

William K. Oestreich

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EDUCATION

Stanford University

Doctor of Philosophy (PhD) in Biology

Advisors: Dr. Larry Crowder and Dr. Jeremy Goldbogen

PhD Thesis: Animal migration and behavioral flexibility in an era of rapid global change

Pacific Grove, CA, USA

In progress, expected April 2022

Northwestern University

Master of Science (MS) in Environmental Engineering

Advisor: Dr. Luisa Marcelino

BS/MS Thesis: Variability in coral bleaching severity: Insights from application of Bleaching Response Index (BRI) to global and Caribbean bleaching records

Evanston, IL, USA

2015

Northwestern University

Bachelor of Science (BS) in Environmental Engineering

Evanston, IL, USA

2015

SELECT PROFESSIONAL EXPERIENCE

Monterey Bay Aquarium Research Institute

Moss Landing, CA, USA

Postdoctoral Research Fellow

Starting summer 2022

Stanford University

Pacific Grove, CA, USA

Graduate Research Fellow

Aug 2017 - Present

Woods Hole Oceanographic Institution

Woods Hole, MA, USA

Research Assistant III, Computational Biogeochemistry Group (PI: Dr. Scott Doney)

Aug 2015 - July 2017

Jal Bhagirathi Foundation + Northwestern University

Jodhpur, Rajasthan, India

Water Quality Research Technician

June 2015 - Aug 2015

Natural Resources Defense Council

Chicago, IL, USA

Litigation Team Intern

Jan 2015 - June 2015

PEER-REVIEWED PUBLICATIONS (* denotes co-first authorship)

16. Oestreich, WK, Abrahms, B, McKenna, MF, Goldbogen, JA, Crowder, LB, and Ryan, JP (2022). Acoustic signature reveals blue whales tune life history transitions to oceanographic conditions. *Functional Ecology* 36, 882-895.
15. Segre, PS, Gough, WT, Roualdes, EA, Cade, DE, Czapanskiy, MF, Fahlbusch, J, Kahane-Rapport, SR, Oestreich, WK, Bejder, L, Bierlich, KC, Burrows, JA, Calambokidis, J, Chenoweth, EM, di Clemente, J, Durban, JW, Fearnbach, H, Fish, FE, Friedlaender, AS, Hegelund, P, Johnston, DW, Nowacek, DP, Oudejans, MG, Penry, GS, Potvin, J, Simon, M, Stanworth, A, Straley, JM, Szabo, A, Videsen, SKA, Visser, F, Weir, CR, Wiley, DN, and Goldbogen, JA (2022). Scaling of maneuvering performance in baleen whales. *Journal of Experimental Biology* 225, jeb243224.

14. McKenna, MF, Baumann-Pickering, S, Kok, ACM, **Oestreich, WK**, Adams, JD, Barkowski, J, Frstrup, K, Goldbogen, JA, Joseph, JE, Kim, EB, Kugler, A, Lammers, MO, Margolina, T, Peavey Reeves, LE, Rowell, TJ, Stanley, JA, Stimpert, AK, Zang, EJ, Southall, BL, Wall, CC, Van Parijs, S, and Hatch, LT (2021). Advancing the interpretation of shallow water marine soundscapes. *Frontiers in Marine Science* 8.
13. Cade, DE, Fahlbush, JA, **Oestreich, WK**, Ryan, J, Calambokidis, J, Findlay, KP, Friedlaender, AS, Hazen, EL, Seakamela, SM, and Goldbogen, JA (2021). Social exploitation of extensive, ephemeral, environmentally controlled prey patches by super-groups of rorqual whales. *Animal Behaviour* 182, 251-266.
12. Kitzes, J, Blake, R, Bombaci, S, Chapman, M, Duran, SM, Huang, T, Joseph, MB, Lapp, S, Marconi, S, **Oestreich, WK**, Rhinehart, TA, Schweiger, AK, Song, Y, Surasinghe, T, Yang, D, and Yule, K (2021). Expanding the National Ecological Observatory Network (NEON) biodiversity surveys with new instrumentation and machine learning models. *Ecosphere* 12, e03795.
11. Cade, DE, Gough, WT, Czapanskiy, MF, Fahlbush, JA, Kahane-Rapport, SR, Linsky, JMJ, Nichols, RC, **Oestreich, WK**, Wisniewska, DM, Friedlaender, AS, and Goldbogen, JA (2021). Tools for integrating inertial sensor data with video bio-loggers, including estimation of animal orientation, motion, and position. *Animal Biotelemetry* 9, 34.
10. *Chapman, MS, ***Oestreich, WK**, Frawley, TH, Boettiger, C, Diver, S, Santos, BS, Scoville, C, Armstrong, K, Blondin, H, Chand, K, Haulsee, DE, Knight, CJ, and Crowder, LB. (2021). Promoting equity in the use of algorithms for high seas conservation. *One Earth* 4, 790-794.
9. Cade, DE, Seakamela, SM, Findlay, K, Fukunaga, J, Kahane-Rapport, S, Warren, J, Calambokidis, J, Fahlbush, JA, Friedlaender, AS, Hazen, EL, Kotze, D, McCue, S, Meyer, M, **Oestreich, WK**, Oudejans, M, Wilke, C, Goldbogen, JA (2021). Predator-scale spatial analysis of intra-patch prey distribution reveals energetic drivers of rorqual whale super-group formation. *Functional Ecology* 35, 894-908.
8. Green, KM, Selgrath, JS, Frawley, TH, **Oestreich, WK**, Mansfield, EJ, Urteaga, J, Swanson, SS, Santana, FS, Green, SJ, Naggea, J, and Crowder, LB (2021). How adaptive capacity shapes the Adapt, React, Cope Response to climate impacts: insights from small-scale fisheries. *Climatic Change* 164, 1-22.
7. **Oestreich, WK**, Fahlbush, JA, Cade, DE, Calambokidis, J, Margolina, T, Joseph, J, Friedlaender, AS, McKenna, M, Stimpert, AK, Southall, BL, Goldbogen, JA, and Ryan, JP (2020). Animal-borne metrics enable acoustic detection of blue whale migration. *Current Biology* 30, 4773-4779.
6. Haver, SM, Rand, Z, Hatch, LT, Lipski, D, Dziak, RP, Gedamke, J, Haxel, J, Heppell, SA, Jahncke, J, McKenna, MF, Mellinger, DK, **Oestreich, WK**, Roche, L, Ryan, JP, and Van Parijs, SM, (2020). Seasonal trends and primary contributors to the low frequency soundscape of the Cordell Bank National Marine Sanctuary. *Journal of the Acoustical Society of America* 148, 845-858.
5. **Oestreich, WK**, Chapman, MS, and Crowder, LB (2020). A comparative analysis of dynamic management in marine and terrestrial systems. *Frontiers in Ecology and the Environment* 18, 496-504.
4. **Oestreich, WK**, Frawley, TH, Mansfield, EJ, Green, KM, Green, SJ, Naggea, J, Selgrath, JC, Swanson, SS, Urteaga, J, White, TD, and Crowder, LB (2019). The impact of environmental change on small-scale fishing communities: Moving beyond adaptive capacity to community response. In Cisneros-Montemayor, AM, Cheung, W, and Ota, Y (ed). *Predicting future oceans: Sustainability of social-ecological systems under climate change*. Elsevier. New York, NY.
3. Glover, DM, Doney, SC, **Oestreich, WK**, and Tullo, A (2018). Geostatistical analysis of mesoscale spatial variability and error in SeaWiFS and MODIS/Aqua global ocean color data. *Journal of Geophysical Research: Oceans* 123, 22-39.
2. Swain, TD, Vega-Perkins, JB, **Oestreich, WK**, Triebold, C, DuBois, E, Henss, J, Baird, A, Siple, M, Backman, V, and Marcelino, L (2016). Coral Bleaching Response Index: a new tool to standardize and compare susceptibility to thermal bleaching. *Global Change Biology* 22, 2475-2488.
1. **Oestreich, WK**, Ganju, NK, Pohlman, JW, and Suttles, SE (2016). Colored dissolved organic matter in eutrophic estuaries: relationships between carbon sources and light attenuation. *Biogeosciences* 13, 583-595.

MANUSCRIPTS IN REVIEW AND SUBMISSION (full drafts available)

Oestreich, WK et al. The influence of social cues on timing of animal migrations. (*In revision*).

Blondin, H et al. including **Oestreich, WK**. Land-dependent marine predators face climate-driven impacts on land and at sea. (*In Review*).

Ryan, JP et al. including **Oestreich, WK**. Wind dance of the ocean giants: Ephemeral wind-driven resource tracking by blue whales. (*In submission*).

Ryan, JP, **Oestreich, WK**, and Rueda, CA. Foraging ecology in the mysticete symphony: Baleen whale song as an ecosystem indicator. (*In submission*).

FELLOWSHIPS, GRANTS, AND RESEARCH AWARDS

○ Monterey Bay Aquarium Research Institute Postdoctoral Research Fellowship	2022
○ Myers Oceanographic and Marine Biology Trust Grant (\$3000)	2021
○ Bio Futures Fellowship - Stanford Ethics, Society, and Technology Hub (\$3000)	2020-2021
○ NSF Graduate Research Fellowship (\$138,000)	2018-2021
○ David & Lucile Packard Foundation Stanford Graduate Fellowship (\$275,000)	2017-2020
○ SPICE (Student Projects for Intellectual Community Engagement) Grant (\$10,000)	2019-2021
○ Fieldwork Grant - California Ocean Alliance (\$1000)	2019
○ Best Research Talk - Stanford Woods Institute Young Environmental Scholar Conference (\$250)	2019
○ Conference Travel Grants - Stanford Univ. Office of Graduate Education (\$1800)	2018-2019
○ Whelan Grant - Woods Hole Oceanographic Institution (\$1000)	2016
○ Jimmie E. Quon Memorial Award for Env. Eng. Senior - Northwestern Univ. (\$1000)	2015
○ Conference Travel Grant - Woods Hole Oceanographic Institution (\$1000)	2014
○ Summer Student Fellowship - Woods Hole Oceanographic Institution & US Geological Survey	2014

TEACHING EXPERIENCE

As lead instructor:

○ Fellowship and Proposal Writing, <i>CSU Monterey Bay Summer REU Program</i>	2019, 2020
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As guest instructor:

○ Evolution, Systematics, and Ecology, <i>Foothill College</i>	2022
○ Ocean Conservation: Pathways to Solutions, <i>Stanford University</i>	2022
○ Sensory Ecology of Marine Animals, <i>Stanford University</i>	2021

As teaching assistant:

○ Marine Conservation Biology, <i>Stanford University</i>	2019
○ Intro to Research in Ecology and Evolutionary Biology, <i>Stanford University</i>	2018
○ Public and Environmental Health, <i>Northwestern University</i>	2015

STUDENTS ADVISED

○ Natalie Cross, Stanford University Undergraduate Honors Thesis	2021-2022
○ Emma Pearson, CU Boulder Undergraduate Honors Thesis (co-advised)	2021-2022
○ Kanoe Aiu, Stanford University Undergraduate MUIR Fellow	2021
○ Mackenzie Perillo, Cal State University, Monterey Bay REU Program Fellow (co-advised)	2021
○ Samuel Price, Stanford University Earth Systems Internship (co-advised)	2021
○ Mojca Sebanc, Stanford University guest student from University of Ljubljana	2020
○ Stephanie Cortes, Salinas High School - Hopkins Marine Station Internship Program	2020
○ Alex Khieu, Salinas High School - Hopkins Marine Station Internship Program	2019

ACADEMIC JOURNAL REVIEWING

Reviewer for the following journals: *Ecology*, *Proceedings of the Royal Society B*, *Scientific Reports*, *Marine Mammal Science*, *Integrative Zoology*, *BMC Biology*, *Frontiers for Young Minds*

ACADEMIC SERVICE, VOLUNTEER, AND OUTREACH ACTIVITIES

○ Stanford University Biology PhD Preview Program, <i>Co-organizer</i>	2020-2021
○ Salinas High School - Hopkins Marine Station Internship Program, <i>Co-director</i>	2019-2022
○ Pacific Grove Museum of Natural History Science Saturdays, <i>Volunteer</i>	2019
○ Hopkins Marine Station Open House, <i>Volunteer</i>	2018-2020
○ Pacific Grove Public Schools Marine Science Curriculum, <i>Guest Speaker</i>	2018
○ Mt. Pleasant Elementary School (DE), <i>Marine Science Pen Pal</i>	2017-2019
○ Stanford High School to PhD (HyPE), <i>Volunteer</i>	2017
○ Bourne (MA) High School Science and Engineering Expo <i>Volunteer Judge</i>	2016
○ North Branch Restoration Project (Chicago, IL), <i>Prairie restoration volunteer</i>	2013-2015

ACADEMIC LEADERSHIP EXPERIENCE

○ Friends of Hopkins Marine Station Board, <i>Graduate student representative</i>	2019-2021
○ Stanford Biology Dept. Surf 'n' Turf Research Symposium, <i>Treasurer & co-organizer</i>	2018-2020
○ Monterey Area Research Institutions Network for Education (MARINE), <i>Institution representative</i>	2018-2020

WORKSHOPS AND WORKING GROUPS

○ OceanHackWeek, University of Washington	2019
○ ACKME Mathematical Ecology Working Group, Woods Hole Oceanographic Institution	2017
○ MARINE Ocean Policy Course, Stanford University Center for Ocean Solutions	2017
○ Structured Population Models, Woods Holes Oceanographic Institution	2017
○ Modeling Methods for Marine Science, Woods Hole Oceanographic Institution	2016
○ Satellite Remote Sensing for Biological Oceanography, Cornell University	2016

INVITED SEMINARS, CONFERENCE PRESENTATIONS, AND POSTERS

* denotes presenter(s)

Oestreich, WK*, Abrahms, B, Dodson, S, McKenna, MF, Goldbogen, JA, Crowder, LB, and Ryan, JP. "An acoustic ecosystem indicator: Patterns in song reveal blue whales tune life history transitions to oceanographic conditions." Ocean Sciences Meeting, March 2022. Oral presentation.

Kim, E*, McKenna, MF, Kok, A, Frasier, K, Hatch, L, Joseph, J, Margolina, T, **Oestreich, WK**, Peavey Reeves, L, and Baumann-Pickering, S. "Fish and ships: separation of chronic fish choruses in complex soundscapes." Ocean Sciences Meeting, March 2022. Oral presentation.

Pearson, E*, Wall, C, Haver, S, **Oestreich, WK**, Ryan, JP, Gedamke, J, and Dziak, R. "Spatio-temporal patterns of blue and fin whale sound production identified in NOAA-NPS Ocean Noise Reference Station Network recording sites in the Pacific Ocean." Ocean Sciences Meeting, March 2022. Poster.

Blondin, H, Armstrong, K, Mikles, K, Santos, B, **Oestreich, WK**, Knight, C, Bennett, A, and Crowder, LB. "Climate-driven habitat loss on land and at sea: Differential impacts across land-dependent life histories in marine taxa." Ocean Sciences Meeting, March 2022. Oral presentation.

Oestreich, WK as part of a panel discussion led by H Luddeman M Michelin. "Opportunities for ocean-climate action in the United States." Monterey Bay Aquarium Research Institute, October 2021.

Oestreich, WK*. "Foraging and migration in a vast and dynamic seascape: Population-level insights from acoustic study of the blue whale." Monterey Bay Aquarium All Staff Meeting, June 2021.

Ryan, JP* and **Oestreich, WK***. "The sounds of giants." Monterey Bay Aquarium Research Institute (MBARI) Board of Directors Meeting, June 2021.

Southall, BL*, Ryan, JP*, McKenna, MF, Joseph, JE*, **Oestreich, WK***, and Barkowski, J. "Discussion of sound related research in Monterey Bay National Marine Sanctuary." Monterey Bay National Marine Sanctuary Research Activity Panel (RAP) Virtual Meeting, May 2021.

Fahlbusch, JA, Czapanskiy, M, **Oestreich, WK**, Calambokidis, J, Gough, W, and Goldbogen, JA "Ecological Implications of Multi-Day Behavioral Synchrony and Physiological Variation in a Blue Whale Pair." Society for Marine Mammalogy Annual Meeting, 2021.

Oestreich, WK* "Environmental and social drivers of flexible migration phenology in blue whales." Stanford-UC Santa Cruz Species Interactions Workshop, Dec 2020. Oral presentation.

Oestreich, WK, Cline, DE, Cade, DE, Calambokidis, J, Fahlbusch, JA*, Joseph, JE, Margolina, T, Southall, BA, Goldbogen, JA, and Ryan, JP "Temporal variation in blue whale call types in the Northeast Pacific at diel, seasonal, and interannual time scales with tag-derived behavioral context." Ocean Sciences Meeting, San Diego, CA, Feb 2020. Oral presentation.

Cade, DE*, Seakamela, M, Findlay, K, Fahlbusch, J, Fukunaga, J, Kahane-Rapport, S, **Oestreich, WK**, Warren, J, Calambokidis, J, Hazen, E, Friedlaender, A, Kirkman, S, Kotze, D, McCue, S, Mejer, M, Ryan, J, Wilke, C, and Goldbogen, JA "The patchy distribution of krill within large swarms drives collective exploitation by super groups of rorqual whales." Ocean Sciences Meeting, San Diego, CA, Feb 2020. Oral presentation.

Calambokidis, J*, Fahlbusch, JA, Szesciorka, AR, Sirovic, A, Southall, BL, Cade, DE, Friedlaender, AS, **Oestreich, WK**, and Goldbogen, JA "New insights into blue, fin, and humpback whale feeding, movements, and impacts of human activities from medium duration archival tags." Ocean Sciences Meeting, San Diego, CA, Feb 2020. Oral presentation.

Crowder, LB*, **Oestreich, WK**, Chapman, MS, and Hazen, EL "The emergence of dynamic management approaches in ocean ecosystems with a comparison to management of terrestrial ecosystems." Ocean Sciences Meeting, San Diego, CA, Feb 2020. Oral presentation.

Green, KM*, et al. including **Oestreich, WK** "Adaptation of Small Scale Fisheries to Environmental Change: A Meta-analysis of Community Response." Ocean Sciences Meeting, San Diego, CA, Feb 2020. Poster.

Haver, S*, Rand, Z, Hatch, L, Lipski, D, Dziak, RP, Gedamke, J, Haxel, J, Heppell, SA, Jahncke, J, McKenna, M, Mellinger, D, **Oestreich, WK**, Roche, L, Ryan, JP, and Van Parijs, SM "Passive acoustic monitoring reveals seasonal trends and primary contributors to the low frequency ambient soundscape of the Cordell Bank National Marine Sanctuary." Ocean Sciences Meeting, San Diego, CA, Feb 2020. Poster.

Oestreich, WK*, Cade, DE, Calambokidis, J, and Goldbogen, JA "Context of blue whale vocalizations as determined via tag-mounted accelerometers." World Marine Mammal Conference, Barcelona, Spain, Dec 2019. Oral presentation.

Ryan, JP*, Cline, DE, Benoit-Bird, KJ, Chavez, FP, Raanan, BY, Urmy, SS, Zhang, Y, **Oestreich, WK**, Goldbogen, JA, Joseph, JE, Margolina, T, DeVogelaere, A, Forney, K, Kudela, RM, and Santora, JA "Integrative passive acoustic monitoring in Monterey Bay National Marine Sanctuary." Acoustical Society of America Annual Meeting, San Diego, CA, Dec 2019. Oral presentation.

Oestreich, WK*, Cline, DE, Cade, DE, Calambokidis, J, Goldbogen, JA, Crowder, LB, and Ryan, JP "Synthesis of acoustic, biologging, and machine learning methods enhances monitoring of blue whales from individual to population scales." Joint Meeting of the American Fisheries Society and The Wildlife Society, Reno, NV, Sept 2019. Oral presentation.

Oestreich, WK*, Chapman, MS, and Crowder, LB "Scales of forecasting for dynamic management: gaps in marine and terrestrial systems." Joint Meeting of the American Fisheries Society and The Wildlife Society, Reno, NV, Sept 2019. Oral presentation.

Haulsee, DE*, Blondin, H, **Oestreich, WK**, and Crowder, LB "Seasonal occurrence and distributions of billfish related to climate variability in the Eastern Pacific Ocean." Joint Meeting of the American Fisheries Society and The Wildlife Society, Reno, NV, Sept 2019. Oral presentation.

Oestreich, WK*, Frawley, TH, Mansfield, EJ, Green, KM, Green, SJ, Naggea, J, Selgrath, JC, Swanson, SS, Urteaga, J, White, TD, and Crowder, LB "The impact of environmental change on small-scale fishing communities: Moving beyond adaptive capacity to community response." Nippon Foundation Nereus Science Conference, Princeton, NJ, Sept 2019. Oral presentation.

Oestreich, WK* "Connecting behavior across individual, population, and ecosystem scales: ecological and management implications for the blue whale." Monterey Area Research Institutions Network for Education (MARINE) Annual Colloquium, Moss Landing, CA, May 2019. Oral presentation.

Oestreich, WK* "Enhancing cetacean monitoring using a novel synthesis of passive acoustics, machine

learning, and biologging." Bay Area Conservation Biology Symposium, Berkeley, CA, Apr 2019. Oral presentation.

Chapman, MS*, **Oestreich, WK**, Beytell, P "Impacts of ephemeral water availability and human infrastructure on elephant herd movement." Bay Area Conservation Biology Symposium, Berkeley, CA, Apr 2019. Oral presentation.

Oestreich, WK* "Integrating blue whale behavior from individual to ecosystem scales." Hopkins Marine Station, Stanford University, Pacific Grove, CA, Feb 2019. Oral presentation.

Southall, BL*, Ryan, JP*, **Oestreich, WK***, Urmy, SS*, Joseph, JE*, Stimpert, AK*, Cline, DE*, Cade, DE*, Goldbogen, JA* "Discussion of sound related research in Monterey Bay National Marine Sanctuary." Monterey Bay National Marine Sanctuary Research Activity Panel (RAP) Meeting, Moss Landing Marine Laboratories, Moss Landing, CA, Nov 2018.

Oestreich, WK* "Harnessing dynamic animal behavior data to inform dynamic management practices." Biology Department Surf 'n' Turf Symposium, Stanford University, Palo Alto, CA, Oct 2018. Oral presentation.

Cline, DE*, **Oestreich, WK***, McGill, P*, and Ryan, JP* "Blue whale acoustic detection and classification workflow." MARS Soundscape Research Symposium, Monterey Bay Aquarium Research Institute, Moss Landing, CA, Oct 2018. Oral presentation.

Oestreich, WK* "Listen and learn: Exploring patterns of cetacean behavior via passive acoustics and machine learning." Hopkins Marine Station, Stanford University, Pacific Grove, CA, June 2018. Oral presentation.

Oestreich, WK* "Listen up: Learning about whale and human behavior in the oceans using acoustics and machine learning." GenerationSci Conference, Stanford University, Palo Alto, CA, April 2018. Oral presentation.

Glover, DM, Doney, SC, **Oestreich, WK***, and Tullo, A "Geostatistical Analysis to Quantify Mesoscale Spatial Variability, Patchiness, and Error in SeaWiFS and MODIS/Aqua Global Ocean Color Data." Ocean Sciences Meeting, Portland, OR, February 2018. Poster.

Oestreich, WK*, Grimes, T*, Spies, N*, Zuercher, R*, and Zweig, C* "Socioeconomic data collection in the National Marine Sanctuaries." Center for Ocean Solutions Ocean Policy Workshop, Monterey Bay Aquarium, Monterey, CA, July 2017. Oral presentation.

Doney, SC*, Lima, I, **Oestreich, WK**, Kavanaugh, MT, and Glover, DM "Biogeochemical Modeling and Remote Sensing." North Atlantic Aerosols and Marine Ecosystems Study (NAAMES) PI Meeting II, Hampton, VA, May 2017. Oral presentation.

Doney, SC*, Lima, I, **Oestreich, WK**, Kavanaugh, MT, and Glover, DM "Biogeochemical Modeling and Remote Sensing." North Atlantic Aerosols and Marine Ecosystems Study (NAAMES) PI Meeting I, Corvallis, OR, July 2016. Oral presentation.

Oestreich, WK* "Coral reefs and climate change: Understanding drivers and patterns of coral bleaching." Natural Resources Defense Council Chicago Litigation Team Retreat, May 2015. Oral presentation.

Oestreich, WK*, Ganju, NK, Pohlman, JW, and Suttles, SE "Colored dissolved organic matter in shallow estuaries: the effect of source on quantification." Northwestern University Research and Arts Expo, May 2015. Poster.

Oestreich, WK*, Ganju, NK, Pohlman, JW, and Suttles, SE "Colored dissolved organic matter in shallow estuaries: the effect of source on quantification." American Geophysical Union Fall Meeting, San Francisco, CA, December 2014. Poster.