



MAGE

MARINE ARCTIC GEOLOGICAL  
EXPEDITION

# Helping to explore your offshore areas

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# MAGE history over 48 years

## 1972

**Complex** Marine Arctic Geological-Geophysical Expedition was founded in Murmansk to determine the hydrocarbon and mineral resources potential of the Arctic shelf.

## 1980

**First** Geophysical Surveys on the shelf of Antarctic.  
**Start** of integrated regional surveys on the shelf of Spitzbergen in the North Seas and Pacific ocean.

## 1990

**First** international project.  
**First** commercial project of MAGE on the Russian shelf.  
**MAGE** became a joint-stock company.

## 2000

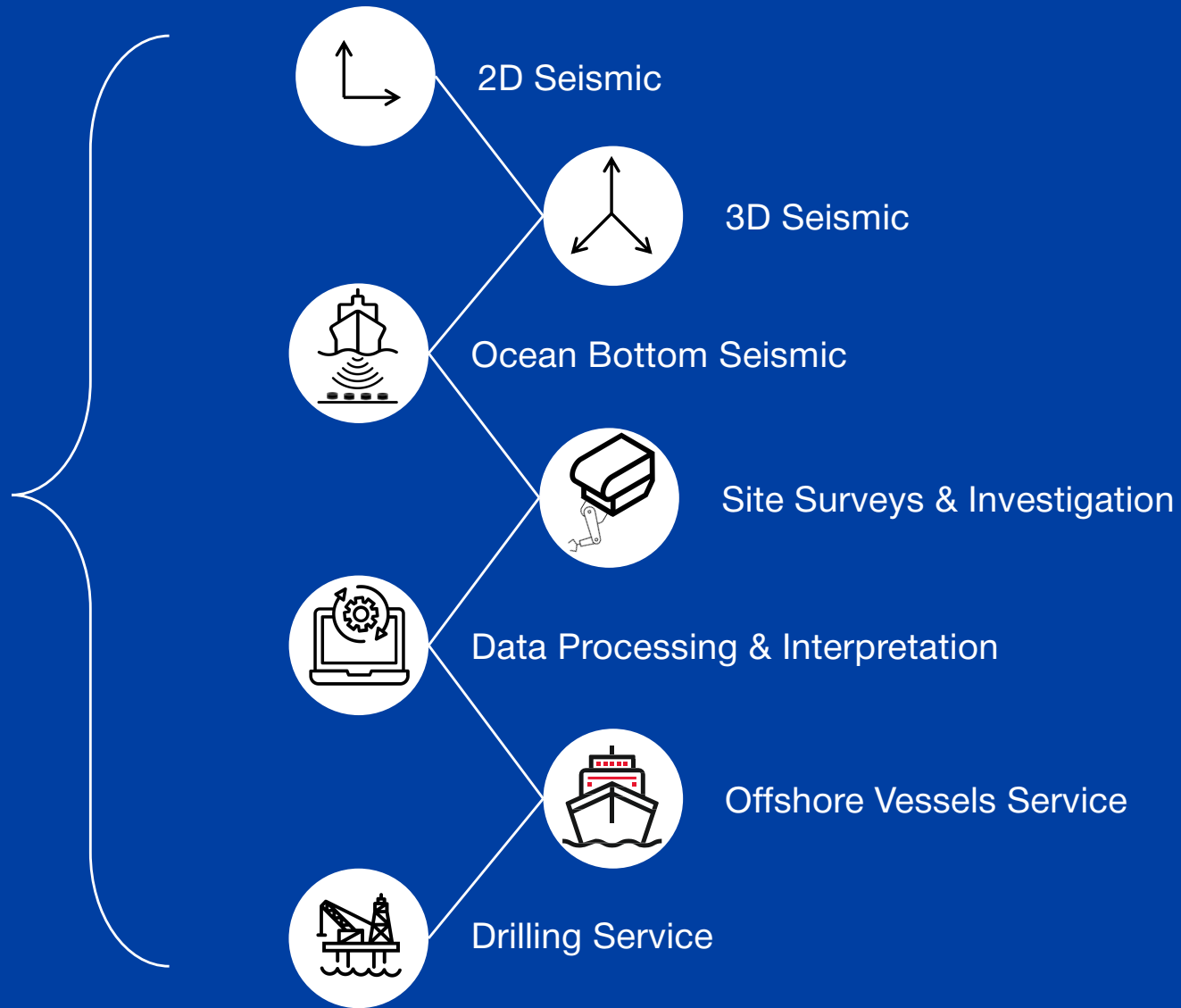
**2D** seismic surveys were performed on the Libyan Shelf in the Mediterranean Sea, on the Norwegian Shelf.  
**MAGE's** Moscow office was established.

## 2010

**First** onshore and transition zone surveys.  
**First** 3D seismic surveys were performed in the Kara Sea, Sea of Okhotsk and Black Sea.  
**First** integrated seismic surveys in the North Pole.

## 2015

**Surveys** on the shelf of Ireland and Mexico.  
**First** project for the integrated service of marine vessels.  
**Start** of integrated drilling service.  
**First** 3D OBN project on the Russian Arctic Shelf.



# We have **Certificates** of conformity to the international requirements

## Exxon Mobile

prequalification procedure for Seismic Survey



## ENI Spa

prequalification procedure for Seismic Survey (marine, TZ and OBN)



Number  
of projects



Number  
of HSE plans



# We DO care about environment and work safety: FAT+LTI+RWC+MTC <1,2 (2016-2018)

		2018	2017	2016
<b>Volume</b>				
Man hours total	Manhours	1 941 000	1 783 776	1 631 274
<b>Health and Safety</b>				
Fatalities	FAT	0	0	0
Lost Time Incidents	LTI	0	0	1
Lost Work days	LWD	0	0	0
Restricted Work Cases	RWC	0	0	0
Medical Treatment Cases	MTC	6	2	3
First Aid cases	FAC	15	25	28
Recordable cases ( Summary FAT, MTC, RWC, LTI)	TRC	5	2	4
Near Misses	NM	5	5	8
Fatality Frequency (For million hours)	FAR	0	0	0
Lost Time Injuries Frequency (For million hours)	LTIF	0	0	1
Total Recordable Cases Frequency (FAT+LTI+RWC+MTC) (For 10 million hours)	TRCF	0	1	3
<b>Environment</b>				
Lost of primery containment	LOPC	0	0	0
Hydrocarbon spills	Spill	0	0	0
Fuel consumption	Fuel	30 305	11 711	7 207

# MAGE is a **seismic expert** since 1972 and you can trust us

## 48

Years in  
exploration

Since the beginning of  
exploration in Russia

## 60+

Completed  
projects

In last 6 years in various  
conditions including harsh

## 650+

Employees

From seismic to drilling

# MAGE is a **reliable partner** and contractor for:

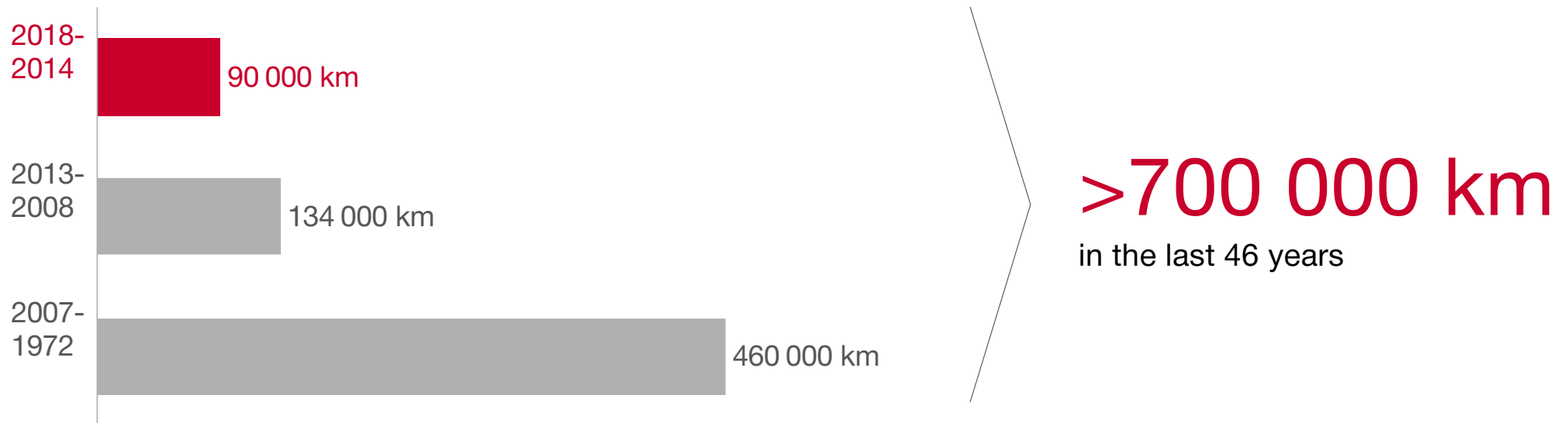




**2D  
SEISMIC**



# Over the past five years MAGE has done **>90 000 km** of 2D seismic



# Choose right vessel from our own fleet to meet your requirements



RV Geolog Dmitriy Nalivkin



RV Nikolay Trubyatchinsky

# Technical details of 2D seismic equipment

## **Recording system**

Sercel Seal 408, Seal 428

## **Seismic Streamers**

Sercel Sentinel Solid Streamer

## **Maximum length of seismic streamers**

12 000 m

## **Navigation system**

Orca 2D Concept Systems

## **Echo-sounder / Multibeam Echo-sounder**

Simrad EA600 / SeaBat 7160 / SeaBat 7125-SV2

## **Air guns**

BOLT 1500LL / 1900 LLX / ION Sleeve Gun I, II

## **Max volume of air gun sources**

8000 cubic inch

## **Seismic data processing and QC**

ProMAX 2D

# Key 2D seismic projects in Russia

<b>Gazpromneft-Sakhalin</b> East-Siberian Sea		5 123 km	2018	→	Ice edge boundary 2-3 months of work
<b>ROS GEO</b> Barents Sea	Offshore	3 000 km	2016		Onshore – TZ – Offshore Integrated surveys on our own
	TZ	150 km	2016	→	
	Onshore	550 km	2016		
<b>MOR GEO</b> Arctic Ocean		4 950 km	2014	→	Severe ice conditions Ice protection patent
<b>MOR GEO</b> Arctic Ocean		4 375 km	2014		

# MAGE has experience working worldwide; 10 projects completed in recent years

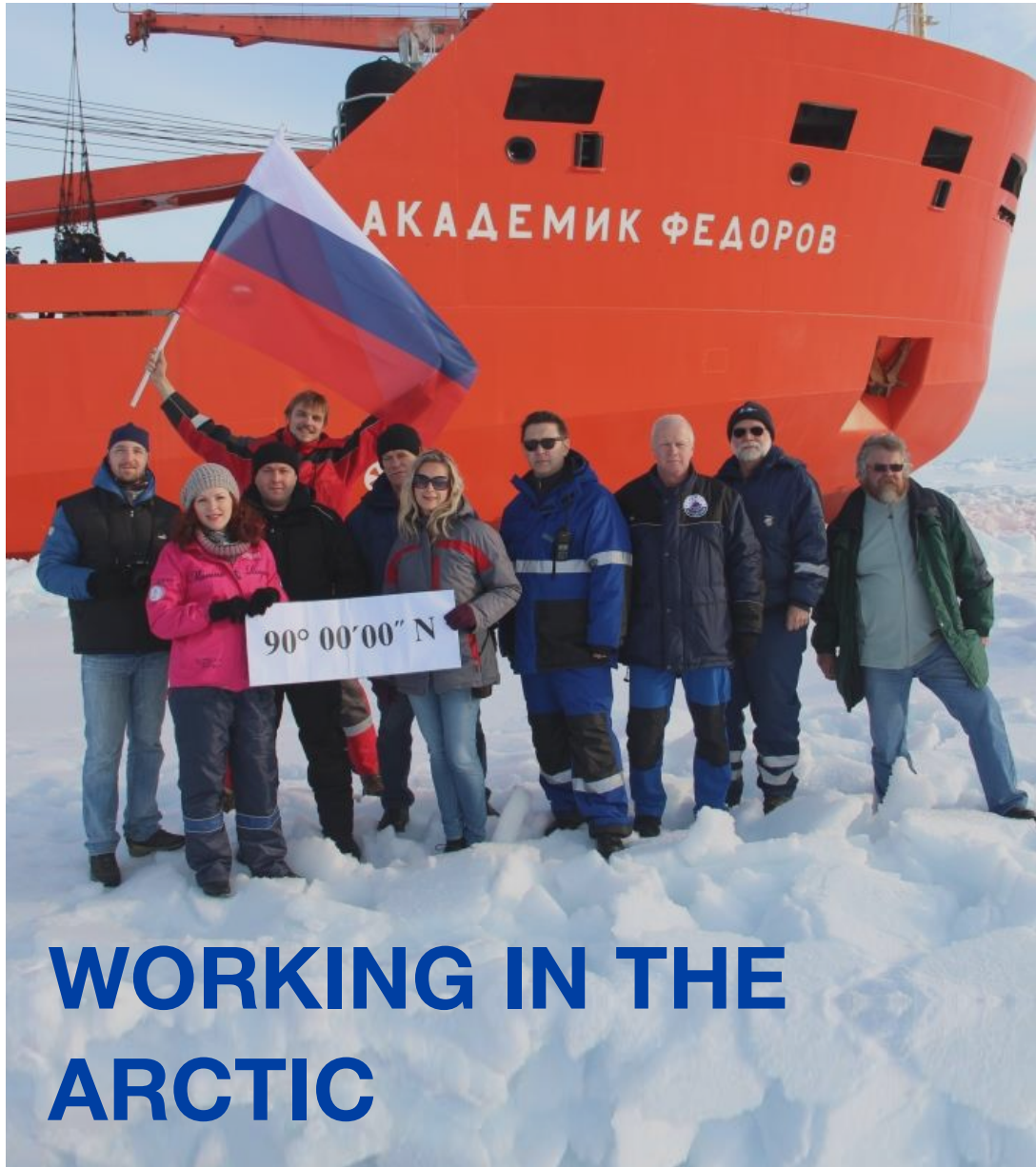
<b>MultiClient Geophysical ASA/Norway</b> Gulf of Mexico, Mexico	6 339 km	2016
<b>GeoPartners Ltd./UK</b> North Celtic Sea, Ireland	5 124 km	2015
<b>Searcher Seismic Pty Ltd./Australia</b> Porcupine Basin, Ireland	9 000 km	2015
<b>MultiClient Geophysical ASA/Norway</b> Barents Sea, Norway	8 110 km	2013
	5 847 km	2012
	6 464 km	2011
<b>Statoil ASA/Norway</b> Barents Sea, Norway	5 858 km	2011
<b>ONGC Ltd./India</b> East. & West. Offshore, India	10 150 km	2010
<b>ONGC Videsh Ltd./India</b> Bay of Bengal, India	12 897 km	2008
<b>Fugro-Geoteam AS/Norway</b> Barents Sea, Norway	7 454 km	2008



International track  
record since 1991.



Water depth >3 500 m



# WORKING IN THE ARCTIC



Severe ice conditions



Short field season



Specialized ice class vessels utilised

+1,2

Based on the data acquired by MAGE in 2015 Russia has submitted a requisition to the UN on the subject of **extension of the continental shelf in the Arctic by 1,2 mln sq km**

+5

This will allow to increase the hydrocarbon resources by **5 bln tons**

2019

In April 2019 the UN sub-commission has approved that the part of the arctic territories is geologically a part of Russian continental shelf



**Gravimagnetic  
measurements**

# MAGE uses **Chekan-AM** and **SeaSPY2** for gravity and magnetic measurements

**8 000 - 25 000** km per year

Gravimeters **Chekan-AM / model Shelf-E**  
FSUE CSRI Elektropribor, made in Russia

Range not less than	10 mGal
Statistical accuracy	1 mGal
Sensitivity	0.01 mGal
Time constant	up to 100 sec.

**SeaSPY2** Marine Magnetometers  
Marine Magnetics, made in Canada

Absolute accuracy	0.1 nT
Sensor sensitivity	0.01 nT
Counter sensitivity	0.001 nT
Resolution	0.001 nT





**3D  
SEISMIC**

# Started in 2013 and became **leaders** with **55%** market share **in 2 years**



## Seismic Vessels

Up to 3 seismic and 4 support per year



## Tech

First 14 spread and Broadband in Russia



## Project team

Providing EIA, permits and logistic support

**> 42 000 km<sup>2</sup>**  
acquired during 2013-2016



**OBN  
SEISMIC**

# Creating project solutions for specific Client needs



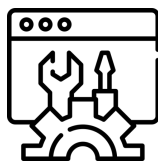
## Sourcing Vessels

Owned and  
Chartering



## Crew

Including local content



## Nodes, Navigation

Manufacturing, Shipping



## Rigging / Derigging

Planning and contracting

**>1 175 km<sup>2</sup>**  
in the last 2 years

# Crab: new 4C nodal system on the market. **3 000 nodes** are available



Made in Russia

45

**Days**  
battery life

24

**Hours**  
to full charge

400

**Meters**  
max depth



# Site Surveys & Investigation

# Will help to solve the problem with positioning: **7 main types** of services

## What is Site Survey?

A **complex** of methods aimed at obtaining data for the correct **positioning of objects**

## Where we can use it?



Drilling Rigs



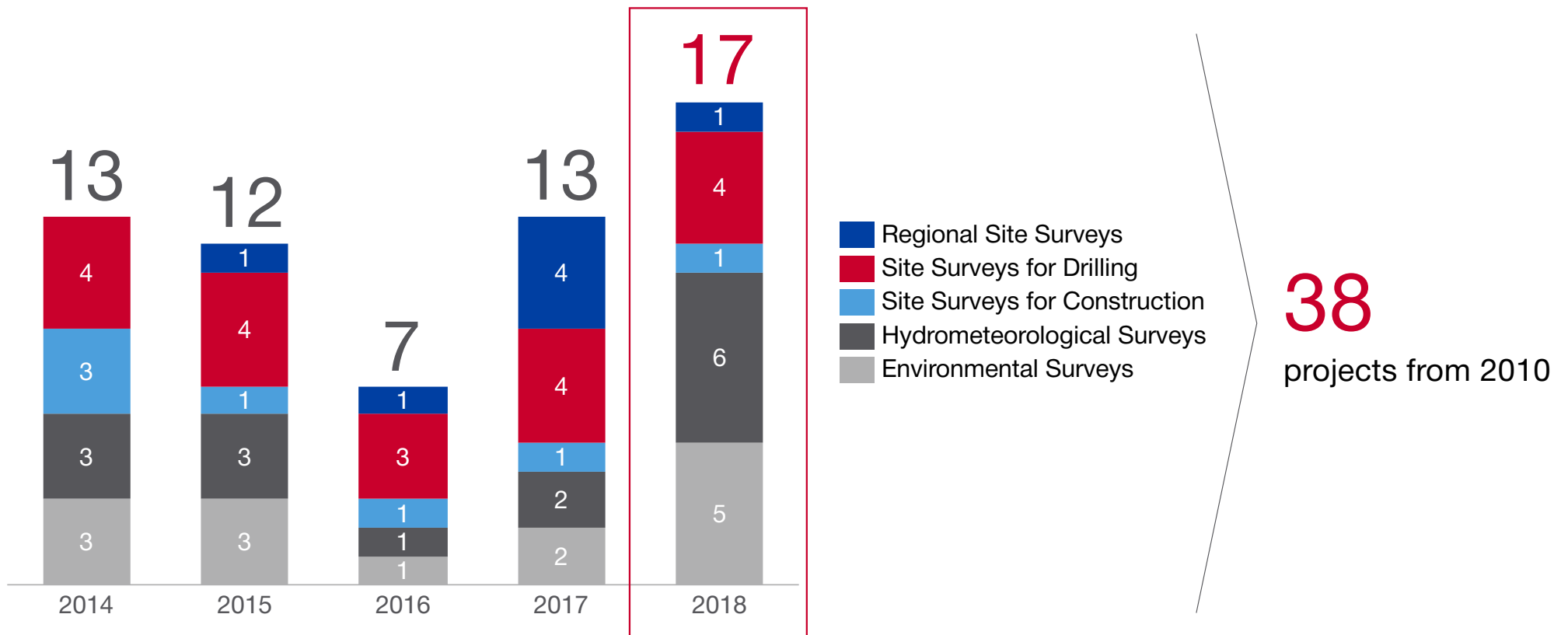
Windmills



Construction Operations  
in Port

1. HR (High Resolution), UHR (Ultra High Resolution), CSP (Continuous Seismic Profiling)
2. MBES (Bathymetric Survey)
3. ROV Survey & Support
4. SSS (Side-scan Sonar)
5. MAG (Magnetic Measurements)
6. Geotechnical Works + Laboratory
7. Environmental Surveys

# Over the past five years, MAGE has **doubled** the annual **scope of work performed**





# More than **1400 targets** inspected by MAGE over the last five years

**1400+**

Targets inspected

Sperre  
SUB-fighter 15k

Perry Slingsby  
Triton XLR 125 hp

**400+**

Routes inspected



**60+**

Wells inspected

# Adding **newer vessel in 2019** to our fleet that is capable to perform even more efficient



RV Fedor Kovrov



RV Sapfir

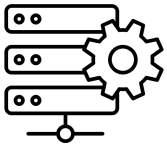


RV Geofizik

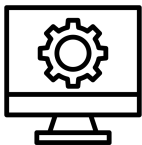


**Data Processing  
& Interpretation**

# We have all the necessary **hardware**, **software** and **capacities** for data processing



Processing **servers**:  
HP DL380p GB,  
DEPO Storm 330P1



Domestic interpretation and processing **system** Prime (Yandex.Terra) and parallel processing software SeisSpace/ProMAX (Landmark, Halliburton)



Cluster **data storage** systems:  
EMC ISILON X200, QNAPTS-  
EC1679U-RP



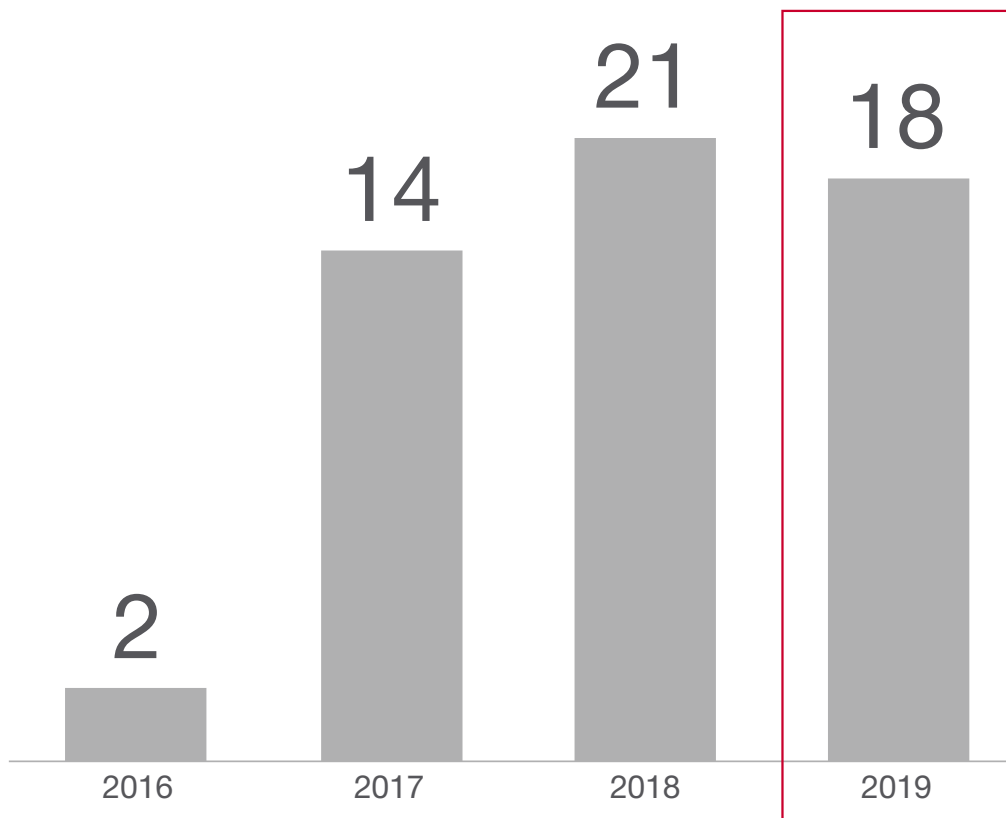
**Workplaces** in accordance  
with the latest standards and  
requirements

**>140 000**  
in the last 5 years (km)



**Offshore Support  
Vessels Service**

# More than **50 vessels** in operation from 2016





# RV Nikolay Trubyatchinsky

Year and place of building	1988, Norway
Reequipped	1991, 2013
Class	KM*ARC5 AUT1 Special purpose ship (RMRS)
Type	Research vessel
Length / Beam / Draft	65.0 / 14.0 / 7.8 m
Total displacement	6762 t
Cruising range	9500 miles
Speed eco/max	10/13 knots
Endurance	>40 days
No. of crew members/ expedition specialists	20/25 persons
Fuel capacity	530 m <sup>3</sup>
Fresh water capacity	47 m <sup>3</sup>
Main engine	Wichmann 3000kW
Generators	2 x Ct 3512 – 960 kW 1 shaft generator – 1814 kW Cat 3412 – 495 kW
High pressure air compressors, electric	3 * LMF – 37 Performance – 37 m <sup>3</sup> /min Pressure – 2000 psi
Source	Dual source 4 subarrays
Guns	7 700 cu in Bolt guns
Consumption	12 mt/day
Seismic Streamers	Sercel Sentinel Solid Streamer max length 12 000 m



# RV Geolog Dmitriy Nalivkin

Year and place of building	1985, Finland
Reequipped	1992, 1998, 2001, 2009
Class	KM(*) UL[1] AUT2 Special purpose ship (RMRS)
Type	Research vessel
Length / Beam / Draft	71.6 / 12.8 / 5.4 m
Total displacement	2142 t
Cruising range	9500 miles
Speed eco/max	9/11 knots
Endurance	40/25 days
No. of crew members/ expedition specialists	27/27 persons
Fuel capacity	329 m <sup>3</sup>
Fresh water capacity	120 m <sup>3</sup>
Main engine	2 x Type G-74, 1150 kW, Russia
Generators	3 x DEUTZ BA8AM 816R, 385 kW 1 x MITSUBISHI S12R-MPTA, 840kW
Source	Dual source 4 subarrays
Guns	4 500 cu in Bolt guns
Consumption	10 mt/day
Seismic Streamers	Sercel Sentinel Solid Streamer max length 12 000 m





Year and place of building	1990, Norway
Reequipped	2016
Class	KM* [1] DYNPOS-1
Type	Research vessel
Length / Beam / Draft	81.90 / 18.00 / 4.98 m
Total displacement	5023 t
Cruising range	Unlimited
Speed eco/max	10/13 knots
Endurance	60 days
No. of crew members/ expedition specialists	28 persons
Fuel capacity	977.4 m <sup>3</sup>
Fresh water capacity	736 m <sup>3</sup>
Main engine	2 x Bergen Diesel 2430 kW
Generators	2 x Caterpillar 320 kW 2 x 1680 kW
DP system	DP1
Deck space	840 m <sup>2</sup> clear deck
Consumption	10 mt/day

# RV Fedor Kovrov



# RV Geofizik

Year and place of building	1983, Russia
Reequipped	2004, 2015
Class	KM * L 2 [I] Special purpose ship
Type	Research vessel
Length / Beam / Draft	55.6 / 9.30 / 4.5 m
Total displacement	1157 t
Cruising range	8000 miles
Speed eco/max	8/10 knots
Endurance	32 days
No. of crew members/ expedition specialists	25/15 persons
Fuel capacity	135 m <sup>3</sup>
Fresh water capacity	45 m <sup>3</sup>
Main engine	1 x 6 NVD 48 A-2U 736 kW
Generators	3 x 6 ChN18/22 150 kW
Consumption	7 mt/day



## RV Sapfir

Year and place of building	1999, England
Reequipped	2019
Type	Research vessel
Length / Beam / Draft	73.8 / 16.05 / 6.3 m
Speed eco/max	10/14 knots
Endurance	32 days
No. of crew members/ expedition specialists	25/15 persons
Fuel capacity	1007 m <sup>3</sup>
Fresh water capacity	768 m <sup>3</sup>
Main engine	2 x Wartsila 6L26 3900 kW
DP system	Kongsberg SDP21 (DP-2)
Cargo deck	Area: 675 m <sup>2</sup> Cargo weight: 1,500 t Max deck load: 5 t/m <sup>3</sup> Moonpool
Consumption	7 mt/day