1
00:00:00,600 --> 00:00:03,020
Floating hundreds of miles from Earth,

2
00:00:03,040 --> 00:00:05,820
astronauts get a unique perspective of our planet.

3
00:00:05,840 --> 00:00:07,960
While they might recognize landmarks,

4
00:00:07,980 --> 00:00:13,110
space is the only place they can see the very edge of our planet’s atmosphere.

5
00:00:13,130 --> 00:00:14,950
From orbit particularly looking at the horizon,

6
00:00:14,970 --> 00:00:18,110
did bring to mind how thin the atmosphere is.

7
00:00:18,130 --> 00:00:21,510
It's like an onionskin around this great big ball of the earth.

8
00:00:21,530 --> 00:00:24,190
This uppermost layer of Earth’s atmosphere,

9
00:00:24,210 --> 00:00:28,830
the ionosphere, also overlaps with the very beginning of space.

10
00:00:28,850 --> 00:00:31,070
It’s the job of NASA’s new mission, GOLD -

11
00:00:31,090 --> 00:00:34,280
the Global-scale Observations of the Limb and Disk instrument -

12
00:00:34,300 --> 00:00:36,210
to study this region --

13
00:00:36,230 --> 00:00:39,300

a region that isn’t just for astronauts to explore,

14
00:00:39,320 --> 00:00:42,800
but that affects humans every day down on the ground.

15
00:00:42,820 --> 00:00:46,390
For one thing, this layer of the upper atmosphere helps protect us

16
00:00:46,410 --> 00:00:50,420
from harmful radiation and energy emanating from the Sun.

17
00:00:50,440 --> 00:00:53,180
But in our modern society, it does so much more.

18
00:00:53,200 --> 00:00:55,630
It affects the smartphone that sits in your pocket

19
00:00:55,650 --> 00:00:59,170
and the radio waves that guide our airplanes.

20
00:00:59,190 --> 00:01:02,080
The ionosphere is a crucial layer of the atmosphere

21
00:01:02,100 --> 00:01:05,580
through which our communications and GPS signals travel.

22
00:01:05,580 --> 00:01:10,520
And when this region changes, it impacts those communications signals.

23
00:01:10,540 --> 00:01:14,420
Changes can occur above this region from the Sun’s activity,

24
00:01:14,450 --> 00:01:16,420
also known as space weather.

25
00:01:16,440 --> 00:01:22,080
Changes can also occur below from Earth’s weather such as hurricanes and wind patterns.

26
00:01:22,100 --> 00:01:26,350
GOLD connects the dots between how space weather and Earth’s weather

27
00:01:26,370 --> 00:01:28,780
shape the upper reaches of the atmosphere.

28
00:01:28,800 --> 00:01:31,030
But this region isn’t easy to study.

29
00:01:31,050 --> 00:01:35,320
The ionosphere spans roughly 60 to 400 miles from Earth’s surface,

30
00:01:35,340 --> 00:01:38,550
which is too high for aircraft and scientific balloons

31
00:01:38,570 --> 00:01:42,780
and the lower regions are too low to easily study with satellites.

32
00:01:42,800 --> 00:01:44,520
What are attainable, however,

33
00:01:44,540 --> 00:01:49,030
are the swathes of red and green light shining out from the upper atmosphere.

34
00:01:49,050 --> 00:01:51,960
Formed when the Sun’s rays hit atmospheric molecules,

35
00:01:51,980 --> 00:01:56,440
this light named “airglow”, comes from green and red bands of glowing gas.

36
00:01:56,460 --> 00:01:59,000
Some of the airglow is invisible to our eyes,

37
00:01:59,020 --> 00:02:01,480
shining in infrared and ultraviolet light,

38
00:02:01,500 --> 00:02:04,810

which can only be seen with scientific instrumentation.

39
00:02:04,830 --> 00:02:09,250
Taking advantage of our planet’s natural glow is GOLD.

40
00:02:09,270 --> 00:02:12,120
The GOLD instrument, which is about the size of a mini fridge,

41
00:02:12,140 --> 00:02:16,350
is hitching a ride on a commercial communications satellite, SES-14.

42
00:02:16,370 --> 00:02:20,420
The satellite’s orbit lies 22,000 miles above Earth

43
00:02:20,440 --> 00:02:26,020
where it can record images in ultraviolet light to monitor changes in airglow across the globe.

44
00:02:26,040 --> 00:02:32,660
These images give information on the temperature, density, and composition of particles in the upper atmosph

45
00:02:32,680 --> 00:02:36,890
GOLD collects these observations faster than any mission has ever done before.

46
00:02:36,910 --> 00:02:40,920
It captures an image of Earth’s entire disk every 30 minutes,

47
00:02:40,940 --> 00:02:45,340
allowing scientists to see how the upper atmosphere evolves throughout the day.

48
00:02:45,360 --> 00:02:49,280
GOLD joins a host of missions studying the very nature of space --

49
00:02:49,300 --> 00:02:52,130
around Earth, the Sun, and planets.

50
00:02:52,150 --> 00:02:55,020
As NASA ventures farther and farther from home,