Introduction

"Convictions are more dangerous enemies of truth than lies."

Nietzsche

"The greatest obstacle to discovering the shape of the earth, the continents, and the oceans was not ignorance but the illusion of knowledge."

Daniel Boorstin

The proverbs of the old Appalachian Mountains contain wisdom that is too often missing in modern life. One in particular is useful for people struggling to understand the issue of Russian and American space activities. Popularized by Will Rogers, it goes like this: "It ain't what you don't know what'll make you look like a fool, it's what you *do* know what ain't so."

In 1988, as a guest on CNN's C*rossfire*, I was actually impudent enough to make use of that proverb on national television. A two-man Soviet space capsule appeared to be stranded in orbit, and I was a member of a "panel of experts" discussing the crisis. I listened as my fellow guests—the Defense Intelligence Agency's former director, Lieutenant General Daniel O. Graham, and New Jersey Congressman Robert Torricelli—expounded on the impending doom in space.

"They're dead men already," Graham asserted, describing how their air would soon run out. Even if they did return to Earth, it would be tough. "The *Soyuz* smashes to Earth with terrific force," Torricelli expounded. Both speakers, I knew, were men of intelligence, experience, and integrity, so I was astounded at how preposterous their comments seemed.

When my turn to speak arrived, I quoted the proverb and then described the variety of tricks that the crew still had at their disposal to make a safe (and soft) landing. I expressed my willingness to "bet the farm" that they'd be safe on Earth swapping yarns with rescuers within hours (as indeed they were). My fellow panelists shook their heads in disbelief.

Later on, when somebody on Torricelli's staff explained to him what (or who) the proverb I had quoted had actually been referring to, he reportedly fired off an angry note to CNN about my "disrespect." Still later, I learned what none of us had known at the time: that the cosmonauts had actually been within seconds of an irrevocable death sentence. Unbeknownst to the entire outside world, they had dodged it, but Graham and Torricelli's instinctive pessimism was closer to the reality of the situation than I had wanted to believe.

At the time, there was a lot we didn't know about Russian space activities. There was a lot we all thought we knew that wasn't so. There was a lot that some people wanted us to believe, whether it was true or not. Worse, there was a lot that specific people didn't want us to know. And most frighteningly, as the fates of the American and Russian space programs became increasingly intertwined throughout the 1990s, there turned out to be a lot that many people wanted *not* to know, lest it get in the way of the "politically correct" policies that NASA's managers had established in response to directives from the White House.

Space is empty, but it is not a blank slate. Travelers there must carry their own air, food, and water, but they also carry the heavy burden of their history. They carry with them what they know, or think they know, about each other. So for the last half century, as Russia and America pioneered the space frontier beyond the physical boundaries of their home planet, they interacted with each other in a context that was rooted firmly back on Earth. The Russian and American space programs have been linked together since the 1950s, and over time, the nature of the relationship has

changed dramatically. It has been by turns inspirational, sloppy, wasteful, and politically and even scientifically useful.

Historians have come to believe that this relationship was a natural outgrowth of the past. Some believe that it was the only feasible way to create and sustain Earth's energetic exploration of space into the future. But its critical value hasn't always been obvious. And its true dynamics remain obscure today. Just look at all of the surprises and disappointments in the current "space partnership" between the United States and Russia. With almost half a century of space diplomacy behind us, how could we still be so myopic and clumsy in our dealings with the Russians? And how could they so regularly misinterpret our intentions in space?

Back in the mid-1950s, just before the dawn of the Space Age, philosophers and science fiction writers were busy trying to forecast the social forces that would motivate the tremendous commitments of resources that would be needed to make it happen. Clearly, space exploration was going to be expensive. The question was, where would the money come from?

I remember the speculations. Already a "space nut" as a boy, I read everything I could lay my hands on. I watched the pre-space-flight science fiction shows on television; I listened to space programs on the radio. The Space Age was about to be born, but who would be the midwife? Nobody even knew who the father would be.

For generations, fiction had invented weird and wonderful motivations for space travel. Jules Verne's "Baltimore Gun Club" sent men around the Moon in order to demonstrate their advanced military skills. H. G. Wells's Martians crossed interplanetary space to flee a dying planet, and sequels by other writers portrayed human fleets (with electric engines designed by Thomas Edison) headed for Mars on a mission of revenge. Contemporary with Wells, the Russian space-flight prophet Konstantin Tsiolkovskiy imagined humans inspired by a "life force" expanding into a new ecological niche.

Some writers in the 1950s thought that commercial ventures would seek profit in space. Others suggested military parallels between atomic energy (brought on by World War II) and space travel (perhaps created during a future U.S.-Soviet war). Almost every theme in the history of terrestrial exploration, from the Vikings to the conquistadors to the Hanseatic League to the Mormons, was reset in the black emptiness

of space. Science and general human curiosity received passing mention as well. A young writer named Ben Bova tried to sell a short story about space exploration sparked by U.S.-Soviet diplomatic competition, but his editor rejected the notion as too unbelievable.

Then, on October 4, 1957, to the great shock of the entire world, *Sputnik* was launched. The Space Race was born, and it took nearly everyone—experts as well as ordinary citizens—by surprise. Surprising, too, were the compelling reasons that soon arose in its support.

Hindsight has allowed historians to recognize why Nikita Khrushchev authorized his rocket builder, Sergey Korolyov, to divert one of his new intercontinental missiles from the Soviets' weapons testing program. The missile would be used to carry an artificial satellite into orbit around Earth. Scientific curiosity, or even Soviet grandstanding, was far from his mind. He needed to prove to America that he could kill millions of civilians in the event of a war. And, faced with a crushing military budget, he needed to prove to his own generals that there were millions of unneeded soldiers in the Red Army.

Once the worldwide (and internal) admiration for Soviet space successes became evident, new goals were developed. A solid foundation for space development was not on the agenda, however. The idea was to go for the "firsts" that would garner headlines around the world. And it was those very headlines that endured, even after the crippling effects of shortsighted goals became evident. The consequences of the hollow triumphs that appeared in those headlines are still shaping our attitudes and beliefs today.

In the West, meanwhile, there was genuine fear that an efficient, centralized Soviet space industry would capitalize on its lead and irreversibly dominate all scientific, commercial, and military aspects of space flight. The shocking reality of the Soviet Union, the feudalistic and byzantine hodgepodge of industrial empires slipping back and forth between unsteady alliance and outright hostility, was to lie hidden for decades. From the very beginning of the Space Age, the Soviets sought to develop space weapons, both automated and manned. They justified their aims by fears of American military plans. Indeed, there was no shortage of American experts calling for the construction of just such weapons, and no lack of industrial organizations eager to build and sell them. In public, however, Soviet spokespeople—along with a broad swath of Western

experts—denounced any American moves toward military space activities. At the same time, they minimized or totally denied the existence of Soviet plans in that direction. Some Pentagon statements during the Reagan years looked pretty paranoid, but in hindsight, these fears turned out to be justified and even incomplete. Such fears would begin to fade only when the Soviet Union itself had ceased to exist.

Deliberate delusion continued. With the Moon race over, the Soviets denied the "American victory," claiming that the Soviet Union had never actually been serious about competing. Nor was self-delusion absent. A few politically motivated joint projects in the 1970s convinced many people that "cooperation in space" could actually change the attitudes of political leaders back on Earth, through pure force of example.

The relationship has since evolved into new patterns of mutual misunderstanding. From the joint near-bankruptcy of the early 1990s to the enthusiastic "marriage in the heavens" of mid-decade, we've become disillusioned even as hard-won joint achievements have appeared in orbit. As Ben Franklin advised about marriage, people should go into it with their eyes open, but keep them half closed afterward. But with the Russians in space, we seem to have done it backward.

Over the last half-century, the dynamics of the Russian-American space competition have powered the space programs in both of these countries and in dozens of their allies. Any consideration of how this has happened, and what forms this relationship will take in the twenty-first century, needs to understand the nature of the "engine."

One widespread, overwhelming, and fundamental misconception about this relationship still stands in the way of understanding it and successfully predicting future trends. Space activities in one country, we are told, influence the planning of space activities in the other country, and vice versa. This is what engineers call a "feedback loop."

In practical terms, however, this is not true now and never was. Mistakenly believing it to be true has led the space programs in both countries to unfounded fears, enthusiastic wild goose chases, time-consuming detours, and heartbreaking setbacks, all at great expense.

What, then, *does* drive this feedback loop? What foreign forces influence a nation's policies? We only have to look back on the dynamics of the past few decades to see the real driving principle.

It turns out that each country's program is not directly influenced by what is truly happening in the other country's program. Rather, it is influenced by what each country's leadership *thinks* is happening in the other country. This is so obvious that it is usually never stated explicitly. As a result, when one country's perception of the situation in the other country is flawed, the response will necessarily be misdirected and mistaken.

Early in the Space Race, the gap between what was real and what was perceived was usually the result of the uncertain nature of the technology and the tendency of each side to attribute its own motivations (or fears) to the other side. Sometimes the worst case had to be prepared for in the absence of reassuring knowledge. Sometimes judgments were colored by what decision makers felt comfortable "knowing."

Often these judgments were derived from misconceptions about the nature of space or were accepted because they satisfied preexisting attitudes. There was the "crude but powerful Russian rockets" myth, for example, which acknowledged that the Soviets' vehicles were big but belittled them for being "unsophisticated." There was the persistent belief that the USSR had concealed the deaths of a dozen "secret cosmonauts," matched by the USSR's undying anxiety about America "militarizing space" (and to mirror that, the American fear of "Soviet bombs hanging over our heads").

In other situations, advocates of a minority position in one country would attempt to strengthen their domestic position by interpreting the other country's program in terms consistent with the advice that they themselves had given. If you wanted your country to build a space station, or a space shuttle, or a space laser, it helped if you could make it look as if the other country was doing this already. And if you couldn't get the key officials to agree, you could bypass them in the national news media (at least in the United States).

That was the stage on which I played the public role of a "space sleuth." Since the early 1970s, I had been publishing articles and giving news interviews on what I thought was the truth behind all the claims and misunderstandings. Sometimes I would work on a particular puzzle for years; sometimes I had to give off-the-cuff interpretations and predictions.

Along with a loose confederation of like-minded private space sleuths around the world, I believe I made many contributions to public understanding. Together, we published some pioneering insights

that stood up pretty well in hindsight. I had my share of near misses, and some outright strike-outs, too. But over the years, I developed some helpful techniques, as well as some valuable resources, in my quest "to find out, and to tell about" (my unofficial slogan) space-flight mysteries.

Then *glasnost* appeared in the USSR, and a torrent of restricted information poured forth. After the collapse of communism in 1991, even greater access to people, old hardware, space factories, and archives became possible. For a while, it looked as if the best verdict I could expect from history was to have been that guy who used to be able to guess really well about the Soviet space program, way back in those dim times before we didn't have to guess any more.

That obituary for a lifelong avocation was premature. The Russians soon had an entirely new array of motivations for keeping "space secrets." As Russia and the United States moved closer in formal cooperative projects, my techniques and resources became more important than ever. The fate of America's space program had become dependent on reliable knowledge of those Russian space activities that were directly involved with American projects.

This is the story to be told in this book. Yet considering in all humility how incomplete and observer-dependent many of these "realities" really are, the concept of an omniscient narrator is laughably inappropriate here. Instead, imagine the narrator as a tour guide. This will be a personal journey of discovery and understanding, helping us to find out just what it is possible to "know" with confidence. It will also involve defining the boundaries of the known, and speculating about what remains to be discovered and what has already been lost forever.

Let's start with a specific example. It involves a discovery about the past that has persistent relevance to our present and our future. It's funny, sad, and frustrating all at once. And it's so typical of what we carelessly "know" about each other's space activities that was never really so.

Going through other people's attics is one of life's vicarious pleasures, considering the treasures you might stumble across. For me, going through Russian space attics is doubly so, because of the genuine treasures that you can stumble across and the intriguing new patterns that the new data points fall into. In the basement of an auction office in New York City in 1997, I gained a new appreciation for the scope of what had been an old, vague pattern.

As the Soviet Union racked up one "space first" after another in the 1960s, it also performed the bureaucratic duty of registering many of these firsts. The world body responsible for all flight records was the International Aviation Federation (FAI, from the organization's name in French) in Paris. Registrations with the FAI took the form of bound, large-format descriptions of the events for which the claims were being made, with appropriate official signatures. One of the most frequent signers for the Soviet claims was Ivan Borisenko, titled "sports commissar."

Just why he had been chosen I could never figure out. Maybe he owned the stopwatch. In any case, a few decades after the Soviet-era glory came the post-Soviet cold and hunger. Struggling on with an inadequate pension, Borisenko produced his own personal archive of two dozen space record claim folders and offered them for sale in the West.

It was this set of handsomely bound documents that I was inspecting and authenticating for my host and paying client, Kaller's America Gallery. We would catalog each one, and I would read it over in Russian to note the accuracy of its claims. One thing that I noted about the claims was the almost universal insistence that the launch site of these "space firsts," Baykonur, was located at precisely 47°22'00" north, 65°29'00" east. Ever since the first American U-2 spy plane flew over Russia in 1956, however, the launch pad has been known to be at 45°55'00" north and 63°20'00" east. Foreign observers had always suspected that the error was deliberate, presumably to get the next U-2 spy planes to stray off course. Finally, in an incredibly rich collection of Russian space memoirs published in the same year as the auction, two former Soviet officials independently described how the falsehood originated. It was just as we suspected, but it's the real inside story.

Vladimir Yastrebov, an expert in spacecraft tracking, wrote about his exact role in the deception: "I was personally involved in naming the Tyura-Tam launch site 'Baikonur' so as to disguise its true location. A few days after Gagarin's flight, my management sent me to one of the central administrations of the Ministry of Defense to meet with Col. Kerim A. Kerimov [the officer in charge of the cosmonaut program]. Together with a senior officer from his section called Alexei Maximov, I was asked to draw up the records of Gagarin's flight in terms of range and altitude for registration with the International Aviation Federation in Paris. Preparing the document was easy enough, but we encountered a major

hurdle when deciding how to identify the site from which the *Vostok* launch vehicle had lifted off. Since we were not allowed for security reasons to name Tyura-Tam, we studied the map and chose a ballistically plausible down-range alternative in the form of a small Kazakh settlement called Baikonur. And that is what the cosmodrome has been called ever since."

Reading further in the same book, *Roads to Space*, I found that Aleksandr (not Aleksey) Maksimov, an official of the Ministry of Defense responsible for space activities, had also contributed a memoir. He told much the same story, but slightly garbled with regard to the dates and organizations: "So where did the name Baikonur come from?" he wrote. "In accordance with an international treaty, we had to register our Aug. 21 [1957] ICBM launch with the United Nations, indicating the date, time, and place of launch.

"Since there were no spy satellites in orbit yet, nobody knew where the test range was situated, and we were not keen to divulge that information for security reasons. We therefore decided to indicate a site whose existence the Americans could verify. With their radars they were able to track the flight of our rocket and, by working backward, calculate the approximate location of the launch site. So we decided to give the Telegraph Agencies of the Soviet Union [TASS, the main news agency] and the United Nations the name of a place situated some 250 kilometers from Tyura-Tam. That place happened to be called Baikonur—and ostensibly that is where we have been launching from ever since."

Yastrebov's account is more accurate, since the Baykonur story was associated with the first manned flight aboard *Vostok* and with the 1961 FAI registration, not with the earlier missile test. But Maksimov's account is essentially corroborative regarding the motivation and the action itself.

So the official claims contained intentional falsehoods. I'd always presumed that the FAI had prohibitions and penalties for submitting knowingly false claims, and there can be no question but that these data were submitted in full knowledge that they were false. Nobody expected the Soviet Union to tell the truth, so we all became accustomed to swallowing lies. In recent years, however, Russia has wanted to become a normal country, to behave by internationally accepted norms, and to earn the trust of the world. Could standards be applied retroactively?

Sure enough, I found the FAI "Sporting Code" on the Internet. It has an entire section on "Complaints," and section 5.2 is entitled "Penalties and Disqualifications." Subsection 5.2.2.3 defines "Unsporting Behavior" this way: "Cheating or unsporting behavior, including deliberate attempts to deceive or mislead officials, falsification of documents, or repeated serious infringements of rules should, as a guide, result in disqualification from the sporting event."

There was no need to withdraw the flight records, since the Soviets really did perform the feats described. But I was hopeful that the false information could at least be expunged from the archives of the world body. I figured that the best way to do that was to have some official ask the Russians to file a letter of amendment to the original claims.

It wasn't as easy as all that, I discovered. I located the U.S. association affiliated with the FAI, the National Aeronautic Association in Arlington, Virginia, and I proposed to them that the Russians be asked to correct the false information on their original records claims.

On November 21, 1997, association official Art Greenfield (the secretary of the Contests and Records Board) wrote back to me to politely explain why that wasn't going to happen. "I understand that you believe the Russians falsified the coordinates of the launch site of those flights in the record dossiers," he began, adding that since the association didn't have the dossiers on file at its office, he had no way of confirming this.

"Perhaps the Russians did attempt to mislead us about the takeoff location for reasons of national security," he conceded. However, since the actual flights are not in doubt, "we see no compelling reason to confront our Russian counterparts with allegations of wrongdoing dating back to the Cold War era." He concluded by saying that these days, both Russians and Americans "are actively involved" with work that "promotes public understanding and awareness of the importance of space flight," and furthermore, that "we hope that this cooperative effort will continue for as long as we explore space."

Max Bishop, the FAI secretary general in Paris, concurred. "No space records depend on the precise location of the launch site," he pointed out, quite correctly. "Therefore modifying the coordinates of Baikonur will in no way affect any FAI-approved performance. We do not intend to take any action."

Perhaps that's the proper perspective. After all, it is reasonable to question the importance of a 1961 fraud in 2001. That is, is there anybody out there who doesn't already know that the official Soviet location for the cosmodrome is false? Why bother with an official correction?

A compelling reason is that the original deception persists through sheer informational inertia. Even a cursory survey of existing cartographic products shows this. For example, recent world globes from Replogle (such as the World Horizon "Livingston Illuminated" globe) and a World News Map published by *U.S. News and World Report* show the town of Baykonur in its correct location. But I would argue that nobody looks up Baykonur out of interest in obscure coal-mining towns (in population and genuine importance, it's much too minor a spot to earn its own place on these maps). People look up Baykonur because they want to find out where the famous cosmodrome of the same name is located. If so, they are misled, since it is the erroneous assumption that the cosmodrome is located at the "false Baykonur."

So I play this game whenever I visit bookstores, and you can play too. Check out the latest world atlases to see if they have the cosmodrome at the correct location, on the Syr Darya River just east of the Aral Sea, or if they put "Baykonur" where the original and utterly unimportant town still is. Hammond's *New Century World Atlas* (1997) has the false location, as does *Webster's Concise World Atlas* (1998). So does Rand McNally's *Classic World Atlas* (1996). The French mapmaker Gabelli issued a map of Asia in 1994, and it showed the false Baikonur.

Even more explicitly, the 1994 *Oxford Encyclopedic World Atlas* has a special updated section on the new post-Soviet geography. Its feature on Kazakhstan specifies the Baykonur Cosmodrome as one of the most important features of that new country. But the Baykonur shown on the actual map is the deceptive one. And in the *Oxford Dictionary of the World*, the definition of "Baikonur" on page 63 is, "a coal-mining town in Kazakhstan, n.e. of the Aral Sea. Nearby is the Baikonur Cosmodrome." Neither the Oxford atlas nor the other misleading products show anything at all near the Syr Darya River, where the cosmodrome and its support city of Leninsk are actually situated.

Some do get it right, such as *National Geographic*. Some list the old "Baikonur" but also have correctly located entries such as the "Space

Launching Centre" or "Leninsk" (the city where the space workers live). But they obviously didn't rely on official FAI documents for their information.

Without making too big a deal out of a minor historical falsification, I've always figured that continuing to tolerate such deception is an insult to modern Russia. Isn't it just a condescending way of saying, "We know Russians are liars, so why bother to expect them to tell the truth?" If I were Russian, I would deeply resent such bigotry.

This isn't just ancient space history. The same attitude has persisted all the way into current times. Throughout this book, we shall see many cases in which American officials talk themselves into tolerating Russian deception, since, after all, "they're only Russians" and we need to get used to it. I will argue that we have reaped a frightful harvest from our carelessness toward truth.

There were other old distortions that had alarming implications, whether they were deliberate or the result of ignorance. I remember how Soviet cosmonauts joined Moscow's propaganda campaign against the U.S. shuttle program in the early 1980s, viciously accusing it of all sorts of space weapons activities. The accusations were false—I was working at Mission Control during those early missions and knew exactly what was and wasn't being done aboard *Columbia*—and I confess to harboring unkind thoughts toward the cosmonauts and what I then assumed were their deliberate lies.

I collected dozens of examples. In August 1983, Georgiy Grechko told a television audience, "We know that sights for laser weapons have already been tested on the first shuttle craft." Vladimir Shatalov, head of cosmonaut training, stated, "We Soviet people, in particular cosmonauts, are pained to hear that some people in the United States are trying to use space for military purposes." Aleksey Leonov proclaimed that "the Soviet side repeatedly underscored the fact that space must never be allowed to be used for deploying weapons." Valeriy Bykovskiy denounced the "insane plans" of U.S. militarists "who want to rule the Universe." And according to another cosmonaut, Vladimir Dzhanibekov, the U.S. shuttle "responds to a great extent to the interests of war, not peace."

At the time, I was concerned that such a campaign might be a prelude to Soviet military action against a shuttle mission. Most alarming

was a statement by cosmonaut Georgiy Beregovoy concerning the right to orbit in space over other countries. He said that it was not unconditional; it was dependent on peaceful intent. I worried about the implications of a Soviet move to deny that right to American space shuttles.

But in hindsight, I've begun to suspect that these shrill accusations were actually aimed at the internal Soviet debate over whether to preserve the USSR's own expensive "shuttleski" program, its effort to duplicate NASA's shuttle program. This program had originally been sold to Soviet leaders as the answer to a perceived military threat from the American shuttle. Hence, it might lose support if the Soviet domestic perception of the threat were allowed to fade. This could have accounted for the accusations. The Soviet statements could have reflected the Soviets' entrapment in their own sincere misperceptions of American intentions.

The consequences of these mutual misunderstandings went far beyond the space arena. Space scientist Paul Spudis recently argued that they may have been critical to the end of the Cold War.

Writing about the *Apollo-11* lunar landing on its thirtieth anniversary in 1999, Spudis put Kennedy's choice of a "Space Race" finish line into perspective: "The goal of the Moon was a technological challenge, a gauntlet thrown down before our global competitor, the Soviet Union, challenging them to a technological fight to the finish. Although it is commonly acknowledged that we won this challenge, the profound effects of that victory are less often considered."

The Soviets attempted to beat the United States to the Moon. They built rockets, landing craft, and space suits for the purpose. They trained a generation of cosmonauts, flight controllers, and scientists for the purpose. But their efforts failed, even as *Apollo* triumphed.

"What lessons did the Soviet Union draw from this disaster?" Spudis asked. "Apparently, the Soviets became convinced that, in programs of vast technical scope, particularly those requiring the practical application of high technology to very complex problems, America could accomplish anything. The Soviets viewed the Americans as having achieved, through a combination of great wealth, technical skill, and resolute determination, an extremely difficult technological goal." And they never forgot it.

Twenty years later, another U.S. president laid down another technological goal. This time, Ronald Reagan challenged the American aerospace industry to "render nuclear missiles impotent and obsolete." He called the project the Strategic Defense Initiative; critics derisively dubbed it "Star Wars." But the criticism came from the same sources—sometimes the same individuals—that had told Kennedy that the *Apollo* lunar program was foolish and futile.

Soviet officials campaigned against Star Wars for years. "Why did the Soviet Union fight so long and adamantly against it?" Spudis asked. "Clearly the Soviet Union was convinced the SDI would work and that we would achieve exactly what we set out to do."

"Here's *Apollo*'s legacy," he argued. "Any technological challenge America undertakes, it can accomplish. The reason this legacy had currency was the success of *Apollo*. We had attempted and successfully achieved a technical goal—one so difficult and demanding, that it made virtually any similar goal seem equally achievable.

"Moreover, this was a goal that the Soviets themselves had attempted and failed," he continued. "They reasoned that getting into a decade-long competition with America on SDI would similarly end in an American victory and would be a race that would bankrupt and destroy their system, as indeed, it did."

In conclusion, Spudis maintained that it was the Soviet perception of *Apollo*, rather than the reality of *Apollo*, that had had profound results: "The success of the *Apollo* program gave America something it did not realize was so important—technical credibility. When President Reagan announced SDI 20 years later, the Soviets were against it, not because it was destabilizing and provocative, but because they thought it would succeed, rendering their vast military machine, assembled at great cost to their people and economy, obsolete in an instant. Among other factors, this hastened the end of the Cold War in our favor."

The reality of a reliable missile defense could easily be called into question, but the actual truth wasn't important. Far more critical was what decision makers in Washington and Moscow believed to be true, or even plausible.

The end of the Cold War and the collapse of Soviet totalitarianism were supposed to make Russia a "normal country," one that didn't need propagandistic deceptions. But these changes did not bring an end to

space-related misconceptions. In *Space Policy* magazine's January 2000 issue, veteran international space projects manager Jeffrey Manber published a report called "Russian-American Space Miscommunication: A Study in Missed Opportunities."

"Mired in political and programmatic confusion, American-Russian space cooperation is at a crossroads," Manber wrote. The process is "still critical to the future of cost-efficient space exploration yet grounded by political barriers and misunderstanding.

"Much of the misunderstanding can be traced to the very beginnings of Russian-American space cooperation," he continued. "There were actually two beginnings: the first a commercial effort and the second, the more publicized overture of NASA to work with the Russian space industry. Both have failed on some very basic levels."

In 1988, a small Boston company signed a contract to fly a modest research payload inside the *Mir* space station. Manber described how top Russian space officials misinterpreted this event, probably because they were anxious about diminishing Soviet government funds for expensive space projects.

"To my surprise," Manber wrote, "they believed the export license from the Reagan Administration to be a well-orchestrated signal from the U.S. government. . . . [It] signaled that a commercially structured Russian program, one supported by market conditions, would be met with political and commercial support from the Americans." Manber remembered trying to convince Soviet officials that the license was a fluke, snuck past opposing forces at the State Department and NASA through bureaucratic back channels.

"Unconvinced, the Soviets left the conference still believing that the US would welcome a commercial Russian space program, even if it competed against the US government space station, or the monopoly status of US launch vehicles and, in general, the non-commercial slant of NASA's space programs," he wrote. "Thus the working relationship between the Russians and Americans was born in confusion and misunderstanding. Little has changed since then."

Manber's pessimism may be exaggerated, in large part because of the frustrations he faced in his position on the frontier of many of the cooperative efforts. As the old proverb goes, you can always recognize the genuine pioneer. He's the guy lying face down on the trail in front of

you with an arrow in his back. Manber, who has devoted the last decade of his life to painfully advancing U.S.-Russian commercial space cooperation, can empathize a lot with that guy.

Where do we go from here? Once the problem has been recognized, it's remediable. Confusion and misunderstanding must be reduced. Years of hard experience have accomplished this goal among many of the American participants in the current cooperative phase of the U.S.-Russian space relationship. For as long as this phase lasts, and especially when the current phase eventually ends and the next phase begins, we must strive for a relationship based on reality. Common interests and complementary skills must benefit everyone involved, and the effects of mutual misunderstandings and baseless fears must be minimized.

As expensive disasters show again and again, outer space is unforgiving of error and of self-delusion. But as we shall see, this is a lesson that many at NASA willfully ignored.