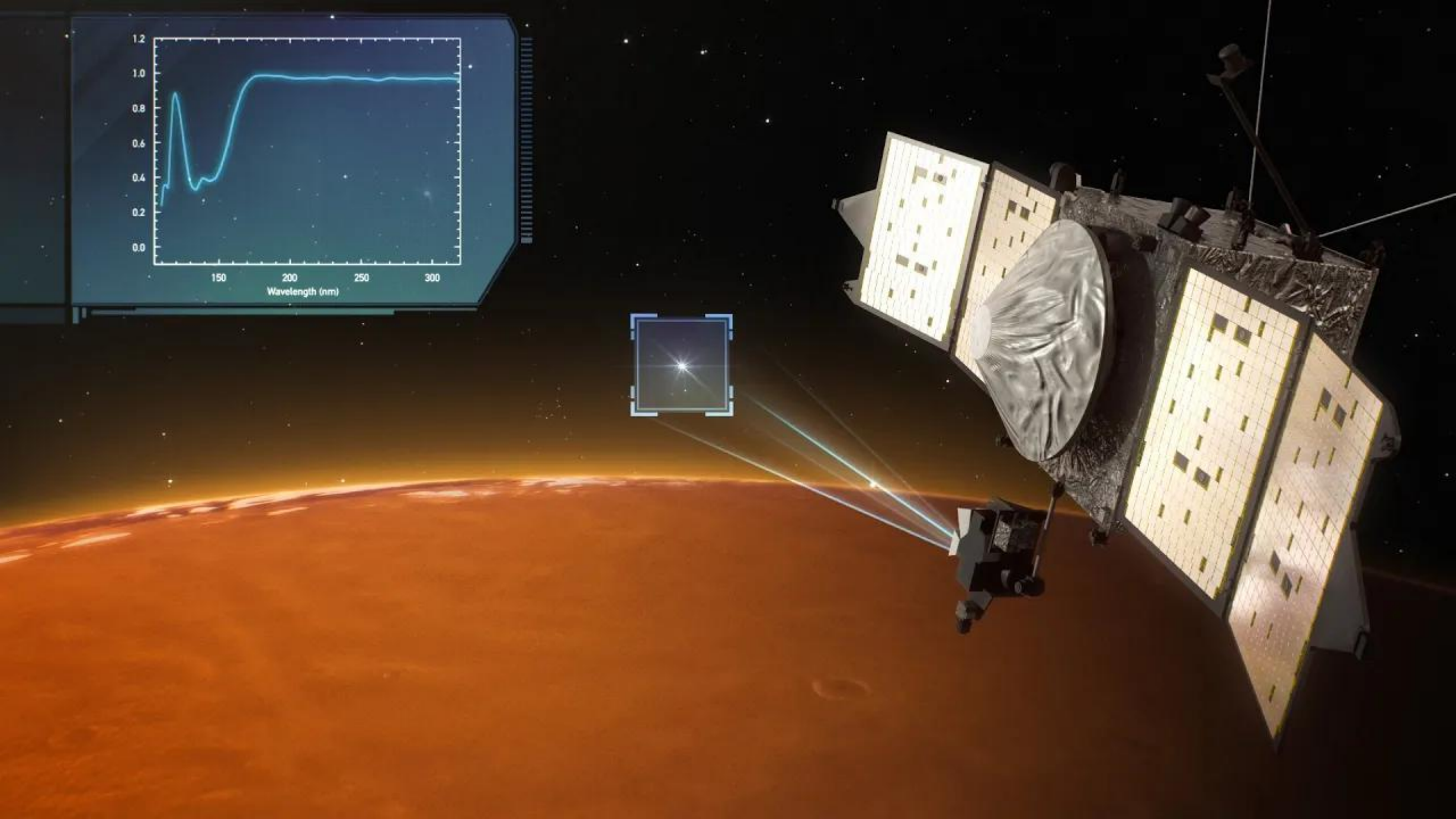
1.2
1.0
0.8
0.6
0.4
0.2
0.0
150
200
250
300
Wavelength (nm)

1
00:00:00,100 --> 00:00:09,180
[music]

2
00:00:09,200 --> 00:00:13,080
Narrator: NASA's newest Mars spacecraft, MAVEN, is currently on a mission

3
00:00:13,100 --> 00:00:18,180
to determine how Mars lost its early atmosphere, and with it, its water.

4
00:00:18,200 --> 00:00:23,170
Jakosky: The questions that MAVEN is trying to answer deal with the history of the Martian climate.

5
00:00:23,190 --> 00:00:27,830
From the previous missions we have a lot of evidence that that climate has changed over time,

6
00:00:27,850 --> 00:00:32,210
that early Mars was warmer, wetter than present-day Mars.

7
00:00:32,230 --> 00:00:36,440
What we're trying to answer with MAVEN is, "Where did all that water go?"

8
00:00:36,460 --> 00:00:43,600
"Where did the carbon dioxide from an early thick atmosphere go?" And we're doing this by studying the top of

9
00:00:43,620 --> 00:00:48,290
Since we are the first mission really looking at all pieces of the puzzle on the upper atmosphere,

10
00:00:48,310 --> 00:00:52,830
almost everything we're seeing and how it relates to everything else is brand new.

11
00:00:52,850 --> 00:00:58,250
As an example, one of the things we measured very early in the mission, right after we went into orbit,

12
00:00:58,270 --> 00:01:04,020
before we even got into our final science mapping orbit, was the distribution of hydrogen,

13
00:01:04,040 --> 00:01:11,020

oxygen, and carbon as a cloud surrounding the planet, the very extended upper atmosphere.

14
00:01:11,040 --> 00:01:19,280
Narrator: In this ultraviolet image, carbon and oxygen cling tightly to Mars, while hydrogen, the lightest element

15
00:01:19,300 --> 00:01:25,830
Understanding the escape of hydrogen is important, because hydrogen is the primary ingredient in water.

16
00:01:25,850 --> 00:01:29,230
While previous Mars orbiters have peered down at the planet's surface,

17
00:01:29,250 --> 00:01:36,780
MAVEN is spending part of its time gazing at the stars, observing the Martian atmosphere through a series of s

18
00:01:36,800 --> 00:01:40,480
Jakosky: The imaging ultraviolet spectrograph, the IUVS instrument,

19
00:01:40,500 --> 00:01:45,900
can determine properties of the upper atmosphere all the way down to the lower atmosphere,

20
00:01:45,920 --> 00:01:51,330
by looking at a star, as the star sets behind the planet as seen from the spacecraft.

21
00:01:51,350 --> 00:01:59,580
And by looking at the diminution, the weakening of the starlight as it sets, we can measure the composition of t

22
00:01:59,600 --> 00:02:03,980
Narrator: The relative motion of the stars allows MAVEN to look at columns of the atmosphere,

23
00:02:04,000 --> 00:02:07,230
revealing how its composition changes with altitude.

24
00:02:07,250 --> 00:02:14,190
At the same time, MAVEN's orbit passes close to the Martian polar caps, giving it north-to-south coverage of th

25
00:02:14,210 --> 00:02:19,180
Mars itself rotates once a day beneath MAVEN, providing east-to-west coverage.

26
00:02:19,200 --> 00:02:22,980
This combination allows MAVEN to observe the entire atmosphere.

27
00:02:23,000 --> 00:02:30,780
Jakosky: My goal with MAVEN is to put together a data set that the Mars science community can spend the ne

28
00:02:30,800 --> 00:02:36,180
We're making very few measurements that have never been made at all before at Mars,

29
00:02:36,200 --> 00:02:41,400
but what we're doing is, we're making them in parts of the atmosphere where they haven't been measured,

30
00:02:41,420 --> 00:02:47,600
we're making comprehensive measurements for a full year rather than, for example with the Viking lander,

31
00:02:47,620 --> 00:02:52,980
a one-time entry, one profile. We're going to get hundreds and hundreds of profiles,

32
00:02:53,000 --> 00:02:58,460
and be able to see how the upper atmosphere responds to the changing solar conditions,

33
00:02:58,480 --> 00:03:05,120
and really put together a picture of the upper atmosphere that we haven't been able to put together before.