Capitalism and the space program

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During the last week of October, an expensive setback and a tragedy occurred with the failure of two separate initiatives in the private enterprise version of space travel. The Antares rocket, built by Orbital Sciences Corporation for resupply of the International Space Station, was destroyed seconds after launch following a catastrophic engine failure. SpaceShipTwo, the flagship tourist rocket of the Spaceship Company, a startup associated with billionaire Richard Branson, disintegrated during powered flight, killing test pilot Michael Alsbury.

The Antares failure occurred in one of its two first-stage boost motors, both of which are 1960s vintage Russian hardware made for the Soviet Union's aborted lunar program and stored for almost half a century. These motors, relabeled from their NK-33 origins, remain the second-highest thrust to weight rocket motors ever built, but predate the floppy disk, the microprocessor and the videocassette. The SpaceShipTwo is a plane that briefly operates as a rocket to expend a mere two percent of the energy budget of an orbiting spacecraft to give wealthy tourists a brief period of weightlessness. Its failure involved technology less sophisticated than the X-15 space plane first flown in 1959.

Fifty-seven years after the launch of Sputnik I, the first artificial satellite, and fifty-three years after Yuri Gagarin first orbited the Earth, access to the frontier of space is neither cheap nor routine. Humans visited the Moon six times between 1969 and 1972 and have not returned since. Four additional Soviet unmanned landings took place up to 1976, including a rover that traveled 24 miles on the surface and a lander that collected six ounces of material, then rocketed back to Earth. Thirty-seven years would elapse before the sole additional landing, the Chinese rover Yutu in 2013.

Nine countries currently have access to space, with only Russia and China currently capable of launching manned missions into low Earth orbit. No manned mission beyond low Earth orbit, a few hundred miles up, has taken place since the last Apollo mission in 1972.

Survey craft and landers have routinely visited Earth's terrestrial twin Mars, but Venus has not been landed on since 1984. The outer planets Uranus and Neptune have been visited once, by a spacecraft launched in 1977, and there are no additional scheduled missions to them nearly four decades later. Highly capable orbiting missions to Jupiter and Saturn, one each, have been made, with the Cassini orbiter still expected to function for a few more years around Saturn.

Technical limitations cannot explain the failure of mankind to gain worldwide access to orbit and maintain a constant tempo of more and more ambitious explorations throughout the solar system and into interstellar space. The recent failures were of the pedestrian kind, involving ancient, weathered hardware in one case and technically unchallenging hardware in the other. The necessary engineering precepts were mastered decades ago. Why then, is man denied what was once called his "final frontier"?

Marx was the first to understand scientifically the contradiction between man's productive forces, among which is included science itself, and the economic organization of society. He noted then the vast development of productive technique, through the application of science and technology, achieved in the course of the bourgeois revolutions of the nineteenth century, although it remained fettered to the profit motive under capitalism.

The contradiction between the development of science and the restrictions placed on it by the profit system took an even sharper form a century later in the aftermath of World War II. The wartime alliance between the United States and Soviet Union became a Cold War for strategic influence, even as the Stalinist bureaucracy undermined revolutionary movements of the working class throughout the globe.

This Cold War struggle gave the significant space initiatives of those years a dual character—scientific and military. Yuri Gagarin and Alan Shepard rode into space in capsules atop lightly modified intercontinental ballistic missiles. College planetaria, widespread in the 1950s, taught not only the tenets of the sky, but also celestial navigation to future military navigators. The Hubble Space Telescope optical contractor was chosen for competence in fabricating spy satellite mirrors, and then forbidden to use that expertise. The civilian Space Shuttle flew ten military missions, nine of which were staffed by serving military astronauts deploying classified payloads amidst encrypted communications. Two NASA administrators since 1989 have come from the military.

Scientific inquiry and exploration necessarily find themselves struggling for niches amidst the larger forces organizing society. The three primary contractors of US scientific spacecraft, Lockheed Martin, Boeing, and Ball, all have significant military cash streams. The Cassini flagship mission to Saturn, of immense scientific importance, nearly failed to relay the vital communications during the 2005 descent of its Huygens lander onto the moon of Titan—because the Cassini radio receiver, manufactured by Italian aerospace company Alenia Spazio, refused to give the specifications of the receiver for proprietary reasons to NASA, who refused to demand them for budgetary reasons. The flaw itself was only noted through the tireless work of several engineers, and a fix designed by revising the entire circumstances of the landing encounter, costing critical rocket fuel.

The Martian Climate Orbiter was lost in 1999 after NASA was

forced by congressional mandate to privatize aspects of mission operations, including the planning of its arrival on Mars and braking into orbit by skimming the Martian atmosphere. Lockheed Martin, the designer of the craft, also became the contractor for mission navigation. The company delivered to NASA navigation instructions specified (without notice) in English units, as opposed to the agreed-upon metric units used by NASA and universally by scientists worldwide. Cost cutting, the pursuit of profit, and the significant control of the political process by lobbyists all interfered with the efforts of the working people of NASA, engineers and scientists, to thoroughly critique every aspect of the mission and discover the error. The news coverage in the aftermath almost exclusively blamed NASA—for a mistake that they did not make due to a situation that they did not control.

Little progress has been made over the intervening decades towards fundamentally new rocket technologies, either for access to space itself, or for efficient propulsion once in space. The exception is ion rockets, whose improvement has largely been driven by profit considerations of lucrative geosynchronous communications satellites. The development of nuclear-powered rockets largely ceased in 1972, though the Soviet Union continued development of fission-powered satellites through 1988.

Within the United States, the nuclearization of surveillance and weapons platforms in Earth orbit has taken a different form. The Department Of Energy Office of Naval Reactors undertook significant design work in the 1990s on a space reactor, promoting its peaceful potential as a power source for a science mission, the Jupiter Icy Moons Orbiter (JIMO), which was perpetually starved of funds and then cancelled. The JIMO team, perhaps not entirely unwittingly, produced at one point a t-shirt with a repurposed motto from the film Dr. Strangelove, "We require only the *WILL* to go there."

Critical services provided from space, such as global navigation systems, are divided by national interests. At present, both Russia and the US operate separate, independent systems, Glonass and GPS, with the US refusing to permit basing of Glonass calibration stations on US territory. Distrustful of dependency on other networks, the European Union is developing its own €3 billion equivalent, the Galileo system.

China joined this effort in 2003: the following year, US Air Force Undersecretary Peter Teets wrote, "What will we do 10 years from now when American lives are put at risk because an adversary chooses to leverage the global positioning system of perhaps the Galileo constellation to attack American forces with precision?"

A threat was later made that the US might blow up such satellites during hostilities; in 2006 China was disinvited from the Galileo consortium and the frequencies of the constellation altered such that they could be jammed by the US without disturbing the American GPS system, which was to have shared operating parameters and frequencies.

Meanwhile, scientists struggle to keep capable, functional spacecraft operating on shoestring budgets, while finding small budgetary increments to support the occasional new mission. There are no "flagship class" NASA missions, the most ambitious class of mission, planned beyond the Mars Science Laboratory and its rover, Curiosity.

The catchphrase for space exploration, as for all other social endeavors, has become "there is no money." Yet the US bought $400 billion of assets with no public debate in mere weeks during the 2008 financial crisis. Trillions more were made potentially available, all balanced on the backs of future earnings of the working class. The money spent on one year's worth of military operations would fund the US space program for half a century. Surveys of the public regularly reveal that the "expected" cost of NASA reaches 20 percent of the federal budget. The true figure is half a percent, almost a factor of ten less than its peak during the Apollo program.

Significant amounts of that money are bestowed to private contractors. The feeding frenzy of contractors has led to debacles like the private Conestoga booster, which received NASA funding to strap boosters to repurposed Minuteman ICBMs to demonstrate "private" access to orbit. Orbital Sciences, provider of the Antares rocket, has an engineering model based on garage-sale Russian rockets and low-wage engineering from Russia and Ukraine. It received $1.9 billion in contracts to resupply the ISS. The mature Lockheed Martin/Boeing Atlas rocket family differs only in using contemporary inexpensive Russian engines, though the design is of similar vintage. SpaceX, led by billionaire Elon Musk, is unique in developing actual new hardware, though at costs which have been far closer to that of existing mature rocket designs like the Boeing Delta than the exuberant predictions made before contracts were let.

That much of the world's launch capacity is reliant on fifty-year-old engineering designs speaks deeply to the inability of the world economic system to purpose the creative labors of scientists and engineers towards the challenges of space. Nation-states spend as much in duplication of dual-purpose infrastructure as they do in the exploration of the cosmos. Critical and unique scientific tools, such as the Hubble Space Telescope, are abandoned in space to operate until some critical part breaks, for lack of human access.

This is no accident. The same contradictions that have divided human aspiration from human achievement, producing growing hunger and want in a world with the technological means to solve both, paralyze the reach of humanity into the solar system. The task to reclaim space as humanity's birthright is inseparable from that necessary to oppose war and conquer want and deprivation. In other words, it is the fight for socialism.