Stanford



Anne Dekas

Associate Professor of Earth System Science and, by courtesy, of Oceans

Bio

BIO

Anne Dekas is a geomicrobiologist interested in how microbial life affects the chemistry and climate of our planet today and throughout time. She obtained her PhD in Geobiology at the California Institute of Technology in 2013, and her AB in Earth and Planetary Sciences at Harvard University in 2004. She joined the Earth System Science Department at Stanford University as an assistant professor in September 2015.

ACADEMIC APPOINTMENTS

- Associate Professor, Earth System Science
- Associate Professor (By courtesy), Oceans

ADMINISTRATIVE APPOINTMENTS

- Associate Professor, Earth System Science, Stanford University, (2025- present)
- Assistant Professor, Earth System Science, Stanford University, (2015-2025)
- Lawrence Postdoctoral Fellow, Lawrence Livermore National Laboratory, (2013-2015)
- NSF Graduate Research Fellow, Geological and Planetary Sciences, California Institute of Technology, (2006-2009)
- Technical Assistant, Planetary Protection Group, Jet Propulsion Laboratory, (2005-2006)

HONORS AND AWARDS

- CAREER Award, National Science Foundation (2022-2027)
- Early Career Investigator in Marine Microbial Ecology and Evolution Award, Simons Foundation (2017-2020)
- Outstanding Presentation Award, Lawrence Livermore National Laboratory Poster Symposium (2014)
- Lawrence Postdoctoral Fellowship, Lawrence Livermore National Laboratory (2013-2015)
- Outstanding Oral Presentation, Southern California Geobiology Symposium (2009)
- Tech Brief Award, NASA Jet Propulsion Laboratory (2009)
- Graduate Research Fellowship, National Science Foundation (2006-2009)
- Harvard College Award, Harvard University (2002, 2003)
- John Harvard Award, Harvard University (2001)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, American Geophysical Union (2008 - present)
- Member, International Society for Microbial Ecology (2008 - present)

PROFESSIONAL EDUCATION

- PhD, California Institute of Technology , Geological and Planetary Sciences, Geobiology (2013)
- AB, Harvard University , Earth and Planetary Sciences, Biogeochemistry (2004)

LINKS

- Dekas Lab website: https://dekaslab.stanford.edu/

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Environmental microbiology, deep-sea microbial ecology, marine biogeochemistry

Teaching

COURSES

2026-27

- Life at the Extremes: From the Deep Sea to Deep Space: EARTHSYS 36N (Spr)
- Techniques in Environmental Microbiology: ESS 210 (Aut)

2025-26

- Answering biological questions with Metagenomic Data: BIOS 264 (Spr)
- Fundamentals of Geobiology: EARTHSYS 205A, EPS 205, ESS 205 (Aut)
- Life at the Extremes: From the Deep Sea to Deep Space: EARTHSYS 36N (Win)

2024-25

- Life at the Extremes: From the Deep Sea to Deep Space: EARTHSYS 36N (Win)
- Techniques in Environmental Microbiology: BIO 201, ESS 210 (Aut)

2023-24

- Fundamentals of Geobiology: EARTHSYS 205A, EPS 205, ESS 205 (Aut)
- Life at the Extremes: From the Deep Sea to Deep Space: EARTHSYS 36N (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Jessica Bullington, AyoOluwateso Coker, Claudette Proctor

Postdoctoral Faculty Sponsor

Maggie Weng

Doctoral Dissertation Advisor (AC)

Rebecca Salcedo

Doctoral (Program)

Anna Finch, Rebecca Salcedo

Publications

PUBLICATIONS

- **Substantial genetic potential for deep-sea chemoautotrophy extends beyond nitrifiers.** *mSystems*
  Salcedo, R. S., Jaffe, A. L., Dekas, A. E.
  2026: e0087826

- **Piezophilic activity dominates the Puerto Rico Trench deep subseafloor biosphere.** *bioRxiv : the preprint server for biology*
  Desmarais, M., Breusing, C., Finch, A. H., Baumas, C. M., Orsi, W. D., Plominsky, A. M., Morono, Y., Wehrmann, L. M., Graham, D., Pockalny, R. A., Spivack, A. J., Smith, D. C., Saucedo, et al
  2026

- **Microbial N2O Reduction in Sulfidic Waters: Implications for Proterozoic Oceans.** *Geobiology*
  Buessecker, S., Klos, A. S., Quan, M. E., Finch, A. H., Sobol, M. S., Evans, G. N., Anbar, A. D., Kaçar, B., Dekas, A. E.
  2026; 24 (4): e70056

- **Time-series hydrochemical analysis of an interwell flow test through a fractured aquifer and comparison against microbial community data** *JOURNAL OF HYDROLOGY*
  Zhang, Y., Li, X., Hawkins, A. J., Li, Y., Zhang, Q., Huang, T., Pang, Z., Dekas, A. E., Horne, R. N.
  2026; 669

- **Lowering the Mo limit for nitrogen fixation by Mo-nitrogenase.** *Communications earth & environment*
  Stevenson, Z., Schultz, D. L., Chamberlain, M., Rico, K., Anbar, A., Dekas, A. E., Swanner, E. D.
  2026; 7 (1): 169

- **Distinct contributions of suspended and sinking prokaryotes to mesopelagic carbon budget** *NATURE GEOSCIENCE*
  Le Coq, P., Christaki, U., Van Wambeke, F., Chevillon, E., Zakardjian, B., Garel, M., Guasco, S., Baumas, C. M. J., Dekas, A. E., Bonin, P., Al Ali, B., Gesson, M., Le Moigne, et al
  2026

- **Abundant and metabolically flexible bacterial lineages underlie a vast potential for rubisco-mediated carbon fixation in the dark ocean.** *Genome biology*
  Jaffe, A. L., Salcedo, R. S., Dekas, A. E.
  2025; 26 (1): 167

- **Transportability of exogenous microbial community correlates with interwell connectivity in deep aquifers.** *Water research*
  Zhang, Y., Dekas, A. E., Hawkins, A. J., Primo, J. C., Gorbatenko, O., Huang, T., Pang, Z., Horne, R. N.
  2025; 285: 124008

- **Abundance, Identity, and Potential Diazotrophic Activity of nifH-Containing Organisms at Marine Cold Seeps.** *Environmental microbiology*
  Semler, A. C., Paris, E. R., Salvador, M., Dekas, A. E.
  2025; 27 (3): e70058

- **Unexpected scarcity of ANME archaea in hydrocarbon seeps within Monterey Bay** *BIOGEOSCIENCES*
  Semler, A. C., Dekas, A. E.
  2025; 22 (2): 385-403

- **Cyanobacteria from marine oxygen-deficient zones encode both form I and form II Rubiscos.** *Proceedings of the National Academy of Sciences of the United States of America*
  Jaffe, A. L., Harrison, K., Wang, R. Z., Taylor-Kearney, L. J., Jain, N., Prywes, N., Shih, P. M., Young, J., Rocap, G., Dekas, A. E.
  2024; 121 (49): e2418345121

- **Urea assimilation and oxidation support activity of phylogenetically diverse microbial communities of the dark ocean.** *The ISME journal*
  Arandia-Gorostidi, N., Jaffe, A. L., Parada, A. E., Kapili, B. J., Casciotti, K. L., Salcedo, R. S., Baumas, C. M., Dekas, A. E.
  2024

- **Genome-guided isolation of the hyperthermophilic aerobe Fervidibacter sacchari reveals conserved polysaccharide metabolism in the Armatimonadota.** *Nature communications*

Nou, N. O., Covington, J. K., Lai, D., Mayali, X., Seymour, C. O., Johnston, J., Jiao, J. Y., Buessecker, S., Mosier, D., Muok, A. R., Torosian, N., Cook, A. M., Briegel, et al
2024; 15 (1): 9534

- **Microbial Proxies for Anoxic Microsites Vary with Management and Partially Explain Soil Carbon Concentration.** *Environmental science & technology*
  Lacroix, E. M., Gomes, A., Heitmann, G. B., Schuler, D., Dekas, A. E., Liptzin, D., Aberle, E., Watts, D. B., Nelson, K. A., Culman, S., Fendorf, S.
  2024
- **Single-cell analysis reveals an active and heterotrophic microbiome in the Guaymas Basin deep subsurface with significant inorganic carbon fixation by heterotrophs.** *Applied and environmental microbiology*
  Meyer, N. R., Morono, Y., Dekas, A. E.
  2024: e0044624
- **Inactive hydrothermal vent microbial communities are important contributors to deep ocean primary productivity.** *Nature microbiology*
  Achberger, A. M., Jones, R., Jamieson, J., Holmes, C. P., Schubotz, F., Meyer, N. R., Dekas, A. E., Moriarty, S., Reeves, E. P., Manthey, A., Brunjes, J., Fornari, D. J., Tivey, et al
  2024
- **Autochthonous carbon loading of macroalgae stimulates benthic biological nitrogen fixation rates in shallow coastal marine sediments** *Frontiers in Microbiology*
  Raut, Y., Barr, C. R., Paris, E. R., Kapili, B. J., Dekas, A. E., Capone, D. G.
  2024; 14
- **Single-cell analysis in hypersaline brines predicts a water-activity limit of microbial anabolic activity.** *Science advances*
  Paris, E. R., Arandia-Gorostidi, N., Klempay, B., Bowman, J. S., Pontefract, A., Elbon, C. E., Glass, J. B., Ingall, E. D., Doran, P. T., Som, S. M., Schmidt, B. E., Dekas, A. E.
  2023; 9 (51): eadj3594
- **Microbially induced precipitation of silica by anaerobic methane-oxidizing consortia and implications for microbial fossil preservation.** *Proceedings of the National Academy of Sciences of the United States of America*
  Osorio-Rodriguez, D., Metcalfe, K. S., McGlynn, S. E., Yu, H., Dekas, A. E., Ellisman, M., Deerinck, T., Aristilde, L., Grotzinger, J. P., Orphan, V. J.
  2023; 120 (51): e2302156120
- **Mcr-dependent methanogenesis in Archaeoglobaceae enriched from a terrestrial hot spring.** *The ISME journal*
  Buessecker, S., Chadwick, G. L., Quan, M. E., Hedlund, B. P., Dodsworth, J. A., Dekas, A. E.
  2023
- **Constraining the composition and quantity of organic matter used by abundant marine Thaumarchaeota.** *Environmental microbiology*
  Parada, A. E., Mayali, X., Weber, P. K., Wollard, J., Santoro, A. E., Fuhrman, J. A., Pett-Ridge, J., Dekas, A. E.
  2022
- **Contributions of anoxic microsites to soil carbon protection across soil textures** *GEODERMA*
  Lacroix, E. M., Mendillo, J., Gomes, A., Dekas, A., Fendorf, S.
  2022; 425
- **Single-cell view of deep-sea microbial activity and intracommunity heterogeneity** *ISME JOURNAL*
  Arandia-Gorostidi, N., Parada, A. E., Dekas, A. E.
  2022
- **Comparison of Microbial Profiling and Tracer Testing for the Characterization of Injector-Producer Interwell Connectivities** *WATER*
  Zhang, Y., Dekas, A. E., Hawkins, A. J., Primo, J., Gorbatenko, O., Horne, R. N.
  2022; 14 (18)
- **Rates and physicochemical drivers of microbial anabolic activity in deep-sea sediments and implications for deep time.** *Environmental microbiology*
  Meyer, N. R., Parada, A. E., Kapili, B. J., Fortney, J. L., Dekas, A. E.
  2022
- **An essential role for tungsten in the ecology and evolution of a previously uncultivated lineage of anaerobic, thermophilic Archaea.** *Nature communications*

Buessecker, S., Palmer, M., Lai, D., Dimapilis, J., Mayali, X., Mosier, D., Jiao, J., Colman, D. R., Keller, L. M., St John, E., Miranda, M., Gonzalez, C., Gonzalez, et al
2022; 13 (1): 3773

- **Geological activity shapes the microbiome in deep-subsurface aquifers by advection.** *Proceedings of the National Academy of Sciences of the United States of America*
  Zhang, Y., Horne, R. N., Hawkins, A. J., Primo, J. C., Gorbatenko, O., Dekas, A. E.
  2022; 119 (25): e2113985119
- **Cold Seeps on the Passive Northern U.S. Atlantic Margin Host Globally Representative Members of the Seep Microbiome with Locally Dominant Strains of Archaea.** *Applied and environmental microbiology*
  Semler, A. C., Fortney, J. L., Fulweiler, R. W., Dekas, A. E.
  2022: e0046822
- **Quantifying Microbial Activity In Situ: the Link between Cells and Cycles.** *mSystems*
  Dekas, A. E.
  2021: e0075821
- **Characterizing the "fungal shunt": Parasitic fungi on diatoms affect carbon flow and bacterial communities in aquatic microbial food webs.** *Proceedings of the National Academy of Sciences of the United States of America*
  Klawonn, I., Van den Wyngaert, S., Parada, A. E., Arandia-Gorostidi, N., Whitehouse, M. J., Grossart, H., Dekas, A. E.
  2021; 118 (23)
- **Microbial diversity and activity in Southern California salterns and bitterns: analogues for remnant ocean worlds.** *Environmental microbiology*
  Klempay, B., Arandia-Gorostidi, N., Dekas, A. E., Bartlett, D. H., Carr, C. E., Doran, P. T., Dutta, A., Erazo, N., Fisher, L. A., Glass, J. B., Pontefract, A., Som, S. M., Wilson, et al
  2021
- **PPIT: an R package for inferring microbial taxonomy from nifH sequences.** *Bioinformatics (Oxford, England)*
  Kapili, B. J., Dekas, A. E.
  2021
- **DNA Tracer Transport Through Porous Media-The Effect of DNA Length and Adsorption** *WATER RESOURCES RESEARCH*
  Zhang, Y., Hartung, M. B., Hawkins, A. J., Dekas, A. E., Li, K., Horne, R. N.
  2021; 57 (2)
- **NanoSIMS sample preparation decreases isotope enrichment: magnitude, variability and implications for single-cell rates of microbial activity.** *Environmental microbiology*
  Meyer, N. R., Fortney, J., Dekas, A. E.
  2020
- **Evidence for phylogenetically and catabolically diverse active diazotrophs in deep-sea sediment.** *The ISME journal*
  Kapili, B. J., Barnett, S. E., Buckley, D. H., Dekas, A. E.
  2020
- **Characterizing Chemoautotrophy and Heterotrophy in Marine Archaea and Bacteria With Single-Cell Multi-isotope NanoSIP.** *Frontiers in microbiology*
  Dekas, A. E., Parada, A. E., Mayali, X., Fuhrman, J. A., Wollard, J., Weber, P. K., Pett-Ridge, J.
  2019; 10: 2682
- **Microbial Community Composition in Deep#Subsurface Reservoir Fluids Reveals Natural Interwell Connectivity** *Water Resources Research*
  Zhang, Y., Dekas, A., Hawkins, A., Parada, A., Gorbatenko, O., Li, K., Horne, R.
  2019
- **High-quality genome sequences of uncultured microbes by assembly of read clouds.** *Nature biotechnology*
  Bishara, A., Moss, E. L., Kolmogorov, M., Parada, A. E., Weng, Z., Sidow, A., Dekas, A. E., Batzoglou, S., Bhatt, A. S.
  2018
- **Widespread nitrogen fixation in sediments from diverse deep-sea sites of elevated carbon loading.** *Environmental microbiology*
  Dekas, A. E., Fike, D. A., Chadwick, G. L., Green-Saxena, A., Fortney, J., Connon, S. A., Dawson, K., Orphan, V. J.

2018

- **Characterization of benthic biogeochemistry and ecology at three methane seep sites on the Northern U.S. Atlantic margin** *Deep Sea Research Part II: Topical Studies in Oceanography*
  McVeigh, D., Skarke, A., Dekas, A., Borrelli, C., Hong, W., Marlow, J., Pasulka, A., Jungbluth, S., Barco, R., Djurhuus, A.
  2018; 150: 41-56

- **Early-career scientists explore newly discovered methane seeps** *Eos*
  Dekas, A. E., Skarke, A.
  2017; 98

- **Activity and interactions of methane seep microorganisms assessed by parallel transcription and FISH-NanoSIMS analyses** *ISME JOURNAL*
  Dekas, A. E., Connon, S. A., Chadwick, G. L., Trembath-Reichert, E., Orphan, V. J.
  2016; 10 (3): 678-692

- **Global metagenomic survey reveals a new bacterial candidate phylum in geothermal springs** *NATURE COMMUNICATIONS*
  Eloe-Fadrosh, E. A., Paez-Espino, D., Jarett, J., Dunfield, P. F., Hedlund, B. P., Dekas, A. E., Grasby, S. E., Brady, A. L., Dong, H., Briggs, B. R., Li, W., Goudeau, D., Malmstrom, et al
  2016; 7

- **Spatial distribution of nitrogen fixation in methane seep sediment and the role of the ANME archaea** *ENVIRONMENTAL MICROBIOLOGY*
  Dekas, A. E., Chadwick, G. L., Bowles, M. W., Joye, S. B., Orphan, V. J.
  2014; 16 (10): 3012-3029

- **Nitrate-based niche differentiation by distinct sulfate-reducing bacteria involved in the anaerobic oxidation of methane** *ISME JOURNAL*
  Green-Saxena, A., Dekas, A. E., Dalleska, N. F., Orphan, V. J.
  2014; 8 (1): 150-163

- **Polyphosphate Storage during Sporulation in the Gram-Negative Bacterium Acetonema longum** *JOURNAL OF BACTERIOLOGY*
  Tocheva, E. I., Dekas, A. E., McGlynn, S. E., Morris, D., Orphan, V. J., Jensen, G. J.
  2013; 195 (17): 3940-3946

- **IDENTIFICATION OF DIAZOTROPHIC MICROORGANISMS IN MARINE SEDIMENT VIA FLUORESCENCE IN SITU HYBRIDIZATION COUPLED TO NANOSCALE SECONDARY ION MASS SPECTROMETRY (FISH-NANOSIMS)** *METHODS IN ENZYMOLOGY: RESEARCH ON NITRIFICATION AND RELATED PROCESSES, VOL 486, PART A*
  Dekas, A. E., Orphan, V. J.
  2011; 486: 281-305

- **Deep-Sea Archaea Fix and Share Nitrogen in Methane-Consuming Microbial Consortia** *SCIENCE*
  Dekas, A. E., Poretsky, R. S., Orphan, V. J.
  2009; 326 (5951): 422-426

- **Bacillus canaveralius sp nov., an alkali-tolerant bacterium isolated from a spacecraft assembly facility** *INTERNATIONAL JOURNAL OF SYSTEMATIC AND EVOLUTIONARY MICROBIOLOGY*
  Newcombe, D., Dekas, A., Mayilraj, S., Venkateswaran, K.
  2009; 59: 2015-2019

- **Diverse syntrophic partnerships from-deep-sea methane vents revealed by direct cell capture and metagenomics** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Pernthaler, A., Dekas, A. E., Brown, C. T., Goffredi, S. K., Embaye, T., Orphan, V. J.
  2008; 105 (19): 7052-7057

- **Microbial burden and diversity of commercial airline cabin air during short and long durations of travel** *ISME JOURNAL*
  Osman, S., La Duc, M. T., Dekas, A., Newcombe, D., Venkateswaran, K.
  2008; 2 (5): 482-497

- **Molecular bacterial community analysis of clean rooms where spacecraft are assembled** *FEMS MICROBIOLOGY ECOLOGY*
  Moissl, C., Osman, S., La Duc, M. T., Dekas, A., Brodie, E., DeSantis, T., Venkateswaran, K.
  2007; 61 (3): 509-521

- **Isolation and characterization of bacteria capable of tolerating the extreme conditions of clean room environments** *APPLIED AND ENVIRONMENTAL MICROBIOLOGY*
  La Duc, M. T., Dekas, A., Osman, S., Moissl, C., Newcombe, D., Venkateswaran, K.
  2007; 73 (8): 2600-2611

- **High-mass triple systems: The classical Cepheid Y Carinae** *ASTRONOMICAL JOURNAL*
  Evans, N. R., Carpenter, K. G., Robinson, R., Kienzle, F., Dekas, A. E.
  2005; 130 (2): 789-793