

ABOUT THE AUTHORS

James T. Andrews is an associate professor of modern Russian and comparative European history in the Department of History at Iowa State University (ISU), where he is co-director of ISU's Ph.D. program and Center for the Historical Studies of Technology and Science. At ISU, he has also been director of Russian, East European, and Central Asian Studies and director of graduate studies in history. He holds a Ph.D. in modern Russian/Soviet history from the University of Chicago and has taught as a visiting professor at several research institutions, including the University of Texas at Austin. Since the summer of 1995, he has been affiliated as a senior research associate with the Russian Academy of Sciences Institute for the History of the Natural Sciences and Technology in Moscow and St. Petersburg. Professor Andrews's books and numerous articles have analyzed the intersection of science and technology, society, and public culture in modern Russia and in a comparative Eurasian framework. He is the author of *Science for the Masses: The Bolshevik State, Public Science, and the Popular Imagination, 1917–34* (Texas A&M University Press, 2003) and editor of *Maksim Gor'kii Revisited: Science, Academics and Revolution* (1995). His newest book, to be published in the Texas University Press Centennial of Air-Flight Series, is entitled *Visions of Space Flight: K. E. Tsiolkovskii, Russian Popular Culture, and the Birth of Soviet Cosmonautics, 1857–1957* (forthcoming, 2008). He is also currently completing a monograph (overview synthesis) entitled *Science and the Public Sphere: Technology, Science, and European Public Culture, 1543–Present*.

Glen Asner joined the NASA Headquarters History Division in December 2004. He recently completed his doctoral dissertation, titled "The Cold and American Industrial Research," at Carnegie Mellon University. Among his publications is an article, "The Linear Model, the U.S. Department of Defense, and the Golden Age of Industrial Research," in *The Science-Industry Nexus*, proceedings of the 123rd Nobel Symposium, edited by Karl Grandin, Nina Wormbs, and Sven Widmalm. In collaboration with Stephen Garber, Glen is currently writing a history of the development of the Vision for Space Exploration. Glen served as a contract historian prior to joining NASA on projects for the U.S. Department of Defense, the U.S. Department of Energy, and the Hagley Museum and Library.

Linda Billings is a Washington-based research associate with the SETI (Search for ExtraTerrestrial Intelligence) Institute of Mountain View, California. She has been conducting science and risk communication research for NASA's Planetary Protection Office since September 2002. From September 1999 through August

2002, she was director of communications for SPACEHAB, Inc., a builder of space habitats. Dr. Billings earned her Ph.D. in mass communication from Indiana University's School of Journalism in September 2005. Her expertise is in mass communication, science communication, risk communication, rhetorical analysis, and social studies of science. Her research has focused on the role that journalists play in constructing the cultural authority of scientists and the rhetorical strategies that scientists and journalists employ in communicating about science. She earned her B.A. in social sciences from the State University of New York at Binghamton and her M.A. in international transactions from George Mason University. Dr. Billings has worked for 25 years in Washington, DC as a researcher, journalist, freelance writer, communication specialist, and consultant to the government. As a researcher, she has worked on communication strategy, risk communication, and audience studies for NASA's Planetary Protection program. As a corporate communications director, she was responsible for communications with the media, the public, and the financial community. As a journalist, she covered energy, the environment, labor relations, and aerospace, primarily for the trade press. She was the founding editor of *Space Business News* (1983–1985) and the first senior editor for space at *Air & Space/Smithsonian* magazine (1985–1988). She also was a contributing author for *First Contact: The Search for Extraterrestrial Intelligence* (New American Library, 1990). Dr. Billings was a member of the staff for the National Commission on Space (1985–1986). For the National Science Foundation and NASA, she has worked as a policy analyst, communications specialist, education and outreach planner, and writer and editor. Her freelance articles have been published in outlets such as the *Chicago Tribune* ("Space Station Is Good for More Than Star-Gazing," 8 October 1998), the *Washington Post Magazine* ("Realtime: Pre-Life Sciences," 11 August 1996) and *Space News* ("Aim for Exploration, Not Exploitation," 14–20 October 1996).

Kevin M. Brady is a doctoral candidate in history at Texas Christian University in Fort Worth, Texas, and is studying with Dr. Gregg Cantrell. Brady's classwork and research have focused on Texas history, science and technology, history of NASA, and military history. Currently, Brady is working on a dissertation titled "NASA Launches Houston into Orbit: The Economic, Political, and Social Impact of the Aerospace Program on Southeast Texas, 1961–1969." In May 2000, Brady earned a B.S. degree in secondary education with a specialization in American history from Baylor University in Waco, Texas. After graduating from Baylor, he remained at the university to pursue graduate work in history. While at Baylor, Brady was the recipient of numerous awards for his academic excellence and dedication to the university. For example, Baylor's Student Life Division awarded him with the James Huckins Award for Outstanding Graduate Assistant. In August 2002, Brady received an M.A. in history from Baylor University. In the fall of 2002, Brady enrolled at Texas Christian University to pursue doctoral studies in history. From 2003 until 2005, he served as a teaching assistant at Texas Christian University, where he taught U.S. survey courses.

During this time, Brady also worked as an adjunct instructor at the Tarrant County Community College. Brady is the author of several articles and has also contributed to a number of reference works, including *Space Exploration and Humanity: A Historical Encyclopedia*. Currently, Brady serves as a research intern with the Universities Space Research Association (USRA) at the NASA Lyndon B. Johnson Space Center (JSC) in Houston, Texas, where he assists the staff of the JSC History Office.

Andrew Chaikin has authored books and articles about space exploration and astronomy for more than two decades. He is also active as a lecturer at museums, schools, and corporate events, and in radio and television appearances. Chaikin is best known as the author of *A Man on the Moon: The Triumphant Story of the Apollo Space Program*, first published in 1994. This acclaimed work was the main basis for Tom Hanks's HBO miniseries, *From the Earth to the Moon*, which won the Emmy for best miniseries in 1998. Chaikin spent eight years writing and researching *A Man on the Moon*, including hundreds of hours of personal interviews with each of the 23 surviving lunar astronauts. Apollo Moonwalker Gene Cernan said of the book, "I've been there. Chaikin took me back." A three-volume, fully illustrated edition of *A Man on the Moon* was published by Time-Life Books in 1999. Chaikin co-edited *The New Solar System*, a compendium of writings by planetary scientists, now in its fourth edition. He is also the author of *Air and Space: The National Air and Space Museum Story of Flight*, published in 1997 by Bulfinch Press. He collaborated with Moonwalker-turned-artist Alan Bean to write *Apollo: An Eyewitness Account*, published in 1998 by the Greenwich Workshop Press. Chaikin co-authored the text for the highly successful collection of Apollo photography, *Full Moon*, which was published by Knopf in 1999. His book, *SPACE: A History of Space Exploration in Photographs*, was published in 2002 by Carlton Books. In 2004 he authored the chapter on human spaceflight in *The National Geographic Encyclopedia of Space*. From 1999 to 2001 Chaikin served as Executive Editor for Space and Science at SPACE.com, the definitive Web site for all things space. He was also the editor of SPACE.com's print magazine, *Space Illustrated*. Chaikin is a commentator for National Public Radio's *Morning Edition*, and has appeared on *Good Morning America*, *Nightline*, and the NPR programs *Fresh Air* and *Talk of the Nation*. He has been an advisor to NASA on space policy and public communications. A former editor of *Sky & Telescope* magazine, Chaikin has also been a contributing editor of *Popular Science* and has written for *Newsweek*, *Air&Space/Smithsonian*, *World Book Encyclopedia*, *Scientific American*, and other publications. A graduate of Brown University, Chaikin served on the Viking missions to Mars at NASA's Jet Propulsion Laboratory, and was a researcher at the Smithsonian's Center for Earth and Planetary Studies before becoming a science journalist in 1980.

Martin J. Collins is a curator in the Smithsonian National Air and Space Museum. He received his Ph.D. from the University of Maryland in history of science and technology. Book publications include *Cold War Laboratory: RAND, the Air Force, and the American State* (2002) and *Showcasing Space*, edited with Douglas Millard, volume 6 of the Artefacts Series: *Studies in the History of Science and Technology* (2005). He is currently working on a history of the Iridium satellite telephone venture.

Erik Conway is the Historian at the Jet Propulsion Laboratory (JPL) of the California Institute of Technology. He is completing a history of atmospheric research at NASA that he started as a contract historian at Langley Research Center in Virginia, and is beginning a history of robotic Mars exploration in the 1980s and 1990s. He has been at JPL since 2004.

Taylor E. Dark, III received his Ph.D. in political science from the University of California, Berkeley and currently teaches in the Department of Political Science at California State University, Los Angeles. He was formerly Associate Dean of the Graduate School of American Studies at Doshisha University in Kyoto, Japan, where he taught for eight years. Professor Dark is the author of *The Unions and the Democrats: An Enduring Alliance* (1999) and has previously published in *The National Interest*, *Journal of Labor Research*, *Labor History*, *Political Science Quarterly*, *Political Parties*, *PS: Political Science and Politics*, and *Presidential Studies Quarterly*. He is currently completing a book manuscript on philosophies of space exploration and development in American culture titled "Reclaiming the Future: The Space Program and the Idea of Progress."

Steven J. Dick is the Chief Historian for NASA. He obtained his B.S. in astrophysics (1971) and his M.A. and Ph.D. (1977) in history and philosophy of science from Indiana University. He worked as an astronomer and historian of science at the U.S. Naval Observatory in Washington, DC for 24 years before coming to NASA Headquarters in 2003. Among his books are *Plurality of Worlds: The Origins of the Extraterrestrial Life Debate from Democritus to Kant* (1982), *The Biological Universe: The Twentieth Century Extraterrestrial Life Debate and the Limits of Science* (1996), and *Life on Other Worlds* (1998). The latter has been translated into Chinese, Italian, Czech, Greek, and Polish. His most recent books are *The Living Universe: NASA and the Development of Astrobiology* (2004) and a comprehensive history of the U.S. Naval Observatory, *Sky and Ocean Joined: The U.S. Naval Observatory, 1830–2000* (2003). The latter received the Pendleton Prize of the Society for History in the Federal Government. He also is editor of *Many Worlds: The New Universe, Extraterrestrial Life and the Theological Implications* (2000) and (with Keith Cowing) of the proceedings of the NASA Administrator's symposium *Risk and Exploration: Earth, Sea and the Stars* (2005). He is the recipient of the Navy Meritorious Civilian Service Medal. He received the NASA Group Achievement Award for his role in NASA's

multidisciplinary program in astrobiology. He has served as chairman of the Historical Astronomy Division of the American Astronomical Society and as president of the History of Astronomy Commission of the International Astronomical Union, and he is the immediate past president of the Philosophical Society of Washington. He is a member of the International Academy of Astronautics.

Andrew Fraknoi is the chair of the Astronomy Program at Foothill College near San Francisco. For 14 years, he served as the executive director of the Astronomical Society of the Pacific, the largest and oldest organization devoted to astronomy education. He founded and directed Project ASTRO, a national program that partners volunteer astronomers with fourth- through ninth-grade teachers. A branch of the project has developed family astronomy games and kits and trained educators and amateur astronomers to use them in regional sites from Boston to Hawaii. Fraknoi organized and moderated more than 20 workshops on teaching astronomy in grades 3–12 and four national symposia on teaching introductory astronomy to college nonscience majors. Educated at Harvard and the University of California, Berkeley, Fraknoi has also taught astronomy and physics at San Francisco State University. With Sidney Wolff, he is co-editor of *Astronomy Education Review*, a Web-based refereed journal on education and outreach. Among the books he has written and edited are *Voyages through the Universe* (a college astronomy text), *The Universe at Your Fingertips* (a collection of K–12 activities and resources), and *The Planets* and *The Universe*, two collections of science and scientifically accurate science fiction. Fraknoi serves on the board of trustees of the SETI Institute and is a fellow of the Committee for the Scientific Investigation of Claims of the Paranormal, specializing in debunking astrology. Awards he has won include the Annenberg Prize of the American Astronomical Society for his contributions to astronomy education. The International Astronomical Union has named Asteroid 4859 Asteroid Fraknoi to recognize his work in astronomy outreach.

Alexander Geppert teaches modern European history at Freie Universität Berlin. He studied history, philosophy, and psychology at Universität Bielefeld, Johns Hopkins University (M.A., 1995) in Baltimore, Georg-August-Universität Göttingen (M.A., 1997), and the University of California, Berkeley. From 1997 to 2004, he was a Ph.D. candidate and research associate at the European University Institute in Florence, where he wrote and defended his dissertation, “London vs. Paris: Imperial Exhibitions, Transitory Spaces and Metropolitan Networks, 1880–1930,” under the supervision of Professors John Brewer, Luisa Passerini, and Bernd Weisbrod. He has held various long-term fellowships at the École des Hautes Études en Sciences Sociales in Paris (1999), the German Historical Institute in London (2000), the Internationales Forschungszentrum Kulturwissenschaften in Vienna (2001–2002), and the Kulturwissenschaftliches Institut in Essen (2002–2005). His work on oral, visual, and urban history (particularly on the history of

international expositions); on the history of sexuality; and on the occult has been published in German, English, Italian, and Chinese. Currently, he is developing a new research project tentatively titled “Outer Space and the European Imagination, 1923–1969.” Publications include five edited or co-edited volumes: *European Ego-Histoires. Historiography and the Self, 1970–2000* (Athens, 2001); *Orte des Okkulten* (Vienna, 2003); *Esposizioni in Europa tra Otto e Novecento. Spazi, organizzazione, rappresentazioni* (Milan, 2004); *Ortsgespräche. Raum und Kommunikation im 19. und 20. Jahrhundert* (Bielefeld, 2005); *New Dangerous Liaisons. Discourses on Europe and Love in the Twentieth Century* (Oxford/New York, 2006). Geppert is also the author of *Brief Cities: Imperial Expositions in Fin-de-siècle Europe* (London, 2006).

Roger Handberg is professor of political science and chair at the University of Central Florida. His published work in space policy and history includes works on NASA, international space commerce, and military space activities. He has published 154 articles and book chapters, 124 professional papers, and 8 books, the most recent being *International Space Commerce: Building from Scratch*, published in June, 2006 by the University Presses of Florida. Current work involves a study of the Chinese space program and work on nanotechnology policy. Dr. Handberg received his B.A. from Florida State University and Ph.D. from the University of North Carolina.

James R. Hansen is professor of history in the Department of History at Auburn University in Alabama, where he teaches courses on the history of flight, history of science and technology, space history, and the history of technological failure. He has published nine books and three dozen articles on a wide variety of technological topics, ranging from the early days of aviation to the first nuclear fusion reactors, to the Moon landings, to the environmental history of golf course development. His books include *First Man: The Life of Neil A. Armstrong* (2005); *The Bird Is on the Wing: Aerodynamics and the Progress of the Airplane in America* (2003); *The Wind and Beyond: A Documentary Journey through the History of Aerodynamics in America* (Vol. 1, 2002), *Spaceflight Revolution* (1995), *From the Ground Up* (1988), and *Engineer in Charge* (1987). Hansen earned a B.A. degree with high honors from Indiana University (1974) and an M.A. (1976) and Ph.D. (1981) from The Ohio State University. He served as historian for NASA Langley Research in Hampton, Virginia, from 1981 to 1984, and as a professor at the University of Maine in 1984–1985. Professor Hansen has received a number of citations for his scholarship, including the National Space Club’s Robert H. Goddard Award, the Air Force Historical Foundation’s Distinction of Excellence, the American Astronautical Society’s Eugene Emme Prize in Astronautical Literature (twice), the American Institute of Aeronautics and Astronautics’s History Book Award; and AIAA Distinguished Lecturer. He has served on a number of important advisory boards and panels, including the Research Advisory Board of the National Air and Space Museum, the Editorial Advisory Board of the Smithsonian Institution Press, the Advisory Board for the Archives

of Aerospace Exploration at Virginia Polytechnic Institute and State University, the Museum Advisory Board of the U.S. Space and Rocket Center in Huntsville, Alabama, and the board of directors of the Space Restoration Society. He is a past vice president of the board of directors of the Virginia Air and Space Museum and Hampton Roads History Center in Hampton, Virginia.

Glenn Hastedt holds a Ph.D. in political science from Indiana University. Formerly the chair of the Political Science Department at James Madison University, he is now the director of the Center for Liberal and Applied Social Sciences. He is the author of *American Foreign Policy: Past, Present, Future*, 6th edition (2005) and has recently authored two articles on intelligence policy, “Public Intelligence: Leaks as Policy Instruments—The Case of the Iraq War,” *Intelligence and National Security* (2005), and “Estimating Intentions in an Age of Terrorism,” *Defense Intelligence Journal* (2005). Along with Kay Knickrehm, he is co-author of *International Politics in a Changing World* (2003). With Tony Eksterowicz, he is co-editor of *White House Studies*. He contributed a chapter, “Sputnik and Technological Surprise,” to Roger Launius et al., *Reconsidering Sputnik* (2000).

Henry R. Hertzfeld is a research professor of Space Policy and International Affairs at the Space Policy Institute, Center for International Science and Technology Policy, Elliott School of International Affairs, George Washington University. He is an expert in the economic, legal, and policy issues of space and advanced technological development and teaches a course in space law as well as one in microeconomics. Dr. Hertzfeld has served as a senior economist and policy analyst at NASA and the National Science Foundation. He has been a consultant to both U.S. and international agencies and organizations, including the Organization for Economic Cooperation and Development, NASA, the Aerospace Corporation, and private companies. He was the co-editor of *Space Economics* (AIAA, 1992) and co-author of *A Study Guide to Managerial Economics* (2005) as well as many articles on the economic and legal issues concerning space and advanced technology. Dr. Hertzfeld has a B.A. from the University of Pennsylvania, an M.A. from Washington University, and a Ph.D. in economics from Temple University. He holds a J.D. degree from the George Washington University and is a member of the bars in Pennsylvania and the District of Columbia.

Stephen B. Johnson is an associate research professor with the Institute for Science and Space Studies at the University of Colorado at Colorado Springs; he is also a health management systems engineer for the Advanced Sensors and System Health Management Branch, NASA Marshall Space Flight Center. He was a faculty member in the University of North Dakota’s Department of Space Studies from 1997 to 2005, teaching military space, space history, and management and economics of space endeavors. He is the author of *The United States Air Force and the Culture of Innovation, 1945–1965* and *The Secret of Apollo: Systems Management in American and*

European Space Programs, both published in 2002. He was also the editor of *Quest: The History of Spaceflight Quarterly* from 1998 to 2005 and is currently the general editor for a two-volume encyclopedia of space history to be published in 2007 by ABC-CLIO, *Space Exploration and Humanity: A Historical Encyclopedia*. His current research involves dependable space system design and operations, space industry management and economics, the history of space science and technology, and the history of cognitive psychology and artificial intelligence. He received his bachelor degree in physics from Whitman College in 1981 and his doctorate in 1997 in the history of science and technology from the University of Minnesota, where he was also the associate director of the Babbage Institute for the History of Computing. Prior to 1997, he worked for Northrop and Martin Marietta and was co-owner of his own small business managing computer simulation laboratories, designing space probes, and developing engineering processes.

De Witt Douglas Kilgore is associate professor of English and American Studies at Indiana University. He is the author of *Astrofuturism: Science, Race and Visions of Utopia in Space* (2003). In 2001, he received the Science Fiction Research Association's Pioneer Award for Excellence in Scholarship. Within the field of twentieth-century American literature and culture, he is particularly concerned with exploring the political (utopian) hopes expressed by our society through its projects in science and technology. He is interested in race as both a social and an analytic category. His first book, *Astrofuturism*, is an incisive engagement with the science writing and science fiction produced by the modern spaceflight movement. As a history, it takes seriously the (sometimes progressive) hopes of those scientists and engineers who wrote the Space Age into being as a great cultural project. As a critique, it turns a cold eye on those narratives of disciplined futurism. Kilgore's current work engages the fiction and science writing that has emerged from SETI (Search for ExtraTerrestrial Intelligence).

John Krige is the Kranzberg Professor in the School of History, Technology and Society at the Georgia Institute of Technology in Atlanta. Krige is a long-time member of the History of Science Society (HSS) and the Society for the History of Technology (SHOT) and has published in the Societies' journals, *Isis* and *Technology and Culture*. He is also the editor of the journal *History and Technology*, published by Routledge (UK). Krige's main focus of research is the relationship between foreign policy and science and technology. He played a major role in two international projects that resulted in a three-volume history of CERN (the European Laboratory for Particle Physics) and a two-volume history of ESA (the European Space Agency). Since moving to the United States in the summer of 2000, he has placed increasing emphasis on U.S.–European relationships in science and technology. He is co-editor (with Kai-Henrik Barth of Georgetown University, Washington, DC) of *Global Power Knowledge. Science and Technology in International Affairs*, *Osiris* 21 (2006), and his most recent book is *American Hegemony and the Postwar Reconstruction*

of *Science in Europe* (2006). During academic year 2004–2005, Krige was the Charles A. Lindbergh Professor in Aerospace History at the Smithsonian National Air and Space Museum, Washington, DC. He took this opportunity to initiate research on his next project, which will deal with the role of space technology as an instrument of U.S.–European relations in the 1960s and early 1970s. His preliminary findings were presented as “Technology, Foreign Policy, and International Cooperation in Space,” in *Critical Issues in the History of Spaceflight*, ed. Steven J. Dick and Roger D. Launius (2006). This project was at the core of Krige’s successful application for a fellowship at the Davis Center, Department of History, Princeton University. Krige was awarded the biennial Dickinson Medal by the (UK) Newcomen Society for the Study of the History of Engineering and Technology in London in May, 2005.

W. Henry “Harry” Lambright is a professor of public administration and political science, and director of the Science and Technology Policy Program at the Maxwell School of Citizenship and Public Affairs at Syracuse University. He teaches courses at the Maxwell School on the intersections of technology, politics, energy, environment, and resources policy. He is a fellow of the American Association for the Advancement of Science. Dr. Lambright has served as a guest scholar at the Brookings Institution, director of the Science and Technology Policy Center of the Syracuse Research Corporation, and director of the Center for Environmental Policy and Administration at the Maxwell School of Syracuse University. He has served as an adjunct professor in the Graduate Program of Environmental Science and Forestry at the State University of New York. He has testified before Congress and consulted for various governmental and private-sector organizations, including the Columbia Accident Investigation Board. He has performed research under support from NASA, the National Science Foundation (NSF), the State Department, the Department of Energy (DOE), the Environmental Protection Agency (EPA), the Department of Defense (DOD), IBM, and other sponsors. A longtime student of large-scale technical projects, and particularly space policy, Dr. Lambright worked for NASA early in his career as a special assistant in its Office of University Affairs. He has been a member of the NASA History Advisory Committee and has written extensively on NASA over many years. He is author of *Powering Apollo: James E. Webb of NASA* (1995) and editor of *Space Policy in the 21st Century* (2003). He has written or edited 5 other books and more than 275 articles, reports, and papers. His doctorate is from Columbia University, where he also received his master’s degree. Dr. Lambright received his undergraduate degree from Johns Hopkins University.

Roger D. Launius is a member of the Division of Space History at the Smithsonian Institution’s National Air and Space Museum in Washington, DC. Between 1990 and 2002, he served as Chief Historian of NASA. A graduate of Graceland College in Lamoni, Iowa, he received his Ph.D. from Louisiana State University, Baton Rouge, in 1982. He has written or edited more than 20 books on aerospace history,

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John M. Logsdon is the director of the Space Policy Institute at George Washington University's Elliott School of International Affairs, where he is also professor of international affairs. He holds a B.S. in physics from Xavier University (1960) and a Ph.D. in political science from New York University (1970). Dr. Logsdon's research interests focus on the policy and historical aspects of U.S. and international space activities. Dr. Logsdon is the author of *The Decision to Go to the Moon: Project Apollo and the National Interest* (1970) and is the general editor of the eight-volume NASA History series *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program* (1995–). He has written numerous articles and reports on space policy and history. He is frequently consulted by the electronic and print media for his views on space issues. In 2003, Dr. Logsdon served as a member of the Columbia Accident Investigation Board. He is a member of the NASA Advisory Council and of the Commercial Space Transportation Advisory Committee of the Department of Transportation. He is a recipient of the NASA Public Service and Distinguished Public Service Medals, the 2005 John F. Kennedy Award from the American Astronautical Society (AAS), and the 2006 Barry Goldwater Space Educator Award from the American Institute of Aeronautics and Astronautics (AIAA). He is a fellow of the American Institute of Aeronautics and Astronautics and of the American Association for the Advancement of Science (AAAS), and he is a member of the International Academy of Astronautics.

M. G. Lord is a cultural historian and investigative journalist. She is the author of *Astro Turf: The Private Life of Rocket Science* (2005) and *Forever Barbie: The Unauthorized Biography of a Real Doll* (1994, 2004). Since 1995 she has been a frequent contributor to *The New York Times Book Review* and *The New York Times Arts & Leisure Section*. Her work has appeared in numerous publications, including *The Wall Street Journal*, *The Los Angeles Times Book Review*, *The New Yorker*, *ArtForum*, and *Vogue*. For 14 years she was a syndicated political cartoonist based at *Newsday*. She currently lives in Los Angeles, where she teaches a nonfiction workshop in the Master of Professional Writing Program at the University of Southern California.

Howard E. McCurdy is a professor of public affairs at American University in Washington, DC. Author or co-author of six books on the U.S. space program, he is best known for *Space and the American Imagination* (1997). He authored *Faster, Better, Cheaper* (2001), a critical analysis of cost-cutting initiatives in the U.S. space program, and an earlier study of NASA's organizational culture, *Inside NASA*, won the 1994 Henry Adams Prize for that year's best history on the federal government. He is often consulted by the media on public policy issues and has appeared on national news outlets such as *NewsHour with Jim Lehrer*, National Public Radio, and *NBC Nightly News*. Professor McCurdy received his bachelor's and master's degrees from the University of Washington and his doctorate from Cornell University.

Kim McQuaid is a professor of history at Lake Erie College in Painesville, Ohio. He received his undergraduate degree in history at Antioch College and his master's degree and Ph.D. in U.S. history at Northwestern University. He was a Woodrow Wilson Fellow in 1970 and has held several Fulbright overseas teaching positions: first as Mary Bell Washington Visiting Professor of U.S. History at the University College Dublin in 1985–1986, and later as a visiting lecturer in U.S. history at the University of Science in Penang, Malaysia's second-oldest national university campus, in 1995–1996. McQuaid's books are *Creating the Welfare State* (co-authored with Edward Berkowitz); *Big Business and Presidential Power* (1982); *The Anxious Years: America in the Vietnam-Watergate Era* (1989); and *Uneasy Partners: Big Business in American Politics, 1945–1990* (1993); and *A Response to Industrialism: Liberal Businessmen and the Evolving Spectrum of Capitalist Reform, 1886–1960* (2003). He is a contributor to academic and nonacademic journals. His most recently published academic piece is "Selling the Space Age: NASA and Earth's Environment, 1958–1990," which appeared in *Environment and History*, a journal published in the United Kingdom. He is a member of three space advocacy groups and as many environmental groups. He is also a regular visitor to the high Arctic of Canada and, most recently, Norway; most of these trips have been wilderness travel. He began to try and grow old gracefully on a Russian scientific survey vessel with an ice-hardened hull. He is currently at work on a social history of the Space Age. A native of rural Maine, he has worked as an antiquarian bookseller and a psychiatric social worker in addition to being an academic.

Wendell Mendell is a planetary scientist serving as the manager of the Office for Human Exploration Science of the NASA Johnson Space Center, where he has been employed since 1963. He is married and has four children. Dr. Mendell has a B.S. in physics from the California Institute of Technology, an M.S. in physics from the University of California, Los Angeles (UCLA), and an M.S. in space science and a Ph.D. in space physics and astronomy from Rice University. His scientific research focus is remote sensing of planetary surfaces, particularly specializing in thermal emission radiometry and spectroscopy of the Moon. Since 1982, he has worked at NASA on planning and advocacy of human exploration of the solar system, especially on the establishment of a permanent human base on the Moon.

His interests in this regard lie as much with policy issues as with technical solutions. He is most well known as the editor of the volume *Lunar Bases and Space Activities of the 21st Century*, and he received the 1988 Space Pioneer Award for Science and Engineering from the National Space Society for this work. Currently, Dr. Mendell splits his time between communicating the principles of the human exploration of the solar system to both lay and technical audiences and working on lunar research. He is a member of the College of Teachers of the International Space University (ISU). At the ISU, he has led “Design Projects for an International Lunar Base” (1988); “International Mars Mission” (1991); “International Lunar Farside Observatory and Science Station” (1993); “Vision 20/20” (1995), a sampling of the future as seen by young space professionals; and “Space Tourism: From Dream to Reality” (2000). He belongs to several professional scientific and engineering societies. He is most active in the International Academy of Astronautics, where he has served as secretary of the Cosmic Study on International Human Exploration of Mars and is currently serving on Academic Commission III; and in the AIAA, where he has chaired the Space Science and Astronomy Technical Committee and sits on the International Activities Committee. He served on (and chaired) the Executive Committee of the Aerospace Division of the American Society of Civil Engineers. He has served as editor for nine technical volumes and has published more than 40 articles in professional journals and conference proceedings. He is also the author of numerous abstracts and short papers presented at technical conferences.

Ron Miller is the author/illustrator of some 40 books, most of them dealing with space exploration, astronomy, and other sciences. These include the award-winning Worlds Beyond series of astronomy books for young adults and *The Art of Chesley Bonestell* (2000), a biography of the grand master of astronomical art. He has also collaborated on five books with noted astronomer William K. Hartmann. These include *The Grand Tour*, *Cycles of Fire*, *In the Stream of Stars*, and *The History of Earth* (all published by Workman Publishing Co.). Considered an authority on Jules Verne, Miller has translated and illustrated new, definitive editions of Verne’s *20,000 Leagues Under the Sea* and *Journey to the Center of the Earth*. A book published in July, 1993, *The Dream Machines* (a comprehensive, quarter-million-word, 744-page history of manned spacecraft) was nominated for the prestigious IAF Manuscript Award and won the Booklist Editor’s Choice Award for 1994. He designed a set of 10 commemorative space exploration stamps for the U.S. Postal Service, one of which is on-board the New Horizons spacecraft bound for Pluto. A current project is the reprinting of classic and little-known space travel novels from the past 200 years.

Valerie Neal has been a space history curator at the Smithsonian National Air and Space Museum since 1989, where she engages in scholarly research, exhibit development, artifact collection, and public service. She has edited two books on space exploration and curated two major exhibitions on the space race and the challenges of future

exploration. Most recently, she led the effort to restore the Space Shuttle *Enterprise* for permanent display and to acquire *SpaceShipOne* for the national collection. Her recent articles on Shuttle history have appeared in *History and Technology* and *Space Policy*. Her current projects are a book and exhibition on the Space Shuttle era. Before joining the Smithsonian, Neal spent a decade as a writer, editor, and manager for some 50 NASA publications on Shuttle and Spacelab missions, the Great Observatories, the space sciences, and NASA history. She also participated in astronaut training activities and worked on the mission management team for four Shuttle missions. Neal earned graduate degrees in american studies from the University of Southern California (M.A.) and the University of Minnesota (Ph.D.). She has taught at the University of Minnesota, the University of Alabama in Huntsville, and Vanderbilt University.

Jennifer Ross-Nazzal currently serves as the historian for the NASA Johnson Space Center (JSC) in Houston, Texas and is a member of the editorial board for *Quest: The History of Spaceflight Quarterly*. Ross-Nazzal began working for JSC in the summer of 2000 when she received an internship with the Johnson Space Center Oral History Project. In her position as historian, she has conducted more than 86 interviews for the Johnson Space Center Oral History Project and the NASA Headquarters History Office. From 2002 to 2004, she served as the oral history editor for *Quest*. Ross-Nazzal also participated in the *Columbia* Recovery Oral History project and later took the lead in a series of interviews to explore NASA's role in the development of microelectromechanical systems. In addition to her work for the JSC History Office, she works as an adjunct instructor for the University of Maryland University College, where she teaches U.S. and women's history. Ross-Nazzal received her M.A. in history from New Mexico State University in 1996 and her Ph.D. in history from Washington State University in May, 2004. Her dissertation, which was nominated for the David H. Stratton Award for the department's best dissertation, the Lerner-Scott Dissertation Prize, and the Phi Alpha Theta/Westerners International Dissertation Prize, focused on the life and times of suffragist Emma Smith DeVoe. Ross-Nazzal is currently revising her dissertation for publication. Two articles spun off from her dissertation have been published by the *Pacific Northwest Quarterly* and *South Dakota History*. Among her many honors and awards, she received a practicum grant from the Woodrow Wilson National Fellowship Foundation, and she is a former graduate fellow at the Thomas S. Foley Institute for Public Policy and Public Service. Most recently, she received the HRA New Professional Award from the National Council on Public History.

Philip Scranton is University Board of Governors Professor, History of Industry and Technology, at Rutgers University, where he directs the M.A. history program (Camden) and assisted in developing a Ph.D. field in the History of Technology, Environment and Health (New Brunswick). He served the Georgia Institute of Technology as Kranzberg Professor of the History of Technology and Science from

1997 to 1999. Professor Scranton also directs the Hagley Museum and Library's research arm, the Center for the History of Business, Technology and Society, with responsibility for a seminar series, twice-yearly conferences, short-term fellowships, and consultation on collections, programs, and planning. During 2003–2004, he held the Lindbergh Chair in Aeronautic and Aerospace History at the Smithsonian's National Air and Space Museum. His publications include 5 books and 35 scholarly articles; multiple contributions to museum catalogs; and numerous reviews of books, conferences, and exhibits. Since 1985 he has presented research papers at 38 international conferences in Europe, Canada, and Japan. Most recently, Princeton University Press released his *Endless Novelty: Specialty Production and American Industrialization, 1865–1925* (1997, paperback 2000, Japanese translation, 2004). Earlier monographs include *Proprietary Capitalism* (1983) and *Figured Tapestry* (1989), which received the SHEAR and Taft prizes, respectively. At present, Scranton is editor or co-editor of two book series: Studies in Industry and Society (Johns Hopkins University Press) and Hagley Perspectives on Business and Society (formerly Routledge, presently Macmillan, with Roger Horowitz). He has edited or co-edited three volumes in the Hagley Series. In addition, Scranton served the Business History Conference as president (2002–2003) and its journal, *Enterprise and Society* (Oxford University Press), for four years as its initial associate editor for reviews. He is a member of the editorial boards of *Technology and Culture*, *Business History Review*, and *Pennsylvania History*. Born in 1946 in western Pennsylvania, Scranton received undergraduate and graduate degrees in history from the University of Pennsylvania (Ph.D., 1975). He taught at the Philadelphia College of Textiles and Science (1974–1984) before joining the faculty at Rutgers–Camden (1984–1997), moving to Georgia Tech, then returning to Rutgers in fall, 1999. His current research project examines the course of specialty manufacturing in the United States during the Cold War, with a focus on jet propulsion and NASA space capsules.

Asif A. Siddiqi is an assistant professor of history at Fordham University in New York. He specializes in the social and cultural history of technology and modern Russian history. His forthcoming book, *The Rockets' Red Glare: Spaceflight and the Russian Imagination, 1857–1957*, will be published in 2008. He is also working on a project on technology, authenticity, and the evolution of rock'n'roll.

Rick W. Sturdevant is the deputy director of history at Headquarters Air Force Space Command, Peterson Air Force Base, in Colorado Springs, Colorado. He holds B.A. (1969) and M.A. (1973) degrees in history from the University of Northern Iowa and a Ph.D. (1982) from the University of California, Santa Barbara. Dr. Sturdevant joined the United States Air Force history program in April, 1984 as the chief historian for Air Force Communication Command's Airlift Communications Division at Scott Air Force Base, Illinois. In April, 1985 he moved to Peterson Air Force Base, Colorado to become the chief historian for Space Communications

Division. He held that position until the division was inactivated in 1991, at which time he moved to the Air Force Space Command History Office. Dr. Sturdevant has published extensively on the subject of military aerospace history in such periodicals as *Space Times*, *Journal of the British Interplanetary Society*, *Air & Space/Smithsonian*, *Quest: The History of Spaceflight Quarterly*, *Air Power History*, *Air Force Magazine*, *High Frontier: The Journal for Space & Missile Professionals*, and *Journal of the West*. He has authored or co-authored chapters or essays in *Beyond the Ionosphere: Fifty Years of Satellite Communication* (1997); *Organizing for the Use of Space: Historical Perspectives on a Persistent Issue* (1995); *Golden Legacy, Boundless Future: Essays on the United States Air Force and the Rise of Aerospace Power* (2000); *Air Warfare: An International Encyclopedia* (2002); *To Reach the High Frontier: A History of U.S. Launch Vehicles* (2002); *The Limitless Sky: Air Force Science and Technology Contributions to the Nation* (2004); and *Encyclopedia of 20th-Century Technology* (2005). A frequent lecturer on space history topics, he has taught Elderhostel and Pillar courses under the sponsorship of Pikes Peak Community College in Colorado Springs and was a guest speaker at the 2005 High Plains Chautauqua in Greeley, Colorado. Dr. Sturdevant is an active member of the American Institute of Aeronautics and Astronautics (AIAA), British Interplanetary Society (BIS), Air Force Space Operations Association (AFSOA), Society for the History of Technology (SHOT), and American Astronautical Society (AAS). Serving on the AAS History Committee, he has participated for nearly a decade in selecting the annual recipient of the Eugene M. Emme Astronautical Literature Award. He is a recipient of the Air Force Exemplary Civilian Service Award and the AAS President's Recognition Award.

James A. Vedda joined The Aerospace Corporation in March 2004 to perform research and analysis on national security, civil, and commercial space issues. Previously, he spent six and a half years at ANSER Inc. in Arlington, Virginia, assigned full-time to the Office of the Secretary of Defense. This included two years with the assistant secretary for Homeland Defense and four and a half years in the Space Policy Directorate. While at ANSER, Dr. Vedda received the company's highest employee award, the Alan S. Boyd Award for Professional Development, in 2002; an annual Trustee's Award and a quarterly Team Excellence Award in 2003; and several awards for publications throughout his tenure. Jim received his Ph.D. in political science from the University of Florida. His dissertation analyzed the evolution of post-Apollo space policy making in the executive and legislative branches. He also has an M.A. in science, technology, and public policy from George Washington University in Washington, DC and a B.S. in business administration from John Carroll University in Cleveland, Ohio. He has been a member of the American Astronautical Society since 1997, serving as its vice president for public policy from July 2002 to November 2004, and as a member of its board of directors since then. From 1987 to 1993, Jim was a professor in the Department of Space Studies at the University of North Dakota, where he taught courses on civil, commercial, and

military space policy to undergraduate and graduate students. He was one of the founding members of the faculty, helping to create the curriculum for the M.S. in Space Studies degree. He was associate director of North Dakota's participation in the NASA Space Grant program, served for a period as department chairman, and pioneered the department's use of multimedia teaching techniques. Jim's writing has appeared in publications such as *Space Policy*, *Space News*, *Space Times*, *Ad Astra*, *Space Energy and Transportation*, and *Space Business News*. He has presented conference papers and commentary for the International Astronautical Federation, the Midwest Political Science Association, the Public Members Association of the Foreign Service, and CNN.

Peter J. Westwick is visiting researcher in history, University of California, Santa Barbara. He was previously an Olin Fellow in international security studies at Yale University and, from 2000 to 2004, senior research fellow in humanities at the California Institute of Technology. He is the author of *The National Labs: Science in an American System, 1947–1974* (2003), which won the 2004 Book Prize of the Forum for the History of Science in America (for best first book), and *Into the Black: JPL and the American Space Program, 1976–2004* (2006). He is currently working on a history of the Strategic Defense Initiative. He received his B.A. in physics and Ph.D. in history from the University of California, Berkeley. He is a moderator of the working group on science and technology at the Institute on California and the West, University of Southern California (USC)/Huntington Library, where he is helping to start an initiative to document the history of the aerospace industry in southern California.

David J. Whalen is vice president, satellite systems consulting at IOT Systems LLC. He has been an engineer and engineering manager in the communications satellite industry for more than 30 years. He has also worked on weather satellites (INSAT, GOES-NEXT), Earth observing satellites (Landsat), and science satellites (GRO, Hubble). He is an associate fellow of the American Institute of Aeronautics and Astronautics (AIAA). He has been a member of the AIAA History Technical Committee and is currently a member of the AIAA Communications Systems Technical Committee. Over the last 20 years he has written about space history and space policy in addition to his engineering work. He holds a B.A. in astronomy from Boston University, an M.S. in astronomy from the University of Massachusetts, an M.B.A. from the College of William and Mary, and a Ph.D. in science, technology, and public policy from George Washington University. He has taught university and industrial courses in orbit determination and maneuver planning, satellite communications, space policy, and the history of technology. His book, *Origins of Satellite Communications 1945-1965*, was published by the Smithsonian Institution Press in 2002. He is currently at work on a book about COMSAT Corporation. He

has made many presentations at AIAA, PTC, CASBAA, AHA, SHFG, and NASA conferences. He has published articles and book reviews on space history, space policy, and space technology in a variety of publications, including *IEEE Technology and Society* and *Technology and Culture*.

Ray A. Williamson is research professor of space policy and international affairs in the Space Policy Institute, focusing on the applications of geospatial information for the management of natural and cultural resources. He is principal investigator for a NASA/NOAA-funded study of the socioeconomic benefits of earth science. He was also co-investigator of *Bridging the Gap: European C4ISR Capabilities and Transatlantic Interoperability* (2004), and principal investigator of a two-year study of dual-purpose space technologies (satellite communications; remote sensing; and position, navigation, and timing) for a private foundation. He serves on the National Academy of Sciences Committee on Space-based Global Precipitation Measurements and the Independent Committee to Assess the National Space Weather Program. Dr. Williamson is also a member of the NOAA Advisory Committee on Commercial Remote Sensing (ACCRES). From 1979 to 1995, he was a senior associate and project director in the Office of Technology Assessment (OTA) of the U.S. Congress. While at OTA, Dr. Williamson was project director for space policy reports that focused on satellite remote sensing. Dr. Williamson is an external faculty member of the International Space University (ISU), Illkirch, France, teaching general space policy and remote sensing for the ISU Masters of Space Studies and summer session programs. He has lectured on remote sensing policies and markets and the applications of geospatial technologies in regional, national, and international forums. Dr. Williamson received his B.A. in physics from the Johns Hopkins University and his Ph.D. in astronomy from the University of Maryland, and spent two years on the faculty of the University of Hawaii studying diffuse emission nebulae. He taught philosophy, literature, mathematics, physics, and astronomy at St. John's College, Annapolis for 10 years, the last 5 of which he also served as assistant dean of the college. Dr. Williamson is editor of *Imaging Notes* and a contributing editor to the journal *Space Policy*. From 1998–2001 he was a member of the Aeronautics and Space Engineering Board of the National Academy of Engineering. He is also a member of the International Academy of Astronautics. His published books include *Bridging the Gap: European C4ISR Capabilities and Transatlantic Interoperability*, ed. with Gordon Adams, Guy Ben-Ari, and John M. Logsdon (2004) and *Commercial Observation Satellites: At the Leading Edge of Global Transparency*, ed. with John C. Baker and Kevin O'Connell (2001).

THE NASA HISTORY SERIES

REFERENCE WORKS, NASA SP-4000:

- Grimwood, James M. *Project Mercury: A Chronology*. NASA SP-4001, 1963.
- Grimwood, James M., and C. Barton Hacker, with Peter J. Vorzimmer. *Project Gemini Technology and Operations: A Chronology*. NASA SP-4002, 1969.
- Link, Mae Mills. *Space Medicine in Project Mercury*. NASA SP-4003, 1965.
- Astronautics and Aeronautics, 1963: Chronology of Science, Technology, and Policy*. NASA SP-4004, 1964.
- Astronautics and Aeronautics, 1964: Chronology of Science, Technology, and Policy*. NASA SP-4005, 1965.
- Astronautics and Aeronautics, 1965: Chronology of Science, Technology, and Policy*. NASA SP-4006, 1966.
- Astronautics and Aeronautics, 1966: Chronology of Science, Technology, and Policy*. NASA SP-4007, 1967.
- Astronautics and Aeronautics, 1967: Chronology of Science, Technology, and Policy*. NASA SP-4008, 1968.
- Ertel, Ivan D., and Mary Louise Morse. *The Apollo Spacecraft: A Chronology, Volume I, Through November 7, 1962*. NASA SP-4009, 1969.
- Morse, Mary Louise, and Jean Kernahan Bays. *The Apollo Spacecraft: A Chronology, Volume II, November 8, 1962–September 30, 1964*. NASA SP-4009, 1973.
- Brooks, Courtney G., and Ivan D. Ertel. *The Apollo Spacecraft: A Chronology, Volume III, October 1, 1964–January 20, 1966*. NASA SP-4009, 1973.
- Ertel, Ivan D., and Roland W. Newkirk, with Courtney G. Brooks. *The Apollo Spacecraft: A Chronology, Volume IV, January 21, 1966–July 13, 1974*. NASA SP-4009, 1978.
- Astronautics and Aeronautics, 1968: Chronology of Science, Technology, and Policy*. NASA SP-4010, 1969.
- Newkirk, Roland W., and Ivan D. Ertel, with Courtney G. Brooks. *Skylab: A Chronology*. NASA SP-4011, 1977.
- Van Nimmen, Jane, and Leonard C. Bruno, with Robert L. Rosholt. *NASA Historical Data Book, Volume I: NASA Resources, 1958–1968*. NASA SP-4012, 1976, rep. ed. 1988.

Ezell, Linda Neuman. *NASA Historical Data Book, Volume II: Programs and Projects, 1958–1968*. NASA SP-4012, 1988.

Ezell, Linda Neuman. *NASA Historical Data Book, Volume III: Programs and Projects, 1969–1978*. NASA SP-4012, 1988.

Gawdiak, Ihor Y., with Helen Fedor, compilers. *NASA Historical Data Book, Volume IV: NASA Resources, 1969–1978*. NASA SP-4012, 1994.

Rumerman, Judy A., compiler. *NASA Historical Data Book, 1979–1988: Volume V, NASA Launch Systems, Space Transportation, Human Spaceflight, and Space Science*. NASA SP-4012, 1999.

Rumerman, Judy A., compiler. *NASA Historical Data Book, Volume VI: NASA Space Applications, Aeronautics and Space Research and Technology, Tracking and Data Acquisition/Space Operations, Commercial Programs, and Resources, 1979–1988*. NASA SP-2000-4012, 2000.

Astronautics and Aeronautics, 1969: Chronology of Science, Technology, and Policy. NASA SP-4014, 1970.

Astronautics and Aeronautics, 1970: Chronology of Science, Technology, and Policy. NASA SP-4015, 1972.

Astronautics and Aeronautics, 1971: Chronology of Science, Technology, and Policy. NASA SP-4016, 1972.

Astronautics and Aeronautics, 1972: Chronology of Science, Technology, and Policy. NASA SP-4017, 1974.

Astronautics and Aeronautics, 1973: Chronology of Science, Technology, and Policy. NASA SP-4018, 1975.

Astronautics and Aeronautics, 1974: Chronology of Science, Technology, and Policy. NASA SP-4019, 1977.

Astronautics and Aeronautics, 1975: Chronology of Science, Technology, and Policy. NASA SP-4020, 1979.

Astronautics and Aeronautics, 1976: Chronology of Science, Technology, and Policy. NASA SP-4021, 1984.

Astronautics and Aeronautics, 1977: Chronology of Science, Technology, and Policy. NASA SP-4022, 1986.

Astronautics and Aeronautics, 1978: Chronology of Science, Technology, and Policy. NASA SP-4023, 1986.

Astronautics and Aeronautics, 1979–1984: Chronology of Science, Technology, and Policy. NASA SP-4024, 1988.

Astronautics and Aeronautics, 1985: Chronology of Science, Technology, and Policy. NASA SP-4025, 1990.

Noordung, Hermann. *The Problem of Space Travel: The Rocket Motor.* Edited by Ernst Stuhlinger and J. D. Hunley, with Jennifer Garland. NASA SP-4026, 1995.

Astronautics and Aeronautics, 1986–1990: A Chronology. NASA SP-4027, 1997.

Astronautics and Aeronautics, 1990–1995: A Chronology. NASA SP-2000-4028, 2000.

MANAGEMENT HISTORIES, NASA SP-4100:

Rosholt, Robert L. *An Administrative History of NASA, 1958–1963.* NASA SP-4101, 1966.

Levine, Arnold S. *Managing NASA in the Apollo Era.* NASA SP-4102, 1982.

Roland, Alex. *Model Research: The National Advisory Committee for Aeronautics, 1915–1958.* NASA SP-4103, 1985.

Fries, Sylvia D. *NASA Engineers and the Age of Apollo.* NASA SP-4104, 1992.

Glennan, T. Keith. *The Birth of NASA: The Diary of T. Keith Glennan.* J. D. Hunley, editor. NASA SP-4105, 1993.

Seamans, Robert C., Jr. *Aiming at Targets: The Autobiography of Robert C. Seamans, Jr.* NASA SP-4106, 1996.

Garber, Stephen J., editor. *Looking Backward, Looking Forward: Forty Years of U.S. Human Spaceflight Symposium.* NASA SP-2002-4107, 2002.

Mallick, Donald L. with Peter W. Merlin. *The Smell of Kerosene: A Test Pilot's Odyssey.* NASA SP-4108, 2003.

Iliff, Kenneth W. and Curtis L. Peebles. *From Runway to Orbit: Reflections of a NASA Engineer.* NASA SP-2004-4109, 2004.

Chertok, Boris. *Rockets and People, Volume 1.* NASA SP-2005-4110, 2005.

Laufer, Alexander, Todd Post, and Edward Hoffman. *Shared Voyage: Learning and Unlearning from Remarkable Projects.* NASA SP-2005-4111, 2005.

Dawson, Virginia P. and Mark D. Bowles. *Realizing the Dream of Flight: Biographical Essays in Honor of the Centennial of Flight, 1903-2003.* NASA SP-2005-4112, 2005.

Mudgway, Douglas J. *William H. Pickering: America's Deep Space Pioneer,* NASA SP-2007-4113, 2007.

PROJECT HISTORIES, NASA SP-4200:

Swenson, Loyd S., Jr., James M. Grimwood, and Charles C. Alexander. *This New Ocean: A History of Project Mercury*. NASA SP-4201, 1966; rep. ed. 1998.

Green, Constance McLaughlin, and Milton Lomask. *Vanguard: A History*. NASA SP-4202, 1970; rep. ed. Smithsonian Institution Press, 1971.

Hacker, Barton C., and James M. Grimwood. *On the Shoulders of Titans: A History of Project Gemini*. NASA SP-4203, 1977.

Benson, Charles D., and William Barnaby Faherty. *Moonport: A History of Apollo Launch Facilities and Operations*. NASA SP-4204, 1978.

Brooks, Courtney G., James M. Grimwood, and Loyd S. Swenson, Jr. *Chariots for Apollo: A History of Manned Lunar Spacecraft*. NASA SP-4205, 1979.

Bilstein, Roger E. *Stages to Saturn: A Technological History of the Apollo/Saturn Launch Vehicles*. NASA SP-4206, 1980, rep. ed. 1997.

SP-4207 not published.

Compton, W. David, and Charles D. Benson. *Living and Working in Space: A History of Skylab*. NASA SP-4208, 1983.

Ezell, Edward Clinton, and Linda Neuman Ezell. *The Partnership: A History of the Apollo-Soyuz Test Project*. NASA SP-4209, 1978.

Hall, R. Cargill. *Lunar Impact: A History of Project Ranger*. NASA SP-4210, 1977.

Newell, Homer E. *Beyond the Atmosphere: Early Years of Space Science*. NASA SP-4211, 1980.

Ezell, Edward Clinton, and Linda Neuman Ezell. *On Mars: Exploration of the Red Planet, 1958-1978*. NASA SP-4212, 1984.

Pitts, John A. *The Human Factor: Biomedicine in the Manned Space Program to 1980*. NASA SP-4213, 1985.

Compton, W. David. *Where No Man Has Gone Before: A History of Apollo Lunar Exploration Missions*. NASA SP-4214, 1989.

Naugle, John E. *First Among Equals: The Selection of NASA Space Science Experiments*. NASA SP-4215, 1991.

Wallace, Lane E. *Airborne Trailblazer: Two Decades with NASA Langley's Boeing 737 Flying Laboratory*. NASA SP-4216, 1994.

Butrica, Andrew J., editor. *Beyond the Ionosphere: Fifty Years of Satellite Communication*. NASA SP-4217, 1997.

Butrica, Andrew J. *To See the Unseen: A History of Planetary Radar Astronomy*. NASA SP-4218, 1996.

Mack, Pamela E., editor. *From Engineering Science to Big Science: The NACA and NASA Collier Trophy Research Project Winners*. NASA SP-4219, 1998.

Reed, R. Dale, with Darlene Lister. *Wingless Flight: The Lifting Body Story*. NASA SP-4220, 1997.

Heppenheimer, T. A. *The Space Shuttle Decision: NASA's Search for a Reusable Space Vehicle*. NASA SP-4221, 1999.

Hunley, J. D., editor. *Toward Mach 2: The Douglas D-558 Program*. NASA SP-4222, 1999.

Swanson, Glen E., editor. *"Before this Decade Is Out . . .": Personal Reflections on the Apollo Program*. NASA SP-4223, 1999.

Tomayko, James E. *Computers Take Flight: A History of NASA's Pioneering Digital Fly-by-Wire Project*. NASA SP-2000-4224, 2000.

Morgan, Clay. *Shuttle-Mir: The U.S. and Russia Share History's Highest Stage*. NASA SP-2001-4225, 2001.

Leary, William M. *"We Freeze to Please": A History of NASA's Icing Research Tunnel and the Quest for Flight Safety*. NASA SP-2002-4226, 2002.

Mudgway, Douglas J. *Uplink-Downlink: A History of the Deep Space Network 1957-1997*. NASA SP-2001-4227, 2001.

Dawson, Virginia P. and Mark D. Bowles. *Taming Liquid Hydrogen: The Centaur Upper Stage Rocket, 1958-2002*. NASA SP-2004-4230, 2004.

Meltzer, Michael. *Mission to Jupiter: A History of the Galileo Project*. NASA SP-2007-4231.

Heppenheimer, T. A. *Facing the Heat Barrier: A History of Hypersonics*. NASA SP-2007-4232, 2007.

CENTER HISTORIES, NASA SP-4300:

Rosenthal, Alfred. *Venture into Space: Early Years of Goddard Space Flight Center*. NASA SP-4301, 1985.

Hartman, Edwin P. *Adventures in Research: A History of Ames Research Center, 1940-1965*. NASA SP-4302, 1970.

Hallion, Richard P. *On the Frontier: Flight Research at Dryden, 1946-1981*. NASA SP-4303, 1984.

Muenger, Elizabeth A. *Searching the Horizon: A History of Ames Research Center, 1940-1976*. NASA SP-4304, 1985.

Hansen, James R. *Engineer in Charge: A History of the Langley Aeronautical Laboratory, 1917–1958*. NASA SP-4305, 1987.

Dawson, Virginia P. *Engines and Innovation: Lewis Laboratory and American Propulsion Technology*. NASA SP-4306, 1991.

Dethloff, Henry C. “*Suddenly Tomorrow Came . . .*”: *A History of the Johnson Space Center*. NASA SP-4307, 1993.

Hansen, James R. *Spaceflight Revolution: NASA Langley Research Center from Sputnik to Apollo*. NASA SP-4308, 1995.

Wallace, Lane E. *Flights of Discovery: 50 Years at the NASA Dryden Flight Research Center*. NASA SP-4309, 1996.

Herring, Mack R. *Way Station to Space: A History of the John C. Stennis Space Center*. NASA SP-4310, 1997.

Wallace, Harold D., Jr. *Wallops Station and the Creation of the American Space Program*. NASA SP-4311, 1997.

Wallace, Lane E. *Dreams, Hopes, Realities: NASA’s Goddard Space Flight Center, The First Forty Years*. NASA SP-4312, 1999.

Dunar, Andrew J., and Stephen P. Waring. *Power to Explore: A History of the Marshall Space Flight Center*. NASA SP-4313, 1999.

Bugos, Glenn E. *Atmosphere of Freedom: Sixty Years at the NASA Ames Research Center*. NASA SP-2000-4314, 2000.

Schultz, James. *Crafting Flight: Aircraft Pioneers and the Contributions of the Men and Women of NASA Langley Research Center*. NASA SP-2003-4316, 2003.

GENERAL HISTORIES, NASA SP-4400:

Corliss, William R. *NASA Sounding Rockets, 1958–1968: A Historical Summary*. NASA SP-4401, 1971.

Wells, Helen T., Susan H. Whiteley, and Carrie Karegeannes. *Origins of NASA Names*. NASA SP-4402, 1976.

Anderson, Frank W., Jr. *Orders of Magnitude: A History of NACA and NASA, 1915–1980*. NASA SP-4403, 1981.

Sloop, John L. *Liquid Hydrogen as a Propulsion Fuel, 1945–1959*. NASA SP-4404, 1978.

Roland, Alex. *A Spacefaring People: Perspectives on Early Spaceflight*. NASA SP-4405, 1985.

Bilstein, Roger E. *Orders of Magnitude: A History of the NACA and NASA, 1915–1990*. NASA SP-4406, 1989.

Logsdon, John M., editor, with Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I, Organizing for Exploration*. NASA SP-4407, 1995.

Logsdon, John M., editor, with Dwayne A. Day and Roger D. Launius. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II, Relations with Other Organizations*. NASA SP-4407, 1996.

Logsdon, John M., editor, with Roger D. Launius, David H. Onkst, and Stephen J. Garber. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume III, Using Space*. NASA SP-4407, 1998.

Logsdon, John M., general editor, with Ray A. Williamson, Roger D. Launius, Russell J. Acker, Stephen J. Garber, and Jonathan L. Friedman. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume IV, Accessing Space*. NASA SP-4407, 1999.

Logsdon, John M., general editor, with Amy Paige Snyder, Roger D. Launius, Stephen J. Garber, and Regan Anne Newport. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume V, Exploring the Cosmos*. NASA SP-2001-4407, 2001.

Siddiqi, Asif A. *Challenge to Apollo: The Soviet Union and the Space Race, 1945–1974*. NASA SP-2000-4408, 2000.

Hansen, James R., editor. *The Wind and Beyond: Journey into the History of Aerodynamics in America, Volume I, The Ascent of the Airplane*. NASA SP-2003-4409, 2003.

Hogan, Thor. *Mars Wars: The Rise and Fall of the Space Exploration Initiative*. NASA SP-2007-4410, 2007.

Hansen, James R., editor. *The Wind and Beyond: Journey into the History of Aerodynamics in America, Volume II, Reinventing the Airplane*. NASA SP-2007-4409, 2007.

MONOGRAPHS IN AEROSPACE HISTORY, NASA SP-4500:

Launius, Roger D. and Aaron K. Gillette, compilers, *Toward a History of the Space Shuttle: An Annotated Bibliography*. Monograph in Aerospace History, No. 1, 1992.

Launius, Roger D., and J. D. Hunley, compilers, *An Annotated Bibliography of the Apollo Program*. Monograph in Aerospace History, No. 2, 1994.

Launius, Roger D. *Apollo: A Retrospective Analysis*. Monograph in Aerospace History, No. 3, 1994.

- Hansen, James R. *Enchanted Rendezvous: John C. Houbolt and the Genesis of the Lunar-Orbit Rendezvous Concept*. Monograph in Aerospace History, No. 4, 1995.
- Gorn, Michael H. Hugh L. *Dryden's Career in Aviation and Space*. Monograph in Aerospace History, No. 5, 1996.
- Powers, Sheryll Goecke. *Women in Flight Research at NASA Dryden Flight Research Center, from 1946 to 1995*. Monograph in Aerospace History, No. 6, 1997.
- Portree, David S. F. and Robert C. Trevino. *Walking to Olympus: An EVA Chronology*. Monograph in Aerospace History, No. 7, 1997.
- Logsdon, John M., moderator. *Legislative Origins of the National Aeronautics and Space Act of 1958: Proceedings of an Oral History Workshop*. Monograph in Aerospace History, No. 8, 1998.
- Rumerman, Judy A., compiler. *U.S. Human Spaceflight, A Record of Achievement 1961–1998*. Monograph in Aerospace History, No. 9, 1998.
- Portree, David S. F. *NASA's Origins and the Dawn of the Space Age*. Monograph in Aerospace History, No. 10, 1998.
- Logsdon, John M. *Together in Orbit: The Origins of International Cooperation in the Space Station*. Monograph in Aerospace History, No. 11, 1998.
- Phillips, W. Hewitt. *Journey in Aeronautical Research: A Career at NASA Langley Research Center*. Monograph in Aerospace History, No. 12, 1998.
- Braslow, Albert L. *A History of Suction-Type Laminar-Flow Control with Emphasis on Flight Research*. Monograph in Aerospace History, No. 13, 1999.
- Logsdon, John M., moderator. *Managing the Moon Program: Lessons Learned From Apollo*. Monograph in Aerospace History, No. 14, 1999.
- Perminov, V. G. *The Difficult Road to Mars: A Brief History of Mars Exploration in the Soviet Union*. Monograph in Aerospace History, No. 15, 1999.
- Tucker, Tom. *Touchdown: The Development of Propulsion Controlled Aircraft at NASA Dryden*. Monograph in Aerospace History, No. 16, 1999.
- Maisel, Martin D., Demo J. Giulianetti, and Daniel C. Dugan. *The History of the XV-15 Tilt Rotor Research Aircraft: From Concept to Flight*. NASA SP-2000-4517, 2000.
- Jenkins, Dennis R. *Hypersonics Before the Shuttle: A Concise History of the X-15 Research Airplane*. NASA SP-2000-4518, 2000.
- Chambers, Joseph R. *Partners in Freedom: Contributions of the Langley Research Center to U.S. Military Aircraft in the 1990s*. NASA SP-2000-4519, 2000.
- Waltman, Gene L. *Black Magic and Gremlins: Analog Flight Simulations at NASA's Flight Research Center*. NASA SP-2000-4520, 2000.

Portree, David S. F. *Humans to Mars: Fifty Years of Mission Planning, 1950–2000*. NASA SP-2001-4521, 2001.

Thompson, Milton O., with J. D. Hunley. *Flight Research: Problems Encountered and What They Should Teach Us*. NASA SP-2000-4522, 2000.

Tucker, Tom. *The Eclipse Project*. NASA SP-2000-4523, 2000.

Siddiqi, Asif A. *Deep Space Chronicle: A Chronology of Deep Space and Planetary Probes, 1958–2000*. NASA SP-2002-4524, 2002.

Merlin, Peter W. *Mach 3+: NASA/USAFYF-12 Flight Research, 1969–1979*. NASA SP-2001-4525, 2001.

Anderson, Seth B. *Memoirs of an Aeronautical Engineer—Flight Tests at Ames Research Center: 1940–1970*. NASA SP-2002-4526, 2002.

Renstrom, Arthur G. *Wilbur and Orville Wright: A Bibliography Commemorating the One-Hundredth Anniversary of the First Powered Flight on December 17, 1903*. NASA SP-2002-4527, 2002.

No monograph 28.

Chambers, Joseph R. *Concept to Reality: Contributions of the NASA Langley Research Center to U.S. Civil Aircraft of the 1990s*. SP-2003-4529, 2003.

Peebles, Curtis, editor. *The Spoken Word: Recollections of Dryden History, The Early Years*. SP-2003-4530, 2003.

Jenkins, Dennis R., Tony Landis, and Jay Miller. *American X-Vehicles: An Inventory-X-1 to X-50*. SP-2003-4531, 2003.

Renstrom, Arthur G. *Wilbur and Orville Wright: A Chronology Commemorating the One-Hundredth Anniversary of the First Powered Flight on December 17, 1903*. NASA SP-2003-4532, 2002.

Bowles, Mark D. and Robert S. Arrighi. *NASA's Nuclear Frontier: The Plum Brook Research Reactor*. SP-2004-4533, 2003.

Matranga, Gene J. and C. Wayne Ottinger, Calvin R. Jarvis with D. Christian Gelzer. *Unconventional, Contrary, and Ugly: The Lunar Landing Research Vehicle*. NASA SP-2006-4535.

McCurdy, Howard E. *Low Cost Innovation in Spaceflight: The History of the Near Earth Asteroid Rendezvous (NEAR) Mission*. NASA SP-2005-4536, 2005.

Seamans, Robert C. Jr. *Project Apollo: The Tough Decisions*. NASA SP-2005-4537, 2005.

Lambright, W. Henry. *NASA and the Environment: The Case of Ozone Depletion*. NASA SP-2005-4538, 2005.

Chambers, Joseph R. *Innovation in Flight: Research of the NASA Langley Research Center on Revolutionary Advanced Concepts for Aeronautics*. NASA SP-2005-4539, 2005.

Phillips, W. Hewitt. *Journey Into Space Research: Continuation of a Career at NASA Langley Research Center*. NASA SP-2005-4540, 2005.

MONOGRAPH 41:

Rumerman, Judith A., compiler, with Chris Gamble and Gabriel Okolski, U. S. *Human Spaceflight: A Record of Achievement, 1961-2006*. NASA SP-4541, 2007.

ELECTRONIC MEDIA, NASA SP-4600:

Remembering Apollo 11: The 30th Anniversary Data Archive CD-ROM. NASA SP-4601, 1999.

The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17. NASA SP-2000-4602, 2001.

Shuttle-Mir: The United States and Russia Share History's Highest Stage. NASA SP-2001-4603, 2002.

U.S. Centennial of Flight Commission Presents Born of Dreams—Inspired by Freedom. NASA SP-2004-4604, 2004.

Of Ashes and Atoms: A Documentary on the NASA Plum Brook Reactor Facility. NASA SP-2005-4605, 2005.

Taming Liquid Hydrogen: The Centaur Upper Stage Rocket Interactive CD-ROM. NASA SP-2004-4606, 2004.

Fueling Space Exploration: The History of NASA's Rocket Engine Test Facility DVD. NASA SP-2005-4607, 2005.

CONFERENCE PROCEEDINGS, NASA SP-4700:

Dick, Steven J., and Keith L. Cowing, editors. *Risk and Exploration: Earth, Sea and the Stars*. NASA SP-2005-4701, 2005.

Dick, Steven J., and Roger D. Launius, editors. *Critical Issues in the History of Spaceflight*. NASA SP-2006-4702, 2006.

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