

'Akademik Ioffe'

23-28. September 2007 cruise

Cruise report

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and shipboard party*



Introduction and aim

From September 23-28, the research vessel ‘Akademik Ioffe’ (Kaliningrad) acted as a platform for a successful Danish-Dutch-Russian-Canadian research cruise in the coastal waters of Newfoundland, Canada. In total 15 scientists, technicians and students from the participating countries partook in the cruise which was part a research initiative ‘*Joint Paleoceanographic investigations in the Labrador Sea region - Late Holocene climate variability in the southwestern Labrador Sea*’ funded by the Danish Natural Science Research Council.

The aim of the cruise, which was a contribution to the IPY #120 NORCLIM and IPY #139 APEX initiatives, was to obtain high-resolution marine sediment records of late Holocene regional sea-surface temperature (SST) and (sea) ice variability off Newfoundland. The core records are simultaneously thought to provide information on large-scale North Atlantic atmospheric circulation changes. In addition, by using near-shore fjord records of the wind-blown sediment fraction we expect to reconstruct changes in regional storm activity likewise indicative of large-scale variations in North Atlantic atmospheric circulation. The work is carried out in close collaboration with scientists from Memorial University, Newfoundland. Various results will be evaluated together with archaeologists working with the Newfoundland settlement history in order to investigate the possible impact of regional ocean- and atmospheric circulation variability on human history.

The sediment cores obtained during the cruise will be a very significant element in the NEWGREEN project, dealing with late Holocene records of sea ice and iceberg drift offshore West Greenland and Newfoundland project funded (2007-2009) by the Danish Commission for Scientific Research in Greenland (KVUG). The goal of the NEWGREEN project is to provide a more consistent record of (sub)Arctic environmental and climatic conditions for human living during the past 5000 years. This will be achieved by reconstruction of late Holocene regional sea surface conditions with special reference to sea ice formation and iceberg drift off West Greenland and Newfoundland. This information will be linked to relevant data from the North Atlantic, Nordic Seas and Fram Strait in order to investigate possible relations between large-scale North Atlantic Ocean and atmospheric circulation changes, Arctic sea ice export and sea ice formation and iceberg drift in waters between Greenland (e.g. Disko Bugt, Jakobshavn Isbræ) and Canada (Newfoundland). The project thus focuses on natural climate variability with special emphasis on marine climate and sea ice conditions and contrasting climatic trends off southwest Greenland when compared with the Norwegian Sea - Barents Sea region and NW Europe. The research is based on an integrated approach to reconstruct the changes in ocean surface currents and terrestrial environments (e.g. wind conditions), combining features of climatic variability as displayed in high-resolution marine and terrestrial sedimentary records (multiproxy approach) with archeological evidence and historical archives (e.g. whaling data) from collaborating IPY partners.

RV Akademik Ioffe and shipboard equipment

The RV Akademik Ioffe (Kaliningrad) was chartered by the Department of Earth Sciences, University of Aarhus, Denmark (ES, AU) from P.P. Shirshov Institute of Oceanology, RAS. The contract was signed by Prof. John A. Korsgård, Head of Department, ES, AU, and Dr. Marit-Solveig Seidenkrantz (ES, AU) (as customers) and by Dr. Alexcy V. Sokov, Deputy Director, P.P. Shirshov Institute of Oceanology, Moscow.

The ship was equipped with a 'Parasound' high-resolution subbottom profiler system and excellent onboard recording software facilities (Kaliningrad). For sediment sampling, a 6-m gravity corer and a box corer from GEUS were deployed using the ship's main winch. The vessel was further equipped with excellent laboratory facilities.



Figure1. For sediment sampling, a 6-m gravity corer and a box corer from GEUS were deployed using the ship's main winch.

Participants – Scientific party

The shipboard party consisted of fifteen scientists, technicians and students:

Seidenkrantz, Marit-Solveig	University of Aarhus, Denmark	Chief scientist
Kuijpers, Antoon	Geological Survey of Denmark and Greenland	Co-chief scientist
Troelstra, Simon R.	Vrije Universiteit Amsterdam, the Netherlands	Co-chief scientist
Ebbesen, Hanne	Geological Survey of Denmark and Greenland	Scientist
Boserup, John W.	Geological Survey of Denmark and Greenland	Technician
Leontyev, Vladimir	P.P. Shirshov Institute of Oceanology, RAS	Technician
Malafeev, Georgy	P.P. Shirshov Institute of Oceanology, RAS	Technician/Scientist
Brushett, Denise M.	Memorial University Newfoundland	Research Assistant
Chestnova, Marina	P.P. Shirshov Institute of Oceanology, RAS	Ph.D. student
Fischel, Andrea	University of Aarhus, Denmark	M.Sc. Student
Werleman, Chantal	Vrije Universiteit Amsterdam, the Netherlands	M.Sc. Student
Christensen, Eva Z.	University of Aarhus, Denmark	B.Sc. Student
Gunvald, Anja K.	University of Aarhus, Denmark	B.Sc. Student
Jørgensen, Esben V.	University of Aarhus, Denmark	B.Sc. student
Palitzsch, Monica M.G.	University of Aarhus, Denmark	B.Sc. Student



Figure 2. The shipboard party on the deck of RV 'Akademik Ioffe'.

Results

Parasound studies and core collection were concentrated in three bays, i.e. Bonavista Bay (see Fig. 3, '1') and Trinity Bay (Fig. 3, '2') off northeast Newfoundland, and Placentia Bay south of

Newfoundland (Fig. 3, '3'). Additional parasound studies were carried out on the open shelf during transit between selected study regions.

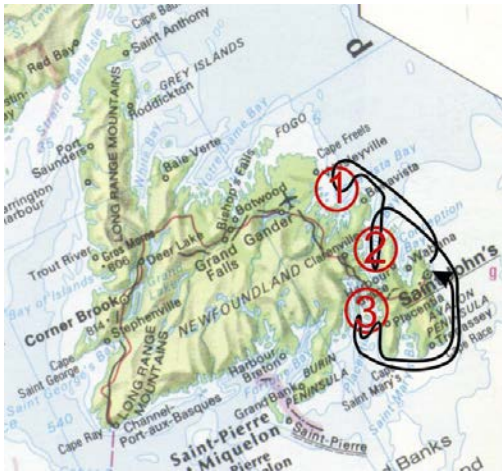


Figure 3. Ships route (in black) and main study sites (red circles).

- 1: Bonavista Bay;
2: Trinity Bay;
3: Placentia Bay.

Parasound

The hull-mounted 'Parasound' system (responsible technician: Vladimir Leontyev) was used to locate suitable coring sites. Parasound waypoints are listed Table 1.

Date	Name	Waypoint no.	Latitude (N)	Longitude (W)
Monday, Sept. 24 (morning)	<i>Bonavista Bay</i>	1	48°50'N	53°15'W
		2	48°44'	53°30'
		3	48°34'	53°32'
		4	48°34'	53°34'30"
		5	48°45'	53°32'W
		6	48°50'	53°22'W
Tuesday, Sept. 25 (morning)	<i>Trinity Bay</i>	1	48°22'N	52°48.5'W
		2	47°58'N	53°33.5'W
		3	47°36'N	53°37'W
Wednesday, Sept. 26 (night) and Thursday, Sept. 26 (early morning)		1	47°00'N	54°52'W
		2	47°07'N	54°52'W
		3	47°14.5'N	54°36.45'W
		4	47°08'N	54°33'W
		5	47°07'N	54°28.5'W
		6	46°52.5'N	54°54'W
		7	47°13'N	54°34'W
Thursday, Sept. 27 (evening and early night) These wave-points were used in opposite order	<i>Placentia Bay</i>	1	47°16.5'N	54°040'W
		2	47°16.5'N	54°070'W
		3	47°13.0'N	54°10.0'W
		4	47°13.0'N	54°060'W
		5	47°10.6'N	54°11.0'W
		6	47°10.6'N	54°08'W
		7	47°08.4'N	54°08'W
		8	47°08.4'N	54°13'W

Table 1. Waypoints for the Parasound survey of the Sept. 23-28. 'Akademik Ioffe' cruise.

Cores

A gravity corer and a box corer, both on loan from GEUS, were deployed using the ships winch (responsible technician: Georgy Malafeev). Gravity cores were cut into 1-m sections, marked and stored for transport to Denmark. Boxcores were subsampled using 3 subcores. Two of the subcores were sliced into 1cm slices for foraminiferal, dinoflagellate, pollen and grain size analyses before they were stored for transport. The third subcore was stored intact to be used for Pb-210 datings. Core stations are listed Table 2.

Date	Name	Core name	Latitude (N)	Longitude (W)	water depth (m)	Core length (cm)
Monday, Sept. 24 (afternoon)	<i>Bonavista Bay</i>	AI07-01G	48°48.709'N	53°24.512'W	317,7	557
		AI07-02BC	48°48.731'N	53°24.450'W	318	32.5
		AI07-03G	48°44.321'N	53°29.181'W	329,5	460
		AI07-04BC	48°44.318'N	53°29.186'W	329.6	40.5
Tuesday, Sept. 25 (afternoon)	<i>Trinity Bay</i>	AI07-05BC	47°50.920'N	53°34.628'W	512	34.5
		AI07-06G	47°50.880'N	53°34.681'W	511	432
		AI07-07BC	48°05.105'N	53°19.930'W	585	44
		AI07-08G	48°05.10'N	53°19.9'W	585.9	438
Thursday, Sept. 27 (morning and afternoon)	<i>Placenta Bay</i>	AI07-09BC	47°14.336'N	54°36.804'W	233	41
		AI07-10G	47°14.335'N	54°36.842'W	231.3	460
		AI07-11BC	47°08.275'N	54°33.192'W	229.5	34.5
		AI07-12G	47°08.204'N	54°33.182'W	230.1	459
		AI07-13BC	46°59.314'N	54°42.103'W	240	15.5
		AI07-14G	46°59.327'N	54°42.046'W	239	515

Table 2. Cores collected during the Sept. 23-26 'Akademik Ioffe' cruise. In core numbers 'G' = gravity cores and 'BC' = box cores.

Future analyses

The cores collected during cruise will among other be studies for grain size and lithology, foraminiferal and dinoflagellate cyst communities, pollen assemblages, magnetic as well as stable isotopes and other geochemical studies. Parts of this work will be carried out as B.Sc. and M.Sc. student projects.

Educational perspective

A total of eight students from Denmark, the Netherlands, Canada and Russia participated in the cruise thus giving the cruise a very significant educational impact. In addition four of the students from the University of Aarhus will use material from the cruise for their bachelor reports.

Acknowledgements

We would like to thank Dr. Vadim Sivkov (sivkov@baltnet.ru), Dr. Sergey Gladyshev (Fleet Department, P.P. Shirshov Institute of Oceanology, 36 Nakhimovskii prospect, Moscow 117997, sgladyshev@ocean.ru) and Dr. Yuri Kuzmin (Expert of Marine Operations Dept., P.P. Shirshov Institute of Oceanography, Russian Academy of Sciences, Nakhimovsky ave.36, Moscow 117997 Russia, ykuzmin@ocean.ru) for help with the arrangements for the lease of 'Akademik Ioffe'. Anette Poulsen Miltoft, University of Aarhus, is thanked for her help during contract discussions.

We are also very grateful to the ships captain and crew as well as to the shipboard party for their hard work and help during the cruise. A special thank to Dr. Hanne Ebbesen, John Boserup, Leontyev, Vladimir and Georgy Malafeev from the shipboard party and to Sergey Vlasenko (boatswain) and Elena Makeenkova (passenger mate) from the ships crew. Sincere thanks also to Profs. Trevor Bell and Priscilla Reynouf and to Ms. Patty Wells, Memorial University, Newfoundland.

Thanks also to the Department of Foreign Affairs and International Trade, Canada, for the permission to undertake the cruise in Canadian territory and to the Ministry of Foreign Affairs of Denmark for their aid in obtaining said permission.

The cruise was funded by the Danish Natural Science Research Council.