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RELEVANT EXPERIENCE

I have extensive experience in the analysis and application of satellite and airborne observations, in-situ data, and model simulations to study synoptic to decadal changes in the marine environment, with specific focus on biophysical interactions, ecosystem dynamics, and carbon fluxes. My current research ranges in scale from the open ocean, investigating the influence of submesoscale ocean dynamics on upper ocean biology, to coastal and inland waters, assessing variability in water quality and the current condition of coral reefs.

EDUCATION

Ph.D., Marine Science, University of South Carolina, 2009

M.S., Meteorology, Florida State University, 2006

B.S., Meteorology, Florida State University, 2004

PROFESSIONAL EXPERIENCE

Scientist, Earth Science Section, JPL, 2011 – present

- Co-Lead, NASA Surface Biology and Geology Pathfinder study, 2020 – present
- Project Manager, NASA EVS-2 COral Reef Airborne Laboratory (CORAL) mission, 2018 – 2019
- Project Scientist, NASA EVS-2 COral Reef Airborne Laboratory (CORAL) mission, 2015 – 2019
- Project Scientist, NASA Physical Oceanography Data Center (PO.DAAC), 2011 – 2021

Postdoctoral Associate, Applied Marine Physics, RSMAS, University of Miami, 2009 – 2011

CURRENT FUNDED PROJECTS

PI NASA Carbon Cycle Science, *A Land to Sea Paradigm: Impact of Spatially and Temporally Varying Nutrient and Freshwater Fluxes on Coastal Carbon Dynamics in the northern Gulf of Mexico*

PI NASA Ocean Biology and Biogeochemistry, *Impact of Spatially and Temporally Varying Thermal Stress on Reef Functional Diversity*

PI JPL Strategic Research & Technology Development, *An Architecture for Science and Applications Needs at the Coastal Interface – The Fulcrum of Lateral Exchanges between Land and Sea*

PI JPL Strategic University Research Partnership with University of California, Los Angeles, *Automated Mapping of Kelp Forest Productivity for Carbon Storage Estimation*

Co-I NASA Interdisciplinary Research in Earth Science, *Impacts of Changing Sea Ice Regimes on Arctic Ocean Biology*

Co-I NASA Earth Venture Suborbital-3, *S-MODE: Sub-Mesoscale Ocean Dynamics Experiment*

PAST FUNDED PROJECTS

PI JPL Strategic University Research Partnership with Carnegie Mellon University, *Automated mapping and planning to improve assessment of coral reef health*

PI NASA Rapid Response, *Rapid Response to the ORCAS Campaign*

PI NASA Ocean Biology and Biogeochemistry, *Variation in phytoplankton composition associated with ENSO diversity in the Equatorial Pacific Ocean*

PI NASA New (Early Career) Investigator Program in Earth Science, *Impact of ENSO diversity on biophysical processes in the Tropical and North Pacific Ocean*

PI NASA South Carolina Space Grant Consortium Graduate Student Research Program Fellowship, *Hurricane contribution to air-sea fluxes of CO₂*

- Co-I** NASA Sustaining Living Systems in a Time of Climate Variability and Change, *Identifying coral refugia from observationally weighted climate model ensembles*
- Co-I** NASA Science Team for the OCO Missions, *Observing and validating carbon-climate feedbacks with OCO-2*
- Co-I** NASA Applied Sciences – Water Resources, *Maximizing utility of remote sensing data for water quality monitoring and resources management in California’s water systems*
- Co-I** NASA Biodiversity, *Scoping study for biodiversity airborne campaigns*
- Co-I** NASA Earth Venture Suborbital-2, *CORAL: COral Reef Airborne Laboratory (Project Scientist)*
- Co-I** NASA OCO-2 Science Team, *Operations and data products for carbon-climate feedbacks using OCO-2*
- Co-I** NASA Physical Oceanography, *Seasonal evolution of the coastal thermal front and small eddies in the Great Lakes as characterized by satellite SST and SAR imagery and numerical modeling*
- Co-I** JPL SRTD, *Under Ice-Shelf Ocean Exploration*
- Co-I** JPL SRTD, *Adaptive AUV In-Situ Sensing and Analysis System*

AWARDS

- NASA Group Achievement Award, CORAL Mission Team, 2020
- NASA Exceptional Public Achievement Medal, 2018
- Florida State University Reubin O’D. Askew Young Alumni Award, 2016
- Florida State University Notable Noles, 2016
- JPL Lew Allen Award for Excellence, 2015
- NASA Early Career Achievement Medal, 2013
- Dean's Award for Excellence in Graduate Study, 2009

REFEREED PUBLICATIONS

1. Raiho, A., K. Cawse-Nicholson, A. Chlus, J. Dozier, **M.M. Gierach**, K. Miner, S. Serbin, D. Schimel, F. Schneider, A. Shiklomanov, S. Skiles, D. Thompson, P. Townsend, S.-K. Zareh, and B. Poulter, 2022: Exploring mission design for imaging spectroscopy retrievals for land and aquatic ecosystems, *Journal of Geophysical Research Biogeosciences*, submitted.
2. Kalmus, P., A. Ekanayaka, E. Kang, M. Baird, and **M.M. Gierach**, 2022: Past the precipice? Projected coral habitability under global heating, *Earth’s Future*, doi:10.1029/2021EF002608.
3. Carroll, D., D. Menemenlis, S. Dutkiewicz, J. Lauderdale, J.F. Adkins, K.W. Bowman, H. Brix, I. Fenty, **M.M. Gierach**, et al., 2022: Attribution of space-time variability in global-ocean dissolved inorganic carbon, *Global Biogeochemical Cycles*, doi:10.1029/2021GB007162.
4. Hochberg, E.J., and **M.M. Gierach**, 2021: Missing the reef for the corals: Unexpected trends between coral reef condition and the environment at the ecosystem scale, *Frontiers in Marine Science*, 8, doi:10.3389/fmars.2021.727038.
5. Candela, A., K. Edelson, **M.M. Gierach**, D.R. Thompson, G. Woodward, and D. Wettergreen, 2021: Using remote sensing and in situ measurements for efficient mapping and optimal sampling of coral reefs, *Frontiers in Marine Science*, 8, doi:10.3389/fmars.2021.689489.
6. Harringmeyer, J.P., K. Kaiser, D.R. Thompson, **M.M. Gierach**, C.L. Cash, and C.G. Fichot, 2021: Detection and sourcing of CDOM in urban coastal waters with UV-visible imaging spectroscopy, *Frontiers in Environmental Science*, doi:10.3389/fenvs.2021.647966.
7. Hausman, J., D. Moroni, M. Gangl, V. Zlotnicki, J. Vazquez-Cuervo, E.M. Armstrong, C. Oaida, **M.M. Gierach**, C. Finch, C. Schroeder, 2021: The evolution of the PO.DAAC: Seasat to SWOT, *Advances in Space Research*, 68, doi:10.1016/j.asr.2019.11.030.
8. Cawse-Nicholson, K., et al., 2021: NASA’s Surface Biology and Geology Designated Observable: A Perspective on Surface Imaging Algorithms, *Remote Sensing of Environment*, 257, doi:10.1016/j.rse.2021.112349.

9. Sikder, M.D., M. Bonnema, C. Emery, C. David, P. Lin, M. Pan, S. Biancamaria, **M.M. Gierach**, 2021: A synthetic dataset inspired by satellite altimetry and impacts of sampling on global spaceborne discharge characterization, *Water Resources Research*, 57, doi:10.1029/2020WR029035.
10. Carroll, D., D. Menemenlis, **M. M. Gierach**, et al., 2020: The ECCO-Darwin data-assimilative global ocean biogeochemistry model: Estimates of seasonal to multi-decadal surface ocean pCO₂ and Air-sea CO₂ flux, *Journal of Advances in Modeling Earth Systems*, 12, doi:10.1029/2019MS001888.
11. Stavros, N.E., C. Oaida, J. Hausman, M. Srinivasan, H. Hua, M. Gangl, and **M.M. Gierach**, 2020: A Quantitative Framework to Inform Cloud Data System Architecture and Services Requirements Based on User Needs and Expected Demand, *IEEE Access*, 8, doi:10.1109/ACCESS.2020.3012054.
12. Fichot, G.G., K. Matsumoto, B. Holt, **M.M. Gierach**, K.S. Tokos, 2019: Assessing change in the overturning behavior of the Laurentian Great Lakes using remotely sensed lake surface water temperatures, *Remote Sensing of Environment*, 235, <https://doi.org/10.1016/j.rse.2019.111427>.
13. Thompson, D., K. Cawse-Nicholson, Z. Erickson, C.G. Fichot, C. Frankenberg, B.-C. Gao, **M.M. Gierach**, R. Green, D. Jensen, V. Natraj, A. Thompson, 2019: A unified approach to estimate land and water reflectances with uncertainties for coastal imaging spectroscopy, *Remote Sensing of Environment*, 231, doi:10.1016/j.rse.2019.05.017.
14. Erickson, Z., C. Frankenberg, D. Thompson, A. Thompson, **M.M. Gierach**, 2019: Remote sensing of chlorophyll fluorescence in the ocean using imaging spectrometry: Towards a vertical profile of fluorescence, *Geophysical Research Letters*, doi:10.1029/2018GL081273.
15. Liu, J., K. Bowman, D. Schimel, N. Parazoo, Z. Jiang, M. Lee, A. Bloom, D. Wunch, K. Gurney, D. Menemenlis, **M. M. Gierach**, D. Crisp, and A. Eldering, 2018: Response to Comment on “Contrasting carbon cycle responses of the tropical continents to the 2015-2016 El Niño”, *Science*, 362, doi:10.1126/science.aat1211.
16. Stephens, B., et al., 2018: The O₂/N₂ Ratio and CO₂ Airborne Southern Ocean (ORCAS) Study, *Bulletin of American Meteorological Society*, doi:10.1175/BAMS-D-16-0206.1.
17. Fournier, S., J. Vialard, M. Lengaigne, T. Lee, **M.M. Gierach**, and A.V.S. Chaitanya, 2017: Modulation of the Ganges-Brahmaputra river plume by the Indian Ocean Dipole and eddies inferred from satellite observations, *Journal of Geophysical Research*, doi:10.1002/2017JC013333.
18. Fournier, S., D. Vandemark, L. Gaultier, T. Lee, B. Jonsson, and **M.M. Gierach**, 2017: Interannual variation in offshore advection of Amazon-Orinoco plume waters: observations, forcing mechanisms, and impacts, *Journal of Geophysical Research*, 122, 8966-8982, doi:10.1002/2017JC013103.
19. Chatterjee, A., **M. M. Gierach**, D. Crisp, A. Eldering, M. Gunson, C. O’Dell, B. Stephens, A. Sutton, and D. Schimel, 2017: Influence of El Niño on atmospheric CO₂ over the tropical Pacific Ocean: Findings from NASA’s OCO-2 mission, *Science*, doi:10.1126/science.aam5776.
20. Liu, J., K. Bowman, D. Schimel, N. Parazoo, Z. Jiang, M. Lee, A. Bloom, D. Wunch, K. Gurney, D. Menemenlis, **M. M. Gierach**, D. Crisp, and A. Eldering, 2017: Contrasting carbon cycle responses of tropical continents to the 2015-16 El Niño, *Science*, doi:10.1126/science.aam5690.
21. Trinh, R. C., C. G. Fichot, **M. M. Gierach**, B. Holt, N. K. Malakar, G. Hulley, and J. Smith, 2017: Application of Landsat 8 for monitoring impacts of wastewater discharge on coastal water quality, *Frontiers in Marine Science*, doi:10.3389/fmars.2017.00329.
22. Bowman, K., J. Liu, A. Bloom, N. Parazoo, M. Lee, Z. Jiang, D. Menemenlis, **M. M. Gierach**, G.J. Collatz, and K. Gurney, 2017: Global and Brazilian carbon response to El Niño Modoki 2011-2010, *Earth and Space Science*, 4, 637-660, doi:10.1002/2016EA000204.
23. Thompson, D. M., E. Hochberg, G. P. Asner, R. O. Green, D. Knapp, B. C. Gao, R. Garcia, **M. M. Gierach**, Z. Lee, and S. Maritorena, 2017: Airborne Mapping of Benthic Reflectance Spectra with Bayesian Linear Mixtures, *Remote Sensing Environment*, 200, 18-30, doi:10.1016/j.rse.2017.07.030.
24. Holt, B., R. C. Trinh, and **M. M. Gierach**, 2017: Stormwater Runoff Plumes in the Southern California Bight: A Comparison Study with SAR and MODIS Imagery, *Marine Pollution Bulletin*, 118, 141-154, doi:10.1016/j.marpolbul.2017.02.040.

25. **Gierach, M. M.**, B. Holt, R. Trinh, B. Pan, and C. Rains, 2017: Satellite detection of wastewater diversion plumes in southern California. *Estuarine, Coastal and Shelf Science*, 186, 171-182, doi:10.1016/j.ecss.2016.10.012.
26. Basnayake, R., E. Bollt, N. Tuffillaro, J. Sun, and **M. M. Gierach**, 2017: Regularization destriping of remote sensing imagery. *Nonlinear Processes in Geophysics*, doi:10.5194/npg-2016-74.
27. Fournier, S., J. T. Reager, T. Lee, J. Vazquez-Cuervo, C. H. David, and **M. M. Gierach**, 2016: SMAP observes flooding from land to sea: The Texas event of 2015, *Geophysical Research Letters*, doi:10.1002/2016GL070821.
28. Fournier, S., T. Lee, and **M. M. Gierach**, 2016: Seasonal and interannual variations of sea surface salinity associated with the Mississippi River plume observed by SMOS and Aquarius, *Remote Sens. Environ.*, 180, 431-439, doi:10.1016/j.rse.2016.02.050.
29. Fichot, C. G., B. Downing, B. Bergamaschi, L. Windham-Myers, M. Marvin-DiPasquale, D. R. Thompson, and **M. M. Gierach**, 2016: High-resolution remote sensing of water quality in the San Francisco Bay-Delta Estuary, *Environmental Science and Technology*, 50(2), 573–583, doi:10.1021/acs.est.5b03518.
30. Thompson, D. R., F. C. Seidel, B. C. Gao, **M. M. Gierach**, R. O. Green, R. M. Kudela, and P. Mouroulis, 2015: Optimizing irradiance estimates for coastal and inland water imaging spectroscopy. *Geophys. Res. Lett.*, 42, doi:10.1002/2015GL063287.
31. Lee, T., G. Lagerloef, H.-Y. Kao, M. J. McPhaden, J. Willis, **M. M. Gierach**, 2014: The influence of salinity on Tropical Atlantic instability waves and eddies. *J. Geophys. Res.*, 119(12), 8375-8394, doi:10.1002/2014JC010100.
32. **Gierach, M. M.**, M. Messié, T. Lee, K. B. Karnauskas, and M.-H. Radenac, 2013: Biophysical Responses near Equatorial Islands in the Western Equatorial Pacific Ocean during El Niño/La Niña Transitions. *Geophys. Res. Lett.*, 40(20), 5473-5479, doi:10.1002/2013GL057828.
33. **Gierach, M. M.**, J. Vazquez, T. Lee, V. Tsontos, 2013: Aquarius and SMOS detect effects on an extreme Mississippi River flooding event in the Gulf of Mexico, *Geophys. Res. Lett.*, 40(19), 5188-5193, doi:10.1002/grl.50995.
34. Lee, T., D. E. Waliser, J. F. Li; F. W. Landerer, and **M. M. Gierach**, 2013: Evaluation of CMIP3 and CMIP5 Wind Stress Climatology Using Satellite Measurements and Atmospheric Reanalysis Products. *J. Clim.*, 26(16), 5810-5826, doi:http://dx.doi.org/10.1175/JCLI-D-12-00591.1.
35. Lee, T., G. Lagerloef, **M. M. Gierach**, H.-Y. Kao, S. Yueh, and K. Dohan, 2012: Aquarius reveals salinity signature of tropical instability waves. *Geophys. Res. Lett.*, 39, L12610, doi:10.1029/2012GL052232.
36. **Gierach, M. M.**, T. Lee, D. Turk, and M.J. McPhaden, 2012: Biological response to the 1997-98 and 2009-10 El Niño events in the equatorial Pacific Ocean. *Geophys. Res. Lett.*, 39, L10602, doi:10.1029/2012GL051103.
37. **Gierach, M. M.**, H. C. Graber, and M. J. Caruso, 2012: SAR-derived gap jet characteristics in the lee of the Philippine Archipelago. *J. Remote Sens. Environ.*, 117, 289-300.
38. **Gierach, M. M.**, B. Subrahmanyam, and P. G. Thoppil, 2009: Physical and biological responses to Hurricane Katrina (2005) in a 1/25° nested Gulf of Mexico HYCOM. *J. Mar. Syst.*, 78, 168-179.
39. **Gierach, M. M.**, B. Subrahmanyam, A. Samuelsen, and K. Ueyoshi, 2009: Hurricane-driven alteration in plankton community size structure in the Gulf of Mexico: A modeling study. *Geophys. Res. Lett.*, 36, L07604, doi:10.1029/2009GL037414.
40. **Gierach, M. M.**, and B. Subrahmanyam, 2008: Biophysical responses of the upper ocean to major Gulf of Mexico hurricanes in 2005. *J. Geophys. Res. Oceans*, 113, C04029, doi:10.1029/2007JC004419.
41. **Gierach, M. M.**, and B. Subrahmanyam, 2007: “Global ocean color and phytoplankton”, State of the Climate in 2006. *Bull. Amer. Meteor. Soc.*, 88, S43-S45.
42. **Gierach, M. M.**, and B. Subrahmanyam, 2007: Satellite data analysis of the upper ocean response to Hurricanes Katrina and Rita (2005) in the Gulf of Mexico. *IEEE Geosci. Remote Sens. Lett.*, 4, 132-136.
43. **Gierach, M. M.**, M. A. Bourassa, P. Cunningham, J. J. O’Brien, and P. D. Reasor, 2007: Vorticity-based detection of tropical cyclogenesis. *J. Appl. Meteor. Climatol.*, 46, 1214-1229.

OTHER PUBLICATIONS

1. National Academies of Sciences, Engineering, and Medicine. 2021. *Reckoning with the U.S. Role in Global Ocean Plastic Waste*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26132>.
2. Pavelsky, T. M., C. H. David, J. D. Bales, **M. M. Gierach**, L. Giosan, M. P. Lamb, C. J. Legleiter, J. M. Melack, F. E. Muller-Karger, J. E. Richey, E. Rodriguez, M. Simard, and L. C. Smith, 2015: From the Mountains to the Sea: Interdisciplinary Science and Applications Driven by the Flow of Water, Sediment, and Carbon, *2017-2017 Decadal Survey for Earth Science and Applications from Space of the National Academies of Sciences, Engineering and Medicine*, Request for Information, submitted on 2015-11-02, [available online](#).
3. Pavelsky, T. M., C. H. David, R. O. Green, S. Fournier, C. I. Michailovsky, S. Calmant, J. –F. Cretaux, J. D. Bales, S. Biancamaria, T. S. Bianchi, C. Dupouy, **M. M. Gierach**, C. B. Jones, B. Laignel, M. P. Lamb, C. J. Legleiter, J. –M. Martinez, J. M. Melack, F. E. Muller-Karger, J. E. Richey, E. Rodriguez, M. Simard, and L. C. Smith, 2016: From the Mountains to the Sea: Interdisciplinary Science and Applications Driven by the Flow of Water, Sediment, and Carbon II, *2017-2027 Decadal Survey for Earth Science and Applications from Space of the National Academies of Sciences, Engineering and Medicine*, 2nd Request for Information, submitted on 2016-05-17, [available online](#).

PROFESSIONAL ACTIVITIES

- 2022-present Steering Committee Member on NASA’s Network for Ocean Worlds (NOW)
- 2021-2022 Scientific Organizing Committee Member for OCB-US CLIVAR Ecological Forecasting Workshop (April 2022)
- 2021-present International Ocean Colour Coordinating Group (IOCCG) Remote Sensing of Marine Litter and Debris Task Force, Technologies Core Topic
- 2021-present US CLIVAR Phenomena, Observations, and Synthesis (POS) Panel co-chair, SSC member
- 2020-2022 Member of the National Academies of Sciences Engineering and Medicine “*Committee on U.S. Contributions to Global Ocean Plastic Waste*” Study
- 2020-2021 Topic Editor of “Remote Sensing for Applied Coral Reef Science and Management” Special Issue in *Frontiers in Marine Science*
- 2018-present Technical Advisory Committee (TAC) Alliance for Coastal Technologies for Hyperspectral Imaging
- 2018-present US CLIVAR Phenomena, Observations, and Synthesis (POS) Panel member
- 2015 NASA representative at the U.N. Climate Change Conference (COP-21)
- 2015 NASA representative for the 2016 National Earth Observation Assessment
- 2014-2016 NASA Early Career Scientist/Engineer Working Group (ECSEWG) member
- 2014 NASA representative at the U.N. Climate Change Conference (COP-20)
- 2013 USGCRP Oceans and Coasts Indicator team member
- 2013 NASA ESD Decadal Survey System Trade Study: Data Latency Needs and Requirements steering committee member
- 2012-2014 NASA representative for the IOOS Data Management And Communications steering team
- 2009-present Journal Reviewer for several articles (e.g., *Geophysical Research Letters*, *Journal of Geophysical Research*, *Journal of Applied Meteorology and Climatology*, *Remote Sensing of Environment*, *Estuaries and Coasts*, *Marine Environmental Research*, *Marine Ecology Progress Series*), Subject Matter Editor for *Ecological Applications Journal*.

MENTORING

- 2021-present **Advisor** to Kelly Luis NASA Postdoctoral Program (NPP) Associate
- 2021-present **Advisor** to Boyang “Jack” Pan, NASA Postdoctoral Program (NPP) Associate
- 2021-present **Advisor** to Adam Chlus, JPL Postdoctoral Associate
- 2021 **Advisor** to Ashley Kleinman, JPL Summer Intern
- 2021 **Co-Advisor** to Graham Trolley, JPL Summer Intern

2020-present **Thesis Advisory Committee** for Lily Dove, Caltech
2018-2021 **Senior mentor**, Mentoring Physical Oceanography Women to Increase Retention (MPOWIR)
2017-2019 **Advisor** to Dustin Carroll, Caltech Postdoctoral Associate (*now Research Associate at Moss Landing Marine Laboratories*)
2017 **Co-Advisor**, NASA DEVELOP San Francisco Bay-Delta Water Resources I & II project
2016-2019 **Thesis Advisory Committee** for Zachary Erickson, Caltech (*now NASA GSFC postdoc*)
2016 **Co-Advisor**, NASA DEVELOP Los Angeles Oceans & Water Resources III project
2015-2018 **Advisor** to Severine Fournier, NPP Postdoctoral Associate (*now JPL scientist*)
2015 **Co-Advisor**, NASA DEVELOP Los Angeles Oceans & Water Resources II project
2015-2016 **Advisor** to Yang (Cathy) Feng, Caltech Postdoctoral Associate
2014-2016 **Advisor** to Cedric Fichot, Caltech Postdoctoral Associate (*now Assistant Professor at Boston University*)
2014 **Co-Advisor**, NASA DEVELOP Los Angeles Oceans & Water Resources I project
2014 **Thesis Jury** for Severine Fournier, IFREMER