

## In space, Taiwan can live forever

Written by Richard Fisher Jr  
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By the simple gesture of inviting President Tsai Ing-wen (蔡英文) to visit NASA's Houston Space Center on Aug. 19, Taiwan and the US acknowledged their partnership in space. With the visit, Taipei and Washington also seized the future, opening the door to new levels of space cooperation, which could transform Taiwan's economic, security and even political future.

Although the National Space Organization in Hsinchu was not formed until 1991, Tsai's NASA visit in a way marked the culmination of more than 20 years of Taiwan-US space cooperation, which started with the January 1999 launch of Taiwan's Formosat-1 observation satellite from Florida's Cape Canaveral.

The Formosat-5 observation satellite was launched on Aug. 24 last year by a US SpaceX Corp Falcon-9 launcher. The 12-satellite constellation Formosat-7 could be launched from the larger SpaceX Falcon Heavy next year.

In addition, the Chungshan Institute of Science and Technology-Academia Sinica Alpha Magnetic Spectrometer, placed on the International Space Station (ISS) in 2011, was so successful that NASA decided to work with the institute to develop a cloud computer for the ISS.

Also, in 2016, NASA asked the institute to help design a moon lander to support its Resource Prospector Mission to find water and useful minerals.

Taiwan's record of cooperation with NASA, and with new US private sector "space pioneers" like SpaceX, qualifies Taiwan to become an active partner in realizing the future benefits of the "space economy."

By radically lowering the costs of space access, SpaceX and other private space companies, like Blue Origin, are making it possible to achieve a significant manned and unmanned scientific and economic presence on the moon by the mid-2020s and to soon after, begin mankind's expansion to Mars.

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In September 2016 in Guadalajara, Mexico, SpaceX founder Elon Musk revealed his low Earth orbit-capable Big Falcon Rocket and described how it could eventually transport 1 million humans to Mars.

Key to this future would be the encouragement of Taiwan's private sector to seek opportunities in space services and commerce.

US President Donald Trump has placed a top priority on creating a new regulatory regime that can better enable the US private sector to find opportunities and profit in space. US companies seeking international partners for ventures on the moon and Mars should be encouraged to consider Taiwanese companies.

Washington can make a grand gesture to encourage such cooperation by offering Taiwan the opportunity for an astronaut-tended program on the ISS.

Washington should also relax its previous opposition to Taiwan's development of space-launch vehicles, which arose out of the desire to constrain the nation's long-range missiles in the failed hope it might help restrain China's mounting missile threat.

China, too, would like to partner with Taiwan in space, but its loud protests of Tsai's visit to the US last month and its subsequent "stealing" of El Salvador's diplomatic relationship with Taipei served to drown out the offer made in March by Chinese astronaut Yang Liwei (杨利伟) that Taiwanese astronauts could work on China's future space station.

However, as China's space station will be a "dual-use" civil-military platform that could be used to attack Taiwan, consistent with China's overall dual-use space program, which eventually aims to eventually militarize the moon, it makes no sense for Taiwan or any democracy to work with China in space until China can agree to real peace on Earth.

This might not happen soon, due in no small part to China's ambition to control the Earth-moon system, thus leveraging control over how all nations might benefit from the emerging space economy.

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Therefore, it is also important for Washington to consider how new space capabilities might help to deter Chinese aggression against Taiwan.

For example, with even short warning, a Taiwan-based space launcher could be used to loft hundreds of very small surveillance satellites that China cannot shoot down, thus ensuring Taiwan could monitor and target invading Chinese ships and aircraft. This could go far to deter China from initiating such an attack.

Taiwan could benefit in other ways. Early last month, General Carlton Everhart, leader of the US Air Force Mobility Command, spoke of his visit to SpaceX, where he was told the Big Falcon Rocket could move 136 tonnes of cargo around the Earth in 30 minutes.

On the eve of Chinese aggression, three such missions could very quickly ship about 1,200 PAC-3 missile interceptors to Taiwan. While the US might not have this number of PAC-3s today, three Big Falcon Rocket missions could make it possible to ship about as many PAC-3s as the number of Chinese short-range ballistic missiles targeting Taiwan.

China's growing threats to Taiwan, other US allies and to US forces in Asia, especially from its emerging maneuverable hypersonic glide vehicle weapons, is a factor forcing the US to expand its missile defense capabilities to space.

First, this might include new missile detection sensors and then new low Earth orbit-based missile defense systems. These will enable the US to target enemy missiles in their most vulnerable "boost phase" of launch, and complement the land and sea-based missile defenses of the US and Taiwan.

For Washington and Taipei, peace in the Taiwan Strait, as in all of Asia, now depends not just on terrestrial military strength and cooperation alone, but also on strength and cooperation in space. China's and Russia's military challenges on Earth and space must now be countered by new US capabilities in space. These US capabilities could bring closer the day both China and Russia conclude that aggression will fail. This in turn would contribute to real peace on the Taiwan Strait, in low Earth orbits and beyond.

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By contributing to a future space economy on the moon and Mars, Taiwan could help the democracies to achieve a level of presence that can help deter space aggression. It can also deepen its partnership with the US and other space-faring nations, transcending China's long effort to isolate and destroy the nation's democratic example.

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