Lewis J. Gramer

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Citizenship: USA

Education

Postdoctoral Fellow, 2013–2015 University of South Florida FIO Layton, FL

Postdoctoral Research Fellow: Supervisor Dr. Nancy Thompson, Director of Florida Keys Marine Laboratory. Physical oceanography of coral reefs and other shallow-water marine ecosystems; analyzing big data on physical environments on the continental shelf to improve understanding of relative ecosystem resilience and restoration potential; research on impacts of oceanographic and meteorological variability on reefs and reef fisheries.

Ph.D. Phys. Oceanography, 2013 University of Miami RSMAS Miami, FL

Dissertation (PhD): *Dynamics of Sea Temperature Variability on Florida's Reef Tract*, published August, 2013. Advisor: Prof. A. J. Mariano. Coursework: Physical oceanography, statistical data analysis, large-scale ocean circulation, coastal ocean circulation, geophysical fluid dynamics (I and II), atmospheric science, computational fluid dynamics, air-sea interaction, remote sensing of the ocean, ocean biogeochemistry, research ethics.

S.B. Mathematics, 1990 Mass. Institute of Technology Cambridge, MA

Minor in English Literature, with significant cross-enrollment coursework at Harvard University.

Mathematics coursework: multivariate calculus, ODEs & PDEs, linear algebra, probability & statistics, group and field theory; algebraic topology, real & complex analysis, differential geometry, mathematical logic.

Computer science coursework: software design, numerical computing methods, digital systems design; real-time systems and control, operations research (LPs, IPs, quadratic programming problems, simulations, heuristic solutions), Artificial Intelligence and Expert Systems, Parallel Processing and Data Flow Architectures.

Science coursework: Organic chemistry, mechanics, electromagnetism, vibrations & waves, astronomy.

Valedictorian, 1983 South Dade Senior High Homestead, FL

1982 - 1983 Community Science part-time research assistant on Positron Emission Tomography project, Univ. of Miami and Mt. Sinai Hospital – mathematics of image analysis (convolution, Laplacians), and data analysis. Awarded American Heart Association summer research grant for this project, Summer 1983.

Mathematics courses at University of Miami: differential equations and (500 level) topology, Spring 1983. Summer Science Program scholar, University of Florida, Computer Science Dept., Summer 1982.

Professional Experience

May 2005 – Present University of Miami CIMAS Miami, FL

Associate Scientist: Working for Dr. S. G. Gopalakrishnan, NOAA AOML. Researching physical oceanography of tropical cyclone (TC) forecast modeling. Team development and real-time test of HAFS coupled HYCOM configuration; analysis and validation of forecast atmosphere, ocean, and air-sea forecasts vs. Hurricane Field Program observations. Assist transition to Readiness Level 8 (near-operational) for HWRF-B Basin Scale coupled TC model with ensemble KF atmospheric data assimilation. Apply statistical and artificial intelligence/machine learning (AI/ML) tools in python, to analyze observations and model outputs with the goal of providing "guidance on guidance". Additional collaboration: very high-resolution modeling of coastal ocean circulation for reef connectivity and coral disease transmission in the Florida reef tract. 2006-2019 for Dr. J. C. Hendee. Researched physical oceanography of coastal and near-surface marine environments. Applied ML/AI tools to analyze dynamical and other physical observations on the shelf and surface ocean. 2005-2006 for Dr. M. Baringer: Created high-res. isopycnal smoothed ocean climatologies, parallelized jobs to apply climatologies to observational data (XBT, CTD) for annual NOAA State of the Climate Reports.

Professional Experience, continued

Aug 2002 - Nov 2004 ***Upstream Technologies LLC*** ***Boston, MA***
Upstream's *IMS* product provided massively scaled portfolio (quadratic) optimization using COM+, MSMQ/Application Center, and SQLServer, via a user interface based on ASP, XSLT, CSS and Jscript.
VP, Client Technical Services and Integration: Responsible for integrating client portfolio management and equity/fixed-income trading systems with Upstream *IMS* product, using XML/XSL, COM+ and Windows Services. Gathered client needs, developed client apps in MATLAB, C#, VB for Windows Services + COM+.

Jun 1996 - Aug 2002 ***State Street Bank*** ***Boston, MA***
1998 - 2002 Equity Trading technologist - integration and support specialist for new clients; gathered client requirements for and implemented proprietary electronic trading systems, in C++ and Java with Oracle, and VBA with ADO; executed program trades for large institutional clients. **Instructor and student supervisor** in trading technology transfer to State Street's new Technology Center, Zhe Jiang Univ., Hang Zhou, China (PRC).
1996 - 1998 Principal Software Engineer - designed, implemented and deployed new features of Lattice institutional electronic trading system using C++ and J2EE on Digital Unix and Solaris, with Oracle. Projects included integrating Lattice with multiple US ECNs, London Stock Exchange SETS system.

Feb 1992 - Jun 1996 ***CS First Boston Corp.*** ***Boston, MA***
Principal Software Engineer, developing in C++ and FORTRAN for UNIX and VMS, using Oracle and RDB. Integrated proprietary electronic *Lattice Trading System* with NYSE SuperDOT and NASDAQ electronic exchange systems, and Order Management System integrations and proprietary trading solutions.

1990 - 1992 ***People Tech Inc.*** ***Cambridge, MA***
VP of Technology. Managed a small team developing a multimedia application for the business market, using C++ with MFC on Windows, and MASM for SoundBlaster card and memory map interface.

Fall 1990 ***CS First Boston Corp.*** ***New York, NY***
Contract position, developing equity options pricing software in Objective-C for the NeXT OS.

1988 - 1990 ***Lotus Development Corp.*** ***Cambridge, MA***
Senior Software Engineer, in Lotus CD Information Services Division, and on Lotus 1-2-3 Version 3.0.

1988 ***Nomura Securities - America*** ***New York, NY***
Contract position, implementing fixed income pricing algorithms in FORTRAN for VMS.

1986 ***IBM*** ***Boca Raton, FL***
Contract position, developing stress- and unit-testing applications in C and MASM, for Virtual IO, Graphic Programming and Threading interfaces to new OS/2 1.0 operating system, at IBM Boca campus.

Publications

Gramer, L.J., et al., in prep: Slope moderates reef temperatures.
Gramer, L.J., et al., in prep: Seawater residence times at Cheeca Rocks patch reef in the upper Florida Keys.
Gramer, L.J., J.E. Hendee, M. Soden, in revision: Operational ecological forecasting for coral reefs using artificial intelligence and integrated near real-time environmental data. *Bulletin of Marine Science*.
Dobbelaere, T., D. M. Holstein, E. M. Muller, L. J. Gramer, L. McEachron, S. D. Williams, and E. Hanert, 2022: Connecting the Dots: Transmission of Stony Coral Tissue Loss Disease from the Marquesas to the Dry Tortugas. *Frontiers in Marine Science*, **9,** 9.
Gramer, L. J., J. A. Zhang, G. Alaka, A. Hazelton, and S. Gopalakrishnan, 2022: Coastal downwelling intensifies landfalling hurricanes. *Geophysical Research Letters***,** e2021GL096630.

Publications, continued

Gopalakrishnan, S., and Coauthors, cited 2021: 2020 HFIP R&D Activities Summary: Recent Results and Operational Implementation. https://hfip.org/sites/default/files/documents/hfip-annual-report-2020-final_0.pdf.

Hazelton, A., K. Gao, M. Bender, L. Cowan, G.J. Alaka, A. Kaltenbaugh, L. Gramer, X. Zhang, L. Harris, T. Marchok, M. Morin, A. Mehra, Z. Zhang, B. Liu, F. Marks, and Coauthors, 2022: Performance of 2020 Real-Time Atlantic Hurricane Forecasts from High-Resolution Global-Nested Hurricane Models: HAFS-globalnest and GFDL T-SHiELD. *Weather and Forecasting*, **37,** 143-161.

Dobbelaere, T., E.M. Muller, L.J. Gramer, D.M. Holstein, E. Hanert, 2020: Coupled Epidemio-Hydrodynamic Modeling to Understand the Spread of a Deadly Coral Disease in Florida. *Frontiers in Marine Science*.

Alaka, G.K., D. Sheinin, B. Thomas, L. Gramer, Z. Zhang, B. Liu, H.S. Kim, A. Mehra, 2020: A hydrodynamical atmosphere/ocean coupled modeling system for multiple tropical cyclones. *MDPI Atmosphere*.

Hendee, J.E., N. Amornthammarong, L.J. Gramer, A. Gomez, 2019: A novel low-cost, high-precision sea temperature sensor for coral reef monitoring. *Bulletin of Marine Science*.

Johns, E.M., R. Lumpkin, N.F. Putman, R.H. Smith, F.E. Muller-Karger, D. Rueda-Roa, M.T. Brooks, C. Hu, M. Wang, L.J. Gramer, F.E. Werner, 2019: The establishment of a *Sargassum* population in the tropical Atlantic: biological consequences of a basin-scale long distance dispersal event. *Progress in Oceanography*.

Obura, D.O, et al., 2019: Coral reef monitoring, reef assessment technologies, and ecosystem-based management. *Frontiers in Marine Science – Ocean Observation*.

Rosales, S.R., C. Sinigalliano, M. Gidley, P. Jones, L.J. Gramer, 2019: Oceanographic habitat and the microbiomes of urban-adjacent corals, *PeerJ*.

Gramer, L.J. and J.C. Hendee, 2018: Coastal turbidity on the Southeast Florida Shelf: Monitoring turbid water sources and fates by satellite. NOAA Technical Memorandum, OAR-AOML-105, doi.10.25923/zqv9-nw98.

Putman, N.F., G.J. Goni, L. J. Gramer, C. Hu, E.M. Johns, J. Trinanes, M. Wang, 2018: Simulating transport pathways of pelagic *Sargassum* from the Equatorial Atlantic into the Caribbean Sea. *Progress in Oceanography* **165**: 205-214. doi:https://doi-org.access.library.miami.edu/10.1016/j.pocean.2018.06.009.

Hendee, J.C., J. Halas, P.J. Fletcher, M. Jankulak, L.J. Gramer, 2016: Expansion of the Coral Reef Early Warning System (CREWS) Network throughout the Caribbean. In: *Proceedings of 13th International Coral Reef Symposium*, June, 2016, Honolulu, Hawai'i.

Maynard, J., B. Parker, R. Beeden, J. Tamelander, P. McGowan, L. Gramer, S. Heron, M. Kendall, S. C. McKagan, E. McLeod, K. Oleson, S. Pittman, 2015: Coral reef resilience research and management: Past, present and future. Workshop Report, NOAA Coral Reef Conservation Program, 44 pp.

Gramer, L. J., 2013: Dynamics of Sea Temperature Variability on Florida's Reef Tract. University of Miami, Ph.D. Dissertation.

Gramer, L.J., A.J. Mariano, J.C. Hendee, 2012: Heat budget for Florida reefs: Reef-scale thermal stress via satellite. In: Yellowlees, D., T.P. Hughes (eds.), *Proceedings of 12th International Coral Reef Symposium*, July, 2012, Cairns, Australia, ICRS2012_4A_2.

Hendee, J.C., L.J. Gramer, S.F. Heron, M. Jankulak, N. Amornthammarong, M. Shoemaker, T. Burgess, J. Fajans, S. Bainbridge, W. Skirving, 2012: Wireless architectures for coral reef environmental monitoring. In: Yellowlees, D., T.P. Hughes (eds.), *Proceedings of 12th International Coral Reef Symposium*, July 9 - 13, 2012, Cairns, Australia, ICRS2012_5B_1.

Lirman, D., S. Schopmeyer, D. Manzello, L.J. Gramer, W.F. Precht, et al., 2011: Severe 2010 Cold-Water Event Caused Unprecedented Mortality to Corals of the Florida Reef Tract and Reversed Previous Survivorship Patterns. *PLOS One* **6**: 10.

Brainard, R.E., S. Bainbridge, R. Brinkman, C.M. Eakin, M. Field, J.-P. Gattuso, D. Gledhill, L. Gramer, A. Green, J. Hendee, R.K. Hoeke, S.J. Holbrook, O. Hoegh-Guldberg, M. Lammers, D. Manzello, M. McManus, R. Moffitt, M. Monaco, J.A. Morgan, D. Obura, S. Planes, R.J. Schmitt, C. Steinberg, H. Sweatman, O.J. Vetter, C. Wilkinson, K.B. Wong, 2010: An international network of coral reef ecosystem observing systems (I-CREOS). In Hall, J., D.E. Harrison, and D. Stammer, eds., *OceanObs'09: Sustained Ocean Observations and Information for Society*, Vol. 2. European Space Agency Publication, WPP-306.

DiNezio, P. N., L. J. Gramer, W. E. Johns, C. S. Meinen, M. O. Baringer, 2009: Observed Interannual Variability of the Florida Current: Wind Forcing and the North Atlantic Oscillation. *Journal of Physical*

Oceanography, **39**(3), 721-736.

Publications, continued

Gentemann, C.L., P. J. Minnett, J. Sienkiewicz, M. DeMaria, J. Cummings, Y. Jin, J. D. Doyle, L. Gramer, C. N. Barron, K. Casey, and C. Donlon, 2009: The Multi-sensor Improved Sea Surface Temperature (MISST) project. *Oceanography*, **22**(2), 76-87.

Gramer, L. J., E. M. Johns, J. C. Hendee, and C. M. Hu, 2009: Characterization of biologically significant hydrodynamic anomalies on the Florida Reef Tract. In Dodge, R., ed., *Proceedings of the 11th International Coral Reef Symposium*, July 7 - 11, 2008, Fort Lauderdale, Florida, 470-474.

Hendee, J., L. Gramer, D. Manzello, and M. Jankulak, 2009: Ecological forecasting for coral reef ecosystems. In Dodge, R., ed., *Proceedings of the 11th International Coral Reef Symposium*, July 7 - 11, 2008, Fort Lauderdale, Florida, 534-538.

Hu, C. M., F. Muller-Karger, B. Murch, D. Myhre, J. Taylor, R. Luerssen, C. Moses, C. Y. Zhang, L. Gramer, and J. Hendee, 2009: Building an automated integrated observing system to detect sea surface temperature anomaly events in the Florida Keys. *IEEE Transactions on Geoscience and Remote Sensing*, **47**(7), 2071-2084.

Hendee, J. C., L. J. Gramer, J. A. Kleypas, D. Manzello, M. Jankulak, and C. Langdon, 2007: The Integrated Coral Observing Network: Sensor solutions for sensitive sites. *Proceedings of the 3rd International Conference, Intelligent Sensors, Sensor Networks, and Information Processing*, Melbourne, Australia, 2007, 669-673.

Hendee, J., L. Gramer, D. Manzello, and M. Jankulak, 2007: Integrating near real-time data for coral reef ecological forecasting. *Proceedings of the Gulf and Caribbean Fisheries Institute (2006)*, **59**: 525-528.

Brown, P., and others, 1998: Global Ground-Based Electro-Optical and Radar Observations of the 1999 Leonid Shower: First Results. *Earth, Moon, and Planets*, **82/83**, 167-190.

Presentations (excluding those appearing in peer-reviewed proceedings)

Gramer, L.J., H.-S. Kim, M. Aristizabal, J. Steffen (2022), Ocean Coupling in Tropical Cyclone Intensity Forecasting: A Case Study with HAFS-A. AMS 35th Conference on Hurricanes and Tropical Meteorology, May 2022: https://ams.confex.com/ams/35Hurricanes/meetingapp.cgi/Paper/401874

Gramer, L.J., J. Zhang, G. Alaka, A. Hazelton, G. Sundararaman (2021), Exploring the dynamics of how coastal downwelling can lead to landfalling hurricane intensification. AGU Fall Meeting, New Orleans, LA, USA, December 2021, doi 10.1002/essoar.10509567.1.

Gramer, L.J., S. Rosales, C. Sinigalliano, N. Putman, M. Gidley, P. Jones, E. Hanert (2018), Where to Restore: Oceanography, Coral Reef Microbiomes, and Coral Health under Natural and Human Influences. *REEF FUTURES 2018*, Key Largo, Florida, USA, December 2018.

Gramer, L.J., S. Rosales, C. Sinigalliano, N. Putman, M. Gidley, P. Jones, B. van Dine, C. Staley, J. Lopez (2018), Physical habitat as a driver of microbiome structure on urban-impacted coral reefs. *Association for the Sciences of Limnology and Oceanography – Summer Meeting*, Victoria, Canada, June 2018.

Gramer, L.J., N. Putman, S. Rosales, X. Serrano, J.C. Hendee, C. Sinigalliano, M. Gidley, C. Staley, Chun, Sadowsky, Lopez, M. Miller (2017), Drivers of Reef Biome Structure: Next-Generation Sequencing, Gene Flow, and Physical Habitat. *European Coral Reef Symposium*, Oxford, U.K., December. 2017.

Gramer, L.J., J.C. Hendee, N.B. Thompson, and P.J. Fletcher (2016), Better living through physics: Mapping reef resilience with site-specific ecological forecasts. *International Coral Reef Symposium*, Hawaii, June. 2016.

Gramer, L.J., A.J. Mariano, J.C. Hendee, and N.B. Thompson (2014), Dynamics of Sea Temperature Variability on Florida's Reef Tract. *Ocean Sciences Meeting*, Hawaii, Feb. 2014.

Gramer, L. J., C. L. Gentemann, D. Fenner, O. Vetter, and J. C. Hendee (2010), *In situ* and remote monitoring for conditions conducive to coral bleaching in American Samoa. *AGU/ASLO/TOS 15th Ocean Sciences Meeting*, Portland, OR USA, 22-26 February 2010.

Gramer, L. J., A. Mariano, J. C. Hendee, J. Fajans (2010), Ocean Heat Budget for the Florida Reef Tract: Methods, Climatology, and the Thermal Siphon. *Linking Science to Management: Conference and Workshop on the Florida Keys Marine Ecosystem*, Duck Key, FL USA, 19-22 October 2010.

Gramer, L. J., D. P. Manzello, J. Fajans, J. C. Hendee (2010), Climatological Significance of Sea Temperature Extremes on the Florida Reef Tract in 2010. *Linking Science to Management: Conference and Workshop on the Florida Keys Marine Ecosystem*, Duck Key, FL USA, 19-22 October 2010.

Presentations, continued

Gramer, L. J., C. L. Gentemann, D. Fenner, O. Vetter, J. C. Hendee (2010), *In situ* and remote monitoring for conditions conducive to coral bleaching in American Samoa. *AGU/ASLO/TOS 2010 Ocean Sciences Meeting*, Portland, OR, USA, February 2010.

Gramer, L. J., J. C. Hendee, C. Hu, D. Fenner (2009), Integrating SST and other Data for Ecological Forecasts on Coral Reefs. *Group for High-Resolution SST –International Users Symposium*, Santa Rosa, CA, USA, 2009.

Gramer, L. J., J. C. Hendee, M. Shoemaker, M. Jankulak, D. Manzello, C. Langdon (2008), A Near Real-Time Marine Environmental Monitoring Network for the Caribbean: NOAA's Integrated Coral Observing Network (ICON). *AGU/ASLO/TOS 14th Ocean Sciences Meeting*, Orlando, FL, USA, March 2008.

Support

NOAA Hurricane Forecast Improvement Project (HFIP). For FY 2019-2022. PI: Gopalakrishnan, G. P.
Hurricane Supplemental (SUP). For FY 2021-2023. PI: Hazelton, A.

Skills

Languages: Functional in German (6 yrs). Four years (2001-2005) tutoring Mandarin Chinese (普通话). Irish.
Computer Languages: C++, C, FORTRAN, MPI, Python (xarray, MetPy, scikit-learn, cartopy, matplotlib), MATLAB, R, Java, VB, Objective-C, Perl, csh/bash, SQL.
Sys Admin skills: 7+ years Linux (RHEL, CentOS, SL), MySQL, Apache, mailman. 8+ years UNIX (Alpha, SunOS/Solaris, AIX), Oracle (7 to 9i); 10+ years with Windows (NT – 10), SQLServer, COM+, .NET.

Service and Teaching

Mentor of a Little Brother since 2006 through Big Brothers and Big Sisters of Greater Miami.
Teacher, NAMI Family-to-Family 12-week course, Miami, FL, 2013-present. State trainer, 2016-present.
Co-moderator, 2006-2019: *Coral-List*. Co-webmaster: http://coral.noaa.gov, http://ecoforecast.coral.noaa.gov.
Instructor: The technology of asset management and institutional equity trading, State Street Joint Technology Center, Zhe Jiang Univ., Hang Zhou, China (PRC), 2002.
T.A.: C++ Programming, Object-Oriented Analysis and Design. Harvard Extension/Summer Schools, 1989-1990.