems, SCSEIO, Odessa, p. 148-162.
88. Sixteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE), Lisbon, Portugal, 30 October - 9 November 2000.

89. Report of the Regional Co-ordinator for the Black Sea Region on the Sixteen Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE), Lisbon, Portugal, 30 October - 9 November 2000.
90. The Global Ocean Observing System Data and Information Management Strategy and Plan (Third Draft), submitted by the GOOS Project Office (Author: J. R. Wilson, Consultant) on the Sixteen Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE), Lisbon, Portugal, 30 October - 9 November 2000.
91. Suvorov A.M., Godin E.A., Khaliulin A.Kh., Ostrovskaya, I.G., Plastun T.V., Andryushchenko E.G., 2001. Bank of ecological and oceanological data for the Black Sea. In: Topical questions of development of innovation activity in states with transient economy, Sonat, Simferopol, p. 228-231, (in Russian).
92. Suvorov A.M., Ingerov A.V., 2001. Marine information technology of sea-level in the Black and Mediterranean Seas. In: Topical questions of development of innovation activity in states with transient economy, Sonat, Simferopol, p. 225-228, (in Russian).
93. Suvorov A.M., Ingerov A.V., 2001. Oceanological data and knowledge bases as a basis for investigation of sea-level variability in the Black and Mediterranean Seas. In: Environmental Monitoring Systems, MHI UAS, Sevastopol, p. 179-187, (in Russian).
94. Suvorov A.M., Khaliulin A.Kh., Plastun T.V., Ostrovskaya, I.G., Andryushchenko E.G., 2001. MHI NASU data bank structure. In: Environmental Monitoring Systems, MHI UAS, Sevastopol, p. 194-198, (in Russian).

6. DIGITAL PUBLICATIONS AND PRODUCTS

1. Black Sea GIS CD-ROM 1997. In cooperation with Black Sea PCU (UNDP) and MSU (Russia).
2. NATO TU-Black Sea Project data Base. CD-ROM, 1997. In cooperation with IMS METU (Turkey).
3. NATO TU-Black Sea Project Data Base Inventory (Version 2.0). Diskette. 1997. In cooperation with IMS METU (Turkey).
4. Black Sea Information System (BlackSIS). Online. Version 2.0. February 1998. Available: <http://bsein.mhi.iuf.net/metadata/>.
5. Black Sea Red Data Book (BSRDB), 1998. Online. March 1998. Available: <http://www.grid.unep.ch/bsein/redbook/index.htm>.
6. NATO TU-Black Sea Project data Base. CD-ROM, 1997. In cooperation with IMS METU (Turkey).
7. NATO TU-Black Sea Project Data Base Inventory (Version 2.0). Diskette. 1997. In cooperation with IMS METU (Turkey).
8. Black Sea Information System (BlackSIS). Online. Version 2.0. February 1998. Available: <http://bsein.mhi.iuf.net/metadata/>.
9. Black Sea Red Data Book (BSRDB), 1998. Online. March 1998. Available: <http://www.grid.unep.ch/bsein/redbook/index.htm>.
10. OceanBase TU-BS. Oceanographic Data Base Management System. Demo-version and Presentation. CD-ROM. May 1998. NATO TU-Black Sea Project. Science for Stability Program.

11. Seasonal Variability of Thermohaline Structure and of Some Chemical Properties in the North-Western Black Sea: a Tool for Tuning General Circulation and Ecosystem Models. CD-ROM. MHI NASU. Version 1.01. April 1999.
12. Web-site of the NATO SFP ODBMS Black Sea Project. Version 1.02. Online. October 1999. Available: <http://sfp1.ims.metu.edu.tr/>
13. Web-site of the INCO COPERNICUS BLACK SEA WEB Project Online Available: <http://www.blackseaweb.net/>
14. Vladymyrov V., Myroshnychenko V., Mamaev V., 2000. Black Sea Information System. In: The Electronic Conference on Sustainable Development Information Systems, June 19-28, 2000, available at: <http://www.cedare.org.eg/events/sdis/papers.htm>
15. Vladimirov V., Davis P., Miroshnichenko V., Berle H., Musin O., Kalinkin I., Aliaoutdinov A., Schaap D., Laban C., Panin N., Ion G., Ion E., Mamaev V., Lyubartsev V., 2000. Black Sea Web - a Demonstrator for the Black Sea Marine Environmental Management Support System. In: The Electronic Conference on Sustainable Development Information Systems, June 19-28, 2000, available at: <http://www.cedare.org.eg/events/sdis/papers.htm>
16. NATO Sfp Black Sea Ecosystem Processes and Forecasting. Operational Database Management System. Presentation for the End-users. CD-ROM. May 2000.
17. Vladymyrov V., Myroshnychenko V., Mamaev V., 2000. Black Sea Information System. In: The Electronic Conference on Sustainable Development Information Systems, June 19-28, 2000, available at: <http://www.cedare.org.eg/events/sdis/papers.htm>
18. Vladimirov V., Davis P., Miroshnichenko V., Berle H., Musin O., Kalinkin I., Aliaoutdinov A., Schaap D., Laban C., Panin V., Ion V., Ion E., Mamaev V., Lyubartsev V., 2000. Black Sea Web - a Demonstrator for the Black Sea Marine Environmental Management Support System. In: The Electronic Conference on Sustainable Development Information Systems, June 19-28, 2000, available at: <http://www.cedare.org.eg/events/sdis/papers.htm>
19. NATO Sfp Black Sea Ecosystem Processes and Forecasting. Operational Database Management System. Presentation for the End-users. CD-ROM. May 2000.

7. OTHER INFORMATION RELATED TO OCEANOGRAPHIC DATA AND INFORMATION ON THE BLACK SEA

This section contains materials on Black Sea GOOS Data and Data-Products prepared by Editing Committee of the Black Sea GOOS Programme. The materials can be of interest for specialists solving the problems of the Black Sea Marine Information Systems and Technologies and are published with kind permission of Valery N. Eremeev, Director General of the Oceanological Centre of the National Academy of Sciences of Ukraine, the Chairman of the IOC UNESCO Black Sea Regional Committee, the Chairman of the Steering Committee of the Black Sea Global Observing Oceanographic System.

MARINE SERVICE MODULE (MSM)

The MSM will be guided by the basic principles, which is the observing system will produce dataproducts that address a broad spectrum of user needs:

- Observation will be designed to address specific problems that occur in the basin and affect human activities at several different levels.

- The users of the data and data-products will interact with both technical experts and scientists to drive the process of designing, operating and improving the system in response to the evolving needs of user groups.

The development of MSM involves a cost-effective use of existing data; expertise and infrastructure i.e., the entire process from measurements to products will be cost-effective:

- MSM will incorporate, enhance and supplement existing programmes as appropriate. It will develop a comprehensive system of observations through shared use of infrastructure from measurement systems and platforms to communication networks, data management systems, assimilation techniques, and modelling.
- Measurements will be routine (uninterrupted flow of data of known quality) and data will be assimilated, analysed and transformed into products in a timely fashion.
- Products will ensure social and economic benefits that will largely compensate the operational costs of the observation system.

Process-oriented scientific research that leads to new knowledge, improved technologies, and more powerful models is of critical importance to the development of MSM:

- MSM will enable a constructive and timely synergy between process-oriented research and the generation of information and products in response to user needs.
- The observing system must be both integrated and sustained. The successful achievement of the goals of MSM requires that it capture a wide spectrum of environmental responses (the temporal and spatial dimensions of variability) to external forcing.
- Observations will be sustained to capture episodic events and long-term trends (i.e. to document both high and low frequency variability), enhance scientific analysis, and support model predictions.
- The observing system will cover from synoptic measurements of physical, biological and chemical properties over a broad range of time and space scales to data management (multiple data types from disparate sources) and analyses that are consistent with the needs of end-users.
- MSM will be designed and implemented in collaboration with EuroGOOS.

The following types of measurements are carried out within the frame of MSM:

- (a) Standard hydrometeorology observations.
- (b) Small vessels for monthly measurements across selected transects from coastal areas to shelf and continental slopes.
- (c) Ships-of-opportunity measurements along selected sections (using self-contained, autologging instrumentation packages on merchant vessels and ferries).
- (d) Drifters and floats.
- (e) Satellite.

Standard hydrometeorology observations and services

Wind, temperature, humidity, cloud cover, precipitation, and evaporation are among the measurements routinely conducted at the Black Sea coastal meteorological stations. A tide gauge network around the Black Sea is essential to calibrate the satellite altimeter data. All these data should be made available to Black Sea GOOS on a real- or near-real-time basis.

National Meteorological/Hydrometeorological Services of the coastal countries maintain 46 coastal marine meteorological stations (Bulgaria – 6, Georgia – 8, Ukraine – 16, Romania – 4, Russian Federation – 5, Turkey – 7. For example Ukrainian main components of Marine observations network is shown on Fig 9). According to the WMO Technical Regulations they monitor with three hours interval the following parameters: air and sea water temperature, direction and speed of wind, height, period and direction of waves, atmospheric pressure, solar radiation, visibility, precipitation, humidity. Limited number of stations observes sea level, some chemical parameters, air pollution, etc. Some coastal marine meteorological stations have more than 50-year long series of observations of certain elements. At all the stations observations are made manually.

In addition, there are three automatic stations in Varna (Bulgaria), Constanta and Gloria (Romania) with limited number of sensors.

Coastal stations report their observations so as messages with coded data are collected at National Meteorological Centres as a rule not later than 20 minutes after time of observation.

Marine operational forecasting systems for the Black Sea have been developed in several countries around the sea. They typically contain:

- An meso-scale atmospheric model (limited area model) covering the region of the Black Sea.
- An wave model taking the wind input from the atmospheric model.
- Visualization system for different weather and wave parameters.
- Verification procedures.

Rapid advances being made in the atmospheric modelling, the operational used models cover the Black Sea region with horizontal resolution of about 10 km; sophisticated physics describing the atmospheric and surface soil physical processes is included. Two National Meteorological Services (Bulgaria and Romania) are using the ALADIN limited area model coupled with the French global model ARPEGE.

Other components underlie the operational marine hydrometeorological services of Ukraine, Turkey, Russia and Georgia. Short description is presented in Annexe 3.

Small-vessel observation program

This program involves continuous measurements, as shown in Table 5.1, at selected transects across the shelf, from the coast to the interior basin, performed within a day or so biweekly. The narrowness and steepness of most of the Black Sea shelf regions will permit efficient and nested monitoring observations through limited area coverage. The measurements are carried out within a day or so across the coastal and shelf areas, and continental margins over weekly time periods. A number of small research vessels will collect data along a transect within pilot areas located around the basin and off their own ports (to minimize costs for ship time). The program also takes advantage of the fact that major marine institutes of the Black Sea own small research vessels designed for coastal and shelf studies. The program is expected to provide the needed time series data to be assimilated in the nested coupled biological and hydrodynamic models. Such a program is affordable only with small vessels, in terms of cost, practicability, and vessel availability for the participating institutions. (See the proposed network in Figure 5.1) This program is expected to provide unique time-series data annually over the entire basin, which is crucial to assessing the fate of environmental parameters monitored and investigated.

At present, all of the major Black Sea marine institutes possess Sea Bird Electronics CTD probes with rosette samplers, also equipped with fluorometers, transmissometers, a beam attenuation

coefficient sensor, a sensor for pH, and standard biological sampling equipment. A good number of research vessels are capable of operating in the Black Sea. Sediment traps may also be deployed at several critical locations for certain periods of time to obtain data on the particle fluxes sinking from the surface layer.

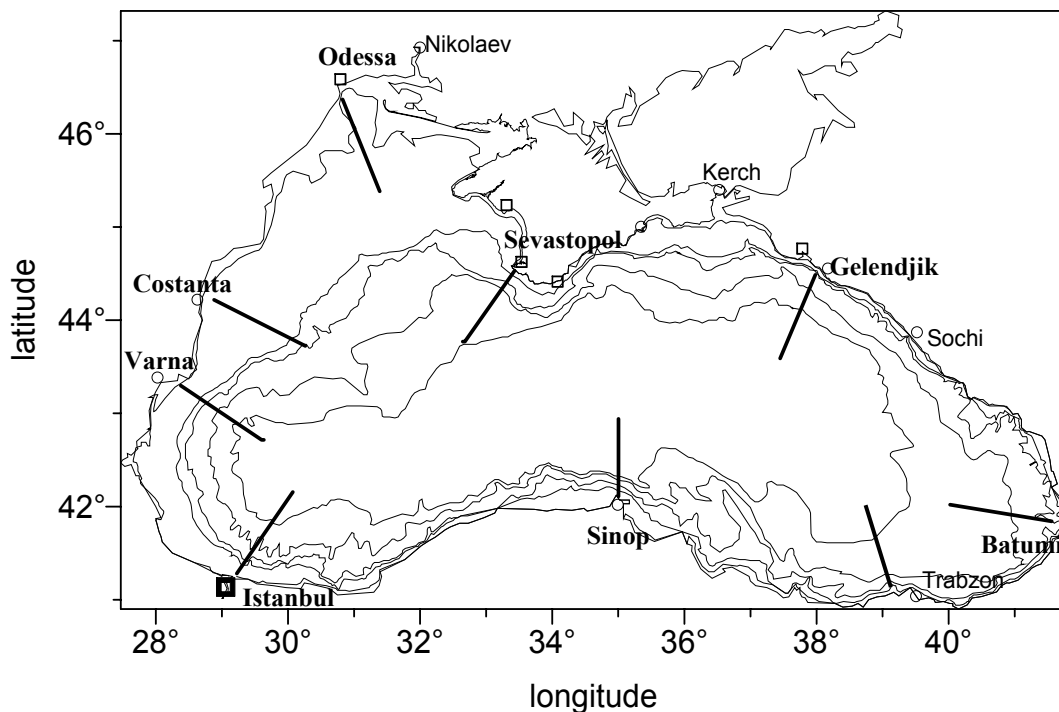


Figure 5.1. Location of transects for small vessel observation program in the Black Sea (~100 km, 6 to 8 oceanographic stations)

Table 5.1. Parameters to be measured by small-vessels program

Meteorological variables:	Barometric pressure, wind speed and direction, air-sea fluxes of heat, freshwater flux (evaporation-precipitation) cloudiness, air temperature, surface spectral radiation.
Physical variables:	Temperature, salinity, current, light transmission, and PAR at depth and its attenuation.
General variables:	TSS, pH, BOD1, BOD5, particulate and dissolved TOC, alkalinity, H ₂ S, and redox potential (eH).
Nutrients:	Orthophosphate, total phosphorus, ammonium, nitrate, nitrite, total nitrogen, and silicate.
Metals:	Cd, Hg, and Pb.
Biological:	Chlorophyll-a (Chl-a), phyto plankton and zooplankton abundances, primary production, and bacterial biomass, fluorescence.
Other substances:	POPs, plastics and litter, oil slicks, and petroleum hydrocarbons, contaminant level on biota.

Ship-of-opportunity measurements

These measurements constitute the most important element of MSM's measurement system. Regularly scheduled launchings of XBTs/XCTDs, together with various discrete and continuous samplings/measurements complement efforts to monitor the large-scale physical and biogeochemical structure of the sea. Platforms used may include merchant, fishing, military, or small oceanographic vessels. It is envisaged that the ship-of-opportunity based measuring system for BS GOOS, if ideally organized, will suffice for continuous monitoring of atmospheric forcing (curl of the wind, heat flux), intensity of general circulation and sub-basin scale features, optical parameters, concentrations of nutrients, and primary production levels at the sea surface.

Specifically, ship-of-opportunity observations will include:

- Regular meteorological observations by means of autonomous logging meteorological stations.
- Observations of upper layer water column stratification through XBT or XCTD launches.
- continuous measurements of sea surface temperature, conductivity, and bio-optical variables with a standard CTD probe by means of continuous pumping of water through a reservoir with a volume of approximately 0.5 m^3 ;
- observations of currents, sea surface temperature, and atmospheric pressure by means of drifting buoys launched from ship-of-opportunity;
- observations of currents, sea surface temperature, and atmospheric pressure, and temperature profiles within the upper 200 m (thermocline topography) by means of diving drifters also launched from ship-of-opportunity;
- discrete sampling for measurements of concentrations of various biogeochemical variables on board using express analyzer technique or concentrations of pollutants;
- discrete biological sampling (phyto- and zooplankton abundance) from the sea surface;
- continuous plankton recorder observations;
- Ferrybox.

Figure 5.2 depicts the common ship routes in the Black Sea; for each route, the number indicates the fewest ships regularly operating on that route. The crews of these ships are generally well acquainted with oceanographic fieldwork. These ships operate on a regular weekly basis from Odessa, Evpatoria, Sevastopol, Yalta, and Novorossiisk. At speeds of 9 to 11 knots, it takes about 20 to 35 hours from the western ports and about 45 hours from Novorossiisk to reach Istanbul. This means that every 3 to 4 days each ship crosses the circulation features of the basin. It is logical therefore to recruit one ship-of-opportunity vessel each from Odessa, Evpatoria, Sevastopol, Yalta, and Novorossiisk. The ship-of-opportunity based measurement system, when ideally organized, may thus provide an excellent opportunity to monitor the basin, sub-basin, and mesoscale features of the system. The measurements will be selected from the list in Table 5.1, depending on the capabilities and opportunities, and may vary from vessel to vessel.

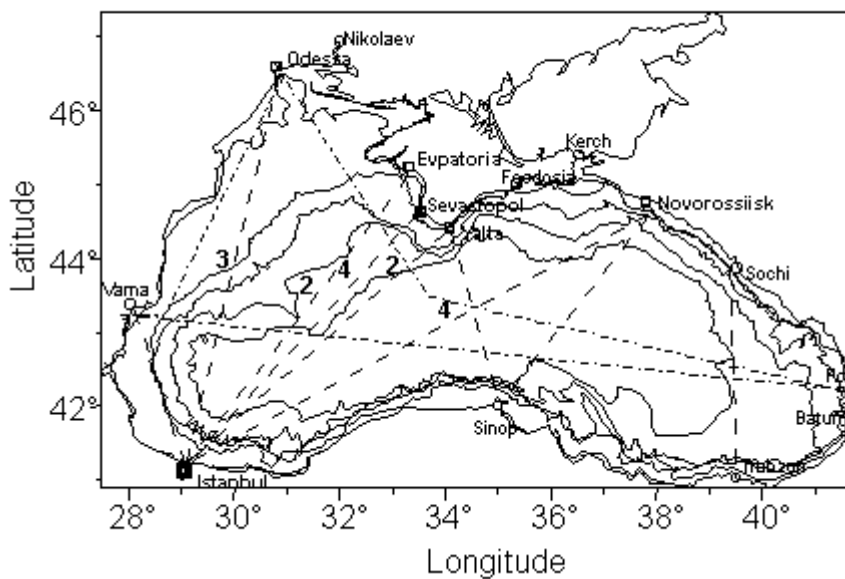


Figure 5.2. *Common ship routes in the Black Sea.*

Drifting buoys and floats.

A new technology for monitoring water masses over seasonal-annual time scales, provide a Lagrangian picture of the flow fields as they move with prevailing currents. Drifter data provide a unique opportunity to understand the dynamics of the Rim Current structure and associated mesoscale circulation characteristics of the system. They may be deployed either at fixed-depth or fixed-density levels. The use of drifters and drogues for biological studies is relatively recent. Drifting buoys, consisting of a spectro-radiometer, a fluorometer, a beam transmissometer, acoustic doppler current profiler, thermistors, and conductivity sensors, are available and are used successfully in various observational programs. The drifting buoys may even consist of an automated water sampler from which water is collected at 6-hour intervals for plankton and nutrient analysis. Another type of drifter, ALACE Float, is able to operate both vertically and horizontally in the water column, providing a three-dimensional picture. The main advantage of drifters over other platforms is that they provide a relatively inexpensive means for obtaining broad geographical in situ sampling.

The temperature measurements from surface drifters may be used to calibrate the satellite SST data, particularly when and where ship observations are sparse or nonexistent. When they are equipped with thermistor chains measuring water temperature down to about 300 m or programmed to undulate, they will also allow a cost-effective way of complementing hydrographic cross-sections taken by research vessels or by ships of opportunity XBTs.

Another advantage of the drifters is that they can be deployed from research vessels as well as from the ships of opportunity, thereby allowing a flexible network of observations.

Remote-sensing measurements.

In-situ measurements of oceanographic properties using moorings, drifters, and samplings on stations by research vessels and ships of opportunity are complemented by satellite remote-sensing data, which provide quasi-synoptic, basin-, and sub-basin-scale knowledge of enhanced biological production and plant biomass (via SeaWiFS), sea-surface temperature (via Advanced Very High Resolution Radiometer (AVHRR)) and sea-surface height (via Topex-Poseidon and ERS2 altimeter

measurements). The latter two techniques help determine large-scale and mesoscale near-surface current patterns, which are important for the advection of living and nonliving constituents and the identification of shelf-sea fronts, topographic features (banks and ridges), shelf edges, and other upwelling zones, where zooplankton and fish populations are known to accumulate for feeding, spawning, and early life development. LANDSAT images are also useful for identifying pollution sources and tracking land-use changes.

Moreover, NSCAT scatterometer provides data on the wind speed to within 2 m/s and on wind direction to within 20 degrees, with 50 km spatial resolution and 2-day sampling interval. This data has been available since late 1996.

The remote sensing and in situ observations must be considered simultaneously. Together they can provide a virtually complete set of sampling strategies covering the full spectrum of time and space scales. The remote sensing technology gives quasi-synoptic snapshots of a large area with fine spatial resolution, which is practically impossible with the use of drifters and other in situ techniques. On the other hand, conventional oceanographic measurements provide high resolution data within the water column and time and a much wider range of measurements of biological, biochemical, and physical properties, which can not be obtained by remote sensing methods. The synergy between in situ and remote sensing measurements is thus vital.

Data management program

Efficiency of the data flow is essential for an operational forecasting system. The relevant data sets, which are planned to be assimilated in the operational prediction systems, must be received, assembled, quality controlled, processed, and transmitted in near real time. The data sets and derived products must then be disseminated to the user community and archived. The database for Black Sea GOOS must include not only the standard oceanographic and marine environmental data, but also the meteorological time series and the remotely sensed observations such as the SeaWiFS, AVHRR, and TOPEX/POSEIDON altimetry data. Some selected model results that would be useful for comparison and later studies should also be included in the database.

The Black Sea Data and Information Management System (BS-DIMS) will be developed on a highly based on contribution by marine and meteorological organizations and institutes, data centres in the Black Sea Region. Various international as well as national and regional Black Sea programmes under development have different data and information management strategies encompassed physical, chemical, biological and hydrometeorological observation. Initial implementation of Black Sea data and information management will be accomplished in an interactive fashion by connecting the existing data banks.

The diversity of the existing systems and lack of specific details in regard to the future requirements prohibiting implementation of a centralized data management system with strict control of formats, quality control procedures, accuracy and precision standards, and data products “certification” in the near future. Thus the BS-DIMS is designed to outline a set of guiding principles on data management practices for the programmes contributing to the Black Sea GOOS. .

There are two other important items that must be included in the design of the BS-DIMS . There is a need to connect the programmes and the participating data and science centres under a unified and centralized “information services system”. This contributes information about the programmes and observations how to access to the data. The second item is the requirement carefully designed and automated self-controlled data and information flow. They can thus be cheked periodically whether or not the system is working and if not to locate where the problem lie.

There are three general classes of users for the Black Sea GOOS data and information:

- Operational users.

- Authorities and managers of large - scale projects.
- Scientists, engineers, and economists doing special research, strategic design studies, and other studies to advance the application and usefulness of the Black Sea GOOS data and information.

The operational users analyse the data that have been collected and produce a prediction about weather, sea state, or the sea level to warn for a severe storm to implement a regulation such as the closure of a fishery for a specific health danger.

The authorities or managers of large - scale projects need timely oceanographic information, which includes regular statistics and climatic trends. This information could be available with some delay in time but should be generalized and interdisciplinary as rule.

Scientists, engineers, and social scientists require accurate, long term data sets for research in physical, biological, and chemical oceanographic processes; model development and testing; design criteria for ships, structures and marine facilities; studies of the effect of climate change on economies and populations, etc. For these types of works accuracy and completeness of the data sets are more important than having the data in real or near real time.

The requirements for BS-DIMS management are for a series of intersecting end-to-end that must:

- Ingest various versions of in situ and satellite data and metadata.
- Apply the appropriate level of quality control based on the delivery time for each data set or product.
- Provide the best available copy of the data, metadata and products at several elapsed times after observation to a variety of users.
- Provide for the archival of the best available final copy of the data, meta data and products for future users with updates of the archives if re-analyses are done or better copies of the data and information become available.
- Provide feedback on data-related problems to data acquisition groups on the usefulness of the data and products to users to the developers of the systems, and on the timeliness and completeness of the data flows to data collectors and managers of the data flows.

The most of the systems in operation today have been targeted for one class of users, for example the weather services or the physical oceanographic researches. The products have generally been left to these users. The Black Sea GOOS as well as GOOS needs a different paradigm, the service chain.

The service chain embodies the idea of a distributed system that takes data, performs quality control, analyses it if necessary, delivers product to a broad community at various times after collection, and archives the data for continuing service to the research and engineering community .

Electronic networks will play an increasing role in the development of BS-DIMS.

Therefore existing communication capabilities must be improved significantly at the initial stages of Black Sea GOOS. Faster Internet connections in the region is crucially important for the successful implementation of the Black Sea GOOS.

The oceanographic institutions participating in the Black Sea GOOS program have long-standing experience with data handling procedures. The software and hardware capabilities, however, need to be updated for handling large volumes of data flow from satellite-tracked observation systems and for archiving. The software also needs to be extended to provide the means for joint processing and analysis of a variety of data. A specific data base policy must be developed and approved by all the participants.

A critically important topic is relevant metadata collection. Metadata is crucial if data are to be interpreted properly and readily used across disciplines. All possible efforts must be spent to provide, at a minimum, concise metadata with all historical data sets. Recent data must be supplied with full metadata in all cases. Metadata has to be in a form that can be used efficiently by all data analysts.

Data quality has a fundamental importance for the Black Sea GOOS. Attention must be paid to data quality control and arrangement of data sets with pertinent and internationally accepted quality flags throughout the data flow process. The proper protocols for data collection and treatment should be defined (especially for biogeochemical data). Accepted international standards should be used to the greatest extent possible for media, formats, processing, and transmission of data sets.

Quality time series and climatic data sets must be created in the Black Sea GOOS. Special software should be designed to provide easy and comfortable user access to this type of data.

The Black Sea GOOS data system must facilitate the exchange and distribution of data and ensure the long-term existence of the collected data set. For this purpose the participating data centers and institutions must be organized for the long-term collection and safeguarding of data. The near-real-time data and metadata dissemination to the scientific community will be achieved through a series of dedicated file transfer protocol (FTP) sites and powerful World Wide Web (WWW) servers. Rapid electronic publishing of bulletins, new metadata, and scientific results as well as an information flow for the public and mass media should be carried out through the same WWW servers.

All the BS-DIMS data sets, operational and historical, will be collected and managed. Most data systems implemented in BS-DIMS will have operational data flows. The management of model data will be one of the fundamental elements of BS-DIMS because all the aspects of climate and global change of the Black Sea state will come through models that assimilate data and produce fields interpolated in space and time, in either nowcast or predictive modes.

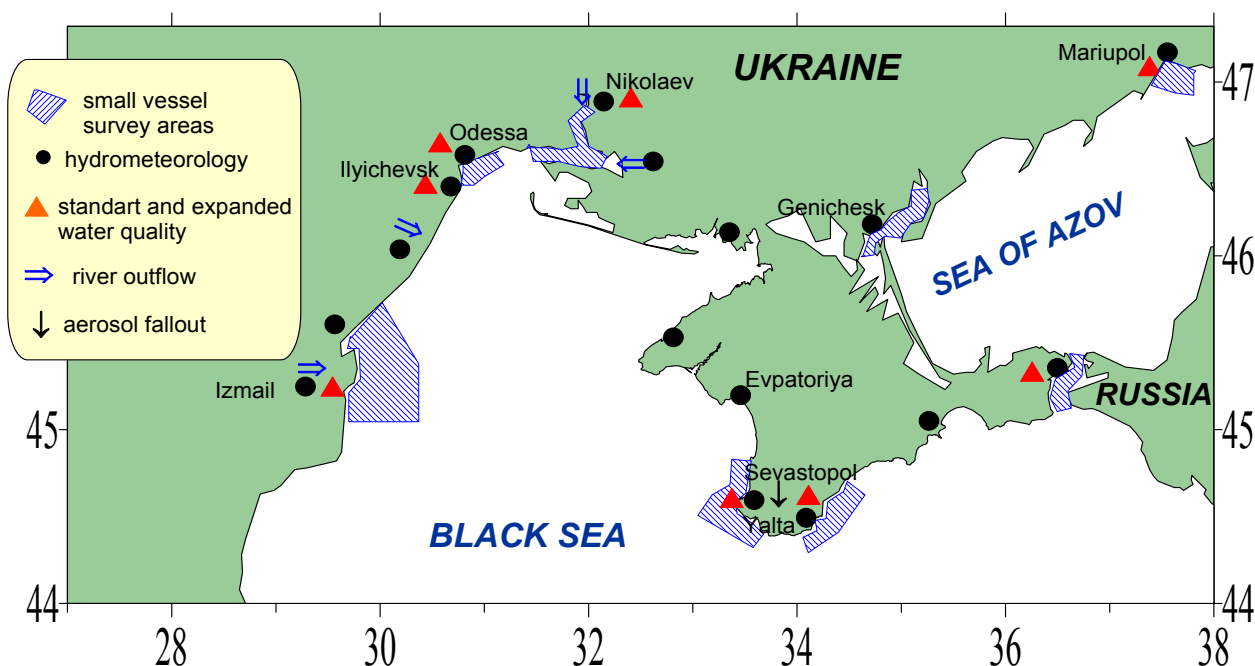


Figure 5.3. Marine observations network (main components) of the Ukrainian Hydrometeorological Service

Strategic plan of the Marine Service Module development on 2002– 2006.

General terms.

The near-future mission in MSM is to identify the addresses and personal contacts for at least 50 potential customers and user agencies for operational oceanographic information and forecasts in each country in the Black Sea region. Identification of customers and describing their requirements for operational information and data products is definitely possible but not easy. There are different classes of customers for each level of processing of the data, starting with raw observational data, and working through stages of data quality control, assembly, gridding, assimilation, modelling, and high level products generation. Each industrial, commercial or governmental sector also requires different parameters and variables, processed in different combinations, predicting different impacts.

Short-term objectives for 2002-2004

A special Working Group on operational marine services needs to be established first. It comprises scientists, technical experts and end-users. They should to identify the needs for marine data and forecasts.

The successful operational marine service is not possible without appropriate infrastructure for the Black Sea GOOS. This infrastructure includes all kind of required regular observations, information technology for telecommunications and data management as well as the technologies for data processing and creation of real products with their distribution to the end-users. The Working Group on operational marine services should investigate what improvement of the operational observing network could be realized in near future on follows:

- Regular observations along several routes in open sea (on ferryboats) including the sea temperature, salinity and atmospheric elements.
- Marine observations in coastal marine observing stations.
- Observations by regular “time-series” stations.
- Small vessels observations in the coastal zone.
- Satellite remote sensing data (SST and surface currents).

A special Task Team should realise a pilot study of the operational oceanographic information system (Intranet) for the Black Sea region providing:

- Real-time telecommunications between operational observing stations and processing centres and agencies.
- Access of most important end-users to up-to-date operational oceanographic services.

The Working Group on operational marine services should provide all necessary actions for the research and creation of the most appropriate operational models for the forecasts and predictions concerning Weather, Waves, Warnings, Sea ice, Temperature, Salinity, Sea level, Oil drift, etc. The Working Group should maintain close corporation and coordination with other teams on up-to-date forecasts and prediction models for the sea-atmosphere circulation and ecological models.

The Working Group on operational marine services should prepare and organize demonstration activities with end-users in every country.

The Working Group on operational marine services should create possibilities for establishment of close cooperation with EuroGOOS.

The Working Group on operational marine services should investigate the possibilities to involve external investments for the creation of Black Sea GOOS infrastructure collaborating with the programmes developed by EU, IOC, WMO, GEF, NATO-ESAD, etc.

Medium term objectives for 2004– 2006

The Working Group on operational marine services should develop a routine system of customer identification. A regular schedule of dialogues with customers and user groups should be developed.

The Working Group on operational marine services should create the infrastructure for the Black Sea GOOS including the most appropriate forecasts and prediction models as well as data management with up-to-date distribute technologies. A full realization of the operational oceanographic information system (Intranet) for the Black Sea region providing:

- Real-time telecommunications between operational observing stations and processing centres and agencies;
- Access of most important end-users to up-to-date operational oceanographic services should be realised.

The Working Group on operational marine services should broaden the customer base by strengthening links to climate variability forecasting.

The Working Group on operational marine services should prepare and organize on continuous demonstration activities with end-users in every country.

Similar to the Short Term objectives, there will be a collective investment and external funding by projects with international organizations and agencies.