Societal Impact of Spaceflight

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CHAPTER 31


Alexander C.T. Geppert

The only interplanetary voyages made by our species to date have been flights of fancy.

A.V. Cleaver
British Interplanetary Society
11 October 1947

HISTORICIZING THE EUROPEAN SPACE EFFORT

“Historians need to explore . . . the cultural meaning of space exploration, and the space programs of other countries” besides those of the United States, American scholar Pamela E. Mack has suggested. Since she made this statement in 1989, i.e., almost 20 years ago, the state of research in Europe has gradually, yet not absolutely, improved. The publication of the official history of the European Space Agency (ESA), on the occasion of its 25th anniversary in 2000, certainly marked a milestone in this process. In much detail and on more than 1,100 pages,

1. A.V. Cleaver, “The Interplanetary Project,” Journal of the British Interplanetary Society 7, no. 1 (January 1948): pp. 21–39, here p. 21. This paper presents the first findings of a comprehensive research project on the cultural history of outer space, astrofuturism and extraterrestrial life in the European imagination of the twentieth century, approximately between the publication of Hermann Oberth’s pioneering Die Rakete zu den Planetenräumen (1923) and the establishment of ESA a half-century later (1975). I would like to express my sincere gratitude to the editors of this volume for their kind invitation to me to discuss parts of my work at such an early stage, and to the Fritz Thyssen Stiftung for generously supporting this Habilitationsprojekt. Heartfelt thanks are also due to Dorothee Dehnicke, Rita Hortmann, Heinz Hermann Koelle, Tessa Mittelstaedt, and Paul Nolte.

this multinational institution’s complex beginnings and the development of its organizational structure were meticulously traced back to the formation of its two precursors, the European Launcher Development Organisation (ELDO) in 1962 and the European Space Research Organisation (ESRO) in 1964, while deliberately leaving aside broader social, cultural, and imaginative issues. What is true for the history of Europe at large, however, is applicable here as well: European history and the history of Europe are not identical, but overlap at best. The in-depth analysis of a single European institution—thoroughly researched and, without the slightest doubt, enormously valuable as it now stands—should not be taken for a social and cultural history of European practices and representations of outer space per se. In other words: Because it lacks a direct equivalent to the NASA History Office and the Space History Division of the Smithsonian National Air and Space Museum—with their concerted activities and unparalleled research programs which effectively created and later shaped the entire field in the United States—in Europe, space history is a much smaller, more fragmentary, and by far less established area of historiographical research.

In direct consequence, much research on the cultural history of the European space effort, its historical significance, and societal impact still remains to be done, especially with regard to the 12 years after Peenemünde and prior to Sputnik—a period which many consider the Golden Age of Space Travel *avant la lettre*. Therefore, the following tentative reflections are limited to presenting and discussing three broader issues and provisional hypotheses. They are intended to ask the right questions rather than to provide possibly premature answers. First, where do historians have to look in order to locate what kind of possible repercussions of spaceflight? Why is it so complex a task to identify and measure any kind of impact spaceflight might have had on culture and society in general? Second, how can Europe’s role and position in this entire scenario be described and assessed? Has a distinctly European version of outer space evolved gradually, especially since 1945? Or were, for instance, the Apollo flights already subject to

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3. John Krige, Arturo Russo, and Lorenza Sebesta, *A History of the European Space Agency*, 2 vols. (Noordwijk, The Netherlands: European Space Agency Publications, 2000). “Little has, in fact, been written on the European space effort,” the authors conceded in their preface, and went on to ask for “more reflective and comparative studies” to contextualize their results and to relate them to other research in the field (vol. 1, p. xvi). Walter A. McDougall, “Space-Age Europe: Gaullism, Euro-Gaullism, and the American Dilemma,” *Technology and Culture* 26, no. 1 (January 1985): pp. 179–203. For a recent fact-oriented summary of European activities in outer space, see Brian Harvey, *Europe’s Space Programme: To Ariane and Beyond* (Chichester, U.K.: Springer-Praxis Publishing, 2003); see also ESA’s own historical series, called History Studies Reports. The most recent of these more than 30 working paper-type publications are to be found at [http://www.esa.int/esapub/pi/lstPI.htm](http://www.esa.int/esapub/pi/lstPI.htm) (accessed 17 January 2007).

such globalized, carefully orchestrated, and extensive media coverage that they subsequently gave rise to the same process of myth-making both in the United States and in Europe? And, third, while the persistence of the so-called American spacefaring vision has, time and again, been attributed to the deeply rooted frontier myth in popular culture and in the public imagination, is the European vision of outer space best characterized by the complete lack of such a key trope and the absence of a commonly shared belief system—or is there any equivalent?

“Berlin, wir haben ein Problem,” (“Berlin, we have a problem”) read one of the most popular slogans in a recent national advertising campaign, entitled “Deutschland braucht Raumfahrt” (“Germany needs spaceflight”). Financed by the German space industry, this campaign lamented the lack of government support and endeavored to raise public awareness of the industry’s pecuniary needs and oft-formulated appeal for increased government funding (figure 31.1). It is more than remarkable that such a tribute to the famous Apollo 13 phrase “Houston, we’ve had a problem”—originally uttered by Commander James Lovell in April 1970 but popularized by Tom Hanks in the Oscar-winning Hollywood blockbuster 25 years later—did not require an explanation, even in a German context, proving to be sufficiently effective in an entirely different public sphere. Apparently, the responsible publicity agency had every reason to take for granted the existence of the necessary historical background information. The well-informed spectator would be rewarded with a smile for his successful knowledge transfer from one national context to another and applying it to quite a different problem. In the present academic context, however, this witty motif draws our attention to the potency of American popular culture myths far beyond national borders, where, in fact, they may be interpreted quite differently. In the end, “Berlin, wir haben ein
Societal Impact of Spaceflight problem” points to the far-reaching importance of international and crosscultural perspectives in analyzing both science fact and science fiction. It reminds us, in short, that the societal impact of spaceflight and its imaginative dimension cannot be properly historicized without considering transatlantic references, perceptual interdependencies, and transnational interrelations.

**Spaceflight, the Impact Question, and the Spatial Turn: Three Heuristic Remarks**

Without going into too much detail, the first heuristic remark consists of a fundamental conceptual question: How can we define—and then diagnose—the societal impact of spaceflight in an historical and international perspective? How do we describe, assess, and characterize it once such impact has been recognized? And what set of criteria do we employ in order to compare views and attitudes toward space and spaceflight across different cultures worldwide?

The challenging aspect of this question lies, of course, in the paradigmatic inversion and the complete change in historiographical perspectives it proposes. For a long time one of the most fundamental question in the field of space history was how spaceflight, in a comparatively short time, developed from science fiction into science fact. Who invented the necessary technologies, where, and in what circumstances? What kind of institutions were established, who financed them, and how did they produce, structure, and organize knowledge? Which scientific fictions became, at what point, predominant and were transformed into actual science—whereas others remained merely fictitious? Today, historians seem far less interested in compiling yet another, sometimes semi-hagiographical, often oversimplistic, yet almost always teleological genealogy of space travel thought, its pioneers, and its practitioners. The new perspective is diametrically reversed. It is also less prone to endorsing undercomplex master narratives. What was formerly the dependent variable now becomes the independent one. We take spacefaring as given, and then aim to understand and explain the impact and possible effects that outer space, space travel and space exploration have had on culture and society at large.

From the viewpoint of a cultural historian and recent newcomer to this field of historical research, such a general change of perspective seems more than overdue. Almost inevitably it should lead to less specialist and fewer internalist analyses, to the advantage of broader, more integrative perspectives, by paying greater attention to historical context and culturally ascribed meaning. Multifaceted links and manifold connections are conceivable if space history breaks with its self-chosen splendid isolation and decides to open itself up to different historiographical branches such as social, cultural and intellectual history, but also to less obviously related disciplines such as science studies, social and cultural geography, sociology of knowledge, literary criticism, art history, and contemporary archaeology. Most probably, such an extension will eventually lead to a complete transformation of the entire field and
enable space history to harmonize far better with presently “hot” historiographical debates on transnationality, globalization, and “entangled history” as the key features of a state-of-the-art histoire du temps présent.5

At the same time, space historians must remain cautious. “Impact” is a very broad and imprecise term that can denote many different aspects simultaneously. Space-related cultural artifacts, such as Hermann Oberth’s seminal 1923 book Die Rakete zu den Planetenräumen and Frith Lang’s 1929 film Frau im Mond, certainly had an immense public impact; so had Willy Ley’s numerous public lectures and Wernher von Braun’s countless media appearances, not even to mention the actual events such as the Sputnik launch in 1957, the first weather satellite launch three years later, the Mercury and Gemini flights, or the Apollo landings which, in many ways, marked the end of an epoch rather than the beginning. After defining and refining the original “impact question,” space historians thus need to sharpen their analytical tools by differentiating carefully between different kinds of impact, and by endeavoring to categorize, classify, and contextualize. Whom or what was affected, when and where, immediately or on a long-term basis? And did this impact have a lasting effect or did it fizzle out soon after? Different notions such as “repercussions,” “influence,” “consequences,” and “effects” on the one hand, and “perception,” “consumption,” and “appropriation” on the other, come to mind and could be considered possible alternatives.

Conceptual problems of an almost identical kind are by no means specific to this field of historical research. They have been discussed by neighboring disciplines and branches of research—such as reception aesthetics—at least since the 1970s, if not even earlier. Quite clearly, this constitutes another good reason why space history can only profit from widening its thematic focus and sharpening its analytical tools, including the incorporation of innovative methodological achievements made elsewhere.6

Moreover, in order to locate and specify societal and cultural impacts of spaceflight and space exploration, it might prove necessary to search elsewhere, in areas where effects, consequences, and repercussions are not readily expected and hence are

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less obvious than, say, in utopian literature, pop culture, or science fiction TV shows and movies. If the implicit assumption of this volume is correct—that spaceflight was, at least for several decades during the twentieth century, an emblematic and absolutely central element to the project of Western modernity—historians should be able to locate evidence for its lasting effectiveness far beyond the established circles of the international spaceflight community and their widespread activities, and as independently of its historical and contemporaneous advocates as possible.

Last but not least, it is somewhat surprising to observe that the notion of “space” itself has hardly been problematized and how little theoretical attention it seems to have received, despite the classic works by geographers, philosophers, sociologists, and ethnographers such as Gaston Bachelard, Henri Lefebvre, Yi-Fu Tuan, Pierre Nora, Marc Augé, and numerous others. How can we explain that the current upsurge of interest in space as a specific category of historical analysis—which is frequently labeled topographical or spatial turn—and the historiographical field of space history have not at all been seen in relation to each other so far? “What are you buying when you go to outer space?” someone asked rhetorically during the conference which inspired the present volume, and then replied to his own question, seemingly surprised, by exclaiming in despair: “There is simply nothing there!” Yet, outer space is by no means a spatial vacuum; it changes constantly and is always formed and refashioned. It is precisely this static and ahistorical notion of space that must be problematized by asking questions such as: “Where” and “what” was outer space at which point in time? How was it represented and imagined? Has the perception of space changed over time? And in what way were changing conceptions in turn affected by the continuous and ongoing exploration of outer space? Even if it may sound paradoxical, it would seem high time to apply the so-called spatial turn to space history, and to write a social and cultural history of outer space with special emphasis on space.

**Europe’s Outer Space in the Postwar Period: 1945 and 1968/69 as Global Turning Points**

Is there a genuinely European variant of outer space? In fact, is there a specific perspective on outer space which could be called European? Is there a set of commonly shared assumptions about space and the specific role of Europe in the history

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of spaceflight? For the period prior to 1945 at least, these questions are not highly problematic. Historians agree as to the fundamental significance of the various European space fads of the 1920s, notably in Germany and Russia, and, in consequence, the far-reaching effects of the slow yet steady formation of various interconnected networks of international space experts. Also in other European nations, such as Great Britain or France, transnational personal contacts among rocket scientists and space experts frequently preceded the establishment of the various amateur societies.9

Yet, by the time the Golden Space Age was in full swing in the 1950s—with actual space travel remaining far from a reality—Europe’s position was secondary at best. Hence, the crucial question in this context is precisely when and through which unilateral transfer processes such cultural hegemony was lost in the aftermath of World War II, not least as a concomitant of the rapidly emerging U.S.–USSR polarization. Analytically, the problem is further complicated by the fact that many of the new key players then residing in the United States, such as the engineer and rocket scientist Wernher von Braun (1912–1977), the writer and space science popularizer Willy Ley (1906–1969), and the technician Krafft Arnold Ehr icke (1917–1984), were clearly of European origin, even if they may have gradually developed a somewhat different attitude concerning their own nationality. Von Braun, for instance, did not participate in any of the early international congresses on astronautics which began in Europe annually after 1950, and did not (even temporarily) return to Germany prior to the autumn of 1957.10 Be this as it may, with regard to Europe’s (self-)positioning vis-à-vis outer space, the end of World War II was definitely the first decisive turning point whose long-lasting impact can still be felt today.

Indications of this fundamental displacement of cultural hegemony can, for instance, be observed in the realm of popular culture, especially with regard to imagery and iconography. More than 10 years after its 1929 premiere, film stills originally produced for Fritz Lang’s epochal Frau im Mond were used time and again to illustrate numerous articles on rocketry and spaceflight appearing in a wide array of international journals and magazines, simply due to the lack of visual material otherwise available.11 By the early 1950s, however, the situation had drastically changed.


At that time, a direct equivalent to the enormously successful *Collier’s*/Disney complex simply did not exist in any European context. Popular iconography widely available in the European public sphere was far less elaborate, less futuristic, and by no means as imaginative as its American counterpart—just compare, for instance, the visual expressiveness of Chesley Bonestell’s (1888–1986) famous illustrations for *Collier’s* magazine with a number of European samples from the same period (figures 31.2 and 31.3). The first example, showing a spaceship on the Moon with its crew about to begin their exploration, was distributed by the British Interplanetary Society to its approximately 2,300 members as their official Christmas Card for 1952; the second stems from one of the numerous publications of Heinz Gartmann (1917–1960), a German engineer, author, and well-connected editor of *Weltraumfahrt: Beiträge zur Raketenentwicklung*, and was based on a painting by graphic artist Klaus Büergle (1926– ). It is hardly surprising that these illustrations proved far less effective and by no means as trendsetting as their American counterparts.

On the other hand, the lavishly illustrated, large-format books into which the American *Collier’s* series had swiftly
been transformed were soon translated into numerous foreign languages, including Japanese, Italian, Dutch, Swedish, Finnish, German, French, and Spanish, and sold especially well in Europe. In Germany, for instance, S. Fischer, one of the best-reputed publishing houses, soon acquired the copyrights and, before long, sold a considerable number of copies, running into several thousands. Thus, geopolitical and iconographical shifts went hand in hand. From a European perspective, the 1950s space race was accompanied by a new sociocultural space fad in the public imagination, although this time of transatlantic rather than domestic origin.

Ever since then, autonomy—or, rather, the quest for it—has been the predominant theme of the European space effort. Since the first “philosophical” reflections, undertaken by the Italian physicist Edoardo Amaldi (1908–1989) in April 1959, on the urgent need to establish an official and independent European space organization, “encouraging” or even “increasing” European unity “from without” has been the explicit political aim in all common activities in space. In the late 1980s five European research institutes came to the conclusion that a European “space spirit” had gradually developed, largely as a consequence of ESA’s activities. They argued that to undertake such activities would give the European Union (EU) nothing less than a genuine chance to “consolidate a common identity.” The EU, they concluded in their large-scale study, should hence have its “eyes and ears in space.”

Steadily pursuing this goal has, at least at times, posed a considerable challenge to all plans of cooperation with third parties and possible partners such as the United States.

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Christmas 1968 marks the second, well-known turning point, with the epoch-making spaceflight of Apollo 8 and the first photographs of the entire Earth taken on this occasion. American writer Archibald MacLeish (1892–1982) and Austrian philosopher Günter Anders (1902–1992) were among the first to realize that the most profound consequence of the Apollo program was not at all the continued exploration of outer space, its scientific results, or the proof of the actual technical possibility for so doing. It was, rather, a radical change in self-perception on a genuinely global level, literally resulting in a new *Weltanschauung*, i.e., ways of viewing the world. For the first time ever, it was felt that the entire Earth could be seen—and see itself—from without and as a whole.\(^{14}\)

Even if this argument, originally coined by MacLeish and Anders simultaneously but independently of each other, has been repeated and modified so many times since that it now might be considered trite, it is beyond doubt that the images originating from this particular mission (especially the famous photograph “Earthrise”) produced enormous, hitherto entirely unforeseen effects. It is no exaggeration to state that these images fundamentally altered our contemporary geographical imagination. Thus, the major television event of the 1960s, the 1969 Apollo Moon landing, must, first and foremost, be seen as a carefully orchestrated, global media event. The fact, that it could be witnessed by approximately 600 million people, i.e., approximately a fifth of the world population, live on TV in 49 countries worldwide, symbolizes the central role of space exploration in the process of globalization. Taking place only seven months after Apollo 8, it was cause and effect at the same time: Technically only possible because of the recently set up Intelsat system, the Moon landing proved an event which, in itself, had considerable globalizing consequences difficult to overestimate in retrospect. Not only does this second turning point afford a perfect example of how the exploration of outer space substantially affects and alters conceptions of “inner,” (i.e., Earthly) space, it also makes the question of Europeanness even more complex.\(^{15}\)

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The same tension—a certain form of nationalism or Europeanness on one hand, versus a specific variant of internationalism or globalism avant la lettre on the other—was already a central element in many of the programmatic self-descriptions of the early space advocates, often proving a highly problematic issue. Directly after its inception in 1934, members of the British Interplanetary Society, for instance, discussed their self-image as expressed in the Society’s name on several occasions. Although it was at first disputed whether British Rocket Society would not be a more appropriate name than British Interplanetary Society if it was to harmonize better with its Continental and North American sister organizations, 17 years later, in 1951, the conflict had become whether the word “British” should not be omitted completely from the its title. Some of the Society’s members strongly feared that it could be interpreted as an expression of just that kind of latent nationalism which they considered as contradictory to the Society’s international character and detrimental to their common “vision of the coming of interplanetary communication.” From their perspective, Europe was a state in between two different stages of development. Europe was to be preferred to any national context and something of a self-evident frame of reference, yet not the global society either, which they hoped eventually to create through their cosmic activities.  

INFINE FRONTIERS, COSMIC VISIONS, FUTURES PAST

“The desire to explore and understand is part of our character,” President George W. Bush declared on 14 January 2004, announcing his new “Vision for Space Exploration” initiative at NASA Headquarters in Washington, DC. “Mankind is drawn to the heavens for the same reason we were once drawn into unknown lands and across the open sea,” he continued, in order to justify space travel by making bold psychological statements and indicating broad historical parallels: “We choose to explore space because doing so improves our lives, and lifts our national spirit. So let us continue the journey.” Thus Bush, in a few simple words, connected


individual with collective psychology, history with the future, and questions of the quality of life with the welfare of the entire nation. He also reintroduced one of the oldest and most frequently advanced arguments for investing extensive resources in human spaceflight: outer space as humankind’s final frontier, as an enormous, quite natural task only to be undertaken by all concerned collectively, yet obviously and exclusively under his direction and leadership.

By no means was George W. Bush the first to envisage the exploration of outer space as a direct consequence of America’s alleged predisposition to continuously open new frontiers and steadily seek new discoveries. Originally, this famous argument goes back to historian Frederick Jackson Turner (1861–1932) who, on the occasion of the epochal World’s Columbian Exposition 1893 in Chicago, had tried to explain that many characteristic features of American society developed during the exploration of the American West and later persisted, even after the actual process of conquest and settlement was long completed. Turner’s so-called frontier thesis has, ever since, been attacked by legions of professional historians who have severely and successfully criticized his argument from various angles, eventually debunking the thesis as a myth. It was, nevertheless, successfully politically exploited in the 1960s in order to strengthen unity and the nation’s self-image by conjuring one great common task. Thus, Bush did not add a new element to the debate but, rather, took over and gave fresh justification to exactly the same kind of frontier rhetoric that numerous other space advocates, including John F. Kennedy and John Glenn, had already used long before him, and in which current NASA Administrator Michael Griffin also seems willing to invest.

Whether true or not, from the perspective of a professional historian it is quite remarkable how present a simplified and vulgarized version of Turner’s original thesis still is in everyday public discourse, and what considerable influence it continues to have in the American public sphere. It might be best described as an historical argument of the second order, i.e., an argument that is historically far from accurate but is retrospectively believed to be true and, despite its original falseness, thus proves enormously effective (in this case, up to the present day). When applied within a European context, its shortcomings become even more obvious. Although Europe


has always had a variety of different and oft-changing frontiers and open spaces, both real and imagined (most of which were located overseas), a direct equivalent to the American frontier has never existed, neither in Realgeschichte nor in myth. Even more than in the United States, some time in the early 1970s the theme of “space” lost much of its popular and futuristic appeal, as did nuclear power and atomic energy.\(^{20}\)

From the aftermath of World War II through the early 1970s, however, outer space clearly had constituted one of the “major sites of utopian thinking,” not only in the United States but also in Europe.\(^{21}\) During these three decades it was a widely shared assumption that the future would—literally—take place in outer space. While also fostering actual technological developments, scientists, technicians, and engineers drafted grand schemes of how the world would soon appear. They attempted to anticipate a future in space and at the same time tried to interpret and make this understandable from a philosophical perspective. Some of the main protagonists, such as the English science-fiction author Arthur C. Clarke (1917–), philosopher Olaf Stapledon (1886–1950), aeronautical engineer A. V. Cleaver (1917–1977), and the already mentioned technician Krafft A. Ehricke (1917–1984), considered themselves explicitly as agents of an ongoing spatial revolution—the “interplanetary project”—which would change humankind forever. Long before Sputnik they already declared the advent of the “Space Age” or the “orbital age,” featuring an “interstellar” or “multi-planetary society” peopled by “\textit{Homo extraterrestris}” or “interplanetary man,” and diagnosed the dawn of a new “3-dimensional civilization.” They discussed potential repercussions of spacefaring on the human psyche, demanded the establishment of a United Nations organization control, and debated with great verve not only whether “on Mars life (such as we know) has evolved to the human level” but also how communicative exchange with extraterrestrials might be made possible. Reflecting upon the necessity for a “common field of semantic reference (C.F.S.R.)” as a condition for any exchange between Earthlings and their “extra-terrestrial neighbours (E.T.N.),” under the heading of “Astraglossa” some enthusiasts even set out to take “first steps in celestial syntax,” just in case genuine long-distance communication “with beings with whom we presumptively share no idiom of discourse” had to be initiated (figure 3.4).\(^{22}\)


Controversies on the existence of extraterrestrial life are by no means an epiphenomenon of postmodernity; they go back at least to the Copernican revolution. Even if early experts such as Willy Ley, Wernher von Braun or the numerous members of the German Gesellschaft für Weltraumforschung (GfW), under the direction of engineer Heinz Hermann Koelle (1925–), often did their very best to steer clear of such muddy waters and preferred, mainly for tactical and strategic reasons, not to take an openly positive stand, the quest for extraterrestrial life has always been one of the most central, yet often hidden, motives behind many scientific debates and space-related enterprises; not surprisingly, it still is today. It is not a coincidence that so many contemporary space exploration projects are motivated by the search for water, believed to be a necessary precondition for extraterrestrial life-forms.

Ultimately, it can be argued that a vast number of the debates fought out during the twentieth century on the social and cultural rationale behind the space effort oscillated between two distinct poles—or, as it were, “discursive vanishing points”—other than the myth of the frontier. First, there is that entire argumentative strand for which literary scholar De Witt Douglas Kilgore has found the neat label “astrofuturism,” i.e., the widely shared belief system that the future would necessarily take place in outer space and that it would entail an encounter with alien life-forms as the twentieth century’s most radical version of imagined alterity but yet an “other” unlike any other before. A German journalist summarized expectations for the future in 1951: “The steady progress of science and technology obscure the boundaries. More than ever the world of tomorrow is a concern of the present, and even to visit a secret laboratory can today become the beginning of an adventurous voyage of discovery into the future.”

Second, in addition to this utopian component there is a strong religious, spiritual, and/or mythical strand to be detected behind these numerous debates and activities. How did changing images and conceptions of outer space, “other worlds,” and the entire cosmos impinge not only on competing versions of the future but also on religion and transcendental beliefs? As early as the late 1920s, contemporary critics spoke of the “religion of spacecraft,” calling it a “technological ersatz religion.” Although such an aspect continues into the present, it has hitherto not been adequately examined, sometimes quite dramatically so. Both factors—the utopian/futuristic strand and the spiritual/religious component—must be made central categories when historicizing outer space. Last but not least, it is Archibald MacLeish and Günter Anders who deserve credit for drawing our attention to the anthropocentrism so deeply inherent in all variants of space exploration. They made us realize that the Copernican revolution never took place in the realm of the imaginary. The more elaborate and far-fetched our conceptions and images of outer space, of other worlds “out there,” and extraterrestrial life-forms have become, the more anthropocentric they remain. Indeed, distinguishing between space exploration and its impact can only constitute a temporary analytical separation. In fact, spaceflight already affected European culture and society long before it ceased to be a mere “flight of fancy.”


About the Authors

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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
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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
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**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
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**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).