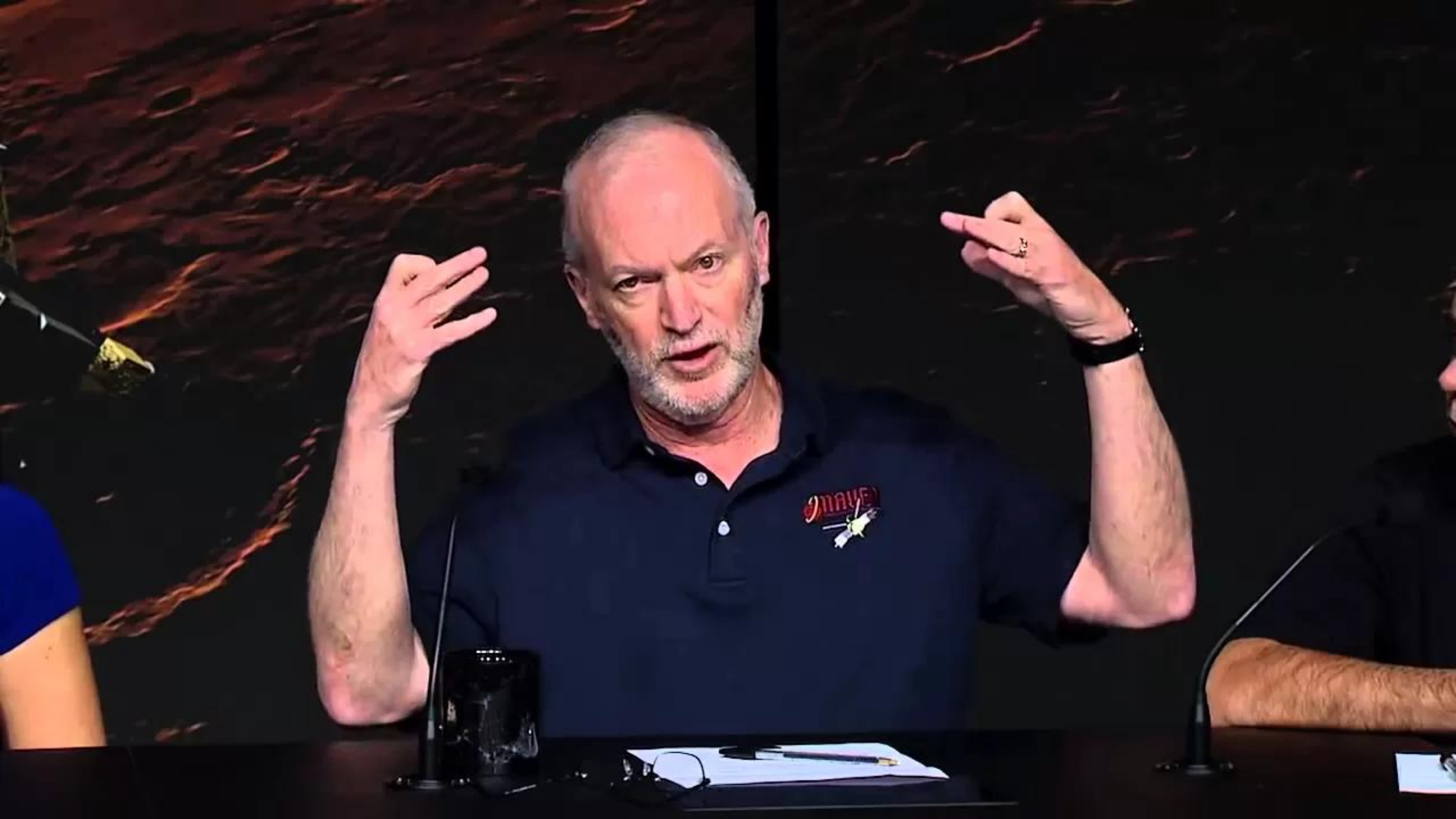

1
00:00:09,080 --> 00:00:07,039
well good afternoon welcome to NASA

2
00:00:11,480 --> 00:00:09,090
headquarters my name is Duane Brown with

3
00:00:13,940 --> 00:00:11,490
the Office of Communications today you

4
00:00:16,910 --> 00:00:13,950
were here about NASA's next mission to

5
00:00:18,979 --> 00:00:16,920
Mars the first mission devoted to

6
00:00:21,319 --> 00:00:18,989
understanding the upper atmosphere of

7
00:00:23,120 --> 00:00:21,329
the red planet will have brief

8
00:00:24,620 --> 00:00:23,130
presentations then open it up for

9
00:00:26,990 --> 00:00:24,630
questions starting here in Washington

10
00:00:29,420 --> 00:00:27,000
and that's the sinners and the phone

11
00:00:34,010 --> 00:00:29,430
line and you can send your questions in

12
00:00:35,630 --> 00:00:34,020
the hashtag ask NASA of course follow

13
00:00:38,030 --> 00:00:35,640

the conversation and when you talk about

14
00:00:39,950 --> 00:00:38,040
Mars there's a lot of excitement and a

15
00:00:43,120 --> 00:00:39,960
lot of people talking about this mission

16
00:00:46,280 --> 00:00:43,130
join us on Twitter Facebook YouTube

17
00:00:48,560 --> 00:00:46,290
another of the NASA social media sites

18
00:00:50,780 --> 00:00:48,570
and of course all of the information

19
00:00:55,720 --> 00:00:50,790
you're here today and much much more is

20
00:00:59,090 --> 00:00:55,730
on the web at WWF

21
00:01:01,930 --> 00:00:59,100
maven before I introduce you to our

22
00:01:04,189 --> 00:01:01,940
briefers to provide opening remarks

23
00:01:05,870 --> 00:01:04,199
ladies and gentlemen please welcome the

24
00:01:16,580 --> 00:01:05,880
associate administrator for the science

25
00:01:19,640 --> 00:01:16,590
Mission Directorate John Grunsfeld thank

26
00:01:21,080 --> 00:01:19,650
you very much Duane our exciting mission

27
00:01:23,390 --> 00:01:21,090
for science at NASA

28
00:01:26,600 --> 00:01:23,400
is to unravel the mysteries of the

29
00:01:28,550 --> 00:01:26,610
universe no other planet other than

30
00:01:30,530 --> 00:01:28,560
perhaps earth has held the attention of

31
00:01:32,149 --> 00:01:30,540
people around the world than Mars of

32
00:01:33,730 --> 00:01:32,159
course those are all the planets that

33
00:01:35,960 --> 00:01:33,740
we've discovered there may be one yet

34
00:01:38,300 --> 00:01:35,970
but for now it's been the inspiration

35
00:01:40,640 --> 00:01:38,310
for legions of science fiction authors

36
00:01:42,380 --> 00:01:40,650
and for many scientists who thought they

37
00:01:45,109 --> 00:01:42,390
were doing science but turned out to be

38
00:01:47,840 --> 00:01:45,119

science fiction that's the process of

39
00:01:50,060 --> 00:01:47,850
science with the great discoveries from

40
00:01:53,120 --> 00:01:50,070
our robotic explorers and most recently

41
00:01:57,010 --> 00:01:53,130
curiosity on Mars the mystery of what

42
00:02:01,429 --> 00:01:57,020
happened to Mars atmosphere is indeed a

43
00:02:02,570 --> 00:02:01,439
mystery yet to be solved maven the Mars

44
00:02:05,420 --> 00:02:02,580
atmosphere and volatile evolution

45
00:02:07,460 --> 00:02:05,430
mission is designed to do just that

46
00:02:10,269 --> 00:02:07,470
unravel the mystery of the past and

47
00:02:13,670 --> 00:02:10,279
present history of the Mars atmosphere a

48
00:02:15,920 --> 00:02:13,680
maven is a trusted expert based an

49
00:02:16,460 --> 00:02:15,930
accumulation of knowledge who seeks to

50
00:02:19,730 --> 00:02:16,470
pass

51
00:02:21,530 --> 00:02:19,740
knowledge onto others Maven like its

52
00:02:23,660 --> 00:02:21,540
entomological origin will indeed

53
00:02:25,610 --> 00:02:23,670
establish the knowledge on which

54
00:02:27,950 --> 00:02:25,620
scientists can build a story of the Mars

55
00:02:30,680 --> 00:02:27,960
atmosphere and help future human

56
00:02:33,860 --> 00:02:30,690
explorers who journey to Mars and to the

57
00:02:36,740 --> 00:02:33,870
Mars surface the maven teen has done an

58
00:02:39,290 --> 00:02:36,750
exemplary job getting as close to the

59
00:02:43,220 --> 00:02:39,300
launch pad however these journeys are

60
00:02:44,930 --> 00:02:43,230
never easy just earlier this month the

61
00:02:47,170 --> 00:02:44,940
team had a potential showstopper with

62
00:02:49,640 --> 00:02:47,180
the shutdown of the federal government

63
00:02:51,410 --> 00:02:49,650

given the extreme importance of the

64
00:02:54,710 --> 00:02:51,420
MAVEN spacecraft as a future

65
00:02:57,320 --> 00:02:54,720
communication resource at Mars for our

66
00:02:59,840 --> 00:02:57,330
assets on the surface we were able to

67
00:03:03,980 --> 00:02:59,850
keep maven processing towards a launch

68
00:03:06,260 --> 00:03:03,990
on November 18 I'm thrilled to be here

69
00:03:08,660 --> 00:03:06,270
today so we can update you on all the

70
00:03:10,760 --> 00:03:08,670
launch preparations for maven and about

71
00:03:18,400 --> 00:03:10,770
the great science that it will do thank

72
00:03:25,310 --> 00:03:21,410
thank you John now let me introduce you

73
00:03:29,180 --> 00:03:25,320
to today's briefers first up will be Jim

74
00:03:29,620 --> 00:03:29,190
Green director NASA's Planetary Science

75
00:03:36,830 --> 00:03:29,630
Division

76
00:03:41,830 --> 00:03:36,840
that's headquarters Lisa May maven

77
00:03:46,400 --> 00:03:43,630
Kelly fast

78
00:03:50,110 --> 00:03:46,410
Maven's program scientists also in NASA

79
00:03:57,580 --> 00:03:54,280
Bruce Schakowsky Navin principal

80
00:03:59,650 --> 00:03:57,590
investigator University of Colorado

81
00:04:05,979 --> 00:03:59,660
Boulder laboratory for atmospheric and

82
00:04:08,320 --> 00:04:05,989
space physics and David Mitchell maven

83
00:04:11,110 --> 00:04:08,330
project manager at NASA's Goddard Space

84
00:04:13,210 --> 00:04:11,120
Flight Center in Greenbelt Maryland and

85
00:04:15,339 --> 00:04:13,220
with that Jim I'll toss it to you thank

86
00:04:19,300 --> 00:04:15,349
you very much Duane man I had my first

87
00:04:22,120 --> 00:04:19,310
graphic please what we're seeing here is

88
00:04:25,270 --> 00:04:22,130

an overview of our Mars missions within

89
00:04:27,580 --> 00:04:25,280
this next decade we see several

90
00:04:30,490 --> 00:04:27,590
operational missions these are our

91
00:04:33,640 --> 00:04:30,500
orbiters and two of our Rovers are still

92
00:04:37,000 --> 00:04:33,650
moving well on the surface our orbiters

93
00:04:40,330 --> 00:04:37,010
Mars Odyssey the Mars Reconnaissance

94
00:04:42,670 --> 00:04:40,340
Orbiter and the ESA's Mars Express are

95
00:04:45,190 --> 00:04:42,680
doing a great job continuing to map the

96
00:04:48,040 --> 00:04:45,200
surface look for potential sites for

97
00:04:50,140 --> 00:04:48,050
future missions but also giving us a

98
00:04:53,980 --> 00:04:50,150
window into some of the past regions

99
00:04:56,190 --> 00:04:53,990
regions where for instance curiosity has

100
00:04:58,960 --> 00:04:56,200
landed we see from curiosity

101
00:05:01,270 --> 00:04:58,970
observations that it's landed in an

102
00:05:03,940 --> 00:05:01,280
ancient riverbed this tells us right

103
00:05:06,820 --> 00:05:03,950
away that Mars had much thicker

104
00:05:09,219 --> 00:05:06,830
atmosphere and was much more like Earth

105
00:05:11,980 --> 00:05:09,229
in terms of a blue planet than it is

106
00:05:15,279 --> 00:05:11,990
currently today a very dry on the

107
00:05:18,310 --> 00:05:15,289
surface planet Curiosity has also told

108
00:05:21,550 --> 00:05:18,320
us a lot about its atmosphere it tells

109
00:05:24,370 --> 00:05:21,560
us that perhaps as much as 85 to 95

110
00:05:27,760 --> 00:05:24,380
percent of Mars's atmosphere is changed

111
00:05:30,190 --> 00:05:27,770
over several billion years how that's

112
00:05:32,620 --> 00:05:30,200
happened is a quite the mystery and

113
00:05:34,510 --> 00:05:32,630

that's where we get to maven we're all

114
00:05:37,270 --> 00:05:34,520
very excited about the upcoming launch

115
00:05:40,510 --> 00:05:37,280
of maven and November 18th is when the

116
00:05:42,520 --> 00:05:40,520
window opens maven will begin to look at

117
00:05:44,830 --> 00:05:42,530
those processes that tell us what's

118
00:05:48,460 --> 00:05:44,840
happened to Mars is atmosphere and why

119
00:05:51,550 --> 00:05:48,470
Mars perhaps underwent a major climate

120
00:05:54,909 --> 00:05:51,560
change in its past for the rest of the

121
00:05:58,089 --> 00:05:54,919
decade we have several orbiters planned

122
00:06:01,360 --> 00:05:58,099
in addition to a couple of our landers

123
00:06:03,790 --> 00:06:01,370
and in fact we're working hard for our

124
00:06:05,770 --> 00:06:03,800
next Mars 2020 Rover

125
00:06:10,600 --> 00:06:05,780
which will be based largely on

126
00:06:12,520 --> 00:06:10,610
curiosity's structure so with that I'd

127
00:06:15,309 --> 00:06:12,530
like to now turn it over to our program

128
00:06:19,300 --> 00:06:15,319
executive Lisa May we'll talk about the

129
00:06:21,010 --> 00:06:19,310
Maven team Lisa thank you Jim about five

130
00:06:23,140 --> 00:06:21,020
years ago a little more than five years

131
00:06:25,540 --> 00:06:23,150
ago maven was selected as the second

132
00:06:27,369 --> 00:06:25,550
Mars Scout mission Mars Scout missions

133
00:06:29,830 --> 00:06:27,379
like discovery missions are what we call

134
00:06:32,710 --> 00:06:29,840
pi lead and that means a principal

135
00:06:35,200 --> 00:06:32,720
investigator in this case Bruce has to

136
00:06:37,480 --> 00:06:35,210
pick objective science objectives that

137
00:06:39,399 --> 00:06:37,490
are compelling they have to develop an

138
00:06:43,450 --> 00:06:39,409

approach that's credible and assemble a

139
00:06:46,719 --> 00:06:43,460
qualified team and it's appropriate at

140
00:06:49,149 --> 00:06:46,729
this juncture to look back and look at

141
00:06:51,189 --> 00:06:49,159
Bruce's choices and our decision to

142
00:06:54,640 --> 00:06:51,199
select maven as the Mars Scout mission

143
00:06:58,029 --> 00:06:54,650
and recognize how very well that has

144
00:07:00,270 --> 00:06:58,039
turned out this team which consists of

145
00:07:02,529 --> 00:07:00,280
the University of Colorado at Boulder

146
00:07:04,290 --> 00:07:02,539
Goddard Space Flight Center the

147
00:07:07,689 --> 00:07:04,300
University of California Berkeley

148
00:07:09,610 --> 00:07:07,699
Lockheed Martin and JPL along with the

149
00:07:11,320 --> 00:07:09,620
United Launch Alliance and the launch

150
00:07:15,370 --> 00:07:11,330
services program at Kennedy Space Center

151
00:07:18,309 --> 00:07:15,380
has performed excellently they are on

152
00:07:20,589 --> 00:07:18,319
schedule they are on budget and they are

153
00:07:23,409 --> 00:07:20,599
on track to launch at the beginning of

154
00:07:25,540 --> 00:07:23,419
the launch period of November 18th it's

155
00:07:26,800 --> 00:07:25,550
very exciting and quite a privilege to

156
00:07:29,439 --> 00:07:26,810
have worked with them these many years

157
00:07:31,899 --> 00:07:29,449
and to be here at this most visible

158
00:07:34,420 --> 00:07:31,909
milestone on their journey to Mars and

159
00:07:37,209 --> 00:07:34,430
when they get to Mars when maven gets to

160
00:07:40,269 --> 00:07:37,219
Mars next fall it will do some amazing

161
00:07:42,189 --> 00:07:40,279
science as Jim has alluded to and to

162
00:07:45,279 --> 00:07:42,199
describe a little more about how that

163
00:07:47,320 --> 00:07:45,289

science fits into our overall science

164
00:07:50,439 --> 00:07:47,330
program here at NASA I'd like to turn

165
00:07:53,469 --> 00:07:50,449
you over to dr. Kelly fast Kelly thank

166
00:07:55,600 --> 00:07:53,479
you Lisa it has been and it will be an

167
00:07:58,300 --> 00:07:55,610
exciting few weeks in NASA planetary

168
00:08:00,129 --> 00:07:58,310
exploration the ladee mission just

169
00:08:02,709 --> 00:08:00,139
recently went into orbit around the moon

170
00:08:05,559 --> 00:08:02,719
and soon it will begin studying the

171
00:08:07,510 --> 00:08:05,569
environment of the moon later on we're

172
00:08:08,920 --> 00:08:07,520
going to even have the Venus spectral

173
00:08:11,140 --> 00:08:08,930
rocket which will take a peak above

174
00:08:13,689 --> 00:08:11,150
Earth's atmosphere to take a look at

175
00:08:15,279 --> 00:08:13,699
Venus's upper atmosphere and then in

176
00:08:17,350 --> 00:08:15,289
between we have the maven launch and

177
00:08:20,110 --> 00:08:17,360
it's just been a pleasure to see

178
00:08:22,360 --> 00:08:20,120
the Maven mission come together and so

179
00:08:24,189 --> 00:08:22,370
maven is a planetary mission but it

180
00:08:25,719 --> 00:08:24,199
really cuts across the science that

181
00:08:28,629 --> 00:08:25,729
maven will be doing really cuts across

182
00:08:31,689 --> 00:08:28,639
all of NASA's science disciplines as

183
00:08:33,579 --> 00:08:31,699
shown in this graphic maven will be

184
00:08:36,880 --> 00:08:33,589
studying processes that led to the

185
00:08:39,219 --> 00:08:36,890
escape of much of Mars atmosphere but

186
00:08:41,529 --> 00:08:39,229
those processes actually are driven

187
00:08:43,839 --> 00:08:41,539
largely by the Sun and so the study of

188
00:08:46,990 --> 00:08:43,849

the Sun heliophysics figures very

189
00:08:49,120 --> 00:08:47,000
prominently into maven science those

190
00:08:51,190 --> 00:08:49,130
processes are also active in Earth's

191
00:08:52,900 --> 00:08:51,200
environment but under very different

192
00:08:55,329 --> 00:08:52,910
conditions and with a very different

193
00:08:57,400 --> 00:08:55,339
outcome and so that falls within the

194
00:08:59,530 --> 00:08:57,410
realm of earth science and in these

195
00:09:01,210 --> 00:08:59,540
processes are also players in the

196
00:09:04,300 --> 00:09:01,220
interaction between other stars and

197
00:09:06,670 --> 00:09:04,310
their own planets an area of exoplanet

198
00:09:08,680 --> 00:09:06,680
research in astrophysics and so the

199
00:09:11,650 --> 00:09:08,690
science really does cut across NASA

200
00:09:13,900 --> 00:09:11,660
science disciplines but the next step in

201
00:09:16,300 --> 00:09:13,910
the study of that science is maven and

202
00:09:18,040 --> 00:09:16,310
with that I would like to pass the

203
00:09:20,440 --> 00:09:18,050
microphone to mavens principal

204
00:09:22,750 --> 00:09:20,450
investigator Bruce jakosky who's going

205
00:09:24,340 --> 00:09:22,760
to continue to tell you about the maven

206
00:09:25,689 --> 00:09:24,350
science all the details and further

207
00:09:29,199 --> 00:09:25,699
details about the mission

208
00:09:31,810 --> 00:09:29,209
thank you it's clear that major

209
00:09:34,180 --> 00:09:31,820
questions about the history of Mars

210
00:09:36,670 --> 00:09:34,190
Center on the history of its climate and

211
00:09:39,670 --> 00:09:36,680
atmosphere and how that's influenced the

212
00:09:42,490 --> 00:09:39,680
the surface the geology and on the

213
00:09:44,620 --> 00:09:42,500

possibility for life maven is going to

214
00:09:46,420 --> 00:09:44,630
focus on trying to understand what the

215
00:09:49,060 --> 00:09:46,430
history of the atmosphere has been how

216
00:09:51,699 --> 00:09:49,070
the climate has changed through time and

217
00:09:54,130 --> 00:09:51,709
how that's influenced the evolution of

218
00:09:57,490 --> 00:09:54,140
the surface and the potential

219
00:09:59,829 --> 00:09:57,500
habitability at least by microbes of

220
00:10:01,780 --> 00:09:59,839
Mars what I'd like to do is tell you a

221
00:10:03,430 --> 00:10:01,790
little bit about the science and then

222
00:10:05,350 --> 00:10:03,440
about how we're going to achieve the

223
00:10:08,290 --> 00:10:05,360
science can we go to the first video

224
00:10:11,230 --> 00:10:08,300
please we're looking here not at the

225
00:10:14,350 --> 00:10:11,240
earth although you might think so but at

226
00:10:16,360 --> 00:10:14,360
an artist's rendition of early Mars an

227
00:10:19,449 --> 00:10:16,370
atmosphere thick enough to hold water

228
00:10:21,550 --> 00:10:19,459
water clouds on Mars we know that these

229
00:10:23,470 --> 00:10:21,560
things happen that water flowed over the

230
00:10:25,900 --> 00:10:23,480
surface because of geological and

231
00:10:29,230 --> 00:10:25,910
geochemical features that are present on

232
00:10:31,199 --> 00:10:29,240
ancient surfaces but somehow that

233
00:10:33,869 --> 00:10:31,209
atmosphere changed over time to the

234
00:10:37,139 --> 00:10:33,879
cold dry environment that we see today

235
00:10:39,509 --> 00:10:37,149
one that is too cold with an atmosphere

236
00:10:42,059 --> 00:10:39,519
too thin to be able to support liquid

237
00:10:44,939 --> 00:10:42,069
water what we don't know is what the

238
00:10:48,090 --> 00:10:44,949

driver of that change has been there are

239
00:10:50,759 --> 00:10:48,100
two places that the atmosphere can go it

240
00:10:52,590 --> 00:10:50,769
can go down into the crust it can go up

241
00:10:55,019 --> 00:10:52,600
to the top of the atmosphere and be lost

242
00:10:57,449 --> 00:10:55,029
to space and I think these questions of

243
00:10:59,819 --> 00:10:57,459
where did the water go where did the co2

244
00:11:04,079 --> 00:10:59,829
go from that early atmosphere our

245
00:11:07,139 --> 00:11:04,089
driving our thought driving our

246
00:11:09,210 --> 00:11:07,149
exploration of Mars what I'd like to do

247
00:11:11,609 --> 00:11:09,220
is talk a little bit about some of the

248
00:11:13,470 --> 00:11:11,619
mechanisms for climate change and in

249
00:11:16,619 --> 00:11:13,480
particular how the atmosphere might have

250
00:11:19,410 --> 00:11:16,629
been stripped away by process is driven

251
00:11:21,710 --> 00:11:19,420
by the Sun there are a lot of processes

252
00:11:23,910 --> 00:11:21,720
that we think may have played a role and

253
00:11:25,980 --> 00:11:23,920
we don't have the measurements to

254
00:11:27,749 --> 00:11:25,990
understand them today but we've got an

255
00:11:29,999 --> 00:11:27,759
idea of how some of them work can we go

256
00:11:34,049 --> 00:11:30,009
to the second video please we're going

257
00:11:36,090 --> 00:11:34,059
to see a simulation of the ability of

258
00:11:38,669 --> 00:11:36,100
the Sun to strip away some of the

259
00:11:40,340 --> 00:11:38,679
atmosphere we're looking at a model

260
00:11:42,809 --> 00:11:40,350
simulation of the upper atmosphere

261
00:11:45,299 --> 00:11:42,819
represented by the colors with the

262
00:11:47,489 --> 00:11:45,309
arrows showing the solar wind and you

263
00:11:50,369 --> 00:11:47,499

can see that as the solar wind sweeps by

264
00:11:53,100 --> 00:11:50,379
it is able to strip off the atmospheric

265
00:11:54,989 --> 00:11:53,110
gas it looks like it's flowing off here

266
00:11:58,019 --> 00:11:54,999
but it's actually stripped away molecule

267
00:12:01,799 --> 00:11:58,029
by molecule atom by atom now this is

268
00:12:03,869 --> 00:12:01,809
only one simulation of how this process

269
00:12:05,639 --> 00:12:03,879
might have worked and it's only one of

270
00:12:07,559 --> 00:12:05,649
the many processes that might have

271
00:12:09,900 --> 00:12:07,569
operated to take gas out of the

272
00:12:11,730 --> 00:12:09,910
atmosphere and remove it to space but it

273
00:12:15,019 --> 00:12:11,740
shows very graphically what we're trying

274
00:12:17,269 --> 00:12:15,029
to measure with the the maven mission

275
00:12:20,850 --> 00:12:17,279
the next graphic please

276
00:12:23,850 --> 00:12:20,860
we selected a suite of instruments in

277
00:12:26,160 --> 00:12:23,860
order to make the measurements that will

278
00:12:27,749 --> 00:12:26,170
tell us what's going on and we have

279
00:12:30,569 --> 00:12:27,759
eight instruments they're shown here as

280
00:12:33,419 --> 00:12:30,579
nine sensors the instruments in the

281
00:12:36,239 --> 00:12:33,429
upper left are focused on measuring the

282
00:12:39,419 --> 00:12:36,249
energy input from the Sun the solar wind

283
00:12:43,049 --> 00:12:39,429
the solar storm events that can blow

284
00:12:44,910 --> 00:12:43,059
material out the solar UV radiation UV

285
00:12:46,949 --> 00:12:44,920
photons all of these

286
00:12:49,170 --> 00:12:46,959
hit the upper atmosphere of Mars and

287
00:12:51,990 --> 00:12:49,180
through a variety of processes strip

288
00:12:53,840 --> 00:12:52,000

away gas with these instruments we have

289
00:12:57,120 --> 00:12:53,850
the ability to measure what's going on

290
00:12:59,639 --> 00:12:57,130
to understand what these processes were

291
00:13:02,819 --> 00:12:59,649
and how they operated these five

292
00:13:04,949 --> 00:13:02,829
instruments along the bottom are focused

293
00:13:07,019 --> 00:13:04,959
on understanding the structure and

294
00:13:10,110 --> 00:13:07,029
composition of the upper atmosphere and

295
00:13:11,970 --> 00:13:10,120
how it responds to the solar energy that

296
00:13:14,160 --> 00:13:11,980
hits it in these different formats I

297
00:13:17,879 --> 00:13:14,170
wish I could tell you about each of

298
00:13:19,860 --> 00:13:17,889
these instruments but I think we would

299
00:13:22,290 --> 00:13:19,870
be here all afternoon because there's a

300
00:13:24,030 --> 00:13:22,300
lot to talk about on each one of these

301
00:13:27,629 --> 00:13:24,040
and I hope we'll have that opportunity

302
00:13:30,120 --> 00:13:27,639
coming up these instruments are on the

303
00:13:32,160 --> 00:13:30,130
MAVEN spacecraft which also was designed

304
00:13:34,949 --> 00:13:32,170
to allow us to get the measurements we

305
00:13:38,129 --> 00:13:34,959
need over the course of the mission so

306
00:13:39,960 --> 00:13:38,139
so hopefully these instruments will give

307
00:13:41,699 --> 00:13:39,970
us the data that we need in order to

308
00:13:43,860 --> 00:13:41,709
answer the questions that we've posed

309
00:13:44,819 --> 00:13:43,870
now in addition to the science

310
00:13:47,610 --> 00:13:44,829
instruments

311
00:13:51,150 --> 00:13:47,620
we're also carrying an Electra relay

312
00:13:53,880 --> 00:13:51,160
communications antenna and radio this

313
00:13:56,009 --> 00:13:53,890

allows us to continue the ability to

314
00:14:01,139 --> 00:13:56,019
communicate with the Rovers on the

315
00:14:03,269 --> 00:14:01,149
surface by sending the data through one

316
00:14:06,210 --> 00:14:03,279
of the orbiters we'll be able to provide

317
00:14:08,280 --> 00:14:06,220
that function for opportunity and

318
00:14:11,340 --> 00:14:08,290
curiosity that are on the ground today

319
00:14:16,199 --> 00:14:11,350
and into the future for insight and for

320
00:14:20,280 --> 00:14:16,209
the Mars 2020 Rover that will launch in

321
00:14:22,920 --> 00:14:20,290
2020 remarkably I'd like to go on to the

322
00:14:26,250 --> 00:14:22,930
the next graphic we've had a vigorous

323
00:14:28,740 --> 00:14:26,260
outreach program to bring the results of

324
00:14:31,079 --> 00:14:28,750
the mission to the public now we haven't

325
00:14:33,449 --> 00:14:31,089
launched yet but we've had a vigorous

326
00:14:36,059 --> 00:14:33,459
program leading up to launch we've

327
00:14:37,829 --> 00:14:36,069
collected names of over a hundred

328
00:14:39,120 --> 00:14:37,839
thousand people that we'll be sending to

329
00:14:41,309 --> 00:14:39,130
Mars these are names that people

330
00:14:44,220 --> 00:14:41,319
submitted to us because they want their

331
00:14:49,949 --> 00:14:44,230
names to go to Mars in addition we've

332
00:14:52,680 --> 00:14:49,959
had two contests one of them was to send

333
00:14:55,380 --> 00:14:52,690
haiku messages to Mars we had over

334
00:14:57,660 --> 00:14:55,390
15,000 entries in that and the public

335
00:14:58,770 --> 00:14:57,670
selected the winning entries that will

336
00:15:00,510 --> 00:14:58,780
fly to Mars

337
00:15:04,410 --> 00:15:00,520
and then shown in the graphic at the top

338
00:15:07,110 --> 00:15:04,420

here is the winning entry off of the

339
00:15:11,460 --> 00:15:07,120
public art contest this one was

340
00:15:14,580 --> 00:15:11,470
submitted by a classroom of I believe

341
00:15:18,000 --> 00:15:14,590
second graders where each ball is the

342
00:15:19,890 --> 00:15:18,010
planet Mars and they affixed to the

343
00:15:22,230 --> 00:15:19,900
planet the things that they want to take

344
00:15:23,940 --> 00:15:22,240
with them when they go to Mars and and

345
00:15:26,730 --> 00:15:23,950
took a picture of it and submitted it as

346
00:15:29,850 --> 00:15:26,740
their winning entry all of the winning

347
00:15:33,780 --> 00:15:29,860
entries are going on a DVD pictured in

348
00:15:36,090 --> 00:15:33,790
the lower left that will fly on the

349
00:15:38,100 --> 00:15:36,100
MAVEN spacecraft the arrow points to

350
00:15:41,490 --> 00:15:38,110
where on the solar panel will it will go

351
00:15:44,010 --> 00:15:41,500
and just last week the flight DVD we

352
00:15:45,990 --> 00:15:44,020
actually had a test DVD as well the

353
00:15:47,610 --> 00:15:46,000
flight DVD was affixed onto the

354
00:15:50,310 --> 00:15:47,620
spacecraft you can see that in the lower

355
00:15:55,140 --> 00:15:50,320
right it's on the backside of the edge

356
00:15:58,550 --> 00:15:55,150
of the solar panel we have a really

357
00:16:00,990 --> 00:15:58,560
exciting mission I'm looking forward to

358
00:16:02,850 --> 00:16:01,000
getting to Mars about a year from now

359
00:16:05,070 --> 00:16:02,860
little under a year from now and being

360
00:16:06,960 --> 00:16:05,080
able to do our science mission I have to

361
00:16:10,170 --> 00:16:06,970
tell you it is so thrilling to be able

362
00:16:13,800 --> 00:16:10,180
to look at launch only three weeks away

363
00:16:15,690 --> 00:16:13,810

from today at this point I'd like to

364
00:16:17,580 --> 00:16:15,700
turn it over to our project manager

365
00:16:19,110 --> 00:16:17,590
David Mitchell from Goddard Space Flight

366
00:16:20,880 --> 00:16:19,120
Center who will tell us about the

367
00:16:23,010 --> 00:16:20,890
process of getting the spacecraft in

368
00:16:24,810 --> 00:16:23,020
instruments here thank you Bruce for

369
00:16:27,150 --> 00:16:24,820
starters I want to take a step back I am

370
00:16:28,860 --> 00:16:27,160
gonna talk about the team a bit and the

371
00:16:31,350 --> 00:16:28,870
milestones that we've achieved in the

372
00:16:33,150 --> 00:16:31,360
milestones going forward but taking a

373
00:16:34,830 --> 00:16:33,160
step back as Bruce mentioned we're just

374
00:16:37,110 --> 00:16:34,840
three weeks away we're on the doorstep

375
00:16:40,560 --> 00:16:37,120
of going to Mars and to spend a journey

376
00:16:43,710 --> 00:16:40,570
of ten years you know we were selected

377
00:16:46,260 --> 00:16:43,720
five years ago but Bruce and a couple

378
00:16:50,340 --> 00:16:46,270
others put together from a clean sheet

379
00:16:52,800 --> 00:16:50,350
of paper the the idea back in 2003 so

380
00:16:56,100 --> 00:16:52,810
it's it's amazing now at this point

381
00:16:59,160 --> 00:16:56,110
after 10 years to be on the threshold of

382
00:17:01,680 --> 00:16:59,170
heading out to the red planet so anyway

383
00:17:03,690 --> 00:17:01,690
I'll talk a bit about some of the events

384
00:17:08,010 --> 00:17:03,700
that have happened certainly it's been

385
00:17:10,020 --> 00:17:08,020
years of work just building proposals

386
00:17:11,400 --> 00:17:10,030
and and building the designs and it's

387
00:17:12,429 --> 00:17:11,410
starting with the instruments and the

388
00:17:15,639 --> 00:17:12,439

boxes and the SEM

389
00:17:18,159 --> 00:17:15,649
the spacecraft over the past year the

390
00:17:20,499 --> 00:17:18,169
team has been engaged in and putting it

391
00:17:23,619 --> 00:17:20,509
all together and going through extensive

392
00:17:26,679 --> 00:17:23,629
testing of the system leading up to when

393
00:17:29,169 --> 00:17:26,689
we shipped to Cape Canaveral from Denver

394
00:17:31,659 --> 00:17:29,179
in August so there's been a lot of work

395
00:17:33,490 --> 00:17:31,669
on that point what I'm particularly

396
00:17:36,610 --> 00:17:33,500
proud of is the fact that when we

397
00:17:38,200 --> 00:17:36,620
submitted as proposal five years ago we

398
00:17:39,940 --> 00:17:38,210
picked a certain date that we wanted to

399
00:17:43,570 --> 00:17:39,950
be launched ready it was November 18

400
00:17:45,850 --> 00:17:43,580
2013 and by golly we're close I mean

401
00:17:47,590 --> 00:17:45,860
we're three weeks away and everything is

402
00:17:49,629 --> 00:17:47,600
on track for us to actually be launch

403
00:17:51,850 --> 00:17:49,639
ready and of course weather and a lot of

404
00:17:55,149 --> 00:17:51,860
other things could steer us a little bit

405
00:17:57,519 --> 00:17:55,159
there but really really proud of what

406
00:17:59,350 --> 00:17:57,529
the team has done so far but then on the

407
00:18:01,149 --> 00:17:59,360
other side of it this is really just the

408
00:18:02,619 --> 00:18:01,159
beginning we're finally gonna start

409
00:18:05,560 --> 00:18:02,629
flying to Mars so there's a long way to

410
00:18:08,440 --> 00:18:05,570
go and I've always said to Bruce and and

411
00:18:09,909 --> 00:18:08,450
he back to me that we're never a success

412
00:18:11,889 --> 00:18:09,919
until we're at Mars and we're taking

413
00:18:14,529 --> 00:18:11,899

data and getting the science that these

414
00:18:18,430 --> 00:18:14,539
folks envision back in 2003

415
00:18:20,139 --> 00:18:18,440
so Lisa mentioned the teaming and I want

416
00:18:22,600 --> 00:18:20,149
to say it one more time because it's so

417
00:18:24,220 --> 00:18:22,610
important what this group is done at the

418
00:18:26,889 --> 00:18:24,230
University of Colorado the Goddard Space

419
00:18:28,720 --> 00:18:26,899
Flight Center Lockheed Martin Berkeley

420
00:18:31,060 --> 00:18:28,730
out at the University of California and

421
00:18:33,220 --> 00:18:31,070
the Jet Propulsion lab from a spacecraft

422
00:18:35,680 --> 00:18:33,230
teaming standpoint it has been such a

423
00:18:36,999 --> 00:18:35,690
pleasure to work with this group on the

424
00:18:40,269 --> 00:18:37,009
launch vehicle side and I'll show a

425
00:18:42,730 --> 00:18:40,279
couple of videos in a moment but the the

426
00:18:45,669 --> 00:18:42,740
Atlas 5 team what a track record with at

427
00:18:47,409 --> 00:18:45,679
that launch vehicle and with the United

428
00:18:50,200 --> 00:18:47,419
Launch Alliance with a Kennedy Space

429
00:18:52,509 --> 00:18:50,210
Center launch services program and the

430
00:18:54,159 --> 00:18:52,519
US Air Force 45th Space Wing the group

431
00:18:57,789 --> 00:18:54,169
down there at Cape Canaveral Air Force

432
00:19:00,940 --> 00:18:57,799
Station so really really excited to be

433
00:19:04,389 --> 00:19:00,950
at this point so I will go now to the

434
00:19:06,759 --> 00:19:04,399
video if that could be rolled in just a

435
00:19:09,549 --> 00:19:06,769
couple of minutes of activities I wanted

436
00:19:12,340 --> 00:19:09,559
to point out this a fast pace view of

437
00:19:14,830 --> 00:19:12,350
the spacecraft being loaded into a c-17

438
00:19:16,330 --> 00:19:14,840

aircraft now it's it was leaving from

439
00:19:18,580 --> 00:19:16,340
Buckley now it's landing up the shuttle

440
00:19:21,100 --> 00:19:18,590
landing facility at the Kennedy Space

441
00:19:25,419 --> 00:19:21,110
Center and now that the spacecraft is

442
00:19:26,409 --> 00:19:25,429
coming out of the the c-17 this is our

443
00:19:29,139 --> 00:19:26,419
spacecraft as

444
00:19:31,539 --> 00:19:29,149
just arrived at the PHS F at the Kennedy

445
00:19:36,190 --> 00:19:31,549
Space Center being lowered onto a ground

446
00:19:37,960 --> 00:19:36,200
support stand and here is a test that

447
00:19:40,810 --> 00:19:37,970
was actually done in Denver but repeated

448
00:19:43,570 --> 00:19:40,820
again in at the Kennedy Space Center and

449
00:19:45,759 --> 00:19:43,580
it's a solar array deployment this is

450
00:19:47,249 --> 00:19:45,769
the wings being deployed and and ready

451
00:19:50,560 --> 00:19:47,259
to fly I mean this is how it'll look

452
00:19:52,450 --> 00:19:50,570
just a few minutes after separation from

453
00:19:54,639 --> 00:19:52,460
the Atlas vehicle three weeks from now

454
00:19:56,609 --> 00:19:54,649
we hope so it'll fly in this

455
00:19:59,109 --> 00:19:56,619
configuration all the way to Mars so

456
00:20:01,509 --> 00:19:59,119
very exciting moment to get to this

457
00:20:03,549 --> 00:20:01,519
point and show it everything operating

458
00:20:07,269 --> 00:20:03,559
is planned and as you'll see in a minute

459
00:20:08,859 --> 00:20:07,279
a happy group they're cheering it on the

460
00:20:11,289 --> 00:20:08,869
next shot actually this test occurred

461
00:20:13,060 --> 00:20:11,299
last week in in Florida at the Kennedy

462
00:20:15,070 --> 00:20:13,070
Space Center and this is spin balancing

463
00:20:16,869 --> 00:20:15,080

of the spacecraft and the properties

464
00:20:19,149 --> 00:20:16,879
were so well done that they only needed

465
00:20:20,919 --> 00:20:19,159
eight pounds of ballast to get it where

466
00:20:23,440 --> 00:20:20,929
they needed to so this is this is

467
00:20:26,349 --> 00:20:23,450
spinning at about 5 rpm this is the

468
00:20:29,259 --> 00:20:26,359
Delta Mariner ship that takes the

469
00:20:31,320 --> 00:20:29,269
booster and the Atlas centaur from

470
00:20:33,849 --> 00:20:31,330
Decatur Alabama where it was built and

471
00:20:35,349 --> 00:20:33,859
brought out to the launch site and there

472
00:20:37,690 --> 00:20:35,359
it's making its way over to the launch

473
00:20:39,970 --> 00:20:37,700
site and this is of course is what we're

474
00:20:42,669 --> 00:20:39,980
all about here this is just an animation

475
00:20:45,129 --> 00:20:42,679
of course but this is what in September

476
00:20:47,320 --> 00:20:45,139
of next year we hope to be orbiting Mars

477
00:20:50,229 --> 00:20:47,330
and we fully intend to and it's it's

478
00:20:53,529 --> 00:20:50,239
been a great journey so far and we got a

479
00:20:55,960 --> 00:20:53,539
long way to go and but we're on track I

480
00:20:58,720 --> 00:20:55,970
just wanted to mention a couple of other

481
00:21:02,080 --> 00:20:58,730
quick things one is that we launched on

482
00:21:06,690 --> 00:21:02,090
November 18th and will be in Mars orbit

483
00:21:10,330 --> 00:21:06,700
insertion September 22nd of 2014 and

484
00:21:13,029 --> 00:21:10,340
they on the operation side the the ops

485
00:21:15,399 --> 00:21:13,039
team has been working and testing and

486
00:21:18,580 --> 00:21:15,409
stressing the system to make sure we're

487
00:21:20,349 --> 00:21:18,590
all we've got it all in line and they've

488
00:21:22,960 --> 00:21:20,359

really worked very well together and

489
00:21:24,999 --> 00:21:22,970
we're distributed around the country so

490
00:21:27,489 --> 00:21:25,009
great ops team they're there ready to

491
00:21:28,840 --> 00:21:27,499
roll in as a whole our team is excited

492
00:21:30,759 --> 00:21:28,850
and get out and get ready for the next

493
00:21:32,499 --> 00:21:30,769
part of the journey so with that I'll

494
00:21:34,450 --> 00:21:32,509
turn it back to Duane okay thank you

495
00:21:37,060 --> 00:21:34,460
well ladies and gentlemen before we take

496
00:21:39,279 --> 00:21:37,070
questions just I've had opportunity to

497
00:21:40,210 --> 00:21:39,289
work with many many teams and the

498
00:21:43,509 --> 00:21:40,220
science

499
00:21:45,190 --> 00:21:43,519
Arina and these guys are good let me

500
00:21:47,289 --> 00:21:45,200
tell you Bruce jakosky

501
00:21:50,139 --> 00:21:47,299
dad get that right I got to get the

502
00:21:51,940 --> 00:21:50,149
boss's name right here but and I know

503
00:21:54,009 --> 00:21:51,950
lots of folks watching this program

504
00:21:56,320 --> 00:21:54,019
particularly the folks down in Florida

505
00:21:57,850 --> 00:21:56,330
we're coming down and thanks for all you

506
00:22:00,369 --> 00:21:57,860
do down there in Florida in the

507
00:22:04,200 --> 00:22:00,379
spacecraft ready you can send your

508
00:22:07,840 --> 00:22:04,210
questions in again on hashtag ask NASA

509
00:22:10,480 --> 00:22:07,850
follow us on Twitter Facebook YouTube

510
00:22:11,919 --> 00:22:10,490
other social sites so what we're going

511
00:22:15,549 --> 00:22:11,929
to do we're going to start off with the

512
00:22:17,379 --> 00:22:15,559
phone lines first and then we'll toss it

513
00:22:22,119 --> 00:22:17,389

to my colleague Jason Townsend who is

514
00:22:23,950 --> 00:22:22,129
Manning Manning the ash NASA site send

515
00:22:26,080 --> 00:22:23,960
those questions in and let's go to the

516
00:22:32,070 --> 00:22:26,090
phone lines and I believe we have Peter

517
00:22:43,029 --> 00:22:41,499
yes Peter great okay we'll get Peter

518
00:22:49,330 --> 00:22:43,039
back we lost the connection camille

519
00:22:54,560 --> 00:22:49,340
carlisle are you on the phone going once

520
00:22:59,569 --> 00:22:57,739
okay all right well let's go to let me

521
00:23:00,859 --> 00:22:59,579
go to my colleague Jason and we can get

522
00:23:02,449 --> 00:23:00,869
back to the phone lines Jason what you

523
00:23:04,189 --> 00:23:02,459
got going over there indeed we're

524
00:23:06,439 --> 00:23:04,199
monitoring all of our social networks

525
00:23:08,539 --> 00:23:06,449
here for questions from the hashtag ask

526
00:23:10,549 --> 00:23:08,549
NASA so first one up here comes from

527
00:23:12,639 --> 00:23:10,559
Marshall Smith what international

528
00:23:17,209 --> 00:23:12,649
participation if any is there in maven

529
00:23:19,389 --> 00:23:17,219
let me address that we have two

530
00:23:24,199 --> 00:23:19,399
components of international cooperation

531
00:23:27,199 --> 00:23:24,209
the first is from one of the groups in

532
00:23:30,439 --> 00:23:27,209
Toulouse France which provides hardware

533
00:23:31,609 --> 00:23:30,449
for the suite instrument the solar wind

534
00:23:33,859 --> 00:23:31,619
electron analyzer

535
00:23:40,339 --> 00:23:33,869
that instrument is built jointly between

536
00:23:42,469 --> 00:23:40,349
Berkeley and the the I rap group instead

537
00:23:45,769 --> 00:23:42,479
I'm not going to get the French right

538
00:23:48,859 --> 00:23:45,779

but Research Institute for astrophysics

539
00:23:51,109 --> 00:23:48,869
and planetary science the instrument is

540
00:23:52,699 --> 00:23:51,119
jointly done between the two groups in

541
00:23:55,159 --> 00:23:52,709
addition we have several other

542
00:23:58,639 --> 00:23:55,169
investigators in France who are

543
00:24:01,339 --> 00:23:58,649
participants on the science team on the

544
00:24:03,349 --> 00:24:01,349
spacecraft side Dave do you want to talk

545
00:24:06,309 --> 00:24:03,359
about the international components from

546
00:24:10,129 --> 00:24:06,319
the spacecraft certainly there's there's

547
00:24:12,829 --> 00:24:10,139
multiple elements that come from Germany

548
00:24:14,149 --> 00:24:12,839
Italy I'm trying to click through the

549
00:24:17,899 --> 00:24:14,159
others but they're there certainly as

550
00:24:19,909 --> 00:24:17,909
they're primarily subcontractor vendors

551
00:24:21,859 --> 00:24:19,919
through Lockheed Martin different

552
00:24:31,399 --> 00:24:21,869
elements of the spacecraft that are

553
00:24:34,369 --> 00:24:31,409
provided from European locations first

554
00:24:35,989 --> 00:24:34,379
is from Seba how could findings from the

555
00:24:38,389 --> 00:24:35,999
maven mission help future manned

556
00:24:41,269 --> 00:24:38,399
missions to Mars and the second one from

557
00:24:43,579 --> 00:24:41,279
Allison will Gus asks how will data from

558
00:24:45,709 --> 00:24:43,589
maven help us improve our models and

559
00:24:48,289 --> 00:24:45,719
plans for human scaling entry descent

560
00:24:51,019 --> 00:24:48,299
and landing on the surface let me

561
00:24:55,279 --> 00:24:51,029
address both of those again on the entry

562
00:24:58,849 --> 00:24:55,289
descent and landing for for spacecraft

563
00:25:00,889 --> 00:24:58,859

like the Rovers that we've been sending

564
00:25:02,809 --> 00:25:00,899
recently they're only very slightly

565
00:25:05,389 --> 00:25:02,819
sensitive to this part of the atmosphere

566
00:25:07,970 --> 00:25:05,399
they really begin to sense it at about

567
00:25:10,070 --> 00:25:07,980
the altitudes we're at we're

568
00:25:12,500 --> 00:25:10,080
studying but they're not as important

569
00:25:14,780 --> 00:25:12,510
the possibility where they come into

570
00:25:18,380 --> 00:25:14,790
play a little bit more is when we send

571
00:25:19,909 --> 00:25:18,390
human missions where we're especially if

572
00:25:22,280 --> 00:25:19,919
we're using passage through the

573
00:25:25,190 --> 00:25:22,290
atmosphere to slow down the the

574
00:25:27,350 --> 00:25:25,200
spacecraft we want to understand what

575
00:25:29,960 --> 00:25:27,360
the structure the composition is at all

576
00:25:34,760 --> 00:25:29,970
parts of the atmosphere including the

577
00:25:37,039 --> 00:25:34,770
upper atmosphere okay let's go back to

578
00:25:38,630 --> 00:25:37,049
the phones and see who we have on now I

579
00:25:42,280 --> 00:25:38,640
believe where it is Irene are you with

580
00:25:44,960 --> 00:25:42,290
us I am Duane Thanks

581
00:25:47,659 --> 00:25:44,970
can you hear me all right yes go ahead

582
00:25:50,510 --> 00:25:47,669
good thank you I have a few different

583
00:25:51,860 --> 00:25:50,520
questions first is it sounds probably

584
00:25:53,659 --> 00:25:51,870
for Bruce it sounded from the

585
00:25:58,310 --> 00:25:53,669
description of the mission that this is

586
00:25:59,299 --> 00:25:58,320
a very much a cumulative process you're

587
00:26:03,590 --> 00:25:59,309
not gonna there's not going to be

588
00:26:06,260 --> 00:26:03,600

science coming out on a kind of a

589
00:26:07,760 --> 00:26:06,270
regular basis like we get with MSL as it

590
00:26:09,560 --> 00:26:07,770
goes to different sites and things if

591
00:26:13,669 --> 00:26:09,570
you could just maybe address that and

592
00:26:19,030 --> 00:26:13,679
also the the primary mission duration

593
00:26:21,980 --> 00:26:19,040
and the program cost on the first one we

594
00:26:23,659 --> 00:26:21,990
it is a cumulative mission in the sense

595
00:26:26,090 --> 00:26:23,669
that we need the data from all of our

596
00:26:28,880 --> 00:26:26,100
instruments working together in order to

597
00:26:30,890 --> 00:26:28,890
get the science results and we're

598
00:26:33,260 --> 00:26:30,900
anticipating that will really begin to

599
00:26:35,450 --> 00:26:33,270
get our first key results at answering

600
00:26:37,789 --> 00:26:35,460
the questions we've posed after about

601
00:26:40,789 --> 00:26:37,799
three months we picked the mission

602
00:26:44,030 --> 00:26:40,799
duration of one earth year because in

603
00:26:46,159 --> 00:26:44,040
that time at this timing in the solar

604
00:26:48,860 --> 00:26:46,169
cycle we expect there to be enough

605
00:26:50,960 --> 00:26:48,870
variability of the Sun enough solar

606
00:26:54,230 --> 00:26:50,970
events that will really be able to get a

607
00:26:56,659 --> 00:26:54,240
handle on what's happening so we we

608
00:26:58,490 --> 00:26:56,669
picked that mission duration now even

609
00:27:02,030 --> 00:26:58,500
despite that despite requiring

610
00:27:05,539 --> 00:27:02,040
integrated data we do anticipate putting

611
00:27:07,520 --> 00:27:05,549
some data out very quickly some we're

612
00:27:10,880 --> 00:27:07,530
hoping some cool images of the planet as

613
00:27:12,710 --> 00:27:10,890

we start to collect data and it's very

614
00:27:15,950 --> 00:27:12,720
hard to anticipate discoveries you're

615
00:27:18,289 --> 00:27:15,960
going to make until you see them but but

616
00:27:22,159 --> 00:27:18,299
when we do if we do we will get those

617
00:27:25,849 --> 00:27:22,169
out very quickly Lisa on the

618
00:27:27,649 --> 00:27:25,859
kostya on the on the program cost mavin

619
00:27:30,440 --> 00:27:27,659
as a Mars Scout like discovery missions

620
00:27:32,649 --> 00:27:30,450
has a cost captain when we cost cap and

621
00:27:35,239 --> 00:27:32,659
when we confirmed native and it was at

622
00:27:36,830 --> 00:27:35,249
671 million dollars for the lifecycle

623
00:27:39,080 --> 00:27:36,840
all the way through that earth year of

624
00:27:43,180 --> 00:27:39,090
operations and they are doing very well

625
00:27:53,509 --> 00:27:43,190
in that respect okay next on the fall

626
00:27:56,090 --> 00:27:53,519
Ken Kramer from Universe Today Ken going

627
00:28:00,919 --> 00:27:56,100
once going twice Ken are you with us yes

628
00:28:02,180 --> 00:28:00,929
hi can you hear me now yes okay good let

629
00:28:03,950 --> 00:28:02,190
me just say good luck through the launch

630
00:28:07,190 --> 00:28:03,960
my question I have a couple questions

631
00:28:10,639 --> 00:28:07,200
one for Bruce and then one for Jim and

632
00:28:13,430 --> 00:28:10,649
John Grunsfeld for Bruce can you mention

633
00:28:16,399 --> 00:28:13,440
if there is any methane capability

634
00:28:19,519 --> 00:28:16,409
capability to detect methane with with

635
00:28:21,710 --> 00:28:19,529
this at all and I'm also wondering you

636
00:28:24,139 --> 00:28:21,720
know we have the Indian Mars mom mission

637
00:28:26,720 --> 00:28:24,149
coming up soon has a few similar

638
00:28:30,649 --> 00:28:26,730

objectives have you held any discussions

639
00:28:33,470 --> 00:28:30,659
with that team Thanks we we do not have

640
00:28:36,859 --> 00:28:33,480
the capability to measure methane or any

641
00:28:38,899 --> 00:28:36,869
of its chemical byproducts in putting

642
00:28:42,889 --> 00:28:38,909
the maven mission together we wanted to

643
00:28:45,200 --> 00:28:42,899
focus on specific questions that dealt

644
00:28:47,359 --> 00:28:45,210
with escape of the atmosphere history of

645
00:28:49,249 --> 00:28:47,369
the atmosphere over time and as

646
00:28:51,289 --> 00:28:49,259
important as understanding the role of

647
00:28:53,840 --> 00:28:51,299
methane is in the atmosphere today

648
00:28:55,999 --> 00:28:53,850
especially as a possible indicator of

649
00:29:01,070 --> 00:28:56,009
life we just had to leave that one off

650
00:29:03,950 --> 00:29:01,080
in order to stay focused and stay within

651
00:29:06,889 --> 00:29:03,960
our available resources with regard to

652
00:29:08,749 --> 00:29:06,899
the Indian mission we have had some

653
00:29:10,759 --> 00:29:08,759
discussions with their science team

654
00:29:14,239 --> 00:29:10,769
there are some overlapping objectives

655
00:29:17,859 --> 00:29:14,249
and at the point where we're both in

656
00:29:21,249 --> 00:29:17,869
orbit collecting data we do plan to

657
00:29:24,259 --> 00:29:21,259
collaborate and work together with the

658
00:29:27,529 --> 00:29:24,269
the data jointly we just have not gotten

659
00:29:33,830 --> 00:29:27,539
that far yet in our discussions and can

660
00:29:50,400 --> 00:29:36,720
he's okay all right let's go back to

661
00:29:52,320 --> 00:29:50,410
social media so the question in case you

662
00:29:54,240 --> 00:29:52,330
couldn't hear that was how different are

663
00:29:56,400 --> 00:29:54,250

the Maven instruments from those that

664
00:29:57,960 --> 00:29:56,410
have flown on previous orbiters let me

665
00:30:00,180 --> 00:29:57,970
let me answer a little bit more broadly

666
00:30:02,669 --> 00:30:00,190
than that because the instruments that

667
00:30:03,600 --> 00:30:02,679
we're flying have generally flown before

668
00:30:05,910 --> 00:30:03,610
somewhere

669
00:30:08,760 --> 00:30:05,920
either in Earth orbit studying some of

670
00:30:11,310 --> 00:30:08,770
the same processes there or some of them

671
00:30:13,110 --> 00:30:11,320
have actually flown at Mars this is the

672
00:30:15,480 --> 00:30:13,120
first time we will have flown all of

673
00:30:17,190 --> 00:30:15,490
these instruments in one package so that

674
00:30:19,799 --> 00:30:17,200
we can really get a comprehensive look

675
00:30:23,870 --> 00:30:19,809
at the Mars upper atmosphere with all of

676
00:30:28,440 --> 00:30:25,770
wonderful our next question comes from

677
00:30:30,000 --> 00:30:28,450
Omni comment could you elaborate more on

678
00:30:32,070 --> 00:30:30,010
the competing science models for the

679
00:30:35,910 --> 00:30:32,080
loss of atmosphere that maven is going

680
00:30:39,120 --> 00:30:35,920
to test limit let me give a try at that

681
00:30:42,990 --> 00:30:39,130
and I'm not sure if this is answering

682
00:30:46,049 --> 00:30:43,000
the question but the the driver is that

683
00:30:48,180 --> 00:30:46,059
the atmosphere of Mars must have been

684
00:30:52,590 --> 00:30:48,190
thicker in order to have been warmer and

685
00:30:54,450 --> 00:30:52,600
wetter a thick co2 atmosphere is for

686
00:30:56,880 --> 00:30:54,460
example is the easiest way to get

687
00:30:59,520 --> 00:30:56,890
greenhouse warming to warm up the planet

688
00:31:01,470 --> 00:30:59,530

early in its history especially what as

689
00:31:03,690 --> 00:31:01,480
the Sun was 30 percent dimmer at that

690
00:31:05,580 --> 00:31:03,700
time the question has been where did the

691
00:31:09,060 --> 00:31:05,590
co2 go and where did the water go

692
00:31:11,940 --> 00:31:09,070
there's a lot of evidence that some co2

693
00:31:14,820 --> 00:31:11,950
has gone to form carbonate minerals that

694
00:31:17,010 --> 00:31:14,830
is minerals that contain co2 that are

695
00:31:18,690 --> 00:31:17,020
present within the crust we've detected

696
00:31:21,390 --> 00:31:18,700
them from a number of different

697
00:31:23,549 --> 00:31:21,400
spacecraft observations from Martian

698
00:31:25,980 --> 00:31:23,559
meteorites that have been collected here

699
00:31:29,669 --> 00:31:25,990
on earth what we don't know is how much

700
00:31:32,220 --> 00:31:29,679
of the co2 from an early thick

701
00:31:34,380 --> 00:31:32,230
atmosphere is retained in the crust it's

702
00:31:36,720 --> 00:31:34,390
very hard to get a global inventory of

703
00:31:39,660 --> 00:31:36,730
the total amount of carbon within the

704
00:31:42,450 --> 00:31:39,670
crust but so far we just don't see a

705
00:31:45,650 --> 00:31:42,460
large enough inventory to explain the

706
00:31:47,540 --> 00:31:45,660
early thick atmosphere the other way to

707
00:31:49,040 --> 00:31:47,550
rid of it is for it to be lost out the

708
00:31:50,750 --> 00:31:49,050
top of the atmosphere and we have

709
00:31:53,510 --> 00:31:50,760
measurements that tell us that this is

710
00:31:56,450 --> 00:31:53,520
an ongoing process today at least at a

711
00:31:58,430 --> 00:31:56,460
low level we have measurements of

712
00:32:01,250 --> 00:31:58,440
isotopes in the Mars atmosphere made

713
00:32:03,920 --> 00:32:01,260

most recently from the Curiosity rover

714
00:32:07,310 --> 00:32:03,930
that tells us that escaped to space has

715
00:32:09,560 --> 00:32:07,320
occurred and the European Mars Express

716
00:32:11,960 --> 00:32:09,570
mission has detected some of these atoms

717
00:32:14,270 --> 00:32:11,970
directly that have been lost what we

718
00:32:17,390 --> 00:32:14,280
don't know is how much loss has occurred

719
00:32:20,090 --> 00:32:17,400
through time or how the processes that

720
00:32:22,220 --> 00:32:20,100
control and operate so maven is designed

721
00:32:25,520 --> 00:32:22,230
to provide not just the measurements

722
00:32:27,770 --> 00:32:25,530
that tell us about loss to space not

723
00:32:29,570 --> 00:32:27,780
just that it has occurred but to let us

724
00:32:32,360 --> 00:32:29,580
determine how much has occurred over

725
00:32:35,030 --> 00:32:32,370
time and what processes have controlled

726
00:32:37,250 --> 00:32:35,040
it so what we're trying to do is to

727
00:32:39,830 --> 00:32:37,260
determine the relative significance of

728
00:32:41,450 --> 00:32:39,840
these different processes by looking at

729
00:32:44,330 --> 00:32:41,460
the one that has been completely ignored

730
00:32:45,980 --> 00:32:44,340
so far okay let's take one more question

731
00:32:47,120 --> 00:32:45,990
and then we're going to try the phone

732
00:32:48,740 --> 00:32:47,130
lines again we're having some

733
00:32:50,000 --> 00:32:48,750
connectivity issues but they're

734
00:32:52,100 --> 00:32:50,010
addressing their normal question yeah

735
00:32:53,750 --> 00:32:52,110
wonderful then um these two questions

736
00:32:56,240 --> 00:32:53,760
kind of dovetail exactly together here

737
00:32:58,160 --> 00:32:56,250
first comes from steel-toed will may

738
00:33:00,530 --> 00:32:58,170

even collect data or images during the

739
00:33:03,110 --> 00:33:00,540
journey to Mars and then Hannah Byrd

740
00:33:04,730 --> 00:33:03,120
asks is any of the Opera is there any

741
00:33:08,840 --> 00:33:04,740
opportunity for the public to analyze

742
00:33:11,270 --> 00:33:08,850
any of the Maven data during the cruise

743
00:33:15,110 --> 00:33:11,280
we have a 10-month cruise phase to get

744
00:33:17,930 --> 00:33:15,120
to mars and the the primary focus there

745
00:33:21,230 --> 00:33:17,940
is going to be on testing the

746
00:33:24,620 --> 00:33:21,240
instruments making sure they work doing

747
00:33:26,570 --> 00:33:24,630
calibrations in space but in doing that

748
00:33:28,760 --> 00:33:26,580
we will get some observations along the

749
00:33:34,520 --> 00:33:28,770
way particularly of the solar wind and

750
00:33:37,670 --> 00:33:34,530
the the solar hydrogen corona permeating

751
00:33:41,900 --> 00:33:37,680
interplanetary space in terms of public

752
00:33:44,330 --> 00:33:41,910
and analysis of data our plan is to put

753
00:33:47,300 --> 00:33:44,340
the data out to the public through the

754
00:33:49,340 --> 00:33:47,310
planetary data system that will happen

755
00:33:51,980 --> 00:33:49,350
as soon as we have the data well

756
00:33:56,330 --> 00:33:51,990
understood and calibrated at that point

757
00:33:57,230 --> 00:33:56,340
it's available to everybody okay let's

758
00:33:59,539 --> 00:33:57,240
see if we can go back to the phone lines

759
00:34:08,659 --> 00:33:59,549
and if we have Peter King that

760
00:34:10,569 --> 00:34:08,669
to rejoin us Peter Peter King well Oh

761
00:34:13,520 --> 00:34:10,579
Dan Dan Vigano

762
00:34:15,470 --> 00:34:13,530
dan hi folks this is Dan Fergana with

763
00:34:18,379 --> 00:34:15,480

National Geographic I have two questions

764
00:34:21,049 --> 00:34:18,389
one is what's the launch vehicle cost on

765
00:34:23,599 --> 00:34:21,059
top of the 671 million and the second is

766
00:34:25,399 --> 00:34:23,609
a scientific question try understand if

767
00:34:27,740 --> 00:34:25,409
Mars is magnetic field is varied over

768
00:34:30,470 --> 00:34:27,750
time how can you be confident of what

769
00:34:32,270 --> 00:34:30,480
the loss you're seeing now is reflected

770
00:34:33,619 --> 00:34:32,280
in you know results or yourself now will

771
00:34:37,280 --> 00:34:33,629
reflect what it was happening way back

772
00:34:39,740 --> 00:34:37,290
in the past hi Dan this is Lisa Lisa May

773
00:34:42,919 --> 00:34:39,750
the launch vehicle cost is included in

774
00:34:47,619 --> 00:34:42,929
the 671 and it's approximately 170

775
00:34:50,059 --> 00:34:47,629
million dollars on the science question

776
00:34:53,030 --> 00:34:50,069
we have measurements from Mars Global

777
00:34:56,000 --> 00:34:53,040
Surveyor of the crustal remnant

778
00:34:58,370 --> 00:34:56,010
magnetism that tell us that Mars had a

779
00:35:01,940 --> 00:34:58,380
magnetic field at some time in its past

780
00:35:03,859 --> 00:35:01,950
the role of the magnetic field here is

781
00:35:06,770 --> 00:35:03,869
that if you have a global field it

782
00:35:08,960 --> 00:35:06,780
causes the solar wind to stand off it

783
00:35:11,299 --> 00:35:08,970
pushes it away so it doesn't hit the

784
00:35:16,099 --> 00:35:11,309
upper atmosphere it isn't able to strip

785
00:35:18,470 --> 00:35:16,109
off the gas out the top so the turn off

786
00:35:20,210 --> 00:35:18,480
of the magnetic field would have allowed

787
00:35:22,819 --> 00:35:20,220
the turn-on of stripping of the

788
00:35:24,609 --> 00:35:22,829

atmosphere by the solar wind and we know

789
00:35:26,720 --> 00:35:24,619
that the magnetic field turned off

790
00:35:30,109 --> 00:35:26,730
partly because we don't measure one

791
00:35:32,480 --> 00:35:30,119
today and partly because the crustal

792
00:35:34,670 --> 00:35:32,490
remnant magnetism the regions that

793
00:35:37,670 --> 00:35:34,680
retained that magnetic field is limited

794
00:35:40,250 --> 00:35:37,680
to the surfaces about four billion years

795
00:35:42,170 --> 00:35:40,260
old and older the younger surfaces

796
00:35:44,900 --> 00:35:42,180
generally don't have a magnetic field

797
00:35:46,460 --> 00:35:44,910
imprinted on them that would have

798
00:35:51,530 --> 00:35:46,470
indicated the presence of a magnetic

799
00:35:53,180 --> 00:35:51,540
field the next question from Camille

800
00:35:57,740 --> 00:35:53,190
Carlisle from Scott telescope

801
00:36:00,770 --> 00:35:57,750
Camille hi can you hear me yes excellent

802
00:36:03,829 --> 00:36:00,780
so my question is reversed and I was

803
00:36:06,380 --> 00:36:03,839
wondering one of the ratios talked about

804
00:36:08,900 --> 00:36:06,390
in maven studies is the deuterium to

805
00:36:11,740 --> 00:36:08,910
hydrogen ratio I was wondering if you

806
00:36:13,280 --> 00:36:11,750
can explain how can you relate that

807
00:36:15,860 --> 00:36:13,290
ratio

808
00:36:17,050 --> 00:36:15,870
and Mars atmosphere - what happened to

809
00:36:20,780 --> 00:36:17,060
the water

810
00:36:24,170 --> 00:36:20,790
okay the the determined hydrogen ratio

811
00:36:26,240 --> 00:36:24,180
comes into play as follows hydrogen and

812
00:36:28,090 --> 00:36:26,250
deuterium aren't the same element

813
00:36:30,230 --> 00:36:28,100

deuterium is just twice as heavy as

814
00:36:33,140 --> 00:36:30,240
hydrogen because it has an extra Neutron

815
00:36:35,780 --> 00:36:33,150
in the nucleus what that means is that

816
00:36:37,670 --> 00:36:35,790
as hydrogen escapes hydrogen and

817
00:36:39,740 --> 00:36:37,680
deuterium are both light enough that

818
00:36:42,530 --> 00:36:39,750
they can float up and escape out the top

819
00:36:44,300 --> 00:36:42,540
of the atmosphere the lighter hydrogen

820
00:36:49,100 --> 00:36:44,310
escapes more efficiently than the

821
00:36:52,430 --> 00:36:49,110
heavier deuterium so as escape continues

822
00:36:56,120 --> 00:36:52,440
more hydrogen as loss less deuterium the

823
00:36:59,810 --> 00:36:56,130
ratio of deuterium to hydrogen of What's

824
00:37:03,080 --> 00:36:59,820
Left Behind been increases over time the

825
00:37:05,390 --> 00:37:03,090
source of either the D or the H is water

826
00:37:08,000 --> 00:37:05,400
out of the atmosphere it's broken apart

827
00:37:09,770 --> 00:37:08,010
by sunlight and that frees up the

828
00:37:12,290 --> 00:37:09,780
hydrogen or the deterring so it can

829
00:37:13,580 --> 00:37:12,300
float to the top and escape ultimately

830
00:37:16,160 --> 00:37:13,590
what's left behind can get

831
00:37:18,410 --> 00:37:16,170
reincorporated back into water so you

832
00:37:20,990 --> 00:37:18,420
can measure that D to H ratio either in

833
00:37:23,810 --> 00:37:21,000
the water or in the hydrogen at the top

834
00:37:26,330 --> 00:37:23,820
of the atmosphere but by measuring that

835
00:37:29,960 --> 00:37:26,340
ratio you can directly infer what the

836
00:37:32,180 --> 00:37:29,970
escape to space has been the ratio as as

837
00:37:36,260 --> 00:37:32,190
measured in some of the meteorites that

838
00:37:37,880 --> 00:37:36,270

come back from Mars and in in some very

839
00:37:41,090 --> 00:37:37,890
limited measurements at the top of the

840
00:37:43,460 --> 00:37:41,100
atmosphere suggest a ratio of about five

841
00:37:46,280 --> 00:37:43,470
times the terrestrial value and that

842
00:37:49,730 --> 00:37:46,290
means that somewhere in the range of 85

843
00:37:51,980 --> 00:37:49,740
to 90 percent of the hydrogen that was

844
00:37:54,830 --> 00:37:51,990
there must have escaped and that means

845
00:37:56,270 --> 00:37:54,840
that 85 to 90 percent of the water that

846
00:37:59,510 --> 00:37:56,280
was there must have been broken apart

847
00:38:04,910 --> 00:37:59,520
the hydrogen escaped and the oxygen

848
00:38:06,770 --> 00:38:04,920
sequestered somewhere okay that's I

849
00:38:10,340 --> 00:38:06,780
believe Irene from Reuters has a

850
00:38:12,020 --> 00:38:10,350
follow-up Irene thanks I'm not sure it

851
00:38:13,190 --> 00:38:12,030
would be best to answer this but I was

852
00:38:17,150 --> 00:38:13,200
just wondering if someone could please

853
00:38:23,270 --> 00:38:17,160
go through the major milestones between

854
00:38:25,970 --> 00:38:23,280
now and launch day Thanks so this week

855
00:38:27,079 --> 00:38:25,980
we're in in the process while say late

856
00:38:30,079 --> 00:38:27,089
last week we feel

857
00:38:33,469 --> 00:38:30,089
spacecraft up so all the hydrogen is on

858
00:38:37,219 --> 00:38:33,479
board we are now this week going to go

859
00:38:40,759 --> 00:38:37,229
through attaching the the interface ring

860
00:38:43,670 --> 00:38:40,769
the payload adapter between the well at

861
00:38:45,140 --> 00:38:43,680
the bottom of the spacecraft and then so

862
00:38:47,839 --> 00:38:45,150
that'll be secured that will ultimately

863
00:38:50,630 --> 00:38:47,849

go on the upper stage the the sent our

864
00:38:54,049 --> 00:38:50,640
interface of the launch vehicle but that

865
00:38:56,749 --> 00:38:54,059
comes next week so that that interface

866
00:38:58,969 --> 00:38:56,759
ring will be attached this week then

867
00:39:01,609 --> 00:38:58,979
late this week they're working on the

868
00:39:03,459 --> 00:39:01,619
the encapsulation of the fairing are

869
00:39:06,440 --> 00:39:03,469
processing getting ready for that

870
00:39:09,140 --> 00:39:06,450
encapsulation which will occur early

871
00:39:11,630 --> 00:39:09,150
next week so that'll that'll be the last

872
00:39:14,049 --> 00:39:11,640
time the spacecraft is visible as a

873
00:39:17,079 --> 00:39:14,059
whole its it's shrouded in this Atlas 5

874
00:39:19,309 --> 00:39:17,089
fairing and then if all goes to plan

875
00:39:22,940 --> 00:39:19,319
very early in the morning I think about

876
00:39:25,519 --> 00:39:22,950
2 a.m. on November 6 they'll start the

877
00:39:28,150 --> 00:39:25,529
the slow process of driving the

878
00:39:32,150 --> 00:39:28,160
spacecraft in the and the the fairing

879
00:39:36,589 --> 00:39:32,160
out to the launch pad and so on November

880
00:39:39,380 --> 00:39:36,599
6 they will take it to the pad and hoist

881
00:39:41,390 --> 00:39:39,390
it up and put it on top of the rocket so

882
00:39:44,120 --> 00:39:41,400
from that point it's all about

883
00:39:46,579 --> 00:39:44,130
integrated operations in terms of the

884
00:39:48,499 --> 00:39:46,589
communications and the testing that'll

885
00:39:52,450 --> 00:39:48,509
happen between the spacecraft and launch

886
00:39:55,370 --> 00:39:52,460
vehicle and then as we get even closer

887
00:39:57,769 --> 00:39:55,380
so about 10 days after that that made

888
00:39:59,630 --> 00:39:57,779

and a lot of ringing out of the system

889
00:40:02,900 --> 00:39:59,640
make sure everything is talking as it

890
00:40:05,959 --> 00:40:02,910
should we will roll the launch vehicle

891
00:40:10,880 --> 00:40:05,969
out to the out to the the final location

892
00:40:13,450 --> 00:40:10,890
for the for the launch just a I don't

893
00:40:18,380 --> 00:40:13,460
know a couple hour journey out to that

894
00:40:22,519 --> 00:40:18,390
launch pad and then the two days later

895
00:40:24,739 --> 00:40:22,529
we'll be ready to launch tomorrow the

896
00:40:26,599 --> 00:40:24,749
team is involved with what's called on

897
00:40:28,579 --> 00:40:26,609
the launch vehicle side is a wet dress

898
00:40:31,359 --> 00:40:28,589
rehearsal where they'll tank up the

899
00:40:33,170 --> 00:40:31,369
booster in the and the second stage and

900
00:40:35,180 --> 00:40:33,180
check out the system make sure

901
00:40:39,620 --> 00:40:35,190
everything is operating as planned on

902
00:40:40,340 --> 00:40:39,630
the valves and the telemetry all that

903
00:40:42,560 --> 00:40:40,350
all the

904
00:40:44,840 --> 00:40:42,570
data points are all playing as planned

905
00:40:46,580 --> 00:40:44,850
and so that's important that if there's

906
00:40:48,590 --> 00:40:46,590
anything that's found in that operation

907
00:40:50,570 --> 00:40:48,600
tomorrow we can repair it well in

908
00:40:52,610 --> 00:40:50,580
advance of the spacecraft moving out to

909
00:40:54,320 --> 00:40:52,620
the pad so a lot of integrated

910
00:40:56,510 --> 00:40:54,330
activities over the next couple of weeks

911
00:41:00,140 --> 00:40:56,520
and getting ready for the launch on the

912
00:41:01,850 --> 00:41:00,150
18th okay we're gonna take a couple more

913
00:41:03,380 --> 00:41:01,860

questions from our public and then we're

914
00:41:04,910 --> 00:41:03,390
gonna go to the phone lines one last

915
00:41:07,280 --> 00:41:04,920
time I'm determined to get Peter King

916
00:41:08,930 --> 00:41:07,290
from CBS they asked the question a

917
00:41:12,320 --> 00:41:08,940
couple more questions from our public

918
00:41:14,780 --> 00:41:12,330
Jason sure so Vladimir Kiefer asks when

919
00:41:17,630 --> 00:41:14,790
will maven orbit Mars if it launches in

920
00:41:20,330 --> 00:41:17,640
November and Maxwell Taggart asks how

921
00:41:23,330 --> 00:41:20,340
long will the mission run if we launch

922
00:41:27,320 --> 00:41:23,340
on November 18th we arrive at Mars on

923
00:41:29,420 --> 00:41:27,330
September 22nd we have a 20 day launch

924
00:41:30,980 --> 00:41:29,430
period during which we can launch if we

925
00:41:36,590 --> 00:41:30,990
launched at the end of that on December

926
00:41:39,740 --> 00:41:36,600
7th I believe we arrive on September

927
00:41:43,760 --> 00:41:39,750
26th so late September will be arriving

928
00:41:45,980 --> 00:41:43,770
we have a five and a half week period in

929
00:41:47,960 --> 00:41:45,990
orbit in order to commission the

930
00:41:50,900 --> 00:41:47,970
spacecraft that will be the time we get

931
00:41:53,330 --> 00:41:50,910
into our final mapping orbit deploy all

932
00:41:55,420 --> 00:41:53,340
the booms make sure all the instruments

933
00:41:57,650 --> 00:41:55,430
are operating do the final tests and

934
00:41:59,720 --> 00:41:57,660
calibrations and then we're ready to

935
00:42:02,570 --> 00:41:59,730
start mapping we have a one earth year

936
00:42:05,120 --> 00:42:02,580
primary mission so that runs from about

937
00:42:10,820 --> 00:42:05,130
November 1st give or take a couple of

938
00:42:13,100 --> 00:42:10,830

days of 2014 to November 1st of 2015 and

939
00:42:16,480 --> 00:42:13,110
then we have enough fuel to continue

940
00:42:19,990 --> 00:42:16,490
perhaps for as long as almost a decade

941
00:42:23,420 --> 00:42:20,000
doing a combination of relay and

942
00:42:28,790 --> 00:42:23,430
extended mission science so so we're

943
00:42:31,100 --> 00:42:28,800
hoping for a very long mission ok ok

944
00:42:33,920 --> 00:42:31,110
Peter King I'm gonna give you one last

945
00:42:35,240 --> 00:42:33,930
shot my friend we had time for a couple

946
00:42:38,440 --> 00:42:35,250
more questions Peter are you with me

947
00:42:41,589 --> 00:42:38,450
from CBS can you hear me now

948
00:42:43,810 --> 00:42:41,599
there he is all right

949
00:42:46,150 --> 00:42:43,820
glad we finally got this resolved I've

950
00:42:49,120 --> 00:42:46,160
got a couple of questions one for Bruce

951
00:42:51,040 --> 00:42:49,130
and one for John Grunsfeld and that will

952
00:42:53,140 --> 00:42:51,050
give our last Bruce first that will give

953
00:42:54,520 --> 00:42:53,150
John time to get to the mic Bruce when

954
00:42:57,400 --> 00:42:54,530
we were in the clean room a few weeks

955
00:42:59,880 --> 00:42:57,410
ago down here at KSC you and I talked a

956
00:43:02,680 --> 00:42:59,890
little bit about the possible shutdown

957
00:43:04,720 --> 00:43:02,690
and the government shutdown only really

958
00:43:05,640 --> 00:43:04,730
affected you guys for a couple days I'm

959
00:43:07,839 --> 00:43:05,650
just curious

960
00:43:10,270 --> 00:43:07,849
did you lose anything terribly

961
00:43:13,390 --> 00:43:10,280
significant or meaningful in terms of

962
00:43:15,940 --> 00:43:13,400
the big picture and how worried was the

963
00:43:19,390 --> 00:43:15,950

Maven team with with this specter

964
00:43:22,750 --> 00:43:19,400
looming I'm gonna let Dave answer the

965
00:43:24,790 --> 00:43:22,760
question about the impact on the team in

966
00:43:26,920 --> 00:43:24,800
the develop and the preparations sure

967
00:43:29,770 --> 00:43:26,930
so the shutdown as everyone knows

968
00:43:31,720 --> 00:43:29,780
occurred on October 1st and so on that

969
00:43:34,870 --> 00:43:31,730
day we were in the process of saving all

970
00:43:38,010 --> 00:43:34,880
our systems so that that went well and

971
00:43:41,380 --> 00:43:38,020
then within two days we were thankfully

972
00:43:44,920 --> 00:43:41,390
reactivated so you know we lost a couple

973
00:43:48,520 --> 00:43:44,930
of days there in from the standpoint of

974
00:43:51,730 --> 00:43:48,530
you know efficiencies and an actual time

975
00:43:53,800 --> 00:43:51,740
down but one thing about this team that

976
00:43:55,839 --> 00:43:53,810
has been incredible since day one is

977
00:43:58,180 --> 00:43:55,849
they they rise to the occasion rise to

978
00:43:59,970 --> 00:43:58,190
the challenges and so extra shifts were

979
00:44:02,950 --> 00:43:59,980
added we made sure we had the right

980
00:44:05,140 --> 00:44:02,960
people on board extra people to do this

981
00:44:08,620 --> 00:44:05,150
safely but you know we worked extra

982
00:44:11,319 --> 00:44:08,630
shifts over the weekends second shifts

983
00:44:14,890 --> 00:44:11,329
and they got right back on track in a

984
00:44:17,859 --> 00:44:14,900
matter of a week so we're on our nominal

985
00:44:21,040 --> 00:44:17,869
pre shutdown plan at this point we're

986
00:44:23,559 --> 00:44:21,050
really doing well so again kudos to the

987
00:44:25,420 --> 00:44:23,569
team but it was it was it's the

988
00:44:27,700 --> 00:44:25,430

uncertainty that's always hard when are

989
00:44:30,730 --> 00:44:27,710
we going to be reactivated but once we

990
00:44:33,960 --> 00:44:30,740
did the team really really stepped up

991
00:44:39,309 --> 00:44:37,480
Peter question for John because you know

992
00:44:41,500 --> 00:44:39,319
obviously the decision was made to

993
00:44:42,819 --> 00:44:41,510
continue work on maven because it was

994
00:44:45,400 --> 00:44:42,829
time-sensitive and there was an awful

995
00:44:48,430 --> 00:44:45,410
lot of money involved but much of the

996
00:44:50,829 --> 00:44:48,440
rest of NASA was shut down for a good 16

997
00:44:51,849 --> 00:44:50,839
days and I'm wondering with the projects

998
00:44:54,819 --> 00:44:51,859
that you and your

999
00:44:56,859 --> 00:44:54,829
division are involved with what kinds of

1000
00:44:59,380 --> 00:44:56,869
data were lost during that time what

1001
00:45:02,890 --> 00:44:59,390
kind of work was lost during that time

1002
00:45:04,120 --> 00:45:02,900
and you know is this anything that could

1003
00:45:06,640 --> 00:45:04,130
be made up

1004
00:45:10,539 --> 00:45:06,650
and finally future implications of all

1005
00:45:10,930 --> 00:45:10,549
that and now I'll be quiet listen thanks

1006
00:45:13,779 --> 00:45:10,940
Dan

1007
00:45:16,299 --> 00:45:13,789
the the impacts to the shutdown are are

1008
00:45:18,970 --> 00:45:16,309
still being evaluated clearly for those

1009
00:45:21,910 --> 00:45:18,980
projects that were completely shut down

1010
00:45:24,640 --> 00:45:21,920
and had no work going on you know we're

1011
00:45:26,380 --> 00:45:24,650
behind on those in some cases there day

1012
00:45:28,690 --> 00:45:26,390
for day slips in some cases they'll be

1013
00:45:31,779 --> 00:45:28,700

much longer than that because conflict

1014
00:45:33,729 --> 00:45:31,789
for resources such as test chambers you

1015
00:45:37,210 --> 00:45:33,739
know thermal vac chambers vibration

1016
00:45:40,569 --> 00:45:37,220
tables all that's still being evaluated

1017
00:45:43,210 --> 00:45:40,579
for the missions that are on-orbit

1018
00:45:45,309 --> 00:45:43,220
taking data for the most part those

1019
00:45:47,140 --> 00:45:45,319
continued and operations continued on

1020
00:45:49,539 --> 00:45:47,150
their scientific missions the data

1021
00:45:51,249 --> 00:45:49,549
analysis stopped but the actual

1022
00:45:53,650 --> 00:45:51,259
acquisition of data for instance the

1023
00:45:56,140 --> 00:45:53,660
Hubble Space Telescope typically carries

1024
00:45:58,599 --> 00:45:56,150
with it two weeks of observations in its

1025
00:46:00,819 --> 00:45:58,609
own memory so it continues as long as it

1026
00:46:02,769 --> 00:46:00,829
doesn't get upset and go into safe mode

1027
00:46:04,180 --> 00:46:02,779
or something like that all of that data

1028
00:46:06,130 --> 00:46:04,190
gets beamed down to the ground and

1029
00:46:08,140 --> 00:46:06,140
eventually the scientists will get that

1030
00:46:09,819 --> 00:46:08,150
and work on it so it's kind of a

1031
00:46:12,400 --> 00:46:09,829
combination of things but that's that's

1032
00:46:14,049 --> 00:46:12,410
still an evaluation there are there are

1033
00:46:17,049 --> 00:46:14,059
some things where the science is just

1034
00:46:20,470 --> 00:46:17,059
simply lost we we had flights of our

1035
00:46:23,140 --> 00:46:20,480
airborne Observatory Sofia we lost nine

1036
00:46:24,880 --> 00:46:23,150
days of observations those could get

1037
00:46:26,319 --> 00:46:24,890
recycled into the queue in some future

1038
00:46:28,779 --> 00:46:26,329

years but for the most part those

1039
00:46:31,539 --> 00:46:28,789
observations are lost and will have to

1040
00:46:33,099 --> 00:46:31,549
be repurposed thanks John okay we're

1041
00:46:35,890 --> 00:46:33,109
gonna take two more questions from the

1042
00:46:38,609 --> 00:46:35,900
phone line Dan Leone from space News and

1043
00:46:43,239 --> 00:46:38,619
then Ken Kramer you will have the final

1044
00:46:46,660 --> 00:46:43,249
timeslot here so Dan space news yeah hi

1045
00:46:48,999 --> 00:46:46,670
everybody thanks for having this event

1046
00:46:50,620 --> 00:46:49,009
very helpful very educational I have a

1047
00:46:52,599 --> 00:46:50,630
potpourri of questions and anyone who

1048
00:46:55,049 --> 00:46:52,609
likes can take them first what's the

1049
00:46:57,460 --> 00:46:55,059
launch readiness review day for maven

1050
00:46:59,799 --> 00:46:57,470
second would there be any consequence to

1051
00:47:02,200 --> 00:46:59,809
science operations if you launch at the

1052
00:47:04,329 --> 00:47:02,210
end of your window which and correct me

1053
00:47:04,930 --> 00:47:04,339
if I'm wrong is something like the 15th

1054
00:47:09,040 --> 00:47:04,940
of this

1055
00:47:11,400 --> 00:47:09,050
and finally regarding the sausage-making

1056
00:47:14,710 --> 00:47:11,410
of how you get the project turned on

1057
00:47:17,110 --> 00:47:14,720
back on during the shutdown you know

1058
00:47:19,090 --> 00:47:17,120
we're at NASA was that decision made how

1059
00:47:22,030 --> 00:47:19,100
did you get people who a lot of people

1060
00:47:24,760 --> 00:47:22,040
who are presumably light out of work to

1061
00:47:26,680 --> 00:47:24,770
coordinate and say with without wasting

1062
00:47:28,330 --> 00:47:26,690
any time we must restart this right away

1063
00:47:29,010 --> 00:47:28,340

how does it turn can you walk us through

1064
00:47:31,840 --> 00:47:29,020
it

1065
00:47:34,930 --> 00:47:31,850
in any order is good for me thank you

1066
00:47:39,070 --> 00:47:34,940
well I can I can say launch readiness

1067
00:47:41,950 --> 00:47:39,080
review date is Friday November 15th in

1068
00:47:45,490 --> 00:47:41,960
advance of the initial launch capability

1069
00:47:50,140 --> 00:47:45,500
of the 18th of November this is Bruce on

1070
00:47:52,960 --> 00:47:50,150
the question of science impact of where

1071
00:47:55,870 --> 00:47:52,970
we launch during the launch period we

1072
00:47:59,400 --> 00:47:55,880
had a nominal twenty day launch period

1073
00:48:02,080 --> 00:47:59,410
from November 18th to December 7th as

1074
00:48:03,820 --> 00:48:02,090
we've gone through the development and

1075
00:48:05,410 --> 00:48:03,830
the spacecraft came in a little bit

1076
00:48:07,930 --> 00:48:05,420
lighter and the launch vehicle

1077
00:48:10,300 --> 00:48:07,940
capability came in a little bit larger

1078
00:48:13,690 --> 00:48:10,310
than originally assumed we're able to

1079
00:48:16,090 --> 00:48:13,700
extend that so so that's why you and I

1080
00:48:18,010 --> 00:48:16,100
have talked about the December 15th date

1081
00:48:21,070 --> 00:48:18,020
we could actually even go a little bit

1082
00:48:23,860 --> 00:48:21,080
later but if we launch it anytime up to

1083
00:48:26,380 --> 00:48:23,870
about December 15th we have the full

1084
00:48:29,020 --> 00:48:26,390
science mission there's no impact as we

1085
00:48:32,140 --> 00:48:29,030
get later than that if we're not able to

1086
00:48:35,380 --> 00:48:32,150
launch until a week after that it takes

1087
00:48:37,780 --> 00:48:35,390
more fuel to get into orbit and that

1088
00:48:39,610 --> 00:48:37,790

fuel comes out of the science mission so

1089
00:48:41,770 --> 00:48:39,620
it begins to have an impact but

1090
00:48:46,600 --> 00:48:41,780
certainly during the nominal twenty days

1091
00:48:48,460 --> 00:48:46,610
or even the extended 27 days or so where

1092
00:48:51,880 --> 00:48:48,470
we launch really doesn't make that much

1093
00:48:54,070 --> 00:48:51,890
of a difference obviously the the best

1094
00:48:56,040 --> 00:48:54,080
place to launch the best time to launch

1095
00:49:01,360 --> 00:48:56,050
was right in the middle of the period

1096
00:49:05,320 --> 00:49:01,370
because that's when the energy

1097
00:49:07,060 --> 00:49:05,330
requirements are the lowest and the fuel

1098
00:49:08,770 --> 00:49:07,070
used would be the least and we would

1099
00:49:10,810 --> 00:49:08,780
have the most fuel for an extended

1100
00:49:13,270 --> 00:49:10,820
mission but we can do our full mission

1101
00:49:17,590 --> 00:49:13,280
and extended mission anywhere during

1102
00:49:18,800 --> 00:49:17,600
that period and the the estimates for

1103
00:49:20,810 --> 00:49:18,810
longevity that we

1104
00:49:22,820 --> 00:49:20,820
talked about her all based on sort of

1105
00:49:29,420 --> 00:49:22,830
the worst opportunity within that 20

1106
00:49:33,710 --> 00:49:29,430
days Lisa or Jim relative to the

1107
00:49:35,510 --> 00:49:33,720
planning process for an anticipated

1108
00:49:39,680 --> 00:49:35,520
shutdown that really started in the

1109
00:49:41,930 --> 00:49:39,690
Planetary Science Division we began with

1110
00:49:43,790 --> 00:49:41,940
a contingency plan in the event that

1111
00:49:46,580 --> 00:49:43,800
there would be a shutdown we began to

1112
00:49:49,150 --> 00:49:46,590
pull documentation together Lisa loved

1113
00:49:52,030 --> 00:49:49,160

that effort did an outstanding job

1114
00:49:55,790 --> 00:49:52,040
putting together the material that

1115
00:49:58,580 --> 00:49:55,800
clearly demonstrated what our problems

1116
00:50:01,940 --> 00:49:58,590
are with planetary missions that have a

1117
00:50:04,640 --> 00:50:01,950
window and what at what would happen if

1118
00:50:07,970 --> 00:50:04,650
we actually missed the window with maven

1119
00:50:12,800 --> 00:50:07,980
in particular so that assessment was

1120
00:50:16,700 --> 00:50:12,810
then brought to John and John took that

1121
00:50:19,820 --> 00:50:16,710
up to our administration and and and

1122
00:50:22,490 --> 00:50:19,830
worked the process from there on and in

1123
00:50:26,260 --> 00:50:22,500
fact a decision was made that if the

1124
00:50:29,510 --> 00:50:26,270
furlough took place more than two days

1125
00:50:33,080 --> 00:50:29,520
then we would have the opportunity to

1126
00:50:36,200 --> 00:50:33,090
restart the project okay

1127
00:50:39,350 --> 00:50:36,210
okay last question ken Kramer University

1128
00:50:41,480 --> 00:50:39,360
today hi thank you I just wanted to

1129
00:50:43,370 --> 00:50:41,490
follow up on my my prior question I

1130
00:50:45,410 --> 00:50:43,380
think got lost in the garble maybe Jim

1131
00:50:47,210 --> 00:50:45,420
Green just answered it but I was

1132
00:50:49,750 --> 00:50:47,220
wondering about the emergency exemption

1133
00:50:52,820 --> 00:50:49,760
exactly how that was done who did that

1134
00:50:55,340 --> 00:50:52,830
was that easy or difficult and also with

1135
00:50:58,160 --> 00:50:55,350
the Indian mom mission is there any US

1136
00:51:03,590 --> 00:50:58,170
involvement in scientists or instruments

1137
00:51:06,170 --> 00:51:03,600
Thanks all right yeah I'll start with

1138
00:51:08,240 --> 00:51:06,180

that one of the important things that

1139
00:51:09,500 --> 00:51:08,250
you might have not noticed in Bruce's

1140
00:51:11,630 --> 00:51:09,510
last statement is that the amount of

1141
00:51:14,060 --> 00:51:11,640
energy required to get into orbit at

1142
00:51:16,430 --> 00:51:14,070
Mars varies and we recognized that

1143
00:51:18,440 --> 00:51:16,440
longevity for maven is important not

1144
00:51:22,580 --> 00:51:18,450
just for the science but for the relay

1145
00:51:25,190 --> 00:51:22,590
and we as a Mars program of course count

1146
00:51:27,890 --> 00:51:25,200
on all of our orbiter assets to relay

1147
00:51:30,680 --> 00:51:27,900
data for the Rovers currently Odyssey

1148
00:51:32,570 --> 00:51:30,690
and and MRO or relaying all the data you

1149
00:51:35,660 --> 00:51:32,580
see from curiosity and opportunity

1150
00:51:38,740 --> 00:51:35,670
and so as a program we recognized a risk

1151
00:51:41,540 --> 00:51:38,750
to the agency of not only missing the

1152
00:51:44,120 --> 00:51:41,550
science that was poised too long to be

1153
00:51:46,460 --> 00:51:44,130
done when maven launched but also of

1154
00:51:47,960 --> 00:51:46,470
having a long-lived enough asset to

1155
00:51:51,380 --> 00:51:47,970
provide us that communications

1156
00:51:53,660 --> 00:51:51,390
capability and that discussion happened

1157
00:51:57,260 --> 00:51:53,670
at as Jim noted the planetary level and

1158
00:51:59,750 --> 00:51:57,270
then went up to the up to the agency

1159
00:52:04,760 --> 00:51:59,760
level but the important thing is is this

1160
00:52:07,130 --> 00:52:04,770
team is so high-performing that they

1161
00:52:09,560 --> 00:52:07,140
absolutely knew how long they could

1162
00:52:13,400 --> 00:52:09,570
tolerate a delay and they provided us

1163
00:52:15,980 --> 00:52:13,410

with very good information about what it

1164
00:52:18,410 --> 00:52:15,990
would mean to their team to be able to

1165
00:52:21,410 --> 00:52:18,420
restart after differing periods of time

1166
00:52:23,240 --> 00:52:21,420
and what it would mean to their mission

1167
00:52:25,130 --> 00:52:23,250
and their mission lifetime depending on

1168
00:52:27,230 --> 00:52:25,140
when they launched and if there were

1169
00:52:29,390 --> 00:52:27,240
delays and so the agency had a lot of

1170
00:52:32,620 --> 00:52:29,400
good data from the project to work with

1171
00:52:34,910 --> 00:52:32,630
in order to set that decision and the

1172
00:52:37,910 --> 00:52:34,920
administrator level made that decision

1173
00:52:39,380 --> 00:52:37,920
to have a waiting period because we knew

1174
00:52:43,340 --> 00:52:39,390
this team could tolerate a bit of a

1175
00:52:45,500 --> 00:52:43,350
delay and make it up as they did and as

1176
00:52:49,130 --> 00:52:45,510
for the mom mission the Indian mission

1177
00:52:50,840 --> 00:52:49,140
that's about to launch next week I don't

1178
00:52:53,030 --> 00:52:50,850
believe we have any current science

1179
00:52:55,250 --> 00:52:53,040
participation let Bruce talk to that

1180
00:52:57,800 --> 00:52:55,260
more if you'd like but we are actually

1181
00:53:00,350 --> 00:52:57,810
supporting them with the Deep Space

1182
00:53:02,090 --> 00:53:00,360
Network and tracking and also some

1183
00:53:03,410 --> 00:53:02,100
navigation support out of the Jet

1184
00:53:05,870 --> 00:53:03,420
Propulsion Laboratory

1185
00:53:08,510 --> 00:53:05,880
so they've approached NASA and we've

1186
00:53:10,310 --> 00:53:08,520
agreed to provide that support and that

1187
00:53:12,380 --> 00:53:10,320
will be valuable for them as they send

1188
00:53:14,270 --> 00:53:12,390

their first mission to Mars and it's

1189
00:53:17,510 --> 00:53:14,280
also valuable for us in able to

1190
00:53:20,630 --> 00:53:17,520
collaborate and in order to track them

1191
00:53:22,010 --> 00:53:20,640
as they arrive at Mars at approximately

1192
00:53:25,130 --> 00:53:22,020
the same time that maven does in the

1193
00:53:27,140 --> 00:53:25,140
same month that maven does anything

1194
00:53:29,390 --> 00:53:27,150
further Bruce no I'm not aware of any

1195
00:53:33,410 --> 00:53:29,400
science collaboration or cooperation

1196
00:53:35,680 --> 00:53:33,420
beyond what I mentioned earlier okay

1197
00:53:37,730 --> 00:53:35,690
well ladies don't be flawed closeout

1198
00:53:40,330 --> 00:53:37,740
clearly you've heard some recurring

1199
00:53:44,990 --> 00:53:40,340
themes here the incredible science

1200
00:53:46,430 --> 00:53:45,000
credible team on budget on schedule and

1201
00:53:48,680 --> 00:53:46,440
meaning any chow

1202
00:53:50,990 --> 00:53:48,690
just please give join me in giving these

1203
00:54:00,160 --> 00:53:51,000
Maven team a round of applause for this

1204
00:54:01,930 --> 00:54:00,170
outstanding work okay the date is set

1205
00:54:04,910 --> 00:54:01,940
November 18th

1206
00:54:07,849 --> 00:54:04,920
128 p.m. Eastern Time

1207
00:54:09,740 --> 00:54:07,859
we're going back to Mars folks we want

1208
00:54:12,260 --> 00:54:09,750
to see you there and of course you can

1209
00:54:16,040 --> 00:54:12,270
go to the website to learn much more

1210
00:54:20,660 --> 00:54:16,050
about the mission any updates at WWN

1211
00:54:22,430 --> 00:54:20,670
assay gov / maven we'll see you in