

Irina I. Rypina

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Physical Oceanographer
Associate Scientist with Tenure
Physical Oceanography Department, MS#21
Woods Hole Oceanographic Institution
Woods Hole, MA, 02543

EDUCATION:

B.S. in Plasma Physics, Nizhny Novgorod State University, Russia, 2002
M.S. in Physics, University of Louisiana at Lafayette, USA, 2003
Ph.D. in Applied Marine Physics, RSMAS, University of Miami, USA, 2007

PROFESSIONAL EXPERIENCE:

Associate Scientist, 2014-present, Assistant Scientist, 2010-2014, Postdoctoral Investigator, 2008-2010, Physical Oceanography Department, Woods Hole Oceanographic Institution, USA; Research Assistant, Division of Applied Marine Physics, Rosenstiel School of Marine and Atmospheric Science, University of Miami, USA 2003-2007; Teaching Assistant, Physics Department, University of Louisiana at Lafayette, USA, 2002-2003; Physics Teacher at Yeshiva middle school, Nizhny Novgorod, Russia, 2000-2001.

PROFESSIONAL AFFILIATIONS:

Member of the American Geophysical Union
Member of the European Geophysical Union
Member of the Acoustical Society of America
Member of Sigma Pi Sigma Physics Honor Society

RESEARCH INTERESTS;

Transport and exchange processes in oceanic and atmospheric flows; effects of transport processes on redistribution of physical, chemical and biological tracers in the ocean and atmosphere; Lagrangian approach to studying transport, ocean and atmosphere dynamics; dynamical systems theory; Hamiltonian dynamics; stochastic PDEs.

My approaches span a large range from field studies to numerical modeling to theory, and applications of my research span a large range of scales, from sub-mesoscale to basin-scales.

PROFESSIONAL ACTIVITIES:

WHOI (Non Education Related):

PO recruitment committee, 2013

Meeting with the visiting committee, 2015

WHOI interdisciplinary proposals review panel meeting, 2015

PO recruitment committee, 2018-2020

PO postdoctoral coordinator, 2019-2020

Mentoring committee member for Kirstin Meyer-Kaiser, an Assistant Scientist in the Biology

Department, **2020-ongoing**

Mentoring committee member for Thomas Guilment, a PostDoc in AOPE, **2021-ongoing**

Outside WHOI:

Reviewer: *Journal of Physical Oceanography, Journal of Geophysical Research-Oceans, Journal of Atmospheric and Oceanic Technology, Physica D, Nonlinear Processes in Geophysics, and Journal of Acoustical Society of America, Limnology and Oceanography, Fluids, Ocean Modeling.*

Session co-organizer at the Dec 2020 AGU Meeting

Organized a seminar by Ivan Savelyev for the CALYPSO seminar series in Nov 2020

Invited editor for a special issue of Fluids on “Lagrangian Transport in Geophysical Flows.”

2019-2021

PICES group member, **2018-2021**

Panel Member for the SEA’s Marine Biodiversity and Conservation Symposium. May 2019

Panel Member of the SEA’s Symposium on Sargasso Sea, Jun 2018

Panel Member of the Semester At Sea Symposium on Sargasso Sea, Jun 2018

Co-organized a session on “Transport and Coherent Structures: New and Traditional Approaches for Studying Ocean Stirring and Mixing” at the Ocean Sciences Meeting, Portland OR, Feb 2018

Wrote a successful proposal to AmeriMech and co-organized a workshop on “Fluid Transport and Nonlinear Dynamics,” WHOI, May 2017

NASA review panel meeting, November 2016

Co-organized a session on “Modeling and observing the physical-biological interactions that organize the spatio-temporal distribution of biomass in marine ecosystems,” Ocean Sciences meeting, New Orleans, LA, Feb 2016

NASA review panel meeting, September 2014

Co-organized a minisymposium on “3D geophysical fluid flows,”SIAM Conference on Dynamical Systems, Snowbird, UT, May 2013

Co-organized a session on “Lagrangian Coherent Structures and Other Dynamical System Techniques in Geophysical Flows,” Fall AGU meeting, San Francisco, CA, Dec 2011

PARTICIPATION IN EDUCATION PROGRAM:

Advising:

Yana Bebieva, Summer Student Fellow (co-advisor with L. Pratt), 2011

Genevieve “Jay” Brett, WHOI-MIT Graduate Student (co-advisor with L. Pratt), 2013-2018

Shannon Davis, PostDoc (co-advisor with Larry Pratt), 2013

David Fertitta (2015 summer student fellow, co-advisor with Alison Macdonald)

Victor Estella Perez (visiting guest student, co-advisor) 2015

Laura Slivinsky, Post Doc (co-advisor with L. Pratt), 2014-2015

Ella Cedarholm, 2018 summer student fellow, primary advisor

Samuel Entner, 2018 summer visiting student, primary advisor

Margaux Filippi, WHOI-MIT Graduate Student, (co-advisor) 2017-2019

Michael Dotzel, WHOI-MIT Graduate Student, primary advisor, **2019-ongoing**

Timothy Getscher, NAVY WHOI-MIT Graduate Student, primary advisor, **2019-ongoing**
 Mason Rogers, WHOI-MIT Graduate Student, secondary advisor, **2020-ongoing**
 Margaret Gregory, WHOI-MIT Joint Program Graduate student, **2021 summer project**

Courses Taught:

Summer Course on Fields Methods, Summer 2014
 12.701. Classical Papers in Physical Oceanography, Spring 2017
 12.701. Classical Papers in Physical Oceanography, Spring 2018
 12.701. Classical Papers in Physical Oceanography, **Spring 2021**

SUPERVISION AT WHOI:

Jared Schwartz, Addison Geiger, Kevin Manganini, and Ben Hodges (technical help with field work in 2011-2017)
 Laura Slivinski (postdoc)
 David Fertitta (summer student, 2015)
 Victor Estella Perez (visiting guest student, Fall 2015)
 Stephen Maldonado (summer student, 2016, I effectively co-advised Stephen)
 Ella Cedarholm, 2018 summer student fellow, primary advisor
 Samuel Entner, 2018 summer visiting student, primary advisor
 Michael Dotzel, WHOI-MIT Graduate Student, primary advisor, **2019-ongoing**
 Timothy Getscher, NAVY WHOI-MIT Graduate Student, primary advisor, **2019-ongoing**
 Mason Rogers, WHOI-MIT Graduate Student, secondary advisor, **2020-ongoing**
 Ben Hodges, technical help with CALYPSO drifter deployments, **2018-ongoing**
 Margaret Gregory, WHOI-MIT Graduate Student, **summer project supervisor, 2021**
 Jezabel Curbelo, WHOI/PO Guest Investigator, **Spring 2021**

CRUISE PARTICIPATION/FIELD EXPERIENCE

June 4-19, 2011 – *R/V KOK*, Participation in an international survey measuring a variety of Fukushima-related radionuclide isotopes in surface and subsurface waters off Japan.

August 1-4, 2011 – coastal vessels R&R, Handshake and Quickwater: Mass drifter experiment in the coastal waters south of Martha's Vineyard, MA.

August 4-8 and September 8-12, 2014 – *R/V Tioga*, coastal vessel Islander: drifter and dye release experiments in the coastal waters south of Martha's Vineyard, MA.

Aug 16-19, 2015, drifter experiment in Katama Bay: field work aims to collect drifter data to be used for investigating the utility of Lagrangian data assimilation in realistic oceanic flows.

Aug 14-18, 2017, Pilot Experiment for the NSF-funded HazardSEES-ALPHA project. Field work involved drifters and dye releases/surveys in the coastal ocean south of Martha's Vineyard, MA

Aug 6-18, 2018, series of 3 Drifter and Dye Experiments for the NSF-funded HazardSEES-ALPHA project. Field work involved multi-layer drifter and 2-layer dye releases/surveys in the coastal ocean south of Martha's Vineyard, MA

PAPERS IN REFEREED JOURNALS AND BOOKS:

Publications

1. Brown, M. G., F. J. Beron-Vera, I. I. Rypina, and I. A. Udovydchenkov (2005). Rays, modes, wavefield structure, and wavefield stability. *J. Acoust. Soc. Am.*, **117**, 1607-1610.
2. Rypina, I., I. A. Udovydchenkov, and M. G. Brown (2006). A transformation of the environment eliminates parabolic equation phase errors. *J. Acoust. Soc. Am.*, **120**, 1295-1304.
3. Olascoaga, M. J., I. I. Rypina, M. G. Brown, F. J. Beron-Vera, H. Kocak, L. E. Brand, G. R. Halliwell, and L. K. Shay (2006). Persistent transport barrier on the West Florida Shelf. *Geophys. Res. Lett.*, **33**, L22603, doi:10.1029/2006GL027800.
4. Rypina, I. I., M. G. Brown, F. J. Beron-Vera, H. Kocak, M. J. Olascoaga, and I. A. Udovydchenkov (2007). On the Lagrangian dynamics of atmospheric zonal jets and the permeability of the stratospheric polar vortex. *J. Atmos. Sci.*, **64**, 3595-3610.
5. Rypina, I. I., M. G. Brown, F. J. Beron-Vera, H. Kocak, M. J. Olascoaga, and I. A. Udovydchenkov (2007). Robust transport barriers resulting from strong Kolmogorov-Arnold-Moser stability. *Phys. Rev. Lett.*, **98**, 104102, doi:10.1103/PhysRevLett.98.104102.
6. Rypina, I. I., and M. G. Brown (2007). On the width of a ray. *J. Acoust. Soc. Am.*, **122**, 1440-1448.
7. Beron-Vera, F. J., M. G. Brown, M. J. Olascoaga, I. I. Rypina, H. Kocak, and I. A. Udovydchenkov (2008). Zonal jets as transport barriers in planetary atmospheres. *J. Atmos. Sci.*, **65**, 3316-3326.
8. Rypina, I. I., M. G. Brown, and H. Kocak (2009). Transport in an idealized three-gyre system with application to the Adriatic Sea. *J. Phys. Oceanogr.*, **39**, 675-690.
9. Beron-Vera, F. J., M. J. Olascoaga, M. G. Brown, H. Kocak, and I. I. Rypina (2010). Invariant-tori-like Lagrangian coherent structures in geophysical flows. *Chaos*, **20**, 017514, doi:10.1063/1.3271342
10. Udovydchenkov, I. A., I. I. Rypina, and M. G. Brown (2010). Mode filters and energy conservation. *JASA Express Letters*, **127**(5), DOI: 10.1121/1.3327240.

11. Rypina, I. I., L. J. Pratt, J. Pullen, J. Levin, and A. Gordon (2010). Chaotic advection in an archipelago. *J. Phys. Oceanogr.*, **40**(9), 1988-2006.
12. Rypina, I. I., L. J. Pratt, and M. S. Lozier (2011). Near-surface transport pathways in the North Atlantic ocean. *J. Phys. Oceanogr.*, **41**, 911-925.
13. Rypina, I. I., S. Scott, L. J. Pratt, and M. G. Brown (2011). Investigating the connection between complexity of isolated trajectories and Lagrangian coherent structures. *Nonlin. Proc. Geophys.*, **18**, 977-987, doi:10.5194.
14. Buesseler, K.O., S. R. Jayne, N. S. Fisher, I. I. Rypina, H. Baumann, Baumann Z., C. F. Breier, E. M. Douglass, J. George, A. M. Macdonald, H. Miyamoto, J. Nishikawa, S. M. Pike, S. Yoshida (2012). Fukushima-derived radionuclides in the ocean and biota off Japan. *PNAS*, **109**(16), 5984-5988.
15. Rypina, I. I., I. Kamenkovich, L. J. Pratt, and P. Berloff (2012). Eddy-induced particle dispersion in the North Atlantic. *J. Phys. Oceanogr.*, **42**(12), 2206-2228.
16. Charette, M. A., C. F. Breier, P. B. Henderson, S. M. Pike, I. I. Rypina, S. R. Jayne, and K. O. Buesseler (2013). Radium-based estimates of cesium isotope transport and total direct ocean discharges from the Fukushima Nuclear Power Plant accident. *Biogeosciences*, **10**, 2159-2167, doi: 10.5194/bg-10-2159-2013.
17. Rypina, I. I., S. Jayne, S. Yoshida, A. Macdonald, E. Douglass, and K. Buesseler (2013). Short-term Dispersal of Fukushima-derived Radionuclides off Japan: Modeling Efforts and Model-data Inter-comparison. *Biogeosciences*, **10**, 4973-4990, doi:10.5194/bg-10-4973-2013.
18. Pratt, L. J., I. I. Rypina, T. Ozgokmen, P. Wang, H. Childs and Y. Bebieva (2013). Chaotic advection in a steady, 3D, Ekman-driven circulation. *Journal of Fluid Mechanics*, **738**, 143-183, doi:10.1017/jfm.2013.583.
19. Rypina, I. I., A. Kirincich, R. Limeburner, and I. A. Udovydchenkov (2014). Eulerian and Lagrangian Correspondence of High-Frequency Radar and Surface Drifter Data: Effects of Radar Resolution and Flow Components. *Journal of Atmos. Ocean Technol.*, **31**, 945-966.
20. Rypina, I. I., L. J. Pratt, J. Llopiz, and S. Lozier (2014). Dispersal pathways of American eel larvae from the Sargasso Sea. *Limnology and Oceanography*, **59**, 1704-1714.
21. Rypina, I. I., S. R. Jayne, S. Yoshida, A. M. Macdonald, and K. Buesseler (2014). Drifter-based estimate of the 5-year dispersal of Fukushima-derived radionuclides. *Journal of Geophysical Research-Oceans*, **119**, doi: 10.1002/2014JC010306.

22. Kamenkovich, I., I. I. Rypina, and P. Berloff (2015). Properties and Origins of the Anisotropic Eddy-Induced Transport in the North Atlantic. *Journal of Physical Oceanography*, **45**, 778-791, doi:10.1175/JPO-D-14-0164.1.
23. Rypina, I. I., L. J. Pratt, P. Wang, T. M. Ozgokmen, and I. Mezic (2015). Resonance phenomena in a time-dependent, three-dimensional model of an idealized eddy. *Chaos*, **25**, 087401, <http://dx.doi.org/10.1063/1.4916086>.
24. Williams, M. O., I. I. Rypina, and C. W. Rowley (2015). Identifying Finite-Time Coherent Sets from Limited Quantities of Lagrangian Data. *Chaos*, **25**, 087408 <http://dx.doi.org/10.1063/1.4927424>
25. Yoshida, S., A. M. Macdonald, S. R. Jayne, Rypina, I. I., and K. Buesseler (2015). Observed eastward progression of the Fukushima 134Cs signal across the North Pacific. *Journal of Geophysical Research-Oceans*, **42**, 7139-7147, DOI: 10.1002/2015GL065259
26. Rypina, I. I., L. J. Pratt, and M. S. Lozier (2016). Influence of ocean circulation changes on the inter-annual variability of American eel larvae dispersal. *Limnology and Oceanography*, doi:10.1002/lno.10297
27. Rypina, I. I., A. Kirincich, S. Lentz, M. Sundermeyer (2016). Investigating the eddy diffusivity concept in the coastal ocean. *J. Phys. Oceanogr.*, **46**(7), 2201-2218, DOI: <http://dx.doi.org/10.1175/JPO-D-16-0020.1>
28. Pratt, L. J., R. Barkan, and I. I. Rypina (2016). Scalar flux kinematics. *Fluids*, **1**(3), 27, doi:10.3390/fluids1030027
29. Rypina, I. I., D. Fertitta, A. Macdonald, S. Yoshida, S. Jayne (2016). Multi-iteration approach to studying tracer spreading using drifter data. *J. Phys. Oceanogr.*, **47**, 339–351, doi: 10.1175/JPO-D-16-0165.1.
30. Slivinski, L., L. J. Pratt, I. I. Rypina, M. M. Orescanin, B. Raubenheimer, J. MacMahan, and S. Elgar (2017). Assimilating Lagrangian data for parameter estimation in a multiple-inlet system. *Ocean Modeling*, **113**, Pages 131–144
31. Rypina, I. I., and L. J. Pratt (2017). Trajectory encounter volume as a diagnostic of mixing potential in fluid flows. *Nonlin. Processes Geophys.*, **24**, 189-202, <https://doi.org/10.5194/npg-24-189-2017>
32. Kamenkovich, I., P. Berloff, and I. I. Rypina (2018). Anisotropic and inhomogeneous eddy-induced transport in flows with jets. *Chapter for book "Zonal Jets"*, B. Galperin and P. Read, eds., Cambridge University Press, Cambridge
33. Balasuriya, S., N. Ouellette and I. I. Rypina (2018). Generalized Lagrangian Coherent Structures. *Physica D*, **372**, 31–51, <https://doi.org/10.1016/j.physd.2018.01.011>

34. Rypina, I. I., S. L. Smith, and L. J. Pratt (2018). Connection between encounter volume and diffusivity in geophysical flows. *Nonlin. Processes Geophys.*, 25, 267–278, <https://doi.org/10.5194/npg-25-267-2018>
35. Pratt, I. J., E. J. Albright, I. I. Rypina, H. Jiang, and S. Davis (2018). Strong Wind Jets and Transitions in the Tokar Gap and Neighboring Gaps of the Red Sea Hills. *Monthly Weather Review*. In review
36. Sharma, A., I. I. Rypina, R. Musgrave, and G. Haller (2019). Analytic Reconstruction of a Two-Dimensional Velocity Field from an Observed Diffusive Scalar. *J. of Fluid Mech.*, 871, 755-774, DOI: <https://doi.org/10.1017/jfm.2019.301>
37. Rypina, I. I., C. Hernandez, K. Chen., L. Pratt, and J. Llopiz (2019). Suitability of the Slope Sea for Atlantic Bluefin Tuna Spawning. *ICES Journal of Marine Science*. doi:10.1093/icesjms/fsz079
38. (*) Cedarholm, E., I. I. Rypina, S. Yoshida and A. Macdonald (2019). Investigating subsurface pathways of Fukushima-derived Cesium in the Northwest Pacific. *Geophysical Research Letters*. <https://doi.org/10.1029/2019GL082500>
39. (*) Brett, G., L. Pratt, I. I. Rypina, and P. Wang (2019). Competition between Chaotic Advection and Diffusion: Stirring and Mixing in a 3D Eddy Model. *Nonlin. Proc. Geophys.* 26, 1–23, 2019, <https://doi.org/10.5194/npg-26-1-2019>
40. M. Serra, P. Sathe, I. I. Rypina, A. Kirincich, S. D. Ross, P. Lermusiaux, T. Peacock, A. Allen, and G. Haller (2020). “Search and Rescue at Sea Aided by Hidden Flow Structures.” *Nature Communications*.11(1),.1-7
41. I. I. Rypina, L. Pratt, S. Entner, A. Anderson, D. Cherian (2020). The Influence of an Eddy in the Success Rates and Distributions of Passively Advected or Actively Swimming Biological Organisms Crossing the Continental Slope. *JPO*, 50(7), 1839-1852
42. Macdonald, A., S. Yoshida, S. M. Pike, K. O. Buesseler, I. I. Rypina, S. R. Jayne and J. Kenyon (2020). A Fukushima Tracer Perspective on Four Years of North Pacific Mode Water Evolution. *Deep Sea Research Part I: Oceanographic Research Papers*, 166, p.103379.
43. (*) G. Brett, L. J. Pratt, **I. I. Rypina**, J. C. Sanchez-Garrido (2020). The Western Alboran Gyre: an analysis of its properties and its exchange with surrounding water. *Journal of Physical Oceanography*, 50(12), pp.3379-3402.
44. G. S. Vieira, **I. I. Rypina**, and M. R. Allshouse (2020). Uncertainty quantification of trajectory clustering applied to ocean ensemble forecasts. *Fluids*, 5(4), p.184.

45. Pratt, L.J., Albright, E.J., **I. I. Rypina**, and Jiang, H. (2020). Eulerian and Lagrangian Comparison of Wind Jets in the Tokar Gap Region. *Fluids*, 5(4), p.193.
46. **I. I. Rypina**, M. Dotzhel, C. Hernandez, L. Pratt, and J. Llopiz (2021). Exploring interannual variability in potential spawning habitat for Atlantic bluefin tuna in the Slope Sea. *Progress in Oceanography.*, 192, p.102514
47. (*) Filippi, M., **I. I. Rypina**, Hadjighasem, A. and Peacock, T. (2021). An Optimized-Parameter Spectral Clustering Approach to Coherent Structure Detection in Geophysical Flows. *Fluids*, 6(1), p.39.
48. González-Rocha, J., Sosa, A.J., Hanlon, R., Allen, A.A., **Rypina, I.**, Schmale-III, D.G. and Ross, S.D. (2021). Multirotor-assisted measurements of wind-induced drift of irregularly shaped objects in aquatic environments. *Applied Ocean Research*, 110, p.102538.
49. (*) M. Filippi, A. Hadjighasem, M. Rayson, **I.I. Rypina**, G. Ivey, R. Lowe, J. Gilmour and T. Peacock (2021). Investigating transport in a tidally driven coral atoll flow using Lagrangian coherent structures. *Limnology and Oceanography*, 66(11), pp.4017-4027.
50. **I. I. Rypina**, L. Pratt, and T. Getscher, B. Mourre (2021). Observing and quantifying ocean flow properties using drifters with drogues at different depths. *JPO*. 51(8), pp.2463-2482.
51. Hernandez, C. M., D. E. Richardson, I. I. Rypina, K. Chen, K. E. Marnchik, K. Shulzitski, and J. Llopiz (2021). Support for the Slope Sea as a major spawning ground for Atlantic bluefin tuna: evidence from larval abundance, growth rates, and particle-tracking simulations. *Canadian Journal of Fisheries and Aquatic Sciences*.(ja)
52. **I. I. Rypina**, A. Kirincich, and T. Peacock (2021). Horizontal and vertical spreading of dye in the coastal ocean of the northern Mid-Atlantic bight. *Continental Shelf Research*, 230, p.104567.
53. (*) M. Filippi, Regina Hanlon, **I. I. Rypina**, B. Hodges, T. Peacock, and D. G. Schmale III (2021). Tracking a Surrogate Hazardous Agent (Rhodamine Dye) in a Coastal Ocean Environment Using In Situ Measurements and Concentration Estimates Derived from Drone Images. *Remote Sensing*, 13(21), p.4415.
54. **I. I. Rypina**, T. Getscher, T. Ozgokmen, and L. Pratt (2021). Application of the techniques from the dynamical systems theory to real drifters. In review in NPG
55. (*) Rogers, M., and **I. I. Rypina** (2021). A stochastic approach to modeling marine microplastics. In prep for JPO

56. H. Ueno, A. Bracco, J. A. Barth M. V. Budyansky, D. Hasegawa, S. Itoh, S. Y. Kim, C. Ladd, X. Lin, Y.-G. Park, S. Prants, T. Ross, **I. I. Rypina**, Y. Sasai, O. O. Trusenkova, E. I. Ustinova, Y. Zhong (2021). Oceanic mesoscale processes in the North Pacific: physical and biogeochemical impacts. Submitted to Progress in Oceanography

(*) paper by a student or postdoc

BROAD-AUDIENCE ARTICLES ABOUT MY RESEARCH

<https://www.whoi.edu/oceanus/feature/a-slithery-ocean-mystery/>

<https://www.whoi.edu/oceanus/feature/the-secret-tuna-nursery/>

<https://sinews.siam.org/Details-Page/spawning-habits-of-atlantic-bluefin-tuna-reveal-valuable-information-about-oceanic-currents-2>

(2020) <https://medium.com/usfishandwildlifeservicenortheast/expensive-taste-1a931b670e32>

(2020) <https://ethz.ch/en/news-and-events/eth-news/news/2020/05/pr-search-and-rescue.html>

(2020) <http://news.mit.edu/2020/search-rescue-algorithm-ocean-traps-0526>

(2020) https://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=300697&WT.mc_id=USNSF_1

Mar 2021: gave an interview to science journalist at Wired for his book on marine microplastics

OTHER PUBLICATIONS (Unreviewed media, etc.)

Thesis and Dissertation

Rypina, I. I., 2001. Generation of the second harmonic in near-field scanning microscopy problems. Nizhniy Novgorod State University, Advanced School of General and Applied Physics. *A Thesis Presented to the Faculty Committee of the Nizhniy Novgorod State University In Partial Fulfillment of the Requirements for the Degree Bachelor of Science in Plasma Physics.*

Rypina, I. I., 2007. Lagrangian coherent structures and transport in two-dimensional incompressible flows with oceanographic and atmospheric applications. *Ph. D. dissertation, University of Miami, Rosenstiel School of Marine and Atmospheric Science, Division of Applied Marine Physics.*

MEETINGS AND WORKSHOP PRESENTATIONS (presenting author only)

- I. I. Rypina, I. A. Udovydchenkov, M. G. Brown, and F. J. Beron-Vera (2004). A simple transformation of the environment eliminates standard PE phase errors. *J. Acoust. Soc. Am.*, **116**, 2635.
- I. I. Rypina, and M. G. Brown (2006). Fresnel zones in inhomogeneous media. *J. Acoust. Soc. Am.* **120**, 3022.
- I. I. Rypina, M. G. Brown, F. J. Beron-Vera, H. Kocak, M. J. Olascoaga, and I. A. Udovydchenkov. On the Lagrangian Dynamics of Atmospheric Zonal Jets and the Permeability of the Stratospheric Polar Vortex (2007). AGU 88(52), Fall Meet. Suppl., Abstract A51F-11.
- I. I. Rypina, I. A. Udovydchenkov and M. G. Brown (2008). Resonant forward scattering of sound in deep ocean environments. 11th NPAL Analysis Workshop.
- I. I. Rypina, L. J. Pratt, M. G. Brown, I. A. Udovydchenkov, and H. Kocak (2008). Transport and mixing in oceanic surface flows. NLOA 2008 Workshop.
- I. I. Rypina, I. A. Udovydchenkov, and M. G. Brown (2008). Resonant forward scattering of sound in deep ocean environments. *J. Acoust. Soc. Am.*, **124**, 2598.
- I. I. Rypina, L. J. Pratt, M. G. Brown, I. A. Udovydchenkov, and H. Kocak (2008). Transport in an idealized three-gyre system with application to the surface flow in the Adriatic Sea. AGU 89(53) Lorenz lecture, Fall Meet. Suppl., Abstract NG42A-02. Invited talk.
- I. I. Rypina, L. J. Pratt, M. G. Brown, and I. A. Udovydchenkov (2009). Detecting Lagrangian coherent structures using isolated trajectory measure methods. EGU General Assembly, NP6.1, EGU2009-1241.
- I. I. Rypina, L. J. Pratt, M. G. Brown, I. A. Udovydchenkov, and H. Kocak (2009). Transport in an idealized three-gyre system with application to the Adriatic Sea. EGU General Assembly, NP6.1, EGU2009-5685.
- I. I. Rypina, I. A. Udovydchenkov, T. F. Duda, and M. G. Brown (2009). Resonant forward scattering of sound in the deep ocean by internal tides. *J. Acoust. Soc. Am.* **125(4)**, 2501.
- I. I. Rypina, L. J. Pratt, J. Pullen, and J. Levin (2009). Lagrangian Coherent Structures and Transport in the Philippine Archipelago Region. MOCA-09 Joint Assembly, P06.2/22417.
- I. I. Rypina, L. J. Pratt, J. Pullen, J. Levin, A. L. Gordon (2009). Chaotic advection in an archipelago. 2009 PhilEx Workshop.
- I. I. Rypina, I. A. Udovydchenkov, and M. G. Brown (2009). Resonant forward scattering of sound in the deep ocean by internal tides. 12th NPAL Analysis Workshop.

- I. I. Rypina, L. J. Pratt, J. Pullen, J. Levin, and A. Gordon (2010). Chaotic advection in an archipelago. Ocean Science Meeting 2010, Eos Trans. AGU, 91(26), Ocean Sci. Meet. Suppl., Abstract PO23C-07.
- I. I. Rypina, I. A. Udovydchenkov, M. G. Brown, and B Dushaw (2010). Sound propagation in strongly range-dependent deep ocean environments with application to the Philippine Sea. 13th NPAL Analysis Workshop.
- I. I. Rypina, S. Shott, and L. J. Pratt (2010). Investigating the connection between trajectory complexities, Lagrangian coherent structures, and transport in the ocean. 1st MURI Meeting on the “Dynamical systems theory and Lagrangian data assimilation in 4D Geophysical fluid dynamics”.
- I. I. Rypina, I. A. Udovydchenkov, M. G. Brown, and B Dushaw (2010). Sound propagation in strongly range-dependent deep ocean environments with application to the Philippine Sea. *J. Acoust. Soc. Am.* **128**, p 2387.
- I. I. Rypina, S. Scott, L. J. Pratt, and M. G. Brown (2011). Investigating the connection between complexity of isolated trajectories and Lagrangian coherent structures. Workshop on Coherent Structures in Dynamical Systems. Lorentz center. Invited talk.
- I. I. Rypina, S. Scott, L. J. Pratt and M. G. Brown (2011). Understanding the interplay between Lagrangian coherent structures, trajectory complexities, and transport in the ocean. SIAM Conference on Dynamical Systems.
- I. I. Rypina, S. Scott, L. J. Pratt, and M. G. Brown (2011) Investigating the connection between complexity of isolated trajectories and Lagrangian coherent structures. Conference on Geometric methods for infinite-dimensional dynamical systems” at Brown University, November 2011. Invited talk.
- I. I. Rypina, L. J. Pratt, and M. S. Lozier (2011). Transport pathways in the North Atlantic: looking for throughput. AGU Fall Meeting in San Francisco, December 2011.
- I. I. Rypina, S. Scott, L. J. Pratt, and M. G. Brown (2012). Investigating the connection between complexity of isolated trajectories and Lagrangian coherent structures. MURI Workshop in Wilmington, January 2012.
- I. I. Rypina, S. Scott, L. J. Pratt, and M. G. Brown (2012). Identifying Lagrangian Coherent Structures using trajectory complexity methods. Ocean Sciences, February 2012.
- I. I. Rypina, I. Kamenkovich, P. Berloff, and L. J. Pratt (2012). Eddy-induced particle dispersion in the upper-ocean North Atlantic. Ocean Sciences, February 2012.
- I. I. Rypina, I. Kamenkovich, P. Berloff, and L. J. Pratt (2012). Eddy-induced particle dispersion in the upper-ocean North Atlantic. Seminar at the University of Louisiana at Lafayette, March 2012. Invited talk.

- I. I. Rypina, A. Kirincich, and L. J. Pratt (2012) Near-surface drifter experiment in the coastal ocean near Martha's Vineyard. NLOA International Workshop on Dynamical Systems, July 2012. Invited talk.
- I. I. Rypina, S. Jayne, S. Yoshida, A. Macdonald, E. Douglass, and K. Buesseler (2012). Short-term Dispersal of Fukushima-derived Radionuclides off Japan: Modeling Efforts and Model-data Inter-comparison. ICFD 2012 International Conference in Sendai, Japan, September 2012.
- I. I. Rypina, S. R. Jayne, S. Yoshida, A. M. Macdonald, E. Douglass, and K. O. Buesseler (2012). Short-term Dispersal of Fukushima-derived Radionuclides off Japan: Modeling Efforts and Model-data Inter-comparison. AGU Fall 2012 Meeting. NG44B-03.
- I. I. Rypina, and L. J. Pratt (2013). Resonance widths in 3D volume-preserving flows with symmetries subject to a small time-dependent perturbation. MURI Workshop in Chapel Hill.
- I. I. Rypina, and L. J. Pratt (2013). Dynamical Systems Analysis of a Three-dimensional Time-dependent Ekman-driven Fluid Flow. SIAM Conference on dynamical systems.
- I. I. Rypina, S. Scott, and L. J. Pratt (2013). Complexity-measure-based methods for identifying Lagrangian coherent structures. ONR MURI review in Washington DC.
- I. I. Rypina, L. J. Pratt, T. Ozgokmen, P. Wang, I. Mezic (2013). Chaotic advection in a non-steady, three-dimensional, Ekman-driven Eddy. BIRS Workshop in Banff Canada. Invited talk.
- I. I. Rypina, L. J. Pratt, T. Ozgokmen, P. Wang, I. Mezic (2014). Chaotic advection in a non-steady, three-dimensional, Ekman-driven Eddy. 2014 Workshop on Mixing, Transport and Coherent Structures in Oberwolfach, Germany. Invited talk.
- I. I. Rypina, L. J. Pratt, J. Llopiz, and S. Lozier (2014). Coupled physical-biological numerical modeling study of the American eel larvae migration. Ocean Sciences Meeting in Honolulu, Hawaii.
- I. I. Rypina, L. J. Pratt, J. Llopiz, and S. Lozier (2014). Dispersal pathways of American eel larvae from the Sargasso Sea. International Eel Symposium at the 2014 ASLO meeting in Quebec City, Canada.
- I. I. Rypina, L. J. Pratt, T. Ozgokmen, P. Wang, I. Mezic (Nov 2014). Chaotic advection in a non-steady, three-dimensional, Ekman-driven Eddy. Invited seminar at U. Miami/RSMAS.
- I. I. Rypina, L. J. Pratt, T. Ozgokmen, P. Wang, I. Mezic (Nov 2014). Chaotic advection in a non-steady, three-dimensional, Ekman-driven Eddy. MURI meeting in Miami. Talk
- I. I. Rypina, S. R. Jayne, S. Yoshida, A. M. Macdonald, and K. Buesseler (Dec 2014). Drifter-

based estimate of the 5 year dispersal of Fukushima-derived radionuclides, Fall 2014 AGU Meeting in San Francisco. Poster

- I. I. Rypina, L. J. Pratt, J. Llopiz, and S. Lozier (Mar 2015). Dispersal pathways of American eel larvae from the Sargasso Sea. Invited seminar at the University of Louisiana at Lafayette. Invited talk
- I. I. Rypina, L. J. Pratt, J. Llopiz, and S. Lozier (May 2015). Dispersal pathways of American eel larvae from the Sargasso Sea. WHOI PO 10-min presentation for prospective students. Talk
- I. I. Rypina, and L. J. Pratt (May 2015). Chaotic advection in 3D time-dependent flows with applications to rotating can and Langmuir cell flows. SIAM Conference of dynamical systems. Talk
- I. I. Rypina, L. J. Pratt, J. Llopiz, and S. Lozier (Jul 2015). Dispersal pathways of American eel larvae from the Sargasso Sea. LAPCOD meeting in Winter Harbor, ME. Talk
- I. I. Rypina, L. J. Pratt, M. S. Lozier, L. Slivinski, S. Elgar, B. Raubenheimer (Sep 2015). Influence of ocean circulation changes on the variability of American eel larvae dispersal, and an overview of the drifter experiment in Katama Bay, MA. 2015 Fall MURI workshop on Ocean 3d+1. Talk
- I. I. Rypina, L. J. Pratt, M. S. Lozier, (Feb 2016). Influence of ocean circulation changes on the inter-annual variability of American eel larval dispersal. 2016 Ocean Sciences Meeting. Talk (Larry Pratt gave this talk instead of me)
- I. I. Rypina, I. I., A. Kirincich, S. Lentz, M. Sundermeyer (Jan 2016). Investigating the eddy diffusivity concept in the coastal ocean. Hazards SEES project kickoff meeting at MIT. Talk
- I. I. Rypina, I. I., A. Kirincich, S. Lentz, M. Sundermeyer (May 2016). Investigating the eddy diffusivity concept in the coastal ocean. AmeriMech Symposium on “Fluid Transport and Nonlinear Dynamics” at WHOI. Talk
- I. I. Rypina (Aug 2016). New approach to quantifying mixing properties in fluid flows based on trajectory encounter number. Hazards SEES year-one workshop meeting at WHOI. Talk
- I. I. Rypina, I. I., A. Kirincich, S. Lentz, M. Sundermeyer (Dec 2016). Investigating the eddy diffusivity concept in the coastal ocean. AGU Fall 2016. Talk
- I. I. Rypina, D. Fertitta, A. Macdonald, S. Yoshida, S. Jayne (Dec 2016). Multi-iteration approach to studying tracer spreading using drifter data. AGU Fall 2016. Poster
- I. I. Rypina, and L. J. Pratt (Jan 2017). Trajectory encounter volume as a diagnostic of mixing potential in fluid flows. *Banff Workshop on Dynamical Systems*, January 2017. Talk
- I. I. Rypina (Mar 2017). Trajectory encounter volume as a diagnostic of mixing potential in fluid

flows. *WHOI/PO open house presentation*, Mar 2017. Talk

- I. I. Rypina, and L. J. Pratt (May 2017). Trajectory encounter volume as a diagnostic of mixing potential in fluid flows. *SIAM Conference on Applications of Dynamical Systems*, May 2017. Talk
- I. I. Rypina, S. G. Llewellyn Smith, and L. J. Pratt (Nov 2017). Connection between encounter volume and diffusivity in geophysical flows. SCRIPPS. Talk
- I. I. Rypina, S. G. Llewellyn Smith, and L. J. Pratt (Nov 2017). Connection between encounter volume and diffusivity in geophysical flows. OSU. Talk
- I. I. Rypina, S. G. Llewellyn Smith, and L. J. Pratt (Nov 2017). Connection between encounter volume and diffusivity in geophysical flows. University of Alberta, CA. Talk
- I. I. Rypina, S. G. Llewellyn Smith, and L. J. Pratt (Feb 2018). Connection between encounter volume and diffusivity in geophysical flows. Ocean Sciences, Feb 2017. Talk
- I.I. Rypina, C. Hernandez, K. Chen., L. Pratt, and J. Llopiz (Jun 2018). Suitability of the Slope Sea for Atlantic Bluefin Tuna Spawning. AOPE COFDL. Invited talk
- I.I. Rypina, C. Hernandez, K. Chen., L. Pratt, and J. Llopiz (Jun 2018). Suitability of the Slope Sea for Atlantic Bluefin Tuna Spawning. SSF lecture. Invited talk
- I.I. Rypina, C. Hernandez, K. Chen., L. Pratt, and J. Llopiz (Sep 2018). Suitability of the Slope Sea for Atlantic Bluefin Tuna Spawning. SMAST DEOS/SFO joint seminar. Invited talk
- I.I. Rypina, C. Hernandez, K. Chen., L. Pratt, J. Llopiz, and S. Entner (May 2019). Transport Properties of the Slope Sea with Application to Atlantic Bluefin Tuna Spawning. SIAM. Invited talk
- I.I. Rypina (May 2019). Physical-biological numerical modeling of larval dispersal in the ocean, with applications to American Eel and Atlantic Bluefin Tuna larvae. SEA. Invited talk
- I.I. Rypina, L. J. Pratt, B. Hodges, R. Musgrave, and A. Mahadevan (Jun 2019). CALYPSO multi-layer drifter deployments. ONR CALYPSO all-hands meeting in Mallorca, Spain. Talk
- I.I. Rypina, C. Hernandez, K. Chen., L. Pratt, J. Llopiz, and S. Entner (Jun 2019). Suitability of the Slope Sea for Atlantic Bluefin Tuna Spawning. Ocean Twilight Zone (OTZ) group meeting. WHOI. Invited Talk
- I.I. Rypina, C. Hernandez, K. Chen., L. Pratt, J. Llopiz, and S. Entner (Jun 2019). Suitability of the Slope Sea for Atlantic Bluefin Tuna Spawning. Gordon Res. Conference. Invited Talk
- I.I. Rypina, C. Hernandez, K. Chen., L. Pratt, J. Llopiz, and S. Entner (Jul 2019). Suitability of the Slope Sea for Atlantic Bluefin Tuna Spawning. IUGG. Talk

- I.I. Rypina, T. Getscher, L. Pratt (Dec 2019). Analyses of the CALYPSO multi-layer drifter deployments in the Mediterranean Sea. Ocean Sciences. CALYPSO meeting. Talk
- I.I. Rypina, T. Getscher, L. Pratt (Feb 2020). Analyses of the CALYPSO multi-layer drifter deployments in the Mediterranean Sea. Ocean Sciences. Poster
- I.I. Rypina, T. Getscher, L. J. Pratt. (Jun 2020). Analyses of the CALYPSO multi-layer drifter deployments in the Mediterranean Sea. Ocean Sciences. 2020 CALYPSO virtual meeting. Talk
- I.I. Rypina, L. Pratt, S. Entner, A. Anderson, D. Cherian (Jul 2020). The Influence of an Eddy in the Success Rates and Distributions of Passively Advected or Actively Swimming Biological Organisms Crossing the Continental Slope. Virtual PO Seminar
- I.I. Rypina, C. M. Dotzel, Hernandez, K. Chen., L. Pratt, J. Llopiz (Dec 2020). Suitability and inter-annual variability of spawning habitat for Atlantic bluefin tuna in the Slope Sea. AGU Fall 2020 meeting, poster presentation.
- I. I. Rypina, C. M. Dotzel, Hernandez, K. Chen., L. Pratt, J. Llopiz (Feb 2021). Suitability and inter-annual variability of spawning habitat for Atlantic bluefin tuna in the Slope Sea. Invited Seminar for the MOANA group.
- I. I. Rypina, Getscher, T. R., Pratt, L. J., and Mourre, B. (Mar 2021). Analysis of multi-layer drifters and comparisons with u-ctd and adcp. CALYPSO group meeting
- I. I. Rypina, Getscher, T. R., Pratt, L. J., and Mourre, B. (Apr 2021). Observing and quantifying ocean flow properties using drifters with drogues at different depths, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-13761, <https://doi.org/10.5194/egusphere-egu21-13761>, 2021.
- I. I. Rypina (Apr 2021). Towards a better understanding of the movement and distribution of marine microplastics. Presentation for the sponsors of the WHOI Innovation Accelerator Award
- I. I. Rypina, Getscher, T. R., Pratt, L. J., and Ozgokmen, T. (Jul 2021). Application of dynamical systems techniques to real drifters. CALYPSO group meeting
- (*). Getscher, **I. I. Rypina**, T. R., Pratt, L. J., and Mourre, B. (**Sep 2021**). Observing and quantifying ocean flow properties using drifters with drogues at different depths, PO Seminar.
- I. I. Rypina**, Getscher, T. R., Pratt, L. J., and Ozgokmen, T. (**Dec 2021**). Application of dynamical systems techniques to real drifters. Invited talk at NUY, COURANT
- I. I. Rypina (Jan 2022)**. Towards a better understanding of the movement and distribution of marine microplastics. WHOI Microplastics Group Presentation

- I. I. Rypina**, L. Pratt, M. Dotzel, M. Rogers(**Feb 2022**). Towards a better understanding of the movement and distribution of marine microplastics. CALYPSO Group Meeting Presentation
- I. I. Rypina**, Getscher, T. R., Pratt, L. J., and Ozgokmen, T. (**Mar 2022**). Application of dynamical systems techniques to real drifters. Ocean Sciences 2022 Meeting, talk
- I. I. Rypina**, A. Kirincich, and T. Peacock (**Mar 2022**). Horizontal and vertical spreading of dye in the coastal ocean of the northern Mid-Atlantic bight. Ocean Sciences 2022 Meeting, Invited Poster
- (*) M. Rogers, I. I. Rypina (**Mar 2022**). Stochastics approach to modeling the distribution of marine microplastics in the ocean. Ocean Sciences 2022 Meeting, talk
- I. I. Rypina**, Getscher, T. R., Pratt, L. J., and Ozgokmen, T. (**Apr 2022**). Application of dynamical systems techniques to real drifters. PO Seminar