How to watch four rocket launches on a banner day for the space industry



The space industry is rocketing through the last few weeks of 2018. And on Wednesday, December 19th, there are *four* rockets slated to launch from locations all over the globe. Thanks to how the orbital mechanics of these flights worked out, you could potentially watch a launch during breakfast, lunch, and dinner (depending on when you eat your meals, of course).

Originally, most of these launches were supposed to get underway on Tuesday, December 18th. But thanks to incredible luck (and unfavorable weather conditions), practically all of the rockets scheduled to launch yesterday got delayed. One of them, Blue Origin's test flight, has been pushed back to Friday.

Here are the four rocket missions set for takeoff on Wednesday, including what they're launching and how to watch them.

First Breakfast: ISRO’s GSLV

What is it launching? India’s space agency, the Indian Space Research Organization, is launching one of its GSLV rockets tomorrow, which will carry a communications satellite called GSAT-7A. The satellite is the 35th communication spacecraft built by ISRO and will provide coverage over India.

Where is this happening? The GSLV is lifting off from the Satish Dhawan Space Center on the southeast coast of India.

When can I watch? Take off is scheduled for 5:40AM ET, and ISRO usually provides livestreams beforehand on its Twitter account.

Anything else? Unlike the flights below, this mission was always scheduled to launch on Wednesday, December 19th. So it hasn’t suffered any 24-hour delays (yet).

Second Breakfast: SpaceX’s Falcon 9

What is it launching? SpaceX is launching its latest national security payload for the US Air Force – a satellite called GPS III SV01. The satellite was originally scheduled to fly on a Delta IV rocket made by the United Launch Alliance, but the Air Force decided to switch it over to a Falcon 9. Once in orbit, the satellite will join the current constellation used for GPS, ensuring it stays operational.

Where is this happening? The mission is taking place from SpaceX’s launch site at Cape Canaveral Air Force Station in Florida.

When can I watch? SpaceX’s launch window lasts from 9:07AM ET to 9:33AM ET, so the Falcon 9 can take off within that timeframe. Typically, the company’s live streams get started 15 to 20 minutes prior to takeoff. Originally this launch was meant to happen around the same time on Tuesday, but SpaceX

had to delay after a strange sensor reading triggered an abort of the final countdown sequence.

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Anything else? Unfortunately for SpaceX fans, there won't be a signature Falcon 9 landing after this flight. SpaceX needs all the fuel it can muster to get this satellite to space, so the company isn't saving any leftover propellant to perform a landing. The rocket doesn't have any landing legs or grid fins needed for steering, ensuring this vehicle is going bye bye after launch.

But, this flight does mark the last mission of the year for SpaceX, and if it's successful, it will bring the company's total 2018 launch count to 21. That's the most missions SpaceX has ever done in a year, beating a record 18 launches from 2017.

(Early) Lunch: Arianespace's Soyuz

What is it launching? Europe's main launch provider, Arianespace, is sending up a military satellite for France, using a Soyuz rocket. The satellite is called CSO-1, and it's the first of three identical satellites that France will use for surveillance, imaging the Earth for national security. The satellite will also be accessible to multiple European nations, including Germany, Sweden, and Belgium. Italy may even join in the near future.

Where is this happening? The flight is taking place from Arianespace's South American launch facility in French Guiana.

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When can I watch? Liftoff is scheduled for 11:37AM ET, and Arianespace should have a live stream on its YouTube channel before takeoff. The company rescheduled the launch from Tuesday, due to high winds in the upper altitudes over the

launch site.

Anything else? This is also Arianespace's last launch of the year, bringing the company's total missions to 11 for 2018.

(Late) Dinner: ULA's Delta IV Heavy

What is it launching? The military's primary launch provider, the United Launch Alliance, is planning to launch its most powerful vehicle, the Delta IV Heavy. On the rocket is a classified satellite for the National Reconnaissance Office called NROL-71. Since it's classified we don't know much about it, though we do have one of the NRO's intense mission patches — which sports an angry-looking eagle.

Where is this happening? The Delta IV Heavy is slated to take off out of Vandenberg Air Force Base in California.

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When can I watch? The launch is set for 8:44PM ET. Originally, this mission was supposed to happen two weeks ago, but ULA ran into a number of issues leading up to the flight. It was then scheduled for Tuesday, but had to be pushed until Wednesday due to high ground winds.

Anything else? As is the case for all the above companies, this is the last launch of the year for ULA. If it goes up, it will be the company's ninth mission of 2018.

Special dessert on Friday: Blue Origin's New Shepard

What is launching? Jeff Bezos' spaceflight venture Blue Origin plans to do another test flight this week, as early as Tuesday morning. The company is planning to fly its New Shepard suborbital rocket again. The vehicle is designed to fly to the edge of space, and then land back on Earth. Ultimately, Blue

Origin wants to fly tourists to space with the vehicle, and the company has been flying the New Shepard multiple times in preparation of the first crewed flights.

This flight won't be carrying people, but it will carry a handful of research payloads from various universities and NASA centers – a deal arranged through NASA's Flight Opportunities Program. One will measure the electromagnetic fields surrounding the New Shepard vehicle during flight, while another will test out how to measure rocket fuel in microgravity. And if the flight is like previous New Shepard launches, it seems likely the company will have a test dummy on board – one appropriately named Mannequin Skywalker.

Where is this happening? Blue Origin flies the New Shepard out of the company's launch facility in Van Horn, Texas.

When can I watch? Blue Origin will have a live stream of the flight. The once very secretive company used to never stream test flights, but then started to get into the habit of live-streaming them a few years ago. Blue Origin is aiming for no earlier than Friday, December 21st, and should have a livestream closer to launch time. The test flight was originally scheduled for Tuesday, but Blue Origin halted the mission due to some issues with the launch infrastructure on the ground. The company is still working with those problems, which is why a later date is needed.

Anything else? This will be the third test flight of the year for Blue Origin, potentially with the same New Shepard vehicle. Blue Origin retired its last New Shepard in 2016, after launching and landing it five times. Since then, the company has been flying an upgraded version of the New Shepard that is easier to reuse and sports actual windows. That particular vehicle has launched three times so far, and this week, it could go to space and back a fourth time.

However, we're still waiting for the next big milestone: when

people fly on a New Shepard for the first time. Blue Origin is aiming for that to take place in 2019, and will use a brand-new vehicle for the job – one that is rated for carrying crew. That vehicle, the fourth New Shepard rocket that the company will fly, is already at Blue Origin's West Texas launch facility.

The perfect storm

Four launches in a day may seem like a lot, but this isn't the first time we've had such a gathering of rockets before. In fact, there have been at least three instances in which four rockets have launched to orbit within a 24-hour period, according Jonathan McDowell, an astrophysicist at Harvard and avid spaceflight statistician. The most recent perfect storm happened in 1989, says McDowell, when a Japanese H-1 rocket, two Soyuz rockets, and a US Titan 23G rocket launched to orbit between September 5th and September 6th.

All of those rockets went to orbit, though. When it comes to suborbital records, those are much different. There have been times when upwards of 30 suborbital sounding rockets have launched from the same *site* within the same day, says McDowell. Still, four orbital missions in a day is fairly rare, and if all of these flights go up Wednesday, we may match the four-launch record for the first time in 29 years.

Luckily, space enthusiasts might not have to wait so long for the next four-launch day. There are dozens of orbital launch sites all over the globe, and more and more commercial players entering the field. And when you add in suborbital players like Virgin Galactic and Blue Origin, that only increases the chances of simultaneous launch dates. With all that activity, days of four-plus launches are a definite possibility in the future.

Update December 18th, 3:15PM ET: *At various times throughout the day on Tuesday, December 18th, four rockets scheduled for*

launch had to be pushed back until Wednesday.

https://www.theverge.com/2018/12/18/18144475/spacex-falcon-9-blue-origin-new-shepard-arianespace-soyuz-ula-delta-iv