

# Jeffrey J. Early

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## Professional Preparation

University of Puget Sound	B.S., Mathematics and Physics	May 2002
University of Oregon	M.S., Physics	May 2004
Oregon State University	Ph.D., Physical Oceanography	Oct. 2009
NorthWest Research Associates	Postdoctoral Researcher	Jan. 2011–May 2012
NorthWest Research Associates	Research Scientist	Jun. 2012–Dec. 2019
NorthWest Research Associates	Senior Research Scientist	Jan. 2020–present

## Scientific, Technical, and Management Performance

My research interests can be broadly characterized as using statistical and mathematical approaches to understanding dynamical processes ranging from submesoscale stirring by internal waves to mesoscale eddies and geostrophic turbulence. I specialize in the formulation and numerical implementation of process models, most of which are publicly available at [jeffreyearly.com](http://jeffreyearly.com). I have been principal investigator on research grants funded through the Office of Navy Research (ONR), the National Science Foundation (NSF), and the National Aeronautics and Space Administration (NASA).

## Relevant Publications

1. Klenz, T., H. Simmons, L. Centurioni, J. Lilly, J. Early, and V. Hormann (2022). Estimates of Near-Inertial Wind Power Input Using Novel In Situ Wind Measurements from Minimet Surface Drifters in the Iceland Basin. *Journal of Physical Oceanography*. <https://doi.org/10.1175/JPO-D-21-0283.1>.
2. Early, J., M. P. Lelong, and M. A. Sundermeyer (2021). A generalized wave-vortex decomposition for rotating Boussinesq flows with arbitrary stratification. *Journal of Fluid Mechanics*. <https://doi.org/10.1017/jfm.2020.995>.
3. Ocroft, S., A. Sykulski, and J. Early (2021). Separating Mesoscale and Submesoscale Flows from Clustered Drifter Trajectories. *Fluids*. <https://doi.org/10.3390/fluids6010014>
4. Early, J., M. P. Lelong, and K. S. Smith (2020). Fast and Accurate Computation of Vertical Modes. *Journal of Advances in Modeling Earth Systems*. <https://doi.org/10.1029/2019MS001939>.
5. Early, J. and A. Sykulski (2020). Smoothing and Interpolating Noisy GPS Data with Smoothing Splines. *Journal of Atmospheric and Oceanic Technology*. <https://doi.org/10.1175/JTECH-D-19-0087.1>.
6. Sykulski, A., S. Olhede, A. Guillaumin, J. M. Lilly and J. Early (2019). The De-Biased Whittle Likelihood. *Biometrika*, **106** (2): 251–266. <https://doi.org/10.1093/biomet/asy071>.
7. Lilly, J. M., A. M. Sykulski, J. J. Early, and S. C. Olhede (2017). Fractional Brownian motion, the Matérn process, and stochastic modeling of turbulent dispersion. *Nonlinear Processes in Geophysics*, **24**: 481–514. <https://doi.org/10.5194/npg-24-481-2017>.
8. Guillaumin, A., A. M. Sykulski, S. C. Olhede, J. J. Early, and J. M. Lilly (2017).

- Analysis of nonstationary modulated time series with applications to oceanographic surface flow measurements. *Journal of Time Series Analysis*, **38** (5): 668–710. <https://doi.org/10.1111/jtsa.12244>.
9. Sykulski, A., S. Olhede, J. M. Lilly and J. Early (2017). Frequency-domain stochastic modeling of stationary bivariate or complex-valued signals. *IEEE Transactions on Signal Processing*, **65** (12):3136-3151. <https://doi.org/10.1109/TSP.2017.2686334>
  10. Lelong, M., Early, J. J., Kunze, E., Sundermeyer, M. A, and Wortham, C. J. (2016). Lateral stirring in the ocean on scales of 0.1-10 km: The role of internal waves. *International Symposium on Stratified Flows*, 1(1).
  11. Elipot, S., R. Lumpkin, R. C. Perez, J. M. Lilly, J. J. Early, and A. M. Sykulski (2016). A global surface drifter data set at hourly resolution. *Journal of Geophysical Research: Oceans*, **121**: 1–30. <https://doi.org/10.1002/2016JC011716>
  12. T. Bartlett, A. Sykulski, S. Olhede, J. M. Lilly, J. Early (2015). A power variance test for nonstationarity in complex-valued signals. Refereed conference proceedings paper. *Proceedings of the 14th International Conference on Machine Learning and Applications*. <https://doi.org/10.1109/ICMLA.2015.122>
  13. Shcherbina, et al. (2015). The LatMix summer campaign: submesoscale stirring in the upper ocean. *Bulletin of the American Meteorological Society*. <https://doi.org/10.1175/BAMS-D-14-00015.1>
  14. Early, J. (2012). The forces of inertial oscillations. *Quarterly Journal of the Royal Meteorological Society* **138**: 1914-1922. <https://doi.org/10.1002/qj.1917>
  15. Early, J., R. M. Samelson and D. Chelton (2011). The evolution and propagation of quasigeostrophic ocean eddies. *Journal of Physical Oceanography* **41**: 1535-1555. <https://doi.org/10.1175/2011JP04601.1>
  16. Chelton, D. B., Gaube, P., Schlax, M., Early, J. J., and Samelson, R. M. (2011). The influence of nonlinear mesoscale eddies on oceanic chlorophyll. *Science* **334**: 328-332. <https://doi.org/10.1126/science.1208897>
  17. Early, J., J. Pohjanpelto, R. Samelson (2010). Group foliation in geophysical fluid dynamics. *Discrete and Continuous Dynamical Systems, Series A* **27** (4): 1571-1586. <https://doi.org/10.3934/dcds.2010.27.1571>