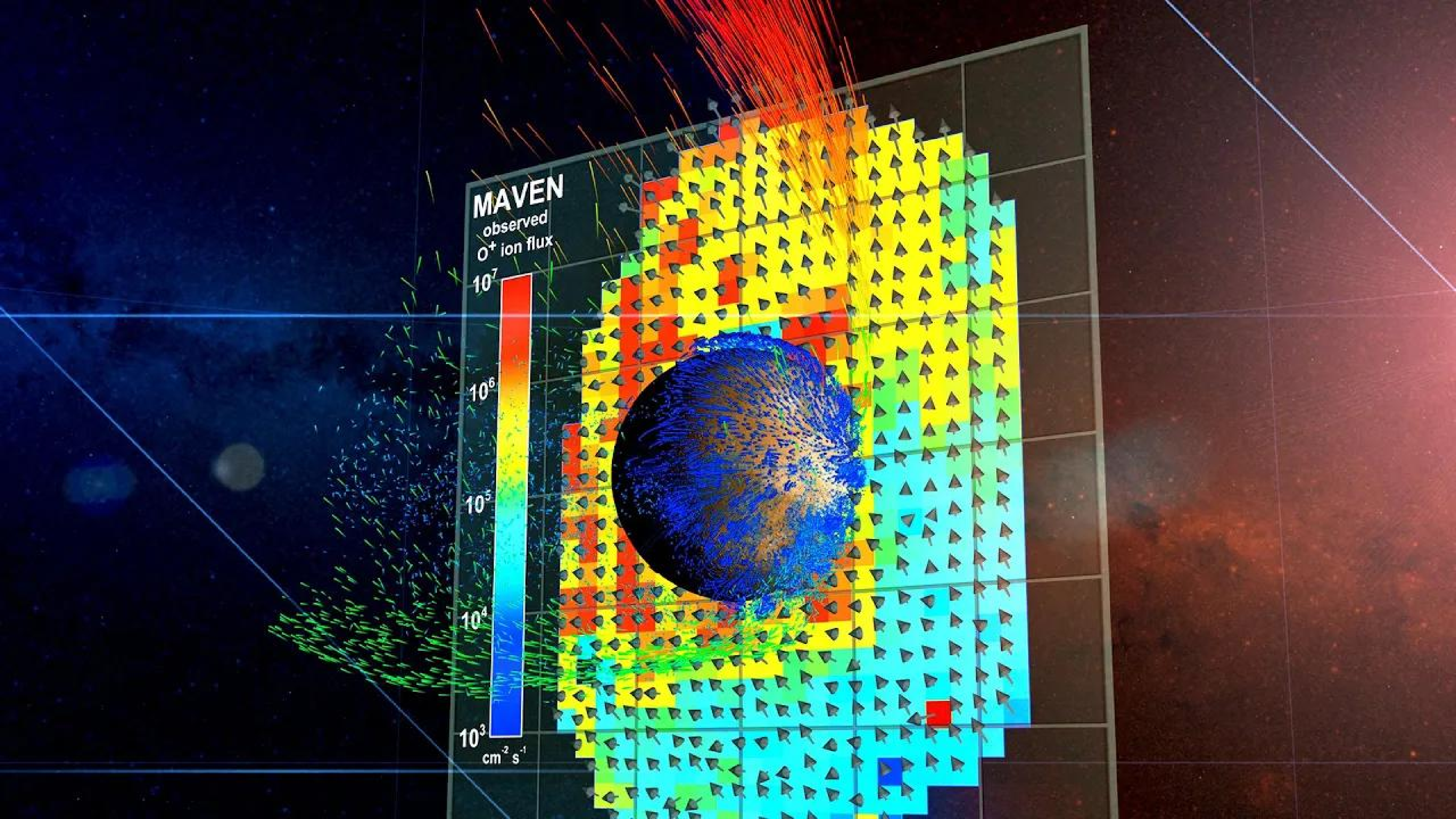
MAVEN
observed
O^+ ion flux
10^7
10^6
10^5
10^4
10^3
$cm^{-2}\ s^{-1}$

1
00:00:00,717 --> 00:00:04,321
A fleet of robotic spacecraft
is exploring the Red Planet,

2
00:00:04,321 --> 00:00:08,242
sending back a flood of data and
helping to unlock the secrets of
Mars.

3
00:00:08,242 --> 00:00:11,562
When NASA's MAVEN orbiter
arrived in 2014, it became the

4
00:00:11,562 --> 00:00:15,165
first mission dedicated to
observing the Mars upper
atmosphere.

5
00:00:15,165 --> 00:00:18,452
This region is the conduit
for air to escape to space,

6
00:00:18,452 --> 00:00:21,471
a process that may have
dried up early Mars.

7
00:00:21,471 --> 00:00:24,741
The most likely cause of this
process is the solar wind,

8
00:00:24,741 --> 00:00:28,078
a stream of electrically charged
particles blowing from the Sun.

9
00:00:28,078 --> 00:00:31,181
When the solar wind reaches
Mars, it interacts directly with

10
00:00:31,181 --> 00:00:35,085
the upper atmosphere, piling

up ahead of the planet in a bow
shock.

11
00:00:35,085 --> 00:00:38,906
Charged particles from the Mars
upper atmosphere, seen here in
color,

12
00:00:38,906 --> 00:00:42,943
feel the pull of the
electric field generated by the
solar wind.

13
00:00:42,943 --> 00:00:46,246
These particles, or ions, can
pick up sufficient energy from

14
00:00:46,246 --> 00:00:49,316
the electric field
to escape into space.

15
00:00:49,316 --> 00:00:52,069
In this simulation,
green particles represent

16
00:00:52,069 --> 00:00:56,073
medium-energy ions swept back
in the wake of the solar wind.

17
00:00:56,073 --> 00:00:59,259
High-energy ions, in yellow and
red, follow the electric field

18
00:00:59,259 --> 00:01:01,762
in a "polar plume" above Mars.

19
00:01:01,762 --> 00:01:06,266
Now, data from MAVEN are
supporting this model of solar
wind erosion.

20
00:01:06,266 --> 00:01:09,836
This graph shows the first-ever
measurements of oxygen ion flux

21
00:01:09,836 --> 00:01:13,423
around Mars, allowing us to
see the solar wind driving the

22
00:01:13,423 --> 00:01:18,345
atmosphere into space, in both
the polar plume and the tail
regions.

23
00:01:18,345 --> 00:01:21,548
As the MAVEN mission continues,
new measurements will be key to

24
00:01:21,548 --> 00:01:24,534
understanding how these
processes operate, shaping the