

Andrea J. Fassbender

Research Physical Scientist
NOAA Pacific Marine Environmental Laboratory
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EDUCATION

- 2010 - 2014 Ph.D. Oceanography
University of Washington (UW), School of Oceanography, Advised by Dr. Christopher L. Sabine
Dissertation: New approaches to study the marine carbon cycle
- 2007 - 2010 M.S. Oceanography
UW School of Oceanography, Advised by Dr. Christopher L. Sabine
- 2007 - 2009 Graduate Certificate in Climate Science
UW Program on Climate Change
- 2003 - 2007 B.S. Combined Honors: Chemistry and Oceanography
University of British Columbia, Advised by Dr. Kristin Orians
Thesis: Manganese as a tracer of bottom water renewal in Saanich Inlet, British Columbia

APPOINTMENTS

- 2020 - present Research Physical Scientist, NOAA Pacific Marine Environmental Laboratory (PMEL)
- 2018 - present Assistant Adjunct Professor in Ocean Sciences, UC Santa Cruz
- 2017 - 2020 Scientist, Monterey Bay Aquarium Research Institute
- 2014 - 2016 UCAR Postdoctoral Fellow: Postdocs Applying Climate Expertise; Host: NOAA PMEL
- 2007 - 2014 Chemical Oceanography Ph.D. Student, UW

PUBLICATIONS (*Lab member)

IN REVIEW

Siegel, D. **et al.** Overview of the EXport Processes in the Ocean from RemoTe Sensing (EXPORTS) Northeast Pacific Field Deployment. In review at *Elementa*.

Fassbender A.J., J.C. Orr, and A.G. Dickson. Technical note: Interpreting pH changes (2021). In review at *Biogeosciences*, doi: [10.5194/bg-2020-348](https://doi.org/10.5194/bg-2020-348). **Media:** [EGU Blogs: Biogeosciences](#)

REFEREED

22. *Haskell W.Z., **A.J. Fassbender**, *J.S. Long, and J.N. Plant. Annual net community production of particulate and dissolved organic carbon from a decade of biogeochemical profiling float observations in the Northeast Pacific (2020). *Global Biogeochemical Cycles*, doi: [10.1029/2020GB006599](https://doi.org/10.1029/2020GB006599).
Media: [OCB Research Highlight](#)
21. Rodgers, K.B., S. Schlunegger, R.D. Slater, M. Ishii, T.L. Frölicher, K. Toyama, Y. Plancherel, O. Aumont, and **A.J. Fassbender**. Re-emergence of anthropogenic carbon into the ocean's mixed layer strongly amplifies transient climate sensitivity (2020). *Geophysical Research Letters*, doi: [10.1029/2020GL089275](https://doi.org/10.1029/2020GL089275).
20. Johnson, K.S., M.F. Bif, S.M. Bushinsky, **A.J. Fassbender**, and Y. Takeshita. Biogeochemical Argo [in "State of the Climate in 2019"] (2020). *Bull. Amer. Meteor. Soc.*, 101 (8), S39–S41, doi: <https://doi.org/10.1175/BAMS-D-20-0105.1>.
19. Cai, W.J. **et al.** Controls on surface water carbonate chemistry along North American ocean margins (2020). *Nature Communications*, doi: [10.1038/s41467-020-16530-z](https://doi.org/10.1038/s41467-020-16530-z).
Media: [UDaily article](#)
18. Sulpis, O., Dofour, C.O., Trossman, D.S., **Fassbender, A.J.**, Arbic, B.K., Boudreau, B.P., Dunne, J.P., and A. Mucci. Decreasing bottom-current speeds and seafloor CaCO₃ dissolution under a business-as-usual scenario (2019). *Global Biogeochemical Cycles*, doi: [10.1029/2019GB006230](https://doi.org/10.1029/2019GB006230).

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17. Todd, R. E., Chavez, F. P., Clayton, S., **et al.**, Global perspectives on observing ocean boundary current systems (2019). *Frontiers in Marine Science*, doi: [10.3389/fmars.2019.00423](https://doi.org/10.3389/fmars.2019.00423).
16. Carter, B.R., Williams, N.L., Evans, W., **Fassbender, A.J.**, Barbero, L., Hauri, C., Feely, R.A., and A.J. Sutton. Time-of-emergence as a metric for prioritizing between climate observation quality, frequency, and duration (2019). *Geophysical Research Letters*, doi: [10.1029/2018GL080773](https://doi.org/10.1029/2018GL080773).
15. **Fassbender, A.J.**, Bourbonnais, A., Clayton, S., Gaube, P., Omand, M., Franks, P., Altabet, M.A., and D.J. McGillicuddy Jr. (2018). Interpreting mosaics of ocean biogeochemistry. *Eos*, doi: [10.1029/2018EO109707](https://doi.org/10.1029/2018EO109707).
14. **Fassbender, A.J.**, Rodgers, K.B., Palevsky, H.I., and C.L. Sabine (2018). Seasonal asymmetry in the evolution of surface ocean $p\text{CO}_2$ and pH thermodynamic drivers and the influence on sea-air CO_2 flux. *Global Biogeochemical Cycles*, doi: [10.1029/2017GB005855](https://doi.org/10.1029/2017GB005855).

Media: [Comment by Ryan J. Woosley](#)

13. **Fassbender, A.J.**, Alin, S.R., Feely, R.A., Sutton, A.J., Newton, J.A., Krembs, C., Bos, J., Keyzers, M., Devol, A., Ruef, W., and G. Pelletier (2018). Seasonal carbonate chemistry variability in marine surface waters of the US Pacific Northwest. *Earth System Science Data*, doi: [10.5194/essd-10-1367-2018](https://doi.org/10.5194/essd-10-1367-2018).

Media: [PMEL Monthly Feature Publication](#)

12. Feely, R.A., Okazaki, R.R., Cai, W.-J., Bednaršek, N., Alin, S.R., Byrne, R.H., and **A.J. Fassbender** (2017). The combined effects of acidification and hypoxia on pH and aragonite saturation in the coastal waters of the California Current Ecosystem and the northern Gulf of Mexico. *Continental Shelf Research*, doi: [10.1016/j.csr.2017.11.002](https://doi.org/10.1016/j.csr.2017.11.002).
11. **Fassbender, A.J.**, Palevsky, H.I., Martz, T.R., Ingalls, A.E., Gledhill, M., Fawcett, S.E., Brandes, J.A., Aluwihare, L.I., and the participants of *COME ABOARD* and *DISCO XXV* (2017). Perspectives on Chemical Oceanography in the 21st century: Participants of the COME ABOARD Meeting examine aspects of the field in the context of 40 years of DISCO. *Marine Chemistry*, doi: [10.1016/j.marchem.2017.09.002](https://doi.org/10.1016/j.marchem.2017.09.002).
10. **Fassbender, A.J.**, Sabine, C.L., and H.I. Palevsky (2017). Nonuniform ocean acidification and attenuation of the ocean carbon sink. *Geophysical Research Letters*, doi: [10.1002/2017GL074389](https://doi.org/10.1002/2017GL074389).
9. **Fassbender, A.J.**, Sabine, C.L., Cronin, M.F., and A.J. Sutton (2017). Mixed layer carbon cycling at the Kuroshio Extension Observatory. *Global Biogeochemical Cycles*, doi: [10.1002/2016GB005547](https://doi.org/10.1002/2016GB005547).

Media: [OCB](#) & [US CLIVAR](#) Research Highlights

8. **Fassbender, A.J.**, Alin, S.R., Feely, R.A., Sutton, A.J., Newton, J.A., and R.H. Byrne (2017). Estimating total alkalinity in the Washington State coastal zone: Complexities and surprising utility for ocean acidification research. *Estuaries and Coasts*, doi: [10.1007/s12237-016-0168-z](https://doi.org/10.1007/s12237-016-0168-z).
7. Newsom, E.R., **Fassbender, A.J.**, Maloney, A.E., and S.M. Bushinsky (2016). Increasing the usability of climate science in political decision-making. *Elementa: Science of the Anthropocene*, doi: [10.12952/journal.elementa.000127](https://doi.org/10.12952/journal.elementa.000127).

Media: [UW Today](#)

6. **Fassbender, A.J.**, Sabine, C.L., and K.M. Feifel (2016). Consideration of coastal carbonate chemistry in understanding biological calcification. *Geophysical Research Letters*, 43(9), 4467-4476, doi: [10.1002/2016GL068860](https://doi.org/10.1002/2016GL068860).

Media: [Nature Climate Change Research Highlight](#)

5. **Fassbender, A.J.**, Sabine, C.L., and M.F. Cronin (2016). Net community production and calcification from seven years of NOAA Station Papa Mooring measurements. *Global Biogeochemical Cycles*. doi: [10.1002/2015GB005205](https://doi.org/10.1002/2015GB005205).

Media: [Eos Research Spotlight](#)

4. **Fassbender, A.J.**, Sabine, C.L., Lawrence-Slavas, N., De Carlo, E.H., Meinig, C. and S. Maenner Jones (2015). Robust sensor for extended autonomous measurements of surface ocean dissolved inorganic carbon. *Environmental Science & Technology*, doi: [10.1021/es5047183](https://doi.org/10.1021/es5047183).

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3. Pfeil, B., Olsen, A., Bakker, D. C. E., Hankin, S., Koyuk, H., Kozyr, A., Malczyk, J., Manke, A., Metzl, N., Sabine, C. L., **et al.** (2013). A uniform, quality controlled Surface Ocean CO₂ Atlas (SOCAT). *Earth System Science Data*, doi: [10.5194/essd-5-125-2013](https://doi.org/10.5194/essd-5-125-2013).
2. Sabine, C. L., Hankin, S., Koyuk, H., Bakker, D. C. E., Pfeil, B., Olsen, A., Metzl, N., Kozyr, A., **Fassbender, A.J.**, **et al.** (2013). Surface Ocean CO₂ Atlas (SOCAT) gridded data products. *Earth System Science Data*, doi: [10.5194/essd-5-145-2013](https://doi.org/10.5194/essd-5-145-2013).
1. **Fassbender, A.J.**, Sabine C.L., Feely, R.A., Langdon, C., and C.W. Mordy (2011). Inorganic carbon dynamics during northern California coastal upwelling. *Continental Shelf Research*, doi: [10.1016/j.csr.2011.04.006](https://doi.org/10.1016/j.csr.2011.04.006).

NON-REFERREED PUBLICATIONS

- Fassbender, A. J.**, J. B. Palter, M. C. Long, T. Ito, S. P. Bishop, and M. F. Cronin, **2018**: Ocean Carbon Hot Spots. A Joint US CLIVAR and OCB Workshop Report, 2018-3, 34pp., doi:[10.5065/D6Z036ZS](https://doi.org/10.5065/D6Z036ZS).
- Rodgers, K.B., Zhai, P., Iudicone, D., Aumont, O., Carter, B., **Fassbender, A.J.**, Griffies, S.M., Plancherel, Y., Resplandy, L., Slater, R.D., and K. Toyama. “Western boundary currents as conduits for the ejection of anthropogenic carbon from the thermocline”. Joint [US CLIVAR Variations](#) & [OCB News](#) edition entitled *Frontiers in western boundary current research*. November **2017**.
- Zhang, D., Cronin, M.F., Lin, X., Inoue, R., **Fassbender, A.J.**, Bishop, S.P., and A.J., Sutton. “Observing air-sea interaction in the western boundary currents and their extension regions: Considerations for OceanObs 2019”. Joint [US CLIVAR Variations](#) & [OCB News](#) edition entitled *Frontiers in western boundary current research*. November **2017**.
- Qiu, B., Oka, E., Bishop, S.P., Chen, S., and **A.J. Fassbender**. “Decadal variability of the Kuroshio Extension system and its impact on subtropical mode water formation”. Joint [US CLIVAR Variations](#) & [OCB News](#) edition entitled *Frontiers in western boundary current research*. November **2017**.
- Fassbender, A.J.** and C.L. Sabine. "Observing changes in the surface ocean carbon inventory, autonomously". *IMBER Update Newsletter*. June **2015**. <http://www.imber.info/News/Newsletters/Issue-n-28-June-2015>

GRANTS

RESEARCH

- 2020 K.S. Johnson (Lead PI, MBARI); Co-PIs: S. Riser (UW); L. Talley (Scripps); S. Wijffels (WHOI); J. Sarmiento (Princeton). [Mid-scale RI-2 Consortium: Biogeochemical-Argo: A global robotic network to observe changing ocean chemistry and biology](#). NSF-OCE-1946578, \$52,942,749. Nov. 2020 – Oct. 2025. **A.J. Fassbender** is Senior Personnel and Co-lead of the Data Team.
- 2020 **A.J. Fassbender** (Lead PI*, MBARI), K.S. Johnson (MBARI), D. Nicholson (WHOI), M. Estapa (UMaine), I. Cetinić (UMaine). [Collaborative Research: Multi-Platform Approach to Evaluate Spring Bloom Timing and Carbon Export Processes in the North Atlantic Ocean](#). NSF-OCE-2023274, \$995,934 (\$472,642 MBARI portion), Aug. 2020 – July 2023.
*Lead PI status transferred to K.S. Johnson when Fassbender moved to NOAA PMEL. Project effort still led by Fassbender
- 2019 C. Edwards (Lead PI, UCSC), UCSC Co-PIs: J. Fiechter, K. Kroeker, A. Moore, and MBARI Co-PIs: **A.J. Fassbender**, and H. Ruhl. [An observing system optimization study for ocean acidification along the central and northern California coast](#). NOAA, \$769,999 (\$155,461 MBARI portion), Sept. 2019 – Aug. 2021.
- 2018 J. Palter (Lead PI, URI), A. Gray (UW), and Collaborators: S.P. Bishop (NCSU), S. Bushinsky (Princeton), K. Donohue (URI), **A.J. Fassbender** (MBARI), A.J. Sutton (PMEL), and R. Weller (WHOI). [Exchange of heat and carbon in the Gulf Stream and mode water formation region: Proof of concept for a Western Boundary Current observing system](#). 2018 Saildrone Award, \$1,000,000 in Saildrone time, Jan. 1 – 31, 2019.

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- 2018 A.J. Sutton (Lead PI, PMEL), M. Casari (Co-PI, PMEL), N. Lawrence-Slavas (Co-PI, PMEL), S. Chu (Co-PI, PMEL), C. Meinig (Co-PI, PMEL), **A.J. Fassbender** (Co-PI, MBARI), and C.L. Sabine (Co-PI, UH Mānoa). [*Air-sea CO₂ and dissolved inorganic carbon system for autonomous moored and surface vehicle applications*](#). NOPP, \$715,000 (\$43,743 MBARI portion), Oct. 2018 – Sept. 2020.
- 2018 **A.J. Fassbender** (PI*, MBARI*). [*Constraining upper-ocean carbon export with biogeochemical profiling floats*](#). NSF-OCE-1756932, \$683,207, Mar. 2018 – Feb. 2021.
 *Grant transferred to UCSC in 2019
 *Lead PI status transferred to P.J. Lam when Fassbender moved to NOAA PMEL. Project effort still led by Fassbender

2017 **A.J. Fassbender** (PI). *Carbon wave glider development*. MBARI, \$75,000, Jan. 2018 – Dec. 2020.

COMMUNITY BUILDING

- 2020 K.S. Johnson, R. Hotinski, **A.J. Fassbender**, S. Riser, L. Talley, and S. Wijffels. *A Proposal for a Joint OCB-CLIVAR Scoping Workshop on the Major Expansion of BGC-Argo and the Use of Profiling Floats*. OCB and US CLIVAR will assist with community advertising and workshop implementation. No funding was requested. Virtual workshop planned for 2021.
- 2019 C. Brendan, M. Álvarez, A. Dickson, Y. Takeshita, N. Williams, A. Murata, L. Barbero, R. Byrne, **A.J. Fassbender**, M. Chierici, W.J. Cai, R. Woosley, and R. Easley. *Ocean Carbonate System Intercomparison Forum*. OCB: \$29,500. Working Group 2019-2020.
- 2016/2017 **A.J. Fassbender** and S.P. Bishop. *Ocean Carbon Hot Spots Workshop*. OCB: \$25,404. U.S. CLIVAR: \$25,000. Held Sept. 2017.

HONORS, AWARDS, & *SERVICE APPOINTMENTS

- 2020 Chinese-American Kavli Frontiers of Science symposium, invited speaker - *postponed until 2021*
- 2019 [US CLIVAR Early Career Scientist Leadership Award](#)
- 2019 Jupiter Research Foundation [REACT Program](#) Scientific Advisory Board*
- 2018 [AGU 2017 Editor's Citation for Excellence in Refereeing - JGR-Oceans](#)
- 2017 PMEL Outstanding Scientific Publication Nomination: doi: [10.1002/2015GB005205](#)
- 2017 OCB Scientific Steering Committee Early Career Member, nominated and elected*
- 2017 Invited Co-Guest Editor of joint [U.S. CLIVAR Variations & OCB News Edition](#)*
- 2017 Climate Impact on Ocean Systems Workshop (Stanford), invited participant
- 2017 ALPS II (Scripps), invited participant
- 2016 COME ABOARD Meeting (Honolulu, HI), invited participant and meeting Chair*
- 2014 Dissertations in Chemical Oceanography (DISCO) XXIV (Kauai, HI), invited participant
- 2014 Student Oral Presentation Award (Bergen, Norway), IMBER Open Science Conference
- 2012 - 2014 NSF IGERT Program on Ocean Change Fellowship
- 2008 - 2009 UW Program on Climate Change Fellowship
- 2007 - 2008 UW Graduate School Top Scholar Award

SELECT CONFERENCE PROCEEDINGS

Haskell, W.Z., **A.J. Fassbender**, and J.S. Long. "A decade of net POC, DOC, and PIC production in the North Pacific from biogeochemical profiling floats." *OceanObs'19. Poster*. Honolulu, HI. September 15-20, **2019**.

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- Fassbender, A.J.**, S. Po-Chedley, S. Schlunegger, and K.B. Rodgers. “Interactions between natural and anthropogenic carbon pools alter annual ocean carbon uptake through seasonal processes.” Chapman Conference on Understanding Carbon-Climate Feedbacks. **Talk**. San Diego, CA. August 26-30, **2019**.
- Fassbender, A.J.**, J. Cross, W. Guo, G. Waldbusser, L. Bach, K. Krumhardt, and B. Boudreau. “Calcification and the Carbon Cycle.” Ocean Carbon and Biogeochemistry Summer Workshop. **Session Intro Talk**. Woods Hole, Massachusetts. June 26, **2019**.
- Fassbender, A.J.**, Rodgers, K.B., and S. Schlunegger. “A Modified Marine Carbon Cycle Under RCP8.5: Implications for Ocean Carbon Storage.” AGU Fall Meeting. **Talk**. Washington, DC. December 12, **2018**.
- Fassbender, A.J.**, Rodgers, K.B., Sabine, C.L., and H.I. Palevsky. “Drivers of Seasonal $p\text{CO}_2$ Variability at Subtropical-Subpolar Boundaries and the Evolution of Sea-Air CO_2 Fluxes through 2100 Under the RCP8.5 Concentration Pathway.” Ocean Sciences Meeting. **Talk**. Portland, Oregon. February 11-16, **2018**.
- Fassbender, A.J.**, C.L. Sabine, and H.I. Palevsky. “Non-Uniform Ocean Acidification and Attenuation of the Ocean Carbon Sink.” Chemical Oceanography Gordon Conference. **Poster**. New London, New Hampshire. July 24-28, **2017**.

INVITED TALKS

- Fassbender, A.J.**, S. Schlunegger, K.B. Rodgers, S. Po-Chedley. “How will 21st Century Technology Change the way we Observe the Marine Carbon Cycle?” University of Rhode Island, Vetlesen Distinguished Lecture Series. Narragansett, RI. January 29, **2020**.
- Fassbender, A.J.**, S. Schlunegger, K.B. Rodgers, S. Po-Chedley. “How do natural and anthropogenic carbon pool interactions alter ocean carbon uptake.” Scripps Institution of Oceanography, Geoscience/Marine Chemistry & Geochemistry Seminar. San Diego, CA. December 2, **2019**.
- Fassbender, A.J.**, S. Po-Chedley, S. Schlunegger, and K.B. Rodgers. “Interactions between natural and anthropogenic carbon pools alter annual ocean carbon uptake through seasonal processes.” Lawrence Livermore National Lab, Climate Science Seminar. Livermore, CA. August 21, **2019**.
- Fassbender, A.J.**, Schlunegger, S., and K.B. Rodgers. “Sensitivity of the ocean carbon sink to natural and anthropogenic carbon cycle interactions.” UC Santa Barbara Interdepartmental Graduate Program in Marine Science Seminar. Santa Barbara, CA. April 23, **2019**.
- Fassbender, A.J.**, Rodgers, K.B., Schlunegger, S., Palevsky, H.I., and C.L. Sabine. “Sensitivity of the ocean carbon sink to natural and anthropogenic carbon cycle interactions.” OCB Ocean Carbon Uptake in CMIP6 Models Synthesis and Intercomparison Workshop. Washington, DC. December 9, **2018**.
- Fassbender, A.J.**, Rodgers, K.B., Schlunegger, S., Palevsky H.I., and C.L. Sabine. “Chemical feedbacks in the climate system: A modified marine carbon cycle under business-as-usual carbon dioxide emissions.” University of Montana Chemistry Department Seminar. Missoula, MT., October 22, **2018**.
- 2018** Goldschmidt Invited Speaker for the session *Carbon Storage in the Ocean now and over Time (071)*. Declined for scheduling reasons.
- Fassbender, A.J.**, Rodgers, K.B., Schlunegger, S., Palevsky H.I., and C.L. Sabine. “Natural and Anthropogenic Carbon Cycle Interactions.” Moss Landing Marine Laboratories Seminar Series. Moss Landing, CA., April 12, **2018**.
- Fassbender, A.J.** “Drivers and sensitivities of ocean carbon uptake.” UC Santa Cruz Spring Seminar Series. Santa Cruz, California. June 2, **2017**.
- Fassbender, A.J.** and S.R. Alin. “Estimating total alkalinity in the coastal zone: considerations, complexities, and the surprising utility for ocean acidification research.” Washington State Department of Ecology. Olympia, Washington. December 15, **2015**.
- Fassbender, A.J.** “New approaches to study the marine carbon cycle.” Monterey Bay Aquarium Research Institute. Moss Landing, California. October 21, **2015**.

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SERVICE ACTIVITIES

COMMUNITY EVENTS

Feb. 16 - 21, 2020	Co-Chair of the Ocean Sciences Session: <i>Seasonal Cycles of Ocean Biogeochemistry and Ecosystems Under a Changing Climate</i> . San Diego, CA.
June. 24 - 27, 2019	Co-Chair of the OCB Summer Workshop Session on <i>Calcification and the Carbon Cycle</i> . Woods Hole, MA.
Feb. 12 - 16, 2018	Co-Chair of the Ocean Sciences Session: <i>Spatial and Temporal Variability of Seawater Chemistry in Coastal Ecosystems in the Context of Global Change</i> . Portland, OR.
Sept. 25 - 26, 2017	Co-Chair of the joint sponsored U.S. CLIVAR & OCB Ocean Carbon Hot Spots Workshop held at the Monterey Bay Aquarium Research Institute. Moss Landing, CA.
June 26 - 29, 2017	Co-Chair of the OCB Summer Workshop Session on <i>Physical-Biological-Biogeochemical Interactions</i> . Woods Hole, MA.
Oct. 14 - 16, 2016	Chair of the Chemical Oceanography MEeting: A BOttom-up Approach to Research Directions (COME ABOARD) Meeting held at UH Mānoa. Honolulu, HI.
2012 - 2013	Co-Organizer of the IGERT Program on Ocean Change Winter Seminar Series. UW.
2009 - 2010	Science Program Co-Organizer of the 4 th Annual Graduate Climate Conference. Pack Forest, WA.

REFEREE

2018 - 2019	Guest Associate Editor for <i>Frontiers in Marine Science</i> Coastal Ocean Processes topic on Spatial and Temporal Variability of Seawater Chemistry in Coastal Ecosystems in the Context of Global Change .
2018	Co-Guest Editor for Joint U.S. CLIVAR Variations & OCB News Edition on Frontiers in Western Boundary Current Research .
Journal Reviews	Environmental Science & Technology, Limnology and Oceanography, Deep Sea Research Part I, Marine Chemistry, Global Biogeochemical Cycles, Estuaries and Coasts, Journal of Geophysical Research Oceans, Geophysical Research Letters, Oceanography, AGU Books, Frontiers in Marine Science, AGU Advances, Scientific Reports, Biogeosciences, Nature
Proposal Reviews	Sea Grant, NOAA OAP, NSF-Physical Oceanography, NSF-Chemical Oceanography, NSF-OTIC, Schmidt Ocean Institute