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Education

1998 Ph.D., Physical Oceanography, Florida State University, Florida. Thesis title: "Sea Ice and Climate Sensitivity." PhD advisor: Dr. W. K. Dewar.

1993 M.S., Applied Mathematics and Physics. Moscow Institute of Physics and Technology, Russia. Thesis title: "Dynamics of a barotropic monopole on a beta-plane." MS advisor: Dr. G. M. Reznik.

1991 B.S., Physics and Mathematics, Moscow Institute of Physics and Technology, Russia.

Professional Employment

2014 – present Professor, University of Wisconsin-Milwaukee.

2009 – 2013 Associate Professor, University of Wisconsin-Milwaukee.

2005 – 2009 Assistant Professor, University of Wisconsin-Milwaukee.

2002 – 2005 Research Scientist, Institute of Geophysics and Planetary Physics, Department of Atmospheric and Oceanic Sciences, UCLA.

1999 – 2001 Postdoctoral Researcher, Institute of Geophysics and Planetary Physics, Department of Atmospheric and Oceanic Sciences, UCLA.

Current Research Interests

Atmospheric Sciences, Physical Oceanography, Sea-Ice Dynamics, Climate Dynamics, Large-Scale and Mesoscale Atmosphere–Ocean–Sea-Ice Interaction, Statistical Methods, Data Modeling

Refereed Publications

1. Gavrilov, A., **Kravtsov, S.**, Buyanova, M. *et al.*, 2023: Forced response and internal variability in ensembles of climate simulations: Identification and analysis using linear dynamical mode decomposition. *Climate Dynamics*, https://doi.org/10.1007/s00382-023-06995-1

2. Blount, D. V., C. Evans, I. L. Jirak, A. R. Dean, and S. Kravtsov, 2023: An objective method for clustering observed vertical thermodynamic profiles by their boundary layer structure. *Wea. Forecasting*, **38**, 1143–1156, https://doi.org/10.1175/WAF-D-22-0195.1.

3. Mukhin, D., **S. Kravtsov**, A. Seleznev, E. Loskutov, M. Buyanova, and A. Feigin, 2023: Estimating predictability of a dynamical system from multiple samples of its evolution. *Chaos*, **33**, doi: 10.1063/5.0135506, https://doi.org/10.1063/5.0135506.

4. Kravtsov, S., and G. M. Reznik, 2023: Quasi-geostrophic monopoles in a sheared zonal flow: Influence of the beta-effect and variable shear, *Physics of Fluids*, **35**, 016606, https://doi.org/10.1063/5.0131328.

5. Kravtsov, S., A. Gavrilov, M. Buyanova, E. Loskutov, and A. Feigin, 2022: Forced signal and predictability in a prototype climate model: Implications for fingerprinting based detection in the presence of multidecadal natural variability, *Chaos*, **32**, 123130, https://doi.org/10.1063/5.0106514.

6. Kravtsov, S., I. Mastilovic, W. K. Dewar, A. McC. Hogg and J. R. Blundell, 2022: A Moist Quasi-Geostrophic Coupled Model: MQ-GCM2.0. *Geosci. Model Dev.*, **15**, 7449–7469, https://doi.org/10.5194/gmd-15-7449-2022

7. Kravtsov, S., P. Roebber, T. M. Hamill, and J. Brown, 2022: Objective methods for thinning the frequency of reforecasts while meeting post-processing and model validation needs. *Weather and Forecasting*, **37**(5), 727–748. https://journals.ametsoc.org/view/journals/wefo/37/5/WAF-D-21-0162.1.xml

8. Reznik, G., and **S. Kravtsov**, 2021: Monopoles in a zonal flow with constant shear on a quasi-geostrophic *f*-plane: Effects of Galilean non-invariance. *Physics of Fluids*, **33**, 116606; https://doi.org/10.1063/5.0069722

9. Kravtsov, S., and A. A. Tsonis, 2021: "Lorenz-63 Model as a Metaphor for Transient Complexity in Climate" *Entropy* 23, no. 8: 951, https://doi.org/10.3390/e23080951

10. Tsonis, A.A., Wang, G., Lu, W., **Kravtsov, S.**, Essex, C., and Asten, M.W., 2021: On time scales of intrinsic oscillations in the climate system. *Entropy*, **23**, 459. https:// doi.org/10.3390/e23040459.

11. Sergey Kravtsov and G. M. Reznik, 2021: Monopoles in a uniform zonal flow on a quasi-geostrophic β-plane: effects of the Galilean non-invariance of the rotating shallow-water equations. *J. Fluid Mech.*, **909**, A23, Cambridge University Press, doi:10.1017/jfm.2020.906.

12. Reznik, G.M. and **Kravtsov, S.**, 2020. Singular Vortices on a Beta-Plane: A Brief Review and Recent Results. *Physical Oceanography*, [e-journal] **27**(6), pp. 659–676. doi:10.22449/1573-160X-2020-6-659-676.

13. Gavrilov, A., **S. Kravtsov** and D. Mukhin, 2020: Analysis of twentieth century surface air temperature using linear dynamical modes, Chaos, **30**, 123110, DOI: 10.1063/5.0028246, https://doi.org/10.1063/5.0028246.
14. **Sergey Kravtsov**, 2020: Dynamics and predictability of hemispheric-scale multidecadal climate variability in an observationally constrained mechanistic model. *J. Climate*, **33**, 4599–4620, doi:10.1175/JCLI-D-19-0778.1.
15. **Sergey Kravtsov** and G. M. Reznik, 2019: Numerical solutions of the singular vortex problem. *Physics of Fluids*, **31**, 066602, https://doi.org/10.1063/1.5099896.
16. **Sergey Kravtsov**, Christian Grimm and Shijie Gu, 2018: Global-scale multidecadal variability missing in the state-of-the-art climate models. *npj Climate and Atmospheric Science*, **1**, 34, doi:10.1038/s41612-018-0044-6, https://www.nature.com/articles/s41612-018-0044-6.
17. Nikola Jajcay, **Sergey Kravtsov**, George Sugihara, Anastasios A. Tsonis and Milan Palus, 2018: Synchronization and causality across time scales in El Nino/Southern Oscillation, *npj Climate and Atmospheric Science*, **1**, 33, doi:10.1038/s41612-018-0043-7, https://www.nature.com/articles/s41612-018-0043-7.
18. **Kravtsov, S.**, 2017a: Pronounced differences between observed and CMIP5 simulated multidecadal climate variability in the twentieth century. *Geophys. Res. Lett.*, **44**, 5749–5757, doi: 10.1002/2017GL074016.
19. **Kravtsov, S.**, 2017b: Comment on ‘‘Comparison of Low-Frequency Internal Climate Variability in CMIP5 Models and Observations. *J. Climate*, **30**, 9763–9772, doi: 10.1175/JCLI-D-17-0438.1.
20. **Kravtsov, S.**, and D. Callicutt, 2017: On semi-empirical decomposition of multidecadal climate variability into forced and internally generated components. *International J. Climatology*, **37**, 4417–4433, doi: 10.1002/joc.5096.
21. **Kravtsov, S.**, P. Roebber, and V. Brazauskas (2017), A virtual climate library of surface temperature over North America for 1979–2015, Scientific Data, 4, 170,155EP, doi:10.1038/sdata.2017.155.
22. **Kravtsov, S.**, N. Sugiyama and P. Roebber, 2017: Role of nonlinear dynamics in accelerated warming of Great Lakes. In: *Advances in Nonlinear Geosciences*. 2017. Springer International Publishing. 279–296. ISBN 978-3-319-58894-0
23. Sugiyama, N., **S. Kravtsov**, and P. Roebber, 2017: Multiple climate regimes in an idealized lake–ice–atmosphere model. *Climate Dyn.*, https://doi.org/10.1007/s00382-017-3633-x.
24. **Kravtsov, S.**, N. Tilinina, Y. Zyulyaeva, and S. Gulev, 2016: Empirical modeling and stochastic simulation of sea-level pressure variability. *J. Appl. Meteor. Climat.,* **55**, 1197–1219, doi: http://dx.doi.org/10.1175/JAMC-D-15-0186.1.
25. Jajcay, N., J. Hlinka, **S. Kravtsov**, A. A. Tsonis and M. Palus, 2016: Time scales of the European surface air-temperature variability: The role of 7–8-year cycle. *Geophys. Res. Letts.*, **43**, 902–909, doi:10.1002/2015GL067325.
26. **Kravtsov, S.**, M. Wyatt, J. Curry, and A. A. Tsonis, 2015: Comment on “Atlantic and Pacific Multidecadal Oscillations and Northern Hemisphere temperatures.” *Science*, **350**, 1326, doi:10.1126/science.aab3570.
27. **Kravtsov, S.**, I. Rudeva, and S. Gulev, 2015: Reconstructing sea-level pressure variability via a feature tracking approach. *J. Atmos. Sci.*, **72**, 487–506, doi: 10.1175/JAS-D-14-0169.1.

28. Kravtsov, S., N. Sugiyama, and A. A. Tsonis, 2014. Transient behavior in the Lorenz model. *Nonlin. Processes Geophys. Discuss.*, **1**, 1905–1917, doi:10.5194/npgd-1-1905-2014.
29. Kravtsov, S., M. G. Wyatt, J. A. Curry, and A. A. Tsonis, 2014: Two contrasting views of multidecadal climate variability in the twentieth century. *Geophys. Res. Lett.*, **41**, 6881–6888, doi:10.1002/2014GL061416.
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31. Kravtsov, S., and S. Gulev, 2013: Kinematics of eddy–mean-flow interaction in an idealized atmospheric model. *J. Atmos. Sci.*, **70**, 2574–2595. doi: http://dx.doi.org/10.1175/JAS-D-12-0309.1
32. Kravtsov, S., 2012: An empirical model of decadal ENSO variability. *Climate Dynamics*, **39**, 2377–2391. link.springer.com/article/10.1007%2Fs00382-012-1424-y/fulltext.html
33. Peters, J., and **S. Kravtsov**, 2012: Origin of non-Gaussian regimes and predictability in an atmospheric model. *J. Atmos. Sci.*, **69**(8), 2587–2599. journals.ametsoc.org/doi/abs/10.1175/JAS-D-11-0316.1
34. Peters, J. M., **Kravtsov, S. V.,** Schwartz, N. (2012). Predictability associated with nonlinear regimes in an atmospheric model. *J. Atmos. Sci.*, **69**(3), 1137–1154. journals.ametsoc.org/doi/abs/10.1175/JAS-D-11-0168.1
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38. Kravtsov, S., and R. Olivas Saunders, 2011; Comment on "Lies, damned lies, and statistics (in Geology)." *Eos Trans. of AGU*, **92,** 65.
39. Culina, J., **S. Kravtsov**, and A. Monahan, 2011: Stochastic parameterisation schemes for use in realistic climate models. *J. Atmos. Sci.*, **68**, 284–299.
40. Kondrashov, D., **S. Kravtsov**, and M. Ghil, 2010: Signatures of nonlinear dynamics in an idealized atmospheric model. *J. Atmos. Sci.*, **68**, 3–12.
41. Dharshana, K. G. T., **S. Kravtsov**, and J. D. W. Kahl, 2010: The relationship between synoptic weather disturbances and particulate-matter air pollution over the US. *J. Geophys. Res. Atmos.*, **115**, D24219.
42. Jamison, N., and **S. Kravtsov**, 2010: Decadal variations of North Atlantic sea-surface temperature in observations and CMIP3 simulations. *J. Climate*, **23**, 4619–4636.
43. Hanrahan, J. L., **S. Kravtsov**, M. Ghil, and P. Roebber, 2010: Connecting past and present climate variability to the water levels of Lakes Michigan and Huron. *Geophys. Res. Lett.*, **37**, L01701, doi:10.1029/2009GL041707.
44. Strounine, K., **S. Kravtsov**, D. Kondrashov, and M. Ghil, 2010: Reduced models of atmospheric low-frequency variability: Parameter estimation and comparative

performance. *Physica D*, **239**, 145–166, doi:10.1016/j.physd.2009.10.013.

45. Hogg, A., W. K. Dewar, P. Berloff, **S. Kravtsov**, and D. K. Hutchinson, 2009: The effects of mesoscale ocean–atmosphere coupling on the large-scale ocean circulation. *J. Climate*, **22**, 4066–4082.

46. Kravtsov, S., M. Ghil, and D. Kondrashov, 2010: *Empirical Model Reduction and the Modeling Hierarchy in Climate Dynamics and the Geosciences*. *Stochastic Physics and Climate Modeling*, T. Palmer and P. Williams, Eds., Cambridge University Press, pp. 35–72.

47. Hanrahan, J. L., **S. Kravtsov**, and P. J. Roebber, 2009: Quasi-periodic decadal cycles in levels of lakes Michigan and Huron. *Great Lakes Res.,* **35**, 30–35.

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49. Kravtsov, S., W. K. Dewar, M. Ghil, J. C. McWilliams, and P. Berloff, 2008: A mechanistic model of mid-latitude decadal climate variability. *Physica D*, **237**, 584–599, doi:10.1016/j.physd.2007.09.025.

50. Kravtsov, S., and C. Spannagle, 2008: Multi-decadal climate variability in observed and simulated surface temperatures. *J. Climate*, **21**, 1104–1121.

51. Kravtsov, S., W. K. Dewar, P. Berloff, J. C. McWilliams, and M. Ghil, 2008: North Atlantic climate variability in coupled models and data. *Nonlin. Proc. Geophys.*, **15**, 13–24.

52. Tsonis, A. A., K. Swanson, and **S. Kravtsov**, 2007: A new dynamical mechanism for major climate shifts. *Geophys. Res. Lett*., **34**, L13705, doi:10.1029/2007GL030288.

53. Kravtsov, S., W. K. Dewar, P. Berloff, J. C. McWilliams, and M. Ghil, 2007: A highly nonlinear coupled mode of decadal variability in a mid-latitude ocean–atmosphere model. *Dyn. Atmos. Oceans*, **43**, 123–150, doi:10.1016/j.dynatmoce.2006.08.001.

54. Berloff, P., **S. Kravtsov**, W. K. Dewar, and J. C. McWilliams, 2007: Ocean eddy dynamics in a coupled ocean–atmosphere model. *J. Phys. Oceanogr*., 37**,** 1103–1121.

55. Kravtsov, S., P. Berloff, W. K. Dewar, M. Ghil, and J. C. McWilliams, 2006: Dynamical origin of low-frequency variability in a highly nonlinear mid-latitude coupled model. *J. Climate*, **19**, 6391–6408.

56. Kondrashov, D., **S. Kravtsov**, and M. Ghil, 2006: Empirical mode reduction in a model of extratropical low-frequency variability. *J. Atmos. Sci.*, **63**,1859–1877.

57. Kravtsov, S., A. W. Robertson, and M. Ghil, 2006: Multiple regimes and low-frequency oscillations in the Northern Hemisphere's zonal-mean flow. *J. Atmos. Sci*., **63**, 840–860.

58. Kondrashov, D., **S. Kravtsov**, A. W. Robertson, and M. Ghil, 2005: A hierarchy of data-based ENSO models. *J. Climate*, **18**, 4425–4444.

59. Kravtsov, S., D. Kondrashov, and M. Ghil, 2005: Multi-level regression modeling of nonlinear processes: Derivation and applications to climatic variability. *J. Climate*, **18**, 4404–4424.

60. Kravtsov, S., A. W. Robertson, and M. Ghil, 2005: Bimodal behavior in the zonal

mean flow of a baroclinic β-channel model. *J. Atmos. Sci.*, **62**,1746–1769.
61. Kravtsov, S., and M. Ghil, 2004: Interdecadal variability in a hybrid coupled ocean–atmosphere–sea-ice model. *J. Phys. Oceanogr.*, **34**, 1756–1775.
62. Kravtsov, S. V., A. W. Robertson, and M. Ghil, 2003: Low-frequency variability in a baroclinic β-channel model with land–sea contrast. *J. Atmos. Sci.*, **60**, 2267–2293, 409TSTS56.
63. Kravtsov, S. V., and W. K. Dewar, 2003: On the role of thermohaline advection and sea ice in glacial transitions. *J. Geophys. Res. Oceans*, **108**, 3203–3221, 2002JC001439.
64. Kravtsov, S. V., and A. W. Robertson, 2002: Midlatitude ocean–atmosphere interaction in an idealized coupled model. *Clim. Dyn.*, **19**, 693–711.
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67. Kravtsov, S. V., and W. K. Dewar, 1998: Multiple equilibria and transitions in a coupled ocean-atmosphere box model. *J. Phys. Oceanogr.*, **28**, 389–397.
68. Kravtsov, S. V., 1998: Sea Ice and Climate Sensitivity. PhD Thesis, Department of Oceanography, Florida State University.

Articles Pending Publication and under review (available from https://sites.uwm.edu/kravtsov/publications/).

1. Westgate, A., and S. Kravtsov, 2024: Comparison of multidecadal variability in reanalyses and global climate models. In preparation. To be submitted to *PLOS Climate*.

Manuscripts in preparation and unpublished manuscripts (available from https://sites.uwm.edu/kravtsov/publications/)

1. Roebber, P., V. Brazauskas, and **S. Kravtsov**, 2017: The actuarial utility of weather and climate predictions. *2018 Climate Change*, Casualty Actuarial Society, unpublished.
2. Sugiyama, N., **S. Kravtsov**, and P. Roebber, 2017: Simulating recent warming of the Great Lakes in an idealized lake–ice–atmosphere model.
3. Kravtsov, S. and A. A. Tsonis, 2008: How much of global warming is due to natural climate variability? *Unpublished manuscript*.

Collaborators

X. Shen, C. Evans, D. Blount (UWM), E. Loskutov, A. Gavrilov, D. Mukhin, M. Buyanova, A. M. Feigin (IAP RAS), C. Essex (UWO, Canada), G. Wang (IAP, China), G. M. Reznik (IO RAS), G. Sugihara (Scripps), V. Brazauskas (UWM), M. Palus, N.

Jajcay (Institute of Computer Science, Prague), J. Curry (Georgia Tech), N. Tilinina (IO RAS), Y. Zyulyaeva (IO RAS), I. Rudeva (U. Melbourne), S. Gulev (IO RAS), M. Chekroun (UCLA), S. Vavrus (UW-Madison), M. Notaro (UW-Madison), C. Strong (UU), A. Monahan (UVIC), J. Kahl (UWM), P. Roebber (UWM), K. Swanson (UWM), A. Hogg (ANU), S. Lee (PSU), S. B. Feldstein (PSU), A. Tsonis (UWM), M. Ghil (post-doc advisor, UCLA), W. Dewar (graduate advisor, FSU), A. Robertson (IRI, Columbia Univ.), J. McWilliams (IGPP, UCLA), P. Berloff (Imperial college, London, UK), D. Kondrashov (IGPP, UCLA), I. Kamenkovich (U. Miami, RSMAS).

Graduate Students

B. Foster (MS, "Tropical Cyclone Interactions with Midlatitude Jet Stream"), **A. Drugorub** (PhD, "Lacustrine amplification of global climate change in Great Lakes region"), **I. Mastilovic** (PhD, 2023: "Role of mesoscale air–sea interaction in low-frequency climate variability"), **J. Ryan** (MS, 2020: "Role of biennial climate variability in ENSO"), **A. Westgate** (PhD, current, MS, 2020: "Observed and simulated internal multidecadal variability in surface temperature and sea-level pressure"), **A. Oser** (MS, 2018: "Multidecadal climate variability in models and observations"), **C. Grimm** (MS, 2017: "M-SSA based Wiener filtering of multidecadal climate variability"), **T. Plamondon** (MS, 2015: "A mechanistic model of multidecadal climate variability"); **N. Sugiyama** (PhD, 2015: "The Great Lakes' regional climate regimes," *co-advised with P. Roebber*); **J. Peters** (MS, 2011: "Predictability associated with atmospheric circulation regimes," *co-advised with P. Roebber*); **J. Hanrahan** (MS, 2008; PhD, 2010: "Great Lakes decadal cycles;" *co-advised with P. Roebber*); **N. Schwartz** (MS, 2009: "Zonally symmetric and regionally intensified atmospheric weather regimes"); **T. Dharshana** (MS, 2009: "Weather and air pollution;" *co-advised with J. Kahl*); **C. Spannagle** (MS, 2007, "Decadal climate variability in the observed and modeled surface temperatures"); **K. Strounine** (PhD, 2007; *co-advised w/M. Ghil*, "Reduced models of atmospheric low-frequency variability").

Synergistic Activities

- PI and co-PI in a number of multi-institutional collaborative research projects funded by NSF, DOE, and NASA.
- Collaboration with AIR Worldwide (a leading risk modeling firm) on a project to apply empirical stochastic modeling for regional climate risk assessment.
- a member of the US AMOC Science Team since 2015.
- co-organized a number of sessions at the national and international conferences, including the "Data-driven" session at the 2017 joint AGU/JpGU meeting (Tokyo, Japan), a climate dynamics session at the 2017 International Symposium on Topical Problems in Nonlinear Wave Physics (Moscow, Russia), as well as a session on empirical climate modeling at the 2018 EGU meeting (Vienna, Austria)