
GUY BEUTELSCHIES
MAVEN Program Manager, Lockheed Martin Space Systems

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00:00:17,690 --> 00:00:18,460
DAVID MITCHELL/MAVEN Project Manager, NASA
Goddard Space Flight Center: Several billion

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00:00:18,460 --> 00:00:23,910
years ago, Mars was vastly different than
it is today. From the evidence taken so far,

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00:00:23,910 --> 00:00:30,630
it was a very wet environment -- rivers, lakes,
perhaps even oceans on the surface of Mars.

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00:00:30,630 --> 00:00:32,520
A thicker atmosphere.

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00:00:32,520 --> 00:00:38,690
Mars, as we know it, is a barren planet of
extreme temperatures and the thinnest of atmospheres

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00:00:38,690 --> 00:00:43,690
. . . an environment too hostile to sustain
even microbial life.

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00:00:43,690 --> 00:00:45,489
But has this always been the case?

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00:00:45,489 --> 00:00:50,840
A variety of spacecraft launched in recent
years have examined the Red Planet's landscape

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00:00:50,840 --> 00:00:56,450
up close and surveyed it from above -- and
discovered intriguing signs of an ancient,

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00:00:56,450 --> 00:00:58,180
watery world.

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00:00:58,180 --> 00:01:02,579
Now scientists seek to understand what could

have caused such a dramatic change . . . on

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00:01:02,579 --> 00:01:08,600
a planet so near our own. A new NASA mission,
called MAVEN, is heading to Mars to investigate.

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00:01:08,600 --> 00:01:11,700
BRUCE JAKOSKY/MAVEN Principal Investigator,
University of Colorado, Boulder: MAVEN is

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00:01:11,700 --> 00:01:16,630
the first mission that we've sent to Mars
that has the primary goal of understanding

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00:01:16,630 --> 00:01:22,130
the upper atmosphere. And what we're trying
to do with MAVEN is to learn how the atmosphere

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00:01:22,130 --> 00:01:27,750
changed over time, and why. We think that
the atmosphere had a lot more water, a lot

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00:01:27,750 --> 00:01:33,130
more carbon dioxide, early in history, when
a lot of the water-related features we see

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00:01:33,130 --> 00:01:38,220
on the surface were carved. What we're trying
to do is to determine where did the water

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00:01:38,220 --> 00:01:41,690
go? Where did the CO2 go from that early environment?

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00:01:41,690 --> 00:01:47,780
The nearly three-ton MAVEN spacecraft is designed
to look at the Red Planet in a whole new way.

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00:01:47,780 --> 00:01:52,979
Instead of focusing on the Martian surface,
MAVEN will keep its "eyes" trained on the

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00:01:52,979 --> 00:01:54,890
upper atmosphere.

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00:01:54,890 --> 00:02:00,530
MAVEN, which stands for Mars Atmosphere and
Volatile Evolution, is fundamentally different

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00:02:00,530 --> 00:02:06,110
from the Mars missions that have gone before
-- rovers such as Curiosity, Opportunity and

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00:02:06,110 --> 00:02:11,430
Spirit, and orbiters like Mars Odyssey and
the Mars Reconnaissance Orbiter.

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00:02:11,430 --> 00:02:16,330
JAKOSKY: When you look at the other spacecraft
that have gone to Mars, each one of them has

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00:02:16,330 --> 00:02:22,090
explored a different piece of the Mars system.
With MAVEN, we're exploring the single biggest

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00:02:22,090 --> 00:02:24,970
unexplored piece of Mars so far.

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00:02:24,970 --> 00:02:29,500
After a 10-month journey from Cape Canaveral,
Florida to Mars, MAVEN will arrive at the

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00:02:29,500 --> 00:02:33,720
Red Planet on Sept. 22, 2014.

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00:02:33,720 --> 00:02:38,610
The spacecraft then will slip into Martian
orbit, and after another five and a half weeks

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00:02:38,610 --> 00:02:43,670

of checkout, it will be ready to spend the
next Earth year carrying out its assignment.

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00:02:43,670 --> 00:02:49,800
The Laboratory for Atmospheric and Space Physics
at the University of Colorado Boulder leads

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00:02:49,800 --> 00:02:54,570
the scientific portion of the mission, while
NASA's Goddard Space Flight Center in Maryland

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00:02:54,570 --> 00:02:58,260
is responsible for the overall mission management.

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00:02:58,260 --> 00:03:03,420
MAVEN is an eight-foot cube weighing about
5,400 pounds at launch -- as much as a fully

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00:03:03,420 --> 00:03:09,400
loaded sport utility vehicle. With its twin
pairs of gull wing-shaped solar panels fully

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00:03:09,400 --> 00:03:14,210
extended, it stretches 37 feet from wingtip
to wingtip.

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00:03:14,210 --> 00:03:18,620
MAVEN brings with it eight instruments designed
to take a variety of measurements throughout

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00:03:18,620 --> 00:03:25,400
Martian orbit in every region of "Near-Mars"
space. Built by Lockheed Martin Space Systems,

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00:03:25,400 --> 00:03:31,110
the spacecraft makes the most of every available
spot for these scientific sensors.

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00:03:31,110 --> 00:03:36,160
After a series of tests to prove the spacecraft

can handle the rigors of launch and the extremes

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00:03:36,160 --> 00:03:41,420
of deep space, it was flown to NASA's Kennedy
Space Center in Florida aboard an Air Force

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00:03:41,420 --> 00:03:44,560
C-17 cargo aircraft.

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00:03:44,560 --> 00:03:49,650
With MAVEN on site at the spaceport, the final
preparations for liftoff intensified -- and

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00:03:49,650 --> 00:03:53,090
excitement continued to build as the milestones
were checked off.

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00:03:53,090 --> 00:03:55,319
GUY BEUTELSCHIES/MAVEN Program Manager/Lockheed
Martin Space Systems: It makes it all so real

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00:03:55,319 --> 00:03:59,459
to see all this right in front of you. So
there's a tremendous amount of excitement

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00:03:59,459 --> 00:04:03,380
not only from the team but our friends and
family coming down to watch this launch, it's

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00:04:03,380 --> 00:04:08,130
kind of the culmination of a lot of years
of hard work by the team.

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00:04:08,130 --> 00:04:13,130
Getting MAVEN safely off the ground and on
its path to Mars is the job of NASA's Launch

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00:04:13,130 --> 00:04:15,190
Services Program, based at Kennedy.

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00:04:15,190 --> 00:04:18,410
OMAR BAEZ/Launch Director/NASA's Launch Services Program: LSP has been preparing for MAVEN

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00:04:18,410 --> 00:04:24,380
for about five years, and maybe a little bit longer if you look at the announcement of

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00:04:24,380 --> 00:04:31,380
opportunities that came up before that. So it's been quite a while. It's coming to maturity

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00:04:32,569 --> 00:04:34,190
now.

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00:04:34,190 --> 00:04:39,320
The MAVEN mission only has 20 days to launch before its window of opportunity closes for

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00:04:39,320 --> 00:04:44,030
about two years. That's because of the periodic alignment of the Earth and Mars.

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00:04:44,030 --> 00:04:47,620
CHUCK TATRO/Mission Manager/NASA's Launch Services Program: Mars orbits the sun about

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00:04:47,620 --> 00:04:53,590
half as fast as the Earth does. So that means that every 26 months, the Earth and Mars are

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00:04:53,590 --> 00:04:58,770
sort of aligned again, so that it takes the least amount of energy for a rocket to deliver

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00:04:58,770 --> 00:05:00,800
a spacecraft to Mars.

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00:05:00,800 --> 00:05:07,050

MAVEN's ride to space is the Atlas V rocket,
a reliable workhorse with a history of success

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00:05:07,050 --> 00:05:12,030
for NASA missions -- including the Mars Science
Laboratory mission featuring the Curiosity

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00:05:12,030 --> 00:05:13,210
rover.

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00:05:13,210 --> 00:05:19,410
While the Atlas V was readied for flight in
a hangar at Atlas Space Operations Center,

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00:05:19,410 --> 00:05:24,520
or ASOC, on Cape Canaveral Air Force Station,
MAVEN was sent to Kennedy's Payload Hazardous

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00:05:24,520 --> 00:05:30,350
Servicing Facility for one last round of checkouts,
tests, and closeouts.

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00:05:30,350 --> 00:05:34,560
The processing team did face one significant
challenge with less than two months until

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00:05:34,560 --> 00:05:40,050
liftoff: a 17-day government shutdown that
briefly halted prelaunch activities.

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00:05:40,050 --> 00:05:44,880
BAEZ: It's kind of like a hurricane. We have
hurricane plans, but we don't have a government

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00:05:44,880 --> 00:05:51,880
shutdown plan. So that's a hurdle. We overcame
it, we're moving forward, and we're ready

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00:05:52,449 --> 00:05:57,430
to hit the beginning of the window. Luckily

our launch vehicle contractor was not affected

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00:05:57,430 --> 00:06:04,150
as much by the shutdown and the work continued there, so we're able to press forward. We

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00:06:04,150 --> 00:06:08,590
were able to get a limited crew in here to be able to work things.

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00:06:08,590 --> 00:06:13,910
Today, MAVEN is still aiming for the same launch period the team targeted from the start,

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00:06:13,910 --> 00:06:17,949
and with liftoff right around the corner, everyone is looking forward to seeing this

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00:06:17,949 --> 00:06:20,750
spacecraft begin its mission of discovery.

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00:06:20,750 --> 00:06:27,750
MITCHELL: Way back in 2008, we proposed for a launch date of Nov. 18, 2013, and we're

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00:06:29,400 --> 00:06:33,500
running right to it. It's quite an accomplishment by the team. We're really excited. We're so

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00:06:33,500 --> 00:06:36,020
close now. I mean, we're headed to Mars.

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00:06:36,020 --> 00:06:42,360
JAKOSKY: This is all-consuming. I don't know how to do anything except talk about MAVEN

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00:06:42,360 --> 00:06:46,490
anymore, at least that's what my wife tells me. And to see it come together now, to see

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00:06:46,490 --> 00:06:50,830
it today, just about ready to go, I'm beside
myself.

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00:06:50,830 --> 00:06:56,750
When launch day arrives, managers and controllers
from NASA's Launch Services Program, United

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00:06:56,750 --> 00:07:02,000
Launch Alliance and the U.S. Air Force, along
with the spacecraft team, will report to their

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00:07:02,000 --> 00:07:06,160
consoles in launch control for the start of
the countdown.

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00:07:06,160 --> 00:07:10,720
By this time, the MAVEN spacecraft is sealed
in its protective payload fairing atop the

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00:07:10,720 --> 00:07:15,919
Atlas V rocket on the launch pad at Cape Canaveral's
Complex 41.

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00:07:15,919 --> 00:07:20,080
TATRO: Everybody has butterflies going into
launch day. No matter how much you plan and

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00:07:20,080 --> 00:07:25,199
how much you practice, there's always things
that come up at the last second that make

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00:07:25,199 --> 00:07:30,040
you nervous. We have a very good team to overcome
those, but you never know what's going to

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00:07:30,040 --> 00:07:36,009
come up and grab your attention and so you
have to be ready and able to do that.

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00:07:36,009 --> 00:07:41,889
JAKOSKY: The launch team, the launch vehicle people, the spacecraft people -- these are

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00:07:41,889 --> 00:07:47,740
the ultimate professionals who are doing their best to make sure everything works properly,

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00:07:47,740 --> 00:07:52,830
not only on launch day but for the whole mission. And I've got absolute faith in their ability

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00:07:52,830 --> 00:07:55,150
to deliver.

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00:07:55,150 --> 00:08:00,580
A spectacular liftoff might be the most visible milestone on launch day, but a successful

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00:08:00,580 --> 00:08:03,570
climb to space is only the beginning.

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00:08:03,570 --> 00:08:07,650
After the Atlas booster and Centaur upper stage have carried MAVEN out of the grasp

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00:08:07,650 --> 00:08:12,949
of Earth's gravity, another critical element remains. The spacecraft must deploy its solar

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00:08:12,949 --> 00:08:18,070
arrays and let its caretakers on Earth know that it's healthy and on the right path.

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00:08:18,070 --> 00:08:22,820
TATRO: When you get a positive confirmation that the spacecraft has successfully separated

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00:08:22,820 --> 00:08:27,370

from the second stage, and it's on its trajectory
and on its way to Mars, that's always very

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00:08:27,370 --> 00:08:31,759
exciting. All that work that you've done over
the past five to seven years pays off.

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00:08:31,759 --> 00:08:37,639
What will MAVEN discover? What will we learn
about our neighboring planet's past -- and

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00:08:37,639 --> 00:08:41,209
what might this new information teach us about
our own planet?

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00:08:41,209 --> 00:08:47,079
JAKOSKY: I'm just hoping that we'll get there
and get the data to answer these questions

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00:08:47,079 --> 00:08:52,959
about where did the water and the CO2 go.
I don't really have a prediction or an expectation

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00:08:52,959 --> 00:08:56,980
of what the answer's going to be. I'm just
hoping we can get that answer.

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00:08:56,980 --> 00:09:01,860
MITCHELL: The thing about exploration is,
sometimes you don't know what you're going

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00:09:01,860 --> 00:09:06,579
to find until you get there, and so we're
going to be exploring this planet, and there's

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00:09:06,579 --> 00:09:11,769
going to be discoveries I believe that scientists
hadn't quite thought of, that are going to