2021 PACE Applications Workshop

September 15th & 16th 2021

Host/Moderator/Speaker/Panelist Bios

Host: Erin Urquhart, PhD, *PACE Mission Applications Coordinator***,** *NASA Goddard Space Flight Center/Science Systems and Applications Inc*

Dr. Erin Urquhart, Applications Coordinator for the NASA Plankton, Aerosol, Cloud, and ocean Ecosystem (PACE) mission, works at the transdisciplinary boundary of earth science, social science, and public health. Erin engages end-user/stakeholder communities to identify their needs and science objectives while exploring innovative and practical uses of PACE data products. She has a proven track record in coastal and inland water quality research and satellite remote sensing with a MHS in Environmental Public Health and a MA/PhD in Earth & Planetary Sciences from Johns Hopkins University. Before coming to NASA, she worked on model development and detection of inland cyanobacteria harmful algal blooms at the US Environmental Protection Agency (EPA).

Host: Natasha Sadoff, *PACE Mission Applications Deputy Coordinator*, *NASA Goddard Space Flight Center/Science Systems and Applications Inc*

Ms. Natasha Sadoff is the Applications Deputy Coordinator for the NASA PACE mission. Natasha is a geographer who works at the nexus of environmental management, governance, and earth science. She has twelve years of experience connecting data users and stakeholders to resources to improve decision-making and governance in areas such as climate change adaptation and resilience; energy management; air quality; solid waste management; and other areas. She facilitates stakeholder needs assessments, user engagement, training and outreach, and capacity building/development, particularly in the usage of Earth observations for societal benefit. Before coming to NASA, she was a senior scientist at Battelle, where she managed domestic and international environmental governance and capacity building programs for Federal government clients like US EPA and NASA.

Session 1: NASA Applied Sciences & the PACE Mission

Speaker: Emily Sylek-Glassman, PhD**,** *Applied Sciences Program Manager***,** *NASA Headquarters*

Dr. Emily Sylak-Glassman is a program manager in the Applied Sciences Program within the Earth Science Division at NASA Headquarters. She works to apply NASA's knowledge of Earth science to benefit people and the planet. Emily manages a broad portfolio of efforts across the Applied Sciences Program and leads the Program's strategy and budget planning. Emily's work supports the development of practical and innovative applications from data collected by various satellite missions. She serves as the executive secretary and designated federal official for the Applied Sciences Advisory Committee. Before joining NASA, Emily worked at the Science and Technology Policy Institute, a federally funded research and development center. There, she worked with the White House Office of Science and Technology Policy (OSTP) and civil, defense, and intelligence executive branch agencies to provide in-depth analyses and technical expertise. As a project manager and lead researcher, she coordinated climate and Earth science efforts with OSTP, individual agencies, and at the interagency level with subcommittees of the National Science and Technology Council (NSTC). Emily received a PhD in chemistry from the University of California, Berkeley. She also received BS degrees in chemistry and biological chemistry from the University of Chicago.

Speaker: Andre' Dress, *PACE Project Manager, NASA Goddard Space Flight Center*

Andre' Dress is the Program Manager for the PACE Mission. He is also the Deputy Project Manager for JPSS-1 Mission. Formerly, Andre' worked on ESMP, ASTRE PHASE A, DESDynI, GOES N/O/P, GOES I-M, and Landsat 4/5 missions. A Maryland native, Andre' graduated from University of Maryland and later earned a master's degree from Johns Hopkins University. In his spare time, he enjoys camping, work out at the local gym, run foot races, water ski, rock climb, bike, play the trumpet for the Annapolis Bay Winds Band, make soap, and homebrewing.

Speaker: Jeremy Werdell, PhD, *PACE Project Scientist***,** *NASA Goddard Space Flight Center*

Dr. Jeremy Werdell is an oceanographer in the Ocean Ecology Laboratory at NASA Goddard Space Flight Center (GSFC), where he also serves as the Project Scientist for the upcoming Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission. Jeremy joined GSFC in 1999, where he's made a career ruminating on the on-orbit calibration of ocean color instruments, the development of remote-sensing algorithms, and the validation and application of satellite-derived data products. When not traveling with his family and obsessing about his yard, Jeremy also moonlights as a teacher and student mentor. But, if he had to do it all again, he would pursue his real dream of becoming a professional chef.

Speaker: Antonio Mannino, PhD, *PACE Deputy Project Scientist*, *NASA Goddard Space Flight Center*

Dr. Antonio Mannino, research oceanographer of the Ocean Ecology Laboratory at NASA Goddard Space Flight Center since 2002, is currently Deputy Project Scientist for Oceans on NASA's PACE mission focusing on validation and applications. He is also Deputy Principal Investigator on the NASA GLIMR EVI-5 mission. At NASA, Dr. Mannino has served as project PI, lead/co-lead for the GEO-CAPE mission pre-formulation ocean science working group, MODIS and VIIRS ocean science team member, PI for the Ocean Biology and Biogeochemistry field support group, chief scientist and technical officer for multiple field campaigns, liaison on ocean color with the Korean Ocean Satellite Center, and led several instrument design lab studies for NASA. Mannino has served as a member of the International Ocean Color Coordinating Working Group on geostationary ocean color requirements and currently contributing to the IOCCG field measurement protocols. He has mentored several postdoctoral researchers and numerous summer interns. Mannino has published several articles on coastal ocean color algorithm development and validation including for colored dissolved organic matter and particle absorption, dissolved organic carbon, and phytoplankton pigments and taxonomy. His current research applies field observations, satellite data, and 3D models to study carbon cycle processes and phytoplankton diversity from rivers to oceans with greater emphasis on coastal Arctic waters. His fundamental research question focuses on how physical forcings including river discharge, ocean circulation, climate change impact the ocean's (coastal and global) carbon cycle and the plankton at the heart of it. The research is multi-disciplinary requiring a broad range of physical, chemical, and biological observations at various frequencies (hourly to daily to monthly to yearly), over an extended period (decadal to multi-decadal) and at relatively high spatial resolution of ~0.1 to 1 km spanning hundreds of kilometers to global scale. Mannino's research addresses NASA's long-term goal to understand and protect our home planet.

Speaker: Maria Tzortziou, PhD, *PACE Deputy Program Applications Lead, NASA Goddard Space Flight Center; Professor, Earth and Atmospheric Sciences, Center for Discovery and Innovation, City College of New York*

Dr. Maria Tzortziou is a physicist with expertise in optics, photo/biogeochemistry, and remote sensing. After receiving an MSc and a PhD in Ocean and Atmospheric Sciences from the University of Maryland College Park, she became Postdoctoral Fellow at the Smithsonian Institution and NASA Goddard Space Flight Center. She is currently Professor of Earth & Atmospheric Science at the Center for Discovery and Innovation of The City College of New York, and Research Scientist with University of Maryland/NASA Goddard Space Flight Center. Her research integrates multidisciplinary datasets, satellite remote sensing observations, and ecosystem models to provide mechanistic insights into the impacts of human and environmental pressures on air- and water- quality, biogeochemical cycles, and ecological processes along the continuum of inland, coastal, and open ocean ecosystems. Tzortziou is on

the Science Steering Committee for the Ocean Carbon Biogeochemistry (OCB) Program and on the Science Leadership Board of the North American Carbon Program (NACP). She has served on the Steering Committee and Writing Team for the 2017-2027 NASA Ocean Biology & Biogeochemistry Program Advanced Science Plan and was Invited Chapter Author for the Second State of the Carbon Cycle Report (SOCCR-2). Tzortziou serves as the Deputy Program Applications Lead for NASA's PACE (Plankton, Aerosol, Cloud, ocean Ecosystem) mission and was member of the 2014-2017 NASA PACE Science Team. She is Science Team Member and the Applied Science Point of Contact for NASA's recently selected Earth Venture Instrument-5 investigation GLIMR (Geostationary Littoral Imaging and Monitoring Radiometer).

Session 2: Engaging with the PACE Air Quality (AQ) Community and Understanding Their Data Application Needs

Keynote Speaker: Susan Anenberg, PhD, *Associate Professor*, *Environmental and Occupational Health and of Global Health, George Washing University*

Dr. Susan Anenberg is an Associate Professor of Environmental and Occupational Health and of Global Health at the George Washington University Milken Institute School of Public Health. Dr. Anenberg studies the health implications of air pollution and climate change, from local to global scales. Dr. Anenberg has been a Co-Founder and Partner at Environmental Health Analytics, LLC, the Deputy Managing Director for Recommendations at the U.S. Chemical Safety Board, an environmental scientist at the U.S. Environmental Protection Agency, and a senior advisor for clean cookstove initiatives at the U.S. State Department. Her research has been published in top academic journals such as Science, Nature, and Lancet Planetary Health. She has also led or contributed to many science-policy reports on air quality and climate change published by U.S. EPA, World Bank, World Health Organization, United Nations Environment Programme, and others.

Moderator: Helena Chapman, PhD, MD, *Associate Program Manager, Health & Air Quality, NASA Headquarters/Booze Allen Hamilton*

Dr. Helena Chapman serves as Associate Program Manager for Health and Air Quality Applications in the Applied Sciences Program of the NASA Earth Science Division. Helena helps manage a portfolio of Health and Air Quality projects focused on public health applications. She coordinates panel submissions to scientific conferences, which provide research updates and facilitate researcher and stakeholder engagement. She also supports the Group on Earth Observations (GEO) Health Community of Practice and Earth Observations for Health Initiative. Prior to this position, she served as the AAAS Science & Technology Policy Fellow in the NASA Applied Sciences Program. She received her doctoral degree in Public Health (One Health) and master's degree in Public Health (Epidemiology) from

the University of Florida. She holds a medical degree from the Iberoamerican University in the Dominican Republic.

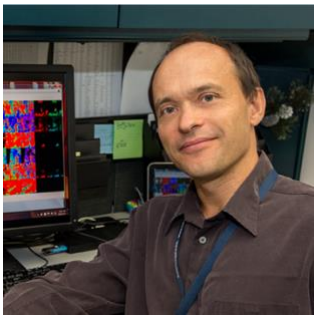
Panelist: Juan Jose Castillo, *Regional Air Quality Advisor, Pan American Health Organization (PAHO)*

Juan Jose Castillo is a Regional Air Quality Advisor at the Pan American Health Organization. He works with health officers to support regional and country action to reduce air pollution and protect public health in the Americas. He fosters the mainstreaming of health considerations to develop and assess public policies that deliver multiple benefits while improving air quality. Juan has +12 years' experience in the environmental public health field. He has worked as an executive officer in international non-profit organizations and has served in the public sector and academy in Colombia. He has supported the preparation of air quality management plans and multisectoral policies to reduce air pollution in several cities in Latin America including Lima, Mexico City, Monterrey, Guadalajara, Bogotá, Cali, Medellín, Tegucigalpa, and Rosario among others. He has a BSc in Environmental Engineering and holds a master's degree in environmental management.

Panelist: Marcela Loria, PhD, *Assistant Professor, School of Meteorology, University of Oklahoma*

Dr. Marcela Loria Salazar is an assistant professor in the School of Meteorology at The University of Oklahoma. Marcela specializes in satellite remote sensing and data assimilation. Her research focuses on how smoke and pollen are transported into the atmosphere and how they interact with humans and clouds. More specifically, she seeks to improve air quality (AQ) forecasting by considering a wide variety of data and analysis techniques, including aerosol processes (physical and chemical composition), gases, weather observations, satellite retrievals, weather numerical models, and "big" data assimilation techniques. Born and raised in Costa Rica, she graduated from Universidad de Costa Rica (2009), and holds a PhD an MS degree in Atmospheric Science from the University of Nevada, Reno.

Panelist: Alexei Lyapustin, PhD, *Research Scientist, Climate & Radiation Lab. NASA Goddard Space Flight Center*



Dr. Alexei Lyapustin is a Physical Research Scientist at the Climate and Radiation Laboratory. He has been at GSFC since 1997, initially with USRA (1997-1999), then with JCET and GEST UMBC (1999-2011), and as a civil servant since 2011. Alexei 's research interests focus on remote sensing of atmospheric aerosol and land surface environmental parameters (bidirectional reflectance and albedo; snow properties including grain size, albedo and sub-pixel snow fraction) from polar-orbiting and geostationary sensors, analysis of field campaign data, and 1D and 3D radiative transfer theory with gaseous absorption and

polarization. Alexei is a member of MODIS and JPSS VIIRS Science Teams, as well as a member of GeoCAPE aerosol working group. Dr. Lyapustin holds a M. Sc. in Physics from the Moscow State University, Russia, and Ph. D. degree in Aerospace Remote Sensing from Space Research Institute, Moscow, Russia.

Panelist: Andy Sayer, PhD, *PACE Project Science Lead for Atmospheres, NASA Goddard Space Flight Center/Universities Space Research Association*

Dr. Andrew Sayer is the PACE Project Science Lead for Atmospheres, with a focus on aerosols and clouds from OCI. He has been involved with the development and application of satellite aerosol and cloud data sets from a number of sensors, including in the NASA Deep Blue and European ORAC algorithm families. He is also very interested in the evaluation of data sets and how uncertainty, sampling, and representativeness influence analyses and the conclusions drawn. Andrew Sayer earned his degrees in the United Kingdom: a master's in chemistry from the University of York (2005), and a doctorate in physics from the University of Oxford (2010). Following his doctoral thesis, "Aerosol remote sensing using AATSR", he worked as a postdoc in aerosol and cloud remote sensing jointly at Oxford and the Rutherford Appleton Laboratory. In September 2010, Dr. Sayer joined Christina Hsu's group in the Climate and Radiation Laboratory at GSFC to work on aerosol remote sensing as part of the Deep Blue aerosol project. He joined GESTAR in May 2011 and has been in Dr. Jeremy Werdell's group in the Ocean Ecology Laboratory, since summer 2018.

Panelist: Abbey Nastan, *MAIA Deputy Program Applications Lead, NASA Jet Propulsion Laboratory*

Abbey Nastan is MAIA's Deputy Program Applications Lead, working to maximize the project's societal benefit. She is a systems software engineer at JPL, specializing in applications development, science communications, and public outreach. She received her MS degree in planetary science from California Institute of Technology and her BS degree in international field geosciences from the University of Montana.

Session 3: Engaging with the PACE Water Quality (WQ) Community and Understanding Their Data Application Needs

Keynote Speaker: John Lehrter, PhD, *Associate Professor, Department of Marine Sciences at the University, University of South Alabama*

Dr. John Lehrter is an Associate Professor in the Department of Marine Sciences at the University of South Alabama and a Senior Marine Scientist at the Dauphin Island Sea Lab. Prior to joining the faculty at USA and DISL in August 2016, Dr. Lehrter was a Research Ecologist with the EPA Office of Research and Development. His research focuses on understanding the biogeochemical cycling of nutrients, organic matter, and oxygen in coastal systems and how these cycles are related to water quality issues such as eutrophication, hypoxia, coastal acidification, and water clarity. The research is largely aimed at solving complex coastal resource management issues through applications of field and lab studies, satellite oceanography, and numerical ecosystem modeling. Dr. Lehrter has served on local and national science committees and has won numerous awards for applying science to decision-making activities. He received his Ph.D. in Biology from the University of Alabama and post-doctoral training at the EPA Gulf Ecology Division.

Moderator: Stephanie Schollaert Uz, PhD, *Applied Sciences Manager- Earth Science Division*, *NASA Goddard Space Flight Center*

Dr. Stephanie Schollaert Uz is the Applied Sciences Manager at NASA Goddard Space Flight Center where she leads activities to advance the practical application of NASA data and science, connecting researchers across the Earth Sciences Division with end users, developing external partnerships, and fostering innovative uses of Earth observations for societal benefit. As part of this effort, she leads a team that convenes six working groups with scientists and stakeholders around Food Security, Air Quality & Health, Climate & Environmental Health, Disasters, Mission Applications, and the Chesapeake Bay. Her research focuses on the response of marine and aquatic ecosystems to physical forcing through the use of satellite data, in situ measurements, model output and statistical reconstructions. She is the Principal Investigator on a new project exploring ways to apply remote sensing to identify water quality issues for aquaculture in the Chesapeake Bay. These and many other Applied Sciences activities inform NASA's upcoming missions, i.e. PACE, scheduled to launch in 2023, a potential Surface Biology and Geology mission recommended by the 2017 Decadal Survey of Earth Science and Applications from Space. She has a Ph.D. in Atmospheric and Oceanic Sciences from the University of Maryland, an M.S. in Physical Oceanography from the Graduate School of Oceanography at the University of Rhode Island and B.S. from the U.S. Naval Academy, where she majored in Oceanography and minored in French.

Panelist: Chris Davis, PhD**,** *Executive Director, Maine Aquaculture Innovation Center*

Dr. Chris Davis serves as Executive Director of the Maine Aquaculture Innovation Center, since 2004. His responsibilities include overseeing 15-20 ongoing research projects funded by the Center, conducting an annual research grants program, conducting outreach and education activities and managing two aquaculture business incubators. Davis currently serves or has served as a board member of the Maine Technology Institute, Maine Innovation Economy Advisory Board, Maine Aquaculture Association, Maine Department of Marine Resources Aquaculture Advisory Council and president of the National Shellfisheries Association. His research interests include new aquaculture species development, selective breeding of bivalves and developing improved husbandry methods. Chris graduated from Colby College and later earned a PhD from the University of Maine.

Panelist: Damian Brady, PhD, ***Associate Professor***, *University of Maine*

Dr. Damian Brady is an associate professor of marine science at the University of Maine's Ira C. Darling Marine Center in Walpole, ME. Dr. Brady has studied estuaries all over the world for over 15 years. He is especially interested in how to link water quality with ecosystems. Because we rely on the coast for tourism, fisheries, aquaculture, pollution processing, and energy (offshore wind and tidal power generation), Dr. Brady has focused on creating tools and models that can explore hypothetical uses of the coast to help communities better reflect their values in how they use their environment. Dr. Brady is the lead of the Ecological Carrying Capacity of Maine Estuaries Research Theme of NSF's Sustainable Ecological Aquaculture Network and the assistant director of Maine Sea Grant for Research. He earned a PhD in 2008 from the University of Delaware. Damian lives in Hallowell, ME with his wife and three daughters.

Panelist: Tim Moore, PhD, *Research Professor*, *Florida Atlantic University*

Dr. Tim Moore is a research professor at Florida Atlantic University's Harbor Branch Oceanographic Institute. Dr. Moore specializes in using ocean color remote sensing technology to study the ecology of phytoplankton and the environment. Since 1991, Dr. Moore has researched ocean, coastal, and freshwater systems across the globe. His work incorporates optical modeling, remote sensing imagery, laboratory experiment, fieldwork, and computer programming. Dr. Moore's work aims to further understand the temporal and spatial trends of the dynamics of plankton communities and water quality. He has been concentrating on inland freshwater systems over the last ten years, with a focus on the optical and ecological properties of cyanobacteria harmful algal blooms. He was part of the NASA Moderate Resolution Imaging Spectroradiometer (Modis) Science Team from 1996 to 2002, then part of the NASA SeaWiFS Science Team. Tim received his doctorate in 2008 from the University of New Hampshire and served as a research professor there from 2012 to 2019.

Panelist: Lachlan McKinna, PhD, *Director & Lead Oceanographer, Go2Q Pty Ltd*

Dr. Lachlan McKinna is a Go2Q Company Founder and Director. He is an accomplished oceanographer and algorithm developer who has worked for SAIC/NASA Goddard Space Flight Center, Curtin University's Remote Sensing and Satellite Research Group, and The Australia Center for Tropical Freshwater Research (JCU). Dr McKinna holds a B.Sc. (Mathematics & Physics), a B.Sc. Honors (Statistics), and a Ph.D. (Physics) all from James Cook University. Lachlan has extensive industry experience and currently works closely with NASA's PACE Science Team and serves as a Principal Investigator on JAXA's GCOM Science Team. Lachlan is also proud to re-invest his professional knowledge by supervising postgraduate students as an Adjunct Research Fellow at James Cook University.

Panelist: Christine Lee, PhD, *Applied Research Scientist/Associate Program Manager, NASA Jet Propulsion Laboratory*

Dr. Christina Lee is a water quality scientist, interested in maximizing the potential benefit of science applications and information for society, particularly in the areas of public health, environmental health, and international development. She serves as the Associate Program Manager for Water Resources at NASA HQ as well as the Applications Coordinator for the NASA ECOSTRESS Mission. Christine joined JPL in 2014 after working for 2 years at NASA Headquarters in the Applied Sciences Program through the American Association for the Advancement of Science (AAAS) Science and Technology Fellowship Program. She holds a PhD and master's degree in Environmental Engineering and a bachelor's degree in Chemical Engineering from UCLA.

Session 4: What Comes Next? Communicating and Expanding PACE Research and Reach for Applications

Moderator: Nancy Searby, PhD, *Program Manager, Capacity Building, NASA Headquarters*

Dr. Nancy Searby manages the Capacity Building Program for NASA's Applied Sciences Program in the Earth Science Division, part of the Science Mission Directorate, at NASA Headquarters in Washington DC, USA. Nancy champions applying Earth Science data to decisions and actions that improve society. Through training, feasibility projects, and services co-development through programs called ARSET, DEVELOP, and SERVIR, the program builds individual and institutional capacity In the United States, in and through regional networks in Africa, Asia, and the Americas, and globally to improve disaster resilience, biodiversity and ecosystem sustainability, water resources management, public health surveillance, and food security and sustainable agriculture. She participates in

related interagency and international activities to help stakeholders make decisions across areas of societal benefit identified by the Group on Earth Observations (GEO) and the regional AmeriGEO, and serves as Co-Chair of the GEO Capacity Development Working Group, Co-Chair of the Inter-American Capacity Development Working Group, and Chair of the Committee on Earth Observation Satellites' Working Group on Capacity Building and Data Democracy.

Panelist: Eric Anderson, *Associate Chief Scientist and Disasters Thematic Service Area Lead, NASA Marshall Flight Center*

Eric Anderson serves in the NASA/SERVIR Science Coordination Office as the Associate Chief Scientist and global Disasters Theme Lead for the joint NASA- and USAID-led SERVIR program. Eric's experience lies in GIS and remote sensing for applied Earth and environmental science, including natural hazards. He began working with SERVIR at the Mesoamerica hub and more recently supports SERVIR's global activities. Eric has a master's degree in Earth System Science from University of Alabama in Huntsville and a bachelor's degree in Environmental Science from McGill University. He enjoys working with people to understand how science fits into decision making processes but isn't afraid to do some serious number crunching. He is a father, enjoys teaching, flying kites, and tossing around any kind of Frisbee.

Panelist: Amita Mehta, PhD, *NASA Goddard Space Flight Center/University of Maryland Baltimore County*

Dr. Amita Mehta received her Ph.D. in meteorology from the Florida State University in 1991. Since the completion of her Ph. D., Mehta has been a Research Scientist at NASA-Goddard Space Flight Center. In 2000 she joined NASA-University of Maryland Baltimore County (UMBC) Joint Center for Erath Systems Technology (JCET) as Research Assistant Professor. Since 2011 Mehta is a lead trainer in the NASA Applied Remote Sensing Training (ARSET) program on using NASA remote sensing data for water resources and disaster monitoring and management. Mehta's primary research interests and experience are in analysis and applications of geophysical parameters derived from remote sensing observations and earth system models.

Panelist: Celeste Gambino, M.S., *NASA Headquarters/Science Systems and Applications Inc.*

Celeste Gambino graduated from Bryn Mawr College with a B.A. in Geology. Her undergraduate research focused on investigating Holocene sea level rise off the coast of North Carolina. After graduation, she moved to Boston to pursue higher education from Boston College. She graduated with a M.S. in Geology, where her research used geochemistry to assess Arctic permafrost sensitivity. Celeste then joined the NASA DEVELOP program as a participant in the spring of 2019. After two terms as a participant, Celeste became the full-time Fellow and Center Lead at the Boston - Massachusetts DEVELOP location.

Celeste recently became a Senior Communications Fellow for the NASA DEVELOP Program. The NASA DEVELOP National Program, a part of NASA's Applied Science Program, addresses environmental and public policy issues through interdisciplinary research projects that apply the lens of NASA Earth observations to community concerns around the globe.

Project Science Breakout Sessions

Breakout Moderator: Ivona Cetinić, PhD, *Research Scientist, NASA Goddard Space Flight Center/Universities Space Research Association*

Dr. Ivona Cetinić is an oceanographer in the Ocean Ecology Laboratory at Universities Space Research Association / NASA Goddard Space Flight Center. Her research focuses on developing new ways of resolving ocean biogeochemistry and phytoplankton diversity from satellite and other remote observations. At the University of Southern California, she conceived of and participated in field campaigns focused on developing innovative ocean observing technology, several for which she served as chief scientist. These campaigns include the ground breaking Tara Oceans circumnavigation of the globe, as well as others that utilized unique fusions of cutting edge technology such as hyperspectral radiometry, light polarimeters, and airborne lidar, allowing for more detailed information about concentration and composition of particles in the ocean (as well as the atmosphere - SABOR). Dr. Cetinić has served as the project scientist for EXPORTS (EXport Processes in the Ocean from RemoTe Sensing), a large scale NASA-led field campaign, and as the PACE (Plankton, Aerosol, Cloud, ocean Ecosystem) Project Science Lead for Ocean Biogeochemistry, a NASA mission scheduled for launch in 2022. In the last 10 years, she has been a member of multiple international science teams and committees and has served as the co-chair of the Ocean Optics Conference. Currently, she is serving at National Academies of Sciences, Engineering, and Medicine Committee on Earth Sciences and Applications from Space. She earned her PhD in biological oceanography at University of Southern California in 2009.

Breakout Moderator: Lachlan McKinna, PhD, *Director & Lad Oceanographer, Go2Q Pty Ltd*

Dr. Lachlan McKinna is a Go2Q Company Founder and Director. He is an accomplished oceanographer and algorithm developer who has worked for SAIC/NASA Goddard Space Flight Center, Curtin University's Remote Sensing and Satellite Research Group, and The Australia Center for Tropical Freshwater Research (JCU). Dr McKinna holds a B.Sc. (Mathematics & Physics), a B.Sc. Honors (Statistics), and a Ph.D. (Physics) all from James Cook University. Lachlan has extensive industry experience and currently works closely with NASA's PACE Science Team and serves as a Principal Investigator on JAXA's GCOM Science Team. Lachlan is also proud to re-invest his professional knowledge by supervising postgraduate students as an Adjunct Research Fellow at James Cook University.

Breakout Moderator: Andy Sayer, PhD, *PACE Project Science Lead for Atmospheres, NASA Goddard Space Flight Center/Universities Space Research Association*

Dr. Andrew Sayer is the PACE Project Science Lead for Atmospheres, with a focus on aerosols and clouds from OCI. He has been involved with the development and application of satellite aerosol and cloud data sets from a number of sensors, including in the NASA Deep Blue and European ORAC algorithm families. He is also very interested in the evaluation of data sets and how uncertainty, sampling, and representativeness influence analyses and the conclusions drawn. Andrew Sayer earned his degrees in the United Kingdom: a master's in chemistry from the University of York (2005), and a doctorate in physics from the University of Oxford (2010). Following his doctoral thesis, "Aerosol remote sensing using AATSR", he worked as a postdoc in aerosol and cloud remote sensing jointly at Oxford and the Rutherford Appleton Laboratory. In September 2010, Dr. Sayer joined Christina Hsu's group in the Climate and Radiation Laboratory at GSFC to work on aerosol remote sensing as part of the Deep Blue aerosol project. He joined GESTAR in May 2011 and has been in Dr. Jeremy Werdell's group in the Ocean Ecology Laboratory, since summer 2018.

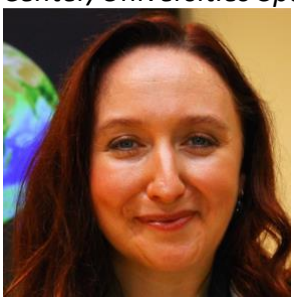
Breakout Moderator: Kirk Knobelspiesse, PhD, *NASA Goddard Space Flight Center*

Dr. Kirk Knobelspiesse develops optical remote sensing methods, from space, of parameters important to the Earth's climate. This includes expertise in radiative transfer computations, information content assessment, algorithm development, and validation with ground and airborne observations. Specific interests include polarimetric remote sensing of aerosols and clouds, atmospheric correction required for ocean color observations, and the statistical and AI tools useful for both. Dr. Knobelspiesse received an undergraduate degree in Photography from the Rochester Institute of Technology in 1998, then a master's degree in Imaging Science from the same university in 2000. For the next four years, he worked as a contractor at NASA GSFC on the SeaWiFS and SIMBIOS projects, then returned to graduate school at Columbia University in 2004. His PhD, in Applied Mathematics, dealt with remote sensing retrievals of atmospheric aerosols from multi-angle polarimeters. During his studies, he spent his time at NASA GISS, and remained at that institution for a Postdoctoral fellowship following graduation. He took a position at NASA Ames in 2012 and returned to NASA GSFC in 2016.

Breakout Moderator: Bryan Franz, PhD, *Senior Research Scientist, NASA Goddard Space Flight Center/Science Systems and Applications Inc*

Dr. Bryan Franz is a Research Scientist and Assistant Chief for Science Research in the Ocean Ecology Laboratory at NASA Goddard Space Flight Center. Since 1996, he has supported research and operations for satellite remote sensing of ocean biology and biogeochmistry at NASA, and he currently leads the assessment, refinement, and periodic reprocessing efforts for the production of consistent ocean biological and biogeochemical climate data records from the Sea-viewing Wide Field-of-view Sensor (SeaWiFS), Moderate Resolution Imaging Spectroradiometer (MODIS), Medium Resolution Imaging Spectrometer (MERIS), Visible and Infrared Imaging Radiometer Suite (VIIRS), and other satellite-based remote sensing radiometers. He is also leading the development of the Science Data Segment (SDS) for the Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission, and currently serves as PACE SDS Manager. His work at NASA has focused on standardization of atmospheric correction and bio-optical algorithms to derived consistent, multi-mission time-series of ocean optical and biogeochemical properties. He also contributes to the develop of bio-optical inversion models for retrieval of marine inherent optical properties, vicarious calibration methods, and sensor cross-calibration techniques. He developed the processing software, vicarious calibration approach, and many of the validation and quality assessment methods used in the production of all global ocean color data products generated and distributed by NASA. He is a member of several domestic and international science Teams, including the MODIS and VIIRS Science Team, JAXA GCOM-C Science Team, ESA Sentinel-3 Validation Team, and ESA Climate Change Initiative for Ocean Color. He serves as an agency representative to the International Ocean Color Coordinating Group (IOCCG) and co-leads the IOCCG Standing Working Group on Ocean Color Climate Data Records. Since 2009 he has served as the Ocean Discipline Leader for the MODIS Science Team and now the combined MODIS and VIIRS Science Team.

Breakout Moderator: Susanne Craig, PhD, *Senior Scientist, NASA Goddard Space Flight Center/Universities Space Research Association*



Dr. Susanne Craig graduated in 1999 from the University of Strathclyde, UK with a PhD in Physics that studied the optical and fluorescence characteristics of phytoplankton. Following her PhD, she postdoc'd in the U.K. for a time, then spent two years at the University of Southern Mississippi at Stennis Space Center working on optical approaches for detecting the harmful alga, *Karenia brevis* under the ECOHAB project. In a serendipitous series of events, she left MS in 2005 to begin a new position at Dalhousie University, Canada one day before Hurricane Katrina destroyed her beach apartment! In Canada, she worked both as a senior scientist in the academic sector and as a Federal Scientist on several projects, focusing on ocean observation systems, novel methods to retrieve optical properties in optically complex waters, phytoplankton ecology, harmful algal blooms, and the role that phytoplankton play in creating climate-relevant trace gases and aerosols. She was Mission Scientist for the Canadian Space Agency's Coastal Ocean Colour Imager (COCI) mission. In February of 2018, she moved to the Ocean Ecology Laboratory at NASA Goddard Space Flight Center to take up a Senior Scientist position. She is the lead for system vicarious calibration (SVC) for the PACE mission, manages a project to develop a

new ocean-viewing hyperspectral polarimeter, and dabbles in machine learning approaches for ocean color algorithm development.

Breakout Moderator: Sean Bailey, *Research Oceanographer/Deputy Manager, NASA Goddard Space Flight Center*

Sean Bailey is a Research Oceanographer in the Ocean Ecology Laboratory (OEL) at NASA Goddard Space Flight Center (GSFC) and serves as the Deputy Manager for the Ocean Biology Distributed Active Archive Center (OB.DAAC). He received a dual-major Bachelors of Science in Marince Science and Biology from the University of Miami in 1992, and a Masters of Science in Biological Oceanography from the University of Southern Mississippi in 1997. His research interests are focused on bio-optical remote sensing of the oceans. In 1997, he was employed by Futuretech Corporation under contract to support the Ocean Biology Processing Group (OBPG) in the Ocean Ecology Branch at NASA Goddard Space Flight Center. In 2015, he left Futuretech to become a civil servant. He currently manages the science software support team, including the staff responsible for the development and maintenance of the SeaWiFS Data Analysis System (SeaDAS). His duties as the deputy DAAC manager include the management and distribution of the data products produced by the OBPG. His work with the OBPG has been focused on the on-orbit calibration of these satellites and the validation of their data products. He has worked on the development and evaluation of algorithms implemented for ocean color satellite data processing, ranging from the atmospheric correction to the bio-optical models that derive geophysical products.

Breakout Moderator: Antonio Mannino, PhD, *PACE Deputy Project Scientist*, *NASA Goddard Space Flight Center*

Dr. Antonio Mannino, research oceanographer of the Ocean Ecology Laboratory at NASA Goddard Space Flight Center since 2002, is currently Deputy Project Scientist for Oceans on NASA's PACE mission focusing on validation and applications. He is also Deputy Principal Investigator on the NASA GLIMR EVI-5 mission. At NASA, Dr. Mannino has served as project PI, lead/co-lead for the GEO-CAPE mission pre-formulation ocean science working group, MODIS and VIIRS ocean science team member, PI for the Ocean Biology and Biogeochemistry field support group, chief scientist and technical officer for multiple field campaigns, liaison on ocean color with the Korean Ocean Satellite Center, and led several instrument design lab studies for NASA. Mannino has served as a member of the International Ocean Color Coordinating Working Group on geostationary ocean color requirements and currently contributing to the IOCCG field measurement protocols. He has mentored several postdoctoral researchers and numerous summer interns. Mannino has published several articles on coastal ocean color algorithm development and validation including for colored dissolved organic matter and particle absorption, dissolved organic carbon, and phytoplankton pigments and taxonomy. His current research applies field observations, satellite data, and 3D models to study carbon cycle processes and phytoplankton diversity from rivers to oceans with greater emphasis on coastal Arctic

waters. His fundamental research question focuses on how physical forcings including river discharge, ocean circulation, climate change impact the ocean's (coastal and global) carbon cycle and the plankton at the heart of it. The research is multi-disciplinary requiring a broad range of physical, chemical, and biological observations at various frequencies (hourly to daily to monthly to yearly), over an extended period (decadal to multi-decadal) and at relatively high spatial resolution of ~0.1 to 1 km spanning hundreds of kilometers to global scale. Mannino's research addresses NASA's long-term goal to understand and protect our home planet.

Breakout Moderator: Jeremy Werdell, PhD, *PACE Project Scientist***,** *NASA Goddard Space Flight Center*

Dr. Jeremy Werdell is an oceanographer in the Ocean Ecology Laboratory at NASA Goddard Space Flight Center (GSFC), where he also serves as the Project Scientist for the upcoming Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission. Jeremy joined GSFC in 1999, where he's made a career ruminating on the on-orbit calibration of ocean color instruments, the development of remote-sensing algorithms, and the validation and application of satellite-derived data products. When not traveling with his family and obsessing about his yard, Jeremy also moonlights as a teacher and student mentor. But, if he had to do it all again, he would pursue his real dream of becoming a professional chef.

Breakout Moderator: Laura Lorenzoni, PhD, *Program Scientist*, *NASA Headquarters*

Dr. Laura Lorenzoni is a Program Scientist for the Ocean Biology and Biogeochemistry Program (OBB) in the NASA Headquarters Science Mission Directorate. The OBB program focuses on describing, understanding, and predicting biological and biogeochemical conditions, interactions and changes in the upper ocean, as determined by observation of aquatic optical properties using remote sensing and in situ data. Laura completed her undergraduate in Biology at the Universidad Simon Bolivar (Venezuela), and subsequently earned both her Master's and PhD degrees in Marine Science at the University of South Florida. Her research interests include land-ocean interactions, and the influence of rivers on transport and distribution of dissolved and particulate organic matter in the coastal ocean. For over a decade, she worked with the CARIACO Ocean Time-Series project, and has been an advocate of time-series (in situ ship-based and autonomous, as well as satellite remote sensing) as tools to understand natural and anthropogenic changes in the ocean.