BENJAMIN TOBEY SAENZ

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EDUCATIONAL BACKGROUND

Stanford University, Stanford, CA, Environmental Earth System Science, **Ph.D., 2011**
NSF Graduate Training Course in Antarctic Biology, McMurdo, Antarctica, **2006**
Stanford University, Stanford, CA, Biological Sciences – Honors, **B.S., 1999**
Stanford University, Stanford, CA, Electrical Engineering, **B.S., 1999**

APPOINTMENTS AND WORK EXPERIENCE

Adecco for X, Inc. (Formerly Google X) | Mountain View, CA | 2018 – present
Marine Biologist
- Worked with a small team developing 'moonshots': rapid technological assessment, ecological modeling, techno-economic & energy+carbon life cycle analyses, biogeochemical experimentation.

biota.earth | Berkeley, CA | 2007 – present
Principal Consultant
- Science and strategy, AiiM Partners Fund (www.aiimpartners.com)
- Bio-Acoustic data processing for the ACCESS program (www.accessoceans.org)
- Calibration of SIMRAD scientific echosounders aboard the R/V Fulmar (NOAA) and R/V John Martin (Moss Landing Marine Laboratory)
- Biological acoustics in the San Francisco Bay Estuary (using BioSonics echosounders)

Resource Management Associates, Inc. | Davis, CA | 2013 – 2020
Senior Water Resources Engineer
- Responsibilities include project management, authoring statistical and graphical data analytic routines, primary model development, and HPC optimization
- Investigated delta smelt upstream migration behavior, zooplankton, and juvenile salmon using particle-tracking simulations embedded in hydrodynamic Sacramento Delta estuary models (UnTRIM, RMA2)
- Utilized bioacoustics for non-take estimates of fish abundances and distribution in the SF Bay Estuary
- Developed open source data analysis tools for ADCP-measured water flow (Github: ADCPy)

University of South Florida | St. Petersburg, FL | 2013 – 2015
Research Scientist
- Primary data analyst on NSF/OPP Collaborative Project, Top-down food web processes in the Southern Ocean: Prey depletion by top predators in McMurdo Sound
- Responsible for field data collection in Antarctica, and analysis of physical oceanography (current and structure), phytoplankton dynamics, bioacoustics of krill and fish, and predator foraging and movements (penguins, whales)
- Three publications are completed and one more in development, addressing primary question of how upper trophic organisms can directly and indirectly structure the lower food web

University of California, Santa Cruz | Santa Cruz, CA | 2011 – 2013
Postdoctoral Scholar
- Authored the KPP-Ecosystem-Ice (KEI) model, that couples a 1-dimensional ocean mixing model (KPP; Large *et al.*, 1994), a sea ice model (SIESTA; Saenz and Arrigo, 2014) and a marine ecosystem model (CESM v1.0; Moore *et al.*, 2002; 2004).

- Using KEI, investigated the influence of climate-related changes in deep-ocean heat and nutrients supply on sea ice, ocean physics, and primary production in the Antarctic Peninsula region

Stanford University | Stanford, CA | 2004–2011
PhD Candidate, Teaching Assistant
- Constructed the SIESTA 3D sea ice and ecosystem model for hemispheric investigation of primary production inside sea ice
- SIESTA incorporates brine fluid dynamics, 2-way spectral irradiance attenuation, conservative mass and thermodynamic physics, and a multi-nutrient NPZ model of algal population
- SIESTA has been used in 5 new-research publications with more in production

Point Blue Conservation Science (formerly PRBO) | Petaluma, CA | 2000 – 2007
Ecologist
- Designed the scientific sampling and oceanographic stations for Applied California Current Ecosystem Study (ACCESS) in the Gulf of the Farallones, CA
- Participated on over 20 research cruises in the Gulf of the Farallones
- Developed data analysis protocols for estimation of krill biomass from acoustic sampling
- Performed primary data collection and reporting of a several multi-year studies of seabird foraging, diet, and prey availability surrounding Alcatraz Island
- Managed 3 seasonal biologists

Monterey Bay Aquarium Research Institute | Moss Landing, CA | 2004
Biological Technician
- Constructed and tested autonomous buoys for measuring dissolved CO_2 in seawater

TECHNICAL SKILLS & RESEARCH TOOLS

Programming: Python, FORTRAN, MATLAB, Java, R, Perl, C, High-performance computing (OpenMP, MPI, CUDA)

Instrumentation & Methodology: CTD and related water quality devices (Seabird, YSI, others), scientific echosounders (BioSonics, SIMRAD), Teledyne ADCP, small boat operations, wildlife trackers (various), OpenROV, Fluorometers (Turner, various), satellite-based oceanography.

OTHER RELEVANT EXPERIENCE

- Scientific Committee on Oceanographic Research (SCOR) Biogeochemical Exchange Processes at the Sea-Ice Interface (BEPSII) (2012-present)
- Volunteer online editor, programmer, and webmaster for the peer-reviewed scientific journal *Marine Ornithology* (2006 – present), http://www.marineornithology.org
- Peer-reviewer for multiple marine science journals

RECENT PUBLICATIONS

Saenz, B. T., D. McKee, S. C. Doney, D. E. Martinson, and S. E. Stammerjohn. *In Prep*. Influence of winds and subsurface ocean heat on the winter evolution of sea ice thickness on a 'warm' Antarctic continental shelf. Submitting to *Journal of Geophysical Research Oceans*.

Rockwood, R. Cotton, Meredith L. Elliott, Benjamin Saenz, Nadav Nur, and Jaime Jahncke. 2020. Modeling Predator and Prey Hotspots: Management Implications of Baleen Whale Co-Occurrence with Krill in Central California. *PLOS ONE* 15(7):e0235603. DOI: 10.1371/journal.pone.0235603.

Ainley, David G., Trevor W. Joyce, Ben Saenz, Robert L. Pitman, John W. Durban, Grant Ballard, Kendra Daly, and Stacy Kim. 2020. Foraging Patterns of Antarctic Minke Whales in McMurdo Sound, Ross Sea." *Antarctic Science* 1–12. DOI: 10.1017/S0954102020000310.

Saenz, B. T., D. G. Ainley, K. L. Daly, G. Ballard, E. Conlisk, M. L. Elrod, & S. L. Kim. 2020. Drivers of concentrated predation in an Antarctic marginal-ice-zone food web. *Scientific Reports.* DOI: 10.1038/s41598-020-63875-y

Kim, S. B, L. A. Gunther, S. H. Mahaffey, K. M. Qualls. M. Sugla, B. T. Saenz, et al. 2019. The contribution of ice algae to the winter energy budget of juvenile Antarctic krill in years with contrasting sea ice conditions. *ICES Journal of Marine Science.* https://doi.org/10.1093/icesjms/fsy145

Thayne, M. W., J. A. Santora, B. Saenz, P. Warzybok, & J. Jahncke. 2018. Combining seabird diet, acoustics and ecosystem surveys to assess temporal variability and occurrence of forage fish. *Journal of Marine Systems*, in press. doi: 10.1016/j.jmarsys.2018.08.006

Selz, V., Saenz, B. T., van Dijken, G. L., & Arrigo, K. R. 2018. Drivers of Ice Algal Bloom Variability between 1980 and 2015 in the Chukchi Sea. *Journal of Geophysical Research: Oceans*, 123. https://doi.org/10.1029/2018JC014123

Kim, S., Saenz, B., Scanniello, J., Daly, K., & Ainley, D. 2018. Local climatology of fast ice in McMurdo Sound, Antarctica. *Antarctic Science*, 30(2), 125-142. doi:10.1017/S0954102017000578

Manugian S., Elliott, M. L., Bradley, R., Howar, J., Karnovsky, N., Saenz, B., et al. 2015. Spatial Distribution and temporal patterns of Cassin's Auklet foraging and their euphausiid prey in a variable ocean environment. *PLoS ONE* 10(12): e0144232. doi:10.1371/journal.pone.0144232

Saenz, B. T., and K. R. Arrigo. 2014. Annual primary production in Antarctic sea ice during 2005-2006 from a sea ice state estimate. *Journal of Geophysical Research*, 119, 3645–3678, doi:10.1002/2013JC009677.

Palmer, M. A., B. T. Saenz, B. T., and K. R. Arrigo. 2014. Impacts of sea ice retreat, thinning, and melt-pond proliferation on the summer phytoplankton bloom in the Chukchi Sea, Arctic Ocean. *Deep Sea Research II*, http://dx.doi.org/10.1016/j.dsr2.2014.03.016

Saenz, B. T., and K. R. Arrigo. 2012. Simulation of a sea ice ecosystem using a hybrid model for slush layer desalination. *Journal of Geophysical Research*, 117: C05007, doi:10.1029/2011JC007544.