Planning Committee Biographies for the Workshop on Technology Developments to Advance Antarctic Research

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University of Colorado

Michael Ashley
University of New South Wales

Amy Bender
Argonne National Laboratory/University of Chicago

George Blaisdell
Cold Regions Research and Engineering Laboratory

Daniel Costa
University of California, Santa Cruz

Minghui Diao
San Jose State University

Jacqueline Goordial
University of Guelph

Bruce Howe
University of Hawaii at Manoa

Hyomin Kim
New Jersey Institute of Technology

Craig Lee
University of Washington

Keith Nicholls
British Antarctic Survey

Maryam Rahnemoonfar
University of Maryland, Baltimore County

Sharon. Robinson
University of Wollongong, Australia

Kristen Schell
Rensselaer Polytechnic Institute

Matthew Siegfried
Colorado School of Mines

Paul Winberry
Central Washington University

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COMMITTEE BIOGRAPHIES

Diane McKnight (*chair*) began her career with the U.S. Geological Survey and is now a Professor in the Department of Civil, Environmental and Architectural Engineering and a Fellow of the Institute of Arctic and Alpine Research at the University of Colorado. Her research focuses on the coupling of hydrology, aquatic ecology and water quality. She studies streams, lakes and wetlands in diverse regions, including polar desert streams in Antarctica, acid-mine drainage streams and alpine lakes in the Rocky Mountains and wetlands in Botswana and Bangladesh. She has been President of the American Society of Limnology and Oceanography, editor of Journal of Geophysical Research-Biogeosciences and has served on numerous committees for the National Research Council. She is a fellow of AGU and AAAS, a member of the National Academy of Engineering and received the Horton Medal from AGU and the John Dalton Award from the European Geophysical Union. From 2015-2018, she served as a program officer with the Arctic Program at NSF. She was the 2019-2020 Association of Environmental Engineering and Science Professors Distinguished Lecturer and is currently the Chair of the Executive Board of the Long Term Ecological Research Network.

Michael Ashley is a professor in the School of Physics at the University of New South Wales, Sydney, Australia. He has worked on instrumentation projects in Antarctica since 1994, including sensors and observing systems for atmospheric studies, astronomy, and astrophysics; data and communications technologies; low-temperature electronics and batteries/power systems for cold-weather environments; remote logistics support; and robotics and autonomous instrument engineering. Prof. Ashley has extensive experience in software and hardware designs for reliable operation in Antarctica at South Pole, Dome A, Dome C and Dome Fuji. He has played a leading role in designing and operating the many PLATO observatories that have been able to provide 1kW of power continuously to several sites on the Antarctic plateau for over a decade. Prof. Ashley was a member of a member of the National Committee for Antarctic Research (an Australian Academy of Sciences committee) from 2015-2020. He is currently a member of the Steering Committee for the Scientific Committee on Antarctic Research's Astronomy and Astrophysics from Antarctica Expert Group. Prof. Ashley holds a Ph.D. in Astronomy from the Australian National University., an M.Sc. in Astronomy, (Caltech), and B.Sc. in Physics (ANU).

Amy Bender is a Physicist at Argonne National Laboratory in the High-Energy Physics division. Her research focuses on observations of the cosmic microwave background (CMB), including both instrumentation development for new experiments and analysis of the data. Current projects include SPT-3G receiver, which was installed on the South Pole Telescope in 2017 and has since been surveying the CMB. Bender is also currently the lead of the South Pole Infrastructure, Integration, & Commissioning subsystem for the planned CMB-S4 project. Bender received her Ph.D. in Astrophysics from the University of Colorado at Boulder after which she was a Postdoctoral Fellow at McGill University and subsequently a postdoctoral researcher at Argonne.

George Blaisdell is currently a cold regions engineering consultant. He recently completed 43 years as a government employee in the roles of a research engineer at the US Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL) and as Operations Manager and then Chief Program Manager for the US Antarctic Program (USAP) as an employee of the National Science Foundation's Office of Polar Programs. His efforts have produced advances in Antarctica such as the McMurdo to South Pole heavy cargo traverse (reducing the cost of delivery by more than five times), year-round heavy wheeled aircraft access to McMurdo (snow and ice runways), robust snow foundation for the South Pole 10-m telescope, introduction of integrated (USAP and New Zealand) wind-power into the Ross Island power grid, and an analytics-based approach to icebreaking operations. In the Arctic, his contributions include a foundation design for a new berthing building at Summit Station, design and development of a low-tare traverse cargo sled, design contributions to

mobile buildings at Summit Station, engineering analyses of the Summit skiway, and evaluation and design recommendations for Summit Station building lifting systems. In addition to a strong technical skill set, George also has experience with management of projects, schedules, budgets, contracts, equipment and infrastructure life-cycles, energy, operations, and logistics. Blaisdell Spur on Mt. Beazley at the head of the Leverett Glacier is named after George.

Daniel Costa is the Director of the Institute of Marine Sciences and Distinguished Professor of Ecology and Evolutionary Biology at the University of California at Santa Cruz. Daniel Costa completed a B.A. at UCLA and a Ph.D. at U.C. Santa Cruz followed by postdoctoral research at the Scripps Institution of Oceanography. His research focuses on the ecology and physiology of marine mammals and seabirds, taking him to every continent and almost every habitat from the Galapagos to Antarctica. He has worked with a broad range of animals including turtles, penguins' albatross, seals, sea lions, sirenians, whales and dolphins and has published over 500 scientific papers. He had been a pioneer on the use of marine animals to collect oceanographic data and co-founded the Tagging of Pacific Predators program. He has worked extensively in Antarctica and served as the chief scientist on two Southern Ocean GLOBEC winter cruises. His research is aimed at recording the movement and distribution patterns of marine mammals and seabirds in an effort to understand their habitat needs. He has served as member of a number of international science steering committees including the Integrated Climate and Ecosystem Dynamics program, The Census of Marine Life, Southern Ocean GLOBEC, CLIOTOP, the Southern Ocean Observing System (SOOS) and the Integrated Marine Biogeochemistry and Ecosystem Research (IMBER). Dr. Costa is a member of the Ocean Studies Board and was a member of the BOEM First in Class panel of the National Academies of Sciences, Engineering and Medicine. He serves as a US representative to SCOR, a member of the US UN Ocean Decade Committee and on the US IOOS Advisory Board.

Minghui Diao is an Associate Professor in the Department of Meteorology and Climate Science at San Jose State University (SJSU). Her research focuses on cloud and aerosol processes based on aircraft in-situ measurements, remote sensing observations, and climate model simulations. In particular, her group examines the characteristics of ice and mixed-phase clouds and their climate impacts in high latitudinal regions (i.e., Antarctica, Arctic and Southern Ocean). Some of the honors and awards that she received include the Lawrence Livermore National Laboratory Faculty Mini-Sabbatical Fellowship, SJSU Research Foundation Early Career Investigator Award, NCAR ASP Postdoctoral Fellowship, NASA NESSF Graduate Fellowship, and the Princeton Francis Upton Fellowship – the highest graduate fellowship given by the School of Engineering and Applied Mathematics at Princeton University. Minghui received her B.S. degree from Peking University and her Ph.D. degree from Princeton University.

Jacqueline Goordial is an Assistant Professor at the University of Guelph in environmental microbiology. She examines how microbial life persists within extreme subsurface environments such as permafrost and oceanic crust/marine sediments. To carry out her research, Goordial employs a combination of genomic sequencing with culturing, microbial metabolic activity and viability measurements both in the field and in the laboratory. Understanding subsurface life also assists in the search for extraterrestrial life in our solar system where the subsurface may be the most habitable of our likely targets. She is a CIFAR Azrieli Global Scholar (2021–2023) and a member of the International Society for Microbial Ecology, the Canadian Society for Microbiology and the Canadian Permafrost Association. She holds a Ph.D. from McGill University and a M.Sc. from the University of Toronto in microbial ecology. Previously, she has presented to the NAS Committee for Planetary Protection on microbial survival on mars and dispersal from spacecraft.

Bruce Howe has been a Researcher in the Department of Ocean and Resources Engineering at the University of Hawaii at Manoa since 2008. From 1987 to 2008, he worked at the Applied Physics Laboratory, University of Washington. Dr. Howe develops ocean observing infrastructure for the

provision of power, communications, and positioning throughout the ocean volume, with an emphasis on cabled and acoustic ocean observing systems. As Chair of the international Joint Task Force SMART Cable initiative, (Science Monitoring And Reliable Telecommunications), Dr. Howe is leading the effort to incorporate sensors into commercial trans-ocean submarine telecommunication cable systems to form a planetary scale observing system for climate, ocean circulation and sea level monitoring and tsunami and earthquake warning. Past projects have included basin-scale acoustic thermometry, and planning, development, and operation of cabled observatories. Dr. Howe and his team installed and operate the ALOHA Cabled Observatory – the world's deepest plug-and-play power and Internet node on the planet at 4728 m water depth, now with 10 years of continuous data. Dr. Howe earned degrees at Stanford University (B.Sc. Mechanical Engineering, M.Sc. Engineering Science) and the University of California at San Diego (Ph.D. Physical Oceanography).

Hyomin Kim, Assistant Professor of Physics at New Jersey Institute of Technology (NJIT), researches the impact of solar emissions such as radiation and charged particles on Earth's geomagnetic environment and human technologies. His analysis of magnetic field waves, caused by the interaction of solar wind with space plasma particles, shows how solar energy is transferred to Earth's upper atmosphere. To that end, he serves as Deputy Director of Center for Solar-Terrestrial Research (CSTR) Polar Engineering Development Center (PEDC) for operation and on-site service of a suite of scientific instruments at manned and unmanned stations across Antarctica. He has conducted many years of fieldwork in Arctic and Antarctic regions for operations of science instruments to study how the energy coming from the Sun is coupled with the Earth's geomagnetic environments. He is currently a member of a project team dedicated to the development and expansion of the most extensive ground-based interhemispheric conjugate network to understand the causes and effects of asymmetries in the Magnetosphere-Ionosphere coupling processes. He has also been involved in rocket- and satellite missions including the former NASA Radiation Belt Storm Probe Ion Composition Experiment (RBSPICE) mission to study the Earth's radiation belts and their interactions with the Earth's geomagnetic field environments.

Craig Lee is Senior Principal Oceanographer, Applied Physics Laboratory and Professor, School of Oceanography, at the University of Washington. Lee's research focuses on studies of small-scale dynamics, physical-biogeochemical interactions, atmosphere-ice-ocean dynamics and Arctic change. He leads a team that develops new instruments and approaches to collect novel observations (including the Seaglider family of long-endurance gliders) with a particular focus on persistent, year-round operation in ice-covered environments. Leadership roles include chairing the University National Oceanographic Laboratory System Council (the advisory body for the US Academic Research Fleet), chairing the Observing Panel for the Study of Environmental Arctic Change and serving as chief scientist for mid-scale Arctic research programs. Lee received an NSF Creativity Award for research into the impact of small-scale dynamics on biological and biogeochemical processes, and to further the development of autonomous approaches. Lee received a BS in Electrical Engineering and Computer Science from the University of California, Berkeley, a PhD in Physical Oceanography from the University of Washington and did postdoctoral research in the department of Physical Oceanography at the Woods Hole Oceanographic Institution.

Keith Nicholls joined the British Antarctic Survey (BAS) in 1987 and is now a senior researcher in the Polar Oceans group. His work concerns the interaction between the Antarctic Ice Sheet and the Southern Ocean, primarily via ice shelves. He has led over 20 field projects to study that interaction, from direct observation of the ocean beneath ice shelves via hot-water drilled access holes to ship-based research cruises, including the use of autonomous underwater vehicles. In recent years, he has developed the use of precise, ground-based, downward-looking radar to monitor ice strain and ocean-driven basal melting. He was awarded the Polar Medal in 2004. Dr. Nicholls received a B.Sc. in physics from the University of Bristol, U.K., where he also studied for a Ph.D. in physics under the supervision of Professor John Nye.

Maryam Rahnemoonfar is the PI and Director of NSF data science institute (iHARP), Director of Computer Vision and Remote Sensing Laboratory, and Associate Professor of AI and Data Science at College of Engineering and Information Technology, University of Maryland, Baltimore Campus. Her research interests include Deep Learning, Computer Vision, Data Science, AI for Social Good, Remote Sensing, and Document Image Analysis. Her research specifically focuses on developing novel machine learning and computer vision algorithms for heterogenous sensors such as Radar, Sonar, Multi-spectral, and Optical. Her research projects have been funded by several awards, including the NSF HDR institute Award, NSF BIGDATA award, Amazon Academic Research Award, Amazon Machine Learning award, Microsoft, and IBM. She is passionate about discovering actionable insights in data and leading interdisciplinary research teams and projects to solve environmental and humanitarian problems. Dr. Rahnemoonfar holds a Ph.D. in Computer Science from University of Salford Manchester, UK.

Sharon Robinson is a Senior Professor, Executive Director of the Global Challenges Program at the University of Wollongong and Deputy Director Science Implementation of the *Securing Antarctica's Environmental Future* Research Program. Dr. Robinson's research spans multiple spatial and temporal scales from sub second electron transport in organelles to decadal ecosystem change. She focuses on understanding how Antarctic vegetation responds to climate change, using her research to inform better environmental protection. She engages with and develops new integrative phenomic techniques linking plant metabolism to data from remotely piloted aerial systems and satellites, to advance our understanding of how plants survive in some of the harshest conditions on Earth. Dr. Robinson is a member of the SCAR *Antarctic Near shore and Terrestrial Observing System* Expert Group, a member of the UN *Environment Programme Environmental Effects* Assessment Panel and an Editor of Global Change Biology. Robinson was awarded the Linnean Society of London Irene Manton Prize in 1991 and was a Finalist for the Australian Museum 2021 Eureka Prize for Leadership in Innovation and Science. She studied Genetics and Botany, has a B.Sc. Honours from University College London, a Graduate Certificate in Science Education from Kings College London, and a Ph.D. from University College London.

Kristen Schell is an Assistant Professor in Mechanical and Aerospace Engineering and a core faculty member of the Sustainable and Renewable Energy Engineering Program at Carleton University. She is also a Research Scientist in the Industrial and Systems Engineering department at Rensselaer Polytechnic Institute in Troy, NY. Dr. Schell's research focuses on developing new methods in power systems modeling to better integrate renewable energy. She is currently PI of an NSF grant developing modular microgrids for Arctic communities, which can be easily adapted, upgraded and potentially moved to improve grid resilience, as climate change affects the installed infrastructure. Her work belongs to the larger field of operations research, including facility location optimization, generation expansion planning and resource forecasting. She was named a Negative Emissions Science Fellow in 2020 and was awarded the IVADO Postdoctoral Fellowship (2018 - 2020) in Mathematics and Industrial Engineering. Her research has been funded by the US Department of Energy, NSF and NSERC. She obtained dual Ph.D. degrees from Carnegie Mellon University and the Faculty of Engineering at the University of Porto, Portugal and completed postdoctoral training at the University of Michigan in Industrial and Operations Engineering.

Matthew Siegfried is a glaciologist who uses satellite remote sensing techniques in combination with field-based and airborne geophysical methods to understand physical processes of Earth's glaciers and ice sheets. He is an assistant professor in the Department of Geophysics at Colorado School of Mines, is affiliated faculty in the Hydrologic Science & Engineering Program and the Humanitarian Engineering & Science Program, and is a faculty fellow at the Payne Institute for Public Policy. Dr. Siegfried runs the Mines Glaciology Laboratory, where the team collects and synthesizes ground-, air-

, and space-based datasets in an effort to span the spatial and temporal on which these processes occur. He is particularly interested in processes at the ice-bed interface, which lies hidden beneath 10s to 1000s of meters of ice at the intersection between glaciology, hydrology, geology, microbiology, and oceanography. Dr. Siegfried is committed to maintaining an open discussion of the changing cryosphere, having collaborated with institutions ranging from local elementary schools to the U.S. State Department in an effort to facilitate our conversation about the local, regional, and global impacts of changes at the Earth's poles. He serves as a scientific editor for the Journal of Glaciology, is a co-chair for the joint UNAVCO and IRIS Polar Science and Technology Committee, is a member of NASA's ICESat-2 mission Science Team, and was a member of NASA's Operation IceBridge Science Team. He received his Bachelor's and Master's degrees in Earth Sciences from Dartmouth College and his Ph.D. also in Earth Sciences from Scripps Institution of Oceanography at University of California, San Diego.

Paul Winberry is a geophysicist at Central Washington University. His research focuses on the physics of fast moving glaciers and ice streams as well as geologic influences on the stability of Earth's ice sheets. He has conducted numerous research expeditions to the Antarctica and Arctic regions and is actively involved in advancing instrumentation for Polar regions. This includes experience leading development efforts to advance polar seismic instrumentation. Additionally, he has served on the advisory committees of the NSF's seismic and ice drilling facilities as well as served as the co-Chair of the polar committee advising the NSF geodetic and seismic facilities. He received his Ph.D. from The Pennsylvania State University in 2008.