Dimitrios Giannakis

Assistant Professor
Department of Mathematics, Center for Atmosphere Ocean Science
Courant Institute of Mathematical Sciences
New York University
251 Mercer St
New York, NY 10012

+1 212 998 3316 (Tel)
+1 212 995 4121 (Fax)
dimitris@cims.nyu.edu
http://cims.nyu.edu/~dimitris

Research Interests

Data-driven, operator-theoretic methods for dynamical systems; kernel algorithms; climate dynamics; statistical forecasting

Appointments

2012–	Assistant Professor, *Courant Institute of Mathematical Sciences, New York University*
2009–2012	Postdoctoral Research Scientist, *Courant Institute of Mathematical Sciences, New York University* Mentor: Andrew J. Majda
2005–2009	Research Assistant, *Department of Physics, University of Chicago*

Education

2003–2009	Ph.D. Physics, *University of Chicago* Adviser: Robert Rosner
2002–2003	M.Phil. Technology Policy, *University of Cambridge*
1997–2001	BA, MSci Natural Sciences, *University of Cambridge*

Teaching Experience

2012–	*Courant Institute of Mathematical Sciences, New York University* Graduate Courses: Data Analysis Methods for High-Dimensional Time Series, Fluid Dynamics, Methods of Applied Mathematics, Ordinary Differential Equations Undergraduate Courses: Introduction to Fluid Dynamics
2011–2012	*Courant Institute of Mathematical Sciences, New York University* Contributed lectures in graduate courses on Stochastic Modeling and Uncertainty Quantification
2004–2008	*Department of Physics, University of Chicago* Teaching Assistant, College Tutor

Research Supervision

Ph.D. Students	Mitchell Bushuk (2013–2015, currently Research Scientist at the Geophysical Fluid Dynamics Laboratory, Princeton, NJ), Romeo Alexander (2014–), Xinyang Wang (2015–)
Masters Students	Xiucai Ding (2013–2014), Zhanyi Dong (2013–2014), June Qiong Wu (2017–)
Undergraduate Students	Eli Bingham (Duke University, 2013–2014), Varun Kambhampati (2016)
Postdoctoral Scientists	Subhomoy Gosh (2013–2014, currently Research Scientist at National Institute of Standards and Technology), Darin Comeau (2013–2016, currently Research Scientist at Los Alamos National Laboratory), Zhizhen Zhao (2013–2016, currently Assistant Professor of Electrical and Computing Engineering, University of Illinois at Urbana-Champaign), Eniko Székely (2013–2017, currently Research Scientist at Swiss Data Science Institute), Suddhasattwa Das (2016–)
Ph.D. Committee Member	Xiao Xiao (2015), Nan Chen (2016), Noah Brenowitz (2017), Di Qi (2017), Qiu Yang (2017)
Ph.D. Committee Member (External to NYU)	Mathew Bowers (Purdue University, expected 2017)

Research Grants

2016–2019	Office of Naval Research, YIP grant N00014-16-1-264, “Geometrical Methods for Feature Extraction and Prediction in Autonomous and Non-Autonomous Dynamical Systems: Applications to Atmosphere Ocean Science”, $510,000, PI role
2016–2018	Defense Advance Research Projects Agency, grant HR0011-16-C-0116, “A Data-Driven, Operator-Theoretic Framework for Space-Time Analysis of Process Dynamics”, $97,185, co-PI role
2015–2017	National Science Foundation, grant MIL111004, “EAGER: Topological Machine Learning”, $199,891, co-PI role
2015–2017	Defense Advanced Research Projects Agency, grant DARPA-BAA-14-46-FP-100, “New Strategies for Prediction and Data Assimilation for Turbulent Dynamical Systems in Climate Science”, $320,000, co-PI role
2015–2018	National Science Foundation, grant DMS-1521775, “Novel Kernel Methods for Data Analysis in Dynamical Systems: Applications to Dimension Reduction and Prediction in Atmospheric and Oceanic Dynamics”, $300,000, PI role
2015–2018	Ministry of Earth Sciences, India, grant MM/SERP NYU/ 2014/SSC-01/002, “A Novel Approach for Improving Rain-Gauge Data Assimilation and Extended Range Prediction of Sub-Seasonal Variability over India,” $549,316, co-PI role
2014–2017	Office of Naval Research, grant N00014-14-1-0150, “Analysis of Large-Scale Datasets from Dynamical Systems through Discrete Exterior Calculus with Applications to Climate Atmosphere Ocean Science,” $330,188, PI role

Professional Service

Refereeing	Journals: Atmospheric Chemistry and Physics, Chaos, Climate Dynamics, Dynamics of Atmospheres and Oceans, Geophysical Research Letters, International Journal of Bifurcation and Chaos, Journal of Climate, Journal of Nonlinear Science, Journal of Physical Oceanography, Journal of the Atmospheric Sciences, Monthly Weather Review, Nature, Nature Communications, Nonlinearity, Physical Review E, Proceedings of the National Academy of Sciences, SIAM Journal on Applied Dynamical Systems, SIAM/ASA Journal on Uncertainty Quantification, Transactions on Knowledge and Data Engineering, Weather and Forecasting
	Conference Proceedings: NASA Conference on Intelligent Data Understanding (2011, 2012), Neural Information Processing Systems (2016)
	Books and Book Chapters: Springer Briefs in Mathematics
	Proposals: National Science Foundation
Conferences	Special Sessions Co-Organized: Stochastic and Statistical Modeling of Climate, *9th AIMS International Conference on Dynamical Systems and Differential Equations (2012)*; Improving Climate and Weather Prediction through Data-Driven Statistical Modeling, *10th AIMS International Conference on Dynamical Systems and Differential Equations (2014)*; Data Driven Methods for Dynamical Systems, *AMMCS-CAIMS Congress (2015)*; Data-driven methods for Quantifying Uncertainty of Multiscale Dynamical Systems, *International Congress on Industrial and Applied Mathematics (2015)*; Koopman Operator Techniques in Dynamical Systems: Theory, *SIAM Conference on Applications of Dynamical Systems (2017)*

Software

1. NLSA algorithms for Matlab. Available for download at http://cims.nyu.edu/~dimitris

Awards

2016–2019	ONR Young Investigator Award
2006–2008	Alexander S. Onassis Scholarship (Greece)
2003–2004	McCormick, Michelson, and Sachs Fellowships, University of Chicago
2000	Alan Cottrell Prize for Natural Sciences, Jesus College, Cambridge University
1997–2003	Cambridge European Trust Fellowship
1997–2001	Embiricos Scholarship, Jesus College, Cambridge University

Manuscripts in Preparation

1. Alexander, R., and D. Giannakis (2017). Conditional analog forecasting
2. Berry, T., and D. Giannakis (2017). Smooth exterior calculus
3. Giannakis, D., A. Ourmazd, J. Slawinska, and Z. Zhao (2017). Spatiotemporal pattern extraction with operator-valued kernels
4. Székely, E., D. Giannakis, and S. Das (2017). An information-geometric framework for feature extraction in ergodic dynamical systems

Refereed Papers

1. Wang, X., D. Giannakis, and J. Slawinska (2017). Antarctic circumpolar waves and their seasonality: Intrinsic traveling modes and ENSO teleconnections. *International Journal of Climatology*, submitted

2. Giannakis, D., A. Kolchinskaya, D. Krasnov, and J. Schumacher (2017). Koopman analysis of the long-term evolution in a turbulent convection cell. *Journal of Fluid Mechanics*, in review

3. Das, S., and D. Giannakis (2017). Delay-coordinate maps and the spectra of Koopman operators. *Nonlinearity*, in review. arXiv:1706.08544

4. Giannakis, D., and S. Das (2017). Extraction and prediction of coherent patterns in incompressible flows through space-time Koopman analysis. *Physica D*, in review. arXiv:1706.06450

5. Comeau, D., D. Giannakis, Z. Zhao, and A. J. Majda (2017). Predicting regional and pan-Arctic sea ice anomalies with kernel analog forecasting. *Climate Dynamics*, in revision. arXiv:1705.05228

6. Giannakis, D., and J. Slawinska (2017). Indo-Pacific variability on seasonal to multidecadal timescales. Part II: Multiscale atmosphere-ocean linkages. *Journal of Climate*, in minor revision. arXiv:1609.09185

7. Slawinska, J., and D. Giannakis (2017). Indo-Pacific variability on seasonal to multidecadal timescales. Part I: Intrinsic SST modes in models and observations. *Journal of Climate*, 30(14), 5265–5294, doi:10.1175/JCLI-D-16-0176.1

8. Giannakis, D. (2017). Data-driven spectral decomposition and forecasting of ergodic dynamical systems. *Applied and Computational Harmonic Analysis*, doi:10.1016/j.acha.2017.09.001

9. Bushuk, M., and D. Giannakis (2017). The seasonality and interannual variability of Arctic sea-ice reemergence. *Journal of Climate*, 30(12), 4657–4676, doi:10.1175/JCLI-D-16-0549.1

10. Alexander, R., Z. Zhao, E. Székely, and D. Giannakis (2017). Kernel analog forecasting of tropical intraseasonal oscillations. *Journal of the Atmospheric Sciences*, 74(4), 1321–1342, doi:10.1175/JAS-D-16-0147.1

11. Sabeerali, C. T. , R. S. Ajayamohan, D. Giannakis, and A. J. Majda (2017). Extraction and prediction of indices for monsoon intraseasonal oscillations: An approach based on nonlinear Laplacian spectral analysis. *Climate Dynamics*, doi:10.1007/s00382-016-3491-y

12. Comeau, D., Z. Zhao, D. Giannakis, and A. J. Majda (2017). Data-driven prediction strategies for low-frequency patterns of North Pacific climate variability. *Climate Dynamics*, 48(5–6), 1855–1872, doi:10.1007/s00382-016-3177-5

13. Székely, E., D. Giannakis, and A. J. Majda (2016). Initiation and termination of intraseasonal oscillations in nonlinear Laplacian spectral analysis indices. *Mathematics of Climate and Weather Forecasting*, 2(1), 1–25, doi:10.1515/mcwf-2016-0001

14. Brenowitz, N. D., D. Giannakis, and A. J. Majda (2016). Nonlinear Laplacian spectral analysis of Rayleigh-Bénard convection. *Journal of Computational Physics*, 315, 536–553, doi:10.1016/j.jcp.2016.03.051

15. Székely, E., D. Giannakis, and A. J. Majda (2016). Extraction and predictability of coherent intraseasonal signals in infrared brightness temperature data. *Climate Dynamics*, 46(5), 1473–1502, doi:10.1007/s00382-015-2658-2

16. Zhao, Z., and D. Giannakis (2016). Analog forecasting with dynamics-adapted kernels. *Nonlinearity*, 29(9), 2888-2939, doi:10.1088/0951-7715/29/9/2888

17. Bushuk, M., and D. Giannakis (2015), Sea-ice reemergence in a model hierarchy. *Geophysical Research Letters*, 42(13), 5337–5335, doi:10.1002/2015GL063972

18. Giannakis, D. (2015). Dynamics-adapted cone kernels. *SIAM Journal on Applied Dynamical Systems*, 14(2), 556–608. doi:10.1137/140954544

19. Berry, T., D. Giannakis, and J. Harlim, (2015). Nonparametric forecasting of low-dimensional dynamical systems. *Physical Review E*, 91, 032915, doi:10.1103/PhysRevE.91.032915

20. Bushuk, M., D. Giannakis, and A. J. Majda (2015). Arctic sea ice reemergence: The role of large-scale oceanic and atmospheric variability. *Journal of Climate*, 28(14), 5477–5509, doi:10.1175/JCLI-D-14-00354.1

21. Bushuk, M., D. Giannakis, and A. J. Majda (2014). Reemergence mechanisms for North Pacific sea ice revealed through nonlinear Laplacian spectral analysis. *Journal of Climate*, 27(16), 6265–6287, doi:10.1175/JCLI-D-13-00256.1

22. Chen, N., A. J. Majda, and D. Giannakis (2014). Predicting the cloud patterns of the Madden-Julian oscillation through a low-order nonlinear stochastic model. *Geophysical Research Letters*, 41(15), 5612–56199, doi:10.1002/2014GL060876

23. Chen, N., D. Giannakis, R. Herbei, and A. J. Majda (2014). An MCMC algorithm for parameter estimation in signals with hidden intermittent instability. *SIAM/ASA Journal of Uncertainty Quantification*, 2(1), 647–699, doi:10.1137/130944977

24. Tung, W.-w., D. Giannakis, and A. J. Majda (2014). Symmetric and antisymmetric Madden-Julian oscillation signals in MJO deep convection. Part I: Basic modes in infrared brightness temperature data. *Journal of the Atmospheric Sciences*, 71, 3302–3326, doi:10.1175/JAS-D-13-0122.1

25. Giannakis, D., and A. J. Majda (2013). Nonlinear Laplacian spectral analysis: Capturing intermittent and low-frequency spatiotemporal patterns in high-dimensional data. *Statistical Analysis and Data Mining*, 6(3), 180–194, doi:10.1002/sam.11171

26. Giannakis, D., and A. J. Majda (2012). Limits of predictability in the North Pacific sector of a comprehensive climate model. *Geophysical Research Letters*, 39, L24602, doi:10.1029/2012GL054273

27. Giannakis, D., A. J. Majda, and I. Horenko (2012). Information theory, model error, and predictive skill of stochastic models for complex nonlinear systems. *Physica D*, 241, 1735–1372, doi:j.physd.2012.07.005

28. Giannakis, D., and A. J. Majda (2012). Comparing low-frequency and intermittent variability in comprehensive climate models through nonlinear Laplacian spectral analysis. *Geophysical Reearch Letters*, 39, L10710, doi:10.1029/2012GL051575

29. Giannakis, D., P. Schwander, and A. Ourmazd (2012). The symmetries of image formation by scattering. I. Theoretical Framework. *Optics Express*, 20(12), 12799–12826, doi:10.1364/OE.20.012799

30. Schwander, P., D. Giannakis, C. H. Yoon, and A. Ourmazd (2012). The symmetries of image formation by scattering. II. Applications. *Optics Express*, 20(12), 12827–12849, doi:10.1364/OE.20.012827

31. Giannakis, D., and A. J. Majda (2012). Quantifying the predictive skill in long-range forecasting. Part I: Coarse-grained predictions in a simple ocean model. *Journal of Climate*, 25(6), 1793–1813, doi:10.1175/2011JCLI4143.1

32. Giannakis, D., and A. J. Majda (2012). Quantifying the predictive skill in long-range forecasting. Part II: Model error in coarse-grained Markov models with application to ocean-circulation regimes. *Journal of Climate*, 25(6), 1814–1826, doi:10.1175/JCLI-D-11-00110.1

33. Giannakis, D., and A. J. Majda (2012). Nonlinear Laplacian spectral analysis for time series with intermittency and low-frequency variability. *Proceedings of the National Academy of Sciences*, 109(7), 2222–2227, doi:10.1073/pnas.1118984109

34. Giannakis, D., R. Rosner, and P. F. Fischer (2009). Large-wavelength instabilities in free-surface Hartmann flow at low magnetic Prandtl numbers. *Journal of Fluid Mechanics*, 636, 217–277, doi:10.1017/S0022112009007824

35. Giannakis, D., P. F. Fischer, and R. Rosner (2009). A spectral Galerkin method for the coupled Orr–Sommerfeld and induction equations for free-surface MHD. *Journal of Computational Physics*, 228(4), 1188–1233, doi:10.1016/j.jcp.2008.10.016

36. Giannakis, D., and W. Hu (2005). Challenges for the kinetic unified dark matter model. *Physical Review D*, 72, 063502, doi:10.1103/PhysRevD.72.063502

37. D. Giannakis, T. Jamasb, and M. G. Pollitt (2005). Benchmarking and incentive regulation of quality of service: An application to the UK electricity distribution networks. *Energy Policy*, 33, 2256, doi:10.1016/j.enpol.2004.04.021

Peer-Reviewed Conference Proceedings

1. Székely, E., and D. Giannakis (2017). Pattern extraction in dynamical systems using information geometry: Application to tropical intraseasonal oscillations. In *Proceedings of the 7th International Workshop on Climate Informatics*, Boulder, Colorado, September 20–22, 2017

2. Slawinska, J., E. Székely, and D. Giannakis (2017). Data-driven Koopman analysis of tropical climate space-time variability. In *Mining Big Data in Climate and Environment*, *17th SIAM International Conference on Data Mining*. Houston, Texas, April 29, 2017

3. Slawinska, J., and D. Giannakis (2016). Spatiotemporal pattern extraction with data-driven Koopman operators for convectively coupled equatorial waves. In *Proceedings of the 6th International Workshop on Climate Informatics*. Boulder, Colorado, September 22–23, 2016. doi:10.5065/D6K072N6

4. Giannakis, D., J. Slawinska, and Z. Zhao (2015). Spatiotemporal feature extraction with data-driven Koopman operators. *J. Mach. Learn. Res. Workshop and Conference Proceedings*, Vol. 44: NIPS 2015 workshop "Feature Extraction: Modern Questions and Challenges", 103–115, Montreal, Quebec, December 11, 2015

5. Székely, E., D. Giannakis, and A. J. Majda (2015). Nonlinear Madden-Julian oscillation indices using kernel methods. In *Proceedings of the 5th International Workshop on Climate Informatics*. Boulder, Colorado, September, September 24–25, 2015

6. Székely, E., D. Giannakis, and A. J. Majda (2014). Extraction and predictability of intraseasonal signals in infrared brightness temperature data. In *Proceedings of the 4th International Workshop on Climate Informatics*, doi:10.1007/978-3-319-17220-0. Boulder, Colorado, September 25–26, 2014

7. Giannakis, D., W.-w. Tung, and A. J. Majda (2012). Hierarchical structure of the Madden-Julian oscillation in infrared brightness temperature data revealed through nonlinear Laplacian spectral analysis. In *Proceedings of the NASA Conference on Intelligent Data Understanding (CIDU) 2012*, doi:10.1109/CIDU.2012.6382201. Boulder, Colorado, October 24–26, 2012

8. Giannakis, D., and A. J. Majda (2011). Time series reconstruction via machine learning: Revealing decadal variability and intermittency in the North Pacific sector of a coupled climate model. In *Proceedings of the 2011 NASA Conference on Intelligent Data Understanding (CIDU 2011)*. Mountain View, California, October 19–21, 2011

Book Chapters

1. Giannakis, D., (2015). Mathematical methods for large geophysical datasets. In *Encyclopedia of Applied and Computational Mathematics*, B. Engquist, Ed., Springer

2. Giannakis, D., and A. J. Majda (2014). Data-driven methods for dynamical systems: Quantifying predictability and extracting spatiotemporal patterns. In *Mathematical and Computational Modeling: With Applications in Engineering and the Natural and Social Sciences*, R. Melnik, Ed., Wiley

Conference and Workshop Talks

1. Kernel Methods for Koopman Mode Analysis and Prediction, *Defense Advance Research Projects Agency MoDyL Review Meeting*, Arlington, Virginia, September 29, 2017

2. Geometrical Methods for Future Extraction and Prediction in Autonomous and Non-Autonomous Dynamical Systems: Applications to Atmosphere Ocean Science, *Office of Naval Research Peer Review Meeting*, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, California, September 5, 2017

3. Physics Constrainted Stochastic-Statistical Models for Extended-Range Environmental Prediction, *Office of Naval Research Peer Review Meeting*, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, California, September 5, 2017

4. Extraction and Prediction of Coherent Patterns in Incompressible Flows through Space-Time Koopman Analysis, *9th European Nonlinear Dynamics Conference (ENOC 2017)*, Budapest, Hungary, June 27, 2017

5. Extraction and Prediction of Coherent Patterns in Incompressible Flows through Space-Time Koopman Analysis, *SIAM Conference on Applications of Dynamical Systems*, Snowbird, Utah, May 23, 2017

6. Kernel Methods for Koopman Mode Analysis and Prediction: Ergodic and Skew-Product Systems, *Defense Advance Research Projects Agency MoDyL Review Meeting*, Arlington, Virginia, March 23, 2017

7. Extraction and Prediction of Coherent Patterns in Incompressible Flows through Space-Time Koopman Analysis, *Workshop on Data-Driven Methods for Reduced-Order Modeling and Stochastic Partial Differential Equations*, Banff International Research Station, Banff, Alberta, January 31, 2017

8. ENSO and its Modulations on Annual and Multidecadal Timescales Revealed by Nonlinear Laplacian Spectral Analysis, *AGU Fall Meeting*, San Francisco, California, December 14, 2016

9. Extraction and Prediction of Coherent Patterns in Incompressible Flows through Space-Time Koopman Analysis, *Kickoff Workshop for DARPA Project "A Data-Driven, Operator-Theoretic Framework for Space-Time Analysis of Process Dynamics"*, Santa Barbara, California, November 4, 2016

10. Extraction and Prediction of Coherent Patterns in Incompressible Flows through Space-Time Koopman Analysis, *Collective Variables in Classical Mechanics*, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, California, October 27, 2016

11. Extraction and Prediction of Coherent Patterns in Incompressible Flows through Space-Time Koopman Analysis, *AMS Fall Central Sectional Meeting*, Minneapolis, Minnesota, October 29, 2016

12. Kernel Methods for Koopman Mode Analysis and Nonparametric Forecasting, *SIAM Conference on Mathematics of Planet Earth*, Philadelphia, Pennsylvania, October 1, 2016

13. Kernel Methods for Nonparametric Analog Forecasting, *Workshop on Stochastic Weather Generators*, Centre Henri Lebesgue, Vannes, France, May 19, 2016

14. Kernel Analog Forecasting of Tropical Intraseasonal Oscillations, *American Meteorological Society (AMS) Conference on Hurricanes and Tropical Meteorology*, San Juan, Puerto Rico, April 20, 2016

15. Analysis and Forecasting of Large Datasets, *Workshop of Office of Naval Research MURI Grant "Physics-Constrained Stochastic/Statistical Models for Extended-Range Environmental Prediction"*, New York University, New York, New York, January 28, 2016

16. Data-Driven Spectral Decomposition and Forecasting of Ergodic Dynamical Systems, *Workshop on Uncertainty Quantification for Multiscale Stochastic Systems and Applications*, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, California, January 21, 2016

17. Data-Driven Spectral Decomposition of Ergodic Dynamical Systems, *Workshop on Sensitivity, Error and Uncertainty Quantification for Atomic, Plasma, and Material Data*, Institute for Advanced Computational Science (IACS), Stony Brook, New York, November 7, 2015

18. Data-Driven Spectral Decomposition of Ergodic Dynamical Systems, *International Conference on Scientific Computation and Differential Equations (SciCADE)*, Potsdam, Germany, September 15, 2015

19. Data-Driven Spectral Decomposition of Ergodic Dynamical Systems, *International Congress on Industrial and Applied Mathematics*, Beijing, China, August 14, 2015

20. Data-Driven Spectral Decomposition of Ergodic Dynamical Systems, *International Congress on Industrial and Applied Mathematics*, 2015 AMMCS-CAIMS Congress, Waterloo, Ontario, June 11, 2015

21. Data-Driven Methods for Nonparametric Forecasting of Dynamical Systems, *12th Annual Conference on Frontiers in Applied and Computational Mathematics (FACM '15)*, New Jersey Institute of Technology, Newark, New Jersey, June 5, 2015

22. Kernel Analog Forecasting of Intraseasonal Oscillations, *Workshop on Stochasticity and Organization of Tropical Convection*, Banff International Research Station, Banff, Alberta, April 30, 2015

23. Novel Nonlinear Time Series Techniques to Capture both Intermittency and Low-Frequency Variability, *Office of Naval Research Option Review Meeting*, Arlington, Virginia, April 17, 2015

24. Data-Driven Methods for Climate Science: Extracting and Predicting Spatiotemporal Patterns, *Symposium on Data Science and Applications*, New York University Shanghai, Shanghai, China, November 22, 2014

25. Extracting Spatiotemporal Patterns with Dynamics-Adapted Kernels, *10th AIMS Conference on Dynamical Systems, Differential Equations, and Applications*, Madrid, Spain, July 8, 2014

26. Extraction and Predictability of MJO Signals in Infrared Brightness Temperature Data, *4th Workshop on Understanding Climate Change through Data*, National Center for Atmospheric Research (NCAR), Boulder, Colorado, July 1, 2014

27. Extracting Spatiotemporal Patterns with Dynamics-Adapted Kernels, *Model-Data Integration in Physical Systems*, Isaac Newton Institute, Cambridge, United Kingdom, March 18, 2014

28. Extraction and Predictability of MJO Signals in Infrared Brightness Temperature Data, *Center for Prototype Climate Modeling*, New York University Abu Dhabi, Abu Dhabi, United Arab Emirates, March 6, 2014

29. Capturing Intermittent and Low-Frequency Variability in High-Dimensional Data through Nonlinear Laplacian Spectral Analysis, *2013 International Symposium on Nonlinear Theory and Applications (NOLTA)*, Santa Fe, New Mexico, September 9, 2013

30. Data-Driven Methods for Dynamical Systems: Quantifying Predictability and Extracting Spatiotemporal Patterns, keynote lecture, *Applied Mathematics, Modeling and Computational Science (AMMCS) Conference*, Waterloo, Ontario, August 27, 2013

31. Capturing Intermittent and Low-Frequency Variability in High-Dimensional Data through Nonlinear Laplacian Spectral Analysis, *CMOS/CGU/CWRA Congress*, Saskatoon, Saskatchewan, May 27, 2013

32. Capturing Intermittent and Low-Frequency Variability in High-Dimensional Data through Nonlinear Laplacian Spectral Analysis, *SIAM Conference on Applications of Dynamical Systems*, Snowbird, Utah, May 21, 2013

33. Capturing Intermittent and Low-Frequency Variability in High-Dimensional Data through Nonlinear Laplacian Spectral Analysis, *Stochastic Modeling of the Oceans and Atmosphere*, Institute for Mathematics and its Applications (IMA), Minneapolis, Minnesota, March 12, 2013

34. NLSA Algorithms and Analysis of CLAUS Data, *Kickoff Workshop for ONR MURI Grant "Physics Constrainted Stochastic-Statistical Models for Extended-Range Environmental Prediction"*, Jet Propulsion Laboratory (JPL), Pasadena, California, February 25, 2013

35. Capturing Intermittent and Low-Frequency Variability in High-Dimensional Data through Nonlinear Laplacian Spectral Analysis, *Adaptive Data Analysis and Sparsity*, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, California, January 31, 2013

36. Capturing Intermittent and Low-Frequency Variability in High-Dimensional Data through Nonlinear Laplacian Spectral Analysis, *Joint Mathematics Meetings*, San Diego, California, January 10, 2013

37. Hierarchical Structure of the Madden-Julian Oscillation in Infrared Brightness Temperature Data Revealed through Nonlinear Laplacian Spectral Analysis, *NASA Conference on Intelligent Data Understanding (CIDU) 2012*, Boulder, Colorado, October 25, 2012

38. Quantifying Long-Range Predictability & Model Error via Data Clustering & Information Theory, *AIMS Conference on Dynamical Systems*, Orlando, Florida, July 2, 2012
39. Capturing Intermittent and Low-Frequency Variability in High-Dimensional Data through Nonlinear Laplacian Spectral Analysis, *AIMS Conference on Dynamical Systems*, Orlando, Florida, July 1, 2012
40. Diffractive Imaging through Manifold Symmetries of Scattering, *SIAM Conference on Imaging Science*, Philadelphia, Pennsylvania, May 21, 2012
41. Quantifying Long-Range Predictability and Model Error through Data Clustering and Information Theory, *SIAM Conference on Uncertainty Quantification*, Raleigh, North Carolina, April 5, 2012
42. Comparing Low-Frequency and Intermittent Variability in Comprehensive Climate Models through Nonlinear Laplacian Spectral Analysis, *Workshop on Tropical and Extratropical Interactions in Climate*, Center for Prototype Climate Modeling, New York University Abu Dhabi, Abu Dhabi, United Arab Emirates, March 22, 2012
43. Quantifying the Predictability and Model Error in Regime Forecasts through Data Clustering and Information Theory, *AGU Fall Meeting*, San Francisco, California, December 8, 2011
44. Nonlinear Laplacian Spectral Analysis for Time Series: Capturing Intermittency and Low-Frequency Variability, *International Workshop on Statistical Inverse Modeling of Complex Nonlinear Systems*, Fudan University, Shanghai, China, September 8, 2011
45. Quantifying Predictability and Model Error in Long-Range Climate Forecasting through Information Theory, *International Workshop on Statistical Inverse Modeling of Complex Nonlinear Systems*, Fudan University, Shanghai, China, September 6, 2011
46. Quantifying Predictability and Model Error in Long-Range Climate Forecasting through Information Theory, *Verification, Validation, and Uncertainty Quantification Across Disciplines*, Institute for Computing in Science (ICiS), Park City, Utah, August 9, 2011
47. Long-Range Climate Forecasts Using Data Clustering and Information Theory, *New York Workshop on Computer, Earth, and Space Sciences*, Goddard Institute for Space Studies, New York, New York, February 25, 2011
48. Structure and Dynamics from Manifold Symmetries of Image Formation, *Minisymposium on Computational Methods for Three-Dimensional Microscopy Reconstruction*, The City University of New York, November 8, 2010
49. Identifying and Predicting the Extensional and Meandering Phases of the Jet in a Double-Gyre Ocean Model, *Mathematical Theory and Modeling in Atmosphere-Ocean Science*, Oberwolfach Institute, Germany, August 12, 2010
50. Identifying and Predicting Regimes in a 1.5-Layer Ocean Model, *Data Hierarchies for Simulating and Understanding Climate*, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, California, June 10, 2010
51. Inferring the Orientation of Molecules by Laplacian Eigenfunctions,, *Random Shapes Reunion Conference*, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, California, December 9, 2009
52. Orientation Recovery by Diffusion Map, *Workshop on Single-Particle Diffraction and Imaging*, University of Wisconsin, Milwaukee, January 22, 2009

Conference and Workshop Posters

1. Spatiotemporal Feature Extraction with Data-Driven Koopman Operators, *Neural Information Processing Systems (NIPS) 2015 workshop "Feature Extraction: Modern Questions and Challenges"*, Montreal, Quebec, December 11, 2015

2. Capturing Intermittent and Low-Frequency Variability in High-Dimensional Data through Nonlinear Laplacian Spectral Analysis, *Challenges in Geometry, Analysis and Computation: High Dimensional Synthesis. A Conference in Honor of Ronald R. Coifman, Peter W. Jones and Vladimir Rokhlin*, Yale University, New Haven, Connecticut, June 4–6, 2012

3. Low-Frequency and Intermittent Variability of the North Pacific Revealed through Nonlinear Laplacian Spectral Analysis, *World Climate Research Programme (WCRP) Open Science Conference*, Denver, Colorado, October 27, 2011

4. Quantifying Long-Range Predictability & Model Error via Data Clustering & Information Theory, *World Climate Research Programme (WCRP) Open Science Conference*, Denver, Colorado, October 26, 2011. Received early-career scientist presentation award

5. Time Series Reconstruction via Machine Learning: Revealing Decadal Variability and Intermittency in the North Pacific, *International Workshop on Climate Informatics*, New York Academy of Sciences, August 26, 2011

6. The Symmetries of Image Formation by Scattering, *Gordon Research Conference on Three-Dimensional Electron Microscopy*, Lucca, Italy, June 20–25, 2010

7. Large-wavelength instabilities in free-surface Hartmann flow, *Postdoctoral Research Symposium*, Argonne National Laboratory, September 11–12, 2008

8. Linear stability analysis of incompressible free-surface MHD flows, *Annual APS Division of Plasma Physics Meeting 2006*, Philadelphia, Pennsylvania, October 30–November 3, 2006

9. Linear stability analysis of free-surface MHD flows, *Center for Magnetic Self-Organization General Meeting*, Chicago, Illinois, August 4, 2006

Seminars

1. Department of Physics, University of Wisconsin-Milwaukee, July 27–28, 2017

2. Lamont-Doherty Earth Observatory, May 5, 2017

3. Department of Mathematics, Yale University, April 23, 2017

4. Google Research, April 12, 2017

5. Department of Mathematics, George Mason University, March 24, 2017

6. Department of Mathematics, University of South Florida, March 10, 2017

7. Department of Mechanical Engineering, University of California, Santa Barbara, January 18, 2017

8. Courant Institute of Mathematical Sciences (Applied Mathematics Seminar), New York University, March 4, 2016

9. Department of Mechanical Engineering, Ilmenau University of Technology, September 17, 2015
10. Department of Mechanical Engineering, Massachusetts Institute of Technology, March 5, 2015
11. Department of Applied Physics and Applied Mathematics, Columbia University, October 13, 2014
12. Department of Mathematics, The Pennsylvania State University, October 6, 2014
13. Department of Earth, Atmospheric and Planetary Sciences, Purdue University, November 14, 2013
14. Scientific and Statistical Computing Seminar, University of Chicago, May 30, 2013
15. Pacific Northwest National Laboratory, December 6, 2012
16. Courant Institute of Mathematical Sciences (Graduate Student/ Postdoc Seminar), November 30, 2012
17. School of Marine and Atmospheric Sciences, Stony Brook University, November 14, 2012
18. Department of Applied Physics and Applied Mathematics, Columbia University, October 18, 2012
19. Department of Mathematics, North Carolina State University, March 30, 2012
20. Department of Mathematics, Princeton University, March 28, 2012
21. Department of Mathematics, University of Delaware, April 26, 2011
22. Department of Applied Mathematics, University of Colorado, Boulder, December 14, 2011
23. Courant Institute of Mathematical Sciences (Applied Mathematics Seminar), New York University, November 11, 2011
24. Courant Institute of Mathematical Sciences (Atmosphere Ocean Science Colloquium), New York University, April 13, 2011
25. Department of Physics, University of Wisconsin, Milwaukee, February 11, 2011
26. Department of Mathematics, Freie Universität Berlin, November 4, 2009
27. Department of Mechanical Engineering, University of California, Berkeley, December 1, 2008
28. Princeton Plasma Physics Laboratory, September 22, 2008