

Promoting Space Sustainability

Continuing supervision

New Zealand Space Agency

15/03/2021

Implementation of the Guidelines for the Long-term Sustainability (LTS) of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space

Operational Case Studies

I. Short description of the outer space activity

In this case study, we outline how the New Zealand Space Agency collaborated with Space Situational Awareness company LeoLabs to develop the Space Regulatory and Sustainability Platform (the Platform). The tool, operated by LeoLabs, helps New Zealand to better supervise national space activities.

In 2017, New Zealand became a launching state when Rocket Lab commenced commercial launch operations. Shortly before the first launch, New Zealand enacted the Outer Space and High-altitude Activities Act, 2017 (the Act). The Act ensures that, before granting a payload permit or a launch license, every application meets certain tests. These include consistency with our international obligations, national interests, and that satellites operate in a manner that avoids collision risk and minimises orbital debris.

That same year, New Zealand also joined the Committee on the Peaceful Uses of Outer Space and participated in the final stages of the negotiations of the LTS Guidelines.

The Outer Space and High-Altitude Activities Act 2017 requires launch vehicles to be licenced and satellites to be permitted. Conditions can be attached to licences and permits to ensure that New Zealand's space activities are conducted in a responsible manner.

Since 2017, Rocket Lab has launched 97 satellites from New Zealand, and each of these required a permit from the New Zealand Space Agency.

To meet our obligations for 'continuing supervision' of national space activities, the New Zealand Space Agency sought a way to monitor objects launched from New Zealand and verify that they are being operated safely and in accordance with the conditions of their permit.

LeoLabs is a US-based provider of commercial radar tracking services for objects in Low Earth Orbit. In 2019, LeoLabs unveiled its third radar, located in New Zealand's Central Otago region.



Figure 1: Kiwi Space Radar, Central Otago, New Zealand. Source: LeoLabs

New Zealand collaborated with LeoLabs to create the Space Regulatory and Sustainability Platform with LeoLabs. A first of its kind among space agencies, this platform enables the New Zealand Space Agency to:

- track and monitor each New Zealand launched object, in real time, using the LeoLabs radar network
- set regulatory limits for specific objects and receive automated alerts when an object is outside of any prescribed parameters
- record object behaviour over time, and build a picture of New Zealand's "catalogue", both historical and current.
-

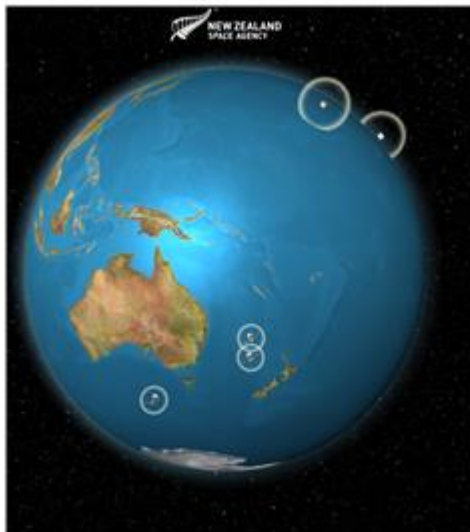


Figure 2: View of all satellites launched from New Zealand. Source: LeoLabs

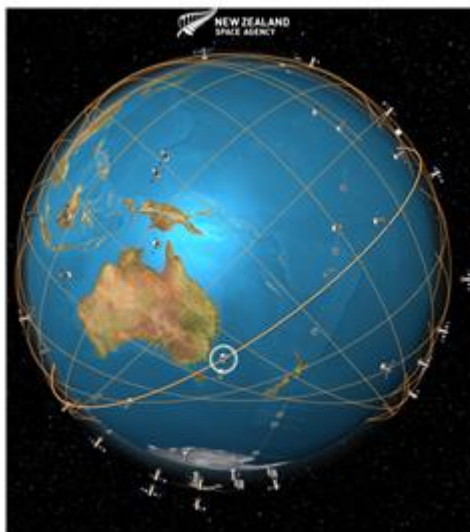


Figure 3: View of satellites launched from a particular launch. Source: LeoLabs

II. Connection with the LTS Guidelines

LTS Guideline **A.3** concerns the **supervision of national space activities**. In particular, it notes that states have a responsibility for 'continuing supervision' of national space activities, and emphasises the importance of ongoing compliance with relevant national and international regulatory frameworks, requirements, policies and processes.

The New Zealand Space Agency conducts a robust process before recommending that the Minister for Economic and Regional Development grant a payload permit or launch license. All of this is based on full information from applicants to ensure they meet the necessary regulatory requirements. Because of this, we assess information before a launch occurs. How does a regulator monitor activity post-launch?

The LeoLabs Platform enables New Zealand to exercise ‘continuing supervision’ after launch by providing highly accurate awareness of the activities of satellites launched from New Zealand and subject to our legislation. In doing so, the New Zealand Space Agency can identify when satellites are not behaving in a way consistent with their permit and contact the satellite operator to address the issue.

III. Lessons learned

The New Zealand Space Agency has now been using the Platform since June 2019, and has found that it has become a key part of our regulatory toolkit and a valuable source of information and evidence. In addition to providing insight at the level of individual launches or satellites, the platform has been critical in developing our understanding of the catalogue of New Zealand launched objects and informing our approach to SSA, STM and our role in a safe, sustainable and responsible LEO environment.

There are three key lessons we draw from our experience working with LeoLabs on the Platform:

- 1. Partnering with industry offers opportunities to find innovative solutions to solve sustainability issues.** The Platform demonstrates the contribution that the space industry can make towards space sustainability, including in assisting governments to meet their international obligations. For New Zealand, host to a fully commercial launch provider, this has shown us that collaborating with industry can deliver cutting-edge services that enhance our understanding of the outer space environment.
- 2. Pilot projects are an effective tool to demonstrate new technologies and practices.** As the pace of technology development accelerates, governments and space agencies need to adapt and be open to innovative new tools. Pilot projects are an effective way to test whether a technology or tool without committing to a long-term programme.
- 3. Tools like these can form the building blocks of space traffic management.** As orbits become more congested, more sophisticated coordination will be needed between satellite operators, and between space agencies. This is especially true as technologies develop and activities such as debris removal and on-orbit servicing become reality.

These developing practices, often referred to as ‘space traffic management’, will be important for ensuring the long-term sustainability of outer space, while also ensuring we can maximise the benefit of space for humankind. Space traffic management will rely on having an accurate understanding of what is happening in outer space; in this sense, the Platform provides early building blocks towards a space traffic coordination system.