Space Weather Operations and Research Infrastructure Workshop

Committee

Mary K. Hudson

Co-Chair

MARY K. HUDSON is the Eleanor and A. Kelvin Smith Professor Emerita of Physics at Dartmouth College and Senior Research Associate NCAR. She also served for eight years as chair of Physics and Astronomy at Dartmouth. Dr. Hudson was one of the principal investigators with the Center for Integrated Space Weather Modeling, where researchers studied the weather patterns that originate from a solar eruption, following the energy and mass transfer through the interplanetary medium, all the way to the Earth's ionosphere. Current areas of investigation include the evolution of the radiation belts; how the ionized particle outflow known as the solar wind and the magnetic field of the Sun interact with the magnetic field of the Earth, producing electrical currents in the ionosphere; and the effects of solar cosmic rays on radio communications near the Earth's poles. She is a co-investigator on NASA's Van Allen Probes Mission. Dr. Hudson is a fellow of the American Geophysical Union (AGU), recipient of the 2017 Fleming Medal, and recipient of the AGU Macelwane Award. Dr. Hudson has served on Heliophysics Subcommittee of the NASA Advisory Council. Dr. Hudson received her Ph.D. in physics from the University of California, Los Angeles. Dr. Hudson previously served as co-chair of the Academies' Standing Committee on Solar and Space Physics and as a member of the Committee on a Decadal Strategy for Solar and Space Physics (Heliophysics).

Janet G. Luhmann

Co-Chair

JANET G. LUHMANN is a senior fellow at the Space Sciences Laboratory at the University of California, Berkeley. Her current research includes the use of spacecraft observations and models to investigate the connections between the Sun and heliospheric conditions, and the solar wind interactions with the planets. Dr.Luhmann is the current PI for the IMPACT Investigation on NASA's STEREO mission, and a Deputy PI for the MAVEN mission. A fellow of the American Geophysical Union (AGU), Dr. Luhmann was also the recipient of the 2007 John Adam Fleming Medal, awarded by the AGU for “original research and technical leadership in geomagnetism, atmospheric electricity, aeronomy, space physics, and related sciences.” She received her Ph.D. from the University of Maryland, College Park. Dr. Luhmann has served on numerous committees for the National Academies, including the Committee on PI-led Missions: Lessons Learned, Committee on Solar and Space Physics (including as chair), Space Studies Board, and the Committee on Solar-Terrestrial Research. She is currently serving on the Committee for the Review of Progress Toward Implementing the Decadal Survey - Solar and Space Physics: A Science for a Technological Society.

Daniel N. Baker

Member

DANIEL N. BAKER, NAE, is Director of the Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder (“CU”). He is Distinguished Professor of Planetary and Space Physics, Professor of Astrophysical and Planetary Sciences, and Professor of Physics at CU. He was Group Leader for Space Plasma Physics at Los Alamos National Laboratory (1980-87) and was division chief at NASA’s Goddard Space Flight Center (1987-1994). Dr. Baker presently holds the Moog-Broad Reach Endowed Chair of Space Sciences at CU. He was a member of the 2006 Decadal Review of the U.S. National Space Weather Program and chaired the National Research Council’s 2013-2022 Decadal Survey in Solar and Space Physics. He has edited nine books and published over 800 papers in the refereed literature. In addition to his election to the National Academy of Engineering, Dr. Baker’s honors include being awarded the 2010 AIAA James Van Allen Space Environments Medal. In 2015, Dr. Baker was chosen as the Vikram A. Sarabhai Professor of the Indian Physical Research Laboratory. He also received in 2015 the Shen Kuo Medal of the International Association of Geomagnetism and Aeronomy (IAGA) for his interdisciplinary leadership in space and Earth sciences. He was chosen in 2016 as winner of the Colorado Governor’s Award for High-Impact Research related to his Space Weather research. Dr. Baker was the recipient of the 2018 William Bowie Medal of the American Geophysical Union for outstanding geoscience research. He also is the recipient of the 2019 Hannes Alfven Medal of the European Geosciences Union. Dr. Baker received his Ph.D. working under Prof. James A. Van Allen and subsequently worked with Prof. Edward C. Stone as a research fellow in the Department of Physics at the California Institute of Technology. Dr. Baker has served on numerous committees for the National Academies including the Committee on a Decadal Strategy for Solar and Space Physics (Heliophysics) as chair, the Committee on Assessment of Impediments to Interagency Cooperation on Space and Earth Science Missions, and the Committee on Solar and Space Physics as chair, and the Space Studies Board.

Anthea J. Coster

Member

ANTHEA J. COSTER is a principal research scientist at the MIT's Haystack Observatory in Westford, Massachusetts. Her research interests include physics of the ionosphere, magnetosphere, and thermosphere; space weather and geomagnetic storm time effects; coupling between the lower and upper atmosphere; GPS positioning and measurement accuracy; radio wave propagation effects; and meteor detection and analysis. She is a co-principal investigator on the NSF supported Millstone Hill Geospace facility award and a principal investigator/co-principal investigator on a numerous projects involving the use of GPS to probe the atmosphere, including investigations of the plasmaspheric boundary layer, stratospheric warming, and the ionosphere over the Antarctic. Dr. Coster and her co-workers developed the first real-time ionospheric monitoring system based on GPS in 1991. She has been involved with measuring atmospheric disturbances over short baselines (GPS networks smaller than 100 km) for the U.S. Federal Aviation Administration, and has coordinated meteor research using the ALTAIR dual-frequency radar for NASA. She received her Ph.D. in space physics and astronomy from Rice University. Dr. Coster previously served on the National Academies' U.S. National Committee for the International Union of Radio Science.

Tamara L. Dickinson

Member

TAMARA L. DICKINSON is president of Science Matters Consulting. She previously served as Principal Assistant Director for Environment and Energy at the White House Office of Science and Technology Policy (OSTP). Dr. Dickinson served as OSTP's Assistant Director for Disaster Resilience and Space Science, addressing issues related to disasters (natural and man-made), NASA space science programs, space weather, and general Earth Science. Dr. Dickinson served at OSTP on a detail from the U.S. Geological Survey where she previously served as the program coordinator for the National Geological and Geophysical Data Preservation Program and Geology Lab Program. Prior to joining USGS, she held several positions at the National Research Council. Dr. Dickinson has held research positions at NASA Johnson and Goddard Space Centers and the Smithsonian Institution Natural History Museum where she focused on the origin and evolution of lunar materials and meteorites. Dr. Dickinson was awarded the National Academies Individual Service Award in 2002, the Bureau of Land Management Sustainable Development Award in 2004, and the Department of Interior Superior Service Award in 2008. She has an asteroid (Asteroid 1981 EU22 Tammydickinson) named in honor of her research and program management work. Dr. Dickinson is a fellow of the Geological Society of America. Dr. Dickinson earned her B.A. from the University of Northern Iowa and M.S. and Ph.D. from the University of New Mexico. She has not previously served as a member of a National Academies' committee.

Mark Gibbs

Member

MARK GIBBS serves as the Head of Space Weather for the UK Met Office where he has worked for nearly 30 years as a meteorologist. During that time he has undertaken a range of roles including flying on the Met Office's atmospheric research aircraft and also developing a health forecasting capability. Since late 2010, he has led the development of space weather forecasting within the Met Office. This work has led to the creation of a manned 24x7x365 Space Weather Operation Centre within the Met Office, only the third center globally to be fully operational. Work is currently focusing on understanding the particular user requirements of the sectors vulnerable to space weather and understanding how you communicate effectively with the public on such a high impact/low probability event. In his role as Head of Space Weather he is also a member of the UK's Space Environment Impacts Expert Group; the UK representative on the International Space Environment Services organization; a member of the UN COPUOS, Science & Technology Sub-Committee, Expert Group on Space Weather; and an advisor of the ICAO Met Panel Working Group on Meteorological Information and Service Development, Space Weather Sub-group. Dr. Gibbs has no previous National Academies' experience.

Janelle V. Jenniges

Member

JANELLE V. JENNIGES, MAJ. USAF, is Chief, Space Weather Integration, Weather Strategic Plans at Interagency Division, Directorate of Weather, HQ USAF. Her previous positions include: Assistant Professor of Space Physics, Air Force Institute of Technology-Graduate School of Engineering & Management, Wright-Patterson AFB, Aug 2015 – Jul 2017; and Flight Commander, Space Weather Operations Center, 2nd Weather Squadron, Air Force Weather Agency, Offutt AFB, Apr 2011 – Aug 2012. Her research covers a wide range of topics in space physics including the improved specification of ionospheric space weather models, the structure of the high-latitude electric fields, and the transition of cutting-edge research to operational forecast products. She received her Ph.D. in physics in 2015 from Utah State University. In 2005, then Lt. Jenniges received the Air Force's Cadet of the Year award. She has no previous National Academies' experience.

Conrad C. Lautenbacher

Member

CONRAD C. LAUTENBACHER, Jr., VADM USN (Ret) is the Chief Executive Officer of GeoOptics, Inc., which is also a member of the American Commercial Space Weather Association. Dr. Lautenbacher retired as Vice Admiral from the U.S. Navy, where he was Commander of the U.S. Third Fleet. Admiral Lautenbacher also served as Deputy Chief of Naval Operations in charge of programs and budget. After leaving the Navy he served as Under Secretary of Commerce for Oceans and Atmosphere and as the eighth Administrator of the National Oceanic and Atmospheric Administration (NOAA), 2001-2008. Before joining NOAA, Lautenbacher formed his own management consultant business, and worked principally for Technology, Strategies & Alliances Inc. He also has been president and CEO of the Consortium for Oceanographic Research and Education (CORE), a non-profit organization of institutions of higher learning with a mission to increase basic knowledge and public support across the spectrum of ocean sciences. Dr. Lautenbacher is a graduate of the U.S. Naval Academy and holds M.S. and Ph.D. degrees in applied mathematics from Harvard University. From 2001-2008 he was an ex-officio member of the NRC Government-University-Industry Research Roundtable.

William Murtagh

Member

WILLIAM MURTAGH currently serves as the Program Coordinator for the National Oceanic and Atmospheric Administration (NOAA) Space Weather Prediction Center (SWPC) in Boulder, Colorado. He is NOAA's space weather lead in coordinating preparedness and response efforts with industry, emergency managers, and government officials around the world. He also serves as the National Weather Service lead in the National Science and Technology Council (NSTC), interagency committee to develop and implement actions in the 2019 National Space Weather Strategy and Action Plan (NSW-SAP). He is the co-chair of the interagency space-weather working group responsible for implementing the NSW-SAP plans and procedures for responding to and recovering from space weather events. He is also NOAA's lead in the National Security Council interagency committee responsible for the development and implementation of Executive Order 13865 - Coordinating National Resilience to Electromagnetic Pulses. In November 2016, he completed a 26-month assignment in the White House Office of Science and Technology Policy (OSTP) as the Assistant Director for Space Weather. In his position at OSTP he oversaw the development and implementation of the 2015 National Space Weather Strategy and Action Plan and coordinated efforts to develop Executive Order 13744 (2016) –"Coordinating Efforts to Prepare the Nation for Space Weather Events." He regularly briefs the White House, Congress, and other government leadership on vulnerabilities of critical infrastructure to space weather storms. He is also a key contributor in U.S. government efforts to advance international cooperation in space weather-related activities. Before joining NOAA, he was a weather forecaster in the United States Air Force. He coordinated and provided meteorological support for national security interests around the world. He transferred to the SWPC in 1997 as a space weather forecaster and liaison between NOAA and the U.S. Air Force. He joined NOAA in 2003 after retiring from the Air Force with 23 years of military service. He has no previous service on National Academies' committees.

Mark A. Olson

Member

MARK A. OLSON is Senior Engineer of Reliability Performance Analysis, North American Electric Reliability Corporation (NERC), where he works on geomagnetic disturbance mitigation. The mission of NERC is to ensure the reliability of the Bulk-Power System in North America; understanding the effects of geomagnetic disturbances (GMD) on bulk power systems and the ability of the industry to mitigate their effects are important to managing system reliability. Prior to joining NERC, Mr. Olson was an officer in the U.S. Navy where he served in various positions related to the operations and management of surface ships and naval personnel. He has a master's degree in electrical engineering from the Naval Postgraduate School and a bachelor’s degree from the U.S. Naval Academy. He has no previous service on National Academies’ committees.

Larry J. Paxton

Member

LARRY J. PAXTON is a member of the Principal Professional Staff at the Johns Hopkins University Applied Physics Laboratory (JHU/APL) and Chief Scientist - Geospace. Paxton is the principal investigator on seven instruments that have flown in space. His research interests include space science, space technology, satellite- and ground-based mission design, the implications of global climate change for the stability of nations; and innovation. He is particularly interested in new instruments that characterize the geospace environment. He has published over 260 papers on these subjects. He is an Academician member of the International Academy of Astronautics and the past president of the American Geophysical Union’s Space Physics and Aeronomy section (2016-2018). His awards include JHU/APL Publication of the Year Awards; JHU/APL Government Purpose Invention of the Year Nominee; and Best Paper – 7th IAA Symposium on Small Satellites for Earth Observation. Other recent relevant experience includes JHU’s Global Water Institute and the JHU Earth Environment Sustainability and Health Institute as well as the NASA Heliophysics Roadmap Committee; NSF Aeronomy Review Panel and NSF Aeronomy Committee of Visitors; chair of IAA Commission 4 and Small Satellite Program Committee. He earned his Ph.D. in astrophysical, planetary, and atmospheric sciences from the University of Colorado in Boulder. He has served on several committees of the Academies, including the Committee on the Effects of Solar Variability on Earth's Climate: A Workshop, and the Committee on a Decadal Strategy for Solar and Space Physics (Heliophysics) Panel on Atmosphere-Ionosphere-Magnetosphere Interactions. He is currently serving on the Space Studies Board.

Tuija Pulkkinen

Member

TUIJA I. PULKKINEN, NAS, is chair and professor at the University of Michigan in Ann Arbor in the Department of Climate and Space Sciences and Engineering. Her research interests cover widely solar wind - magnetosphere - ionosphere coupling, storm and substorm dynamics, energy and plasma transport from the solar wind into the magnetosphere - ionosphere system, and auroral region electrodynamics and its coupling to the magnetosphere. Previously, she served as professor, vice president, and dean of the School of Electrical Engineering at the Aalto University in Espoo, Finland. Prior to her time time at Aalto University, she was a scientist, unit head, and research professor at the Finnish Meteorological Institute in Helsinki, Finland. She received her Ph.D. in theoretical physics from the University of Helsinki in 1992. She has been awarded the EGU Julius Bartels Medal, the AGU Fellowship and James B. Macelwane Medal, Academia Europaea, associate of the Royal Astronomical Society, and Finnish Academy of Sciences and Letters. She earned her Ph.D. in theoretical physics from the University of Helsinki. She is currently a member of the SSB Committee on Solar and Space Physics and has previously served on the Academies' Arctowski Medal Selection Committee.

Pete Riley

Member

PETE RILEY is Vice President, Chief Financial Officer, and Senior Research Scientist at Predictive Science Inc. (PSI). He is particularly interested in 3D, time-dependent MHD simulations of large-scale heliospheric processes, including solar wind streams and coronal mass ejections. His expertise lies primarily in developing, testing, and running massively parallel computer codes, which are run on a range of parallel architectures, from small clusters to large supercomputers, such as NSF's Ranger and NASA's Pleiades. He also analyzes a variety of solar and interplanetary datasets, and is a member of the STEREO, Ulysses, and ACE plasma instrument teams. He is also a member of the Solar Probe and Solar Orbiter magnetometer instrument teams. In 1998, he was awarded a group achievement award for his contribution to the Advanced Composition Explorer mission and co-won the 2006 SAIC RDT&E Group performance award. He has published over 60 papers in the field of space physics, and particularly in the area of heliospheric physics. He was an editor, and subsequently Chief Editor for Reviews of Geophysics, and, before that, an associate editor with GRL. Previously, he served as chair for NSF's SHINE steering committee and he is currently serving on NSF's Space Weather benchmarks steering committee, a follow-on to the NSF Space Weather Benchmarks Phase I study. Additionally, he chairs the 2019 Induced Geo-Electric Fields working group and is also co-lead of the real-time forecasting validation planning group for the CCMC's IMF Bz, which in turn, is part of the IMF Bz at L1 working team, also co-lead by him. Currently, he is a principal investigator for a number of projects supported by NASA, NOAA, NSF, and DoD. He received his Ph.D. in space physics and astronomy in 1994 from Rice University. He has no previous National Academies' experience.

Ronald E. Turner

Member

RONALD E. TURNER is Distinguished Analyst with Analytic Services (ANSER) Inc., which in 2004 became the parent institution of the Homeland Security Institute, the only Federally Funded Research and Development Center (FFRDC) dedicated to the Department of Homeland Security. Dr. Turner is an internationally recognized expert in radiation risk management for astronauts, particularly in response to solar storms. For nine years he was the ANSER point of contact to the NASA Institute for Advanced Concepts (NIAC), an independent institute charged with creating a vision of future space opportunities to lead NASA into the twenty-first century, and he is currently the Senior Science Advisor to the new, NASA Innovative Advanced Concepts Program. He was a Participating Scientist on the Mars Odyssey program. He is on the Advisory Council to the National Space Biomedical Research Institute Center for Acute Radiation Research. He served on an NRC Committee looking at precursor measurements necessary to support human operations on the surface of Mars (May 2002). He was chair of the NRC Human Health and Support Technologies panel of the NASA Capabilities Technology Roadmap Review in 2005. He supported an NRC report on Space Physics Support to NASA's Exploration Vision. He earned his Ph.D. in physics from the Ohio State University. He has served on several National Academies' committees including the Committee on Solar and Space Physics, the Committee to Review NASA's Evidence Reports on Human Health Risks, and the Committee for the Evaluation of Radiation Shielding for Space Exploration.