

Qianhui Qin

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EDUCATION

2015.9-present	Ph.D. in Marine Science (Degree Conferred March 2024) University of California, Santa Barbara
2013.1-2015.12	M.S. in Marine Sciences The University of Georgia (Degree Conferred December 2015)
2008.8-2012.6	B.S. in Chemistry (Marine Chemistry) Ocean University of China

RESEARCH EXPERIENCE

2015.9-2023.7	<p>Graduate Research in the laboratory of Dr. David L. Valentine, UCSB</p> <p>Research topic 1: Seasonality of Water Column Methane Oxidation and Deoxygenation in a Dynamic Marine Environment</p> <ul style="list-style-type: none">Utilized Winkler titration method to monitor changes in deep water column oxygen concentrations throughout a deoxygenation and reoxygenation event in the Santa Barbara Basin.Employed the headspace equilibrium method and gas chromatography (GC) to analyze fluctuations in deep water column methane concentrations during the event.Applied the $^3\text{H-CH}_4$ cultivation technique in conjunction with liquid scintillation counting to examine alterations in the deep water column methane oxidation rates throughout the event.Conducted experiments involving adjustments to initial methane or oxygen concentrations to assess whether either methane or oxygen concentrations have a kinetic influence on the methane oxidation rates. <p>Research topic 2: Methane Budgeting for the Deep Santa Barbara Basin Deep Water Column Indicates Seasonal Source Variability</p> <ul style="list-style-type: none">Assumed linear variations in methane concentration and methane oxidation rate between sampling depths and adjacent sampling days. These assumptions were crucial in calculating methane inventories and sinks under different environmental conditions.
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- Assumed a steady-state condition for each sampling day to estimate the daily minimum methane input required for the deep water column. This estimation utilized previously published data on methane oxidation rates, methane concentrations, and incorporated vertical methane diffusion.
- Revealed that anoxic conditions demand a greater influx of methane into the deep water column, and discussed the plausible factors contributing to the methane input demand changes.
- Compared results with new data collected during a 2023 oceanic research expedition, revealed an even greater demand for methane input in the presence of well-established and persistent anoxic conditions.

Research topic 3: Mechanistic Insights into Stable Carbon Isotope Fractionation in Marine Archaeal Methylotrophic Methanogenesis

- Cultivated four distinct marine methylotrophic methanogen strains using anaerobic cultivation techniques.
- Employed modified phosphate-buffered media, rather than regular bicarbonate-buffered media, to investigate carbon isotope fractionation from methylated substrates to the disproportionation reaction products - CH₄ and CO₂ during different cultivation stages of methylotrophic methanogen strains.
- Implemented two cultivation settings for studying the carbon isotopic fractionations of methylotrophic methanogenesis pathways: a) Open system setting, where the strains were cultivated for a short time with abundant substrates; b) Closed system setting, where the strains were cultivated for an extended time with limited substrates. Similar isotopic fractionation factors at the branch point were anticipated under both settings.
- Both wild strains and a mutant strain in which the reduction of methylated substrate is coupled to hydrogen oxidation or acetate oxidation were studied to provide mechanistic insight of isotopic variations originating at the reaction branch point.

2013.1-2015.7

Graduate Research in the laboratory of Dr. Ming-Yi Sun, Department of Marine Sciences, the University of Georgia.

Research topic: Effect of Cell Growth on Lipids and Associated Molecular Isotopic Compositions of *Thalassiosira Pseudonana*.

- Developed a continuous cultivation apparatus to culture diatom *Thalassiosira pseudonana* under varying growth rates.
- Conducted the extraction of total lipids from culture samples using a combination of Folch extraction and sonication techniques.
- Utilized standard wet chemistry methods, including compound derivatization and column chromatography.

- Identified and quantified fatty acid methyl esters (FAMES) using GC-FID.
- Performed compound-specific isotope analysis using GC-C-IRMS to assess the carbon isotopic compositions.

2012.7-2012.12 Technician, Marine Ecology Research Center, the First Institute of Oceanography, State Oceanic Administration of China.
 Research topic: Structural Characteristics at the Adductor Muscle and Shell Interface in Mussels.

2010.12-2012.6 Undergraduate Research Assistant, Department of Marine Chemistry and Chemical Engineering, Ocean University of China.
 Research topic: Study on the Electrochromic Properties of Two Polyoxometalate Viologen-based Compounds.

FIELD EXPERIENCE

2019.11 Science crew. BASIN19 cruise, RV Atlantis.
 Responsibility: Water column methane concentration sample collection and measurement using GC; Sediment methane flux sample measurement using benthic flux chamber.

2019.6-2020.3 Science crew. Day trips to Santa Barbara Basin to collect deep water samples.
 Responsibility: launching and recovering of CTD rosette to collect deep water Samples; water sample collection for methane concentration measurements and methane oxidation measurements.

2014.9 **Science crew in the** LTER (The Long-Term Ecological Research) September Research Cruise. Responsibility: CDOM, DOC, FTICRMS sampling.

2012.3 Dong Fang Hong II January Research Cruise. Responsibility: pH, alkalinity and salinity measuring. Phosphate, silicate and nitrate analysis.

PUBLICATIONS

Krause, S.J., Liu, J., Yousavich, D.J., Robinson, D., Hoyt, D.W., **Qin, Q.**, Wenzhöfer, F., Janssen, F., Valentine, D.L. and Treude, T., 2023. Evidence of cryptic methane cycling and non-methanogenic methylamine consumption in the sulfate-reducing zone of sediment in the Santa Barbara Basin, California. *Biogeosciences*, 20(20), pp.4377-4390.

Qin, Q., Kinnaman, F.S., Gosselin, K.M., Liu, N., Treude, T. and Valentine, D.L., 2022. Seasonality of water column methane oxidation and deoxygenation in a dynamic marine environment. *Geochimica et Cosmochimica Acta*, 336, pp.219-230.

Campbell, B.J., Sessions, A.L., Fox, D.N., Paul, B.G., **Qin, Q.**, Kellermann, M.Y. and Valentine, D.L., 2017. Minimal influence of [NiFe] hydrogenase on hydrogen isotope fractionation in H₂-oxidizing cupriavidus necator. *Frontiers in Microbiology*, 8, p.1886.

Qin, Q., 2015. Influences of cell growth rate and cellular structures on molecular stable carbon isotopic composition of planktonic fatty acids (Masters dissertation, University of Georgia).

MANUSCRIPTS IN PREPARATION

Qin Q, Kinnaman FS, Gosselin KM, Murphy K, Krause SJ, Treude T, Valentine DL. Methane Budgeting for the Deep Santa Barbara Basin Deep Water Column Indicates Seasonal Source Variability.

Qin Q, Valentine DL. Mechanistic Insights into Stable Carbon Isotope Fractionation in Marine Archaeal Methylophilic Methanogenesis.

Liu J, Young ED, Pellerin A, Ash JL, Barrett GT, Girguis PR, Harris CM, Krause SJ, Leavitt WD, Murphy K, **Qin Q**, Sivan O, Teske A, Valentine DL, Anthony KW, Treude T. Methane clumped isotopes reveal the formation mechanism of microbial methane.

Qin Q, Pan H, Sun M-Y, Influences of cell growth rate and cellular structures on molecular stable carbon isotopic composition of planktonic fatty acids.

MEETINGS AND PRESENTATIONS

- 2023.4 UCSB Earth Science 2023 Graduate Research Poster Review
Seasonality of water column methane oxidation and deoxygenation in a dynamic marine environment.
- 2023.4.29 The 19th Southern California Geobiology symposium, UC Santa Barbara, CA.
Poster presentation: **Q Qin**, FS Kinnaman, KM Gosselin, N Liu, T Treude, DL Valentine.
Seasonality of water column methane oxidation and deoxygenation in a dynamic marine environment.
- 2021 UCSB IGPMS Seminar 2021
Seasonality of water column methane oxidation and deoxygenation in a dynamic marine environment
- 2020.2.16-21 Ocean Sciences Meeting, San Diego, CA.
Poster presentation 1: **Q Qin**, FS Kinnaman, KM Gosselin. Time series of oxygen concentration, methane concentration and methane oxidation rate change of deep Santa Barbara Basin water column.

Poster presentation 2: T Treude, DL Valentine, KM Gosselin, F Janssen, FS Kinnaman, S Krause, N Liu, X Peng, **Q Qin**, D Robinson, J Tarn, F Wenzhöfer, DJ Yousavich.
Coupling of sulfur, nitrogen and carbon biogeochemistry in oxygen minimum zone sediments covered by giant sulfur bacteria mats (Santa Barbara Basin, California).
- 2019 UCSB Earth Science 2019 Graduate Research Poster Review
Testing the effectiveness of a microbial syntrophy
- 2019 UCSB IGPMS Seminar 2019

Testing the effectiveness of a microbial syntrophy

- 2017 UCSB IGPMS Seminar 2017
Stable carbon isotopic fractionations during methanogenesis and anaerobic methane oxidation processes
- 2016 UCSB Earth Science 2016 Graduate Research Poster Review
Isotopic signatures of methanogenesis processes

TEACHING AND MENTORING EXPERIENCE

- 2022 Fall Teaching Assistant, Biogeochemistry of Stable and Cosmogenic Isotopes, Earth Science Department, UCSB
- 2021 Spring Teaching Assistant, Global Warming (remote sessions), Earth Science Department, UCSB
- 2020 Fall Teaching Assistant, Introduction to Oceanography (remote sessions), Earth Science Department, UCSB
- 2020 Winter Teaching Assistant, Climate Change: Lessons from the Past, Earth Science Department, UCSB
- 2019 Fall Lead Teaching Assistant, Antarctica: The Last Place on Earth, Earth Science Department, UCSB
- 2019 Spring Lead Teaching Assistant, Introduction to Oceanography, Earth Science Department, UCSB
- 2018 Spring Teaching Assistant, Earth System Ocean-Atmosphere, Earth Science Department, UCSB
- 2018 Winter Teaching Assistant, Biogeochemistry of Stable and Cosmogenic Isotopes, Earth Science Department, UCSB
- 2016 Spring Teaching Assistant, Introduction to Oceanography, Earth Science Department, UCSB
- 2016 Winter Teaching Assistant, Introduction to Oceanography, Earth Science Department, UCSB
- 2015 Fall Teaching Assistant, Introduction to Oceanography, Earth Science Department, UCSB

AWARDS AND FELLOWSHIPS

- 2022.4 IGPMS Block Grant, Interdepartmental Graduate Program in Marine Science, UCSB
- 2021.8 CARES MSI Summer Grant, Graduate Division, UCSB
- 2018.4 IGPMS Block Grant, Interdepartmental Graduate Program in Marine Science, UCSB
- 2018.6 The Graduate Student Opportunity Award, Earth Science Department, UCSB
- 2018.6 The Lloyd and Mary Edward Field Studies Fellowship in Earth Science, Earth Science Department, UCSB

2013	Excellent Volunteer of the International Orientation at the University of Georgia
2012	Commencement Speaker of the Department of Chemistry and Chemical Engineering 2012 Graduation Ceremony.
2011	Excellent Student of the Year (This is the highest student honor for students in Ocean University of China. 8/15,500 Students in Ocean University of China won this honor in 2011)
2011	Bank of Qingdao Scholarship (for students with excellent performance in professional courses)
2010	National Scholarship (sponsored by the Ministry of Education of China; 50/15,500 students in Ocean University of China won this honor in 2011)
2009	First Prize of the 1st Ocean University of China English Speech Contest
2009	Third Prize of Shandong Province of the 15th National College English Speech Contest
2008-2012	Outstanding Student (successively in four years)
2008-2012	Ocean University of China Scholarship (successively in four years)
2008	Outstanding Volunteer for the 2008 Beijing Olympic Games Sailing Competitions in Qingdao