

## Speaker Bios

**Ken Caldeira** is a climate scientist at the Carnegie Institution for Science, where his job is “to make important scientific discoveries.” He also serves as a Professor (by courtesy) in the Stanford University Department of Earth System Science. Among Caldeira’s key contributions to science are his relatively early recognition of the threats posed by ocean acidification, his pioneering investigations into the environmental consequences of intentional intervention in the climate system (“geoengineering”), and the first peer-reviewed study to estimate near-zero-emission energy needs consistent with a 2°C climate stabilization target. He has also played a central role in helping to elucidate what our understanding of long-term geochemical cycles implies for the fate of today’s carbon dioxide emissions. Caldeira is a member of the committee producing the 2015 U.S. National Academy of Sciences report “Geoengineering Climate: Technical Evaluation and Discussion of Impacts”. He is also a contributing author to the Intergovernmental Panel on Climate Change (IPCC) AR5 report Climate Change 2013: The Physical Science Basis. In 2010, he was a co-author of the 2010 US National Academy America's Climate Choices report and was elected Fellow of the American Geophysical Union. He participated in the UK Royal Society geoengineering panel in 2009 and ocean acidification panel in 2005. Caldeira was coordinating lead author of the oceans chapter for the 2005 IPCC report on Carbon Capture and Storage.

**Greg Rau** is co-founder and CTO of Planetary Hydrogen, Inc. He is also a Senior Research Scientist at the University of California, Santa Cruz. He has 40+ years experience in basic and applied carbon cycle research with increasing focus on CO<sub>2</sub> management technologies. Dr. Rau has authored 100+ papers on these topics including publications in Science, Nature and the Proceedings of the National Academy of Sciences, and is a listed inventor on 6 US patents. He is a Fellow of the American Association for the Advancement of Science.

**Matthew Eisaman** is an Assistant Professor in the Electrical & Computer Engineering Department at Stony Brook University. Prof. Eisaman received an A.B. in physics from Princeton in 2000 (magna cum laude), a Ph.D. in physics from Harvard in 2006, was an NRC Postdoc at NIST from 2006-2008, a member of the research staff at Xerox PARC from 2008-2011, and a physicist at Brookhaven National Lab from 2011-2014. He holds 18 patents and has coauthored 33 papers with over 4000 citations. Over the past ten years, a significant part of Prof. Eisaman’s research effort has been spent developing negative emissions technologies that capture CO<sub>2</sub> from the air using the natural ocean-atmosphere equilibrium.

**Robert Zeller** explores and advises on applications for cutting-edge technologies in carbon capture and utilization in his role as Vice President of Technology for Oxy Low Carbon Ventures. Throughout his career, he has successfully driven chemical innovations from test tube to plant-wide deployment and business commercialization. Applying that knowledge and skill to carbon capture, utilization and storage and associated technologies is critical to his work with Oxy Low Carbon Ventures. He holds 10 U.S. patents with 6 more pending. Over the course of his 30 year career in the chemical industry, Rob has specialized in research and design, project and process engineering and manufacturing. During his tenure at OxyChem, Rob served in senior management positions leading teams focused on specialty chemical technology and manufacturing Chlor-Alkali, VCM and PVC. In 2017, he was recognized by the American Institute of Chemical Engineers and received their 2017 Management Award for his leadership and innovations in operational excellence. Rob has a Ph.D. in Chemical Engineering from Case Western

Reserve University and is a registered Professional Engineer in Texas. He serves on Carbon Engineering's External Review Team and the Board of Directors for TerraLithium and Carbon Finance Labs.

**Niall Mac Dowell** is a Professor in Energy Systems Engineering at Imperial College London. He is a Chartered Engineer, a Fellow of both the IChemE and the Royal Society of Chemistry. His research is focused on understanding the transition to a low carbon economy. Since 2010, he has published more than 100 peer-reviewed scientific papers at the molecular, unit operation, integrated process, and system scales in this context. His work has been presented more than 100 times at conferences in the UK, EU, North America, Middle and Far East. A full list of publications can be found [here](#) and he currently serves on the Advisory Board of Joule. Niall has more than a decade's experience as a consultant to the public and private sectors. He has worked with a range of private sector energy companies, and has provided evidence to members of the Select Committee on Energy and Climate Change and has given advice to DECC/BEIS, the IEA, the IEAGHG the ETI and the JRC. Niall is a member of Total's Scientific Advisory Board, was also a member of the US National Petroleum Council (NPC) CCUS Roadmap Team. Niall has been a member of the technical working group of the Zero Emissions Platform (ZEP), the Carbon Capture and Storage Association (CCSA) and from 2015 – 2019 served as the Secretary of the IChemE's Energy Centre. Finally, Niall was awarded the Qatar Petroleum Prize for his work on Clean Fossil Fuels in 2010 and the IChemE's Nicklin medal for his work on low carbon energy in 2015.

**David Babson** currently serves as a Program Director at the Advanced Research Projects Agency-Energy (ARPA-E). His focus at ARPA-E includes bioenergy, agricultural systems innovation, and carbon management. Prior to joining ARPA-E, Babson served as the Senior Advisor for Renewable Energy, Natural Resources, and the Environment in the Office of the Chief Scientist at the U.S. Department of Agriculture (USDA). There, he led R&D coordination efforts on carbon management, climate adaptation, sustainability, agricultural systems innovation, bioenergy, and biotechnology. Prior to joining the USDA, Babson was a Technology Manager in the Department of Energy's Bioenergy Technologies Office (BETO) where he oversaw several Conversion Program projects and worked to understand how to leverage new technologies to advance the emerging bioeconomy and address global energy and climate challenges. Before BETO, Babson advocated for sustainable transportation solutions as a Senior Fuels Engineer at the Union of Concerned Scientists. Babson earned a B.S. in Chemical Engineering from the University of Massachusetts Amherst and a Ph.D. in Chemical and Biochemical Engineering from Rutgers University.

**Tim Kruger** shares his time between the University of Oxford and a start-up, Origen Power. At Oxford, he runs a multidisciplinary program researching ways of removing carbon dioxide from the air. The program assesses the technical and social issues associated with these proposed techniques to determine, which, if any, of them could be deployed in a safe, permanent and scalable way.

Origen Power (which he founded in 2013 and where he continues to work as Chief Technology Officer) is a start-up that is developing a technology to remove carbon dioxide from the air based on the lime cycle. Tim Kruger's TED Talk from the TED2017 Conference: ["Can we stop climate change by removing CO<sub>2</sub> from the air?"](#)

**Jess Adkins** is a chemical oceanographer interested in using trace metals as tracers of environmental processes. He is the Smits Family Professor of Geochemistry and Global Environmental Science at the California Institute of Technology. Most of his current work is centered around the geochemical investigation of past climates. He is primarily concerned with the last few glacial/interglacial cycles that span a few hundred thousand years. As an oceanographer, he tries to understand the coupled

ocean/atmosphere system during these shifts by monitoring the deep ocean's behavior. Much of his work to date has focused on developing a new climate archive, deep-sea corals, that has the potential to revolutionize the types of information we can obtain about oceanographic climate change.

**Heather Willauer** is an American analytical chemist and inventor working in Washington, D.C., at the United States Naval Research Laboratory (NRL). Leading a research team, Willauer has patented a method for removing carbon dioxide (CO<sub>2</sub>) from seawater, in tandem with hydrogen (H<sub>2</sub>) removed simultaneously. Willauer is researching catalysts to enable a continuous Fischer–Tropsch process to recombine carbon monoxide (CO) and hydrogen gases into complex hydrocarbon liquids to synthesize jet fuel for Navy and Marine aviation, and fuel for the U.S. Navy's ships at sea. The work of Willauer's team of researchers, once the technology is incorporated into the U.S. Navy's warships in the 2020s, is expected to release such ships from their reliance on vulnerable replenishment oilers to give them indefinite time on station. Especially significant is the ability to maintain naval air operations without regular deliveries of jet fuel. A side benefit of the technology is that it will decrease harmful ocean acidification, by removing CO<sub>2</sub> from seawater.

**Richard Zeebe** is a professor within the Department of Oceanography at the University of Hawaii at Manoa. His research group explores various topics including element cycling in the ocean, atmosphere and biosphere; physical chemistry using quantum chemistry computations to understand processes at the molecular level; numerical integrations of planetary systems; and studies of the climate of the past in order to improve understanding and forecasting of the climate of the future.

**Andy Ridgwell** is a Professor of Geology at the University of California, Riverside. Originally hailing from southwestern England, Dr. Ridgwell earned his PhD in 2001 from the University of East Anglia after focusing his thesis on glacial-interglacial perturbations in the global carbon cycles. In 2002, Dr. Ridgwell moved to the U.S. to work as a researcher at UCR, shifting his focus from micronutrient supply and sub-regional details of Quaternary carbon cycling to global-scale aspects of the ill-delineated and late Precambrian Earth system. More recently, his research interests have included the implications for global carbon cycling of changes in the rate, locus, and primary mineralogy of calcium carbonate precipitation and preservation; and the control of marine productivity and atmospheric CO<sub>2</sub> by the aeolian delivery of iron to the ocean surface.

**Ulf Riebesell** is head of the research unit Biological Oceanography at GEOMAR Helmholtz Centre for Ocean Research Kiel and since 2003 Professor for Marine Biogeochemistry at the Christian Albrechts University Kiel. He studied biology and biological oceanography in Kiel, Seattle, and Rhode Island, completed a PhD at the University of Bremen and worked as postdoc at the University of California Santa Barbara. He is member of the Excellence Cluster, “The Future Ocean” and coordinator of the BMBF project: CUSCO – Coastal Upwelling in a Changing Ocean. In 2011 he was awarded the Vernadsky Medal of the European Geosciences Union, in 2012 the Leibniz Prize of the German Science Foundation and in 2016 an Advanced Grant of the European Research Council.

**Ros Rickaby** has aimed to bring life to geochemistry throughout her research career. She has pioneered an interdisciplinary blend of biology and chemistry to resolve questions of past climates, evolution, and the future of the phytoplankton. The feedback between biology and climate is inescapable, and requires investigation of both biological innovation and environmental change over Earth history. Ros' distinctive approach is to read geological history from signals of adaptation within genes of modern organisms, which play out in the evolving affinity and kinetics of the expressed enzymes, or isotopic signals of

adaptation that leave a footprint in fossils and biomolecules. Ros has authored over 100 papers and co-authored a book "Evolution's Destiny: Co-evolving chemistry of the environment and life". Ros has just taken up the role of Chair of Geology, Department of Earth Sciences, University of Oxford, having been Professor of Biogeochemistry since 2002, on the dark side (of blue!) as well as mum to two boys. She received her PhD with Harry Elderfield from Cambridge University in 1995 and studied at Harvard for her post-doc with Dan Schrag. In 2008 Ros received the European Geosciences Union's Outstanding Young Scientist award, in 2010 the American Geophysical Union's James B. Macelwane Award for significant contributions to the geophysical sciences by an outstanding young scientist and most recently, in 2016, the Lyell Award of the Geological Society of London. She currently holds a Wolfson Research Merit Award from the Royal Society.

**Lennart Bach** is a Postdoc at the Institute of Marine and Antarctic Studies. He is interested in marine plankton communities, the carbon cycle, and ocean-based solutions for the climate crisis. Before joining the University of Tasmania, Lennart was scientist at GEOMAR Helmholtz Centre for Ocean Research Kiel and member of the offshore mesocosm team with a focus on seagoing experimentation.

**George Waldbusser** is an associate professor within the College of Earth, Ocean, and Atmospheric Sciences at Oregon State University. His research interests include ocean acidification effects on bivalves; benthic ecology and sediment biogeochemistry; and tidal flat ecology. Dr. Waldbusser's work has been published on over 70 separate occasions and has enjoyed numerous appointments and awards over the course of his professional career. Before his work at Oregon State University, Dr. Waldbusser earned his PhD at the University of Maryland with a focus on Biological Oceanography.

**Baerbel Hoenisch** is a German palaeoceanographer, paleoclimatologist, author and professor at Columbia University. Originally trained as a biologist at the University of Bremen, Dr. Hoenisch obtained her doctorate in 2002 at the Alfred Wegener Institute for Polar and Marine Research. Following that experience, she worked in various scientific roles between 2002 and 2006 including at the Lamont-Doherty Earth Observatory. Since 2007, she has conducted research at Columbia University, becoming a professor in 2019. Dr. Hoenisch is interested in reconstructing past climate change, atmospheric carbon dioxide concentrations and ocean acidification from chemical signals stored in the fossil remains of marine planktonic organisms.

**Christopher L. Sabine** is a full professor in the Oceanography Department and Associate Dean for Research at the School of Ocean and Earth Science and Technology (SOEST) in University of Hawaii Manoa. He received his PhD. in chemical oceanography from the University of Hawaii in 1992. Since that time he has published over 160 journal articles and book chapters on carbon cycling and climate change. His current research focuses on understanding the global carbon cycle, the role of the ocean in absorbing CO<sub>2</sub> released from human activity, and ocean acidification. He has been a scientific advisor for a number of national carbon programs in the U.S. and internationally. He has won several awards including the U.S. Department of Commerce Gold Medal Award for pioneering research leading to the discovery of increased acidification in the world's oceans and was recognized by the Intergovernmental Program on Climate Change (IPCC) for his contributions to the IPCC when they were awarded the Nobel Peace Prize in 2007. He was also a coordinating lead author for working group 1 of the IPCC 5th assessment report, Chapter 6: Carbon and other Biogeochemical Cycles. Dr. Sabine has been active in the Global Ocean Acidification Observing Network's capacity building efforts for the past several years. He helped develop the GOA-ON in a box kits for low cost carbon measurements and has conducted

trainings for African, Pacific Islander, and Latin American scientists using the kits. For more information go to: <https://www.soest.hawaii.edu/oceanography/faculty/Sabine.html>

**Albert J. Plueddemann** received the B.S. degree in engineering from the University of Michigan in 1980 and the M.S. and Ph.D. degrees from the University of California, San Diego (Scripps Institution of Oceanography) in 1981 and 1987, respectively. He joined the Woods Hole Oceanographic Institution in 1987 as a postdoctoral investigator, and currently holds a Senior Scientist position in the Department of Physical Oceanography. He served as Department Chair from 2014-2018. He currently serves as Project Scientist for the Coastal and Global Scale Nodes of the NSF Ocean Observatories Initiative.

Plueddemann's research is focused on upper ocean processes, including the fluxes of momentum and heat at the air-sea interface, the structure of the oceanic surface boundary layer, and the response of the upper ocean to surface forcing. He is also interested in the development and application of oceanographic instrumentation. Plueddemann is a sea-going observationalist, the author or co-author of over 60 publications, and an active participant in the ocean research community.

**Andrew Dickson** is a professor of marine chemistry in the Marine Physical Laboratory division at the Scripps Institution of Oceanography, University of California, San Diego (UCSD). Dickson's research focuses on improving our understanding of the chemistry of carbon dioxide in seawater, with a current emphasis on the effects of ocean acidification. He has played a key role in developing quality control standards for oceanic carbon dioxide measurements and leads a program to prepare, certify, and distribute CO<sub>2</sub> reference materials to the world's marine scientists. Born in Nairobi, Kenya, Dickson received a B.Sc. degree and a Ph.D from the University of Liverpool. Prior to joining Scripps, Dickson served as a postdoctoral research associate at the Marine Biological Association Laboratory in Plymouth, England and as a postdoctoral associate in the University of Florida, Department of Chemistry. He joined Scripps as an assistant research chemistry, became an associate research chemist, a professor-in-residence of marine chemistry then a professor. Dickson's laboratory participates in hydrographic cruises sponsored by the Climate Variability and Predictability (CLIVAR) project of the World Climate Research Programme. He is also part of a multi-institutional collaboration to study the implications of ocean acidification on a variety of organisms that are important to US West Coast fisheries. Dickson is a member of the OceanSITES Data Management Team and the PICES Section on Carbon and Climate. He is also chairman of the steering committee for the California Current Acidification Network. He has served as editor or as an editorial board member of several journals, including most recently Journal of Geophysical Research, Oceans.

**Ellen Briggs** is an assistant professor within the Ocean and Resources Engineering Department at the University of Hawaii at Manoa. Prior to holding this position, she earned her PhD in Oceanography in 2017 at the Scripps Institution of Oceanography. Ellen's research interests include development and deployment of prototype autonomous sensors and instrumentation, chemical sensors, using novel instrumentation for monitoring the marine inorganic carbon dioxide system, coral reef metabolism, and biogeochemical dynamics in the seasonal sea ice zone.