

SARA FERRÓN

Department of Oceanography, University of Hawaii at Manoa

C-MORE Hale, 1950 East-West Rd., Honolulu, HI 96822

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US citizen

EDUCATION

- 2009 **Ph.D. Environmental and Coastal Sciences.** University of Cádiz (Spain)
Magna Cum Laude
Dissertation: *Vertical fluxes of greenhouse gases in coastal systems: benthic production and emissions to the atmosphere*
- 2005 **M.Sc. Environmental and Coastal Sciences.** University of Cádiz (Spain)
- 2003 **M.Sc. Oceanography.** University of Liege (Belgium)
- 2002 **B.Sc. Marine Science.** University of Cádiz (Spain)

RESEARCH AND PROFESSIONAL EXPERIENCE

- 2019-present **Graduate Faculty.** Dept. Oceanography, University of Hawaii
- 2018-2019 **Affiliate Graduate Faculty.** Dept. Oceanography, University of Hawaii.
- 2016-present **Assistant Researcher.** C-MORE/SOEST, Dept. Oceanography, University of Hawaii.
- 2013-2016 **C-MORE Postdoctoral Fellow.** C-MORE/SOEST, Dept. Oceanography, University of Hawaii. Sponsor: David M. Karl.
- 2009-2012 **Postdoctoral Research Scientist.** SOEST, Dept. Oceanography, University of Hawaii. Sponsor: David T. Ho.
- 2008-2009 **Research Associate.** Dept. Physical Chemistry. University of Cádiz
- 2004-2008 **Graduate Research Fellow.** Doctoral fellowship from the Spanish Ministry of Education. Dept. Physical Chemistry. University of Cádiz. Advisors: Jesús Forja Pajares and Teodora Ortega Díaz.
- 2002 –2003 **Graduate Research Assistant.** Erasmus-Socrates European student exchange award. Dept. Chemical Oceanography. University of Liege. Sponsor: Michel Frankignoulle.
- 2000- 2002 **Undergraduate Research Assistant.** Dept. Physical Chemistry. University of Cádiz. Advisor: Jesús Forja Pajares.

PUBLICATIONS

- Ferrón, S.**, Barone, B., Church, M.J., White, A. E., Karl, D. M. (2021). Euphotic zone metabolism in the North Pacific Subtropical Gyre based on oxygen dynamics. *Global Biogeochemical Cycles*, 35, e2020GB006744. doi: 10.1029/2020GB006744.
- Pinedo-Gonzalez, P., Hawco, N. J., Bundy, R. M, Armbrust, E. V., Follows, M. J., Cael, B. B., White, A. E., **Ferrón S.**, Karl, D.M. (2020). Anthropogenic Asian aerosols provide Fe to the North Pacific. *Proceedings of the National Academy of Sciences*, 117: 27862-27868.
- Juranek, L. W., White, A. E., Dugenne, Henderikx Freitas, F., Dutkiewicz, S., Ribalet, F., **Ferrón, S.**, Armbrust, E. V., Karl, D.M. (2020). The importance of the phytoplankton ‘middle class’ to ocean net community production. *Global Biogeochemical Cycles*, 34: e2020GB006702. doi: 10.1029/2020GB006702
- Gradoville, M. R., Farnelid, H., White, A. E., Turk-Kubo, K. A., Stewart, B., Ribalet, F., **Ferrón, S.**, Pinedo-Gonzalez, P., Armbrust, E. V., Karl, D.M., John, S., Zehr, J. P. (2020). Latitudinal constraints on the abundance and activity of the cyanobacterium UCYN-A and other marine diazotrophs in the North Pacific. *Limnology and Oceanography*, 65: 1858-1875, doi: 10.1002/lno.11423.
- Barone, B., Nicholson, D. P., **Ferrón, S.**, Firing, E., Karl, D.M. (2019). The estimation of gross oxygen production and community respiration from autonomous time-series measurements in the oligotrophic ocean. *Limnology and Oceanography: Methods*, 17, 650-664, <https://doi.org/10.1002/lom3.10340>.
- Wilson, S. T., Hawco, N. J., Armbrust, E. V., Barone, B., Björkman, K. M., Boysen, A. K., Burgos, M., Burrell, T. J., Casey, J. R., DeLong, E. F., Dugenne, M., Dutkiewicz, S., Dyhrman, S. T., **Ferrón, S.**, Follows, M. J., Foreman, R. K., Funkey, C. P., Harke, M. J., Kelly, R. L., Knapp, A. N., Letelier, R. M., Ribalet, F., Shimabukuro, E. M., Tabata, R. K. S., Turk-Kubo, K. A., White, A. E., Zehr, J. P., John, S., Karl, D. M. (2019). Kilauea lava fuels phytoplankton bloom in the North Pacific Ocean. *Science*, 365, 1040-1044,doi: 10.1126/science.aax4767 .
- Grant, S. R., Church, M. J., **Ferrón, S.**, Laws, E. W., Rappe, M. (2019) Elemental composition, phosphorus uptake, and characteristics of growth of a SAR11 strain in batch and continuous culture. *mSystems*, 4:e00218-18, doi: <https://doi.org/10.1128/mSystems.00218-18>.
- Casey, J. R., Björkman, K. M., **Ferrón, S.**, Karl, D. M. (2019). Size dependence of physiology and metabolism within marine picoplankton. *Limnology and Oceanography*, 64, 1819-1827, <https://doi.org/10.1002/lno.11153>.

- Wilson, S. T., Bange, H. W., Arévalo-Martínez, D. L., Barnes, J., Borges, A. V., Brown, I., Bullister, J. L., Burgos, M., Capelle, D. W., Casso, M., de la Paz, M., Farías, L., Fenwick, L., **Ferrón, S.**, Garcia, G., Glockzin, M., Karl, D. M., Kock, A., Laperriere, S., Law, C. S., Manning, C. C., Marriner, A., Myllykangas, J.-P., Pohlman, J. W., Rees, A. P., Santoro, A. E., Torres, M., Tortell, P. D., Upstill-Goddard, R. C., Wisegarver, D. P., Zhang, G. L., and Rehder, G. (2018): An intercomparison of oceanic methane and nitrous oxide measurements, *Biogeosciences*, 15, 5891-5907, <https://doi.org/10.5194/bg-15-5891-2018>.
- Royer, S.-J., **Ferrón, S.**, Wilson, S. T., Karl, D. M. (2018). Production of methane and ethylene from plastic in the environment. Submitted to PLoS ONE, 13(8): e0200574.
- Ho, D. T., Engel, V. C., **Ferrón, S.**, Hickman, B., Choi, J., Harvey, J. W. (2018). On factors influencing air-water gas exchange in emergent wetlands. *Journal of Geophysical Research-Biogeosciences*, 123, doi: 10.1002/2017JG004299.
- Casey, J. R., **Ferrón, S.**, Karl, D. M. (2017). Light-enhanced microbial organic carbon yield. *Frontiers in Microbiology*, 8, article 2157, doi: 10.3389/fmicb.2017.02157.
- Fassbender, A.J., Palevsky, H.I., Martz, T.R., Ingalls, A.E., Gledhill, M., Fawcett, S.E., Brandes, J., Aluwihare, L., and the participants of COME ABOARD and DISCO XXV (2017). Perspectives on Chemical Oceanography in a changing environment: Participants of the COME ABOARD Meeting examine the field in the context of 40 years of DISCO. *Marine Chemistry*, 196, 181-190, <https://doi.org/10.1016/j.marchem.2017.09.002>.
- Sosa, O. A., Repeta, D. J., **Ferrón, S.**, Bryant, J. A., Mende, D. R., Karl, D. M., DeLong, E. F. (2017). Isolation and characterization of bacteria that degrade phosphonates in marine dissolved organic matter. *Frontiers in Microbiology*, 8, article 1786, doi: 10.3389/fmicb.2017.01786.
- Wilson, S. T., **Ferrón, S.**, Karl, D. M. (2017). Interannual variability of methane and nitrous oxide in the the North Pacific Subtropical Gyre. *Geophysical Research Letters*, 44, 9885-9892, doi: 10.1002/2017GL074458.
- Wilson, S. T., Aylward, F. O., Ribalet, F., Barone, B., Casey, J. R., Connell, P. E., Eppley, J. A., **Ferrón, S.**, Romano, A. E., Turk-Kubo, K. A., Vislova, A., Armbrust, V., Caron, D. A., Church, M. J., Zehr, J. P., Karl, D. M., DeLong, E. F. (2017). Coordinated regulation of growth activity and transcription in natural populations of the unicellular nitrogen-fixing cyanobacterium *Crocospaera*. *Nature Microbiology*, 2, article 17118, doi: 10.1038/nmicrobiol.2017.118.
- Ho, D. T., **Ferrón, S.**, Engel, V. C., Anderson, W. T., Swart, P. K., Price, R. P., Barbero, L. (2017). Dissolved carbon biogeochemistry and export in mangrove-dominated rivers of the Florida Everglades, *Biogeosciences*, 14, 2543-2559, doi: 10.5194/bg-14-2543-2017.

- Repeta, D. J., **Ferrón, S.**, Sosa, O. A., Johnson, C. G., Repeta, L. D., Acker, M., DeLong, E. F., Karl, D. M. (2016). Marine methane paradox explained by bacterial degradation of dissolved organic matter. *Nature Geoscience*, 9, 884-887, doi:10.1038/ngeo2837.
- Ferrón, S.**, del Valle, D. A., Børkman, K. M., Quay, P. D., Church, M. J., Karl, D. M. (2016). Application of membrane inlet mass spectrometry to measure aquatic gross primary production by the ^{18}O in vitro method. *Limnology and Oceanography: Methods*, 14, 610-622, doi: 10.1002/lom3.10116.
- Wilson, S. T., Barone, B., Ascani, F., Bidigare, R. R., Church, M. J., del Valle, D. A., Dyrman, S. T., **Ferrón, S.**, Fitzsimmons, J. N., Juranek, L. W., Kolber, Z. S., Letelier, R. M., Martínez-García, S., Nicholson, D. P., Richards, K. J., Rii, Y. M., Rouco, M., Viviani, D. A., White, A. E., Zehr, J. P., Karl, D. M. (2015). Short-term variability in euphotic zone biogeochemistry and primary productivity at Station ALOHA: A case study of summer 2012. *Global Biogeochemical Cycles*, 29, 1145–1164, doi:10.1002/2015GB005141.
- Ferrón, S.**, Wilson, S. T., Martínez-García, S., Quay, P. D., Karl, D. M. (2015). Metabolic balance in the mixed layer of the oligotrophic North Pacific Ocean from diel changes in O_2/Ar saturation ratios. *Geophysical Research Letters*, 42: 3421–3430, doi: 10.1002/2015GL063555.
- Ho, D. T., **Ferrón, S.**, Engel, V. C., Larsen L. G., Barr, J. G. (2014). Air-water gas exchange and CO_2 flux in a mangrove-dominated estuary. *Geophysical Research Letters* 41: 108-113, doi: 10.1002/2013GL058785.
- Ferrón, S.**, Ho, D. T., Johnson, Z. I., Huntley, M. E. (2012). Air-water fluxes of N_2O and CH_4 during microalgae (*Staurisira sp.*) cultivation in an open raceway pond. *Environmental Science and Technology* 46: 10842-10848, doi: 10.1021/es302396j.
- Ferrón, S.**, Ortega T., and Forja J. M. (2010). Seasonal and spatial variability of methane in the north-eastern shelf of the Gulf of Cádiz (southwest Iberian Peninsula). *Journal of Sea Research* 64: 213-223.
- Ferrón, S.**, Ortega T., Forja J. M. (2010). Nitrous oxide distribution in the north-eastern shelf of the Gulf of Cádiz (SW Iberian Peninsula). *Marine Chemistry* 119: 22-32.
- Ferrón, S.**, Alonso-Pérez, F., Anfuso, E., Murillo, J., Ortega T., Castro, C. G., Forja J. M. (2009). Benthic nutrient recycling in the northeastern shelf of the Gulf of Cádiz (SW Iberian Peninsula). *Marine Ecology Progress Series* 390: 79-95.
- Ferrón, S.**, Alonso-Pérez, F, Ortega T., Forja J.M. (2009). Benthic respiration in the northeastern shelf of the Gulf of Cádiz (SW Iberian Peninsula). *Marine Ecology Progress Series* 392: 69-80.
- Ferrón, S.**, Ortega T., Forja J. M. (2009). Benthic fluxes in a tidal salt marsh creek affected by fish farm activities: *Río San Pedro* (Bay of Cádiz, SW Spain). *Marine Chemistry* 113: 50-62.
- Ferrón, S.**, Alonso-Pérez, F., Castro, C. G., Ortega T., Pérez, F. F., Ríos, A. F., Gómez-Parra A., Forja J. M. (2008). Hydrodynamic characterization and performance of an autonomous

benthic chamber for use in coastal systems. *Limnology and Oceanography: Methods* 6: 558-571.

Ferrón, S., Ortega, T., Gómez-Parra, A., Forja, J. M. (2007). Seasonal study of CH₄, CO₂ and N₂O in a shallow tidal system of the Bay of Cádiz (SW Spain). *Journal of Marine Systems* 66: 244-257.

Borges, A., Vandenberght, J. P., Schiettecatte, L. S., Gazeau, F., **Ferrón-Smith, S.**, Delille, B., Frankignoulle, M. (2004). Variability of the gas transfer velocity of CO₂ in a macrotidal estuary (the Scheldt). *Estuaries* 27: 595-605.

Submitted

Carlson, M.C.G, Ribalet, F., Maidanik, I., Durham, B.P., Hulata, Y., **Ferrón, S.**, Weissenbach, J., Shamir, N., Goldin, S., Baran, N., Cael, B.B., Karl, D.M., White, A.E., Armbrust, E.V., Lindell, D. *Nature microbiology*, submitted.

RESEARCH GRANTS

- NSF (2021-2022): “*Oligotrophic ocean metabolism from underwater Glider measurements*”, \$233,082. Investigators: Ferrón (PI), Barone (co-PI).
- Deep Green Metals Inc. (2020-2022): “*Characterization and Monitoring of the Water Column Ecosystem in the Eastern CCZ (NORI-D)*”, 2,872,734. Investigators: Drazen (lead PI), Carter (co-PI), Ferrón (co-PI), Goetze (co-PI), Hatta (co-PI), Measures (co-PI), Popp (co-PI), White (co-PI).
- NSF (2019-2021): “*EAGER Collaborative Research: Early career chief scientist training for biological and chemical oceanographers*”, \$215,068 (UH component). Investigators: Goetze (PI), White (co-PI), and Ferrón (co-PI).
- Simons Foundation (2018-2020): “*Oceanography at the Gyre’s Edge*”, \$430,000
Lead Investigator: Armbrust, University of Washington
Co-Investigators: Karl (PI) and Ferrón (co-PI), and multiple institutions.

TEACHING EXPERIENCE

Fall 2018 **Science of the Sea**, University of Hawaii (Geology section)

2006- 2008 **Erasmus Mundus Joint Master in Water and Coastal Management**

University of Cádiz. *Teaching Assistant and occasional Lecturer*

- Chemistry of the carbonate system in aquatic environments
- The role of the littoral ecosystem on global warming

2004 **Teaching Certificate**

Complutense University of Madrid, Spain

ADVISING AND MENTORING

- Andrés Salazar Estrada, University of Hawaii, PhD candidate in Oceanography (serving as PhD Thesis advisor). August 2018 to present.
- Macarena Burgos, University of Hawaii, Postdoctoral scholar. April 2018 to present.
- Macarena Burgos (University of Cádiz, Spain, PhD candidate, degree in May 2017). Served as PhD committee member.
- Gerianne Terlouw, University of Hawaii, Post Graduate Trainee. Served as primary mentor from August 2016 to May 2018.
- Sarah-Jeanne Royer, University of Hawaii, Postdoctoral scholar. Served as co-mentor from August 2016-August 2018.

SELECTED CONFERENCES

Total: 32; first-author: 16

- Ferrón, S.**, White, A., Armbrust, E. V., Juranek, L. W., Ribalet, F., Watkins-Brandt, K., Karl, D. M. Metabolic Rates Along a Meridional Transect in the NE Pacific Ocean. Talk delivered at the **2018 Ocean Sciences Meeting**, Portland, Or, February 2018.
- Ferrón, S.**, Barone, B., Church, M. J., Karl, D. M. Biological oxygen production in the North Pacific Subtropical Gyre. Talk delivered at the **2017 Aquatic Sciences Meeting**, Honolulu, HI, February 2017.
- Ferrón, S.**, Wilson, S. T., del Valle, D. A., Karl, D.M. *Methane sources in the upper ocean at Station ALOHA*. Poster delivered at the **2014 Ocean Sciences Meeting**, Honolulu, Hawaii, February 2014.
- Ferrón, S.**, Larsen, L., Ho, D.T., Engel, V.C. *Determination of Flow Velocity in the Everglades at Different Scales: Results from SF₆ Tracer Release Experiments and Acoustic Doppler Velocimeter Measurements*. Poster delivered at the **9th INTECOL International Wetlands Conference**, Orlando, Florida. June 2012.
- Ferrón, S.**, Ho, D.T., Engel, V.C., Vázquez-Rodríguez, M., Reid, M.C., Larsen, L.G., Palya, A., Cawley, K., He, D., Jaffé, R. *Dynamics of organic and inorganic carbon in a mangrove-dominated estuarine system (Shark River, Florida)*. Talk delivered at the **Ocean Sciences Meeting**, Salt Lake City, Utah. February 2012.
- Ferrón, S.**, Ho, D.T., Hales, B.R. *Vertical diffusivity in the benthic boundary layer of the Oregon shelf from a deliberate tracer release experiment*. Poster delivered at the **AGU Fall Meeting**, San Francisco, California. December 2010.
- Ferrón, S.**, Ho, D.T., Hales, B.R., Reid, M.C., Kai, F-M, Schmieder, P.J., Hubbard, D. *Deliberate multi-tracer release study of transport and transformations of bottom boundary layer waters in a coastal upwelling system*. Poster delivered at the **Ocean Sciences Meeting**, Portland, Oregon. February 2010.

- Ferrón, S.**, Ortega, T., Gómez-Parra, A., Forja, A. *Methane and nitrous oxide distribution in surface waters of the Gulf of Cádiz*. Poster delivered at the **SOLAS Open Science Conference**, Xiamen, China. March 2007
- Ferrón, S.**, Ortega, T., Gómez-Parra, A., Forja, A. *Benthic production of greenhouse gases in a shallow ecosystem affected by organic matter inputs (Bay of Cádiz, Spain)*. Talk delivered at the **9th International Estuarine Biogeochemistry Symposium**-Estuaries and Enclosed Seas under Changing Environmental Conditions, Warnemunde, Germany. May 2006.
- Ferrón, S.**, Ortega, T., Forja, J.M., Gómez-Parra, A. *Seasonal variations in the concentration of three greenhouse gases (CH₄, CO₂ and N₂O) in a shallow coastal area affected by inputs of organic matter and nutrients*. Talk delivered at the **37th International Liège Colloquium on Ocean Hydrodynamics**, Liège, Belgium. May 2005.

AWARDS AND SCHOLARSHIPS

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| 2013 | C-MORE Postdoctoral Fellowship. C-MORE/SOEST, Dept. Oceanography, University of Hawaii. |
| 2008 | Dissertations Symposium in Chemical Oceanography (DISCO XXI). Honolulu, Hawaii. Invited participant. |
| 2007 | Spanish Ministry of Education, national exchange travel award. Instituto de Investigaciones Marinas (CSIC), Vigo, Spain. 3 months. |
| 2007 | University of Cadiz, student travel award. Xiamen, China. |
| 2006 | Spanish Ministry of Education, international exchange travel award. University of Copenhagen, Helsingor, Denmark. 3 months. |
| 2006 | University of Cadiz, student travel award. Warnemunde, Germany. |
| 2005 | Spanish Ministry of Education, international exchange travel award. University of Southern California, Los Angeles, California. 3 months. |
| 2005 | Second International SOLAS Summer School. Corsica, France. Invited participant. |
| 2005 | University of Cadiz, student travel award. Corsica, France. |
| 2005 | University of Cadiz, student travel award. Liege, Belgium. |
| 2004-2008 | Doctoral research fellowship from the Spanish Ministry of Education. University of Cadiz. |
| 2002-2003 | Erasmus-Socrates European student exchange award. University of Liège, Belgium. |

MANUSCRIPT REVIEWS

Algal Research, Biogeosciences, Bioresource Technology, Bulletin of Marine Science, Continental Shelf Research, Environmental Pollution, Environmental Science and Technology,

Geophysical Research Letters, Global Change Biology, Journal of Geophysical Research, Journal of Marine Systems, Limnology and Oceanography, Marine Chemistry, Tellus.

FIELDWORK

Date	Research Vessel	Location	Duration
July 2018	<i>R. V. Kaimikai-O-Kanaloa</i>	Off the coast of Big Island	4 days
April 2018	<i>R. V. Kaimikai-O-Kanaloa</i>	North Pacific Subtropical Gyre	4 days
February 2018	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	4 days
June-July 2017	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	21 days
May-June 2017	<i>R. V. Marcus G. Langseth</i>	North Pacific Ocean (21N-42N meridional Transect)	18 days
November 2016	<i>R.V. Sikuliaq</i>	North Pacific Subtropical Gyre	4 days
July 2016	<i>R. V. Kaimikai-O-Kanaloa</i>	North Pacific Subtropical Gyre	4 days
April-May 2016	<i>R. V. Kaimikai-O-Kanaloa</i>	North Pacific Ocean (21N-38N meridional Transect)	16 days
January 2016	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	4 days
November 2015	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	4 days
July-August 2015	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	14 days
May 2015	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	4 days
April 2015	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	4 days
June 2014	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	21 days
March 2014	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	14 days
November 2013	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	4 days
September 2013	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	12 days
May-June 2013	<i>R.V. Kilo Moana</i>	North Pacific Subtropical Gyre	14 days
July 2012	<i>R.V. Kilo Kai</i>	Kaneohe Bay, Hawaii	7 days
November 2011		Shark and Harney Rivers, Florida	10 days
October 2011		Greater Everglades, Florida	14 days
November 2010		Shark and Harney Rivers, Florida	10 days
October 2009		Greater Everglades, Florida	14 days

July-August 2009	<i>R.V. Wecoma</i>	Oregon shelf	14 days
May 2009	<i>R.V. Wecoma</i>	Oregon shelf	14 days
September 2007	<i>R.V. Mytilus</i>	Ría de Vigo, Spain	7 days
May 2007	<i>R.V. Ucádiz</i>	The Gulf of Cádiz, Spain	14 days
February 2007	<i>R.V. Mytilus</i>	The Gulf of Cádiz, Spain	14 days
November 2006	<i>R.V. Mytilus</i>	The Gulf of Cádiz, Spain	14 days
June 2006	<i>R.V. Mytilus</i>	The Gulf of Cádiz, Spain	14 days
April 2003	<i>R. V. Belgica</i>	The North Sea & Scheld Estuary	10 days
February-March 2003	<i>R.V. Luctor</i>	Scheld Estuary, Belgium	Multiple days
January 2003	<i>R. V. Belgica</i>	The North Sea	7 days
June 2002	<i>R.V. Mytilus</i>	Guadalquivir Estuary, Spain	14 days
