Dr. Faycal Kessouri

Senior Scientist
Biogechemistry Department
Southern California Coastal Water Research Project

Education

Ph.D., oceanography, University of Toulouse Paul Sabatier, France, 2015

M.Sc., oceanography, University Pierre et Marie Curie, Paris, France, 2012

Engineer, marine environment, University of Algiers, Algeria, 2008

B.A., sciences, Algiers, Algeria, 2003

Professional Experience

Senior Scientist, Southern California Coastal Water Research Project. Costa Mesa, CA. 2019-present

Scientist, Southern California Coastal Water Research Project. Costa Mesa, CA. 2018-2019

Post-doctoral researcher, Southern California Coastal Water Research Project. Costa Mesa, CA. 2015-2018

Research assistant, Laboratoire d'Aerologie, CNRS. Toulouse, France. 2012-2015

Ocean biogeochemist, Laboratoire d'Océanographie de Villefranche-sur-Mer, CNRS. Villefranche-Sur-Mer, France. 2012

GIS, Water and sanitation company. Algiers, Algeria. 2008

Session Chair at International Scientific

Conferences

- Kapsenberg L., H. Carter, Kessouri, C Braby. Ocean based solutions to address local to global human impact. Ocean Sciences Meeting. San Diego Convention Center. Feb 2020.
- Kessouri, D. Bianchi, R. Feely, E. Turner, N. Bednarsek, M. Sutula. Coastal and Estuarine Research Federation 26th Bi-annual Conference. Mobile, Alabama. November 2019. “Coastal Acidification, Hypoxia and Warming: Science-Based Tools for Management”.
- McWilliams, J.C., C. Deutsch, F. Kessouri and E. Howard. Ocean Sciences Meeting. Portland Convention Center, Oregon. February 2018.
- Sutula M., F. Kessouri, E. Turner. Coupled Models of Coastal Acidification and Hypoxia: Applications to Management. Coastal and Estuarine Research Federation

Selected conferences

- Faycal Kessouri, Daniele Bianchi, James C McWilliams, Lionel Renault, Curtis A. Deutsch, Hartmut Frenzel. Temporal modulation of biogeochemical cycles and phytoplankton biomass by submesoscale circulation in the California Current System. AGU, Ocean Sciences meeting. 02/2020. San Diego.
- Faycal Kessouri, Daniele Bianchi, Martha Sutula, Clarissa Anderson, Raphael M Kudela, Jayme Smith, and James McWilliams. Ocean Modeling Supports Management Conversations on the Impact of Local Pollution Sources on Algal Blooms in Southern California. American Geoscience Union Fall Meeting, San Francisco. 12/2019.
- Faycal Kessouri, Martha Sutula, Daniele Bianchi, James McWilliams, Curtis Deutsch, Karen McLaughlin, Minna Ho, Nina Bednarsek, Evan Howard, Lionel Renault, Simon Yang, Stephen Weisberg. Submesoscale Simulations to Support Management Conversations on the Impact of Local Pollution in Southern California. Coastal and Estuarine Research Federation 25th Biennial Conference. November 2019. Mobile, Alabama.
- Faycal Kessouri, Martha Sutula, Minna Ho, James McWilliams, Curtis Deutsch, Daniele Bianchi, Karen McLaughlin, Nina Bednarsek, Lionel Renault, Richard Feely, Richard Ambrose, Stephen Weisberg. Submesoscale model to help on nutrients management in coastal southern California. IMBeR Future Oceans2 Conference in Brest, France. 05/2019.
- Faycal Kessouri, James C McWilliams, Daniele Bianchi, Lionel Renault, Hartmut Frenzel and Curtis Deutsch. Seasonal modulation of nutrients cycles and phytoplankton biomass by submesoscale circulation in the California Current System. IMBeR Future Oceans2 Brest Conference Center, France. 05/2019.
- Kessouri, McWilliams JC., Bianchi D., Renault L., Deutsch c., Frenzel h. Submesoscale Modeling of the Biogeochemical Dynamics in the California Current Ecosystem. Ocean Sciences Meeting, Feb 18-22th 2018, Portland Convention Center, Oregon.
- Kessouri, F.; McWilliams, J.; Sutula, M.; Renault, L.; Deutsch, C.; McLaughlin, K.; Frenzel,

H.; Bianchi, D.; Feely, R.; Bednaršek, N.; Alin, S.; Ambrose, R. F.; Gold, M.; Weisberg, S.; Integrated model of ocean acidification and hypoxia to support ecosystem prediction and environmental management in the California Current ecosystem. AGU, Ocean Sciences Meeting. 02/2017. Honolulu Convention Center. Hawaii.
- Faycal Kessouri, James McWilliams, Daniele Bianchi, Lionel Renault, Curtis Deutsch, Hartmut Frenzel. Submesoscale Modeling of the Biogeochemical Dynamics in the California Current Ecosystem. Eastern Pacific Ocean Conference 2017, South Lake Tahoe.

Selected CTAG meetings

- Faycal Kessouri. Acidification and hypoxia modeling of the California Current System: Application to support nutrients management: Model performance assessment. SCCWRP Offices. Stakeholders meeting with the Commission's Technical Advisory Group and partners. 01/23/2020.
- Faycal Kessouri. Acidification and hypoxia modeling of the California Current System: Application to support nutrients management: Brief overview of the model ROMS-BEC. SCCWRP Offices. Stakeholders meeting with the Commission's Technical Advisory Group and partners. 01/23/2020.
- Faycal Kessouri. Acidification and hypoxia modeling of the California Current System: Application to support nutrients management: Plume and point sources modeling and parametrization in ocean model ROMS-BEC. SCCWRP Offices. Stakeholders meeting with the Commission's Technical Advisory Group and partners. 01/23/2020.
- Kessouri, F.: Modeling approach and progress for climate change and pollution assessment. SCCWRP offices, Costa Mesa. CTAG meeting, June 2018.
- Kessouri, F.: Ocean modeling validation approach and metrics of performance. SCCWRP offices, Costa Mesa. CTAG meeting, June 2018.

Journal Articles

Kessouri, F., M. Sutula, J. Smith, J. McWilliams, M. Sandoval-Belmar, D. Bianchi, P. Damien, M. Ho, R. Kudela, C. Anderson. 2026. Anthropogenic, climate, and meso and submesoscale influences on diatom productivity in the Southern California Bight, with implications for domoic acid producing harmful algal blooms. *Frontiers in Marine Science* 13:1729816.

Sandoval-Belmar, M., F. Kessouri, J. Smith, A.R. Moreno, C. Anderson, R.M. Kudela, M. Sutula, M. Ho, P. Damien, C. Benitez-Nelson, J.C. McWilliams, D. Bianchi. 2026. Urban eutrophication enhances domoic acid production by Pseudo-nitzschia in the Southern California Bight. *Harmful Algae* 151:103023.

Hoel, P., D. Bianchi, K.C. Cavanaugh, C.A. Frieder, F. Kessouri. 2025. Influence of anthropogenic nutrient sources on kelp canopies during a marine heat wave. *Marine Pollution Bulletin* 216:117788.

Singh, S., A.B. Gray, C. Murphy-Hagan, H. Hapich, W. Cowger, J. Perna, T. Le, H. Nogi, B. Badwal, K. McLaughlin, F. Kessouri, C. Moore, G. Lattin, L.M. Thornton Hampton, C.S. Wong, M. Sutula. 2025. Microplastic pollution in the water column and benthic sediment of the San Pedro Bay, California, USA. *Environmental Research* 269:120866.

Damien, P., D. Bianchi, F. Kessouri, J.C. McWilliams. 2024. Extremes and Short-Term Fluctuations in Coastal Ocean Acidification and Hypoxia. *Journal of Geophysical Research: Oceans* DOI:10.1029/2024JC021197.

Frieder, C.A., F. Kessouri, M. Ho, M. Sutula, D. Bianchi, J.C. McWilliams, C. Deutsch, E. Howard. 2024. Effects of urban eutrophication on pelagic habitat capacity in the Southern California Bight. *Frontiers in Marine Science* 11:1392671.

McWilliams, J.C., P. Damien, F. Kessouri. 2024. Circulation and dispersal in California's Borderland Basins. *Progress in Oceanography* 229:103349.

Le-Duy Pham, A., P. Damien, D. McCoy, M. Mar, F. Kessouri, J.C. McWilliams, J. Moffett, D. Bianchi. 2024. The Shelf-To-Basin Transport of Iron From the Northern U.S. West Coast to the Pacific Ocean. *Global Biogeochemical Cycles* DOI:10.1029/2023GB008029.

Kessouri, F., M. Sutula, D. Bianchi, M. Ho, P. Damien, J.C. McWilliams, C.A. Frieder, L. Renault, H. Frenzel, K. McLaughlin, C. Deutsch. 2024. Cross-shore transport and eddies promote large scale response to urban eutrophication. *Scientific Reports* 14:7240.

Ho, M., F. Kessouri, C.A. Frieder, M. Sutula, D. Bianchi, J.C. McWilliams. 2023. Effect of ocean outfall discharge volume and dissolved inorganic nitrogen load on urban eutrophication outcomes in the Southern California Bight. *Scientific Reports* 13:22148.

Damien, P., D. Bianchi, J.C. McWilliams, F. Kessouri, C. Deutsch, R. Chen, L. Renault. 2023. Enhanced Biogeochemical Cycling Along the U.S. West Coast Shelf. *Global Biogeochemical Cycles* DOI:10.1029/2022GB007572.

Ulses, C., C. Estournel, P. Marsaleix, K. Soetaert, M. Fourrier, L. Coppola, D. Lefevre, F. Touratier, C. Goyet, V. Guglielmi, F. Kessouri, P. Testor, X. Durrieu de Madron. 2023. Seasonal dynamics and annual budget of dissolved inorganic carbon in the northwestern Mediterranean deep-convection region. *Biogeosciences* 20:4683-4710.

Zhou, J., J.G. Izett, C.A. Edwards, P. Damien, F. Kessouri, J.C. McWilliams. 2023. Modeling the dispersal of the San Francisco Bay plume over the northern and central California shelf.

Estuarine, Coastal and Shelf Science 287:108336.

Damien, P., D. Bianchi, F. Kessouri, J.C. McWilliams. 2023. Modulation of Phytoplankton Uptake by Mesoscale and Submesoscale Eddies in the California Current System. *Geophysical Research Letters* DOI:10.1029/2023GL104853.

Sandoval-Belmar, M., J. Smith, A.R. Moreno, C. Anderson, R.M. Kudela, M. Sutula, F. Kessouri, D.A. Caron, F.P. Chavez, D. Bianchi. 2023. A cross-regional examination of patterns and environmental drivers of Pseudo-nitzschia harmful algal blooms along the California coast. *Harmful Algae* 126:102435.

Kessouri, F., L. Renault, J.C. McWilliams, P. Damien, D. Bianchi. 2022. Enhancement of Oceanic Eddy Activity by Fine-Scale Orographic Winds Drives High Productivity, Low Oxygen, and Low pH Conditions in the Santa Barbara Channel. *Journal of Geophysical Research: Oceans* 127:1-14.

Frieder, C.A., C. Yan, M. Chamecki, D. Dauhajre, J.C. McWilliams, J. Infante, M.L. McPherson, R.M. Kudela, F. Kessouri, M. Sutula, I.B. Arzeno-Soltero, K.A. Davis. 2022. A Macroalgal Cultivation Modeling System (MACMODS): Evaluating the Role of Physical-Biological Coupling on Nutrients and Farm Yield. *Frontiers in Marine Science* DOI:10.3389/fmars.2022.752951.

Kessouri, F., K. McLaughlin, M. Sutula, D. Bianchi, M. Ho, J.C. McWilliams, L. Renault, J. Molemaker, C. Deutsch, A. Leinweber. 2021. Configuration and validation of an oceanic physical and biogeochemical model to investigate coastal eutrophication in the Southern California Bight. *Journal of Advances in Modeling Earth Systems* 13:e2020MS002296.

Bednarsek, N., R. Ambrose, P. Calosi, R.K. Childers, R.A. Feely, S.Y. Litvin, W.C. Long, J.I. Spicer, J. Strus, J. Taylor, F. Kessouri, M. Roethler, M. Sutula, S.B. Weisberg. 2021. Synthesis of Thresholds of Ocean Acidification Impacts on Decapods. *Frontiers in Marine Science* 8:651102.

McLaughlin, K., M.D.A. Howard, G. Robertson, C.D.A. Beck, M. Ho, F. Kessouri, N.P. Nezlin, M. Sutula, S.B. Weisberg. 2021. Influence of anthropogenic nutrient inputs on rates of coastal ocean nitrogen and carbon cycling in the Southern California Bight, United States. *Elementa: Science of the Anthropocene* 9:00145.

Sutula, M., M. Ho, A. Sengupta, F. Kessouri, K. McLaughlin, K. McCune, D. Bianchi. 2021. A baseline of terrestrial freshwater and nitrogen fluxes to the Southern California Bight, USA. *Marine Pollution Bulletin* DOI:10.1016/j.marpolbul.2021.112669 .

Deutsch, C., H. Frenzel, J.C. McWilliams, L. Renault, F. Kessouri, E. Howard, J.H. Liang, D. Bianchi, S. Yang. 2021. Biogeochemical variability in the California Current System. *Progress in Oceanography* DOI:10.1016/j.pocean.2021.102565.

Renault, L., J.C. McWilliams, F. Kessouri, A. Jousse, H. Frenzel, R. Chen, C. Deutsch. 2021.

Evaluation of high-resolution atmospheric and oceanic simulations of the California Current System. *Progress in Oceanography* DOI:10.1016/j.pocean.2021.102564.

Ho, M., J.M. Molemaker, F. Kessouri, J.C. McWilliams, T.W. Gallien. 2021. High-Resolution Nonhydrostatic Outfall Plume Modeling: Cross-Flow Validation. *Journal of Hydraulic Engineering* DOI:10.1061/(ASCE)HY.1943-7900.0001896.

Kessouri, F., J.C. McWilliams, D. Bianchi, M. Sutula, L. Renault, C. Deutsch, R.A. Feely, K. McLaughlin, M. Ho, E.M. Howard, N. Bednarsek, P. Damien, J. Molemaker, S.B. Weisberg. 2021. Coastal eutrophication drives acidification, oxygen loss, and ecosystem change in a major oceanic upwelling system. *Proceedings of the National Academy of Sciences of the United States of America* DOI:10.1073/pnas.2018856118.

Bednarsek, N., P. Calosi, R.A. Feely, R.F. Ambrose, M. Byrne, K.Y. Chan, S. Dupont, J.L. Padilla-Gamino, J.I. Spicer, F. Kessouri, M. Roethler, M. Sutula, S.B. Weisberg. 2021. Synthesis of Thresholds of Ocean Acidification Impacts on Echinoderms. *Frontiers in Marine Science* DOI:10.3389/fmars.2021.602601.

Ulses, C., C. Estournel, M. Fourrier, L. Coppola, F. Kessouri, D. Lefevre, P. Marsaleix. 2021. Oxygen budget of the north-western Mediterranean deep-convection region. *Biogeosciences* 18:937-960.

Sutula, M., M. Ho, A. Sengupta, F. Kessouri, K. McLaughlin, K. McCune, D. Bianchi. 2021. Dataset of terrestrial fluxes of freshwater, nutrients, carbon, and iron to the Southern California Bight, U.S.A.. *Data in Brief* DOI:10.1016/j.dib.2021.106802.

Howard, E.M., H. Frenzel, F. Kessouri, L. Renault, D. Bianchi, J.C. McWilliams, C.A. Deutsch. 2020. Attributing Causes of Future Climate Change in the California Current System With Multimodel Downscaling. *Global Biogeochemical Cycles* DOI:10.1029/2020GB006646.

Kessouri, F., D. Bianchi, L. Renault, J.C. McWilliams, H. Frenzel, C.A. Deutsch. 2020. Submesoscale Currents Modulate the Seasonal Cycle of Nutrients and Productivity in the California Current System. *Global Biogeochemical Cycles* DOI:10.1029/2020GB006578.

Howard, E.M., J.L. Penn, H. Frenzel, B.A. Seibel, D. Blanchi, L. Renault, F. Kessouri, M. Sutula, J.C. McWilliams, C. Deutsch. 2020. Climate-driven aerobic habitat loss in the California Current System. *Science Advances* DOI:10.1126/sciadv.aay3188 .

Bednarsek, N., R.A. Feely, E.L. Howes, B.P.V. Hunt, F. Kessouri, P. Leon, R. Lischka, A.E. Maas, K. McLaughlin, N.P. Nezlin, M. Sutula, S.B. Weisberg. 2019. Systematic Review and Meta-Analysis Toward Synthesis of Thresholds of Ocean Acidification Impacts on Calcifying Pteropods and Interactions With Warming. *Frontiers in Marine Science* 6:227.

Kessouri, F., C. Ulses, C. Estournel, P. Marsaleix, F. D'Ortenzio, T. Severin, V. Taillandier, P. Conan. 2018. Vertical Mixing Effects on Phytoplankton Dynamics and Organic Carbon Export in the Western Mediterranean Sea. *Geophysical Research: Oceans* DOI:10.1002/2016JC012669.

Kessouri, F., C. Ulses, C. Estournel, P. Marsaleix, T. Severin, M. Pujo-Pay, J. Caparros, P. Raimbault, O. Pasqueron de Fommervault, F. D'Ortenzio, V. Taillandier, P. Testor, P. Conan. 2018. Nitrogen and Phosphorus Budgets in the Northwestern Mediterranean Deep Convection Region. *Journal of Geophysical Research: Oceans* 12:9429-9454.

De Fommervaut, O., C. Migon, A. Dufour, F. D'Ortenzio, F. Kessouri, P. Raimbault, N. Garcia, V. Lagadec and C. Estournel. 2015. Atmospheric input of inorganic nitrogen and phosphorus to the Ligurian Sea: Data from the Cap Ferrat coastal time-series station. *Deep Sea Research II*.

Estournel C., P. Testor , P. Damien , F. D'Ortenzio, P. Marsaleix, P. Conan, F. Kessouri, X. Durrieu de Madron, L. Coppola, J.M. Lellouche, S. Belamari, L. Mortier, C. Ulses, M.N. Bouin, and L. Prieur (2016b), High resolution modeling of dense water formation in the north-western Mediterranean during winter 2012-2013: Processes and budget, J. Geophys. Res. *Oceans*, 121, 5367–5392, doi:10.1002/2016JC011935.

Kessouri, F., C. Ulses, P. Marsaleix, C. Estournel, Dewex Group. In review. Vertical mixing effects on phytoplankton dynamics and organic carbon export in the western Mediterranean Sea. *Journal of Geophysical Research Oceans.*

Kessouri, F., C. Estournel, C. Ulses, P. Marsaleix, Dewex Group. In review. Nitrogen and phosphorus budgets in the western Mediterranean Sea. *Journal of Geophysical Research Oceans*.

Severin, T., F. Kessouri, M. Rembauville, et al. (2017), Open-ocean convection process: A driver of the winter nutrient supply and the spring phytoplankton distribution in the Northwestern Mediterranean Sea, *J.Geophys. Res. Oceans,* 122, doi:10.1002/2016JC012664. (2017), Open-ocean convection process: A driver of the winter nutrient supply and the spring phytoplankton distribution in the Northwestern Mediterranean Sea, *J. Geophys. Res. Oceans*, 122, doi:10.1002/2016JC012664.

Severin, T., C. Sauret, M. Boutrif, T. Duhaut, F. Kessouri, L. Oriol, J. Caparros, M. Pujo-Pay, X. Durrieu de Madron, M. Garel, C. Tamburini, P. Conan, J.F. Ghiglione. In press. Impact of an intense water column mixing (0-1500m) on prokaryotic 1 diversity and activities during an open-ocean convection event in the NW Mediterranean Sea. *Environmental Microbiology*.

Ulses, C., P.-A. Auger, K. Soetaert, P. Marsaleix, F. Diaz, L. Coppola, M.Herrmann, F. Kessouri, and C. Estournel (2016), Budget of organic carbon in the North-Western Mediterranean Open Sea over the period 2004-2008 using 3D coupled physical biogeochemical modeling, *J. Geophys. Res. Oceans*, 121, 7026–7055, doi:10.1002/2016JC011818.

Book Chapters

Mignon, C., O. Pasqueron de Fommervault, F. Kessouri. 2020. Emission Sources, Fluxes and Spatiotemporal Distribution of Nutritive Resources. in: C. Mignon, P. Nival, A. Sciandra (eds.), *The Mediterranean Sea in the Era of Global Change 1: 30 Years of Multidisciplinary Study of the Ligurian Sea* pp. 105-138. Wiley. New York, NY.

Technical Reports

Sutula, M., F. Kessouri, C.A. Frieder, N. Lombardo. 2026. Quantifying Uncertainty in Oxygen Predictions of an Ocean Numerical Model: A Case Study for Application to Anthropogenic Nutrient Effect Assessment. Technical Report 1445. Southern California Coastal Water Research Project. Costa Mesa, CA.

Sutula, M., F. Kessouri, M. Ho, C.A. Frieder. 2026. Numerical Simulation of Potential Eutrophication Effects of Oil and Gas Produced Water Discharges on the Southern California Bight. Technical Report 1446. Southern California Coastal Water Research Project. Costa Mesa, CA.

Sutula, M., F. Kessouri, C.A. Frieder, N. Lombardo. 2025. Quality Control Procedures for the Development, Validation and Science Applications of the Regional Ocean Modeling System with Biogeochemical Elemental Cycling Model (2019-2026). Technical Report 1444. Southern California Coastal Water Research Project. Costa Mesa, CA.

Sutula, M., D. Senn, L. Fono, M. Ho, F. Karimpour, F. Kessouri, A. King, A. Latker, P. Markle. 2021. Approaches to Quantifying Uncertainty in Coastal Eutrophication Numerical Modeling: A Workshop Summary. Technical Report . Southern California Coastal Water Research Project. Costa Mesa, CA.