

New Era Of Falling Space Debris, Old Treaties On Liability

By **Tod Northman and Christine Snyder** (May 4, 2018, 1:54 PM EDT)

Friday, Dec. 22, 2017, 5:27 p.m. — SpaceX Falcon 9 rocket is launched from Vandenberg Air Force Base just north of Los Angeles to the amazement, wonder and (for some) terror of millions. As its plume of water vapor hit the cold surrounding air, it created a brilliant display in the night sky. Rush-hour traffic ground to a halt, and the Los Angeles police and fire departments were inundated with calls from alarmed residents, prompting SpaceX CEO Elon Musk to take to Twitter, posting a video of the spectacle along with a sardonic tweet: “Nuclear alien UFO from North Korea.”

Sunday, April 1, 2018, 8:16 p.m. — China’s Tiangong-1 space lab re-enters the Earth’s atmosphere, according to the U.S. Joint Force Space Component Command. The space lab was launched in 2011, but the Chinese lost control of Tiangong-1 (which means “heavenly palace”) in 2016. In the days leading up to Tiangong-1’s re-entry, speculation swirled over exactly where the space lab would come down, as many suggested that not all of the craft would burn up on re-entry. The map released by the European Space Agency depicting the area where the space lab could potentially crash covered most of the U.S., Central America, South America, Australia, much of China and India, and all of Africa. As it turns out, the craft likely burned up over the Pacific Ocean.

Just What Is Floating Above Our Heads?

Since it began in the 1960s, man’s space activity has steadily increased. That increase in space activity has also meant an increase in the amount of man-made space debris left in orbit around our planet. According to the European Space Agency, in the almost 60 years since the start of man’s activity in space, there have been more than 5,000 launches resulting in over 42,000 objects in Earth’s orbit large enough that they are tracked by the U.S. Space Surveillance Network. Nearly a quarter of those objects are satellites, less than 20 percent of which remain operational.[1] But these tracked objects are just a small fraction of the space debris circling our planet. Due to fragmentation (either through the breaking apart of man-made objects in space or the direct of collision those objects), there are estimated to be over 750,000 objects of space debris over 1 cm in size currently orbiting the Earth, and the number of smaller objects is estimated to be in the millions.[2] Moreover, with approximately 100 new launches per year,[3] the amount of space objects and debris in the skies over our heads is ever growing, with the European Space Agency reporting the most drastic increases in the amount of space debris occurring



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since 2010.[4] This increase in space debris and further increases the chances of additional collisions resulting in even more space debris.

What Happens When the Sky Falls?

While most space debris that falls back to Earth burns up in the Earth's atmosphere and never reaches the ground, some objects make it through. "About once a year, we'll find a piece of spacecraft or a rocket body that survived reentry," according to Nicholas Johnson, NASA's chief scientist for orbital debris.[5] And, according to the U.S. Department of Defense, an average of two to three objects re-enters the Earth's atmosphere each day.[6]

So far, we have been lucky. To date, there is only one known instance of a person being struck by falling space debris. In January 1997, Lottie Williams of Tulsa, Oklahoma, was struck in the shoulder by a piece of disintegrating rocket booster approximately the size of a soda can.[7] Fortunately, she was not seriously harmed. But, with the steady increase in space activity by both the public and private sectors comes an increased chance that a failed launch or obsolete space objects will fall back to Earth and cause damages to people and property.

Who is Responsible for Damage Caused By Falling Space Debris?

A series of international treaties dating back to the era of humankind's first forays into the heavens addresses where the responsibility lies for damage caused by falling space debris. The first of these treaties, the 1967 Treaty on Principles Governing the Activities of States in the Exploration of Use of Outer Space, including the Moon and Other Celestial Bodies outlines the fundamental principles governing the peaceful exploration of space.

One such fundamental principle is liability for harm caused by such activity. Article VII of the treaty provides that governments who are a party to the treaty "shall bear international responsibility for national activities in outer space." This means the member nations agree to be responsible for any harm caused by their space activity. More importantly, such liability attaches for any activity by a member state's nationals, whether or not the state's national is acting on behalf of the government or on behalf of a private corporation, and liability attaches even if the launch occurs outside of the member state's territorial limits. For example, if a private U.S. company were to launch a satellite or other space object from a launch site in Europe, the United States would be internationally responsible for any harm or damage caused as a result. More than 100 nations are signatories to the treaty.[8]

In addition to its own provisions, the treaty also served as the foundation for several treaties and U.N. resolutions that followed, each of which developed in more detail specific elements of the fundamental principles covered by the treaty.[9] With regard to liability for damage to persons and property caused by space activity, the Convention on International Liability for Damage Caused By Space Objects further developed and expanded on Article 7 of the treaty. The convention addresses the scope of a nation state's liability when it provides that a "launching state" shall be "absolutely liable" for damage caused by its space objects on the surface of the Earth or to aircraft.[10] It also provides that for damage caused other than on the surface of the Earth (i.e., damages caused to a space craft or personnel in space by another nation's space activity), the launching nation is only liable if the harm was due to its fault.

Only nations may make a claim for compensation for damages caused by space objects or the launching of space object. Individual citizens of those nation states have no right under the convention to assert a claim. Such individuals must petition their government to make a claim under the treaty on their behalf.

A claim for compensation must be made within one year following the date of the occurrence of the damage or within one year following the date of identification of the state responsible for the damage. The convention also contains a number of provisions regarding the division of liability when two or more nations work together to conduct space activity that results in damage to people or property.

In 1981, the former Soviet Union agreed to pay Canada \$2.55 million for damage caused by a Soviet nuclear-powered satellite that fell in Canada in 1978.[11] The satellite, which carried radioactive power cells, largely disintegrated in the atmosphere, but a few pieces landed in Canada's Northwest Territories, causing Canada to expend over \$5 million in recovery and remediation efforts.[12] Canada submitted a claim to the Soviet Union under the convention, and the two countries eventually agreed to a settlement for around half of the original claim amount.[13]

The Future

With private enterprises' ever-increasing efforts to touch the stars, man's activity in space will dramatically increase in the coming decades. Whether it's Houston-based Orion Span Inc.'s plans to launch the first ever luxury space hotel by 2021, Virgin Galactic's plans to start affordable (relatively speaking) space tourism opportunities, or Jeff Bezos' Blue Origin LLC plans to send tourists into space as early as this year, the stars seem closer today than they have ever been. These are exciting times for sure. But, the thrill of reaching the stars is not without risk to those still on the ground. Those same commuters on the 105 in Los Angeles who were mesmerized by the sight of the Falcon 9's ascent, could, next time, be cowering in fear as a launch gone awry rains down over the dense population center. It is only a matter of time before Lottie Williams is not alone. We should be asking whether the current status of space law can sufficiently address these new developments and risks. Or, is it time to revamp space law to meet the realities of a brave new era?

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[1] See ESA website, page on Space

Debris: https://www.esa.int/Our_Activities/Operations/Space_Debris/About_space_debris (accessed April 21, 2018).

[2] Id.; ESA website on Clean

Space: http://www.esa.int/Our_Activities/Space_Engineering_Technology/Clean_Space/How_many_space_debris_objects_are_currently_in_orbit (accessed April 24, 2018).

[3] Id.

[4] See ESA website, page on Space Debris, Count evolution by object type chart: https://www.esa.int/Our_Activities/Operations/Space_Debris/About_space_debris (accessed April 21, 2018).

[5] PBS News Hour, Steady Stream of Space Debris Rains Down on Earth, <https://www.pbs.org/newshour/science/low-earth-orbit-is> (accessed April 21, 2018).

[6] Id.

[7] Id.

[8] See United Nations, Office for Outer Space Affairs, website on Outer Space Treaty, <http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html> (accessed April 18, 2018).

[9] See 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, the 1982 Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, the 1986 Principles Relating to Remote Sensing of the Earth from Outer Space, the 1992 Principles Relevant to the Use of Nuclear Power Sources In Outer Space, and the 1996 Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States

[10] See United Nations, Office for Outer Space Affairs, website on Liability Convention, <http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliability-convention.html> (accessed April 19, 2018).

[11] United Press International Inc., Canada Settles with Russia for satellite crash, <https://www.upi.com/Archives/1981/04/02/Canada-settles-with-Russia-for-satellite-crash/7336355035600/> (accessed April 29, 2018)

[12] Id.

[13] Id.