

HISTORY OF

NASA
and the
ENVIRONMENT

SYMPOSIUM

29–30 September 2022

This symposium is a collaboration of the NASA History Office with Georgetown University, the New Jersey Institute of Technology, and the D.C. Space Grant Consortium.

Dates: September 29–30, 2022

Location: The Edward B. Bunn, S.J. Intercultural Center (ICC)
Georgetown University, 37th and O Streets, N.W., Washington, D.C. 20057
*Symposium will also be streamed online

Planning Committee:

Brian Odom, NASA History Office
Neil Maher, NJIT-Rutgers University, Newark
Dagomar Degroot, Georgetown University
Teasel Muir-Harmony, Smithsonian's National Air and Space Museum

"NASA is called the space agency, but in a broader sense, we could be called an environmental agency ... Virtually everything we do, manned or unmanned, science or applications, helps in some practical way to improve the environment of our planet and helps us understand the forces that affect it."

NASA Administrator James Fletcher to Congress, March 1973

To more critically analyze the historical connection between NASA and the environment, the NASA History Office, Georgetown University, the New Jersey Institute for Technology, and D.C. Space Grant Consortium are sponsoring a two-day symposium, September 29–30, at Georgetown University, Washington, DC. The purpose of the symposium is to analyze the long history of NASA's interest in, responses to, exploration of, and impact upon, environments as broadly construed.

PROGRAM

Day One – Thursday, September 29, 2022

*All times Eastern

8:00am – 8:45am

Registration and Coffee

8:45am – 9:00am

Welcome

9:00am – 10:30am

Session 1A – *Pollution: Global and Local*

<https://youtu.be/24nR4zJNrFg>

Moderator: Neil Maher, New Jersey Institute of Technology

Panelists:

Stephen Buono, Harvard University

The Devil's Glow: Starfish Prime and the Invention of Outer Space

Alyssa Kreikemeier, Boston University

An "Accident of Geography": Military Overflights and the Tohono O'odham Nation

Thomas Turnbull, Max Planck Institute for the History of Science and Cyrus Mody, Maastricht University (both participating virtually)

Earth's Nearest Star: NASA's Demonstrative Solar Energy Projects

Thomas Rowson, University of Bristol

From Jamaica to the Moon: Considering the Environmental Impact of Aluminum in Constructing the Saturn V

Rachel Hill, University College London

"Louder than the Loudest Thunders": The Acoustic Ecologies of Launch

9:00am – 10:30am

Session 1B - Climate Change, Weather, and Atmospheres I

<https://youtu.be/ggu31-kpDos>

Moderator: Dagomar Degroot, Georgetown University

Panelists:

Andrew Ross, Georgetown University

An American Atmosphere: Missile Testing, Military Expansionism, and the Origins of the U.S. Standard Upper Atmosphere, 1946-1952

Anna Amramina, Smithsonian's National Air and Space Museum

Their Last Bow: NASA's Involvement in the US-Soviet Environmental Research

Edward Goldstein, Independent Scholar

The Development of NASA's Earth Science Program and its Role in Climate Change

Tanya Harrison, Planet Labs, PBC

NASA's Legacy and the Birth of the Commercial Earth Observation Sector: Inspiration and Partnerships for a Better Understanding of the Earth System

Break

10:45am – 12:15pm

Session 2A – Extreme Environments and Cabin Ecologies

<https://youtu.be/24nR4zJNrFg>

Moderator: Melinda Baldwin, University of Maryland

Panelists:

Jordan Bimm, Institute on the Formation of Knowledge (IFK), University of Chicago

Simulating Life in Alien Environments: NASA & the politics of 'Mars Jars'

Vyta Pivo, University of Michigan

Concrete Space Oddities: NASA and Built Environments in Outer Space

Daniella McCahey, Texas Tech University (participating virtually)

A Model for extraterrestrial Settlements: Antarctic Environments as an Analogue for Space

David Munns, John Jay College

Riding the Alcatraz to Mars

10:45am – 12:15pm

Session 2B – Monitoring the Earth Environment

<https://youtu.be/ggu31-kpDos>

Moderator: Jennifer Levasseur, Smithsonian's National Air and Space Museum

Panelists:

Christopher Neigh, NASA Goddard Space Flight Center
The History of Landsat and the Earth Environment

Laurence Rothman, Smithsonian Research Associate Center for Astrophysics – Harvard and Smithsonian (participating virtually)
The HITRAN Project: Molecular Spectroscopic Database Archive for Environmental Monitoring

Robert E. Murphy, NASA Headquarters and NASA Goddard Space Flight Center (ret.)
Land Biosphere Interactions with the Climate System – The Addition of Biology to NASA's Earth Science Program 1983-1996

Compton Tucker, NASA Goddard Space Flight Center
Realistic Exchanges of Water, Energy, & Carbon Between Land and Atmosphere: The legacy of Piers Sellers: Meteorologist, Astronaut, Advocate for Earth Science, and Humorist

Lunch

12:15 – 1:30pm

1:30pm – 3:00pm

Session 3A – Space Contamination and Astrobiology

<https://youtu.be/24nR4zJNrFg>

Moderator: Lisa Ruth Rand, California Institute of Technology

Panelists:

Dana Burton, George Washington University
Vital Dynamics: Tracing the Intersection of the Office of Planetary Protection and the Lunar Environment

Aeryn Avilla, Embry-Riddle Aeronautical University
The History of Martian Astrobiology and its Impact on Crewed Martian Exploration

Erik Conway, NASA Jet Propulsion Laboratory
Near-Earth Objects as Environmental History, Revisited

Claas Kirchhelle, University College Dublin (participating virtually)
Fragile Ecologies – Skylab, Salyut, and the Challenge of Managing Microbial Environments in Space

1:30pm – 3:00pm

Session 3B – Building the Earth Observing System Infrastructure

<https://youtu.be/ggu31-kpDos>

Moderator: Roger Launius, Launius Historical Services

Panelists:

Jack Kaye, NASA Headquarters

Impact of Earth Observing System Interdisciplinary Science (IDS) Program on the Development of Earth System Science and the Associated NASA Investigator Community

Dixon Butler, NASA Headquarters (ret.)

NASA, EOS, and the Environment

Ron Doel, Florida State University

Whose Expertise, Whose Skills? Creating Cross-Disciplinary Approaches to Studying Planetary Environments in the Early Space Age

Susan Schoenung, NASA Ames Research Center

NASA's Airborne Science Program contributions to Environmental Science

3:00pm

Closing

6:00pm – 8:00pm (Thursday, September 29)

Keynote Panel Discussion

Description: This keynote conversation brings together historians and scientists to discuss a broad range of issues related to the history of NASA and the environment. The goal is not only to explore areas of possible interdisciplinary collaboration regarding NASA's long history of collecting environmental data, but also to brainstorm how such data might benefit, equitably, all forms of life on earth.

Moderator: John McNeill, Georgetown University

Panelists:

Dagomar Degroot, Georgetown University

Kelsey Herndon, NASA Marshall Space Flight Center

Joshua Howe, Reed College

Neil Maher, New Jersey Institute of Technology-Rutgers University, Newark

Nancy Searby, NASA Headquarters

Day Two, Friday, September 30, 2022

8:00am – 8:45am

Registration and Coffee

8:45am – 9:00am

Welcome

9:00am – 10:30am

Session 4A – Cultural Meanings and Changing Perceptions

<https://youtu.be/FMVIh9nu0e8>

Moderator: Teasel Muir-Harmony, Smithsonian's National Air and Space Museum

Panelists:

Karen Holmberg, New York University

The Biographical Arc of One NASA Aerospace Engineer as a Mirror of the Transforming US Perception of the Earth in the 20th Century

Jeffrey Nesbit, Temple University

Architecture of Assembly: A Brief History of Building NASA's Enclosed Garden

Luca Thanei, ETH Zurich

Stabilizing "Near-Earth Space" NASA's Early Calculation Methods for Collision Probabilities, 1970–1975

Matthias Wong, Treated Spaces Research Group, University of Hull

Lunar Ambassadors: British Perceptions of Moon Samples from NASA and the USSR

9:00am – 10:30am

Session 4B – Deep Space and Deep History

<https://youtu.be/-UxHI9Xyglw>

Moderator: Josh Howe, Reed College

Panelists:

Andy Bruno, Northern Illinois University

Viewing the Landscape of an Asteroid Disaster from Afar: A History of NASA's Investigations of the Tunguska Event of 1908

Dan Irwin and Kelsey Herndon, NASA Marshall Space Flight Center

Seventeen Years of SERVIR: Applications of Earth Observations to Improve Environmental Decision Making Around the Globe

Timothy Murtha, University of Florida, Center for Latin American Studies

NASA, Archaeology, and Environmental History

Thomas Wozniak, Eberhard Karls Universität Tübingen
Medieval Approaches to the Interpretation of Celestial Signs

Break

10:45am – 12:15pm

Session 5A – Photography, Gender, and Science

<https://youtu.be/FMVlh9nu0e8>

Moderator: Margaret Weitekamp, Smithsonian's National Air and Space Museum

Panelists:

Allison Fulton, University of California Davis (participating virtually)

"The Sun Tells Its Own Story:" Seeing and Unseeing the Environment Through Maria Mitchell's Solar Photographs

Jim Fleming, Colby College (participating virtually)

Joanne Simpson and the Tropical Atmosphere

Billy Marino, University of California, Santa Barbara

Seeing Mars: How the First Close-Up Images of Mars Reshaped Understanding of the Red Planet's Environment in the 1960s

Tyler Peterson, Colorado State University-Pueblo

The Role of the Astronaut in Environmental Observations

10:45am – 12:15pm

Session 5B – Climate Change, Weather, and Atmospheres II

<https://youtu.be/-UxHl9Xyglw>

Moderator: Mike Hankins, Smithsonian National Air and Space Museum

Panelists:

Christopher Hain, NASA Marshall Space Flight Center

NASA's Short-term Prediction Research and Transition Center: A Historical Perspective on Transitioning NASA Research into Operations

James Garvin, NASA Goddard Space Flight Center

Topographic Monitoring and Modelling of the Earth's Environment from the 1980s to Present

Gemma Cirac Claveras, University of Barcelona (participating virtually)

Introduction to the Project CLIMASAT: Using the History of Satellite Data to Write a History of Climate

Timothy Lang, NASA Marshall Space Flight Center

History of NASA Global Lightning Observations

12:15pm – 1:30pm

Lunch

1:30pm – 3:00pm

Session 6A – Publicity, Promotion, and Education

<https://youtu.be/FMVIh9nu0e8>

Moderator: Martin Collins, Smithsonian's National Air and Space Museum (ret.)

Panelists:

Emily Watkins, American University

Experiments in Efficacy: NASA Earth Science Video Production Team's Evolving Strategies for Climate and Environmental Communication

Elizabeth (Scout) Blum, Troy University

"The Early Space Program: Impacts on Views of Space by American Pre-Teens, 1960–1980"

Shobhana Gupta, NASA and Diana Garcia Silva, NASA (participating virtually)

Crowdsourcing To Support Earth and Environmental Science

Lin Chambers, NASA

How NASA Engaged Students and the Public Around the World in Observing the Environment to Support NASA Science

1:30pm – 3:00pm

Session 6B – Colonization, Geoengineering, and Astrofuturisms

<https://youtu.be/-UxHI9Xyglw>

Moderator: Matt Shindell, Smithsonian's National Air and Space Museum

Panelists:

Caitlin Kossmann, Yale University

Microbes, Cyborgs, and Gaia 2.0: Agency and Geoengineering in the History of Earth and Climate Science

James Esposito, Ohio State University

Wartime "oxygen sense" in Unpressurized Aircraft of the Second World War

Stuart Simms, Auburn University

"Snakes, Mosquitoes, and the Mississippi Mud": NASA, Environmental Management, and the Tropes of Dispossession at John C. Stennis Space Center

Nikoleta Zampaki, National and Kapodistrian University of Athens (participating virtually)

Thinking Beyond the Future of Aesthetics: Space Art or the Art of Space

3:00pm

Closing

Presenter Biographies

Anna Amramina is a historian of earth and environmental sciences. With a background in linguistics and communication and a doctoral degree in the history of science and technology, she focuses on dialogue between cultures in her research. Currently a postdoctoral fellow at the National Air and Space Museum, Anna is working on a book on American-Soviet scientific collaboration during the Cold War.

Aeryn Avilla is a senior at Embry-Riddle Aeronautical University in Daytona Beach, Florida where she is pursuing a Bachelor of Science degree in Spaceflight Operations. She is currently an intern at NASA with the Goddard Space Flight Center's Explorers Program History Project, in which I research and write about the scientific discoveries and technological advancements of the Earth sciences-focused Explorer satellite missions.

Jordan Bimm is a historian of science, technology, and medicine at the University of Chicago's Institute on the Formation of Knowledge (IFK) focused on the human and biological dimensions of space exploration. His forthcoming book *Anticipating the Astronaut* examines early space medicine research, and his current project *Putting Mars in a Jar* recovers the forgotten military origin of astrobiology.

Elizabeth (Scout) Blum is professor of history at Troy University in Alabama. Growing up minutes from the Johnson Space Center, she continues to have an abiding love for astronomy and the US space program. Her current book project traces popular culture messages adults give children about the environment as well as children's own beliefs about nature in post-World War II America.

Andy Bruno is an Associate Professor of History and Environmental Studies at Northern Illinois University. He is the author of *Tunguska: A Siberian Mystery and Its Environmental Legacy* (2022) and *The Nature of Soviet Power: An Arctic Environmental History* (2016). In 2018 he received a Fellowship in Aerospace History from NASA and the History of Science Society.

Stephen Buono is an Ernest May Fellow in History & Policy at Harvard University. His first book project, *The Province of All Mankind*, narrates the birth of outer space as discrete realm of international relations and legal thought in the twentieth century. At Harvard's Belfer Center, he is at work on a history of lunar governance in the Cold War.

Dana Burton is an anthropology PhD candidate at George Washington University. Her research investigates scientists' search for evidence of life in outer space and how they imagine, theorize, and evaluate this evidence in their mission-related work. Her fieldwork follows scientists, documents, microbes, and machines across Earth and beyond. Dana's work was funded by Wenner-Gren Foundation, NSF, and Society for the History of Technology.

Dixon Butler serves as a consultant to NASA's GLOBE Program; Founder and President of YLACES (Youth Learning as Citizen Environmental Scientists); President of the Virginia Environmental Endowment; led the planning of the Earth Observing System. He holds a PhD in Space Physics and Astronomy from Rice University.

Lin Chambers co-leads NASA's Science Activation program, a network of community-based life-long learning projects across the US. From 2016-2018 she managed the GLOBE Program. She spent 23 years as a researcher in the Climate Science and Aerothermodynamics Branches at NASA Langley. She pioneered engagement of students with NASA science through the Student's Cloud Observations On-Line Project (S'COOL; now part of GLOBE), and the MY NASA DATA Project.

Gemma Cirac-Claveras is Associate Professor at the Autonomous University of Barcelona. She investigates the co-production of measurements, data, models, information and knowledge flows generated with remote-sensing satellites and of environmental discourses, practices and policies. Amongst her most recent articles is "Re-imagining the Space Age: Early Satellite Development from Earthly Fieldwork Practice" (*Science as Culture*, 2021), which won the Maurice Daumas of the International Committee for the History of Technology.

Erik Conway is the historian of Caltech's Jet Propulsion Laboratory. His most recent book is *A History of Near-Earth Objects Research*, with Donald K. Yeomans and Meg Rosenburg, published in July 2022. He recently received a Guggenheim Fellowship with Naomi Oreskes, and served as the inaugural Fellow for the joint Caltech/Huntington Research Institute for the History of Science and Technology.

Dagomar Degroot is an associate professor of environmental history at Georgetown University. His first book, *The Frigid Golden Age*, was published by Cambridge University Press in 2018 and named by the *Financial Times* as one of the ten best history books of that year. His next book, *Ripples in the Cosmic Ocean*, is under contract with Harvard University Press and Viking.

Ron Doel is associate professor of history (history of science, technology, and environmental history) at Florida State University. He has long been fascinated by the influence of military patronage on the rise of the physical branches of the environmental sciences after World War II, as well as the international relations of science in the twentieth century and beyond.

James Esposito is a doctoral candidate in History at Ohio State University. A specialist in Envirotech, his research focuses on the history of artificial breathing apparatus and the militarization of extreme environments. His dissertation, *Last Breath: Artificial Breathing Apparatus at Work and War in Britain, 1914-1945*, examines how the ability to artificially supply, pump, and filter oxygen shaped Britain's environmental experience of the World Wars.

Jim Fleming (PhD, Princeton) is the Charles A. Dana Professor of Science, Technology, and Society, Emeritus, at Colby College. He is the founder of the International Commission on History of Meteorology, was a contributing author for the IPCC, served on two National Research Council study panels, and is series editor of Palgrave Studies in the History of Science and Technology.

Allison Fulton is an English PhD Candidate at the University of California Davis with a Designated Emphasis in Science and Technology Studies. Her dissertation examines how nineteenth-century American scientific disciplines were brought to form through gendered and racialized craftwork technologies. She recently published a co-authored essay in the Plant Humanities Lab. Her work has been generously supported by the American Antiquarian Society and the Winterthur Library.

James Garvin is the Chief Scientist at the NASA Goddard Space Flight Center (GSFC) and Principal Investigator of the DAVINCI mission to Venus. Garvin has held several positions of scientific leadership throughout his career including NASA Chief Scientist, GSFC Chief Scientist, and Chairman of the Administrator's Decadal Planning Team, as well as NASA's first chief scientist for Mars Exploration. Garvin holds a PhD in Geological Sciences from Brown University.

Edward Goldstein served as NASA's chief speechwriter from 2002-2009 and has taught courses on National Science Policy for the Georgetown University McCourt School of Public Policy. His PhD dissertation at George Washington University was a history of NASA's Earth Science Program.

Shobhana Gupta serves as the Open Innovation and Community Applications Manager with Earth Science Division's Applied Sciences Program at NASA Headquarters. Shobhana completed her medical and graduate training at Vanderbilt University School of Medicine in the Department of Microbiology and Immunology, and trained as a postdoctoral fellow at Yale University School of Medicine in the Department of Neurology.

Christopher Hain is an Assistant Research Scientist for the Earth System Science Interdisciplinary Center (ESSIC) at the University of Maryland, College Park. He received his B.S. in Meteorology from Millersville University in 2004 and his M.S. and PhD in Atmospheric Science from the University of Alabama in Huntsville in 2007 and 2009.

Tanya Harrison is the Director of Strategic Science Initiatives at Planet and a Fellow of the University of British Columbia's Outer Space Institute. Previously she worked in science and mission operations for multiple NASA missions over a span of 13 years. She holds a PhD in Geology from the University of Western Ontario.

Kelsey Herndon is a research scientist at NASA SERVIR Science Coordination Office at NASA Marshall Space Flight Center. Before her current position, Herndon served as Amazonia Regional Science Associate at NASA SERVIR. Herndon holds a Master of Science degree in Earth System Science from the University of Alabama in Huntsville. She also holds a Master of Arts degree in Anthropology from the University of Alabama.

Rachel Hill is an Arts and Humanities Research Council funded PhD student in the Science and Technology Studies department of University College London where she researches the environmental histories of spaceflight. She is a co-director of the London Science Fiction Research Community (LSFRC) and is an affiliate of the Centre for Outer Space Studies at UCL.

Karen Holmberg is a Research Scientist at the Gallatin School of New York University. She serves as the Engineering Writing Fellow at The Cooper Union and is a current Faculty Fellow of the Tisch Future Imagination Fund's *This is Not a Drill* initiative, which explores public pedagogy to combine technology, the arts, and critical thinking to address the climate emergency.

Joshua Howe is associate professor of History and Environmental Studies at Reed College. His recent books, *Behind the Curve: Science and the Politics of Global Warming* (University of Washington Press, 2014) and *Making Climate Change History: Documents from Global Warming's Past* (University of Washington Press, 2017) explore the political history of climate change since the 1950s.

Dan Irwin is a research scientist at the NASA/MSFC and the global program manager for SERVIR — a flagship NASA and US Agency for International Development (USAID) program with activities in over 40 countries throughout Eastern and Southern Africa, West Africa, the Hindu Kush Himalaya, lower Mekong and Amazonia regions. Dan received his master's degree in environmental science from Miami University of Ohio in Oxford.

Jack Kaye is the Associate Director for Research in the Earth Science Division (ESD) at NASA HQ. He has worked at NASA for over 38 years as a researcher on stratospheric ozone, manager of a research program on atmospheric composition, and as a Senior Executive overseeing the ESD research program. He is a fellow of the AMS and AAAS, a 3-time recipient of the Meritorious Senior Executive Presidential Rank Award, and was awarded the NASA Distinguished Service Medal in 2022. He has a PhD in chemistry from the California Institute of Technology.

Claas Kirchhelle is lecturer of the history of medicine at University College Dublin. Supported by a Wellcome Trust University Award, his research explores the history of microbial surveillance and drug development. Kirchhelle is curator of the critically acclaimed Typhoidland exhibitions and has published multi-award-winning monographs on the history of antibiotics (Rutgers, 2020), animal welfare science (Palgrave, 2021), and typhoid (Scala, 2022).

Caitlin Kossmann is a PhD candidate in the History of Science and Medicine at Yale University. Her dissertation project, *The Myth of Gaia: Gender, Ecology, and Community in the Making of Earth System Science*, uncovers the complex ties among scientific, political, and spiritual communities and imaginaries in the construction of planetary environmental imaginaries in the late-twentieth century and into the twenty-first.

Alyssa Kreikemeier is a public historian and writer completing her PhD in American Studies at Boston University. Her dissertation explores how the lower atmosphere changed alongside American efforts to access, control, and regulate it over the twentieth century. In January she will join the University of New Mexico as a Postdoctoral Fellow. Alyssa also holds an EdM from Harvard University.

Timothy Lang is a Lead Research Aerospace Technologist at NASA Marshall Space Flight Center, where he has worked for almost ten years. Prior to NASA he was at Colorado State University. He serves as Mission Scientist for the International Space Station Lightning Imaging Sensor and has been involved in over twenty suborbital field campaigns focused on precipitation and lightning.

Neil M. Maher is a Professor of History in the Federated History Department at the New Jersey Institute of Technology and Rutgers University at Newark, where he teaches environmental history and the history of environmental justice. He is the author, most recently, of *Apollo in the Age of Aquarius* (Harvard University Press in 2017), and his writing has also appeared in more popular outlets including the *New York Times* and *The Washington Post*.

Billy Marino is a PhD student in history at UC Santa Barbara. He studies the history of science and technology, environmental history, and public history, focused on how space exploration facilitated the creation of knowledge about planetary environments by scientists and members of the public(s). In particular, he examines the role of photography and other visual materials in the creation of this environmental knowledge.

Daniella McCahey is an Assistant Professor of Modern British History at Texas Tech University where she researches the history of science in Antarctica. She is the co-author of *Antarctica: A History in 100 Objects* and her book manuscript *Laboratories at the Bottom of the World: Antarctica, the International Geophysical Year, and the British Empire* is under contract with Harvard University Press.

Cyrus C. M. Mody is an historian of science and technology and (more recently) of energy and environment. He is author of (among others), *The Squares: US Physical and Engineering Scientists in the Long 1970s* (MIT, 2022) and is PI of the Dutch Research Council-funded Managing Scarcity project on the oil industry, alternative energy, and the resource scarcity debates of the 1970s.

David Munns is a professor of history at John Jay College of the City University of New York. His work encompasses the history of modern life and physical sciences and technology, environmental history, Anthropocene studies, and waste studies. His recent book, *Far Beyond the Moon: A History of Life Support Systems in the Space Age*. (Pittsburgh University Press, 2021), was co-authored with Karin Nickelsen.

Robert E. Murphy, an astronomer, led NASA's transition from the empirical AgRISTARS agricultural survey program to a biology- and physics-based program focused on the interaction between the biosphere and the climate system. He served as Branch Chief for GSFC's Earth Resources Branch, HQ's Land Processes Branch, and as Project Scientist for MODIS and the NPOESS Preparatory Project. He retired from NASA in 2004.

Timothy Murtha, PhD is a professor in the Center for Latin American Studies and the Florida Institute for Built Environment Resilience at the University of Florida. For the past 20 years, his research and practice have been focused on leveraging geospatial tools for community-engaged anthropological and archaeological research and preservation at a landscape scale, primarily relying on remote sensing.

Chris Neigh is a physical scientist at NASA Goddard and recently has become the Landsat 8 and 9 Project Scientist, overseeing phase-E activities. Currently, he's been focused on estimating boreal forest change and agriculture extent mapping in the developing world. Over the past 15 years at Goddard, he has produced >35 peer reviewed publications that leveraged remote sensing observations to understand our changing planet.

Jeffrey S. Nesbit is an architect, urbanist, assistant professor at Temple University, and recently received his Doctor of Design degree from Harvard University Graduate School of Design. His research focuses on infrastructural urbanization, "technical lands," and is currently working on a book which examines the 20th-century American spaceport complex at the intersection of architecture, infrastructure, and aerospace history.

Tyler Peterson is a history instructor at Colorado State University-Pueblo and the author of the book *A Fire to be Lighted: The Training of American Astronauts From 1959 to the Present*.

Vyta Pivo is a postdoctoral scholar with the Michigan Society of Fellows and assistant professor of architecture at the Taubman College of Architecture and Urban Planning at University of Michigan. Her current project is *A World Cast in Concrete: How the US Built its Empire*, examines how the US cement and concrete industries expanded their material and technological reach across the globe and into outer space.

Andrew Ross is a PhD candidate at Georgetown University where he studies U.S. 20th Century Imperialism, Foreign Relations, and Statecraft with a particular thematic focus on Science and Environmental Change. His dissertation research examines the creation and growth of the U.S. Missile Range System as a key infrastructure of American settler colonialism and global power projection during the Cold War.

Thomas Rowson is a Postgraduate Researcher at the University of Bristol, Thomas is an environmental historian conducting his research project on the environmental impacts of the SATURN family of launch vehicles, from design through to their afterlife. A life-long lover of the APOLLO Program, Thomas aims to add value to the considerable body of work on this topic with his cost/benefit analysis.

Laurence Rothman was director of the HITRAN project since its inception at the Air Force Geophysics Laboratory. Since the nineties, with support from NASA, he developed the program as a senior scientist at the Harvard-Smithsonian Center for Astrophysics. The program involves augmenting large molecular spectroscopic databases, and represents a worldwide standard for remote sensing. Dr. Rothman is currently involved with the program in an advisory role as a Smithsonian Research Associate.

Susan Schoenung is Senior Research Scientist at NASA Ames Research Center. Schoenung supports the NASA SMD/ESD Airborne Science Program (ASP). She has worked with the ASP for over 25 years, beginning with providing engineering design analysis for high altitude uncrewed aircraft systems (UAS) to support the Atmospheric Effects of Aviation (AEA) program. Schoenung earned her doctorate and Master of Science degrees in Mechanical Engineering from Stanford University.

Nancy D. Searby manages the NASA Headquarters Earth Sciences Capacity Building Program in Washington DC, USA. Training, prizes and challenges, feasibility projects, and services co-development strengthen individual and institutional capacity in the United States, in and through regional networks in Africa, Asia, and the Americas, and globally to improve environmental resilience and address equity and environmental justice.

Diana Garcia Silva is a graduate student at Queens College, CUNY, New York where she is pursuing a Masters in Geological and Environmental Sciences. She is currently an intern at NASA Headquarters within the Earth Science Division's Applied Sciences Program, in which she is researching NASA's history in crowdsourcing. Research is specifically aimed towards analyzing the impacts from Prizes and Challenges that support Earth science and Environmental causes, whose insights will be used to inform future crowdsourcing project designs and activities.

Stuart Simms is a PhD student from Auburn University studying the intersections of aerospace history and the environment. His work examines the development of aerospace facilities in the US South and their impact on local communities. By utilizing methodological approaches aligned closely to environmental and oral history, he hopes to highlight the many ways that the development of the aerospace complex shaped the experiences and perspectives of residents in nearby communities.

Luca Thanei is a PhD candidate at the History of Technology Department at ETH Zurich. His PhD project is concerned with near-Earth space as an essential resource for satellite-based technologies on Earth. The project draws on historical sources by NASA and ESA and investigates how near-Earth space was quantified and modeled between 1970 and 2010.

Compton Tucker is a senior Earth scientist at NASA/GSFC. He develops and uses satellite methods to study terrestrial photosynthesis, food security, land cover, glacier extent, and carbon residence time in vegetation. He is a fellow of the AAAS and the AGU and the author of 220 scientific papers. Recently he has been mapping carbon in individual trees over large areas

Thomas Turnbull is a geographer and historian interested in the relationship between of thermodynamics and politics and the human sciences in the nineteenth and twentieth centuries. He is a research scholar at the Max Planck Institute for the History of Science. He recently helped organized a large-scale and multidisciplinary analysis of the Mississippi River Basin, which appeared in *The Anthropocene Review*.

Emily Watkins is a second-year graduate student at American University in Washington, D.C. where she is pursuing a Masters of Fine Arts in Film and Media Arts with a concentration in Environmental and Wildlife Filmmaking. She recently interned at Goddard Space Flight Center's Earth Science Video Production Team, participating in the Live James Webb Space Telescope First Light broadcast while creating her own informative Earth Science.

Matthias Wong is a postdoctoral researcher with Treated Spaces, an interdisciplinary environmental research group at the University of Hull. He is a historian of mental worlds and meaning-making, in particular moments of ideational change. Matthias is working on a historical GIS project to recover Indigenous cultural geography, and he co-leads a project to incorporate socio-cultural values into impact assessments of UK space activities.

Thomas Wozniak received his PhD in history (2009) from the University of Cologne. His second book on "Natural Events in the Early Middle Ages" was published by De Gruyter in 2017. After teaching positions in Marburg, Stuttgart, Munich, and Weber State University (Utah), he received a fellowship in Asian Studies at the University of Heidelberg in 2021. He is currently at the Universities of Tuebingen and Leipzig, conducting research in environmental and medieval history.

Nikoleta Zampaki is a PhD Candidate in Modern Greek Literature at the Faculty of Philology of the National and Kapodistrian University of Athens in Greece. She was Instructor at the Utah University in the U.S.A., International Student and Fellow at MIT in the U.S.A., Harvard Extension School, etc. She is Associate and Managing Editor at the *Journal of Ecohumanism*.