Application for Consent to conduct
Marine Scientific Research

Date: 15.12.2017

1. General Information

1.1 Cruise name and/or number:
Akademik Mstislav Keldysh, cruise # 71

1.2 Sponsoring Institution(s):	
Name:	Shirshov Institute of Oceanology
Address:	36 Nakhimovskii prospect, Moscow 117997
Name of Director:	Alexey Sokov

1.3 Scientist in charge of the Project:	
Name:	Sergey Gladyshev
Country:	Russia
Affiliation:	Shirshov Institute of Oceanology
Address:	36 Nakhimovskii prospect, Moscow 117997
Telephone:	+7 (499) 124 61 42
Fax:	+7 (499) 124 63 42
Email:	sgladyshev@ocean.ru
Website (for CV and photo):	www.ocean.ru

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	no
Affiliation:	
Address:	
Telephone:	
Fax:	
Email:	
Website (for CV and photo):	

2. Description of Project

2.1 Nature and objectives of the project:
Specific goals of the cruise are to provide the description of the Subpolar Gyre thermohaline and kinematic structure; to monitor the spatiotemporal changes of transatlantic meridional volume and heat transport, to investigate and evaluate the exchange in the northern part of the Atlantic Ocean. Geological researches aim to study Holocene - Upper Pleistocene climate and to estimate atmosphere – ocean - lithosphere matter exchange.

2.2 If designated as part of a larger scale project, then provide the name of the project and the Organisation responsible for coordinating the project:
The cruise is part of the CLIVAR International Program

2.3 Relevant previous or future research projects:
International World Ocean Circulation Program

2.4 Previous publications relating to the project:
1. *Sarafanov A., Falina A., Lherminier P., Mercier H., Sokov A., Gourcuff C.* Assessing

decadal changes in the Deep Western Boundary Current absolute transport southeast of Cape Farewell (Greenland) from hydrography and altimetry // J. Geophys. Res. – 2010a. – Vol. 115. – doi:10.1029/2009JC005811.

2. *Sarafanov A., Falina A., Mercier H., Sokov A., Lherminier P., Gourcuff C., Gladyshev S., F. Gaillard, Daniault N.* Mean full-depth summer circulation and transports at the northern periphery of the Atlantic Ocean in the 2000s // J. Geophys. Res. – 2012. – Vol. 117. – doi:10.1029/2011JC007572.

3. *Sarafanov A., Falina A., Sokov A., Gladyshev S.* Observing deep-water changes in the northern North Atlantic // Proceedings of OceanObs'09: Sustained Ocean Observations and Information for Society, Annex, Venice, Italy. ESA Publication WPP-306. – 2010b. – doi:10.5270/OceanObs09.

4. *Sarafanov A., Mercier H., Falina A., Sokov A., Lherminier P.* Cessation and partial reversal of deep water freshening in the northern North Atlantic: observation-based estimates and attribution // Tellus. – 2010c. – Vol. 62A. – P. 80–90. – doi:10.1111/ j.1600-0870.2009.00418.x.

5. *Gladyshev S.*V.,Gladyshev V.S.,Falina A.S., Sarafanov A.A. Winter convection in the Irminger Sea in 2004-2014 // Oceanology. 2016. V. 56. N 3. pp. 326–335, **DOI:** 10.1134/S0001437016030073.

6. *Gladyshev S.*V., Gladyshev V.S., Gulev S.K., Sokov A.V. Anomalously Deep Convection in the Irminger Sea during the Winter of 2014–2015 // *Doklady Earth Sciences, 2016. V. 469, Part 1, pp. 766–770,* **DOI:** 10.1134/S1028334X16070229.

7. *Gladyshev S.*V., Gladyshev V.S., Sokov A.V, Gulev S.K., Pautova L.A., Demidov A.B. Average Annual Structure and Transport of Waters Eastward of Greenland by the System of Western Boundary Currents // *Doklady Earth Sciences, 2017. V. 473, Part 1, pp. 313–317,* **DOI:** 10.1134/S1028334X17030035

8. *Gladyshev S.*V., Gladyshev V.S., Gulev S.K., Sokov A.V. Subpolar Mode Water Classes in the Northeast Atlantic: Interannual and Long-Term Variability // *Doklady Earth Sciences, 2017. V. 476, Part 2, pp. 1203–1206,* **DOI:** 10.1134/S1028334X17100166

3. Geographical Areas

3.1 Indicate geographical areas in which the project is to be conducted (with reference in Latitude and longitude in decimal degrees, including coordinates of cruise/track/way points/sampling stations). Please provide coordinates in a separate excel spreadsheet.
Three hydrographic sections between Shetland Islands and Greenland from 60.417° N, 01.917°W to 67.398° N 33.042° W Hydrographic section from 59.5° N 04.6° W to 59.95° N, 43.00° W and survey in the Irminger Sea

3.2 Attach chart(s) at an appropriate scale (1 page, high-resolution) showing the geographical Areas of the intended work and, as far as practicable, the location and depth of sampling Stations, the tracks of survey lines, and the locations of installations and equipment.
Annex 1

4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	Akademik Mstislav KeldyshSergey Vavilov
Type/Class:	Research ship/KM (★) L1 [1] AUT2 DYNPOS
Nationality (Flag State):	Russia
Identification Number (IMO/Lloyds No.):	7811018
Owner:	Shirhsov Institute of Oceanology
Operator:	Shirshov Institute of Oceanology
Overall length (meters):	122.2

Maximum draught:	5.9
Displacement/Gross Tonnage:	6340/6259
Propulsion:	WARTSILA 824TS, 4 x 1070 kW
Cruising & maximum speed:	12.5 & 14
Call sign:	UFJI
INMARSAT number and method and capability of communication (including emergency frequencies):	INMARSAT-C: TLX 581 427300520 INMARSAT – F77: TEL: 870 763477171 radioroom, FAX 870 763477174 radioroom INMARSAT-MINIM TEL 761 322469, 761322470, FAX 761 322471 GMDSS system, region A4, STR-2000" 250W; "SAILOR SYSTEM 5000, USW - Sailor RT-5022, radio IW/SW, 500 W, 2174.5, 4177.5, 6268.0, 8376.5, 12520.0, 16696 kGz
Name of Master:	Yurii Gorbach
Number of Crew:	44
Number of Scientists on board:	35

4.2 Particulars of Aircraft:	
Name:	no
Make/Model:	
Nationality (flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall Length (meters):	
Propulsion:	
Cruising & Maximum speed:	
Registration No.:	
Call Sign:	
Method and capability of communication (including emergency frequencies):	
Name of Pilot:	
Number of crew:	
Number of scientists on board:	
Details of sensor packages:	
Other relevant information:	

4.3 Particulars of Autonomous Underwater Vehicle (AUV):	
Name:	no
Manufacturer and make/model:	
Nationality (Flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall length (meters):	
Displacement/Gross tonnage:	
Cruising & Maximum speed:	
Range/Endurance:	
Method and capability of communication (including emergency frequencies):	
Details of sensor packages:	
Other relevant information:	

4.4 other craft in the project, including its use:
no

4.5 Particulars of methods, full description of scientific instruments to be used (for fishing gear specify type and dimension) and location			
Types of samples and Measurements:	Methods to be used:	Instruments to be used:	To be carried out within 12nm (yes or no):
pressure, temperature, conductivity, dissolved oxygen, turbidity	Deep casts from the surface to the bottom from the drifting ship	SBE 911 plus CTD	no
Oxygen, silicates, phosphates	Titration and standard photometric methods at the sea laboratory on the ship	SBE 32 rosette system 24 bottles-10L	no
U,V components of velocity	Deep casts from the surface to the bottom from the drifting ship	300 kHz Workhorse Sentinel (Monitor) ADCP	no
Surface temperature and conductivity	Underway and on stations at 5 m depth	Thermosalinograph SBE21	no
U,V components of velocity	Underway and on stations in upper 1000 m layer	TRDI OS 75 kHz ship mounted current profiler	no
Surface sediments	From the drifting ship, coordinates pointed out as geological ststions in excel spreadsheet	Van Veen bottom grab 2500 cm^2	no
Upper layer (Holocene-Upper Pleistocene) sediments	From the drifting ship, coordinates pointed out as geological ststions in excel spreadsheet	Gravity Corer, 1 x D127 mm x 8 m	no
Surface sediments	From the drifting ship, coordinates pointed out as geological research in excel spreadsheet	Multi-corer, 4 x d100 mm x 600 mm, model 71.500 (Denmark)	no

4.6 Indicate nature and quantity of substances to be released into the marine environment:
no

4.7 Indicate whether drilling will be carried out. If yes, please specify:
no

4.8 Indicate whether explosives will be used. If yes, please specify type and trade name, Chemical content, depth of trade class and stowage, size, depth of detonation, frequency of Detonation, and position in latitude and longitude:
no

5. Installations and Equipment

Details of installations and equipment (including dates of laying, servicing, method and Anticipated timeframe for recover, as far as possible exact locations and depth, and Measurements):

6. Dates

6.1 Expected dates of first entry into and final departure from the research area by the research vessel and/or other platforms:
23.06.18 – 11.08.18
6.2 Indicate if multiple entries are expected:
Yes

7. Port Calls

7.1 Dates and Names of intended ports of call:
Kaliningrad (Russia) 20.06.18 Arkhangelsk (Russia) 10-15.08.18
7.2 Any special logistical requirements at ports of call:
no

7.3 Name/Address/Telephone of shipping agent (if available):
no

8. Participation of the representative of the coastal State

8.1 Modalities of the participation of the representative of the coastal State in the research Project:
yes

8.2 Proposed dates and ports for embarkation/disembarkation:
Kaliningrad (Russia) 20.06.2018/Arkhangelsk (Russia) 15.08.18

9. Access to Data, Samples and Research Results

9.1 Expected dates of submission to coastal State of preliminary report, which should include The expected dates of submission of the data and research results:
within 1 year after completing the cruise

9.2 Anticipated dates of submission to the coastal State of the final report:
within 1 year after completing the cruise

9.3 Proposed means for access by coastal State to data (including format) and samples:
by e-mail

9.4 Proposed means to provide coastal State with assessment of data, samples and Research results:
by e-mail

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples And research results:
by e-mail

9.6 Proposed means of making results internationally available:
Publication in the International Peer-Reviewed Journals

10. Other permits Submitted

10.1 Indicate other types of coastal state permits anticipated for this research (received or Pending):
Greenland, Faroe Islands, Iceland

11. List of Supporting Documentation

11.1 List of attachments, such as additional forms required by the coastal State, etc.:
Chart of stations, excel spreadsheet with station coordinates

Signature:

Contact information of the focal point:
Name: Sergey Gladyshev
Country: Russia
Affiliation: Shirshov Institute of Oceanology
Address: 36 Nakhimovskii prospect, Moscow 117997
Telephone: +7 (495) 719 02 55
Fax: +7 (499) 124 63 42
Email: sgladyshev@ocean.ru