Commentary: Nukes in Space 2021

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Abstract

The use of nuclear in space is being pushed harder than ever. In July, an Associated Press dispatch declared the headline "US Eyes Building Nuclear Power Plants for Moon and Mars". Also in July, The White House National Space Council issued a strategy for space exploration that includes "nuclear propulsion methods." Additionally, "Space Policy Directive-6" was released by The White House last month titled "Strategy for Space Nuclear Power," elaborating on the U.S. desire for nuclear power and nuclear propulsion in space. And finally, Elon Musk, founder and CEO of SpaceX, has been touting the detonation of nuclear bombs on Mars to transform it into an "Earth-like planet." The rapid trajectory with which this growing support for nuclear in space, however, is quite concerning—especially given the potential of explosion whilst aboard a spacecraft, and even worse, the after effects on humans and the environment here on earth may experience. This article promotes the use of solar energy as an alternative.

Keywords: space, nukes, nuclear power, moon, mars, Elon Musk, SpaceX, solar energy

Comentario: armas nucleares en el espacio 2021

Resumen

El uso de la energía nuclear en el espacio se está presionando más que nunca. En julio, un despacho de Associated Press declaró el titular "Los ojos de EE.UU. están construyendo plantas de energía nuclear para la Luna y Marte". También en julio, el Consejo Nacional del Espacio de la Casa Blanca emitió una estrategia para la exploración espacial que incluye "métodos de propulsión nuclear". Además, la Casa Blanca publicó el mes pasado la "Directiva de política espacial-6" titulada "Estrategia para la energía nuclear espacial", que explica el deseo de Estados Unidos de disponer de energía nuclear y propulsión nuclear en el espacio. Y finalmente, Elon Musk, fundador y director ejecutivo de SpaceX, ha estado

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promocionando la detonación de bombas nucleares en Marte para transformarlo en un "planeta parecido a la Tierra". Sin embargo, la rápida trayectoria con la que este apoyo cada vez mayor a la energía nuclear en el espacio es bastante preocupante, especialmente dado el potencial de explosión a bordo de una nave espacial y, lo que es peor, las secuelas que pueden experimentar los seres humanos y el medio ambiente aquí en la Tierra. Este artículo promueve el uso de la energía solar como alternativa.

Palabras clave: espacio, armas nucleares, energía nuclear, luna, marte, Elon Musk, SpaceX, energía solar

评论文：2021年太空核武器

摘要

在太空中使用核能一事比以往任何时刻都更受到推动。2020年7月，一篇美联社报道宣布了标题为“美国考虑为月球和火星建设核电站”的文章　。同月，白宫国家太空委员会宣布一项太空探索战略，该战略包括“核动力推进方法”。此外，白宫于2020年12月披露了名为“太空核电战略”的“太空政策指令-6”，详细描述了美国对太空中的核电及核动力推动的渴望。最后，SpaceX的创始人兼首席执行官伊隆·马斯克（Elon　Musk）一直在兜售对火星引爆核弹，以期将其转变为“像地球一样的星球”。不过，支持在太空中使用核能一事的快速增长轨迹令人十分担忧—尤其鉴于在飞行器中操作爆炸的潜在后果，甚至更坏的是，地球上人类和环境可能承担的后果。本文支持将太阳能作为替代物。

关键词：太空，核武器，核电，月球，火星，伊隆·马斯克（Elon Musk），SpaceX，太阳能

On its website, SpaceX sells t-shirts emblazoned with the words "Nuke Mars." Business Insider explains, Musk "believes it will help warm the planet and make it more hospitable for human life." As space.com similarly reports, "The explosions would vaporize a fair chunk of Mars' ice caps, liberating enough water vapor and carbon dioxide ... to warm up the planet substantially, the idea goes."

It has been projected that it would take more than 10,000 nuclear bombs to carry out the Musk plan. The

nuclear bomb explosions would render Mars radioactive. The nuclear bombs would be carried to Mars on the fleet of 1,000 Starships that Musk wants to build—like the one that blew up in a fireball in December. "Fortunately," reported NBC's Nightly News host Lester Holt, "no one was aboard."

But *what if* nuclear materials had been aboard? *What if* one or more of those hydrogen bombs were aboard? *What if* a nuclear reactor which was supposed to be delivered to the Moon or Mars was aboard?

Be Careful What You Ask

My interest in nuclear space issues began 35 years ago from reading a U.S. Department of Energy newsletter about two space shuttles: the Challenger, which was to be launched the following year with plutonium aboard, and Atlantis.

The plutonium aboard the shuttles in 1986 was intended to be used as fuel in radioisotope thermoelectric generators (RTGs) that were meant to provide a small amount of electric power for instruments on space probes released from the shuttles once they achieved orbit.

Referring to the U.S. Freedom of Information Act as support, I asked myself what the consequences would be for an accident in the lower or upper atmospheres or an accident on launch—and the impacts of the dispersal of deadly plutonium. A few years earlier, I authored Cover Up: What You Are Not Supposed to Know About Nuclear Power, so I was quite familiar with plutonium—which is considered the most lethal radioactive substance

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—Karl Grossman

Searching for Answers

For ten months there was a stonewall of challenges to my FOIA request by DOE and NASA. Upon finally receiving the information, though heavily redacted, they responded that the likelihood of a shuttle accident releasing plutonium was "small." One document stated that:

"The risk would be small due to the high reliability inherent in the design of the Space Shuttle." NASA placed the odds of a catastrophic shuttle accident at one-in-100,000.

Then, on January 28, 1986, the Challenger blew up.

It was on its next mission, in May 1986, that it was slated to include a plutonium-fueled RTG aboard. I contacted The Nation magazine and asked whether they were aware that the next launch of the Challenger was to be a nuclear mission. They were not.

As this was a terrifying surprise to both of us, *The Nation* suggested that I author a front-page editorial to expose what we entitled "*The Lethal Shuttle*."

"I found that accidents involving the use of nuclear power in space is not a 'sky-is-falling' threat."

—Karl Grossman

The editorial began, "Far more than seven people could have died if the explosion that destroyed Challenger had occurred during the next launch ...."

Incidentally, later in 1986, NASA drastically increased the odds of a catastrophic shuttle accident to one-in-76. It turned out the one-in-100,000 estimate was based on dubious guessing.

I found that accidents involving the use of nuclear power in space is not a "sky-is-falling" threat. Out of 26 U.S. space nuclear missions, there had been three accidents—the worst in 1964 involving a satellite which was powered by a SNAP 9-A radioisotope thermoelectric generator fueled with plutonium. The satellite disintegrated into the atmosphere as it came crashing back down to Earth—its plutonium dispersing as dust extensively on Earth. Dr. John Gofman, an M.D. and Ph.D., professor of medical physics at the University of California at Berkeley, formerly associate director of Lawrence Livermore National Laboratory, author of *Poisoned Power*, and involved in early studies of plutonium, long pointed to the SNAP 9-A accident as causing an increase in lung cancer on Earth.

The Writing on the Wall

The connection was becoming quite clear between NASA's use of nuclear power in space and the weaponization of space. The Ronald Reagan "Star Wars" scheme of the 1980s was predicated on orbiting battle platforms with nuclear reactors or "super" plutonium systems providing the power for hypervelocity guns, particle beams, and laser weapons. As declared Lieutenant General James Abramson, head of former president Ronald Reagan's "Star Wars" (formally called the Strategic Defense Initiative), "without reactors in orbit [there is] going to be a long, long light [extension] cord that goes down to the surface of the Earth" to power space weapons. NASA, although organized as a civilian agency, soon understood where the money exists in Washington, D.C.—the Pentagon. And over decades, has coordinated activities with the U.S. military.

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—Lieutenant General James Abramson

Alternatives to Nuclear Space

As more and more research has been conducted on this important topic, other alternatives to nuclear reactors on Mars and the Moon, have emerged. Here are some examples from both print and digital media documenting this new development:

- Solar power could provide all the energy for would-be settlements, reporting the headline in Universe

Today: "Solar Power is Best for Mars Colonies." The extensive article states how "a NASA-sponsored MIT think-tank has weighed up the future energy needs of a manned settlement on Mars and arrived at an interesting conclusion … solar arrays might function just as well, if not better, than the nuclear options."

- A Discover magazine piece, "How to Harvest Terawatts of Solar Power on the Moon," reported that Japanese corporation, Shimizu, were "gearing up to develop solar power on the Moon." The "photovoltaic cells themselves could be tissue thin, since the moon has no weather or air," said the article, "and half of the Moon is in sunlight at any one time." A huge amount of solar power energy could be generated on the Moon that could be beamed back to Earth, it related.

- *Popular Mechanics* headlined an article in November, "The Thermal Nuclear Engine That Could Get Us to Mars in Just 3 Months," which stated that promoters of nuclear propulsion claim it would get astronauts to Mars quicker.

Meanwhile, General Atomics Electromagnetic Systems developed a design for a nuclear propulsion reactor for trips to Mars.

As to the use of nuclear power for propulsion in space, I have written many pieces about a particular solar alternative: solar sails. In October, the *New Scientist* in October published a comprehensive piece entitled "The new age of sail." The subheading following with: "We are on the cusp of a new type of space travel that can take us to places no rocket could ever visit."

The article begins by discussing 17th Century astronomer Johanne Kepler's observation of comets and discovering "that their tails always pointed away from the sun, no matter which direction they were traveling." To Kepler, it meant only one thing: "[T]he comet tails were being blown from the sun." I further explain in the piece that, indeed, "the sun produces a wind in space" and "it can be harnessed. First, there are particles of light streaming from the sun constantly, each carrying a tiny bit of momentum. Second, there is a flow of charged particles, mostly protons and electrons, also moving outwards from the sun. We call the charged particles the solar wind, but both streams are blowing a gale—that's in the vacuum of space."

Japan launched its Ikaros spacecraft in 2010—sailing in space using this alternative solar energy from the sun. Last year, the LightSail 2 mission of The Planetary Society was launched—and it continues to remain in space, flying with the sun's energy.

New systems using solar power are being developed—past the current use of thin film such as Mylar for solar sails. The *New Scientist* article spoke of scientists "who want to use these new techniques to set a course for worlds currently far beyond our reach—namely the planets orbiting our nearest star, Alpha Centauri."

In terms of RTGs and their generation of electricity, in 2011 NASA launched the Juno space probe to Jupiter–which instead used three solar arrays to generate onboard electricity. Juno also remains in space, orbiting and studying Jupiter, where sunlight is a hundredth of what it is on Earth.

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—Bruce Gagnon, Coordinator Global Network Against Power in Space

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After the SNAP 9-A disaster, NASA stopped using RTGs for satellites and was instrumental in developing solar photovoltaic technology. All satellites launched today use solar—as does the International Space Station.

With the rocky transition between former U.S. President Donald Trump, and current President Joe Biden, one compelling question remains: *Will there be change in its use of nuclear power in space*? This very question was posed on the cover of the November 16, 2020 edition *Space News* entitled, "JOE BIDEN'S TURN, WHAT'S IN STORE FOR NASA & SPACE FORCE?"

It is no secret that President Biden is an advocate of "advanced" nuclear power, and a large segment of fellow members of the Democratic Party voted in the U.S. House of Representatives and Senate in 2019 for formation of a U.S. Space Force. The *Space News* cover article quoted a statement from the Washington aerospace and defense-consulting firm, Velos, that "'Biden has 'expressed no plans for structural changes to U.S. space programs ... the Democratic Party national platform supports continuity within NASA and the Space Force.'"

The leading group since 1992 challenging the use of nuclear power in space is the Global Network Against Weapons and Nuclear Power in Space. The organization's long-time coordinator, Bruce Gagnon (who also shares an article in the current issue of *SESA*), comments: "The Elon Musk plan to explode 10,000 nukes over Mars epitomizes the insanity of this rush to move nuclear power into space. The Department of Energy, which would be responsible for fabricating all of these various nuclear devices being considered for space operations, has a long, tragic record of worker and environmental contamination at their string of labs around the nation. Take, for example, the 1997 launch of the Cassini space probe that carried 72 pounds of toxic plutonium-238 aboard, Gagnon continues, "just prior to the launch, it was reported that Los Alamos National Laboratory in New Mexico had 244 cases of worker contamination while fabricating the plutonium generators for that mission. So, it is not just some theoretical equation that there might be some accident upon launch. The nuclear production process is killing us before any rocket lifts off from a launch pad."

Gagnon further explains that "the plan to build nuclear-powered rockets to Mars, nuclear mining colo-

nies on the planetary bodies and ultimately nuclear-powered weapons in space all signal the dangers and lunacy of those driving this mad rush to colonize space." These space entrepreneurs and the nuclear/military industrial complex have learned nothing since the atomic bombs were exploded over the heads of the people of Hiroshima and Nagasaki."