Decadal Survey for Solar and Space Physics (Heliophysics) 2024-2033

Committee

Stephen A. Fuselier

Co-Chair

STEPHEN A. FUSELIER, NAS, is executive director of the Space Science Directorate at Southwest Research Institute and previously served as a researcher and senior manager at Lockheed Martin Advanced Technology Center. Fuselier is the deputy principal investigator and sensor lead on the Tandem Reconnection And Cusp Electrodynamics Reconnaissance Satellites (TRACERS), co-investigator (Co-I) on the Interstellar Mapping and Acceleration Probe (IMAP), Co-I and sensor lead on the Interstellar Boundary Explorer (IBEX) mission, Co-I and lead for the Hot Plasma Composition Experiment (HPCA) on the Magnetospheric Multiscale Mission, Co-I and lead for the ion instruments on the Twin Rocket Investigation of Cusp Electrodynamics 2 (TRICE-2), Co-I on the Imager for Magnetopause to Aurora Global Exploration (IMAGE), and Lead U.S. Co-I on the Rosetta orbiter spectrometer for ion and neutral analysis (ROSINA). Fuselier is the author or co-author of more than 500 scientific publications, a fellow of the American Geophysical Union (AGU), the 1995 recipient of the AGU James B. Macelwane Award, and the 2016 recipient of the European Geosciences Union Hannes Alfvén Award. Fuselier received his Ph.D. in space plasma physics from the University of Iowa. Fuselier has previously served as a member of the Committee for the Review of Progress Toward Implementing the Decadal Survey - Solar and Space Physics: A Science for a Technological Society.

Robyn M. Millan

Co-Chair

ROBYN M. MILLAN is the Margaret Anne and Edward Leede ’49 Distinguished Professor of Physics and Astronomy at Dartmouth College. Millan’s research focus is energetic particle processes and explosive energy release in planetary magnetospheres. Millan was principal investigator (PI) for the Balloon Array for Radiation-belt Relativistic Electron Losses (BARREL), and is currently the PI for the REAL (Relativistic Electron Atmospheric Loss) Cubesat that will make high time resolution measurements of electron pitch angle and energy distributions in low Earth orbit in order to characterize the mechanisms responsible for scattering radiation belt electrons. Millan has worked to promote the development of small satellites for space science, has served as American Geophysical Union Space Physics and Aeronomy secretary, and has chaired committees at the College, National Academies, national, and international levels. Millan is a recipient of NASA’s Exceptional Public Achievement Medal and Dartmouth's John M. Manley Huntington Award for Newly Promoted Faculty. Millan received her Ph.D. in physics at the University of California, Berkeley. Millan has previously served as co-chair of the Committee for the Review of Progress Toward Implementing the Decadal Survey - Solar and Space Physics: A Science for a Technological Society. Millan recently served on the advisory committee for the NSF Geosciences Directorate but stepped down when she accepted the co-chair position for this decadal survey.

Fran Bagenal

Member

FRANCES BAGENAL, NAS, is a senior research scientist at the Laboratory for Space and Atmospheric Physics of the University of Colorado Boulder and leads its Magnetospheres of the Outer Planets Group. Prior to that, Bagenal was a professor of Astrophysical and Planetary Sciences at the same institution. Bagenal’s research interests focus primarily on planetary physics of gas giants, specifically understanding the magnetospheres by combining data analysis and theoretical models. Bagenal has been co-investigator on several highly successful NASA missions including Voyager, Galileo, New Horizons, and Juno. Bagenal is the recipient of the James Van Allen Lecture Award from the American Geophysical Union and the Boulder Faculty Assembly’s Excellence in Research Award. Bagenal is involved in the American Astronomical Society’s Planetary Science Workforce Survey. In National Academies work, Bagenal co-chaired the Committee on Increasing Diversity and Inclusion in the Leadership of Competed Space Missions, was a member of the 2003 Solar and Space Physics Survey Panel on Education and Society, and was a member of the Panel on Giant Planets Systems of the Planetary Science and Astrobiology Decadal Survey 2023-2032. Bagenal received a Ph.D. in Earth and planetary sciences from the Massachusetts Institute of Technology.

Timothy S. Bastian

Member

TIMOTHY S. BASTIAN is an astronomer with the National Radio Astronomy Observatory (NRAO) and adjunct faculty member in the Astronomy Department at the University of Virginia. Formerly, Bastian served as head of the NRAO Office of Science and Academic Affairs, assistant director and head of Observatory Science Operations, and assistant director and head of Science Support and Research. Bastian's research interests include solar and stellar radiophysics; planetary/exoplanetary radio emission; radio propagation phenomena as probes of the solar wind; the physics of flares and coronal mass ejections; physics of the chromosphere; and ground and space based interferometry. Bastian is currently a co-investigator on the NASA SunRISE mission and the NSF Expanded Owens Valley Solar Array and leads the Atacama Large Millimeter/submillimeter Array (ALMA) Solar Development Group. Previous National Academies service includes the 2003 decadal survey Panel on Solar and Heliospheric Physics, the Committee on Solar and Space Physics, the Committee for the Review of Progress Toward Implementing the Decadal Survey – Solar and Space Physics: A Science for a Technological Society, and chair of the Committee on Assessment of the NSF's 2015 Geospace Portfolio Review. Bastian received a Ph.D. in astrophysics from the University of Colorado.

Sarbani Basu

Member

SARBANI BASU is the William K. Lanman Jr. Professor of Astronomy at Yale University. Basu's research interests include the study of the Sun and other stars using data on stellar oscillations (star quakes), and in studying the variations in the Sun over time-scales that are of societal relevance. To this end, Basu uses solar oscillation data to examine changes that take place deep inside the Sun over periods of years and decades. Basu is a co-investigator on the Helioseismic and Magnetic Imager of NASA's Solar Dynamics Observatory. Basu is the recipient of the George Ellery Hale Prize of the Solar Physics Division of the American Astronomical Society and the M.K. Vainu Bappu Gold Medal of the Astronomical Society of India. Basu is a fellow of the American Association for the Advancement of Science. Basu was chair of the Panel on Stars, Sun and Stellar Populations for the Astro2020 decadal survey. Basu received a Ph.D. in physics from Tata Institute of Fundamental Research.

Richard Doe

Member

RICHARD DOE is an instrument subject matter expert at Cornell Technical Services, LLC. Doe’s previous work experience includes senior research physicist at SRI International, research associate at Boston University, senior RF engineer at Lockheed Engineering and Management Services Co, an EMI Test engineer at Texas Instruments, and a sonar technician at UT Applied Research Laboratory. Doe’s research interests include radar, UV Photometer, Imaging, and RF Beacon Instruments; high-latitude plasma turbulence and structuring; ionospheric and space weather remote sensing; and cubesat mission design, development, and operations. Doe has served as a panel reviewer for the NSF in their Division of Atmospheric and Geospace Sciences, the NASA Heliophysics Division, and NASA Earth Science Division, and a member of the NSF Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Science Steering Committee. Doe received a Ph.D. in astronomy and astrophysics from Boston University.

Eileen Dukes

Member

EILEEN DUKES is the sole proprietor of Interplanetary Horizons. Dukes was formerly chief technology officer of Vestigo Aerospace. Dukes’ experience and technical expertise includes decades of leading the planning and operation of challenging deep space missions, attitude determination and control subsystems (ADCS), and the development and implementation of ADCS flight software algorithms. Prior to joining Vestigo Aerospace, Dukes led mission operations for planetary applications at the Lockheed Martin Corporation and was responsible for the ADCS implementations of the first atmospheric aerobraking at Venus and Mars. Dukes is a recipient of the NASA Public Service Medal. Dukes received a B.S. in aeronautics and astronautics from the Massachusetts Institute of Technology.

Scott L. England

Member

SCOTT L. ENGLAND is an associate professor at Virginia Polytechnic Institute and State University (Virginia Tech) in the Aerospace and Ocean Engineering Department. England's research involves studying coupling of energy and momentum between different regions of the atmosphere via atmospheric waves. England spent 12 years at the Space Sciences Laboratory at the University of California, Berkeley, studying the interaction between atmospheric waves and charged particles in the near-Earth space environment. At Virginia Tech, England's research focuses on using remote sensing and in situ instruments to study the upper atmosphere and space environment around Earth and Mars. England is the project scientist for the NASA Ionospheric Connection Explorer (ICON) spacecraft, co-investigator on the NASA Global-scale Observations of the Limb and Disk (GOLD) mission, co-investigator on the Emirate Mars Mission (EMM), participating scientist on the NASA Mars Atmosphere and Volatile Evolution (MAVEN) mission to Mars, and co-investigator for an instrument on NASA's Geospace Dynamics Constellation (GDC). England was the recipient of a 2016 NASA RHG Exceptional Achievement for Science award for MAVEN and a 2020 NASA group achievement award for ICON. England received a Ph.D. for radio and plasma physics at the University of Leicester, UK. England was a member of the Committee for the Review of Progress Toward Implementing the Decadal Survey – Solar and Space Physics: A Science for a Technological Society.

Allison N. Jaynes

Member

ALLISON N. JAYNES is an associate professor of physics and astronomy at the University of Iowa, researching space and plasma physics. Jaynes' primary research interests include pulsating aurora, radiation belts, and the connection between the two. Jaynes has been co-investigator on NASA's Van Allen Probes missions and on the Voyager mission, the NASA-funded CubeSats GTOSat and AEPEX, and a NASA-funded sounding rocket mission, LAMP. Jaynes served on the Nomination Task Force within AGU's Space Physics and Aeronomy (SPA) section assembled to increase the diversity of honors and awards winners at AGU. Jaynes is serving on the Heliophysics Subcommittee of the NASA Advisory Council but has agreed to step down when appointed. Jaynes served on the National Academies Committee on Increasing Diversity and Inclusion in the Leadership of Competed Space Missions. Jaynes received a Ph.D. in physics from the University of New Hampshire.

Dana W. Longcope

Member

DANA WARFIELD LONGCOPE, NAS, is a professor and head of the Department of Physics at Montana State University-Bozeman. Longcope's research interests include the study of the basic physics of magnetic fields in ionized plasmas and the application of these concepts to magnetic fields on the Sun. Longcope has studied the storage and release of magnetic energy in the Sun's corona through a process known as reconnection. Longcope is a recipient of a Faculty Early Career Development grant from the National Science Foundation, a Presidential Early Career Award for Science and Engineering, the Karen Harvey Prize from the Solar Physics Division of the American Astronomical Society, and the Arktowski Medal from the National Academy of Sciences. Longcope received a Ph.D. in applied physics from Cornell University.

Viacheslav G. Merkin

Member

VIACHESLAV G. MERKIN is a principal professional staff scientist at Johns Hopkins University Applied Physics Laboratory (JHU/APL). Merkin is also the supervisor of the Theory and Modeling Section at JHU/APL's Space Plasma Physics group and currently holds the position of an affiliate scientist at the National Center for Atmospheric Research High Altitude Observatory. Merkin’s research interests include numerical modeling of space plasma environments such as planetary magnetospheres and the inner heliosphere. Merkin is the Director of the NASA Diversify, Realize, Integrate, Venture, Educate (DRIVE) Science Center for Geospace Storms, which was recently selected for Phase II (2022-2027). Merkin received a Ph.D. in physics from the University of Maryland at College Park.

Daniel Mueller

Member

DANIEL MUELLER is a solar physicist and Solar Orbiter Project Scientist at the European Space Technology and Research Centre of the European Space Agency (ESA). Mueller previously served as ESA's deputy project scientist for the ESA/NASA Solar and Heliospheric Observatory (SOHO) mission at NASA's Goddard Space Flight Center (GSFC). Prior to joining ESA, Mueller held a Marie Curie postdoctoral fellowship at the Institute of Theoretical Astrophysics at the University of Oslo, Norway, and worked as a research scientist and research assistant at the Kiepenheuer Institute for Solar Physics in Freiburg, Germany. Mueller's research interests and activities include solar physics, helioinformatics, solar spectropolarimetry, and the numerical modeling of the solar corona. Mueller is currently collaborating with researchers at NASA GSFC, the Leibniz Institute for Solar Physics (formerly the Kiepenheuer Institute for Solar Physics), the Institute of Theoretical Astrophysics at the University of Oslo, Norway, the Royal Observatory of Belgium, the Universidad de Almeria, Spain, and the ESTEC-ESAC Heliophysics Group in Noordwijk, The Netherlands. Mueller received his Ph.D. in physics from the Albert-Ludwigs-Universitaet Freiburg, Germany.

Terrance G. Onsager

Member

TERRANCE G. ONSAGER is a physicist with the National Oceanic and Atmospheric Administration Space Weather Prediction Center. Onsager's research includes solar wind-magnetosphere coupling, modeling the signatures of magnetic reconnection at Earth's magnetopause and in the magnetotail, and the dynamics of the electron radiation belts. It also includes coordinating the capabilities and priorities of international space weather organizations to improve global space weather services and working to bridge the gap between research and operations. Onsager has served as the director of the International Space Environment Service, co-chair of the World Meteorological Organization Inter-Programme Coordination Team on Space Weather, and as a member of the Space Weather Expert Team for the United Nations Committee on the Peaceful Use of Outer Space Working Group on the Long-Term Sustainability of Outer Space. Onsager received a Ph.D. in physics from the University of Washington.

Tai D. Phan

Member

TAI D. PHAN is a senior fellow at the University of California, Berkeley, in the Space Sciences Laboratory. Phan's research interests include solar wind interaction with Earth's magnetosphere and the magnetic reconnection process in space. Phan is a co-investigator of the NASA Time History of Events and Macroscale Interactions during Substorms (THEMIS) mission and is a science co-investigator of the FIELDS instrument on the Solar Probe Plus mission. Phan led an inter-disciplinary science team of the NASA Magnetospheric Multiscale mission. Phan is a fellow of the American Geophysical Union. Phan previously served on the National Academies Committee on Solar and Space Physics and the 2013 decadal survey Panel on Solar Wind-Magnetosphere Interactions. Phan received a Ph.D. in engineering from Dartmouth College.

Tuija Pulkkinen

Member

TUIJA PULKKINEN, NAS, is chair and George R. Carignan Collegiate Professor at the University of Michigan in Ann Arbor in the Department of Climate and Space Sciences and Engineering. Previously Pulkinnen served as professor, vice president, and dean of the School of Electrical Engineering at Aalto University, Espoo, Finland. Prior to Aalto University, Pulkkinen was a scientist, unit head, and research professor at the Finnish Meteorological Institute in Helsinki, Finland. Pulkkinen's research interests cover solar wind-magnetosphere-ionosphere coupling, energy and plasma transport from the solar wind into the magnetosphere-ionosphere system, and auroral region electrodynamics and its coupling to the magnetosphere. Pulkkinen has been awarded the European Geosciences Union Julius Bartels Medal, the American Geophysical Union Fellowship, and the James B. Macelwane Medal. Pulkkinen is a member of the Academia Europaea, the Royal Astronomical Society, and the Finnish Academy of Sciences and Letters. Pulkkinen is the co-chair of the National Academies Committee on Solar and Space Physics. Pulkkinen received a Ph.D. in theoretical physics from the University of Helsinki.

Liying Qian

Member

LIYING QIAN is a project scientist III at the High Altitude Observatory (HAO), National Center for Atmospheric Research (NCAR). Qian studies space weather impact and space climate change in the thermosphere and ionosphere (TI) system, coupling of the TI system with the lower atmosphere and the magnetosphere, and ion and neutral coupling within the TI system. Qian has extensive experience in upper atmosphere and whole atmosphere general circulation modeling, and data analysis of the TI system from space- and ground- based measurements. Qian is a recipient of HAO's Walter O. Roberts scientific and technical advancement award, the University Corporation for Atmospheric Research scientific and technical advancement award, and the NCAR/HAO John W. Firor publication award, and the NASA group achievement award to TIMED/SEE science team. Qian received a Ph. D. in atmospheric science from The Pennsylvania State University.

Marilia Samara

Member

MARILIA SAMARA is a research astrophysicist in the Geospace Physics Laboratory of the Heliophysics Science Division at NASA Goddard Space Flight Center. Previously, Samara was a principal scientist at Southwest Research Institute in San Antonio, TX. Samara studies space plasmas with an emphasis on ionospheric electrodynamics and ionosphere-magnetosphere coupling using both sub-orbital and orbital particle and wave instruments. Samara has a particular passion for space hardware and studying small-scale auroral structure and dynamics using common volume in-situ and ground based measurements. Samara was principal investigator of the Ground-to-Rocket Electrodynamics-Electrons Correlative Experiment (GREECE) sounding rocket and is co-investigator on numerous sounding rockets. GREECE demonstrated that multi-spectral ground imaging of the aurora alone can be used to infer the two-dimensional electron characteristics of the precipitating electrons creating the aurora. Other current projects include serving as the deputy principal investigator of the Electron Electrostatic Analyzer (EEA) instrument of the Heliophysics Environmental and Radiation Measurement Experiment Suite (HERMES) science payload for the Lunar Gateway, the Dione CubeSat, and the Comprehensive Auroral Precipitation Experiment (CAPE) on the Geospace Dynamics Constellation (GDC), all in development. Samara received a Ph.D. in physics and astronomy from Dartmouth College.

Joshua Semeter

Member

JOSHUA SEMETER is a professor of electrical and computer engineering at Boston University (BU) and director of the BU Center for Space Physics. Semeter's previous appointments include senior research engineer at SRI International, postdoctoral fellow at the Max Planck Institute for Extraterrestrial Physics, and control systems engineer at Pratt & Whitney Aircraft. Semeter's lab seeks to understand interactions between the atmosphere, ionosphere, and magnetosphere that underlay space weather. Semeter's research employs combinations of physics-based modeling, radio and optical remote sensing, satellite observations, and physics-based data fusion. Current research interests include high-speed flow channels in the ionosphere, small-scale plasma irregularities and their effects on radio wave propagation, ionospheric signatures of magnetic reconnection, and applications of data science and artificial intelligence to distributed observations of the geospace environment. Semeter has also served on the Advisory Committee to the NSF Geoscience Directorate (AC-GEO), and as chair of the NSF program on Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR). Semeter was a recipient of the NSF Faculty Early Career Development (CAREER) award and has received multiple awards for teaching at Boston University. Semeter has served on the National Academies Committee on Solar and Space Physics, the 2013 Panel on Atmosphere-Ionosphere-Magnetosphere Interactions, and the Committee for the Review of Progress Toward Implementing the Decadal Survey – Solar and Space Physics: A Science for a Technological Society. Semeter received a Ph.D. in Electrical Engineering from Boston University.

Endawoke Yizengaw

Member

ENDAWOKE YIZENGAW is a senior scientist at The Aerospace Corporation. Yizengaw's research interests include the complexities of ionospheric electrodynamics using multiple instrument techniques from ground and space. Yizengaw developed the African Meridian B-field Education and Research (AMBER) network of magnetometer instruments in more than 10 countries and has played a vital role in the expansion of space science education and research in developing countries. Yizengaw participates in the International Space Weather Initiative (ISWI), was active in the International Heliophysical Year (IHY) program, and has performed scientific outreach programs for young scientists in the United States and developing nations. Yizengaw is currently on the Scientific Steering Committee of the NSF Coupling, Energetics and Dynamics of Atmospheric Regions Program. Yizengaw has co-convened conferences in Africa, including an American Geophysical Union (AGU) Chapman Conference and a number of programs of the International Space Weather Initiative and the International Heliophysical Year. Yizengaw was awarded the AGU's Joanne Simpson Medal. Yizengaw received a Ph.D. in space science from La Trobe University, Australia.

Gary P. Zank

Member

GARY ZANK, NAS, is the director of the Center for Space Plasma and Aeronomic Research (CSPAR), University of Alabama Board of Trustees Trustee Professor, Aerojet/Rocketdyne Chair in Space Science, an Eminent Scholar and distinguished professor, and chair of the Department of Space Science at the University of Alabama in Huntsville. Zank's research interests extend across space physics, plasma astrophysics, plasma physics, and the interaction of the solar wind with the partially ionized interstellar medium. Zank was named the University of Alabama Board of Trustees Trustee Professor, the first and only University of Alabama System faculty member to achieve this position. Zank is a recipient of the Axford Medal, the highest honor given by the Asia Oceania Geosciences Society (AOGS). Zank is a fellow of the American Geophysical Union, the American Physical Society, and the American Association for the Advancement of Science. Zank is also an AOGS honorary member and was chosen by the International Space Science Institute as a Johannes Geiss Fellow. Zank received a Ph.D in applied mathematics from the University of Natal in South Africa.