Dmitri A. Kondrashov

Department of Atmospheric and Oceanic Sciences
University of California in Los Angeles
405 Hilgard Av., Los Angeles, CA 90095
dkondras@atmos.ucla.edu; (310)-825-1038
http://www.atmos.ucla.edu/tcd/dkondras

Education

1996 Ph.D., Engineering Science and Mechanics, University of Tennessee, Knoxville.
1990 M.S., Applied Math. and Physics, Moscow Institute of Physics and Technology
1988 B.S., Applied Math. and Physics, Moscow Institute of Physics and Technology

Appointments

2013 - present Full Researcher, UCLA.
2009 - 2013 Associate Researcher, UCLA.
2007 - 2009 Assistant Researcher, UCLA.
2005 - 2006 Project Scientist, UCLA.
1999 – 2005 Research Specialist, UCLA.
1996 – 1999 Postdoctoral Researcher, California Institute of Technology

Research Interests

Theory-informed Machine Learning, Data-driven Modeling and Prediction for Earth and Space Sciences, Data Assimilation, Advanced Spectral Methods and Time Series Analysis.

Publications

1. A. Drozdov, **D. Kondrashov**, K. Strounine and Y. Shprits, 2023: Reconstruction of electron radiation belts using data assimilation and machine learning, *Frontiers in Astronomy and Space Sciences*, doi:10.3389/fspas.2023.1072795.

2. **D. Kondrashov**, Drozdov, A., Vech, D., and D. Malaspina, 2022: Prediction of plasmaspheric hiss spectral classes, *Frontiers in Astronomy and Space Sciences*, doi:10.3389/fspas.2022.977801.

3. N. Argawal, **Kondrashov, D.**, Dueben, P., Ryzhov, E.A., and P.S. Berloff, 2021: A comparison of data-driven approaches to build low-dimensional ocean models, *Journal of Advances in Modelling Earth Systems*, doi:10.1029/2021MS002537.

4. N. Argawal, Ryzhov, E.A., **Kondrashov, D.**, and P.S. Berloff, 2021: Correlation-based flow decomposition and statistical analysis of the eddy forcing, *Journal of Fluid Mechanics*, 924, A5, doi:10.1017/jfm.2021.604.

5. **Kondrashov, D.**, Ryzhov, E.A. and P.S. Berloff, 2020: Data-adaptive harmonic analysis of oceanic waves and turbulent flows, *Chaos*, 30, 061105, doi:10.1063/5.0012077.

6. Ryzhov, E.A., **D. Kondrashov**, N. Agarwal, J.C. McWilliams, and P.S. Berloff, 2020: On data-driven induction of the low-frequency variability in a coarse-resolution ocean model, *Ocean Modelling*, 101664, doi:10.1016/j.ocemod.2020.101664.

7. Ryzhov, E.A., **D. Kondrashov**, N. Agarwal, and P.S. Berloff, 2019: On data-driven augmentation of low-resolution ocean model dynamics, *Ocean Modelling*, 142, 101464, doi:10.1016/j.ocemod.2019.101464.

8. **Kondrashov, D.**, M. D. Chekroun, and M. Ghil, 2018: Data-adaptive harmonic decomposition and prediction of Arctic sea ice extent, *Dynamics and Statistics of the Climate System*, 3(1), 1, doi:10.1093/climsys/dzy001.

9. **Kondrashov, D.**, M. D. Chekroun and P. Berloff, 2018: Multiscale Stuart-Landau Emulators: Application to Wind-Driven Ocean Gyres, *Fluids*, 3(1), 21, doi:10.3390/fluids3010021.

10. Ghil, M., A. Groth, **D. Kondrashov**, and A.W. Robertson, 2018: Extratropical sub-seasonal–to–seasonal oscillations and multiple regimes: The dynamical systems view., In A. W. Robertson and F. Vitart (eds): *The Gap between Weather and Climate Forecasting: Sub-Seasonal to Seasonal Prediction.* Elsevier.

11. **Kondrashov, D.**, and M. D. Chekroun, 2018: Data-adaptive harmonic analysis and modeling of solar wind-magnetosphere coupling, *Journal of Atmospheric and Solar-Terrestrial Physics*,177, 179-189, doi:10.1016/j.jastp.2017.12.021.

12. **Kondrashov, D.**, M. D. Chekroun, X. Yuan, and M. Ghil, 2018: Data-adaptive Harmonic Decomposition and Stochastic Modeling of Arctic Sea Ice, for *Advances in Nonlinear Geosciences*, Springer Nature, Ed. A.A. Tsonis, doi:10.1007/978-3-319-58895-7_10.

13. Chekroun, M. D., and **D. Kondrashov**, 2017: Data-adaptive harmonic spectra and multilayer Stuart-Landau models, *Chaos*, 27, 093110: doi:10.1063/1.4989400.

14. Groth, A., Y. Feliks, **D. Kondrashov**, and M. Ghil, 2017: Interannual Variability in the North Atlantic Ocean's Temperature Field and Its Association with the Wind Stress Forcing. *J. Climate*, **30**, 2655–2678, doi:10.1175/JCLI-D-16-0370.1

15. Boers, N., Chekroun, M. D., Liu, H., **Kondrashov**, D., Rousseau, D.-D., Svensson, A., Bigler, M., and Ghil, M., 2017: Inverse stochastic-dynamic models for high-resolution Greenland ice-core records, *Earth Syst. Dynam.*, **8**, 1171-1190, doi:10.5194/esd-8-1171-2017.

16. Greco, G., **D. Kondrashov**, S. Kobayashi, M. Ghil, et al., 2016: Singular Spectrum Analysis for astronomical time series: constructing a parsimonious hypothesis test, *In The Universe of Digital Sky Surveys*, pp. 105-107. Springer International Publishing, doi:10.1007/978-3-319-19330-4_16.

17. **Kondrashov, D.**, M.D. Chekroun, and M. Ghil, 2016: Comment on "Nonparametric forecasting of low-dimensional dynamical systems", *Phys. Rev. E*, **93**, 3036201, doi:10.1103/PhysRevE.93.036201.

18. Merkin, V. G., **D. Kondrashov**, M. Ghil, and B. J. Anderson, 2016: Data assimilation of low-altitude magnetic perturbations into a global magnetosphere model, *Space Weather*, **14**, 165–184, doi:10.1002/2015SW001330.

19. Chen, C., M. Cane, N. Henderson, D. Lee, D. Chapman, **D. Kondrashov**, and M. D. Chekroun, 2016: Diversity, nonlinearity, seasonality and memory effect in ENSO simulation and prediction using empirical model reduction, *J. Climate*, **29**, 1809–1830, doi:10.1175/JCLI-D-15-0372.1

20. **Kondrashov, D.** and P. Berloff, 2015: Stochastic Modeling of Decadal Variability in Ocean Gyres, *Geophys. Res. Lett.*, **42**, 1543–1553, doi:10.1002/2014GL062871.

21. **Kondrashov, D.**, M.D. Chekroun, and M. Ghil, 2015: Data-driven non-Markovian closure models, *Physica D*, **297**, 33–55, doi:10.1016/j.physd.2014.12.005.

22. Mukhin, D., **D. Kondrashov**, E. Loskutov, A. Gavrilov, A. Feigin, and M. Ghil, 2015: Predicting critical transitions in ENSO models, Part II: Spatially dependent models, *J. Climate*, **28(5)**, 1940–1961, doi:10.1175/JCLI-D-14-00240.1.

23. Kellerman, A. C., Y. Y. Shprits, **D. Kondrashov**, D. Subbotin, R. A. Makarevich, E. Donovan, and T. Nagai, 2014: Three-dimensional data assimilation and reanalysis of radiation belt electrons: Observations of a four-zone structure using five spacecraft and the VERB code, *J. Geophys. Res. Space Physics*, **119**, 8764–8783, doi:10.1002/2014JA020171.

24. Podladchikova, T. V., Y. Y. Shprits, and A. C. Kellerman, **D. Kondrashov**, 2014: Noise statistics identification for Kalman filtering of the electron radiation belt observations 2: Filtration and smoothing, *J. Geophys. Res. Space Physics*, **119**, 5725–5743, doi:10.1002/2014JA019898.

25. Podladchikova, T. V., Y. Y. Shprits, **D. Kondrashov**, and A. C. Kellerman, 2014: Noise statistics identification for Kalman filtering of the electron radiation belt observations I: Model errors, *J. Geophys. Res. Space Physics*, **119**, 5700–5724, doi:10.1002/2014JA019897.

26. **Kondrashov, D.**, R. Denton, Y. Y. Shprits, and H. J. Singer, 2014: Reconstruction of gaps in the past history of solar wind parameters, *Geophys. Res. Lett.*, **41**, doi:10.1002/2014GL059741.

27. Chekroun, M. D., D. Neelin, **D. Kondrashov**, J. McWilliams, M. Ghil, 2014: Rough parameter dependence in climate models and the role of Ruelle-Pollicott resonances, *Proc. Nat. Acad. Sciences USA*, **111 (5)**, 1684–1690, doi:10.1073/pnas.1321816111.

28. **Kondrashov, D.**, M. D. Chekroun, A. W. Robertson, and M. Ghil, 2013: Low-order stochastic model and "past-noise forecasting" of the Madden-Julian Oscillation, *Geophys. Res. Lett.*, **40**, doi:10.1002/grl.50991

29. Shprits, Y., A. Kellerman, **D. Kondrashov**, and D. Subbotin, 2013: Application of a new data operator-splitting data assimilation technique to the 3-D VERB diffusion code and CRRES measurements, *Geophys. Res. Lett.*, **40**, doi:10.1002/grl.50969.

30. Kravtsov, S., **D. Kondrashov**, I. Kamenkovich, and M. Ghil, 2011: An empirical stochastic model of sea-surface temperatures and surface winds over the Southern Ocean, *Ocean Science*, **7**, 755–770, doi:10.5194/os-7-755-2011.

31. **Kondrashov, D.**, M. Ghil, and Y. Shprits, 2011: Lognormal Kalman filter for assimilating phase-space density data in the radiation belts, *Space Weather*, **9**, S11006, doi:10.1029/2011SW000726.

32. Chekroun, M. D., **D. Kondrashov** and M. Ghil, 2011: Predicting stochastic systems by noise sampling, and application to the El Nino-Southern Oscillation, *Proc. Nat. Acad. Sci. USA*, **108 (29)**, 11766–11771, doi: 10.1073/pnas.101575

33. Daae, M., Y.Y. Shprits, B. Ni, J. Koller, **D. Kondrashov** and Y. Chen, 2011: Reanalysis of radiation belt electron phase space density using various boundary conditions and loss models, *Advances in Space Research*, doi:10.1016/j.asr.2011.07.001

34. **Kondrashov, D.**, S. Kravtsov and M. Ghil, 2011: Signatures of nonlinear dynamics in an idealized atmospheric model, *J. Atmos. Sci.*, **68**,1–3, doi: 10.1175/2010JAS3524.1

35. **Kondrashov, D.**, Y. Shprits, and M. Ghil, 2010: Gap filling of solar wind data by singular spectrum analysis, *Geophys. Res. Lett.*, **37**, L15101, doi:10.1029/2010GL044138.

36. 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.

37. S. Kravtsov, **D. Kondrashov** and M. Ghil, 2009: Empirical Model Reduction and the Modeling Hierarchy in Climate Dynamics, invited chapter in *Stochastic Physics and Climate Modelling*, (T. Palmer and P. Williams, Eds.) Cambridge Univ. Press, pp. 35–72.

38. B. Ni, Y. Shprits, T. Nagai, R. Thorne, Y. Chen, **D. Kondrashov**, 2009: Radiation Belt Electron Phase Space Density Reanalyses Using Nearly Equatorial CRRES and Polar-orbiting Akebono Satellite Data, *J. Geophys. Res.*, **114**, A05208, doi:10.1029/2008JA013933.

39. **Kondrashov, D.**, C. Sun, and M. Ghil, 2008: Data Assimilation for a Coupled Ocean-Atmosphere Model. Part II: Parameter Estimation, *Mon. Wea. Rev.*, **136**, 5062–5076, doi: 10.1175/2008MWR2544.1.

40. **Kondrashov, D.**, Y. Shprits, R. Thorne and M. Ghil, 2007: A Kalman Filter Technique to Estimate Relativistic Electron Lifetimes in the Outer Radiation Belt, *J. Geophys. Res.*, **112**, A10227, doi:10.1029/2007JA012583.

41. Y. Shprits, **D. Kondrashov**, Y. Chen, R. Thorne, M. Ghil, R. Friedel, and G. Reeves, 2007: Reanalysis of Relativistic Radiation Belt Electron Fluxes using CRRES Satellite Data, a Radial Diffusion Model, and a Kalman Filter, *J. Geophys. Res.*, **112**, A12216, doi:10.1029/2007JA012579.

42. **Kondrashov, D.** and M. Ghil, 2007: T. Schneider's comment on "Spatio-temporal filling of missing points in geophysical data sets" - Reply, *Nonl. Proc. Geophys.*, **14**, 3-4.

43. **Kondrashov, D.**, J. Shen, R. Berk, F. D'Andrea and M. Ghil, 2007: Predicting weather regime transitions in Northern Hemisphere datasets, *Climate Dyn.*, **29(5)**, 535–551.

44. **Kondrashov, D.** and M. Ghil, 2006: Spatio-temporal filling of missing points in geophysical data sets, *Nonl. Proc. Geophys.*, **13**, 151-159.

45. **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.

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

47. 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.

48. **Kondrashov, D.**, Y. Feliks, and M. Ghil, 2005: Oscillatory modes of extended Nile River records (A.D. 622-1922), *Geophys. Res. Lett.*, **32**, L10702, doi:10.1029/2004GL022156.

49. **Kondrashov, D.**, K. Ide, and M. Ghil, 2004: Weather regimes and preferred transition paths in a three-level quasigeostrophic model, *J. Atmos. Sci.* **61**, 568–587.

50. Ghil M., R. M. Allen, M. D. Dettinger, K. Ide, **D. Kondrashov**, M. E. Mann, A. Robertson, A. Saunders, Y. Tian, F. Varadi, and P. Yiou, 2002: Advanced spectral methods for climatic time series, *Rev. Geophys.*,**40(1)**, pp. 3.1–3.41, 10.1029/2000GR000092.

51. Wang J., **D. Kondrashov**, Liewer P. C, et al. 1999: Three-dimensional deformable-grid electromagnetic particle-in-cell for parallel computers, *J. Plasma Phys.*, **61**, 367-389.

52. **Kondrashov, D.**, J. Feynman, P. C Liewer et al., 1999: Three-dimensional magnetohydrodynamic simulations of the interaction of magnetic flux tubes, *Astrophys.J.*, **519**, 884-898.

53. **Kondrashov, D.**, D. Keefer, 1997: Maxwell's equation solver for 3-D MHD calculations, *IEEE Trans. Magn.*, **33**, 254-259.

54. **Kondrashov, D.**, D. Keefer, 1995: Three-dimensional plasma armature railgun simulations, *IEEE Trans. Magn.*, **31**, 634-639.

Synergetic Activities

(i) Maintenance and development of freely available SSA-MTM Toolkit for advanced time series analysis: http://www.atmos.ucla.edu/tcd/ssa/
(ii) Maintenance and development of freely available Matlab software for data-driven stochastic modeling and prediction: http://research.atmos.ucla.edu/tcd//dkondras/Software.html
(iii) Contributing to a plume of El Niño/Southern Oscillation (ENSO) forecasts compiled monthly by the International Research Institute for Climate Prediction,
http://iri.columbia.edu/climate/ENSO/currentinfo/modelviews.html
(iv) Contributing to Sea Ice Outlook summertime forecasts of Arctic Sea Ice Extent,
https://www.arcus.org/sipn/sea-ice-outlook

(v) Co-convener of several sessions at international geosciences conferences in 2017-2023 (Joint Japan Geoscience Union and American Geophysical Union meeting, European Geosciences Union meeting, Asia Oceanic Geosciences meeting), to promote emerging topics such as "Data-driven analysis, modeling and prediction in geosciences," "New model and data-based approaches to study climate behavior," and "Data-driven Modeling in Geosciences."

Projects (PI or co-PI)

ONR-MURI: "Extended-Range Prediction with Low-Dimensional, Stochastic-Dynamic Models: A Data-driven Approach";
NSF: "Collaborative Research: GEM–Towards Developing Physics-informed Subgrid Models for Geospace MagnetoHydroDynamics (MHD) Simulations", "EAGER: Machine Learning and Data Assimilation for Discovery of Generalized Fokker-Planck Equation for Radiation Belt Modeling", "NSFGEO-NERC: Multiscale Stochastic Modeling and Analysis of the Ocean Circulation", 'Collaborative Research: EaSM 2: Stochastic Simulation and Decadal Prediction of Large-Scale Climate", "EAGER Direct Assimilation of Low-altitude Magnetic Perturbations in a Global Magnetosphere Model", "Robust Climate Projections, Stochastic Models and GCM-EaSM Optimization", "Gap Filling of Solar Wind Data By Singular Spectrum Analysis";
DOE: "Regional climate-change projections through next-generation empirical and dynamical models",

"Robust climate projections and stochastic stability of dynamical systems", "Decadal Prediction and Stochastic Simulation of Hydroclimate Over Monsoonal Asia";
NASA: "Ocean–Atmosphere Interaction over the Southern Ocean: Satellite Data and Stochastic Models", "Estimating Earth's Climate by Assimilating Satellite Observations of the Ocean and Atmosphere with a Coupled Earth System Model", "Quantifying Losses and Sources of Relativistic Electrons using Kalman Filtering";
UCLA–LANL: "Radiation Belts Reanalysis";
CRDF: "Dynamical and Statistical Study of Critical Transitions in Climate Systems".