



## STATE SCIENTIFIC CENTER OF THE RUSSIAN FEDERATION FEDERAL STATE UNITARY GEOLOGICAL ENTERPRISE

**State Scientific Centre YUZHMOREGEOLOGIYA** operates under the jurisdiction of the Federal Agency of Natural Resources of the Ministry of Natural Resources.

**The sphere of activity** —exploration and development of oil&gas and mineral resources on the continental shelf, internal seas and international zones of the World's Oceans.

**YMG** — is one of the leading Russian scientific organizations with more than 55-years of experience. The company takes part in various federal and international programs and is active in the offshore geophysical industry.

Southern Scientific &  
Production  
Association for Marine  
Geological Operations

20, Krymskaya St.,  
Gelendzhik, 353461,  
Russia

tel: +7 (86141) 56267  
fax: +7 (86141) 56266  
E-mail:

[postmaster@ymg.ru](mailto:postmaster@ymg.ru)

General Director —  
Dr. Artur P. Pronkin.



- Located in the city of Gelendzhik (near the Black Sea), that is about 40 kilometers from the port of Novorossiysk
- Comprises of 9 divisions and laboratories, 3 subsidiaries, design facilities and construction workshops
- Possesses four specialized marine vessels and 110 items of research equipment
- Obtained certification in Safety Management of Maritime Register of Shipping and has 21 licenses for various types of activities
- Intellectual property of YMG — 42 patents and copyright certificates

# *Programs and projects*

The corporate policy of YMG is based on striving for collaboration and exchange of experience — both in scientific and commercial spheres. The active search for the cooperative possibilities, in combination with the scientific knowledge and the reputation of a reliable partner, are realized in the participation of our company in large number of federal and international scientific and technical programs and projects.

We are the only Russian scientific company representing our country in the UNO International Seabed Authority, which grants Russia the rights to explore and develop the ore-bearing territory in the Pacific Ocean, with large deposits of polymetallic nodules. Besides, YMG is authorized to provide all geopolitical surveys in Russian offshore of the Azov, Caspian and the Black seas.

For the last decade YMG was an active participant of various international scientific and commercial projects:

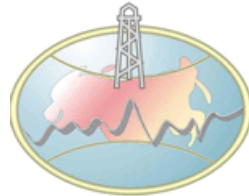
- **The Blue Stream** — the participation in all stages of the project from pre-project survey at the initial stage to the monitoring of the state of the operating gas pipeline that crosses the entire territory of the Black Sea.
- **The Caspian sea (Russian sector)** – offshore wells site preparation: Hvalynskaya, Shirotnaya, Rakushechnaya, Morskaya, Laganskaya
- **The Caspian sea (Kazakh sector)** – offshore wells site preparation: Zhambay, Tub-Karagan, Atash, Kurmangazy
- **Azov sea**- offshore wells site preparation: Gelendzhikskaya, Paleozoyskaya
- **Азовское море** - Геленджикская, Палеозойская
- **Marmara sea** – 1 offshore well.
- **Black sea** – Geological survey of Russian sector of Black sea.
- **DOD** — the exploration of the ferromanganese nodules fields in the Indian Ocean (together with the Department of Ocean Development of the Indian government);
- **TIOG** — geological and geophysical studies of the Indian ocean in the area of Trans-Indian Ocean geotraverse (together with the National Institute of Oceanography (NIO) of India);
- **BIE** — experiment based on the assessment of the environmental impact of ferrimanganese commercial mining (together with NOAA (USA), DORD (Japan) and KORDI (Korea));
- **IARE** — the study of lithospheric processes in the near Antarctic zones of the World Ocean (in collaboration with the University of Bologna, Italy);
- **«Geological Model»** — creation of a geological model of the Clarion-Clipperton zone of the Pacific Ocean
- **GEF** — program of management and protection of the the Black Sea environment (under the aegis of UNEP and World Bank);

# Our Clients

The efficiency and safety of our offshore technologies and equipment was highly rated by our numerous domestic and foreign customers.

## SSC «YMG» works in Russia for:

Ministry of Natural Resources of Russia



Russian Federation Ministry of Civil Defense and Emergency Response



Gazprom



Lukoil



Rosneft



Yukos



Rostelecom



## Our customers abroad:



NOAA (USA)



BP



Eni



Total Fina Elf

TOTAL



Alcatel



EGS (Asia) Ltd.



Kazakhstan Caspiy Shelf

Joint-Stock  
Company Pitergaz



Offshore  
Survey  
and  
Engineer  
ing

Sakhalin  
Energy  
Investment  
Company



Petroalliance



Korea  
Ocean  
Research  
&  
Develop  
ment  
Institute

Oil Company  
Kalmneft



CGGE  
Internati  
onal

Megatron



Interocea  
nmetal

Moscow Aero  
Geodesic  
enterprise



Fugro

KazmunayGaz



Neft Povolzhia

JSC  
Chernomorneftegaz

C&C  
Technologies

JSC  
Priazovneft

# *Technology for geotechnical studies in shelf and transition zones*

**Offshore Wells Site and Pipelines Construction support**

**Offshore Drilling support**

**Offshore Cable location surveys**

**Offshore Geological survey**



Open Joint-Stock Company Lukoil, semi-submersible rig «Astra», the first in the North Caspian Site survey was made by YMG in 2004

## **Application:**

- Natural and artificial reservoirs, rivers;
- Shallow water zones (water depth from 0 to 3-5m);
- Onshore-offshore transition zones;
- Shelf zones with a depth of 50 to 70m
- Deep water zones

The world's demand for geo-technical investigations is constantly growing and we are ready for collaboration with the companies engaged in underwater construction and drilling. Our company's efficient geo-technical exploration is based on sophisticated technologies that are developed by YMG.

We know that reliable data about seabed relief, geology, underwater obstacles reduces hazards when constructing offshore terminals, installation jack-ups and laying pipelines. Providing high-quality data is a key to the success of our geotechnical surveys that specifies all elements of the technological process.

The main technological feature is a custom-tailored combination of high-performance exploration techniques for a specific type of work. The key to success is realized on the basis of our shipboard systems and our optimum set of equipments.

The modular structure of the systems using different types of research vessels helps us to easily adapt to the Customer's requirements and field conditions to carry out studies in various field zones, minimizing mobilization period.

Synergy of the technology is achieved by a combination of a variety of exploration techniques (geophysics, acoustics, video-survey, coring) with a wide range of water depths.

# *Technology of multi component seismic survey onshore-offshore*

Innovative direction of YMG activity based on modern multi component and radio telemetric systems of data acquisition.

High-quality data acquisition potential in hard-to-reach areas of shallow water

Cost cutting and time savings thanks to using cable-free methods

Mobility and maneuverability due to using light vessels

Mitigation and reduction of environmental impacts

The strategic target of YMG is the development of new markets. Shallow water areas of the Russian shelf encompass more than 700 thousand square kilometers that are poorly studied due to complex natural conditions which hamper traditional methods of seismic exploration. The prospecting of such zones by YMG allows us to penetrate into a new market niche and establish new customers, to make a real step from science to business!

YMG's Technology can be successfully used in:

- marshes, flood plains, coastal lakes;
- land bays, sand banks, estuaries, deltas;
- open shallow banks, wide tidal and littoral zones.

YMG's Equipment base:

- The «**BOX**» system is one of the most advanced telemetric systems in the world (manufactured by **Fairfield Industries, USA**)
- The **CCT 480** telemetric system of data acquisition (designed and manufactured by YMG)
- Group airguns (manufactured by **Bolt Technology Corp.**) including down hole sources (manufactured by YMG)
- Various types of specialized carriers (manufactured by YMG)

Research surveys are conducted by qualified staff, in accordance with modern exploration techniques.

Successful application of the technology helped YMG for the first time to:

- explore the Gulf of Taganrog of the Azov Sea by geophysical methods;
- single out about 40 productive horizons on the basis of the acquired data from the deep structure of the sea of Azov (lower Mesozoic-Paleozoic);

- obtain new data about geological structures of the extremely shallow areas of the North Caspian Sea and the Volga river delta;
- complete regional studies on the Yamal and Gydan peninsulas obtained from offshore data;
- study in great detail the Paleozoic sediments in the area of Obskaya Guba (the Gulf of Ob) in the Kara Sea.



# *Technology of ocean ore minerals prospecting*

20-years of experience of targeted studies

Reliable techniques of geological exploration

Complete technological cycle

Fusion of geological knowledge with modern analytical approaches

Co-relation of results with decision-making

Accounting for environmental aspects



Ferromanganese nodules —one of the types of the ocean minerals YMG exploration in the Pacific Ocean, 6 km depth

YMG has the ability to organize in a most effective and economic way very complicated technological processes of comprehensive studies of solid minerals in the World's Oceans.

The structural division of YMG, providing specialized ocean-going vessels, processing facilities, research equipment and experienced staff creates a complete cycle from the exploration activity to contouring of the ore fields.

Moreover, we managed to take a step forward — to carry out preparatory exploration for the next stage of developmental activities and we understand that combining up-to-date technologies with a high level of planning provides new opportunities for our company!

## SCHEME OF THE TECHNOLOGICAL PROCESS

Multi beam echo sounding

Geological interpretation with construction of preliminary geomorphologic maps and structural maps of ore fields

Near-bed acoustic, photo and TV surveys

Gathering geological samples and seabed photographs.

Determination of physical and mechanic properties of sediments and nodules.

Chemical and analytical studies.

Final geological interpretation with evaluation of resources and identification of the prospective areas.

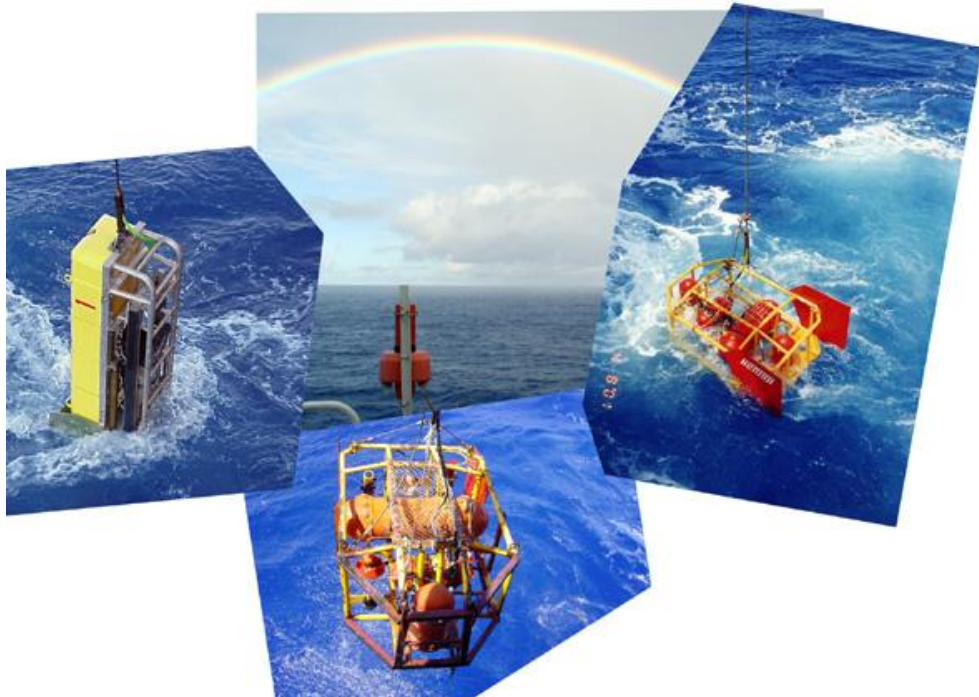
## Research equipment

- **MAK-1M** acoustic system (designed by SSC YMG)
- **NEPTUNE-C** photo and TV system (designed by SSC YMG)
- Samplers and corers of various configurations (designed by SSC YMG)

The technology involved includes a series of studies for the determination of the composition, physical and mechanical properties of sediments and nodules and the dating of sedimentary formations in specialized shipboard and stationary chemical and analytical laboratories.

### Technology allows us to:

- Understand the structure of ore fields
- Identify basic types of nodule fields
- Evaluate mineral resources of fields and their metal potential
- Single out the prospective zones



# Seismic equipment

## RECORDING SYSTEMS

AIRGUNS

**BOX radio telemetry system manufactured by «Fairfield Industries»**

«Puls 6»  
Airguns

**Marsh Line Telemetry system for exploration of transition zones**

«Puls 6C»  
Well  
airgun

**Intromarin-L2 Seismic data acquisition and recording system**

**CCT-480/960 Telemetric cable & modular system for seismic exploration**

«Puls 6A»  
airgun  
array

**(UPCM-120x4) Multi component digital receiver**

**Seismic acoustic complex in aggregate signals Aquaswip**

**Multi channel seismic high response Aquaseis**

**The seismic equipment** is used by YMG for offshore exploration of hydrocarbons site surveys and helps YMG find the best solutions with optimum performance.

- in transition zones
- in offshore areas (seas, lakes, rivers and water reservoirs)
- on land

Recording equipment

Radio telemetric system «BOX»

Manufactured by FAIRFIELD Industries (USA)



Recording system is placed in a mobile container (van)

1024x768, 371 Kb JPEG

Control console



## Specifications:

Number of channels:

More than 8000 channels in real time radio-telemetry mode.

Acquisition module:

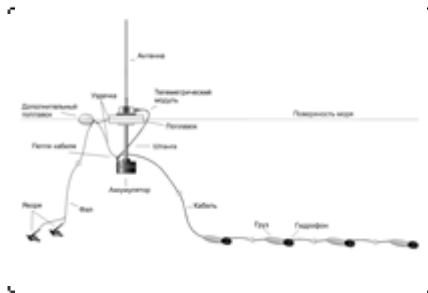
Recording module supports records of 2000 routes in real time with sample rates of 0.5ms, 1ms, 2ms, 4ms, and 8ms. System channel counts can be increased by adding more recording modules.

Data carrier

IBM 3480, 3490, and 3590-compatible cartridges and any other SCSI-carriers.

Format

Demultiplexed formats SEG-D 8024, SEG-D 8048, SEG-D 8058 and SEG-Y.



Telemetric module connection with one «mini-cable»



...and at survey

Marsh Line

Manufactured by (Russia)	SI	Technology
-----------------------------	----	------------



**Marsh Line**

Digital telemetric system based on a rigid cable with built-in sensors (geophones and hydrophone receivers) and field electronics. The system is designed for work in offshore areas, in transition zones and adjacent land areas.

System Marsh Line is used for:

- Regional and detailed geological survey in shelf, shallow-water and transition zones.
- Oil and gas exploration.
- Study of the upper part of the sedimentary sequence.
- Exploration of tectonic zones.
- Exploration of gas hydrates.
- Control of hydrocarbon fields and their accumulation.
- Monitoring over hydrocarbon fields under production in real-time.
- Study of high frequency seismic noise and seismicity.

#### INTROMARIN-L2 Seismic acquisition and recording system

Manufactured by (Russia)	SI	Technology
-----------------------------	----	------------



**INTROMARIN-L2**

Specifications:

Quantity of active channels	248
Used	496
Auxiliary	8

Operating system	Windows NT
Analog-digital converter	24 bits
Sampling period	0.5, 1, 2 or 4 msec
Max recording time	32 sec @ 1 msec
Pre-amplifier gain	12, 24, 36 or 48 dB
Max input signal	from 25 to 1600 mV — depending on the gain
Dynamic range	114 dB
Channel cross-talk coefficient	> 90 dB
Band	from 3 to 750 Hz
Input impedance (differential input)	20 kOhm
Input impedance (common-mode input)	100 kOhm
	<b>Physical specifications</b>
size	550×580×430 mm
Weight of 120-channeled modification	38 kilos
Power	130 W
Electric power supply: voltage DC	12±20% Volt or 24±20% Volt

CCT-480/960 Telemetric cable & modular system for seismic exploration

Manufactured by YMG



**Central station**

The central station based on IBM PC Pentium II-300 controls digital modules and the system, seismic data recording and acquisition.

One CCT section 300 meters long is equipped with one or two digital telemetric modules.

Digital telemetric module (DTM) (basic) provides analogue seismic data recording, gain, analog to digital conversion and transmission to the control console.

UPCM-120x4 Multi component digital receiver

Manufactured by YMG in 2002-2004

Application:

- Exploration for oil and gas in shelf and in transition zones.
- Monitoring of offshore oil and gas fields under production.
- Offshore geotechnical studies.

Composition:

- Shipboard part:
  - PENTIUM-IV computer
  - interface card
  - software
- Outboard part:
  - Transmitting modules
  - Armor multiple-strand cable
  - Digital 4-component modules (120 items):
    - § three piezo-accelerometers
    - § one hydrophone,
    - § angle of pitch (rotation) sensor,
    - § electronics,
    - § azimuth data transmitter.

Seismic sensors and airguns



«Puls 6»  
Airguns

Capacity size	Wave amplitude of pressure (bar/m) (0-peak) (unfiltered)	Shot pint interval (ms)	Weight (kg)
0.3	2.0	48.0	37.0
0.7	3.1	71.0	55.0
0.8	2.1	65.0	27.0
1.5	2.5	76.0	37.0
2.1	2.7	84.0	39.0
1.5	3.7*	75*	40.0
2.5	3.8*	84*	42.0
3.5	3.7	91.0	55.0
5.1	4.9	110.0	91.0



**Borehole air-operated wave transducer «Puls 6C»**  
**Placing of airgun into the well hole**

**Capacity of source (dm<sup>3</sup>):** 0.31.02.02.5

**Operating pressure:** 5-17

**Frequency range (Hz):** 20-300

**Diameter (mm):** 60-130

**Weight (kilos):** 6-18

AQUASEIS Multi component seismic high resolution module

Manufactured by YMG

Application:

- Offshore geological surveys
- Detailed study of the upper part of the section for offshore exploration of solid minerals (oil, gas, gas hydrates, gold-bearing placers, diamonds, tin).
- Site surveys.
- Monitoring of geotechnical structures.



**Certificate of conformity**

Components:

- Air-gun source
- 48-channeled streamer
- Onboard recording station
- Specialized software



**Air gun**



AQUASWIP Seismoacoustic module on complex signals

Manufactured by YMG

Application:

- Offshore geological surveys
- Detailed study of the upper part of the section for offshore exploration of solid minerals (oil, gas, gas hydrates, gold-bearing placers, diamonds, tin).
- Site surveys.
- Monitoring of geotechnical structures.



**General overview of the module**

Components:

- Air-gun array

- 48-channeled streamer
- High resolution data acquisition system
- Software for processing of emitted pulses
- Dual processor processing system based on PC P4
- Software package

The module has been successfully used in the Black Sea since the year 2000 for various surveys. In 2001 it was used in the Far East during a site survey for the construction of a bridge (tunnel) connecting the east coast of Russia with the Sakhalin Peninsula.

### **The equipment for the acoustic survey**

#### Echo-sounders

PEL-D Double-frequency hydrographic survey echo-sounder

Simrad EM 12 Multi-beam echo-sounder

Simrad EM 3000D Multi-beam echo-sounder

#### Sonars

MAK series — deep-water geoacoustic systems

Katran-D Side scan Sonar

CM-2 (C-MAX Ltd., UK) Side scan Sonar System

PEL-D Double-frequency hydrographic survey echo-sounder



**PEL–D Double-frequency hydrographic survey echo-sounder**

PEL-D is a double-frequency hydrographic survey echo-sounder for seabed surveys, designed and constructed by YMG.

Echo-sounder provides:

- Indication of echo signals and depth on a display;
- Registration of the seabed relief on thermal paper in coordinates with coordinate scale;
- Depth data on the navigation system digitally;
- Recording of depths in digital form on magnetic tape;
- Input of corrections about transducers depth, sound velocity and pitch;

- Data Input from the navigation system about distance and time marks, displaying this information on monitors and on paper recorders.

Specifications:

<b>Frequency</b>	Standard: 200 kHz (HF) / 30 kHz (LF), options are available
<b>Frequency range</b>	20-500 ms (15-250 m) HF / 20-2000 ms (15-1500 m) LF
<b>Sounding interval</b>	100-2000 ms (10 ms step) or automatic
<b>Power of transmitter</b>	350 W
<b>Instrumental error</b>	0,2% max HF / 0,5% max LF
<b>Recording</b>	HDD, MOD, RS-232, Ethernet, display
<b>Swell compensator</b>	TSS, Seatex MRU, analog swell compensator
<b>Data-output format</b>	NMEA, Atlas Deso, Innerspace, Simrad
<b>Navigation</b>	Supports NMEA GGA, RMC, GLL, VTG messages. Direct connection to GPS receiver.

#### Simrad EM 12S-120 multi-beam echo-sounder

Simrad EM 12S-120 is a low-frequency (13 kHz) multi-beam echo-sounder with 90°, 105° and 120° operating from 50 to 11000 m depth range with maximum ship's speed (depending on density of observation).

Echo sounder has 81 beams (1,5° each) and can work in two modes — shallow and deep.

Shallow mode is used at depths from 50 to 700 m with 2 ms pulse length.

Deep water mode is used at depths from 700 to 11000 m, 10 ms pulse length.

Simrad EM 12S-120 is not a completely automated system and it can be connected to the following external sensors:

- MRU-5; Sensor of roll & pitch and vertical heave;
- Guis ship gyrocompass;
- Satellite navigation equipment Trimble;
- SVPlus sensor of sound velocity profile in water;
- SmartSV sensor of sound velocity in surface water

#### Simrad EM 3000D multi-beam echo-sounder

EM 3000D is a high resolution multi-beam echo-sounder.

Use: bathymetric and geotechnical surveys.

Specifications:

**Frequency** 300 kHz

**Depth** 0,5 — 300 m  
**Pulse length** 100-2000 ms (10 ms step) or automatic  
**Beam width** 1,5 × 1,5°  
**Number of beams** 127

Deep-water geo-acoustic systems of MAK series

MAK-1M is a multi-purpose, efficient geo-acoustic system for sonar survey and seismo-acoustic profiling of seabed designed and constructed by YMG.

- High resolution acoustic profiler
- Resolution allows for identification of underwater cables and pipelines of minimum 30 mm diameter
- On-line digital data processing



Deep water geoacoustic system of **MAK** series

**Application:**

- Detailed geological and site surveys at depths up to 6000 m
- Exploration of solid minerals
- Environmental monitoring of water areas
- Control over underwater construction
- Search for sunken objects

Tow acoustic system

**Sensors of tilt and orientation of underwater vehicles**

Operating depth 50 — 6000 m  
 Max tow speed up to 4 knots

**High resolution sonar**

Operating frequency 100 kHz  
 Swath for each side up to 300 m

**Long range sonar**

Operating frequency 30 kHz  
 Swath for each side up to 150 m

**Acoustic profiler**

Operating frequency 5 kHz  
 Penetration depth up to 150 m

Weight of tow fish (in air) 500 kg

Katran-D Side scan sonar



Katran-D Side scan sonar

Katran-D is a towed side scan sonar for geological seabed surveys, site surveys and search of objects in shelf zones.

Specifications

TOWED FISH

**Frequency** 100 kHz  
**Range of view** 50 — 250 m  
**Resolution** 15 cm  
**Transducers pattern** 1 × 50 degrees  
**Operating depths** up to 200 m  
**Power supply** +50 W, 200 mA  
**Dimensions** 1410 mm, 75 mm in diameter  
**Weight** 15 kg

ELECTRONIC BOX

**Based on:**  
Intel Pentium with MS Windows NT

**Recording:**  
HDD, MOD, Ethernet, display

**Graphic recorder:**  
EPC thermal printers, Ultra, Ocean, any analog.  
HP LaserJet, Canon Bubble Jet.

**Input data from navigation systems:**  
format, compatible with modern navigation systems

**Power supply:**  
220 W, 50 Hz, 300 W max.

# ROVs

ROVs

**RT-1000PLI**  
**PTM500**  
**PT 6000M**

Towed TV-Systems

**Neptune-D**

RT-1000 PLI (Pipeline Inspector) multipurpose ROV



**RT-1000PLI (Pipeline Inspector)  
multipurpose ROV**

RT-1000 PLI components:

- Remotely operated vehicle
- Specialized launch device
- Laboratory container
- Van for transportation



**System components**

Application:

- Monitoring underwater pipelines and cables
- General and detailed inspection
- Diving support

- Inspection of waterworks
- Drilling support (video inspection)



**Underwater survey**



Advantages:

- Self-contained unit
- Low running costs
- Small size and light weight

RTM500 Shallow water ROV



**RTM500 Shallow water ROV**

RTM 500 components:

- Small ROV for underwater survey
- Special-purpose transporter device
- Laboratory container

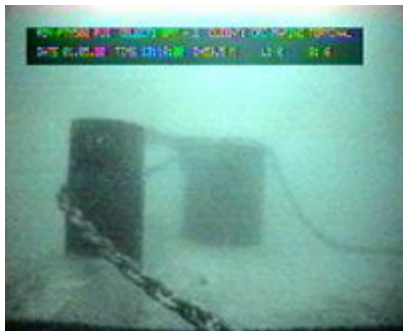


**Laboratory container**

Application:

- Drilling support (video inspection)
- Diving support
- Inspection and intervention
- Waterworks inspection

#### Underwater survey



Advantages:

- Self-contained unit
- Low running costs
- Small size and light weight

#### RT 6000M Deepwater ROV



Application

#### RT 6000M Deepwater ROV

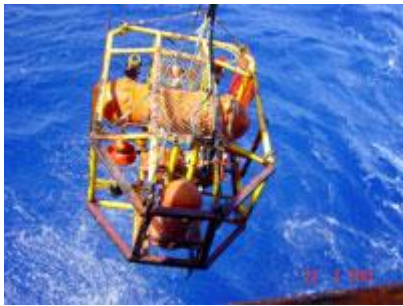
The RT 6000M was designed for geologic exploration in the World's Oceans (to a depth of 6000m) to study sulphides, cobalt-bearing crusts, metal-bearing oozes etc. that are difficult to explore with tow hardware systems. It is also suitable for inspections, the taking of measurements and other deep-water studies.

Auxiliary

- Geological exploration
- Search and inspection of sunken objects
- Underwater inspection / intervention of pipelines, deep-water cables, underwater geotechnical constructions
- Environmental studies
- Sonar
- Differential magnetometer
- Manipulator
- Short / ultra short-baseline underwater acoustic navigation systems

### Towed Underwater Survey System «Neptune-D»

The «Neptune-D» is an open steel frame with hard boxes containing a battery, underwater electronics, and photo/video cameras.



**Towed Underwater Survey System  
«Neptune-D»**

Underwater variable day lights, an underwater strobe light and an echo-sounder antenna are mounted under the steel frame.

Power supply — 4 batteries (12V, 95AH each) provides 20-hours of continuous operation in black-and-white mode.

2 halogen lamps (75Vt each) are used to provide underwater video survey. A 500 Joules flashlight is used for photography.

An echo sounder (operating frequency 165 kHz) is provided for control over altitude is incorporated into the «Neptune-D» system.

The echo sounder also controls automatic photo survey at a designed altitude. Additional photos can be taken manually in locations specified by the operator.

The shipboard control console that is provided for selection of operating modes and for reception and matching video signals is connected to an IBM PC to record frame numbers, time and altitude for providing image zooming if necessary.

# *Sampling, coring and drilling equipment*

Sampling and coring equipment

**OKEAN-0,25** grab sampler

**KADR–1** Self-contained sea-floor coring system

Core pipes

Vibro-cores

Sampling probes

Drilling equipment

**MULTIPURPOSE Drilling Rig START**

Combination of drilling technologies

**PTS-M** Drilling rig

**LITO** Drilling modules

Sampling and coring equipment



**Ocean–0,25** grab sampler  
with GFU-6-8 deepwater camera



**Sample taken by single probe technique**

The single probe technique is used to obtain a good quality sample and a photo picture simultaneously from the same point of the seabed, to study the structure of the sedimentary cover and also to confirm acoustic reflectors and images from sonographs, profilographs or samples taken with use of PT-148 core pipe.



**KADR–1 Self-contained sea-floor coring system**

The «Kadr-1» system can be used for studies of sediments and various geotechnical surveys. The main applications are in connection with offshore oil and gas exploration, the study of hydrothermally active oceanic areas, and in connection with ore formation-related geotechnical and environmental studies.

Structure of the system:

Outboard part

- Core pipe;
- self-contained digital thermo gradiometer;
- camera;
- water bottle.

Shipboard part

- unit for measurements recording;
- shipboard module of exploring of the engineering nature of sedimentary soils;
- software.

#### Core pipes:

Various modifications of vacuum corers of the Kalmar series (multi-blow, self-recoverable, rotating, unsupported, with or without air guns).

Very efficient for taking samples of sands, shales 3 — 20 m thick.

#### Vibrocores:

- VT-1 — for sampling sediments to 2 m depth. Diameter of vibro corer is 146 mm, diameter of the pipe — 125 mm.
- Vibro hammer with double load of 450 kg weight.

#### Sampling probes:

- Vacuum hydrostatic sampling probes;
- Sediment corers — for point sampling of oozes with providing hermetical sample of pore water, etc.
- Core pipes for undisturbed coring, length — 1,5 m, diameter — 98 mm, water depth — from 0,5 m to 10–15 m.

# Drilling equipment

Catamaran based **PTS** drilling rig. The operating equipment includes a winch, a rotator and a vibro-hammer. The penetration depth is to 100 m, a diameter of bore holes is 108 — 168 mm.

A catamaran based **PTS-M** drilling rig is a modified version of **PTS** including a rotator and vibro hammer. The penetration depth is up to 100 m, the bore hole diameter is 108 — 168 mm. Additionally there are three four-berths cabins, a galley, a mess room, a geological laboratory and a radio room in the two-level deckcastle.

**START drilling rig** is a modified drilling rig. The drilling equipment is located on the platform, mounted on casing. Drilling process is controlled remotely.

**START** implements a new efficient technology for drilling by rotary and pressing techniques. It can be used for offshore exploration, coring, geotechnical drilling and static probing from a single-column platform.



**LITO 1**

The drilling module on jack stands. It is used for drilling and taking samples with 10-12 m penetration, 108-127 mm diameter of boreholes in shallow shelf zones at a depth of 2,5 — 3 m.



**LITO 2**

The logistics module designed for transportation, loading/unloading equipment and tools. It can be used as well for food catering and recreational purposes and storage of auxiliary probing/sampling equipment.



**LITO 3**

Penetration drilling module for the technological equipment and equipment for dynamic testing.



**LITO 4**

Multi-purpose module for drilling with penetration to 108 — 164 mm, sampling and



extremely shallow water depths.

**FGL** is a floating geological laboratory for initial processing of sediments and water samples for subsequent geological and geochemical studies.

# Gravimeters



**Grin-2000 Shipboard gravity system**  
1280x960, 360 Kb JPEG

Designed and constructed by YMG

## Components:

- gyro-platform an indicator type with two gravity sensors;
- controlling PC, provides control and digital processing of data;
- electronic instruments for gyro-platform;
- a control console for the gravity sensors;
- system of acquisition, pre-processing and data visualization based on PC;
- continuous power supply.

## Specifications:

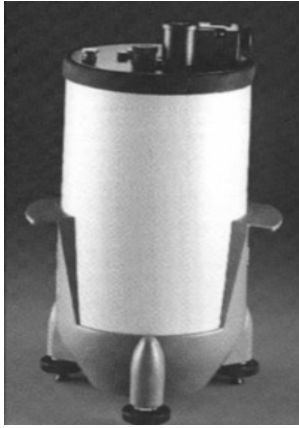
- Instrumental error of gravity sensors — 0.02 mGal;
- Accuracy of sustaining gyro platform horizontal in dynamic conditions 20°;
- Voltage — 220 V, 50 Hz;
- Power requirements — 1 kW;
- Weight — 80 kg.

**Synchronization Grin-2000 with DGPS:** via navigation data channel working in real time mode (time UTS).

## Data format and data entry period

Recording and on-line data QC control is performed by the integrated acquisition system of on the basis of PC.

Data are reordered with 1 s interval in the form of ASCII files.

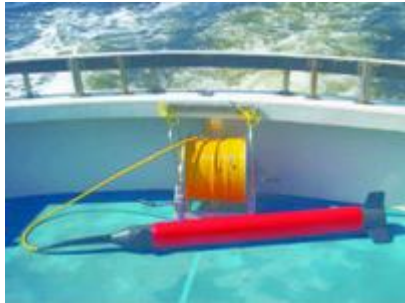


**Gravimeter T-200 by Sodin**

Land-based or stand gravity surveys can be conducted by *Sodin Prospector 200-T* gravimeters, specially produced for surveys at depth to 2,5 meters.

# Magnetometers

300M Sea Spy Marine Magnetics differential magnetometer by Geometrics



**300M Sea Spy Marine Magnetics**

**300M Sea Spy Marine Magnetics** magnetometer is designed for high-accuracy magnetic sea surveys in differential mode for measurements of the Earth's magnetic field and can be used for oil and gas exploration, search for metal and sunken objects and for cartography.

Specifications:

<b>Sensitivity</b>	0,01 nTl
<b>Absolute error</b>	0,2 nTl
<b>Sampling frequency</b>	4 Hz — 0,1 Hz
<b>Range</b>	from 18 000 nTl till 120 000 nTl
<b>Tolerance limit of gradient</b>	10 000 nTl / m
<b>Power supply</b>	15VDC-35VDC or 100-240VAC
<b>Operation temperature</b>	from -45°C till +60°C
<b>Temperature sensor</b>	from -45°C till +60°C, step 0,1°C
<b>Pressure sensor</b>	100 psi, 500 psi, 2 500 psi, 5 000 psi, 10 000 psi
<b>Depth sensor</b>	No-mag 200 κΓц

MDM differential magnetometer (Russian made)

Specifications:

<b>Type</b>	proton
<b>Range of measurement, nTl</b>	20000-80000
<b>Number of sensors</b>	2
<b>Value of count, nTl</b>	0,01-0,1
<b>Measuring period, s</b>	1, 3, 6, 10, 30
<b>Absolute error, nTl</b>	max 2,5

MDM is designed for magnetic surveys in the World Ocean.

G-877 sea proton magnetometer by Geometrics

Specifications:

<b>Measurement range</b>	20000-100000 nTl
<b>Response</b>	0,1 nTl

**Absolute error** max 1 nTl  
**Quantity of sensors** 2  
**Recording** Digital on PC with graphic visualization of magnetic field on display

G-877 is a one channel magnetometer, designed for shallow water surveys.



**M-500 Ionometric converter (Russia)**

For measurement of ion activity of hydrogen (pH), mass concentration of univalent and bivalent anions and cations ( $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{NO}_3^-$ ,  $\text{S}^{2-}$ ,  $\text{K}^+$ ,  $\text{Na}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Ag}^+$  etc.), redox potential (Eh) electromotive difference of electrode systems in water solutions.



**SNOL 67/350 Low-temperature laboratory furnace (Lithuania)**

This electrical furnace is meant for the drying of various materials, carrying out analytical work in air, normalizing and tempering of metals, springs, heat processing of plastic and other materials in stationary heating with temperature from 50 to 350 °C.

**A&D HR-200 High-accuracy scales («A&D», Japan)**

External calibration, 10 units of measurement, settings for various environmental factors, single-piece counting of products, percentage expression of weighing results, ability to weigh with the help of a hook, self-diagnostic test, ability of determination of density, automatic diagnostics, function of digital calibration. Minimum resolution 0,0001 grams.



**MINOTAVR-1SHF-mineralizer**

First Russian device for the microwave mineralization of samples of complex composition.

Can be used for decomposition of soils, sediments, ferromanganese crusts and sulphide ores.

## *Shallow water vessels*



**«Лито-1»**

Drilling modul



**«Лито-2»**

Charge module



**«Лито-3»**

Sampling- Drilling module



**«Лито-4»**

Universal module



**«МНИС-ЭКО»**

Research vessel



**«ПТС-ЭКО»**

Drilling vessel



**«Сейс-1»**

Research vessel



**«Сейс-2»**

Research vessel



**«Сейс-3»**

Support vessel



**«ЭКО-1»**

Support vessel



**«СМБ»**

Support vessel



**«ЭКО-3»**

Support vessel



**«ЭКО-5»**

Geotechnical laboratory



**«ПТС-М»**

Drilling vessel

# *Personnel*

The Human Resources policies account for the market economy principles of our company and is based on the constant improvement of personnel management. The use of modern instruments of control over the internal business-processes together with traditional approaches in the social sphere stimulates the initiative and promotes the creativity of the staff thus helping to reduce professional risks.

The HR potential of the company is made up of many qualified specialists: geologists, geophysics, engineers, chemists, designers, and programmers, many of whom are the graduates of Moscow State University, Bauman MSTU, LETI, the Ryazan and Taganrog institutes of radio engineering etc. Among them there are 44 Doctors of Science, 12 of which have Governmental awards. The specialists of YMG are members of these domestic and foreign scientific associations: Russian Academy of the Earth Sciences, Moscow Society of the Nature Investigators, The Ukraine Engineering Academy, The Ukraine Academy of Oil and Gas, AAPG, SEG, EAGE, IMMS, PACON and others.

The personnel of our company have high professional skills and practical experience in all spheres of the company's activities. Our field parties and marine crews are specialists of the highest qualification. We work with modern high-tech equipment and software which requires special skills. The personnel operating the western equipment obtain professional training directly at the manufacturing company's facilities (Fairfield, Geosoft). Our staff is constantly upgrading their skills by participating in various commercial projects, in special training and internships, including abroad.

The total number of the company employees is 1489 persons. The share of the staff involved in R & D and field survey activity is 63% and is presented by the various professional categories.

In spite of the professional differences, the employees share a common understanding of the company's strategy; this helps YMG to solve complicated scientific and commercial tasks.