

Curriculum Vitae

Andrey K. Morozov

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EDUCATION

MS from Moscow Power Engineering Institute (Technical University) . Radio Engineering Department (Radiophysics), N 443465, February 1975, MS (Russian equivalent) from M.V.Lomonosov Moscow State University, Faculty of Mechanics and Mathematics (Applied Mathematics), N 236220, 1984.

Ph.D. Moscow Power Engineering Institute (Technical University), N 051165; Title of Ph.D: Underwater Acoustic Communications, May 1981

Senior Scientist degree (Communication theory) Moscow Power Engineering Institute (Technical University), N 045761, July 1986

PROFESSIONAL EXPERIENCE

March 1975 - November 1987, post-graduated student, Senior Scientist, Deputy Head of Radio Systems Department of Moscow Power Engineering Institute (Technical University)

December 1987 - September 1999, Lead Scientist of P.P.Shirshov Institute of Oceanology , Russian Academy of Sciences.

January 1998 -July 1999, Visiting Professor Kyushu University , RIAM, Fukuoka, Japan

September 1999 –present, Chief Scientist Teledyne Technologies Inc. (TWR), Falmouth, USA;

March 2001- December 2004, Guest Investigator; January 2005 – April 2006, Visiting Investigator; May 2006 – April 2008, Research Engineer (casual status); April 2008 –November 2012 reclassified as a Research Associate III (casual status); November 2012-present, Research Specialist, Woods Hole Oceanographic Institution , Woods Hole, MA.

RESEARCH INTERESTS

Remote sensing, underwater acoustics, ocean acoustic tomography and communications, experimental ocean engineering, signal and data processing, communication theory, optoacoustics.

PROFESSIONAL ACTIVITIES

Member of technical committee Signal Processing in Acoustics of American Acoustical Society

Associate Editor of JOE IEEE

PROFESSIONAL AFFILIATION

Senior member, IEEE.

Member, Acoustical Society of America

PAPERS IN REFEREED JOURNALS and BOOKS:

1. Morozov A.K., Colosi J.A. Equations for normal-mode statistics of sound scattering by a rough elastic boundary in an underwater waveguide, including backscattering, *J. Acoust. Soc. Am.* 142, EL292-298 (2017); <https://doi.org/10.1121/1.5002734>
2. Morozov A.K., Colosi J.A., Normal-mode statistics of sound scattering by a rough sea surface, elastic bottom, ice. *Proceedings of the Acoustic & Environmental Variability, Fluctuations and Coherence Conference*. Cambridge University (2016), pp. 95–102.
3. Morozov A.K. Colosi J.A. Entropy rate defined by internal wave scattering in long-range propagation *J. Acoust. Soc. Am.* 138(3) 2015 pp.1353-1364
4. Zakharov Yu.V. Morozov A.K. OFDM transmission with no guard interval in fast-varying underwater acoustic channels, *IEEE Journal of Oceanic Engineering*, Vol. 40, No 1, 2015, pp. 144 – 158, 10.1109/JOE.2013.2296842
5. Peter N. Mikhalevsky, Hanne Sagen, Peter F. Worcester, Arthur B. Baggeroer, John Orcutt, Sue E. Moore, Craig M. Lee, Kathleen J. Vigness-Raposa, Lee Freitag, Matthew Arrott, Kuvvet Atakan, Agnieszka Beszczynska-Moeller, Timothy F. Duda, Brian D. Dushaw, Jean Claude Gascard, Alexander N. Gavrilov, Henk Keers, Andrey K. Morozov, Walter H. Munk, Michel Rixen, Stein Sandven, Emmanuel Skarsoulis, Kathleen M. Stafford, Frank Vernon, Mo Yan Yuen, Multipurpose acoustic networks in the integrated Arctic Ocean system. *ARCTIC* Vol 68, No 5, pp. 11-27, 2015.
6. Xiaoka Xu, Shengli Zhou, Andrey K. Morozov, James C. Preisig Per-survivor processing for underwater acoustic communications with direct-sequence spread spectrum *J. Acoust. Soc. Am.* Volume 133, Issue 5, pp. 2746-2754, 2013.
7. Charalampos C. Tsimenidis, Yuriy Zakharov, Christophe Laot, Konstantinos Pelekanakis, Paolo Casari, Andrey K. Morozov "Underwater Communications and Networking," *Journal of Electrical and Computer Engineering*, vol. 2012, Article ID 214012, 2 pages, 2012. doi:10.1155/2012/214012.
8. Colosi J.A., Duda T.F., Morozov A.K. Statistics of low-frequency normal-mode amplitudes in an ocean with random sound-speed perturbations: Shallow-water environments. *J. Acoust. Soc. Am.* 131 (2), Pt. 2, 1749-1761, 2012.
9. Morozov A.K. , Preisig J.C., and Papp J.C., Investigation of Mode Filtering as a Preprocessing Method for Shallow Water Acoustic Communications. *IEEE Journal of Oceanic Engineering.*, Vol. 35, Issue 4, 744-755, (2010).
10. Papp J.C, Preisig J.C., Morozov A.K., Physically constrained maximum likelihood mode filtering, *J. Acoust. Soc. Am.* 127, Issue 4, 2385-2391 (2010).
11. Colosi J.A., Morozov A.K. Statistics of normal mode amplitudes in an ocean with random sound-speed perturbations: Cross-mode coherence and mean intensity, *J. Acoust. Soc. Am.* 126 Issue 3, 1026-1035 (2009).
12. Morozov A.K. , Preisig J.C., and Papp J.C., Investigation of modal processing for low frequency acoustic communications in shallow water, *JASA meeting Acoustics'08 Paris, ACTA ACUSTICA UNITED WITH ACUSTICA* Vol. 94 2008, Suppl.1, S924, *J. Acoust. Soc. Am.* v. 123 p. 3892 (2008), *POMA* Volume 4, Issue 1, pp. 070005-070005-16, (2008).
13. Morozov A.K. , Preisig J.C., and Papp J.C., Modal processing for acoustic communications in shallow water experiment, *J. Acoust. Soc. Am.* Vol. 124, Issue 3, pp. EL177-EL181, 2008.
14. Morozov A. K., Webb D. C., Underwater tunable organ-pipe sound source, *J. Acoust. Soc. Am.* 122 2, August 2007, pp 777-785.
15. Morozov A. K. Colosi J. A., *Stochastic Differential Equation Analysis for Sound Scattering by Random Internal Waves in the Ocean*, *Acoustical Physics*, 2007, Vol. 53, No. 3, pp. 335-347.
16. Morozov A.K., Colosi J.A. Entropy and scintillation analysis of acoustical beam propagation through ocean internal waves. *JASA*, 117(3), Pt. 2 March 2005, pp. 1611-1623.
17. Egerev S.V., Morozov A.K., Lyamshev L.M. Laser sound technique for the remote control of underwater oceanographic instrumentation, *ACTA ACUSTICA united with ACUSTICA*, Vol. 90, No 2, 2004, pp. 263-271.

18. Morozov A.K., Webb D.C. A sound projector for acoustic tomography and global ocean monitoring. (invited paper), IEEE Journal of Oceanic Engineering. Vol. 28, No 2, April 2003, pp. 174-185.
19. Morozov A.K. Pseudocoherent accumulation of pulse response of hydroacoustic channel in processing of pseudonoise signals in the THETIS-II experiment. Acoustical Physics Vol. 42, No 6, 1996, pp. 733-738.
20. Egerev S.V., Lyamshev L.M., Morozov A.K., Pashin A.E. An optoacoustical channel for remote control of underwater oceanological instrumentation. Oceanology Vol. 36, No 2, 1996, pp. 291-295.
21. Derevnin V.A., Morozov A.K. Self-contained buoys with hydroacoustic systems for remote measuring and control. Oceanology Vol. 35, No 4, 1996, pp. 582-586.
22. Kuryanov B.F., Morozov A.K., Timashkevich G.K. Acoustic tomography of internal waves in the ocean. Acoustical Physics, Vol. 41, No 1, 1995, pp. 96-99.
23. Morozov A.K., Derevnin V.A. Use of broadband signals in underwater sound telemetry and remote control systems in autonomous oceanological stations, Acoustical Physics, Vol. 40, No 3, 1994, pp. 420-421.
24. Morozov A.K., Stepin V.A., Characteristics of wideband cascade constructions in multipath channel with Rice fading. Soviet Journal of Communications Technology and Electronics, 1992, v.37, N.16, pp. 76-81.
25. Morozov A.K., Stepin V.A. The characteristics of modulation coding system on the basis of pseudonoise signal ensemble and Reed-Solomon codes in multipath channel with Rice fading, (Russian) Izvestiya vysshikh uchebnykh zavedenii seriya radioelektronika. (English translation in Radio Electronics and Communications Systems) 1991, v.34, N.11, pp.50-53.
26. Morozov A.K., Stepin V.A. Optimal parameters of modulation coding system on the base of orthogonal broadband signals and Reed-Solomon codes in multipath channel with Rayleigh fading, (Russian) Radiotekhnicheskie tetradi, Proceedings of Radiotechnical Department of Moscow Power Engineering Institute, Moscow, 1991, N.1 pp. 31-33.
27. Morozov A.K., Golovkin D.A., Stepin B.A. Information transmission with the help of broadband recurrent signals on the base of matrix in a form of Kronecker power. Proceedings of Moscow Power Engineering Institute, 1991, N. 639, pp. 97-102.
28. Morozov A.K., Stepin V.A. Boundary for generalized code distance in channel with reflections without fading. Proceedings of Moscow Power Engineering Institute, 1991, N. 639, pp. 102-107.
29. Morozov A.K., The upper boundary for reception error probability of signals on the base of blocks and recurrent codes, (Russian) Izvestiya vysshikh uchebnykh zavedenii seriya radioelektronika. (English translation in Radio Electronics and Communications Systems) 1990, v.33, N.1, pp. 48-52.
30. Morozov A.K., Reception of recurrent signals in multipath channel by means of Viterbi algorithm, Soviet Journal of Communications Technology and Electronics, v.34, 16, 1989, p.1-7.
31. Morozov A.K., Kolmogorov A.N., Comparison of block and recurrent signals in low-speed multiple-beam channel having fast fading and unrestricted bandwidth, Radioelectronics and communications systems, v.32, 5, 1989, p.6-10.
32. Morozov A.K. Penin P.I. Microprocessors and microcomputer application in digital communication systems. Moscow, Moscow Power Engineering Institute, student manual, 1989.
33. Morozov A.K., The reliability of recurrent signal reception with an ideal estimate of channel parameters, Telecommunications and radio engineering, v.44, 7, 1989, p.80-83.
34. Morozov A.K., Correlation properties of a sequence of recurrent signals. (Russian) Izvestiya vysshikh uchebnykh zavedenii seriya radioelektronika. (English translation in Radio Electronics and Communications Systems) 1988, n.11, pp.59-62.
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36. Morozov A.K., Kolmogorov A.N., Noise immunity of reception wide-band recurrent phase-manipulated signals in multipath channel, Soviet journal of communications technology and electronics, v.33, 4, 1988, p.122-128.
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39. Morozov A.K., Semenovich B.B., Kholmogorov A.N. A system for transfer of oceanological data from an oceanological research buoy station. Oceanology, 1987, vol.27, No.3, pp. 391-396.
40. Morozov A.K. Kholmogorov A.N. Digital processing of recurrent PM signals in stochastic multipath channels (Russian) Proceedings of Moscow Power Engineering Institute 1987, N.129. pp. 80-84.
41. Morozov A.K. Optimum processing of recurrent signals in multipath channel (Russian) Izvestiya vysshikh uchebnykh zavedenii seriya radioelektronika. (English translation in Radio Electronics and Communications Systems) 1986, v.29, N.1, pp. 3-7.
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 44. Morozov A.K., Litzarev N.A. Adaptive array for the separation of signals arriving from different directions. (Russian) Radiotekhnika (English translation in Telecommunications and Radio Engineering) v.9, 1985, pp. 66-69.
 45. Morozov A.K., Lazareva L.L., Penin P.I., Tuzikov V.A. Digital signal reception in channels with scattering. (Russian), Proceedings of Moscow Power Engineering Institute 1982, v.593, pp.52-56.
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 47. Morozov A.K. Acoustic signals reflected from the sea surface scattering function analysis. (Russian), Acoustic methods and equipment of the ocean exploration, proceedings of Far East Poly-Technical Institute, Vladivostok, 1981, pp.89-92.
 48. Morozov A.K., Kodanov V.P., Kononov E.D., Penin P.I., Tsvelev E.I. About ultrasonic scattering in inhomogeneous sea medium, (Russian), Proceedings of Moscow Power Engineering Institute 1981, v.514/1, pp.114-119.
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 50. Morozov A.K. Optimal noise-immunity of signals with different kinds of modulation in a line of sight scattering channels. (Russian), Proceedings of Moscow Power Engineering Institute 1980, v.467, pp.54-58.
 51. Morozov A.K. Correlation receiver of phase modulated signals in a channel with reflections, (Russian), Proceedings of Moscow Power Engineering Institute 1980, v.467, pp. 49-53.
 52. Morozov A.K. Correlation of field in a random dissipative medium with random boundaries. (Russian), Proceedings of Moscow Power Engineering Institute 1979, v.418, pp.36-39.
 53. Morozov A.K. Frequency-spatial cross correlation of a field in random inhomogeneous medium. (Russian), Proceedings of Moscow Power Engineering Institute 1977, v.334, pp.137-138.
 54. Morozov A.K. Optimization of reception for the binary PM signals in the channel with scattering. (Russian), Proceedings of Moscow Power Engineering Institute 1976, v.295, pp.3-6.
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 56. Morozov A.K., Biryukov Yu.A. Calculation of scattering noise dispersion in information channels. (Russian), Proceedings of Moscow Power Engineering Institute 1975, v.215/2, pp.16-24.
 57. Morozov A.K., Biryukov Yu.A. Optimal noise immunity of PM signals in a line of sight channels with scattering. (Russian), Proceedings of Moscow Institute of Radioengineering, Electronics and Automation 1975, v.83, 50-59.
 58. Morozov A.K., Penin P.I., Khzmalian A.D. Information channels with frequency-dependent characteristics simulation. (Russian), Proceedings of Moscow Power Engineering Institute 1974, v.180, pp.11-12.

OTHER PUBLICATIONS *including peer reviewed conference proceedings, workshops presentations, conference papers and abstracts, some invited lectures.*

1. Morozov A.K., Scussel K.F., Wolf M., Coryer M.J. The new development of the autonomous sources for ocean acoustic navigation, tomography and communications OCEANS 2017 MTS/IEEE Anchorage, pp. 1 – 8, 2017
2. Morozov A.K., Tunable and broadband resonator pipe sound sources for ocean acoustic tomography, communications and long-range navigation OCEANS 2017 MTS/IEEE Aberdeen, pp. 1 – 8, 2017
3. Morozov A.K., Webb D.C., Chiu C.S., Worcester P.F., Dzieciuch M.A.; Sagen H.; Guigné J.Y., Altschuler T.W. High-efficient tunable sound sources for ocean and bottom tomography, 15 years of operating history OCEANS 2016 MTS/IEEE Monterey, pp. 1 – 10, 2016
4. Morozov A.K., Colosi J.A. Normal-mode statistics of sound scattering by a rough elastic boundary in underwater wave-guide in a full coupled mode approach, including back-scattering J. Acoust. Soc. Am. 141, 3474 (2017); <https://doi.org/10.1121/1.4987226>
5. Morozov A.K., Webb D.C. Deep water sound sources for ocean acoustic tomography and long-range navigation J. Acoust. Soc. Am. 140, 3135 (2016); <https://doi.org/10.1121/1.4969823>
6. Morozov A.K., Colosi J.A. Coupled acoustic mode equations in the ocean waveguide with rough sea

- surface and elastic bottom. *J. Acoust. Soc. Am.* 139, 2197 (2016); <https://doi.org/10.1121/1.4950547>
7. Morozov A.K., Green D., Jones C.P. Sub-Ice Glider Navigation and Communication UComms 2016 IEEE, Third Underwater Communications and Networking Conference 2016.
 8. Altshuler T.W., Morozov A.K. Sound sources for ocean acoustic tomography and marine seismic operations. *Oceanology International China* 2015, 3-5 Nov 2015, CECIS, Shanghai
 9. Morozov A.K. Teledyne Seismic Bubble Resonator Source. SEG-2015 Workshop. Next Generation Marine Seismic Sources. New Orleans, LA USA 22 October. 2015;
 10. Morozov A.K. Marine Vibrator Bubble Source Simulation And Testing. COMSOL 2015, BOSTON, MA October 2015;
 11. Xiaoka Xu, Shengli Zhou, Haixin Sun, Andrey K. Morozov, and Yuzhi Zhang Proceedings of Oceans 14 St. Johns, Newfoundland, Canada, 2014
 12. Andre Pant, Robert Lilly, Dr. Jacques Guigné, Andrey Morozov, Shervin Azad Experimental Design and Testing of a Marine Broadband Swept Frequency Seismic Resonating Pipe Source for Offshore Geological Imaging Proceedings of Oceans 14 St. Johns, Newfoundland, Canada, 2014
 13. Morozov A.K. Doubly resonant underwater acoustic transducer for long distance sound propagation, *J. Acoust. Soc. Am.* 135, 2304 (2014); <http://dx.doi.org/10.1121/1.4877588>.
 14. Morozov A.K. Bubble sound source EAGE Amsterdam June 2014.
 15. Morozov A.K, C. Jones, J. Manley Under ice positioning and communications for unmanned vehicle, *Oceans* 2013, Bergen Norway.
 16. Peter N. Mikhalevsky, Hanne Sagen, Peter F. Worcester, Arthur B. Baggeroer, Sue E. Moore, Craig M. Lee, Kathleen J. Vigness-Raposa, Lee Freitag, Agnieszka Beszczynska-Moeller, Timothy F. Duda, Brian D. Dushaw, Jean Claude Gascard, Alexander N. Gavrilov, Andrey K. Morozov, Walter H. Munk, Michel Rixen, Stein Sandven, Emmanuel Skarsoulis, Kathleen M. Stafford, Elling Tveit Multipurpose Acoustic Networks in the Integrated Arctic Ocean Observing System, invited White Paper, Arctic Observing Summit 30 April- 2 May 2013 Vancouver, BC
 17. Y. V. Zakharov, A. K. Morozov Adaptive Sparse Channel Estimation for Guard-Free OFDM Transmission in Underwater Acoustic Channels, International conference on Underwater Acoustic Measurements: Technologies and Results, 12th European Conference on Underwater Acoustics Corfu, Greece, June, 2013.
 18. Sandven, S., Sagen, H., Bertino, L., Beszczynska-Möller, A., Fahrbach, E., Worcester, P. F., Dzieciuch, M. A., Walczowski, W., Wieczorek, P., Skarsoulis, E., Morozov, A. K., Dumont, D., Dushaw, B. D., Lee, C. M., and Hansen, E. (2012). "The Fram Strait integrated ocean observing and modelling system," in Proceedings of the 6th EuroGOOS Conference (Sopot 2012, Poland).
 19. Morozov A.K., C. Jones, J. Manley Unmanned Vehicles and Acoustics for Under Ice Environmental Monitoring. Arctic Technology Conference (ATC), Houston, Texas, USA, 3-5 December 2012
 20. Morozov A.K., Colosi J.A. Entropy Rate and Informational Loss Defined by Internal Wave Scattering in Long-Range Propagation, UCOMMS conference and Workshop in Sestri Levante, Italy 12-14 September 2012
 21. A.K. Morozov, J. E. Manley, C. Jones, Unmanned Vehicles and Acoustics for Under Ice Environmental Monitoring Proceedings of Arctic Technology Conference, 3-5 December 2012
 22. Lee Freitag, Peter Koski, Andrey Morozov, Sandipa Singh, James Partan, Acoustic Communications and Navigation Under Arctic Ice, OCEANS'12 MTS/IEEE HAMPTON ROADS.
 23. Y. V. Zakharov, A. K. Morozov, and J. C. Preisig, "Doppler effect compensation for cyclic-prefix-free OFDM signals in fast-varying underwater acoustic channel" in Proceedings of European Conference on Underwater Acoustics, ECUA'2012, Edinburgh, UK, 2-6 July, 2012 (invited).
 24. Morozov A.K., Green D., Sequential analysis for underwater communications *J. Acoust. Soc. Am.* 131, 3276 (2012).
 25. Sagen H., S. Sandven, A. Beszczynska-Möller, E. Fahrbach, P. Worcester, A. Morozov, The Fram Strait acoustic system for tomography, navigation and passive listening, In *Int. Conf. Underwater Acoustic Measurements: Technologies & Results*, Kos, Greece, J. S. Papadakis and L. Bjorno, 2011.
 26. Morozov, A.K., T.W. Altshuler, T Clayton P. Jones, L.E. Freitag, P. A. Koski, and S. Singh, Underwater Acoustic Technologies for Long-Range Navigation and Communications in the Arctic, In *Int. Conf. Underwater Acoustic Measurements: Technologies & Results*, Kos, Greece, J. S. Papadakis and L. Bjorno, 2011.
 27. Morozov A.K., Freitag L. E., Preisig J.C., Investigation of joint channel estimation and data decoding for underwater acoustic communications with multi-carrier modulation. *J. Acoust. Soc. Am.* 128 2355 (2010).
 28. Morozov A.K, Altshuler T.W, Jones C.P., Freitag L.E., Koski P.A. Acoustic Technology for Glider Long-Range Navigation and Communications. 6-th Biannual NRC-IOT Workshop on underwater vehicle technology. National Research Council Canada (NRC), Institute for Ocean Technology (IOT) St. John's, Newfoundland, Canada October 21-22, 2010.
 29. Morozov A.K., Freitag L. E., Preisig J.C., Joint Channel Estimation and Data Recovery for High-Rate

- Underwater Acoustic Communications with Multi-Carrier Modulation, WUWNET '10 conference WHOI 31 Sep-1 Oct 2010, 4p.
30. Morozov A.K., Freitag L. E., Preisig J.C., Multi-Carrier Modulation for High-Rate Underwater Acoustic Communications, ISWCS 2010, Sep. 2010 York, UK, 2010, 5p.
 31. Freitag L.E., Morozov A.K. Under-Ice Acoustic Communications and Navigation for Gliders and AUVs, American Geophysical Union, Fall Meeting 2009, abstract #OS43B-1389, 2/2009.
 32. Voronovich A.G., Ostashev V.E., Colosi J.A., Morozov A.K. Cross-mode coherences and decoupling of equations for mode intensities in two-dimensional and three-dimensional fluctuating ocean. (A) J. Acoust. Soc. Am. 126 2158 (2009).
 33. Papp J.C., Preisig J.C., Morozov A.K. Physically constrained maximum-likelihood mode filtering and its application as a pre-processing method for underwater acoustic communication. (A) J. Acoust. Soc. Am. 126 2183 (2009).
 34. Sagen, H, Sandven, S., Beszczynska-Moeller, A., Boebel, O., Duda T. F., Freitag, L., Gascard, J. C., Gavrilov, A., Lee, C. M., Mellinger, D.K., Mikhalevsky, P., Moore, S., Morozov, A. K., Rixen, M., Skarsoulis, E., Stafford, K., Tveit, E., Worcester, P. F., Acoustic technologies for observing the interior of the Arctic Ocean OceanObs '09, 21-25 September 2009, Venice, Italy.
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 39. Duda T.F., Morozov A.K., Howe B.M., Brown M.G., Speer K., Lazarevich P., Worcester P.F., Cornuelle B.D. Evaluation of a Long-Range Joint Acoustic Navigation / Thermometry System, Proceedings of Oceans 2006.
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 49. Morozov A.K., Yoon J.-H. Project of acoustic tomography experiment In Japan Sea. Proceedings of International Symposium on Circulation Research of the East Asian Marginal Seas- CREAMS'99 January 25-29 1999, Fukuoka, Japan.
 50. Morozov A.K. Acoustical array application in sea experiments, Proceedings of Workshop "New Concepts in Ocean, Atmosphere, and Sea Floor Sensor Technologies for Gas Hydrate Investigations and Research" Biloxi, Mississippi, March 22-26, 1999, pp. 105-114.
 51. Morozov A.K. Underwater acoustic tomography of Japan Sea Newsletters N 2 of Dynamics Simulation Research Center, Research Institute for Applied Mechanics, Kyushu University, Fukuoka, Japan, 30.4.1999, p. 4.
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- March 1999, JASA v. 105, N2, Pt. 2 February, 1999, p.1170.
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August 2008, RV Håkon Mosby (NERSC, Norway): Fram Strait acoustic tomography experiment.

2008 RV Tioga Martha's Vineyard Coastal Observatory: Acoustic communications experiment RACE08.

February –March 2004 RV Meteor (IFM-GEOMAR, Leibniz Institute of Marine Sciences at the University of Kiel Germany) Fort-de-France – Fort-de-France, Martinique, France, Atlantic Ocean: National German CLIVAR program

February 2003, Guadeloupe, Atlantic Ocean RV Meteor (IFM-GEOMAR, Germany), acoustic tomography system recovery.

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1991 North Atlantic, Arctic Ocean 8-th voyage of RV "Akademik Sergey Vavilov" (P.P.Shirshov Institute Russian Academy of Sciences, Russia)

1990 North Atlantic, Arctic Ocean, 6-th voyage of RV "Akademik Sergey Vavilov"(P.P.Shirshov Institute Russian Academy of Sciences, Russia)

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Expeditions in Black, White and Japan seas.