



1
00:00:00,050 --> 00:00:03,237
Have you ever tried to listen to
your favorite radio station only

2
00:00:03,237 --> 00:00:05,772
to find it garbled or replaced
by a different station?

3
00:00:05,772 --> 00:00:08,892
Well if so, you might've been
the victim of something known as

4
00:00:08,892 --> 00:00:13,130
a "Sporadic-E Layer." They're
concentrations of electrically

5
00:00:13,130 --> 00:00:16,166
charged gas called plasma in a
region of space known as the

6
00:00:16,166 --> 00:00:16,984
ionosphere.

7
00:00:16,984 --> 00:00:20,270
They act kind of like mirrors
in the sky, and bounce radio

8
00:00:20,270 --> 00:00:23,373
transmissions over the horizon
and interfere with your radio,

9
00:00:23,373 --> 00:00:26,610
kind of like two people
trying to talk over each other.

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00:00:26,610 --> 00:00:29,429
Even though we've known about
these layers for over 80 years

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00:00:29,429 --> 00:00:32,633
now, we still don't fully
understand them because they

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00:00:32,633 --> 00:00:35,202
occur at an altitude that is
really difficult to explore.

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00:00:35,202 --> 00:00:38,689
The air there is so thin that we
can't fly an aircraft, but it's

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00:00:38,689 --> 00:00:41,425
just thick enough that if we
were to try to orbit a satellite

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00:00:41,425 --> 00:00:42,759
it would burn up
in the atmosphere.

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00:00:42,759 --> 00:00:45,295
So we've only ever been
able to explore a handful.

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00:00:45,295 --> 00:00:48,365
Well, one planet where the
atmosphere is much thinner is

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00:00:48,365 --> 00:00:49,700
the planet Mars.

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00:00:49,700 --> 00:00:52,469
And one satellite that is
currently exploring Mars is the

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00:00:52,469 --> 00:00:54,037
MAVEN orbiter.

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00:00:54,037 --> 00:00:56,406
One of the instruments on

MAVEN is called STATIC.

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00:00:56,406 --> 00:00:58,959

It's designed to measure plasma
escaping from the ionosphere,

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00:00:58,959 --> 00:01:01,995

this upper
atmospheric layer of Mars.

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00:01:01,995 --> 00:01:04,815

And in the data, scientists were
seeing that when MAVEN would fly

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00:01:04,815 --> 00:01:07,150

through a certain region
of the atmosphere, POOF!

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00:01:07,150 --> 00:01:09,686

There was this big density
enhancement of this plasma

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00:01:09,686 --> 00:01:10,971

concentration.

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00:01:10,971 --> 00:01:13,657

Scientists realized that
they had discovered the Martian

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00:01:13,657 --> 00:01:14,875

equivalent of these layers!

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00:01:14,875 --> 00:01:17,644

It's exciting because now we
have a place that we can go to

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00:01:17,644 --> 00:01:20,297

directly explore these
layers with a satellite.

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00:01:20,297 --> 00:01:23,166

MAVEN has encountered more of these layers at Mars than we've

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00:01:23,166 --> 00:01:24,551

ever been able to explore here at Earth.

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00:01:24,551 --> 00:01:27,688

At Earth, the layers are temporary and unpredictable, but

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00:01:27,688 --> 00:01:30,374

at Mars they seem to be almost permanent and long-lived at

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00:01:30,374 --> 00:01:31,908

predictable locations.

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00:01:31,908 --> 00:01:34,461

Also, scientists found something that they didn't even know could

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00:01:34,461 --> 00:01:35,145

exist.

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00:01:35,145 --> 00:01:37,197

MAVEN discovered the opposite of a layer.

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00:01:37,197 --> 00:01:39,750

They're calling it a "rift" and it's where the sky has been

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00:01:39,750 --> 00:01:40,550

pulled apart.

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00:01:40,550 --> 00:01:43,420

And rather than a concentration

of this plasma, there's a

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00:01:43,420 --> 00:01:44,087
depletion.

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00:01:44,087 --> 00:01:47,107
Many models said this actually
couldn't happen, but yet they do

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00:01:47,107 --> 00:01:49,676
exist and we find them at Mars.

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00:01:49,676 --> 00:01:52,746
This demonstrates how little
we actually know, and how much

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00:01:52,746 --> 00:01:54,398
there still is to discover.

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00:01:54,398 --> 00:01:57,217
These layers are so common –
they happen over our heads all

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00:01:57,217 --> 00:01:57,884
the time.

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00:01:57,884 --> 00:02:00,003
You yourself have probably
detected one of these with your

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00:02:00,003 --> 00:02:02,372
own radio, even if you
weren't aware of it.

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00:02:02,372 --> 00:02:04,691
And who would've thought that
one of the best ways to explore

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00:02:04,691 --> 00:02:07,661

them would be to send a
spacecraft 300 million miles to