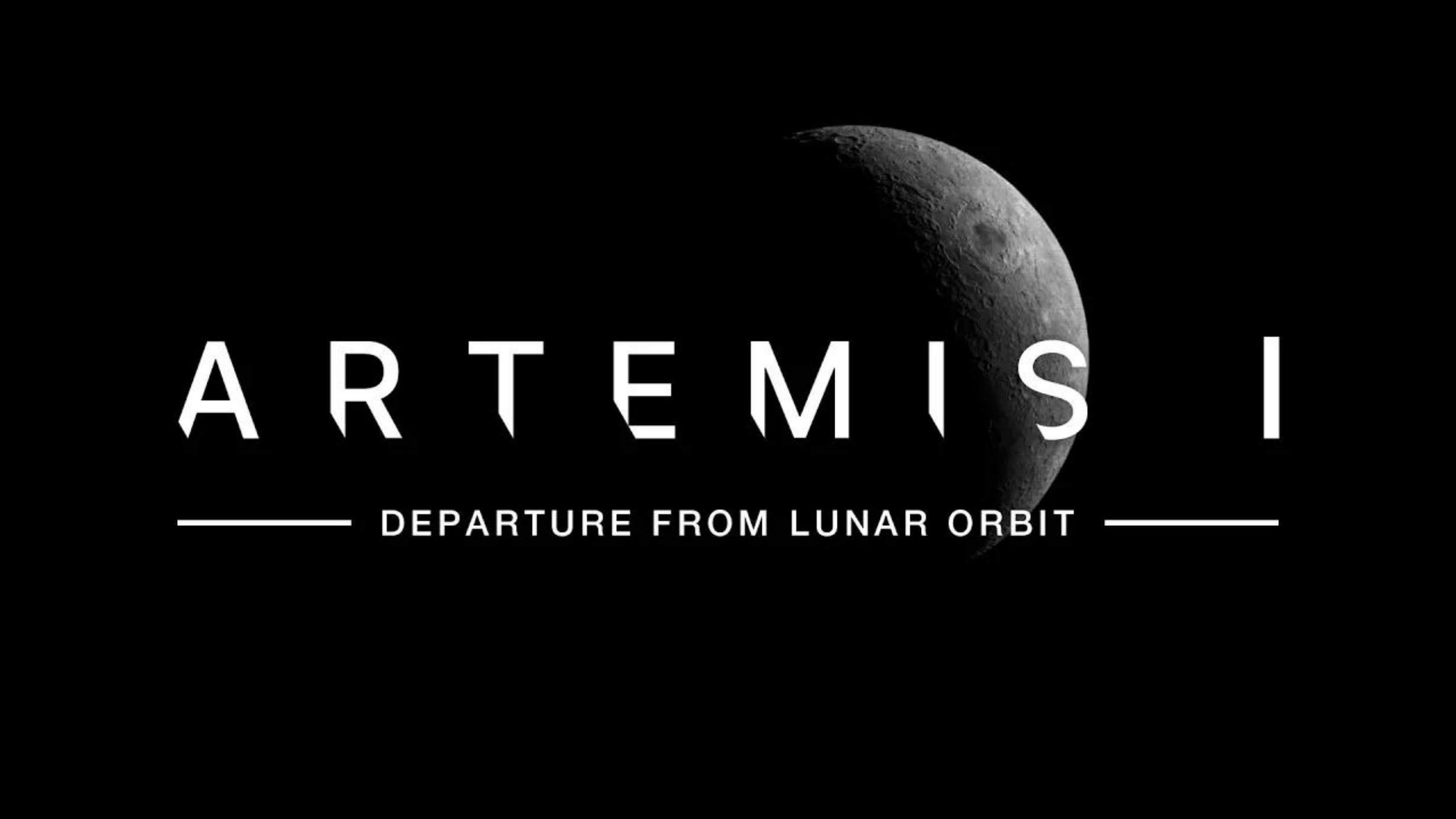
ARTEMIS I
DEPARTURE FROM LUNAR ORBIT

1
00:00:06,880 --> 00:00:05,370
[Music]

2
00:00:12,610 --> 00:00:06,890
[Applause]

3
00:00:14,170 --> 00:00:12,620
[Music]

4
00:00:15,150 --> 00:00:14,180
thank you

5
00:00:16,590 --> 00:00:15,160
[Music]

6
00:00:17,130 --> 00:00:16,600
[Applause]

7
00:00:18,260 --> 00:00:17,140
[Music]

8
00:00:29,480 --> 00:00:18,270
[Applause]

9
00:00:29,490 --> 00:00:40,850
[Music]

10
00:00:40,860 --> 00:00:44,080
foreign

11
00:02:17,930 --> 00:01:39,770
[Music]

12
00:02:17,940 --> 00:02:25,990
foreign

13
00:02:30,650 --> 00:02:28,610

and we are live inside the white flight

14
00:02:33,110 --> 00:02:30,660
control room at the Johnson Space Center

15
00:02:34,910 --> 00:02:33,120
here in Houston Texas we are bringing

16
00:02:37,190 --> 00:02:34,920
you live coverage today of the distant

17
00:02:39,110 --> 00:02:37,200
retrograde orbit departure burn this is

18
00:02:42,229 --> 00:02:39,120
a quick burn expected to fire for one

19
00:02:45,830 --> 00:02:42,239
minute and 45 seconds beginning at 3 53

20
00:02:48,650 --> 00:02:45,840
and 50 seconds p.m Central Time 4 53 p.m

21
00:02:50,690 --> 00:02:48,660
45 seconds eastern time the distant

22
00:02:52,910 --> 00:02:50,700
retrograde orbit is an elliptical orbit

23
00:02:55,670 --> 00:02:52,920
or oval shape

24
00:02:57,470 --> 00:02:55,680
around the moon this orbit is unique to

25
00:02:59,270 --> 00:02:57,480
Artemis 1 testing out its various

26
00:03:02,089 --> 00:02:59,280
systems and will not be used on future

27
00:03:04,070 --> 00:03:02,099
Artemis missions later we'll have NASA's

28
00:03:05,449 --> 00:03:04,080
Dan Hewitt back at the Moon board to

29
00:03:07,610 --> 00:03:05,459
explain a little bit more about the

30
00:03:10,190 --> 00:03:07,620
distant retrograde burn and how it

31
00:03:11,750 --> 00:03:10,200
affects leaving the the distant

32
00:03:14,869 --> 00:03:11,760
retrograde orbit

33
00:03:16,790 --> 00:03:14,879
and nasus Robin elgart is here later

34
00:03:19,009 --> 00:03:16,800
today to talk to us about the deep space

35
00:03:21,110 --> 00:03:19,019
radiation environment and what she is

36
00:03:23,809 --> 00:03:21,120
doing to help further our knowledge on

37
00:03:25,070 --> 00:03:23,819
space beyond lower Earth orbit we'll

38
00:03:28,210 --> 00:03:25,080

catch up with them a little bit later

39
00:04:01,670 --> 00:03:28,220
but for now here are some shots inside

40
00:04:07,070 --> 00:04:03,710
and we're hoping for some views from

41
00:04:10,729 --> 00:04:07,080
Orion a little bit later

42
00:04:21,590 --> 00:04:10,739
currently you're seeing the the arrow

43
00:04:30,230 --> 00:04:24,230
seeing current velocity distance from

44
00:04:35,150 --> 00:04:32,090
following a successful launch on

45
00:04:37,010 --> 00:04:35,160
Wednesday November 16th NASA's uncrewed

46
00:04:38,749 --> 00:04:37,020
Orion spacecraft is ready for its

47
00:04:42,710 --> 00:04:38,759
distant retrograde orbit departure burn

48
00:04:44,330 --> 00:04:42,720
today on day 16 of its 25-day 25 and a

49
00:04:46,730 --> 00:04:44,340
half day Mission beyond the lunar

50
00:04:50,689 --> 00:04:46,740
surface Orion lifted off atop the space

51
00:04:53,870 --> 00:04:50,699
launch system rocket at 1 47 a.m eastern

52
00:04:56,629 --> 00:04:53,880
time from launch complex 39b at NASA's

53
00:04:58,850 --> 00:04:56,639
Kennedy Space Center in Florida

54
00:05:01,550 --> 00:04:58,860
the distant retrograde departure burn

55
00:05:04,330 --> 00:05:01,560
prepares Orion for a second lunar flyby

56
00:05:07,730 --> 00:05:04,340
or that RPF The Returned powered flyby

57
00:05:10,129 --> 00:05:07,740
and an earth insertion burn and finally

58
00:05:22,670 --> 00:05:10,139
preparation for a re-entry in Splashdown

59
00:05:29,330 --> 00:05:24,890
so as we recap some of the Milestones

60
00:05:31,610 --> 00:05:29,340
thus far for Orion on November 21st

61
00:05:33,770 --> 00:05:31,620
Orion performed an outbound powered

62
00:05:36,110 --> 00:05:33,780
flyby burn the first of two Maneuvers

63
00:05:38,930 --> 00:05:36,120

required to enter Dro or the distant

64
00:05:41,810 --> 00:05:38,940
retrograde orbit the second being the

65
00:05:44,150 --> 00:05:41,820
insertion burn that happened later that

66
00:05:46,430 --> 00:05:44,160
week on November 25th

67
00:05:49,249 --> 00:05:46,440
and the time of the outbound powered

68
00:05:50,749 --> 00:05:49,259
flyby Orion was just 81 miles above the

69
00:05:52,070 --> 00:05:50,759
lunar surface

70
00:05:53,450 --> 00:05:52,080
throughout the mission the spacecraft

71
00:05:56,450 --> 00:05:53,460
performed a series of outbound

72
00:05:58,909 --> 00:05:56,460
trajectory correction Burns to put Orion

73
00:06:00,890 --> 00:05:58,919
in the proper configuration to enter the

74
00:06:02,469 --> 00:06:00,900
distant retrograde orbit

75
00:06:05,090 --> 00:06:02,479
so remember

76
00:06:08,390 --> 00:06:05,100
81 miles above the lunar surface on

77
00:06:10,249 --> 00:06:08,400
November 21st and by November 22nd Orion

78
00:06:12,409 --> 00:06:10,259
exited the gravitational sphere of

79
00:06:20,749 --> 00:06:12,419
influence of the Moon and was at a lunar

80
00:06:24,890 --> 00:06:23,029
Orion surpassed the distance record for

81
00:06:27,110 --> 00:06:24,900
a mission with the spacecraft designed

82
00:06:30,110 --> 00:06:27,120
to carry humans to deep space and back

83
00:06:33,350 --> 00:06:30,120
to Earth at 7 42 a.m Saturday November

84
00:06:38,350 --> 00:06:33,360
26th that record was set during the

85
00:06:41,990 --> 00:06:38,360
Apollo 13 mission at 248 065

86
00:06:47,510 --> 00:06:42,000
655 miles from our home planet

87
00:06:52,249 --> 00:06:49,850
Orion surpass

88
00:06:54,590 --> 00:06:52,259

it reached its maximum distance from

89
00:06:57,070 --> 00:06:54,600
Earth during the Artemis 1 Mission and

90
00:07:00,469 --> 00:06:57,080
it was at 268

91
00:07:03,409 --> 00:07:00,479
563 miles away from the home planet

92
00:07:06,050 --> 00:07:03,419
and finally on November 30th just

93
00:07:08,390 --> 00:07:06,060
yesterday teams pulled go for Orion to

94
00:07:10,129 --> 00:07:08,400
exit the distant retrograde orbit today

95
00:07:12,469 --> 00:07:10,139
we are live covering the distant

96
00:07:15,350 --> 00:07:12,479
retrograde orbit departure burn or the

97
00:07:17,150 --> 00:07:15,360
drd which will bring Orion out of the

98
00:07:20,990 --> 00:07:17,160
distant retrograde orbit to prepare

99
00:07:23,870 --> 00:07:21,000
Orion for a Splashdown back on Earth

100
00:07:25,490 --> 00:07:23,880
again Splashdown as planned for December

101
00:07:28,490 --> 00:07:25,500
11th

102
00:07:31,430 --> 00:07:28,500
and we are looking for the burn

103
00:07:34,969 --> 00:07:31,440
for the distant retrograde orbit

104
00:07:41,510 --> 00:07:34,979
departure burn to happen at 353 and 56

105
00:07:50,689 --> 00:07:44,390
again let's get a little insight from

106
00:07:55,430 --> 00:07:53,390
it's been a fantastic Mission but all

107
00:07:58,610 --> 00:07:55,440
great things must come to an end it is

108
00:08:00,890 --> 00:07:58,620
time for Orion to leave its orbit around

109
00:08:03,589 --> 00:08:00,900
the moon and come home so we are getting

110
00:08:05,749 --> 00:08:03,599
ready for distant retrograde departure

111
00:08:07,909 --> 00:08:05,759
this is going to be a firing of those

112
00:08:10,490 --> 00:08:07,919
engines on the European service module

113
00:08:12,830 --> 00:08:10,500

to actually commit us to leaving the

114
00:08:14,990 --> 00:08:12,840
lunar orbit and coming back towards

115
00:08:17,749 --> 00:08:15,000
Earth so we're again going to be using

116
00:08:19,730 --> 00:08:17,759
that large main engine to start to swing

117
00:08:22,070 --> 00:08:19,740
us back in close so we can do

118
00:08:23,809 --> 00:08:22,080
essentially a slingshot around the Moon

119
00:08:25,969 --> 00:08:23,819
we'll be dipping in again for another

120
00:08:28,430 --> 00:08:25,979
powered flyby this one called the return

121
00:08:31,070 --> 00:08:28,440
power flyby which is really going to

122
00:08:32,930 --> 00:08:31,080
kind of fine tune our path back towards

123
00:08:35,149 --> 00:08:32,940
the atmosphere but the one really

124
00:08:36,649 --> 00:08:35,159
committing us to come home is going to

125
00:08:38,810 --> 00:08:36,659
be this one that's coming up this

126
00:08:40,909 --> 00:08:38,820
distant retrograde orbit departure so

127
00:08:43,310 --> 00:08:40,919
for Orion it's going to be farewell to

128
00:08:53,710 --> 00:08:43,320
the Moon until it starts making its way

129
00:08:58,070 --> 00:08:56,269
back inside the Artemis mission control

130
00:09:01,430 --> 00:08:58,080
room or the white flight control room

131
00:09:03,769 --> 00:09:01,440
here at Johnson Space Center we see the

132
00:09:05,329 --> 00:09:03,779
control room and we have flight lead

133
00:09:08,030 --> 00:09:05,339
flight director for Artemis One mission

134
00:09:10,610 --> 00:09:08,040
Rick Le Broad and his team monitoring

135
00:09:15,710 --> 00:09:10,620
and preparing for this upcoming distant

136
00:09:20,750 --> 00:09:17,870
here with me now I have a special guest

137
00:09:23,269 --> 00:09:20,760
today on Console this is Robin elgart

138
00:09:24,949 --> 00:09:23,279

space radiation element scientist she

139
00:09:28,009 --> 00:09:24,959
will discuss the deep space radiation

140
00:09:29,690 --> 00:09:28,019
and deep space radiation environment and

141
00:09:33,470 --> 00:09:29,700
what we are learning on missions like

142
00:09:35,389 --> 00:09:33,480
Artemis 1. hi hi Robin thank you for

143
00:09:37,430 --> 00:09:35,399
joining me today thanks so much Shaniqua

144
00:09:40,250 --> 00:09:37,440
I'm happy to be here and can you tell

145
00:09:43,550 --> 00:09:40,260
everyone what uh space radiation element

146
00:09:45,110 --> 00:09:43,560
scientist is of course so as a space

147
00:09:46,790 --> 00:09:45,120
version element scientist for the human

148
00:09:49,310 --> 00:09:46,800
research program at Nasa I am

149
00:09:52,370 --> 00:09:49,320
responsible along with my excellent team

150
00:09:54,850 --> 00:09:52,380
for developing and executing a robust

151
00:09:57,889 --> 00:09:54,860
research strategy to understand

152
00:09:59,810 --> 00:09:57,899
characterize and hopefully mitigate the

153
00:10:03,230 --> 00:09:59,820
health impacts to humans from the space

154
00:10:05,329 --> 00:10:03,240
space radiation environment and so when

155
00:10:07,610 --> 00:10:05,339
we talk about space radiation

156
00:10:10,009 --> 00:10:07,620
um watch NASA care well it turns out

157
00:10:11,449 --> 00:10:10,019
space is a radiation environment and so

158
00:10:14,690 --> 00:10:11,459
our astronauts are actually radiation

159
00:10:16,670 --> 00:10:14,700
workers and so that means that we we

160
00:10:19,130 --> 00:10:16,680
know that radiation is a health hazard

161
00:10:21,889 --> 00:10:19,140
for them and we need to do our best to

162
00:10:24,650 --> 00:10:21,899
characterize that and mitigate that

163
00:10:27,230 --> 00:10:24,660

um and so we this radiation comes from

164
00:10:31,250 --> 00:10:27,240
three different places in in our

165
00:10:33,769 --> 00:10:31,260
universe first we have our Galactic

166
00:10:37,550 --> 00:10:33,779
cosmic rays Galactic cosmic rays are

167
00:10:40,550 --> 00:10:37,560
theorized to be the um

168
00:10:42,230 --> 00:10:40,560
the result of Stellar explosions were

169
00:10:44,030 --> 00:10:42,240
the things like Supernova are

170
00:10:44,990 --> 00:10:44,040
accelerating particles throughout the

171
00:10:47,210 --> 00:10:45,000
Universe

172
00:10:49,670 --> 00:10:47,220
right and so you can imagine how fast

173
00:10:51,769 --> 00:10:49,680
these particles are going and then we

174
00:10:55,190 --> 00:10:51,779
have trapped radiation trap radiation is

175
00:10:57,949 --> 00:10:55,200
actually a consequence of our Earth

176
00:10:59,509 --> 00:10:57,959
having a beautiful magnetic field and it

177
00:11:01,130 --> 00:10:59,519
protects us from all sorts of things but

178
00:11:02,630 --> 00:11:01,140
it also traps some of that radiation

179
00:11:04,550 --> 00:11:02,640
that's sipping around out in our solar

180
00:11:06,530 --> 00:11:04,560
system inside these belts which are

181
00:11:08,690 --> 00:11:06,540
called the Van Allen belts so those are

182
00:11:11,150 --> 00:11:08,700
these sort of donut shaped rings around

183
00:11:14,030 --> 00:11:11,160
our planet and then thirdly and probably

184
00:11:16,690 --> 00:11:14,040
the most well-known are solar particle

185
00:11:20,290 --> 00:11:16,700
events and these are when the sun

186
00:11:27,370 --> 00:11:20,300
belches out some extra solar particles

187
00:11:32,090 --> 00:11:29,990
okay and you mentioned solar particles

188
00:11:34,430 --> 00:11:32,100

can you explain a little bit of what

189
00:11:37,310 --> 00:11:34,440
those are and how they could affect the

190
00:11:39,350 --> 00:11:37,320
Artemis missions to come absolutely so

191
00:11:41,210 --> 00:11:39,360
the sun is a giant rotating ball of

192
00:11:43,550 --> 00:11:41,220
magnetized plasma which is sort of

193
00:11:44,810 --> 00:11:43,560
mind-blowing when you think about it

194
00:11:47,090 --> 00:11:44,820
and

195
00:11:48,829 --> 00:11:47,100
um it creates an incredibly complex

196
00:11:51,470 --> 00:11:48,839
magnetic field throughout our solar

197
00:11:54,650 --> 00:11:51,480
system and also on this what we think of

198
00:11:58,069 --> 00:11:54,660
as the surface of the Sun and those um

199
00:11:59,750 --> 00:11:58,079
some localized areas of the sun can

200
00:12:03,170 --> 00:11:59,760
those magnetic fields in those localized

201
00:12:05,210 --> 00:12:03,180
areas can get really Tangled Up and

202
00:12:07,310 --> 00:12:05,220
um entangled with each other and that

203
00:12:08,930 --> 00:12:07,320
creates something that we all know of

204
00:12:10,130 --> 00:12:08,940
called sunspots and you can actually see

205
00:12:12,650 --> 00:12:10,140
these with the appropriate kind of

206
00:12:15,769 --> 00:12:12,660
telescope from down here on Earth

207
00:12:17,449 --> 00:12:15,779
um these sunspots can create sort of

208
00:12:21,110 --> 00:12:17,459
active regions where these local

209
00:12:22,630 --> 00:12:21,120
magnetic fields are really entangled and

210
00:12:25,970 --> 00:12:22,640
just like anything

211
00:12:28,069 --> 00:12:25,980
you can something that builds and builds

212
00:12:30,170 --> 00:12:28,079
and builds energy at one point it just

213
00:12:31,730 --> 00:12:30,180

gives up and so these magnetic fields

214
00:12:34,009 --> 00:12:31,740
they break and they reconnect down into

215
00:12:35,750 --> 00:12:34,019
a lower energy state that energy has to

216
00:12:37,790 --> 00:12:35,760
go somewhere and so the energy is

217
00:12:40,069 --> 00:12:37,800
released at this huge amount of energy

218
00:12:43,009 --> 00:12:40,079
release some of which can actually push

219
00:12:43,910 --> 00:12:43,019
particles out from the solar Corona as

220
00:12:47,150 --> 00:12:43,920
well as

221
00:12:49,790 --> 00:12:47,160
the particles out in the solar system

222
00:12:51,230 --> 00:12:49,800
out into the solar system and so that's

223
00:12:53,569 --> 00:12:51,240
what's called a solar particle event

224
00:12:57,290 --> 00:12:53,579
when those particles are accelerated out

225
00:12:59,449 --> 00:12:57,300
from the Sun out into the solar system

226
00:13:02,930 --> 00:12:59,459
awesome and that is definitely something

227
00:13:06,769 --> 00:13:02,940
worth caring for on Artemis 1 on flight

228
00:13:09,949 --> 00:13:06,779
day 13 on November 28th Orion reached

229
00:13:13,150 --> 00:13:09,959
its maximum distance from Earth now we

230
00:13:17,990 --> 00:13:13,160
know that that maximum distance was 268

231
00:13:20,389 --> 00:13:18,000
508 63 miles from home our home planet

232
00:13:24,230 --> 00:13:20,399
um how will being further from Earth

233
00:13:26,509 --> 00:13:24,240
affect our crew on future Artemis

234
00:13:29,030 --> 00:13:26,519
missions that's a great question so

235
00:13:30,590 --> 00:13:29,040
because those Van Allen belts that

236
00:13:33,590 --> 00:13:30,600
surround Earth and protect us from

237
00:13:35,449 --> 00:13:33,600
things beyond beyond those the crew will

238
00:13:38,750 --> 00:13:35,459

no longer have protection from Galactic

239
00:13:41,030 --> 00:13:38,760
cosmic rays those particles that are

240
00:13:43,069 --> 00:13:41,040
accelerated because of supernova or

241
00:13:44,569 --> 00:13:43,079
those solar particle events so if

242
00:13:46,190 --> 00:13:44,579
there's a solar particle event headed

243
00:13:48,110 --> 00:13:46,200
your direction and you are outside the

244
00:13:50,690 --> 00:13:48,120
Van Allen belts you have no protection

245
00:13:52,310 --> 00:13:50,700
from our beautiful snuggly Van Allen

246
00:13:54,470 --> 00:13:52,320
belts anymore right

247
00:13:57,769 --> 00:13:54,480
um and so them being further away from

248
00:13:59,750 --> 00:13:57,779
Earth means that um in in Mission in

249
00:14:03,590 --> 00:13:59,760
real-time monitoring of the solar

250
00:14:04,190 --> 00:14:03,600
environment is really important because

251
00:14:06,170 --> 00:14:04,200
um

252
00:14:08,870 --> 00:14:06,180
if you are going to be exposed to these

253
00:14:10,190 --> 00:14:08,880
solar events we have to have some way to

254
00:14:12,530 --> 00:14:10,200
Shield it because even though we can't

255
00:14:13,970 --> 00:14:12,540
shield from Galactic cosmic rays we can

256
00:14:16,430 --> 00:14:13,980
shield from solar particle events

257
00:14:20,150 --> 00:14:16,440
relatively effectively I mean it doesn't

258
00:14:23,150 --> 00:14:20,160
take much so our operational team

259
00:14:25,250 --> 00:14:23,160
um the the base radiation analysis group

260
00:14:27,650 --> 00:14:25,260
or shrag they've actually developed an

261
00:14:28,910 --> 00:14:27,660
awesome protocol which is to build a

262
00:14:32,030 --> 00:14:28,920
storm shelter and I think we have a

263
00:14:35,389 --> 00:14:32,040

great video that demonstrates what this

264
00:14:39,650 --> 00:14:37,490
my name is Jessica Voss and this is Ann

265
00:14:42,590 --> 00:14:39,660
McLean and we are here today helping the

266
00:14:44,810 --> 00:14:42,600
designers of the Orion capsule evaluate

267
00:14:46,970 --> 00:14:44,820
the ability to protect their crew from

268
00:14:49,069 --> 00:14:46,980
radiation radiation as you know is

269
00:14:50,930 --> 00:14:49,079
really harmful and so the whole point is

270
00:14:53,150 --> 00:14:50,940
for us to get into a really cool little

271
00:14:55,610 --> 00:14:53,160
shelter and take all the equipment we

272
00:14:57,889 --> 00:14:55,620
have in this in this capsule and put it

273
00:14:59,629 --> 00:14:57,899
over us as best as possible and we have

274
00:15:01,490 --> 00:14:59,639
to make sure it's stowed and that we are

275
00:15:03,350 --> 00:15:01,500
safe and we have everything we need in

276
00:15:07,490 --> 00:15:03,360
terms of supplies down in this awesome

277
00:15:12,110 --> 00:15:10,009
so you can see there they build this

278
00:15:14,689 --> 00:15:12,120
basically is what it what amounts to a

279
00:15:17,569 --> 00:15:14,699
pillow fort and putting all of that mass

280
00:15:19,310 --> 00:15:17,579
around them to to keep that those lower

281
00:15:22,730 --> 00:15:19,320
energy particles from solar particle

282
00:15:24,470 --> 00:15:22,740
events out of of of their little pillow

283
00:15:26,269 --> 00:15:24,480
fort there and keep them sheltered from

284
00:15:28,129 --> 00:15:26,279
that storm and you're saying pillow fort

285
00:15:29,750 --> 00:15:28,139
but the pillow fort is

286
00:15:31,970 --> 00:15:29,760
um stowage bags and different things

287
00:15:34,610 --> 00:15:31,980
that are already in Orion for the crew

288
00:15:36,590 --> 00:15:34,620

and they're using that during a solar

289
00:15:38,210 --> 00:15:36,600
particle event to protect themselves

290
00:15:40,610 --> 00:15:38,220
that's exactly right and so they can

291
00:15:42,290 --> 00:15:40,620
hang out in that little area for the the

292
00:15:44,389 --> 00:15:42,300
entirety of the event of course they can

293
00:15:45,710 --> 00:15:44,399
come in and out of that shelter they

294
00:15:48,050 --> 00:15:45,720
don't need to stand there the whole time

295
00:15:50,269 --> 00:15:48,060
but we want them to spend as much time

296
00:15:52,490 --> 00:15:50,279
as they feasibly can inside that shelter

297
00:15:54,470 --> 00:15:52,500
and right it's just using stuff that we

298
00:15:56,509 --> 00:15:54,480
already have on board

299
00:15:59,629 --> 00:15:56,519
um to to sort of even out that mass

300
00:16:02,389 --> 00:15:59,639
distribution gotcha and so as far as

301
00:16:04,310 --> 00:16:02,399
protection goes again for our astronauts

302
00:16:05,689 --> 00:16:04,320
on future missions we know this is an

303
00:16:07,430 --> 00:16:05,699
uncrewed

304
00:16:10,009 --> 00:16:07,440
um Mission but future missions will have

305
00:16:13,129 --> 00:16:10,019
restaurants aboard what can we expect

306
00:16:15,889 --> 00:16:13,139
Beyond this for astronaut protection in

307
00:16:17,569 --> 00:16:15,899
terms of radiation great question so

308
00:16:19,490 --> 00:16:17,579
um for these for like you said this is

309
00:16:21,710 --> 00:16:19,500
you know it's uncrewed but even on these

310
00:16:22,790 --> 00:16:21,720
first short-term missions we are still

311
00:16:24,949 --> 00:16:22,800
learning things about the radiation

312
00:16:28,490 --> 00:16:24,959
environment we have a radiation detector

313
00:16:31,490 --> 00:16:28,500

up there now uh Hira which is

314
00:16:34,250 --> 00:16:31,500
um constantly taking data right now and

315
00:16:36,829 --> 00:16:34,260
we're actually seeing how those those uh

316
00:16:38,150 --> 00:16:36,839
what makes that pillow for it we have a

317
00:16:39,949 --> 00:16:38,160
sensor in there right now and we can see

318
00:16:41,629 --> 00:16:39,959
that it actually is providing protection

319
00:16:43,490 --> 00:16:41,639
uh compared to the sensor that is

320
00:16:44,749 --> 00:16:43,500
outside of that Bay when they transited

321
00:16:46,490 --> 00:16:44,759
through the Van Allen belts because it's

322
00:16:47,990 --> 00:16:46,500
a similar type of radiation to solar

323
00:16:50,329 --> 00:16:48,000
particle events

324
00:16:51,889 --> 00:16:50,339
um but moving forward

325
00:16:53,509 --> 00:16:51,899
um the uniqueness of the space radiation

326
00:16:55,009 --> 00:16:53,519
environment really makes for a hefty

327
00:16:57,530 --> 00:16:55,019
challenge when it comes to doing

328
00:17:00,350 --> 00:16:57,540
research down here on the ground

329
00:17:03,290 --> 00:17:00,360
um so we we don't have the same amount

330
00:17:04,909 --> 00:17:03,300
of protection strategies up in space as

331
00:17:06,650 --> 00:17:04,919
we do down here on the ground usually

332
00:17:08,809 --> 00:17:06,660
when you're in a radiation Oncology

333
00:17:11,270 --> 00:17:08,819
Department you have time distance and

334
00:17:12,710 --> 00:17:11,280
shielding well in space

335
00:17:14,689 --> 00:17:12,720
you can't get away from the solar

336
00:17:17,210 --> 00:17:14,699
radiation and the the galactic cosmic

337
00:17:19,010 --> 00:17:17,220
rays and you can't really Shield it

338
00:17:20,870 --> 00:17:19,020

either so the only thing we have is time

339
00:17:22,850 --> 00:17:20,880
but of course if we're talking about a

340
00:17:24,230 --> 00:17:22,860
year mission to to the Moon we're

341
00:17:26,390 --> 00:17:24,240
talking about three years missing to

342
00:17:28,669 --> 00:17:26,400
Mars time starts to become a problem too

343
00:17:31,610 --> 00:17:28,679
so that's where the space radiation

344
00:17:33,110 --> 00:17:31,620
element is coming up with new strategies

345
00:17:34,909 --> 00:17:33,120
of how we might be able to protect the

346
00:17:36,830 --> 00:17:34,919
crew which includes things like Health

347
00:17:38,150 --> 00:17:36,840
monitoring early disease screening for

348
00:17:40,250 --> 00:17:38,160
the things that we are concerned about

349
00:17:42,370 --> 00:17:40,260
including cancer cardiovascular disease

350
00:17:45,470 --> 00:17:42,380
immune changes and potentially even

351
00:17:47,630 --> 00:17:45,480
neurocognitive defects as well as

352
00:17:49,130 --> 00:17:47,640
looking for some sort of compound based

353
00:17:51,169 --> 00:17:49,140
countermeasure that can help the body

354
00:17:52,789 --> 00:17:51,179
protect itself from that biological

355
00:17:54,350 --> 00:17:52,799
damage we might not be able to stop the

356
00:17:55,549 --> 00:17:54,360
physics but we might be able to help the

357
00:17:57,770 --> 00:17:55,559
biology

358
00:18:00,470 --> 00:17:57,780
that's amazing I know our crew will need

359
00:18:03,409 --> 00:18:00,480
to be protected form those Rays as we

360
00:18:06,049 --> 00:18:03,419
enter into future Artemis missions on

361
00:18:08,270 --> 00:18:06,059
our future missions we talked about the

362
00:18:10,190 --> 00:18:08,280
protection we talked about space

363
00:18:12,650 --> 00:18:10,200

radiation is there anything left that we

364
00:18:14,630 --> 00:18:12,660
didn't talk about that would be relevant

365
00:18:17,090 --> 00:18:14,640
to what we're learning about space

366
00:18:20,630 --> 00:18:17,100
radiation on this Mission or even future

367
00:18:24,409 --> 00:18:22,669
Taylor I really just want

368
00:18:26,090 --> 00:18:24,419
shout out to our operational team space

369
00:18:28,190 --> 00:18:26,100
radiation analysis group because they

370
00:18:31,250 --> 00:18:28,200
have worked so hard on getting their

371
00:18:32,630 --> 00:18:31,260
their detectors up up to speed and

372
00:18:34,669 --> 00:18:32,640
they're they're really starting to see

373
00:18:37,250 --> 00:18:34,679
their models play out you know they they

374
00:18:38,870 --> 00:18:37,260
saw when Orion went behind the moon and

375
00:18:40,970 --> 00:18:38,880
came back out and we finally got that

376
00:18:42,710 --> 00:18:40,980
signal again sure enough there was a 30

377
00:18:45,409 --> 00:18:42,720
drop because of the Moon itself

378
00:18:47,330 --> 00:18:45,419
providing shielding to the capsule and

379
00:18:49,250 --> 00:18:47,340
so just a really huge shout out to that

380
00:18:51,650 --> 00:18:49,260
team because they have done an amazing

381
00:18:53,390 --> 00:18:51,660
work they're working 24-hour consoles to

382
00:18:55,250 --> 00:18:53,400
support this Mission and they really

383
00:18:57,669 --> 00:18:55,260
deserve mad props

384
00:19:00,110 --> 00:18:57,679
thank you very much and thank you Robin

385
00:19:01,909 --> 00:19:00,120
for coming and joining us here today

386
00:19:04,730 --> 00:19:01,919
telling us a little bit about the deep

387
00:19:06,169 --> 00:19:04,740
space radiation environment and why it's

388
00:19:08,510 --> 00:19:06,179

important to the Artemis missions

389
00:19:56,529 --> 00:19:08,520
overall thank you so much Shanika happy

390
00:20:00,470 --> 00:19:58,970
and if you just joined us you're

391
00:20:03,590 --> 00:20:00,480
watching live coverage of the Artemis

392
00:20:05,690 --> 00:20:03,600
One mission today we're on day 16 of the

393
00:20:07,430 --> 00:20:05,700
25 and a half day Mission we are

394
00:20:12,350 --> 00:20:07,440
currently awaiting the drd or the

395
00:20:16,190 --> 00:20:13,970
and we're looking for that burn to

396
00:20:18,110 --> 00:20:16,200
happen at three

397
00:20:28,610 --> 00:20:18,120
53

398
00:23:05,330 --> 00:20:30,710
so about four and a half minutes out now

399
00:23:09,110 --> 00:23:07,250
if you're just joining us we're live

400
00:23:10,789 --> 00:23:09,120
inside the white flight control room at

401
00:23:13,930 --> 00:23:10,799
the Johnson Space Center

402
00:23:16,490 --> 00:23:13,940
we are awaiting the departure burn

403
00:23:18,409 --> 00:23:16,500
that's the distant retrograde orbit

404
00:23:21,649 --> 00:23:18,419
departure burn for Orion you're

405
00:23:23,450 --> 00:23:21,659
currently seeing live views from Orion

406
00:23:25,490 --> 00:23:23,460
spacecraft

407
00:23:28,669 --> 00:23:25,500
As It prepares

408
00:24:13,130 --> 00:23:28,679
for just a minute and a half from now to

409
00:24:42,890 --> 00:24:15,350
in just about 10 seconds away from that

410
00:24:42,900 --> 00:25:19,430
the burn has begun

411
00:25:19,440 --> 00:26:06,230
and we're halfway through the burn

412
00:26:11,810 --> 00:26:08,390
and we currently see a little Earth

413
00:26:14,630 --> 00:26:11,820

behind slash beside when the Orion or

414
00:26:30,409 --> 00:26:14,640
solar arrays coming into view and out of

415
00:27:39,950 --> 00:26:32,570
and a nominal burn has been called in

416
00:27:44,390 --> 00:27:42,230
and with a nominal distant retrograde

417
00:27:46,610 --> 00:27:44,400
orbit departure burn or Ryan will leave

418
00:27:48,890 --> 00:27:46,620
its distant retrograde orbit preparing

419
00:27:51,110 --> 00:27:48,900
Orion for her second lunar flyby that

420
00:27:53,930 --> 00:27:51,120
returned powered flyby burn that we

421
00:27:55,730 --> 00:27:53,940
discussed earlier and Earth insertion

422
00:27:58,310 --> 00:27:55,740
burn and finally preparation for

423
00:28:07,970 --> 00:27:58,320
re-entry and Splashdown planned for

424
00:28:12,890 --> 00:28:11,930
again Orion has had a successful a

425
00:28:15,529 --> 00:28:12,900
nominal

426
00:28:18,110 --> 00:28:15,539
one minute and 45 seconds

427
00:28:19,669 --> 00:28:18,120
depart distant retrograde orbit

428
00:28:22,430 --> 00:28:19,679
departure burn

429
00:28:25,610 --> 00:28:22,440
and with that we'll wrap coverage for

430
00:28:28,010 --> 00:28:25,620
today but we'll be covering the RPF or

431
00:28:32,269 --> 00:28:28,020
the return power flyby Burn live on air

432
00:28:35,570 --> 00:28:32,279
on Monday December 5th again that will

433
00:28:37,610 --> 00:28:35,580
be aired at 8 30 a.m Central Time 9 30

434
00:28:44,690 --> 00:28:37,620
a.m Eastern Time

435
00:28:49,730 --> 00:28:47,390
before we air that December 5th return

436
00:28:54,230 --> 00:28:49,740
power flyby for Orion be sure to check

437
00:28:57,769 --> 00:28:54,240
out live coverage of the US Eva

438
00:29:00,169 --> 00:28:57,779

on December the 3rd

439
00:29:59,330 --> 00:29:00,179
Showtime beginning at 5 a.m Central Time

440
00:30:04,490 --> 00:30:01,570
our live views from Orion have gone

441
00:30:08,269 --> 00:30:04,500
briefly we are currently looking at the

442
00:30:10,930 --> 00:30:08,279
Aero tracker you can track our Miss and

443
00:30:14,690 --> 00:30:10,940
you can track Orion on

444
00:30:16,370 --> 00:30:14,700
www.nasa.gov track Artemis again this is

445
00:30:18,590 --> 00:30:16,380
the arrow tracker giving you the

446
00:30:21,289 --> 00:30:18,600
velocity the distance from Earth and the

447
00:31:20,389 --> 00:30:21,299
distance from the moon for Orion

448
00:31:24,769 --> 00:31:22,370
again we had a nominal distant

449
00:31:27,590 --> 00:31:24,779
retrograde orbit departure burn

450
00:31:31,370 --> 00:31:27,600
Orion will leave its distant retrograde

451
00:31:34,190 --> 00:31:31,380
orbit preparing Orion for a second lunar

452
00:31:36,590 --> 00:31:34,200
flyby an earth insertion burn and

453
00:31:40,850 --> 00:31:36,600
finally preparation for re-entry in

454
00:31:43,370 --> 00:31:40,860
Splashdown planned for December 11th

455
00:31:46,010 --> 00:31:43,380
that'll end our coverage there however

456
00:31:49,909 --> 00:31:46,020
we'll be covering the RPF Burn live on

457
00:31:53,570 --> 00:31:49,919
air on Monday December 5th

458
00:31:56,149 --> 00:31:53,580
beginning at 8 A.M Central Time 9 A.M

459
00:31:59,330 --> 00:31:56,159
Eastern Time

460
00:32:02,450 --> 00:31:59,340
and before that burn coverage we will we

461
00:32:04,850 --> 00:32:02,460
also have live on air

462
00:32:09,230 --> 00:32:04,860
Saturday November sorry Saturday

463
00:32:11,450 --> 00:32:09,240

December 3rd the U.S spacewalk 82 and

464
00:32:14,510 --> 00:32:11,460
that will start at 5 a.m Central Time 6

465
00:32:16,370 --> 00:32:14,520
a.m Eastern Time

466
00:32:18,649 --> 00:32:16,380
and be sure to follow along with our

467
00:32:21,409 --> 00:32:18,659
daily blog post as Orion continues its

468
00:32:24,010 --> 00:32:21,419
Journey To The Moon and Beyond and

469
00:32:25,930 --> 00:32:24,020
prepares for its trip back home

470
00:32:29,750 --> 00:32:25,940
followtheblogs at

471
00:32:31,669 --> 00:32:29,760
blogs.nasa.gov forward slash Artemis

472
00:32:33,950 --> 00:32:31,679
again thank you for joining us and

473
00:32:43,480 --> 00:32:33,960
that'll wrap coverage for today this is

474
00:33:18,230 --> 00:32:49,850
[Music]

475
00:33:18,240 --> 00:33:29,380
foreign