

A satellite is shown in orbit around the Earth. A bright green line traces the satellite's path, which is a circular orbit around the planet. The Earth's surface is visible, showing continents and oceans. The satellite is positioned on the left side of the frame, with its orbital path extending across the top and right. The background is the dark, starry space of the universe.

**4** times a year

1

00:00:00,030 --> 00:00:04,080

NASA is about to launch the most advanced laser instrument of its kind,

2

00:00:04,100 --> 00:00:08,110

the Ice, Cloud and land Elevation Satellite-2, or ICESat-2,

3

00:00:08,130 --> 00:00:12,130

will measure changes in glaciers, ice sheets and sea ice. So to prepare

4

00:00:12,150 --> 00:00:16,200

for launch, we're counting down ten quick facts about ICESat-2.

5

00:00:16,220 --> 00:00:20,220

Ten thousand. That's how many times the ICESat-2 laser will fire

6

00:00:20,240 --> 00:00:24,240

each second. More pulses mean more height data. The fast-firing

7

00:00:24,260 --> 00:00:28,290

laser will allow us to measure the average annual change in the vast ice sheets

8

00:00:28,310 --> 00:00:32,310

down to the width of a pencil. Nine years of data from Operation

9

00:00:32,330 --> 00:00:36,340

IceBridge will be added to ICESat-2's new data. The airborne mission

10

00:00:36,360 --> 00:00:40,370

bridged the gap between the original ICESat and ICESat-2 with

11

00:00:40,390 --> 00:00:44,410

flights over the Arctic and Antarctica. Eight hundred picoseconds,

12

00:00:44,430 --> 00:00:48,450

less than one-billionth of a second. That's the precision at which individual

13

00:00:48,470 --> 00:00:52,500

laser photons will be timed as they complete their roundtrip journey from

14

00:00:52,520 --> 00:00:56,560

the satellite to the Earth and back. Seven kilometers per second is

15

00:00:56,580 --> 00:01:00,620

how fast ICESat-2 will zoom above the planet. It'll complete an orbit

16

00:01:00,640 --> 00:01:04,670

around Earth in 90 minutes. The orbits will converge around the poles, focusing the data

17

00:01:04,690 --> 00:01:08,760

in the regions with the most expected change. Six laser beams

18

00:01:08,780 --> 00:01:12,820

split from one on board ICESat-2. That's six times the beams

19

00:01:12,840 --> 00:01:16,880

of the original ICESat. More beams will cover more ground--or ice--and allow

20

00:01:16,900 --> 00:01:20,980

scientists to assess the slope of the surface they're measuring.

21

00:01:21,000 --> 00:01:25,090

Five hundred and thirty-two nanometers, the wavelength of the bright green laser.

22

00:01:25,110 --> 00:01:29,130

When these laser photons return to the satellite, filters block any light that's not exactly

23

00:01:29,150 --> 00:01:33,160

at this wavelength, keeping the amount of data noise down.

24

00:01:33,180 --> 00:01:37,190

Four times a year, every 91 days, ICESat-2 will measure the same ground

25

00:01:37,210 --> 00:01:41,240

tracks, allowing scientists to see how glaciers and other frozen features change

26

00:01:41,260 --> 00:01:45,270

with the seasons, including over winter. A 3-D look at Earth.

27

00:01:45,290 --> 00:01:49,320

Now with more height. ICESat-2 will measure elevation to see how much

28

00:01:49,340 --> 00:01:53,360

glaciers, sea ice and ice sheets are rising or falling and give us a more

29

00:01:53,380 --> 00:01:57,390

complete picture of our planet. There are two types of ice that ICESat-2 is after:

30

00:01:57,410 --> 00:02:01,400

land ice and sea ice. Land ice builds up year after year

31

00:02:01,420 --> 00:02:05,430

from snowfall, but sea ice forms when the ocean water freezes. It can last

32

00:02:05,450 --> 00:02:09,470

for years or just one winter. Only one instrument,

33

00:02:09,490 --> 00:02:13,520

but it's a really good one. The Advanced Topographic Laser Altimeter System,

34

00:02:13,540 --> 00:02:17,570

or ATLAS, was built by hundreds of people at NASA's Goddard Space Flight Center