

ROCKET LAB USA 2019

RUNNING OUT OF FINGERS PRESS KIT NOVEMBER 2019



LAUNCHING ON ELECTRON VEHICLE
TEN: 'RUNNING OUT OF FINGERS'





ROCKET LAB PRESS KIT 'RUNNING OUT OF FINGERS' 2019

LAUNCH INFORMATION

LAUNCH WINDOW

28 NOVEMBER – 12 DECEMBER NZDT
(28 NOVEMBER – 12 DECEMBER 2019 UTC)

LAUNCH SITE

LAUNCH COMPLEX 1
MAHIA PENINSULA, NZ

Launch Timing: First launch opportunity no-earlier than 07:56 UTC, Thursday 28 November (20:56 NZDT). The launch window will be open for up to two hours each day.

Watch the live launch webcast: www.rocketlabusa.com/live-stream.

For information on launch day visit www.rocketlabusa.com/missions/next-mission/ and follow Rocket Lab on Twitter [@RocketLab](https://twitter.com/RocketLab).



ALBA ORBITAL INTEGRATING THEIR ALBAPOD TO ELECTRON'S KICK STAGE AT LAUNCH COMPLEX 1 | November 2019



ALE CO. LTD'S TECHNICIANS AT WORK DURING PAYLOAD INTEGRATION AT LAUNCH COMPLEX 1 | November 2019

MISSION OVERVIEW

Running Out Of Fingers will be Rocket Lab's tenth Electron mission since the company's first launch in May 2017.

Onboard this rideshare mission are several PocketQube spacecraft from satellite manufacturer and mission management provider Alba Orbital. These six nanosatellites together represent five different countries and a range of technology demonstrations, including: LEO-to-LEO intersatellite link capabilities crucial to creating real-time global communications constellations; a payload built by university students in Hungary to measure human-made electromagnetic pollution; and a tester of new thermal isolation material for use in space.

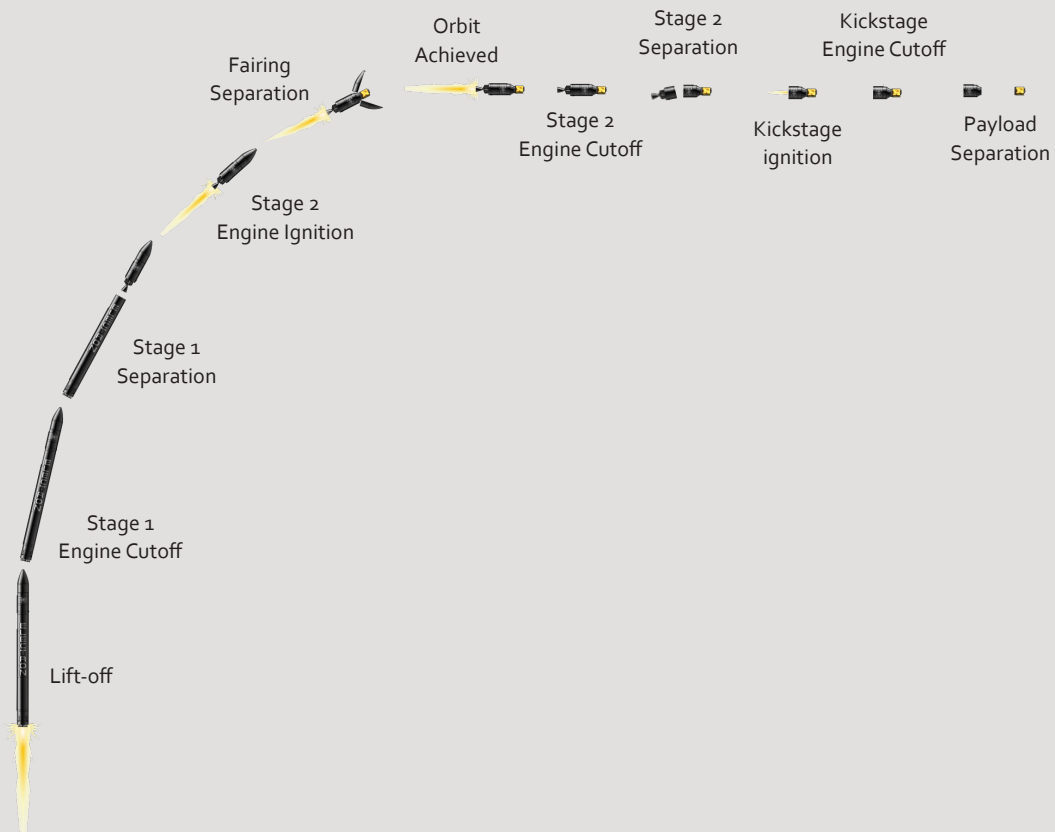
The final payload on board was procured by satellite rideshare and mission management provider Spaceflight for ALE Co., Ltd (ALE), a Tokyo-based company creating microsatellites that simulate meteor particles.

'Running Out Of Fingers' will also include the first guided, full telemetry re-entry of the Electron launch vehicle's first stage as part of Rocket Lab's plans to re-use and re-fly rocket boosters in future missions. Recovery instrumentation onboard this flight will include guidance and navigation hardware, including S-band telemetry and onboard flight computer systems, to live-gather data during the first stage's atmospheric re-entry, as well as a reaction control system to orient the booster.

TIMELINE OF EVENTS

HOURS:MINUTES:SECONDS FROM LIFT-OFF

	EVENT
-06:00:00	Road to the launch site closed
-04:00:00	Electron lifted to vertical position and filled with fuel
-02:30:00	Launch pad personnel exit area in preparation for launch
-02:00:00	Electron filled with liquid oxygen (LOx)
-02:00:00	Safety zones are activated for designated marine space
-00:30:00	Safety zones are activated for designated airspace
-00:18:00	The Launch Director conducts a go/no-go poll of launch operators to confirm Electron is ready for launch
-00:02:00	Autosequence commences and Electron's on-board computers initiate the launch sequence
-00:00:02	Ignition of the nine Rutherford engines powering Electron's first stage
00:00:00	Lift-off
+00:02:36	Main engines (Stage 1) cut off
+00:02:39	Stage 1 of Electron separates
+00:02:42	The vacuum Rutherford engine on Stage 2 ignites
+00:03:13	The Electron's fairing separates
+00:06:32	Battery hot-swap is performed
+00:08:54	Electron reaches orbit
+00:09:01	Stage 2 of Electron separates
+00:50:21	Kick Stage ignites
+00:51:57	Curie engine powering Kick Stage cuts off
~+00:60:00	Payloads deployed



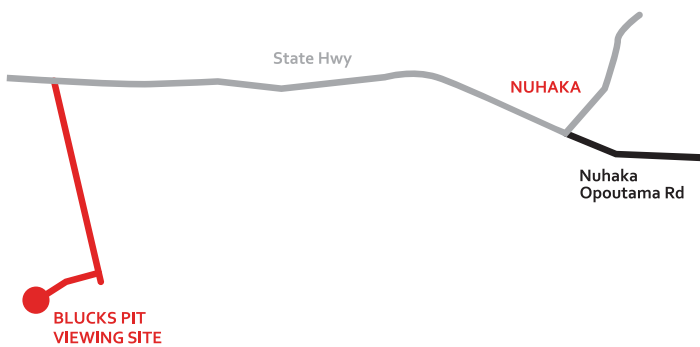


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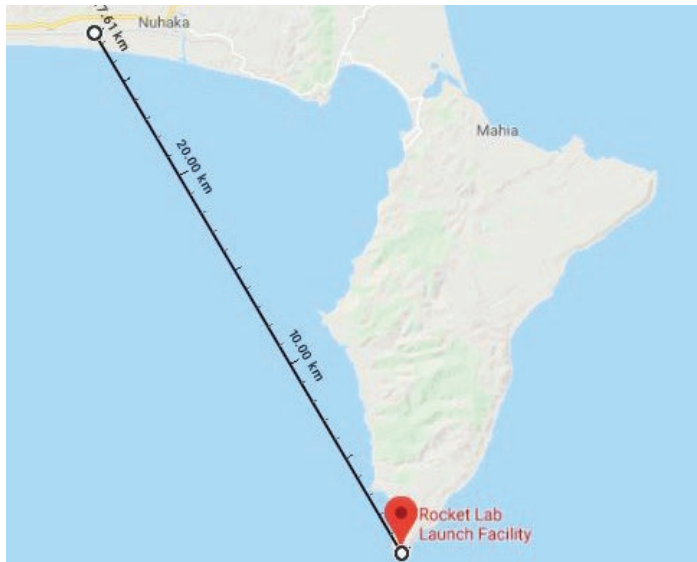
VIEWING A LAUNCH

VIEWING IN PERSON

Wairoa District Council has allocated a rocket launch viewing area for the public near Nuhaka, accessible via Blucks Pit Road. Visit www.visitwairoa.co.nz/welcome-to-wairoa/space-coast-new-zealand/ for more information. Scrubs and postponements are likely during launch windows, so visitors to the Blucks Pit viewing site should anticipate multiple postponements, sometimes across several days.



● **LC-1 LAUNCH VIEWING AREA** | Blucks Pit Road, near Nuhaka

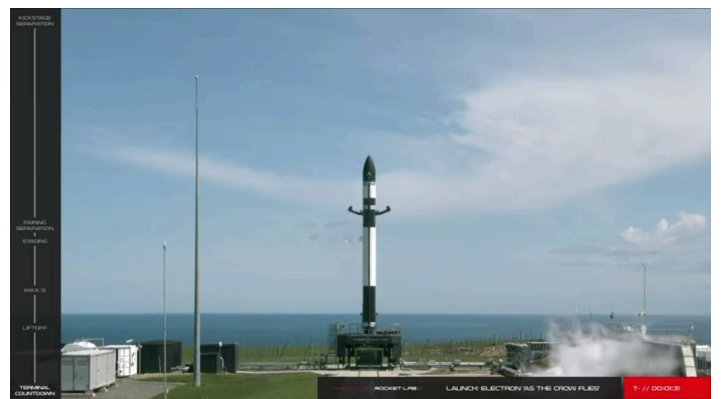


● **LAUNCH VIEWING AREAS DISTANCE FROM ROCKET LAB LC-1**

As Rocket Lab's top priority during the test launch is public safety, there are safety zones in place during a launch and no access will be permitted to Onenui Station where Launch Complex 1 is located.

LIVESTREAM

The best way to view a launch is via Rocket Lab's live video webcast. This offers the best views of launch and includes helpful commentary about the launch process. A livestream will be made available approximately 15 - 20 minutes prior to a launch attempt. Rocket Lab will post links to the webcast when live via Facebook and Twitter. The livestream is viewable at www.rocketlabusa.com/live-stream and Rocket Lab's YouTube channel.



● **ROCKET LAB'S LIVESTREAM OF 'AS THE CROW FLIES' MISSION** | October, 2019

LAUNCH FOOTAGE AND IMAGES

Images and video footage of the 'Running Out Of Fingers' launch will be available shortly after a successful mission at www.rocketlabusa.com/news/updates/link-to-rocket-lab-imagery-and-video

Images and footage of previous Rocket Lab launches can also be found at that link.

SOCIAL MEDIA

For real time updates on the launch follow the Rocket Lab Twitter page @RocketLab

f @RocketLabUSA t @RocketLab

CONTACTS

MORGAN BAILEY
HEAD OF COMMUNICATIONS

☎ +64 27 538 9039
✉ morgan@rocketlabusa.com



REUSABLE ROCKETS

LAUNCH FAST, LAUNCH OFTEN

Earlier this year we announced plans to recover and re-fly Electron's first stage. It's a move we're making to further increase launch frequency by eliminating the need to build a new first stage for every mission.

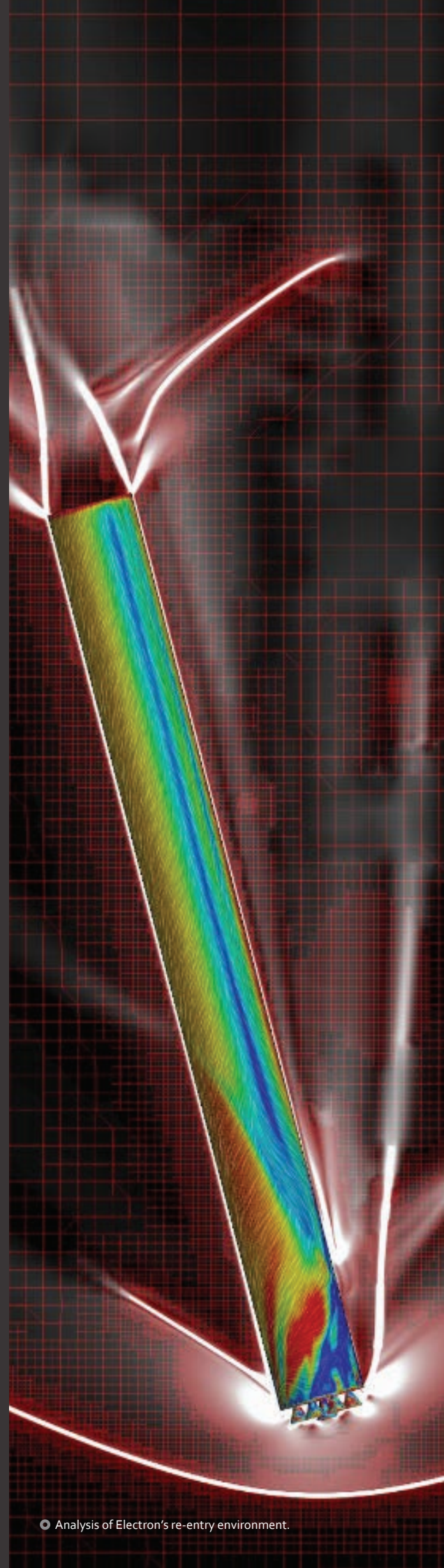
Work on Rocket Lab's Electron first stage reuse program began in late 2018. Long term, our plan is to capture Electron's first stage mid-air by helicopter, then transport the stage back to Launch Complex 1 for refurbishment and relaunch. Before we get to this point, we're focusing on gathering data from each mission and learning more about Electron's re-entry environment.

Our tenth mission – Running Out Of Fingers – represents the first major block upgrade to the Electron vehicle to support future recovery efforts. Electron's first stage will not be recovered from this mission, but the stage is equipped with new guidance and navigation hardware (including S-band telemetry and onboard flight computer systems) and a reaction control system to orient the booster during its atmospheric re-entry.

This mission will play a key role in helping us gather data and iterate towards our first full recovery mission next year.



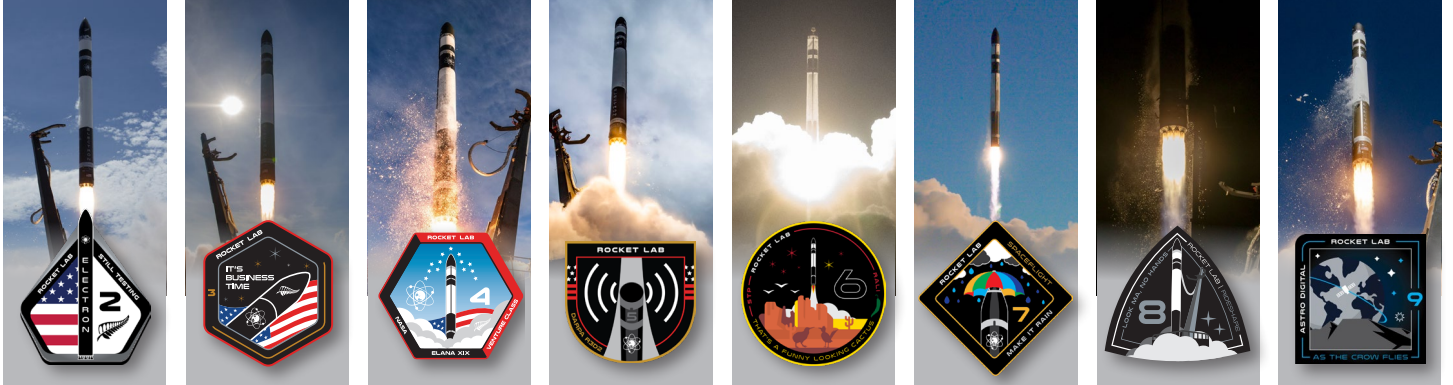
● Renders of Rocket Lab's stage 1 reuse and re-fly plan



● Analysis of Electron's re-entry environment.

RESPONSIVE SPACE ACCESS WITH ROCKET LAB

LAUNCH ON DEMAND – WE'RE READY WHEN YOU ARE.



Responsive launch is the key to resilience in space. All satellites are vulnerable, be it from natural, accidental, or deliberate actions. The ability to deploy new satellites to precise orbits in a matter of hours, not months or years, is critical to government and commercial satellite operators alike. It means uninterrupted weather monitoring, communications, navigation, early warning, and security systems - serving billions of people every day.

TRULY RESPONSIVE SPACE ACCESS REQUIRES THREE THINGS

1

RESPONSIVE LAUNCH VEHICLES

Electron is designed for standardized, rapid production. An entirely new Electron is currently built from scratch every 30 days. This high production rate ensures there are always launch vehicles on standby, ready to be assigned a payload for launch on demand.



2

RESPONSIVE LAUNCH SITES

Rocket Lab delivers the highest number of launch opportunities globally - more than 130 each year.

Rocket Lab's Launch Complex 1 in New Zealand can support up to 120 launches per year, offering unmatched launch schedule flexibility.

Launch Complex 2 on Wallops Island, Virginia, is tailored specifically for government missions and can support up to 12 launches per year.



3

RESPONSIVE SATELLITES

Rocket Lab's Electron launch vehicle is a standardized design, created to suit a range of satellites and missions, from a CubeSat rideshare to a single microsat. By not building to tail numbers, Rocket Lab provides unrivaled flexibility for on-demand launch. Satellites are integrated onto the stand-alone payload plate which can then be mounted to any Electron vehicle, enabling rapid and responsive launch opportunities.

Rocket Lab goes one step further with the creation of the common Photon satellite bus. Small satellite operators simply provide their sensor and Rocket Lab looks after satellite build, launch and ground segments. Photon removes the need for operators to build their own spacecraft and is an end-to-end solution for increasing flexibility for quick-reaction launches, without sacrificing reliability.





CONTACT US

[rocketlabusa.com](https://www.rocketlabusa.com)
[+64 9 373 2721](tel:+6493732721)
enquiries@rocketlabusa.com

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