1
00:00:07,490 --> 00:00:05,090
good afternoon and welcome to the deep

2
00:00:09,770 --> 00:00:07,500
space climate Observatory pre-launch

3
00:00:12,440 --> 00:00:09,780
news conference discover is a joint

4
00:00:15,079 --> 00:00:12,450
mission of NOAA NASA and the US Air

5
00:00:17,180 --> 00:00:15,089
Force and is a spacecraft that will be

6
00:00:20,870 --> 00:00:17,190
launched atop a SpaceX Falcon 9 rocket

7
00:00:22,490 --> 00:00:20,880
tomorrow at 6:10 p.m. Eastern Time from

8
00:00:24,740 --> 00:00:22,500
Cape Canaveral Air Force Station here in

9
00:00:26,750 --> 00:00:24,750
Florida and we are very pleased today to

10
00:00:28,189 --> 00:00:26,760
have the pre-launch news conference to

11
00:00:30,050 --> 00:00:28,199
learn more about this important

12
00:00:33,020 --> 00:00:30,060
spacecraft and the mission beyond launch

13
00:00:35,090 --> 00:00:33,030

so I would like to introduce our panel

14
00:00:39,380 --> 00:00:35,100
members at this time immediately to my

15
00:00:41,209 --> 00:00:39,390
left dr. Stephen volts assistant

16
00:00:43,220 --> 00:00:41,219
administrator of the NOAA satellite and

17
00:00:48,830 --> 00:00:43,230
information service in Silver Spring

18
00:00:50,720 --> 00:00:48,840
Maryland dr. Tom Berger director of the

19
00:00:56,900 --> 00:00:50,730
NOAA's Space Weather Prediction Center

20
00:00:59,330 --> 00:00:56,910
in Boulder Colorado Stephen Clarke NASA

21
00:01:01,040 --> 00:00:59,340
joint agency satellite division director

22
00:01:05,440 --> 00:01:01,050
for the agency's science Mission

23
00:01:10,310 --> 00:01:08,390
Colonel Jason Catherine space

24
00:01:12,560 --> 00:01:10,320
demonstrations division chief at

25
00:01:15,670 --> 00:01:12,570
Kirtland Air Force Base in Albuquerque

26
00:01:21,170 --> 00:01:19,039
Hans Kuhn xmin vice president of mission

27
00:01:27,320 --> 00:01:21,180
assurance at SpaceX in Hawthorne

28
00:01:29,179 --> 00:01:27,330
California and Mike McCauley ninh launch

29
00:01:31,010 --> 00:01:29,189
weather officer with the 45th weather

30
00:01:34,490 --> 00:01:31,020
squadron at Cape Canaveral Air Force

31
00:01:36,859 --> 00:01:34,500
Station gentlemen welcome thank you for

32
00:01:38,480 --> 00:01:36,869
being here we will begin with opening

33
00:01:40,850 --> 00:01:38,490
comments and then we'll take questions

34
00:01:42,679 --> 00:01:40,860
both in the room here on our phone

35
00:01:45,260 --> 00:01:42,689
bridge and if you're monitoring on

36
00:01:47,330 --> 00:01:45,270
social media we have a hashtag that you

37
00:01:49,940 --> 00:01:47,340
can use to ask your questions as you see

38
00:01:54,590 --> 00:01:49,950

on the screen and watch the spelling its

39
00:01:55,760 --> 00:01:54,600
hashtag ask discover dscovr and we'll

40
00:01:57,410 --> 00:01:55,770
look for your questions a little bit

41
00:02:00,080 --> 00:01:57,420
later on but without any further ado

42
00:02:01,370 --> 00:02:00,090
let's begin with dr. volts thank you

43
00:02:03,950 --> 00:02:01,380
Mike and good afternoon everyone welcome

44
00:02:06,139 --> 00:02:03,960
here to the Kennedy Space Center it's a

45
00:02:07,969 --> 00:02:06,149
very exciting time for us to be here we

46
00:02:09,889 --> 00:02:07,979
stand we stand at this point of sort of

47
00:02:11,449 --> 00:02:09,899
on the threshold of history this is the

48
00:02:12,500 --> 00:02:11,459
we are seen tomorrow the launch have

49
00:02:14,869 --> 00:02:12,510
discovered the first

50
00:02:17,720 --> 00:02:14,879
operational space weather mission to be

51
00:02:19,580 --> 00:02:17,730
launched by NOAA into deep space it's a

52
00:02:21,130 --> 00:02:19,590
very exciting time for all of us this

53
00:02:23,929 --> 00:02:21,140
has been a long time coming as well

54
00:02:25,729 --> 00:02:23,939
started as the discoverer started as the

55
00:02:29,149 --> 00:02:25,739
Triana mission just got created and

56
00:02:30,410 --> 00:02:29,159
conceived by NASA in the late 1990s it

57
00:02:32,210 --> 00:02:30,420
was completed ready

58
00:02:33,830 --> 00:02:32,220
tested and ready for a further

59
00:02:35,149 --> 00:02:33,840
deployment of her flying when it was

60
00:02:37,850 --> 00:02:35,159
cancelled around the turn of the century

61
00:02:40,069 --> 00:02:37,860
around 2001 there went into storage and

62
00:02:42,710 --> 00:02:40,079
sat there for several years until in the

63
00:02:43,479 --> 00:02:42,720

2007 to 2008 period NASA and NOAA

64
00:02:46,009 --> 00:02:43,489
together

65
00:02:47,839 --> 00:02:46,019
looked at evaluating discover pulled it

66
00:02:49,460 --> 00:02:47,849
out of storage checked it out to see if

67
00:02:51,740 --> 00:02:49,470
it was still a viable and capable

68
00:02:53,059 --> 00:02:51,750
instrument and satellite and at that and

69
00:02:55,369 --> 00:02:53,069
determining that it was and that could

70
00:02:57,319 --> 00:02:55,379
meet Noah's space weather emission

71
00:02:58,910 --> 00:02:57,329
requirements which we'll talk about a

72
00:03:01,280 --> 00:02:58,920
little bit more in the future in a few

73
00:03:03,559 --> 00:03:01,290
minutes at that point a partnership was

74
00:03:05,479 --> 00:03:03,569
born between NASA NOAA and the Air Force

75
00:03:07,550 --> 00:03:05,489
another party who was very interested in

76
00:03:10,819 --> 00:03:07,560
the quality in space weather forecasts

77
00:03:12,920 --> 00:03:10,829
and the partnership in 2004 2008 on has

78
00:03:14,390 --> 00:03:12,930
got us to where we are today in this

79
00:03:16,670 --> 00:03:14,400
partnership NOAA has the mission

80
00:03:18,379 --> 00:03:16,680
leadership responsibilities as part of

81
00:03:20,210 --> 00:03:18,389
our space weather for our requirements

82
00:03:22,099 --> 00:03:20,220
for the nation we provide the space

83
00:03:23,809 --> 00:03:22,109
weather data processing center we

84
00:03:25,250 --> 00:03:23,819
provide all the data archiving for it

85
00:03:26,689 --> 00:03:25,260
and the mission operations which will be

86
00:03:28,330 --> 00:03:26,699
operated out of our NOAA satellite

87
00:03:32,539 --> 00:03:28,340
operations facility in Suitland Maryland

88
00:03:34,069 --> 00:03:32,549

NASA funded by NOAA has brought was did

89
00:03:35,390 --> 00:03:34,079
the original triana on their own funding

90
00:03:37,250 --> 00:03:35,400
but out of our funding is brought it out

91
00:03:38,629 --> 00:03:37,260
of storage refurbished the spacecraft

92
00:03:40,520 --> 00:03:38,639
and the space weather instruments

93
00:03:42,949 --> 00:03:40,530
entirely to make them ready for launch

94
00:03:44,599 --> 00:03:42,959
to this date they also fanaa so funded

95
00:03:45,830 --> 00:03:44,609
on their own funding evaluated and

96
00:03:47,629 --> 00:03:45,840
refurbished the earth-observing

97
00:03:49,400 --> 00:03:47,639
instruments which are part secondary

98
00:03:52,490 --> 00:03:49,410
payload part of the discover mission and

99
00:03:53,869 --> 00:03:52,500
the Air Force as private is providing

100
00:03:58,089 --> 00:03:53,879
the launch services for this with their

101
00:04:00,199 --> 00:03:58,099
contract with the SpaceX organization so

102
00:04:02,059 --> 00:04:00,209
space weather you'll hear a lot more

103
00:04:04,250 --> 00:04:02,069
about space weather and why we why were

104
00:04:06,319 --> 00:04:04,260
interested in and and concerned about it

105
00:04:07,879 --> 00:04:06,329
from dr. burgher in a moment but it is

106
00:04:09,979 --> 00:04:07,889
just I'll just lead off by saying that

107
00:04:11,360 --> 00:04:09,989
the potential for solar storms solar

108
00:04:13,159 --> 00:04:11,370
storms can provide have a potential

109
00:04:16,550 --> 00:04:13,169
provide significant impact to the earth

110
00:04:18,529 --> 00:04:16,560
and to our and to the the society major

111
00:04:20,080 --> 00:04:18,539
critical economic critical sectors could

112
00:04:22,459 --> 00:04:20,090
be affected by it such as aviation

113
00:04:23,719 --> 00:04:22,469

telecommunications power grids and

114
00:04:25,909 --> 00:04:23,729
Global Positioning Systems could be

115
00:04:26,360 --> 00:04:25,919
affected by the significant solar storms

116
00:04:30,080 --> 00:04:26,370
which

117
00:04:31,700 --> 00:04:30,090
our way it is a technology we

118
00:04:33,200 --> 00:04:31,710
become more susceptible the impacts on

119
00:04:34,820 --> 00:04:33,210
those technology elements from such

120
00:04:36,980 --> 00:04:34,830
things as solar storms as dr. Berger

121
00:04:39,320 --> 00:04:36,990
will talk about so we are dependent upon

122
00:04:40,400 --> 00:04:39,330
a reliable source of early warning and

123
00:04:42,860 --> 00:04:40,410
advance notice and when such things

124
00:04:44,510 --> 00:04:42,870
might occur discover when it launches

125
00:04:47,300 --> 00:04:44,520
will take about a hundred and ten days

126
00:04:49,430 --> 00:04:47,310
to get to its observing point which is

127
00:04:50,930 --> 00:04:49,440
kind of a unique place for us as I said

128
00:04:52,340 --> 00:04:50,940
it's the first deep-space observer we

129
00:04:53,600 --> 00:04:52,350
have it will be sitting out what's

130
00:04:55,700 --> 00:04:53,610
called the Lagrange point which is a

131
00:04:57,439 --> 00:04:55,710
gravitation stable point between the

132
00:04:58,580 --> 00:04:57,449
Earth and the Sun about a hundred about

133
00:05:00,950 --> 00:04:58,590
a million miles away from the earth

134
00:05:02,750 --> 00:05:00,960
directly in line with the Sun from that

135
00:05:05,060 --> 00:05:02,760
position it is staring at the Sun and

136
00:05:06,320 --> 00:05:05,070
taking in-situ data of the measurements

137
00:05:07,490 --> 00:05:06,330
of the wind the solar wind and the

138
00:05:09,469 --> 00:05:07,500

observer coming from the Sun in

139
00:05:11,510 --> 00:05:09,479
real-time and transmitting that data

140
00:05:12,920 --> 00:05:11,520
directly to the earth looking backwards

141
00:05:15,200 --> 00:05:12,930
it's also observing the earth enough

142
00:05:18,140 --> 00:05:15,210
what as a secondary payload opportunity

143
00:05:19,640 --> 00:05:18,150
there at l1 as we call Lagrange point

144
00:05:21,469 --> 00:05:19,650
one it will join ace the advanced

145
00:05:23,930 --> 00:05:21,479
composition Explorer which NASA flew in

146
00:05:25,820 --> 00:05:23,940
1997 providing all of these measurements

147
00:05:28,790 --> 00:05:25,830
and others since that period of time

148
00:05:30,650 --> 00:05:28,800
l want aces of Venerable satellite 17

149
00:05:32,750 --> 00:05:30,660
years now well past its prime lifetime

150
00:05:33,740 --> 00:05:32,760
but still providing accurate data the

151
00:05:35,060 --> 00:05:33,750
importance of the space weather

152
00:05:36,800 --> 00:05:35,070
measurements and observations are so

153
00:05:38,839 --> 00:05:36,810
critical it is essential that we get

154
00:05:40,790 --> 00:05:38,849
discover out there to be in partner with

155
00:05:42,409 --> 00:05:40,800
a twith party with ace and to carry on

156
00:05:43,520 --> 00:05:42,419
the ace measurements at least as far as

157
00:05:47,690 --> 00:05:43,530
space weather is concerned

158
00:05:49,400 --> 00:05:47,700
into the future so as we said NOAA will

159
00:05:51,170 --> 00:05:49,410
be operating discover out of the n soft

160
00:05:52,640 --> 00:05:51,180
facility where we will make the data and

161
00:05:54,200 --> 00:05:52,650
the observations vailable to the

162
00:05:56,480 --> 00:05:54,210
partners in the public NOAA's Space

163
00:05:58,159 --> 00:05:56,490

Weather Prediction Center operated out

164
00:06:00,200 --> 00:05:58,169
of Boulder Colorado will process the

165
00:06:02,450 --> 00:06:00,210
space weather data with and provide

166
00:06:04,430 --> 00:06:02,460
products forecast alerts and and the

167
00:06:07,580 --> 00:06:04,440
like to to the nation and to the to

168
00:06:09,920 --> 00:06:07,590
users and and the data once taken will

169
00:06:11,600 --> 00:06:09,930
be archived at NOAA's national national

170
00:06:15,350 --> 00:06:11,610
geographic data center also in Boulder

171
00:06:17,029 --> 00:06:15,360
Colorado so once we launch to discover

172
00:06:19,670 --> 00:06:17,039
what next we're not just sitting to sit

173
00:06:20,870 --> 00:06:19,680
and watch discover for 17 years we we

174
00:06:22,070 --> 00:06:20,880
know this is a very important

175
00:06:24,230 --> 00:06:22,080
measurement to be made and we're already

176
00:06:26,300 --> 00:06:24,240
working within NOAA to figure out what

177
00:06:27,290 --> 00:06:26,310
we will do following discover well we

178
00:06:28,969 --> 00:06:27,300
will hire it takes years to get a

179
00:06:30,140 --> 00:06:28,979
satellite developed and on orbit and we

180
00:06:31,339 --> 00:06:30,150
understand the criticality this

181
00:06:32,719 --> 00:06:31,349
measurement is so we're looking for the

182
00:06:34,129 --> 00:06:32,729
next generation of space weather

183
00:06:36,649 --> 00:06:34,139
observations and measurements to be made

184
00:06:37,850 --> 00:06:36,659
following a discover mission so we're

185
00:06:39,140 --> 00:06:37,860
very excited about this today about

186
00:06:39,860 --> 00:06:39,150
today and about what's going on here

187
00:06:42,230 --> 00:06:39,870
this is a

188
00:06:44,330 --> 00:06:42,240

a set of firsts our first deep observing

189
00:06:46,760 --> 00:06:44,340
space weather mission our first venture

190
00:06:48,740 --> 00:06:46,770
beyond Geo era of any kind our first

191
00:06:50,840 --> 00:06:48,750
launch on spacex three very important

192
00:06:52,430 --> 00:06:50,850
ones and looking to the future so I want

193
00:06:55,250 --> 00:06:52,440
to give my congratulations to the NASA

194
00:06:57,440 --> 00:06:55,260
NOAA air force SpaceX and broad science

195
00:06:58,700 --> 00:06:57,450
and engineering and operations team that

196
00:07:00,680 --> 00:06:58,710
count got us to this point

197
00:07:02,180 --> 00:07:00,690
some have been working for literally

198
00:07:04,010 --> 00:07:02,190
four decades for this particular mission

199
00:07:06,230 --> 00:07:04,020
to get it ready for launch and for

200
00:07:08,150 --> 00:07:06,240
operations and with that I'll turn it

201
00:07:10,100 --> 00:07:08,160
over to Tom Berger to talk about the

202
00:07:12,260 --> 00:07:10,110
more details about the space weather

203
00:07:13,940 --> 00:07:12,270
itself thanks Tom alright thank you

204
00:07:15,320 --> 00:07:13,950
Steve I'm Tom Berger the director of

205
00:07:17,150 --> 00:07:15,330
NOAA's Space Weather Prediction Center

206
00:07:18,410 --> 00:07:17,160
in Boulder Colorado the nation's

207
00:07:20,240 --> 00:07:18,420
official source for space weather

208
00:07:23,180 --> 00:07:20,250
forecasts and alert and the primary

209
00:07:24,830 --> 00:07:23,190
users of discovered data discovers a

210
00:07:26,180 --> 00:07:24,840
prime example of NOAA's ongoing

211
00:07:28,430 --> 00:07:26,190
investment in observational

212
00:07:30,370 --> 00:07:28,440
infrastructure to provide reliable

213
00:07:33,250 --> 00:07:30,380

accurate timely and actionable

214
00:07:34,850 --> 00:07:33,260
environmental intelligence in this case

215
00:07:37,040 --> 00:07:34,860
environmental intelligence for the

216
00:07:38,510 --> 00:07:37,050
near-earth space environment like

217
00:07:40,070 --> 00:07:38,520
terrestrial weather forecasting space

218
00:07:42,920 --> 00:07:40,080
weather forecasting begins with

219
00:07:45,050 --> 00:07:42,930
observations primarily from satellites

220
00:07:46,610 --> 00:07:45,060
such as discover discover will provide

221
00:07:47,870 --> 00:07:46,620
the observations necessary to help us

222
00:07:50,000 --> 00:07:47,880
deliver warnings and alerts to

223
00:07:51,560 --> 00:07:50,010
industries affected by space weather so

224
00:07:53,360 --> 00:07:51,570
they can take actions protect

225
00:07:55,790 --> 00:07:53,370
infrastructure and be more resilient in

226
00:07:57,350 --> 00:07:55,800
the face of severe events impacts from

227
00:07:59,390 --> 00:07:57,360
space weather as Steve mentioned are

228
00:08:01,970 --> 00:07:59,400
very wide-ranging with potentially

229
00:08:03,380 --> 00:08:01,980
severe consequences many public

230
00:08:05,480 --> 00:08:03,390
infrastructure systems such as

231
00:08:07,310 --> 00:08:05,490
satellites GPS systems commercial

232
00:08:08,690 --> 00:08:07,320
aviation and the electric power industry

233
00:08:10,190 --> 00:08:08,700
are vulnerable to space weather

234
00:08:12,710 --> 00:08:10,200
particularly the severe events that can

235
00:08:14,180 --> 00:08:12,720
sometimes occur as our society has grown

236
00:08:16,220 --> 00:08:14,190
more dependent on this technological

237
00:08:17,870 --> 00:08:16,230
infrastructure space weather decision

238
00:08:18,890 --> 00:08:17,880

support services have become more

239
00:08:22,220 --> 00:08:18,900
important to the National Weather

240
00:08:24,620 --> 00:08:22,230
Service swip sea now serves over 44,000

241
00:08:26,780 --> 00:08:24,630
individuals and organizations who have

242
00:08:29,480 --> 00:08:26,790
registered to receive our space weather

243
00:08:31,190 --> 00:08:29,490
forecasts and products now discover will

244
00:08:32,720 --> 00:08:31,200
be the nation's first operational space

245
00:08:34,970 --> 00:08:32,730
weather mission in deep space as Steve

246
00:08:36,620 --> 00:08:34,980
mentioned it will be located at that l1

247
00:08:37,940 --> 00:08:36,630
point 1 million miles from Earth where

248
00:08:39,920 --> 00:08:37,950
it will orbit between the Earth and the

249
00:08:41,660 --> 00:08:39,930
Sun continually from this location

250
00:08:42,830 --> 00:08:41,670
Discoverer will provide forecasters with

251
00:08:45,140 --> 00:08:42,840
critical information about the

252
00:08:46,700 --> 00:08:45,150
supersonic solar wind that continually

253
00:08:47,930 --> 00:08:46,710
streams from the Sun to interact with

254
00:08:50,330 --> 00:08:47,940
the Earth's magnetosphere and upper

255
00:08:51,710 --> 00:08:50,340
atmosphere most of us know this

256
00:08:53,450 --> 00:08:51,720
interaction through its generation of

257
00:08:55,550 --> 00:08:53,460
the aurora borealis or

258
00:08:58,790 --> 00:08:55,560
Northern Lights the most visible aspect

259
00:09:00,950 --> 00:08:58,800
of space weather but discover will also

260
00:09:02,750 --> 00:09:00,960
serve as our tsunami buoy in space if

261
00:09:04,490 --> 00:09:02,760
you will giving forecasters up to an

262
00:09:06,470 --> 00:09:04,500
hours warning on the arrival of the huge

263
00:09:08,090 --> 00:09:06,480

magnetic eruptions from the Sun that

264
00:09:10,570 --> 00:09:08,100
occasionally occur called coronal mass

265
00:09:12,470 --> 00:09:10,580
ejections or CMEs

266
00:09:14,690 --> 00:09:12,480
CME's are the cause of the largest

267
00:09:15,980 --> 00:09:14,700
geomagnetic storms at Earth some of

268
00:09:17,840 --> 00:09:15,990
which can severely disrupt our

269
00:09:18,950 --> 00:09:17,850
technological society causing loss of

270
00:09:20,840 --> 00:09:18,960
communications with aircraft

271
00:09:23,390 --> 00:09:20,850
particularly those flying over the poles

272
00:09:24,950 --> 00:09:23,400
damage to satellites in orbit and even

273
00:09:27,110 --> 00:09:24,960
damage to power grid equipment on the

274
00:09:28,370 --> 00:09:27,120
ground so with the launch of discover

275
00:09:30,590 --> 00:09:28,380
NOAA and Swift sea we'll be better

276
00:09:32,270 --> 00:09:30,600
prepared for this critical mission NOAA

277
00:09:34,040 --> 00:09:32,280
has tested all of the data processing

278
00:09:36,410 --> 00:09:34,050
elements that need to be in place when

279
00:09:38,000 --> 00:09:36,420
Discoverer reaches the l1 point and is

280
00:09:39,590 --> 00:09:38,010
handed over for operations and we are

281
00:09:41,090 --> 00:09:39,600
ready and very excited to embark on this

282
00:09:43,430 --> 00:09:41,100
new day for operational space weather

283
00:09:45,140 --> 00:09:43,440
forecasting as Steve also mentioned

284
00:09:46,940 --> 00:09:45,150
Discoverer will follow NASA's ace

285
00:09:48,350 --> 00:09:46,950
satellite to give forecasters faster and

286
00:09:50,150 --> 00:09:48,360
more reliable measurements of solar wind

287
00:09:52,220 --> 00:09:50,160
properties improving their ability to

288
00:09:53,900 --> 00:09:52,230

monitor changes in the solar wind and to

289
00:09:57,080 --> 00:09:53,910
more reliably predict the arrival time

290
00:09:58,820 --> 00:09:57,090
of the big CME's at Earth data from

291
00:10:02,510 --> 00:09:58,830
Discoverer will also feed new models of

292
00:10:04,040 --> 00:10:02,520
the Earth's magnetosphere that will

293
00:10:06,440 --> 00:10:04,050
enable forecasters to predict the impact

294
00:10:08,690 --> 00:10:06,450
of geomagnetic storms on regional basis

295
00:10:10,520 --> 00:10:08,700
this is new right now we predict

296
00:10:12,650 --> 00:10:10,530
geomagnetic storms on a planetary basis

297
00:10:14,750 --> 00:10:12,660
regional basis is coming based on the

298
00:10:16,190 --> 00:10:14,760
new models and forecasters will soon be

299
00:10:17,510 --> 00:10:16,200
able to deliver targeted critical

300
00:10:19,190 --> 00:10:17,520
information to industries such as the

301
00:10:21,170 --> 00:10:19,200
power grid operators in the Northeast

302
00:10:23,060 --> 00:10:21,180
region of the country say who are some

303
00:10:26,270 --> 00:10:23,070
of the most at risk from severe space

304
00:10:27,560 --> 00:10:26,280
weather events like large CME's it's

305
00:10:29,090 --> 00:10:27,570
also important to keep in mind that

306
00:10:29,630 --> 00:10:29,100
space weather is not just a national

307
00:10:34,400 --> 00:10:29,640
phenomenon

308
00:10:35,480 --> 00:10:34,410
affects all nations on earth and NOAA

309
00:10:36,890 --> 00:10:35,490
has formed strong international

310
00:10:38,360 --> 00:10:36,900
partnerships to make the discover

311
00:10:40,310 --> 00:10:38,370
mission a collaborative project across

312
00:10:42,770 --> 00:10:40,320
the globe including the German Aerospace

313
00:10:44,030 --> 00:10:42,780

Center in Germany the national institute

314
00:10:47,930 --> 00:10:44,040
of information communications technology

315
00:10:51,350 --> 00:10:47,940
in japan and the korean national radio

316
00:10:53,120 --> 00:10:51,360
research agency all of whom are part of

317
00:10:55,760 --> 00:10:53,130
the discover mission and will be

318
00:10:58,450 --> 00:10:55,770
providing downlink stations to enable

319
00:11:00,530 --> 00:10:58,460
the critical 24/7 operations of

320
00:11:03,080 --> 00:11:00,540
recessions of discovered data required

321
00:11:04,370 --> 00:11:03,090
to forecast the space weather we also

322
00:11:06,020 --> 00:11:04,380
have strong partnerships with the Air

323
00:11:07,280 --> 00:11:06,030
Force Weather Service and with the UK

324
00:11:09,499 --> 00:11:07,290
Met Office

325
00:11:11,120 --> 00:11:09,509
in the UK to collaborate on space

326
00:11:13,879 --> 00:11:11,130
weather forecasting using discover

327
00:11:15,410 --> 00:11:13,889
real-time data discovery will ensure

328
00:11:16,970 --> 00:11:15,420
that space weather forecasters from NOAA

329
00:11:18,680 --> 00:11:16,980
the Air Force and other nations have the

330
00:11:20,150 --> 00:11:18,690
capability to provide timely actionable

331
00:11:22,550 --> 00:11:20,160
and relevant space weather watches

332
00:11:23,960 --> 00:11:22,560
warnings and alerts the environmental

333
00:11:25,460 --> 00:11:23,970
intelligence needed by government and

334
00:11:28,189 --> 00:11:25,470
private sector decision-makers and

335
00:11:29,749 --> 00:11:28,199
emergency managers to ensure that we can

336
00:11:31,819 --> 00:11:29,759
respond to anything the Sun might send

337
00:11:34,009 --> 00:11:31,829
our way and with that I'll turn it over

338
00:11:35,629 --> 00:11:34,019

to Steve thank you Tom

339
00:11:38,030 --> 00:11:35,639
well it's good to be here at the Cape

340
00:11:40,129 --> 00:11:38,040
for the launch of Discoverer now this is

341
00:11:42,079 --> 00:11:40,139
the first launch of a mission managed by

342
00:11:44,840 --> 00:11:42,089
the joint agency satellite division at

343
00:11:47,749 --> 00:11:44,850
NASA headquarters as jazz D as we like

344
00:11:49,819 --> 00:11:47,759
to call it we work closely with our NOAA

345
00:11:52,189 --> 00:11:49,829
partners with the requirements that they

346
00:11:55,040 --> 00:11:52,199
have and they provide us the funding and

347
00:11:57,350 --> 00:11:55,050
we acquire and develop the satellites

348
00:11:59,120 --> 00:11:57,360
for NOAA and once we launch them and do

349
00:12:00,379 --> 00:11:59,130
the on-orbit checkouts and make sure

350
00:12:02,689 --> 00:12:00,389
that every all the systems are working

351
00:12:04,610 --> 00:12:02,699
properly then we turn the keys over to

352
00:12:06,769 --> 00:12:04,620
know what to operate those spacecraft

353
00:12:11,030 --> 00:12:06,779
and discover is being the first one in

354
00:12:12,590 --> 00:12:11,040
the jazz D portfolio also as dr. voles

355
00:12:14,840 --> 00:12:12,600
mentioned there are a couple Earth's

356
00:12:17,360 --> 00:12:14,850
science instruments onboard as secondary

357
00:12:19,400 --> 00:12:17,370
objectives of this mission and those

358
00:12:22,340 --> 00:12:19,410
instruments will be acquiring very

359
00:12:25,309 --> 00:12:22,350
important earth science data including

360
00:12:29,210 --> 00:12:25,319
looking at the aerosol content ozone and

361
00:12:31,250 --> 00:12:29,220
the radiation balance of the earth now a

362
00:12:34,160 --> 00:12:31,260
lot of hard work has gotten us to this

363
00:12:35,750 --> 00:12:34,170

point and the hard work has been

364
00:12:38,090 --> 00:12:35,760
accomplished by this extraordinary

365
00:12:40,129 --> 00:12:38,100
partnership between NOAA NASA the Air

366
00:12:42,500 --> 00:12:40,139
Force and SpaceX and I too want to thank

367
00:12:44,300 --> 00:12:42,510
the extended team for all of their hard

368
00:12:46,490 --> 00:12:44,310
work and dedication in getting us to

369
00:12:49,639 --> 00:12:46,500
this point and we're very anxious about

370
00:12:52,069 --> 00:12:49,649
getting Discoverer off I'd like to show

371
00:12:53,900 --> 00:12:52,079
share a short video with you which will

372
00:12:56,179 --> 00:12:53,910
show some of the discover processing

373
00:12:58,370 --> 00:12:56,189
activities at the Astrotech facility in

374
00:13:00,439 --> 00:12:58,380
Titusville the spacecraft was shipped

375
00:13:03,050 --> 00:13:00,449
down from Goddard in November of this

376
00:13:05,749 --> 00:13:03,060
year here the shipping container is

377
00:13:08,480 --> 00:13:05,759
removed and the spacecraft is wheeled

378
00:13:11,449 --> 00:13:08,490
into the clean room at the high bay with

379
00:13:12,769 --> 00:13:11,459
the protective cover removed and

380
00:13:14,600 --> 00:13:12,779
inspections were done to ensure

381
00:13:16,579 --> 00:13:14,610
everything was good with the

382
00:13:18,980 --> 00:13:16,589
transportation and then the team

383
00:13:19,970 --> 00:13:18,990
performed a number of tests to ensure

384
00:13:20,990 --> 00:13:19,980
that all the instruments in the

385
00:13:22,490 --> 00:13:21,000
spacecraft systems

386
00:13:25,720 --> 00:13:22,500
good here the solar array deployment

387
00:13:27,620 --> 00:13:25,730
test was performed there's a very clean

388
00:13:30,500 --> 00:13:27,630

processing flow at the Astrotech

389
00:13:32,630 --> 00:13:30,510
facility and here the technicians are

390
00:13:34,550 --> 00:13:32,640
doing very close inspections of all the

391
00:13:36,920 --> 00:13:34,560
instruments the various systems onboard

392
00:13:39,860 --> 00:13:36,930
the spacecraft with the solar arrays

393
00:13:41,780 --> 00:13:39,870
deployed prior to packaging up the

394
00:13:43,940 --> 00:13:41,790
spacecraft and here you can see it on

395
00:13:45,350 --> 00:13:43,950
top of the payload launch adapter with

396
00:13:47,560 --> 00:13:45,360
one of the fairing halves with our

397
00:13:50,060 --> 00:13:47,570
Discoverer logo on the front

398
00:13:55,130 --> 00:13:50,070
before encapsulation at the high bay and

399
00:13:57,110 --> 00:13:55,140
transportation out to slick 40 so the

400
00:13:58,690 --> 00:13:57,120
spacecraft wear is in great shape we're

401
00:14:01,130 --> 00:13:58,700
not working any issues at this time

402
00:14:03,800 --> 00:14:01,140
final closeouts will occur later today

403
00:14:05,750 --> 00:14:03,810
and we're looking forward to SpaceX

404
00:14:08,060 --> 00:14:05,760
providing discover a great ride tomorrow

405
00:14:09,140 --> 00:14:08,070
evening on its journey to l1 and with

406
00:14:11,180 --> 00:14:09,150
that I'll turn it over to Colonel

407
00:14:12,470 --> 00:14:11,190
Kaufman thanks Steve good afternoon

408
00:14:14,480 --> 00:14:12,480
everybody

409
00:14:16,730 --> 00:14:14,490
as an Orlando native and a graduate of

410
00:14:18,920 --> 00:14:16,740
the UCF college of engineering it's a

411
00:14:21,380 --> 00:14:18,930
it's really gratifying to be back here

412
00:14:23,210 --> 00:14:21,390
in Central Florida for this mission this

413
00:14:25,670 --> 00:14:23,220

important discover mission and as the

414
00:14:28,460 --> 00:14:25,680
Air Force's space and missile system

415
00:14:29,840 --> 00:14:28,470
center advanced systems and development

416
00:14:33,200 --> 00:14:29,850
Directorate representative to this

417
00:14:35,870 --> 00:14:33,210
unique partnership with NASA NOAA SpaceX

418
00:14:37,670 --> 00:14:35,880
and the 45th Space Wing we are excited

419
00:14:40,160 --> 00:14:37,680
to be a part of this mission this is the

420
00:14:41,840 --> 00:14:40,170
air force's first with SpaceX the

421
00:14:44,510 --> 00:14:41,850
integrated team has put in a tremendous

422
00:14:48,110 --> 00:14:44,520
effort to get us to today and our

423
00:14:50,000 --> 00:14:48,120
opportunity tomorrow the spacecraft as

424
00:14:52,310 --> 00:14:50,010
Steve said is ready working no issues

425
00:14:55,370 --> 00:14:52,320
the Falcon 9 launch vehicle is ready

426
00:14:56,840 --> 00:14:55,380
working no issues the range is ready the

427
00:14:58,760 --> 00:14:56,850
teams have been trained and are ready

428
00:15:00,740 --> 00:14:58,770
and we are looking forward to a

429
00:15:02,720 --> 00:15:00,750
tremendous opportunity for launch

430
00:15:04,850 --> 00:15:02,730
tomorrow so thank you and I now I'll

431
00:15:06,290 --> 00:15:04,860
turn it over to Hans from SpaceX thank

432
00:15:08,329 --> 00:15:06,300
you thank you

433
00:15:10,760 --> 00:15:08,339
well SpaceX is delighted to work with

434
00:15:13,130 --> 00:15:10,770
the three agencies Air Force North NASA

435
00:15:14,960 --> 00:15:13,140
and I really would like to thank them

436
00:15:18,530 --> 00:15:14,970
for the trust and the Falcon 9 and

437
00:15:20,420 --> 00:15:18,540
SpaceX in particular we I can give you a

438
00:15:24,350 --> 00:15:20,430

couple more details on the first stage

439
00:15:27,050 --> 00:15:24,360
and second stage sent first stage will

440
00:15:29,840 --> 00:15:27,060
burn 165 seconds a little less than

441
00:15:31,460 --> 00:15:29,850
three minutes you will then deploy the

442
00:15:32,780 --> 00:15:31,470
second stage the second stage will

443
00:15:35,120 --> 00:15:32,790
ignite

444
00:15:36,950 --> 00:15:35,130
the deployer fearing about 40 seconds

445
00:15:39,980 --> 00:15:36,960
into the second stage burn so it's about

446
00:15:41,870 --> 00:15:39,990
220 seconds and then at about 8 minutes

447
00:15:45,080 --> 00:15:41,880
and 40 seconds little less than nine

448
00:15:47,030 --> 00:15:45,090
minutes the second stage will stop the

449
00:15:51,410 --> 00:15:47,040
first burn or burn out for the first

450
00:15:54,410 --> 00:15:51,420
time and Coast for about 22 minutes

451
00:15:57,050 --> 00:15:54,420
before then ignites again for a final

452
00:16:00,350 --> 00:15:57,060
fairly large burn that brings the

453
00:16:03,650 --> 00:16:00,360
spacecraft then to album that happens

454
00:16:05,810 --> 00:16:03,660
then 30 minutes after liftoff spacecraft

455
00:16:08,600 --> 00:16:05,820
separation is going to be 35 minutes

456
00:16:09,680 --> 00:16:08,610
after after liftoff and then spacecraft

457
00:16:12,160 --> 00:16:09,690
is on its way

458
00:16:14,810 --> 00:16:12,170
second stage will go through a series of

459
00:16:18,950 --> 00:16:14,820
you know maneuvers passivation and

460
00:16:20,240 --> 00:16:18,960
saving anything basically I feel like I

461
00:16:23,300 --> 00:16:20,250
should probably say a little bit to the

462
00:16:27,110 --> 00:16:23,310
landing that we attempt this time we had

463
00:16:31,280 --> 00:16:27,120

some adjustments after the last fairly

464
00:16:34,970 --> 00:16:31,290
hard landing on cs5 if you recall we

465
00:16:38,870 --> 00:16:34,980
fixed the problems we hope it will go

466
00:16:40,850 --> 00:16:38,880
well this time that their own ship just

467
00:16:43,670 --> 00:16:40,860
read the instructions as its named is

468
00:16:46,760 --> 00:16:43,680
out there and waiting for the first

469
00:16:48,680 --> 00:16:46,770
stage however I really want to point out

470
00:16:52,760 --> 00:16:48,690
this is a secondary objective again this

471
00:16:54,440 --> 00:16:52,770
is primary objective is discovery you're

472
00:16:56,090 --> 00:16:54,450
working very hard to get discovery into

473
00:16:58,610 --> 00:16:56,100
the right orbit into the perfect orbit

474
00:17:04,180 --> 00:16:58,620
basically and this first stage landing

475
00:17:09,140 --> 00:17:06,950
parking line is in great shape it's it

476
00:17:14,270 --> 00:17:09,150
has a very good static fire on last

477
00:17:18,800 --> 00:17:14,280
Saturday we reviewed the data it's ready

478
00:17:21,750 --> 00:17:18,810
to fly discover ready to support thank

479
00:17:27,940 --> 00:17:24,820
okay well today's one of those days that

480
00:17:29,290 --> 00:17:27,950
brings to mind the saying that the good

481
00:17:31,240 --> 00:17:29,300
thing about winter as long as Space

482
00:17:33,460 --> 00:17:31,250
Coast is that they end at 10 a.m. every

483
00:17:35,620 --> 00:17:33,470
day so I think tomorrow is going to be

484
00:17:38,470 --> 00:17:35,630
just about a carbon copy of today but

485
00:17:41,530 --> 00:17:38,480
first let's go to the satellite and you

486
00:17:43,380 --> 00:17:41,540
can see almost a clear Peninsula we got

487
00:17:46,390 --> 00:17:43,390
a few scattered clouds just offshore

488
00:17:48,490 --> 00:17:46,400

rolling along and then a kind of a broad

489
00:17:50,200 --> 00:17:48,500
swath of moisture off the keys southwest

490
00:17:53,310 --> 00:17:50,210
of Florida that might come into play

491
00:17:55,180 --> 00:17:53,320
very late on Sunday and into Monday

492
00:17:58,120 --> 00:17:55,190
let's talk about Monday's forecast

493
00:18:00,460 --> 00:17:58,130
though next slide see again a very very

494
00:18:02,920 --> 00:18:00,470
good weather day should wake up to

495
00:18:05,980 --> 00:18:02,930
temperatures in upper 40s maybe 50s and

496
00:18:08,230 --> 00:18:05,990
in the Graduate gradually increase like

497
00:18:10,690 --> 00:18:08,240
today into the 70s looking for just a

498
00:18:12,550 --> 00:18:10,700
few clouds mostly offshore cumulus

499
00:18:14,710 --> 00:18:12,560
variety and some upper level clouds like

500
00:18:17,620 --> 00:18:14,720
there is out there today winds are

501
00:18:20,590 --> 00:18:17,630
beyond the southeast and very light 8 to

502
00:18:23,440 --> 00:18:20,600
12 miles per hour so just a very low

503
00:18:24,760 --> 00:18:23,450
threat of Violation for for any kind of

504
00:18:27,250 --> 00:18:24,770
cloud cover that would be if a cumulus

505
00:18:28,810 --> 00:18:27,260
cloud were to stray in offshore or that

506
00:18:30,460 --> 00:18:28,820
swath of moisture were to roll in a

507
00:18:32,800 --> 00:18:30,470
little bit quicker from the southwest

508
00:18:33,790 --> 00:18:32,810
and is currently forecast and just

509
00:18:35,350 --> 00:18:33,800
because I know you're gonna ask cons

510
00:18:37,020 --> 00:18:35,360
several questions about landing I went

511
00:18:39,340 --> 00:18:37,030
ahead and put the landing forecast up

512
00:18:40,330 --> 00:18:39,350
you can see the waves out there look

513
00:18:43,360 --> 00:18:40,340

pretty good

514
00:18:45,940 --> 00:18:43,370
winds are light about 10 knots almost

515
00:18:49,420 --> 00:18:45,950
clear skies and just 2 to 4 feet of seas

516
00:18:51,610 --> 00:18:49,430
so the autonomous drone read the

517
00:18:53,730 --> 00:18:51,620
directions vessel will be fairly stable

518
00:18:57,430 --> 00:18:53,740
and ready to receive the first stage

519
00:18:58,990 --> 00:18:57,440
okay for a delay forecast to Monday you

520
00:19:00,730 --> 00:18:59,000
can see whether it does deteriorate a

521
00:19:03,040 --> 00:19:00,740
bit we increase the cloud covers at all

522
00:19:05,620 --> 00:19:03,050
levels and have increase the probability

523
00:19:08,170 --> 00:19:05,630
of violation to 30% mostly because of

524
00:19:09,970 --> 00:19:08,180
thick layer clouds that's a potential

525
00:19:12,490 --> 00:19:09,980
risk to a triggered lightning if the

526
00:19:14,740 --> 00:19:12,500
thick layer clouds get to around 5,000

527
00:19:16,750 --> 00:19:14,750
feet and are approaching the 0 degrees

528
00:19:20,020 --> 00:19:16,760
Celsius to the minus 20 degrees Celsius

529
00:19:21,430 --> 00:19:20,030
level in that in that area so that's

530
00:19:25,120 --> 00:19:21,440
what we're looking for for a Monday

531
00:19:27,280 --> 00:19:25,130
delay so just summarize tomorrow looks

532
00:19:29,680 --> 00:19:27,290
great I think we should be in a very

533
00:19:32,460 --> 00:19:29,690
very low threat of a violation for a

534
00:19:34,980 --> 00:19:32,470
spectacular sunset launch thank you

535
00:19:36,720 --> 00:19:34,990
all right thank you all we're ready for

536
00:19:39,000 --> 00:19:36,730
questions now again if you are

537
00:19:44,549 --> 00:19:39,010
monitoring on social media please use

538
00:19:45,720 --> 00:19:44,559

the hashtag ask discover dscovr and here

539
00:19:47,370 --> 00:19:45,730
in the room please wait for the

540
00:19:48,779 --> 00:19:47,380
microphone state your name and

541
00:19:50,430 --> 00:19:48,789
affiliation and to whom you're

542
00:19:53,010 --> 00:19:50,440
addressing the question we'll start with

543
00:19:55,919 --> 00:19:53,020
Marsha done Marsha den Associated Press

544
00:19:58,649 --> 00:19:55,929
from mr. clinics Minh on your secondary

545
00:20:00,570 --> 00:19:58,659
objective is was it just a matter of

546
00:20:02,250 --> 00:20:00,580
adding more hydraulic fluid was that

547
00:20:04,880 --> 00:20:02,260
essentially the fix and are you tweaking

548
00:20:07,740 --> 00:20:04,890
anything else about tomorrow's game plan

549
00:20:09,950 --> 00:20:07,750
from lessons learned the first time you

550
00:20:12,990 --> 00:20:09,960
got it exactly right it's basically a

551
00:20:15,750 --> 00:20:13,000
added reservoir of electric sorry

552
00:20:18,080 --> 00:20:15,760
hydraulic fluid that gives us the

553
00:20:21,120 --> 00:20:18,090
ability to control the fins longer and

554
00:20:23,130 --> 00:20:21,130
control the vehicle better there's

555
00:20:27,000 --> 00:20:23,140
there's a couple differences in the

556
00:20:30,409 --> 00:20:27,010
trajectory we will not we will perform

557
00:20:33,360 --> 00:20:30,419
an entry burn at the landing burn so the

558
00:20:35,909 --> 00:20:33,370
speed of the stage coming in into the

559
00:20:37,649 --> 00:20:35,919
entry is actually higher and that on the

560
00:20:39,930 --> 00:20:37,659
other side makes it a little bit less

561
00:20:41,640 --> 00:20:39,940
likely to succeed so on one side we

562
00:20:43,799 --> 00:20:41,650
fixed the problem on the other side this

563
00:20:46,080 --> 00:20:43,809

trajectory is a lot more aggressive and

564
00:20:48,600 --> 00:20:46,090
a lot more difficult for the first stage

565
00:20:53,370 --> 00:20:48,610
secondary this has nothing officially to

566
00:20:54,630 --> 00:20:53,380
do with the primary discovery mission do

567
00:20:56,130 --> 00:20:54,640
you know the speed at which it'll be

568
00:20:56,490 --> 00:20:56,140
coming in or how much more than last

569
00:21:00,899 --> 00:20:56,500
time

570
00:21:04,110 --> 00:21:00,909
I believe the dynamic pressure is twice

571
00:21:06,320 --> 00:21:04,120
of what it was before so that would

572
00:21:08,789 --> 00:21:06,330
indicate one point four on the velocity

573
00:21:13,110 --> 00:21:08,799
actually it's not that easy

574
00:21:14,610 --> 00:21:13,120
twice the dynamic pressure bill Gellin

575
00:21:18,539 --> 00:21:14,620
from Space Flight Insider question for

576
00:21:19,890 --> 00:21:18,549
Tom if there's a airplane that's going

577
00:21:21,930 --> 00:21:19,900
up over the pole and you detect

578
00:21:23,640 --> 00:21:21,940
something and you give him a fifteen

579
00:21:24,419 --> 00:21:23,650
minute warning and this is going to be a

580
00:21:26,850 --> 00:21:24,429
big event

581
00:21:30,210 --> 00:21:26,860
what can the airplane do at that point

582
00:21:32,370 --> 00:21:30,220
to try and avoid the incoming event well

583
00:21:34,080 --> 00:21:32,380
the primary concern there with aircraft

584
00:21:36,180 --> 00:21:34,090
over the poles in particular is incoming

585
00:21:37,590 --> 00:21:36,190
charged particle radiation associated

586
00:21:40,529 --> 00:21:37,600
with a coronal mass ejection that's

587
00:21:41,940 --> 00:21:40,539
coming in or and and what airlines can

588
00:21:43,470 --> 00:21:41,950

do over the poles is just simply lower

589
00:21:44,940 --> 00:21:43,480
the altitude the more atmosphere you

590
00:21:45,930 --> 00:21:44,950
have over you the more protected you are

591
00:21:47,940 --> 00:21:45,940
from charged particle

592
00:21:50,220 --> 00:21:47,950
d--ation you can also divert your route

593
00:21:51,930 --> 00:21:50,230
away from the extreme polar routes that

594
00:21:53,970 --> 00:21:51,940
has been done in the past so there are a

595
00:21:57,169 --> 00:21:53,980
couple of ways they can mitigate against

596
00:21:58,350 --> 00:21:57,179
the radiation effects of these storms

597
00:22:02,820 --> 00:21:58,360
Irene

598
00:22:05,460 --> 00:22:02,830
couple questions about the satellite and

599
00:22:07,860 --> 00:22:05,470
then one about the Falconeri entry for

600
00:22:11,759 --> 00:22:07,870
the satellite do either of you have a

601
00:22:16,289 --> 00:22:11,769
mission cost in possibly including the

602
00:22:18,869 --> 00:22:16,299
original Triana price and also including

603
00:22:20,669 --> 00:22:18,879
the launch and if you could recap a

604
00:22:23,279 --> 00:22:20,679
little bit about the difference between

605
00:22:25,980 --> 00:22:23,289
the original Triana mission which if I

606
00:22:28,590 --> 00:22:25,990
recall correctly was basically an Earth

607
00:22:30,899 --> 00:22:28,600
observing mission with a camera I didn't

608
00:22:33,440 --> 00:22:30,909
hear any mention of that in your

609
00:22:37,049 --> 00:22:33,450
descriptions now and how that's changed

610
00:22:39,360 --> 00:22:37,059
and now that's the other one after I'll

611
00:22:41,519 --> 00:22:39,370
take the first one the the net cost the

612
00:22:43,289 --> 00:22:41,529
total cost of the discover mission is

613
00:22:45,570 --> 00:22:43,299

approximately 340 million dollars and

614
00:22:47,399 --> 00:22:45,580
two first orders a very close split

615
00:22:50,399 --> 00:22:47,409
between the three organizing agencies

616
00:22:51,899 --> 00:22:50,409
Air Force NASA and NOAA with the Air

617
00:22:53,460 --> 00:22:51,909
Force with a launch vehicle NASA with a

618
00:22:55,320 --> 00:22:53,470
contributed spacecraft from the triana

619
00:22:58,889 --> 00:22:55,330
heritage and NOAA from the refurbishment

620
00:23:01,830 --> 00:22:58,899
operations and refers 'men operations of

621
00:23:02,879 --> 00:23:01,840
the mission now and as far as the

622
00:23:05,190 --> 00:23:02,889
original surround turned that over to

623
00:23:06,779 --> 00:23:05,200
Steve to address so what we've had is

624
00:23:08,580 --> 00:23:06,789
that really a swap of primary mission

625
00:23:11,519 --> 00:23:08,590
objectives here Triana was primarily

626
00:23:14,009 --> 00:23:11,529
focused on Earth observing and earth

627
00:23:15,779 --> 00:23:14,019
science with space weather being the

628
00:23:18,810 --> 00:23:15,789
secondary and now space weather is the

629
00:23:20,369 --> 00:23:18,820
primary mission for Discoverer so we did

630
00:23:22,769 --> 00:23:20,379
have space weather instruments on board

631
00:23:25,230 --> 00:23:22,779
for Triana but now they've become the

632
00:23:27,450 --> 00:23:25,240
primary objective of this mission the

633
00:23:30,539 --> 00:23:27,460
earth polychromatic imager camera is

634
00:23:32,190 --> 00:23:30,549
still on there as is nice star which is

635
00:23:34,440 --> 00:23:32,200
an advanced radiometer so those two

636
00:23:37,470 --> 00:23:34,450
instruments are still on board they are

637
00:23:40,310 --> 00:23:37,480
secondary objectives and we we've

638
00:23:42,749 --> 00:23:40,320

checked them out and they're ready to go

639
00:23:45,210 --> 00:23:42,759
what Steve just said related to the

640
00:23:46,649 --> 00:23:45,220
Triano moved to discover a switch

641
00:23:48,749 --> 00:23:46,659
between primary and secondary where the

642
00:23:50,100 --> 00:23:48,759
now the space Wizards primary is part of

643
00:23:52,889 --> 00:23:50,110
the refurbishment activities that NASA

644
00:23:54,930 --> 00:23:52,899
did on behalf of NOAA was to basically

645
00:23:56,519 --> 00:23:54,940
disassemble the spacecraft pull all the

646
00:23:58,289 --> 00:23:56,529
instruments off check them all make sure

647
00:23:59,340 --> 00:23:58,299
they're all still working accurate

648
00:24:01,560 --> 00:23:59,350
there's no all

649
00:24:03,480 --> 00:24:01,570
parts that need to be replaced but also

650
00:24:04,799 --> 00:24:03,490
to reef to look at it as a system more

651
00:24:06,750 --> 00:24:04,809
carefully and in that process they

652
00:24:08,430 --> 00:24:06,760
discovered some elements of the

653
00:24:10,169 --> 00:24:08,440
spacecraft the rover the reaction wheels

654
00:24:12,960 --> 00:24:10,179
with momentum wheels reaction wheels the

655
00:24:15,180 --> 00:24:12,970
wheels which would be affecting for

656
00:24:16,260 --> 00:24:15,190
example the magnetic capability to

657
00:24:18,930 --> 00:24:16,270
measure magnetic fields which they

658
00:24:20,370 --> 00:24:18,940
correct it now so the space weather

659
00:24:22,049 --> 00:24:20,380
portions are better than they would have

660
00:24:23,700 --> 00:24:22,059
been before because of this and the

661
00:24:25,560 --> 00:24:23,710
earth as well were refurbished and

662
00:24:27,210 --> 00:24:25,570
recalibrated so they're all in a higher

663
00:24:29,789 --> 00:24:27,220

quality than they would have been when

664
00:24:32,090 --> 00:24:29,799
they launched ten years ago thanks um

665
00:24:34,409 --> 00:24:32,100
that 340 is for how many years of

666
00:24:36,840 --> 00:24:34,419
operations to your basic mission

667
00:24:43,110 --> 00:24:36,850
operations thanks and um so on the

668
00:24:45,450 --> 00:24:43,120
Falcon 9 fly back I think I heard you

669
00:24:47,220 --> 00:24:45,460
say that there's two to engine burns

670
00:24:49,440 --> 00:24:47,230
instead of three that were done on the

671
00:24:52,320 --> 00:24:49,450
CRS mission and could you basically

672
00:24:54,510 --> 00:24:52,330
maybe just walk us through the the

673
00:24:59,270 --> 00:24:54,520
sequence of events from first stage

674
00:25:01,770 --> 00:24:59,280
separation to all the way to the landing

675
00:25:04,500 --> 00:25:01,780
attempt as far as like the deployment of

676
00:25:07,350 --> 00:25:04,510
the grid thin the fins and when the

677
00:25:09,600 --> 00:25:07,360
burns would be conducted thanks sure so

678
00:25:13,380 --> 00:25:09,610
there's gonna be no get an early burn

679
00:25:15,120 --> 00:25:13,390
originally that burn is what we can tour

680
00:25:18,299 --> 00:25:15,130
this time because the autopen goes to

681
00:25:20,310 --> 00:25:18,309
the primary mission of that burn we will

682
00:25:22,200 --> 00:25:20,320
flip the stage around after separation

683
00:25:23,490 --> 00:25:22,210
on that eighty degrees and you will

684
00:25:26,669 --> 00:25:23,500
probably I actually forgot to mention

685
00:25:29,039 --> 00:25:26,679
this is a sunset launch and it's

686
00:25:31,500 --> 00:25:29,049
probably very good to see it's probably

687
00:25:34,590 --> 00:25:31,510
very visible in the sky what we what we

688
00:25:36,360 --> 00:25:34,600

do and and you can see the first stage

689
00:25:38,640 --> 00:25:36,370
moving around

690
00:25:41,880 --> 00:25:38,650
it will then Coast will go through

691
00:25:43,799 --> 00:25:41,890
Apogee and will begin to descend and

692
00:25:46,950 --> 00:25:43,809
that's when the entry burn happens the

693
00:25:52,440 --> 00:25:46,960
and entry burn basically ends with the

694
00:25:54,930 --> 00:25:52,450
entry and a fin deploy and it's followed

695
00:25:57,169 --> 00:25:54,940
by the landing burn so it's gone only

696
00:26:00,360 --> 00:25:57,179
going to be two burns after the main

697
00:26:03,950 --> 00:26:00,370
primary mission descent burn and the

698
00:26:06,990 --> 00:26:03,960
whole the whole sequence is about nine

699
00:26:10,140 --> 00:26:07,000
nine and a half minutes so it's shortly

700
00:26:11,600 --> 00:26:10,150
after the second stage shot shuts off

701
00:26:15,140 --> 00:26:11,610
the first time

702
00:26:17,450 --> 00:26:15,150
we even kind of lenss okay we'll take

703
00:26:19,970 --> 00:26:17,460
one more here before we go to the phone

704
00:26:22,790 --> 00:26:19,980
bridge and after that we'll field some

705
00:26:25,460 --> 00:26:22,800
social media questions but James go

706
00:26:30,140 --> 00:26:25,470
ahead thanks James Dean Florida today

707
00:26:32,240 --> 00:26:30,150
maybe for mr. Clark or her volts I know

708
00:26:33,890 --> 00:26:32,250
the I guess the former vice president's

709
00:26:37,220 --> 00:26:33,900
involvement is somewhat of a footnote to

710
00:26:40,190 --> 00:26:37,230
the mission at this point but epic will

711
00:26:42,440 --> 00:26:40,200
provide the images that were sort of the

712
00:26:43,640 --> 00:26:42,450
original inspiration I if I understand

713
00:26:46,280 --> 00:26:43,650

correctly so I just want to confirm

714
00:26:48,470 --> 00:26:46,290
basically will you provide be providing

715
00:26:52,490 --> 00:26:48,480
these images will we be making them

716
00:26:55,310 --> 00:26:52,500
available online as again was sort of

717
00:26:58,400 --> 00:26:55,320
the original inspiration for this the

718
00:27:00,770 --> 00:26:58,410
spacecraft and you know do you think all

719
00:27:03,950 --> 00:27:00,780
these years later those will prove to be

720
00:27:05,930 --> 00:27:03,960
important inspiring images at all or are

721
00:27:08,120 --> 00:27:05,940
these sort of been there done that kinds

722
00:27:09,950 --> 00:27:08,130
of things for us at this point so to get

723
00:27:12,800 --> 00:27:09,960
to the first part of your question yes

724
00:27:14,990 --> 00:27:12,810
epic will be taking images full

725
00:27:18,170 --> 00:27:15,000
resolution images of the sunlit disc of

726
00:27:20,840 --> 00:27:18,180
the earth approximately four to six

727
00:27:23,690 --> 00:27:20,850
times a day and then downloading those

728
00:27:26,750 --> 00:27:23,700
images over our Wallops Island ground

729
00:27:29,510 --> 00:27:26,760
station and then those images will be

730
00:27:32,180 --> 00:27:29,520
posted roughly a day later and they'll

731
00:27:34,880 --> 00:27:32,190
be posted on a web site for everyone to

732
00:27:37,550 --> 00:27:34,890
see a public web site so that those

733
00:27:41,360 --> 00:27:37,560
views will be there the original vision

734
00:27:43,010 --> 00:27:41,370
was to have that real-time but we won't

735
00:27:45,680 --> 00:27:43,020
be doing that for this mission it will

736
00:27:48,860 --> 00:27:45,690
be those images posted about a day later

737
00:27:52,490 --> 00:27:48,870
on the website and to get back to your I

738
00:27:53,780 --> 00:27:52,500

guess second part of the question I this

739
00:27:55,670 --> 00:27:53,790
was all part of the earth science

740
00:27:58,940 --> 00:27:55,680
secondary objectives we're going to be

741
00:28:00,950 --> 00:27:58,950
able to look at the aerosols the ozone

742
00:28:03,260 --> 00:28:00,960
content and so forth of the atmosphere

743
00:28:04,610 --> 00:28:03,270
from that unique vantage point so yes it

744
00:28:06,380 --> 00:28:04,620
will provide important earth science

745
00:28:09,020 --> 00:28:06,390
data for all of the science users out

746
00:28:11,000 --> 00:28:09,030
there to be able to use and I think it

747
00:28:13,430 --> 00:28:11,010
will be an inspiration for for people to

748
00:28:14,900 --> 00:28:13,440
see the sunlit discs when they can go

749
00:28:16,790 --> 00:28:14,910
online and take a look at it something

750
00:28:19,010 --> 00:28:16,800
that was just taken from a unique

751
00:28:21,890 --> 00:28:19,020
vantage point rough like 24 hours before

752
00:28:23,390 --> 00:28:21,900
so I know it'll be for me and I know my

753
00:28:25,590 --> 00:28:23,400
children will be

754
00:28:27,060 --> 00:28:25,600
happy to see that kind of thing and the

755
00:28:29,400 --> 00:28:27,070
teachers they've already talked about it

756
00:28:30,779 --> 00:28:29,410
in their schools in Virginia and if I

757
00:28:32,070 --> 00:28:30,789
could follow on the latency question as

758
00:28:33,510 --> 00:28:32,080
well as we talked of it is both the

759
00:28:34,919 --> 00:28:33,520
space weather primary and an earth

760
00:28:36,600 --> 00:28:34,929
earth-observing secondary the space

761
00:28:38,039 --> 00:28:36,610
where the data will be available within

762
00:28:40,140 --> 00:28:38,049
minutes to the Space Weather Prediction

763
00:28:42,480 --> 00:28:40,150

Center for the real-time or near

764
00:28:44,610 --> 00:28:42,490
real-time forecast alerts the and as

765
00:28:46,560 --> 00:28:44,620
Steve said the the Earth observing data

766
00:28:47,850 --> 00:28:46,570
will be downlinked on a latency of

767
00:28:49,919 --> 00:28:47,860
approximately a day for the Earth

768
00:28:54,620 --> 00:28:49,929
observing data sets but as far as

769
00:28:57,090 --> 00:28:54,630
weather it provides a a vision or

770
00:28:59,130 --> 00:28:57,100
inspiration the discoverer is an

771
00:29:01,760 --> 00:28:59,140
important satellite measurement from leo

772
00:29:04,049 --> 00:29:01,770
from l1 but it's part of a much larger

773
00:29:05,760 --> 00:29:04,059
consortium or a constellation of

774
00:29:07,620 --> 00:29:05,770
satellite observations that we make so I

775
00:29:10,049 --> 00:29:07,630
think it will be an important addition

776
00:29:11,970 --> 00:29:10,059
to an already very capable observation

777
00:29:14,760 --> 00:29:11,980
set that we have from geo geostationary

778
00:29:16,680 --> 00:29:14,770
from low-earth orbit from NASA from NOAA

779
00:29:18,750 --> 00:29:16,690
from other satellites and so it's it's

780
00:29:21,840 --> 00:29:18,760
added to an already very complex and

781
00:29:22,680 --> 00:29:21,850
very rewarding set of measurements we

782
00:29:25,020 --> 00:29:22,690
make from space

783
00:29:25,980 --> 00:29:25,030
it'll be noticed but in the larger pan

784
00:29:29,190 --> 00:29:25,990
thing I know all the measurements we are

785
00:29:31,470 --> 00:29:29,200
already making so I'm sorry just to

786
00:29:33,630 --> 00:29:31,480
follow up on with respect the just the

787
00:29:37,289 --> 00:29:33,640
visual aspect images for the non

788
00:29:39,600 --> 00:29:37,299

scientists among us is have will we have

789
00:29:42,149 --> 00:29:39,610
seen have we seen this before a picture

790
00:29:44,010 --> 00:29:42,159
of Earth from from l1 or anything like

791
00:29:46,260 --> 00:29:44,020
this or is this among the the firsts of

792
00:29:47,970 --> 00:29:46,270
the mission and then just again the

793
00:29:50,789 --> 00:29:47,980
extra follow-up I was gonna add was just

794
00:29:53,730 --> 00:29:50,799
as far as the name change along the way

795
00:29:56,850 --> 00:29:53,740
here was that a conscious effort to put

796
00:29:59,310 --> 00:29:56,860
triana you know in history in the past

797
00:30:01,380 --> 00:29:59,320
and and start fresh or what was the

798
00:30:03,180 --> 00:30:01,390
motive there I would say as far as

799
00:30:04,710 --> 00:30:03,190
whether we've taken visual observations

800
00:30:05,909 --> 00:30:04,720
from l1 I don't think that's the case I

801
00:30:07,649 --> 00:30:05,919
could be wrong but I don't think there

802
00:30:08,880 --> 00:30:07,659
are any of the similar nature to this

803
00:30:11,430 --> 00:30:08,890
though it is groundbreaking in that

804
00:30:14,070 --> 00:30:11,440
aspect changing the name from discover

805
00:30:15,600 --> 00:30:14,080
true from dust around to discover as we

806
00:30:17,310 --> 00:30:15,610
said we went from primary became

807
00:30:19,620 --> 00:30:17,320
secondary secondary became primary this

808
00:30:21,570 --> 00:30:19,630
is a mission to be part of the larger

809
00:30:23,520 --> 00:30:21,580
deeps it's a deep-space mission to

810
00:30:25,560 --> 00:30:23,530
contribute to our climate assessments of

811
00:30:26,970 --> 00:30:25,570
the solar climate if you will between

812
00:30:29,520 --> 00:30:26,980
the Sun the earth and the dynamics

813
00:30:30,630 --> 00:30:29,530

between those two so I wasn't so much I

814
00:30:32,370 --> 00:30:30,640
would say an attempt to put something

815
00:30:33,539 --> 00:30:32,380
behind us but to recognize the different

816
00:30:36,810 --> 00:30:33,549
nature of this mission in its

817
00:30:38,789 --> 00:30:36,820
a function alright let's go to the phone

818
00:30:40,830 --> 00:30:38,799
bridge where Tariq Malik Malik from

819
00:30:43,799 --> 00:30:40,840
space calm his standing by

820
00:30:46,769 --> 00:30:43,809
Tariq are you there yes how do you hear

821
00:30:50,190 --> 00:30:46,779
me loud and clear great well thank you I

822
00:30:53,249 --> 00:30:50,200
just had a one follow-up question on the

823
00:30:55,440 --> 00:30:53,259
satellite and then also one for SpaceX

824
00:30:57,749 --> 00:30:55,450
so just for the satellite real quickly I

825
00:31:00,509 --> 00:30:57,759
think for mr. burger I'm curious just

826
00:31:02,220 --> 00:31:00,519
how long you expect discovered to last I

827
00:31:04,680 --> 00:31:02,230
know it's a two-year primary mission ace

828
00:31:07,200 --> 00:31:04,690
has lasted it seems like forever you

829
00:31:08,820 --> 00:31:07,210
know what what could this if you get an

830
00:31:11,249 --> 00:31:08,830
extension does the life man be for the

831
00:31:12,960 --> 00:31:11,259
satellite well as dr. bolts mentioned

832
00:31:16,109 --> 00:31:12,970
the two-year nominal mission lifetime is

833
00:31:18,180 --> 00:31:16,119
an under estimate we hope we believe

834
00:31:19,590 --> 00:31:18,190
when we finally get to l1 will have a

835
00:31:21,060 --> 00:31:19,600
better estimate at the fuel on board

836
00:31:22,769 --> 00:31:21,070
which will be used as station keep the

837
00:31:26,190 --> 00:31:22,779
orbit and that will ultimately determine

838
00:31:28,349 --> 00:31:26,200

how long discover can operate at the l1

839
00:31:30,090 --> 00:31:28,359
point with a good insertion and a good

840
00:31:32,399 --> 00:31:30,100
orbit it could go many years beyond the

841
00:31:34,259 --> 00:31:32,409
five-year operational lifetime that's

842
00:31:35,909 --> 00:31:34,269
mentioned as well so it really remains

843
00:31:37,590 --> 00:31:35,919
to be seen once we get there how much

844
00:31:39,330 --> 00:31:37,600
fuel is left and how much station

845
00:31:40,799 --> 00:31:39,340
keeping needs to be done with this

846
00:31:44,220 --> 00:31:40,809
particular platform but we hope for a

847
00:31:46,169 --> 00:31:44,230
well beyond five years of course thank

848
00:31:47,759 --> 00:31:46,179
you and sir mr. Koenig's Minh you

849
00:31:49,139 --> 00:31:47,769
mentioned a lot of the differences

850
00:31:51,690 --> 00:31:49,149
between the trajectory for discover

851
00:31:54,450 --> 00:31:51,700
launch versus the Dragon launch just 30

852
00:31:56,879 --> 00:31:54,460
days ago and I'm wondering what what

853
00:31:59,430 --> 00:31:56,889
changes have been required for the the

854
00:32:02,580 --> 00:31:59,440
drone ship itself is it further offshore

855
00:32:03,960 --> 00:32:02,590
than before I guess how far you know is

856
00:32:06,599 --> 00:32:03,970
it out in the Atlantic and how long

857
00:32:09,509 --> 00:32:06,609
would it take to get a return to port

858
00:32:12,450 --> 00:32:09,519
even say a successful demonstration

859
00:32:16,279 --> 00:32:12,460
thank you yeah so the the drone ship is

860
00:32:18,659 --> 00:32:16,289
further out that's true it's it's about

861
00:32:24,029 --> 00:32:18,669
close to 400 miles

862
00:32:26,519 --> 00:32:24,039
I think it's 370 miles downrange so it's

863
00:32:28,830 --> 00:32:26,529

a lot lot further out than the last one

864
00:32:31,349 --> 00:32:28,840
that also means that we need more time

865
00:32:33,960 --> 00:32:31,359
to get back to port and actually more

866
00:32:37,859 --> 00:32:33,970
time to get there I believe it is now

867
00:32:40,470 --> 00:32:37,869
taking us close to two days to get back

868
00:32:45,609 --> 00:32:40,480
but I'm not entirely sure sorry I didn't

869
00:32:51,080 --> 00:32:49,159
all right we're back here and we have

870
00:32:53,570 --> 00:32:51,090
Steve Cole who is with NASA

871
00:32:55,190 --> 00:32:53,580
Communications at NASA headquarters in

872
00:32:56,930 --> 00:32:55,200
Washington and he's been monitoring the

873
00:32:59,089 --> 00:32:56,940
traffic coming in on the hashtag ask

874
00:33:01,909 --> 00:32:59,099
Discoverer and Steve do we have some

875
00:33:03,680 --> 00:33:01,919
questions yes quite a lot first one is

876
00:33:05,869 --> 00:33:03,690
what are the advantages of having so

877
00:33:09,320 --> 00:33:05,879
many different agencies working in

878
00:33:10,310 --> 00:33:09,330
concert on this project I'll take that

879
00:33:12,560 --> 00:33:10,320
one Steve

880
00:33:13,609 --> 00:33:12,570
so the different agencies bring

881
00:33:15,409 --> 00:33:13,619
different perspectives different

882
00:33:17,509 --> 00:33:15,419
resources and different technical

883
00:33:19,549 --> 00:33:17,519
expertise often to any inner any

884
00:33:21,710 --> 00:33:19,559
partnership space weather and weather in

885
00:33:24,200 --> 00:33:21,720
general is obviously of interest to all

886
00:33:26,659 --> 00:33:24,210
it's a global phenomenon or planetary

887
00:33:28,549 --> 00:33:26,669
you know planetary system phenomenon so

888
00:33:30,440 --> 00:33:28,559

it's to all of our interest to go

889
00:33:32,089 --> 00:33:30,450
forward with it so in this particular

890
00:33:33,259 --> 00:33:32,099
partnership having the Air Force

891
00:33:34,519 --> 00:33:33,269
bringing its expertise and it's

892
00:33:35,570 --> 00:33:34,529
interesting getting SpaceX launch

893
00:33:37,279 --> 00:33:35,580
vehicle brought forward

894
00:33:38,479 --> 00:33:37,289
NASA's expertise and the Triana

895
00:33:40,249 --> 00:33:38,489
satellite which they originally built

896
00:33:42,560 --> 00:33:40,259
and are the technical experts able to

897
00:33:44,299 --> 00:33:42,570
refurbish and design it NOAA's expertise

898
00:33:46,519 --> 00:33:44,309
in in space weather in space weather

899
00:33:48,889 --> 00:33:46,529
prediction modeling and analysis Mission

900
00:33:50,320 --> 00:33:48,899
Operations for operational systems is a

901
00:33:52,339 --> 00:33:50,330
natural fit for the three organizations

902
00:33:54,229 --> 00:33:52,349
with their contributions and their

903
00:33:58,009 --> 00:33:54,239
resources to come together for a common

904
00:33:59,839 --> 00:33:58,019
goal in this particular example ok next

905
00:34:02,029 --> 00:33:59,849
question is will discover shorten the

906
00:34:04,729 --> 00:34:02,039
forecast time as compared to the a

907
00:34:07,249 --> 00:34:04,739
satellite currently in orbit I'll take

908
00:34:09,769 --> 00:34:07,259
that it will not it's going to be

909
00:34:11,480 --> 00:34:09,779
located at the same basic orbit the l1

910
00:34:15,369 --> 00:34:11,490
or but about a million miles from Earth

911
00:34:17,659 --> 00:34:15,379
and so the time from that point until

912
00:34:19,339 --> 00:34:17,669
Chokwe from a cm II for instance hits

913
00:34:20,720 --> 00:34:19,349

the earth is about the same so it's

914
00:34:22,159 --> 00:34:20,730
going to be detecting roughly the same

915
00:34:23,930 --> 00:34:22,169
thing that age will be detecting and

916
00:34:26,659 --> 00:34:23,940
giving us the same lead time that we

917
00:34:28,669 --> 00:34:26,669
currently have with ace similar

918
00:34:31,220 --> 00:34:28,679
follow-on question will discover data

919
00:34:34,339 --> 00:34:31,230
allow for more accurate projections of

920
00:34:36,470 --> 00:34:34,349
coming harm from these storms the

921
00:34:38,269 --> 00:34:36,480
discovered data that we will get is very

922
00:34:40,159 --> 00:34:38,279
similar to the ACE data we are getting

923
00:34:42,379 --> 00:34:40,169
now it's what we need to forecast the

924
00:34:44,480 --> 00:34:42,389
arrival time of the shockwave once it

925
00:34:48,470 --> 00:34:44,490
hits the Ace or Discoverer spacecraft at

926
00:34:51,109 --> 00:34:48,480
l1 very similar data it's it's not

927
00:34:54,019 --> 00:34:51,119
really accurate to say that it's more

928
00:34:57,410 --> 00:34:54,029
accurate data for instance it's the same

929
00:34:58,940 --> 00:34:57,420
forecast once Discoverer is in orbit

930
00:35:01,700 --> 00:34:58,950
well that data be a veil

931
00:35:04,430 --> 00:35:01,710
for schools for example to use in real

932
00:35:06,230 --> 00:35:04,440
time teaching yes it will that data will

933
00:35:07,910 --> 00:35:06,240
go in real time from the satellite down

934
00:35:10,309 --> 00:35:07,920
to the Space Weather Prediction Center

935
00:35:11,510 --> 00:35:10,319
will it where it will be processed used

936
00:35:13,370 --> 00:35:11,520
in our forecast office almost

937
00:35:16,370 --> 00:35:13,380
immediately and also posted to our

938
00:35:18,170 --> 00:35:16,380

website which is space weather gov and

939
00:35:21,440 --> 00:35:18,180
you can get the data there almost in

940
00:35:23,510 --> 00:35:21,450
real time ok still a lot more questions

941
00:35:26,150 --> 00:35:23,520
here how much fuel does it take to keep

942
00:35:29,780 --> 00:35:26,160
discover in the l1 orbit once it gets

943
00:35:31,520 --> 00:35:29,790
there I'll take that I don't have exact

944
00:35:35,690 --> 00:35:31,530
numbers for that but we have enough

945
00:35:37,880 --> 00:35:35,700
propellant onboard to also do mid-course

946
00:35:39,440 --> 00:35:37,890
Corrections if needed once we've been

947
00:35:42,740 --> 00:35:39,450
safely separated from the second stage

948
00:35:44,510 --> 00:35:42,750
of Falcon 9 on its way to l1 we continue

949
00:35:46,670 --> 00:35:44,520
to look at the trajectory on the journey

950
00:35:49,490 --> 00:35:46,680
to determine if slight adjustments to

951
00:35:51,710 --> 00:35:49,500
the trajectory are needed and so we've

952
00:35:53,240 --> 00:35:51,720
analyzed that in done a worst case

953
00:35:55,099 --> 00:35:53,250
scenario that's why we have the amount

954
00:35:58,160 --> 00:35:55,109
of propellant on board I think Tom

955
00:36:00,589 --> 00:35:58,170
mentioned that if if we need little to

956
00:36:04,160 --> 00:36:00,599
no adjustments that'll just provide more

957
00:36:05,630 --> 00:36:04,170
propellant life for the spacecraft what

958
00:36:08,030 --> 00:36:05,640
was the condition of the discover

959
00:36:11,660 --> 00:36:08,040
spacecraft after sitting in storage for

960
00:36:13,520 --> 00:36:11,670
so long the discover spacecraft was in

961
00:36:17,539 --> 00:36:13,530
great shape it was stored in a cleanroom

962
00:36:19,490 --> 00:36:17,549
all this time so it was protected and

963
00:36:22,970 --> 00:36:19,500

the instruments were under a purge at

964
00:36:24,950 --> 00:36:22,980
this time so the spacecraft was in what

965
00:36:26,599 --> 00:36:24,960
I'd call pristine condition and I think

966
00:36:28,370 --> 00:36:26,609
dr. Bowles mentioned that once we pulled

967
00:36:30,349 --> 00:36:28,380
it out of storage and did a complete

968
00:36:33,829 --> 00:36:30,359
assessment all of the systems we

969
00:36:35,660 --> 00:36:33,839
actually then started tearing down and

970
00:36:38,180 --> 00:36:35,670
refurbishing some of those systems that

971
00:36:39,829 --> 00:36:38,190
we felt needed to be upgraded from the

972
00:36:43,609 --> 00:36:39,839
technology that was originally in there

973
00:36:45,890 --> 00:36:43,619
but overall it was in great shape ok

974
00:36:48,230 --> 00:36:45,900
Falcon 9 is proving to be a very

975
00:36:50,950 --> 00:36:48,240
reliable launch vehicle what drove the

976
00:36:56,049 --> 00:36:50,960
decision to use it versus say a delta or

977
00:37:00,759 --> 00:36:59,739
a good suggestion as we mentioned

978
00:37:03,339 --> 00:37:00,769
earlier about the question of the value

979
00:37:05,439 --> 00:37:03,349
of partnerships um there's this was a

980
00:37:08,249 --> 00:37:05,449
particular example I I'll turn it over

981
00:37:10,809 --> 00:37:08,259
to Colonel Calvin in a minute but the

982
00:37:12,429 --> 00:37:10,819
launch requirements to get to l1 could

983
00:37:14,529 --> 00:37:12,439
have been addressed by any of several

984
00:37:16,630 --> 00:37:14,539
different launch vehicles this was a

985
00:37:20,140 --> 00:37:16,640
particular it's worth noting this is a

986
00:37:21,699 --> 00:37:20,150
Class D or a relatively moderate risk

987
00:37:23,410 --> 00:37:21,709
experimental satellite which is

988
00:37:26,679 --> 00:37:23,420

different from say a geostationary

989
00:37:27,969 --> 00:37:26,689
observing platform or JWST a James Webb

990
00:37:29,559 --> 00:37:27,979
Space Telescope which are very high

991
00:37:31,599 --> 00:37:29,569
profile high reliability requirements

992
00:37:33,670 --> 00:37:31,609
which require a different launch vehicle

993
00:37:36,189 --> 00:37:33,680
so with the partnership we had with the

994
00:37:37,689 --> 00:37:36,199
Air Force the Air Force was at brought

995
00:37:39,429 --> 00:37:37,699
forth their recommendation their

996
00:37:41,559 --> 00:37:39,439
proposal for how to get it to space and

997
00:37:43,209 --> 00:37:41,569
and as part of our agreement we worked

998
00:37:44,380 --> 00:37:43,219
with them so Carl Carl would you like to

999
00:37:45,459 --> 00:37:44,390
mention go from there yeah the only

1000
00:37:48,549 --> 00:37:45,469
thing I would add to that is that

1001
00:37:52,289 --> 00:37:48,559
obviously we are interested in as the

1002
00:37:55,209 --> 00:37:52,299
Air Force in in competition in and

1003
00:37:57,309 --> 00:37:55,219
looking at who is out there to provide

1004
00:38:00,309 --> 00:37:57,319
the capabilities that we need for access

1005
00:38:02,589 --> 00:38:00,319
to space and SpaceX is one of those and

1006
00:38:04,509 --> 00:38:02,599
we wanted to give them an opportunity to

1007
00:38:06,299 --> 00:38:04,519
do a pathfinder mission for the

1008
00:38:11,289 --> 00:38:06,309
Department of Defense in the Air Force

1009
00:38:12,640 --> 00:38:11,299
and this was a perfect opportunity this

1010
00:38:14,769 --> 00:38:12,650
unique partnership we're all talking

1011
00:38:16,359 --> 00:38:14,779
about here is the the agency's continue

1012
00:38:19,719 --> 00:38:16,369
to talk to each other and look forward

1013
00:38:21,370 --> 00:38:19,729

for other opportunities to share where

1014
00:38:23,169 --> 00:38:21,380
we have common objectives which i think

1015
00:38:26,949 --> 00:38:23,179
is a great model for cross agency

1016
00:38:28,630 --> 00:38:26,959
collaboration let's take two more from

1017
00:38:29,650 --> 00:38:28,640
social media Steve and then we'll take

1018
00:38:31,089 --> 00:38:29,660
some more in the room and then we'll get

1019
00:38:34,539 --> 00:38:31,099
back to you well great I know you have a

1020
00:38:37,419 --> 00:38:34,549
lot there we do is it more difficult in

1021
00:38:40,259 --> 00:38:37,429
complex to get a spacecraft to l1 orbit

1022
00:38:51,009 --> 00:38:40,269
versus orbiting one into low-earth or

1023
00:38:53,499 --> 00:38:51,019
synchronous orbits it's a little bit

1024
00:38:57,160 --> 00:38:53,509
more effort because you gotta adjust

1025
00:39:00,419 --> 00:38:57,170
this from day to day so usually we don't

1026
00:39:03,549 --> 00:39:00,429
have different launch times and

1027
00:39:05,709 --> 00:39:03,559
different trajectories at the end and

1028
00:39:06,969 --> 00:39:05,719
per day in this case we have a little

1029
00:39:09,160 --> 00:39:06,979
bit more overhead on the mission

1030
00:39:13,269 --> 00:39:09,170
planning side but other than that

1031
00:39:16,420 --> 00:39:13,279
that's Delta V requirements and those

1032
00:39:17,980 --> 00:39:16,430
are high but certainly not that

1033
00:39:22,299 --> 00:39:17,990
different from some of the other

1034
00:39:24,819 --> 00:39:22,309
missions view when you're in low Earth

1035
00:39:26,170 --> 00:39:24,829
orbit for example it is various and

1036
00:39:28,509 --> 00:39:26,180
often essentially you have a precise

1037
00:39:29,980 --> 00:39:28,519
crossing time a precise viewing period

1038
00:39:31,269 --> 00:39:29,990

you have to be looking at the ground at

1039
00:39:33,039 --> 00:39:31,279
the same time of day within a few

1040
00:39:34,299 --> 00:39:33,049
seconds or minutes certainly it's a

1041
00:39:36,849 --> 00:39:34,309
different position when you're sitting

1042
00:39:37,990 --> 00:39:36,859
out at l1 with a much looser requirement

1043
00:39:40,660 --> 00:39:38,000
in terms of where you are in that

1044
00:39:42,309 --> 00:39:40,670
location so the actual when you're the

1045
00:39:44,079 --> 00:39:42,319
observing spot once you're there is

1046
00:39:45,579 --> 00:39:44,089
probably more forgiving that l1 that it

1047
00:39:46,750 --> 00:39:45,589
is when you're low Earth orbit or even

1048
00:39:48,430 --> 00:39:46,760
in geostationary where you have a very

1049
00:39:49,690 --> 00:39:48,440
crowded array of commercial and other

1050
00:39:51,609 --> 00:39:49,700
satellites up there we have to be very

1051
00:39:53,200 --> 00:39:51,619
careful to stay in your zone it's a lot

1052
00:39:55,089 --> 00:39:53,210
more forgiving out at l1 once you get

1053
00:39:58,269 --> 00:39:55,099
there and that's the task of launch

1054
00:40:00,339 --> 00:39:58,279
vehicles to help us get there this may

1055
00:40:02,380 --> 00:40:00,349
be a related question why doesn't this

1056
00:40:04,900 --> 00:40:02,390
Lodge have an instantaneous launch

1057
00:40:10,120 --> 00:40:04,910
window I'll address that one I think

1058
00:40:13,000 --> 00:40:10,130
that's a certain spot in space and since

1059
00:40:14,859 --> 00:40:13,010
the Earth rotates amidst its it's just

1060
00:40:21,579 --> 00:40:14,869
once per day the opportunity to get

1061
00:40:24,249 --> 00:40:21,589
there don't bill Harwood CBS News with

1062
00:40:25,690 --> 00:40:24,259
two questions one on the camera I'm just

1063
00:40:27,370 --> 00:40:25,700

curious you know so much time has gone

1064
00:40:28,930 --> 00:40:27,380
by you know everybody knows how cameras

1065
00:40:31,150 --> 00:40:28,940
advance and you know you buy one at the

1066
00:40:33,549 --> 00:40:31,160
your local store and it's ever ever more

1067
00:40:34,660 --> 00:40:33,559
sophisticated I mean is this I guess

1068
00:40:35,980 --> 00:40:34,670
what I'm asking is is this old

1069
00:40:37,809 --> 00:40:35,990
technology in other words I'm trying to

1070
00:40:39,009 --> 00:40:37,819
figure out if when the public looks at a

1071
00:40:40,720 --> 00:40:39,019
picture of the Earth from this camera

1072
00:40:42,940 --> 00:40:40,730
are they going to be wowed are they

1073
00:40:44,589 --> 00:40:42,950
going to say well it's just you know

1074
00:40:46,539 --> 00:40:44,599
whatever I'm just trying to get a sense

1075
00:40:48,130 --> 00:40:46,549
of the camera that's first question I

1076
00:40:50,470 --> 00:40:48,140
don't know I think they'll probably be

1077
00:40:52,990 --> 00:40:50,480
wowed but when the camera was originally

1078
00:40:56,620 --> 00:40:53,000
developed it was cutting-edge technology

1079
00:40:58,599 --> 00:40:56,630
at that time and as we've mentioned when

1080
00:41:01,150 --> 00:40:58,609
Discoverer was was brought on board here

1081
00:41:03,670 --> 00:41:01,160
to do this primer this new mission the

1082
00:41:06,730 --> 00:41:03,680
instruments were assessed and torn down

1083
00:41:08,920 --> 00:41:06,740
and looked at the technology we wanted

1084
00:41:11,019 --> 00:41:08,930
to be cost-effective on what we were

1085
00:41:13,569 --> 00:41:11,029
doing for this mission and so looking at

1086
00:41:15,640 --> 00:41:13,579
the technology in the camera it's still

1087
00:41:17,470 --> 00:41:15,650
very good technology it might not be

1088
00:41:19,769 --> 00:41:17,480

cutting edge like you know today but the

1089
00:41:22,840 --> 00:41:19,779
electronics are good the optics are good

1090
00:41:25,840 --> 00:41:22,850
so yes I think the epic camera is

1091
00:41:27,730 --> 00:41:25,850
in good shape and I don't consider it

1092
00:41:31,420 --> 00:41:27,740
old technology its refurbished

1093
00:41:33,040 --> 00:41:31,430
and I think the the pixels that are

1094
00:41:37,480 --> 00:41:33,050
going to be in that the views are going

1095
00:41:39,940 --> 00:41:37,490
to be excellent can you tell us what the

1096
00:41:42,100 --> 00:41:39,950
intonation of the trajectory is going

1097
00:41:44,710 --> 00:41:42,110
out of here and and I guess I was

1098
00:41:47,710 --> 00:41:44,720
curious about getting the l1 and the

1099
00:41:49,720 --> 00:41:47,720
performance required the burn you're

1100
00:41:52,450 --> 00:41:49,730
giving up and so you're accepting the

1101
00:41:54,700 --> 00:41:52,460
risk of a higher max I guess dynamic

1102
00:41:56,230 --> 00:41:54,710
pressure when you come back in you said

1103
00:41:58,330 --> 00:41:56,240
that causes a little bit of an issue I

1104
00:42:00,580 --> 00:41:58,340
mean is that any way you can not ask you

1105
00:42:01,990 --> 00:42:00,590
to predict the odds of success but I may

1106
00:42:04,120 --> 00:42:02,000
ask you to predict the odds of success

1107
00:42:05,710 --> 00:42:04,130
though I mean you have a sub sense of

1108
00:42:07,420 --> 00:42:05,720
how confident you are you can pull this

1109
00:42:10,690 --> 00:42:07,430
off with with just the two burns and

1110
00:42:12,730 --> 00:42:10,700
coming in at a high speed show so um the

1111
00:42:15,070 --> 00:42:12,740
the inclination is 25 degrees and that

1112
00:42:17,530 --> 00:42:15,080
really has more to do with where the

1113
00:42:18,820 --> 00:42:17,540

second bonus and how to target it you

1114
00:42:21,340 --> 00:42:18,830
could have picked other other

1115
00:42:22,630 --> 00:42:21,350
inclinations to it's it's a value that

1116
00:42:26,670 --> 00:42:22,640
we picked because it gave us the most

1117
00:42:29,500 --> 00:42:26,680
flexibility with respect to the odds of

1118
00:42:31,630 --> 00:42:29,510
success on the landing I I think I'm

1119
00:42:37,030 --> 00:42:31,640
going to stick with 50% after careful

1120
00:42:38,980 --> 00:42:37,040
deliberation it's to me it's a when we

1121
00:42:41,500 --> 00:42:38,990
fix this this fixed one problem that we

1122
00:42:43,180 --> 00:42:41,510
had last time there might be other

1123
00:42:45,040 --> 00:42:43,190
issues ahead of us obviously this is a

1124
00:42:50,640 --> 00:42:45,050
difficult thing and then at the same

1125
00:42:53,920 --> 00:42:50,650
time the trajectory is more difficult

1126
00:42:56,770 --> 00:42:53,930
but stewart money interspace dotnet in

1127
00:42:59,410 --> 00:42:56,780
my questions for dr. berger will

1128
00:43:01,540 --> 00:42:59,420
discover be it an orbital position where

1129
00:43:03,730 --> 00:43:01,550
it would provide the the first possible

1130
00:43:06,370 --> 00:43:03,740
warning of a coronal mass ejection and

1131
00:43:09,040 --> 00:43:06,380
then looking forward to possible human

1132
00:43:11,920 --> 00:43:09,050
trips into deeper space if the if it's

1133
00:43:15,330 --> 00:43:11,930
placed well and it lasts long would that

1134
00:43:20,230 --> 00:43:15,340
be a sort of a key astronaut warning

1135
00:43:21,580 --> 00:43:20,240
beacon to answer your first part the

1136
00:43:24,130 --> 00:43:21,590
first part of your question yeah that

1137
00:43:25,660 --> 00:43:24,140
primary location is the first warning we

1138
00:43:28,060 --> 00:43:25,670

get of an incoming see me towards the

1139
00:43:29,590 --> 00:43:28,070
Earth now the l1 point orbits with the

1140
00:43:31,840 --> 00:43:29,600
earth between the Earth and the Sun so

1141
00:43:34,720 --> 00:43:31,850
that's really an earth direct CME that

1142
00:43:36,250 --> 00:43:34,730
it's alerting us to in an astronaut

1143
00:43:36,730 --> 00:43:36,260
flight out to Mars for instance a

1144
00:43:40,180 --> 00:43:36,740
difference

1145
00:43:42,220 --> 00:43:40,190
factory off of that line that particular

1146
00:43:44,070 --> 00:43:42,230
buoy if you will won't be so useful in

1147
00:43:46,180 --> 00:43:44,080
forecasting the impact of a CME on an

1148
00:43:47,440 --> 00:43:46,190
interplanetary flight for instance

1149
00:43:50,200 --> 00:43:47,450
depending on the direction of the flight

1150
00:43:52,390 --> 00:43:50,210
of course and we have other assets

1151
00:43:54,730 --> 00:43:52,400
available nASA has research satellites

1152
00:43:56,370 --> 00:43:54,740
available that can also do similar types

1153
00:43:59,310 --> 00:43:56,380
of forecasting in different directions

1154
00:44:01,570 --> 00:43:59,320
but that's not a primary NOAA

1155
00:44:02,920 --> 00:44:01,580
operational satellite out there we use

1156
00:44:08,320 --> 00:44:02,930
the l1 mission as the primary

1157
00:44:10,540 --> 00:44:08,330
operational satellite thanks Steven

1158
00:44:13,330 --> 00:44:10,550
Clark with spaceflight now a couple of

1159
00:44:15,609 --> 00:44:13,340
questions first for Colonel Kathryn

1160
00:44:16,720 --> 00:44:15,619
could you talk a little bit about you

1161
00:44:19,690 --> 00:44:16,730
mentioned this is a Pathfinder mission

1162
00:44:21,280 --> 00:44:19,700
for DoD on SpaceX can you talk a little

1163
00:44:23,560 --> 00:44:21,290

bit about what sort of progress this may

1164
00:44:25,510 --> 00:44:23,570
make toward certification of the Falcon

1165
00:44:28,150 --> 00:44:25,520
9 for EE lvu class missions in the

1166
00:44:30,010 --> 00:44:28,160
future could this data that you get from

1167
00:44:31,870 --> 00:44:30,020
this mission sort of expedite that

1168
00:44:35,400 --> 00:44:31,880
process a little bit and also could

1169
00:44:38,290 --> 00:44:35,410
someone address perhaps mr. Clark

1170
00:44:40,150 --> 00:44:38,300
someone address when these epic images

1171
00:44:42,730 --> 00:44:40,160
will be available how long after launch

1172
00:44:44,770 --> 00:44:42,740
will these be operate up be posted on

1173
00:44:47,830 --> 00:44:44,780
this website Thanks

1174
00:44:49,390 --> 00:44:47,840
so yes unfortunately I and neither I or

1175
00:44:51,520 --> 00:44:49,400
my office have been involved in the new

1176
00:44:53,859 --> 00:44:51,530
entrant certification so I can't speak

1177
00:44:55,720 --> 00:44:53,869
to that but I can talk you about how the

1178
00:44:57,310 --> 00:44:55,730
integrated team has been worked very

1179
00:44:57,940 --> 00:44:57,320
working very hard on this particular

1180
00:44:59,859 --> 00:44:57,950
mission

1181
00:45:01,470 --> 00:44:59,869
you know nASA has been here with their

1182
00:45:04,750 --> 00:45:01,480
space vehicle since November I believe

1183
00:45:06,970 --> 00:45:04,760
getting that prepared my team led by

1184
00:45:08,859 --> 00:45:06,980
captain Oba Vinson has been here since

1185
00:45:11,200 --> 00:45:08,869
December working through the holidays

1186
00:45:15,730 --> 00:45:11,210
and so we are very prepared and laser

1187
00:45:17,470 --> 00:45:15,740
focused on the discovere mission so the

1188
00:45:21,580 --> 00:45:17,480

second part of that question - I guess

1189
00:45:23,500 --> 00:45:21,590
my alter-ego over there Steve Clark so

1190
00:45:26,020 --> 00:45:23,510
we mentioned before that it takes about

1191
00:45:27,790 --> 00:45:26,030
110 days to get to the l1 point and then

1192
00:45:29,830 --> 00:45:27,800
we've got to go through a roughly 40 day

1193
00:45:33,010 --> 00:45:29,840
checkout period of all the systems on

1194
00:45:34,750 --> 00:45:33,020
board so at that point about 150 days

1195
00:45:37,630 --> 00:45:34,760
after launch is one will actually start

1196
00:45:39,250 --> 00:45:37,640
taking pictures that we can start

1197
00:45:42,099 --> 00:45:39,260
downloading as I mentioned a day later

1198
00:45:43,510 --> 00:45:42,109
so if you say about 150 days and we

1199
00:45:44,560 --> 00:45:43,520
launched tomorrow night then we'd

1200
00:45:46,359 --> 00:45:44,570
probably look around the july/august

1201
00:45:48,260 --> 00:45:46,369
timeframe of when those would become

1202
00:45:49,910 --> 00:45:48,270
available

1203
00:45:52,040 --> 00:45:49,920
and that's an interesting additional

1204
00:45:54,260 --> 00:45:52,050
point about the partnership the NASA is

1205
00:45:56,990 --> 00:45:54,270
our development and research development

1206
00:45:59,329 --> 00:45:57,000
arm for discover we'll be handling the

1207
00:46:01,400 --> 00:45:59,339
drift that phased getting to l1 to

1208
00:46:02,690 --> 00:46:01,410
checkout and executing that on behalf of

1209
00:46:04,400 --> 00:46:02,700
NOAA and at about the hundred fifty day

1210
00:46:06,470 --> 00:46:04,410
point as Steve Clark mentioned there'll

1211
00:46:08,300 --> 00:46:06,480
be an operational handover review when

1212
00:46:09,829 --> 00:46:08,310
we'll review the all the testing all

1213
00:46:11,510 --> 00:46:09,839

these checkout of the spacecraft and its

1214
00:46:13,550 --> 00:46:11,520
operations and it'll be handed over to

1215
00:46:15,980 --> 00:46:13,560
the NOAA national NOAA satellite

1216
00:46:18,730 --> 00:46:15,990
facility for routine operations and the

1217
00:46:21,680 --> 00:46:18,740
posting of all the data at that point on

1218
00:46:23,599 --> 00:46:21,690
Marcia Marcia Dunn Associated Press with

1219
00:46:27,710 --> 00:46:23,609
two questions first one for dr. Berger

1220
00:46:31,190 --> 00:46:27,720
when was the last event of note that was

1221
00:46:33,890 --> 00:46:31,200
disruptive to earth life based on a

1222
00:46:37,430 --> 00:46:33,900
solar event well I'm not sure what you

1223
00:46:39,859 --> 00:46:37,440
mean by earth life our daily life the

1224
00:46:41,030 --> 00:46:39,869
technological affects are primary in

1225
00:46:43,940 --> 00:46:41,040
space weather of course we haven't had

1226
00:46:46,190 --> 00:46:43,950
any particularly human tragedies yet

1227
00:46:48,560 --> 00:46:46,200
from space weather thankfully but the

1228
00:46:51,890 --> 00:46:48,570
the last sort of major what we call

1229
00:46:53,690 --> 00:46:51,900
geomagnetic storm occurred in early

1230
00:46:56,810 --> 00:46:53,700
January actually it was on a scale of

1231
00:46:58,310 --> 00:46:56,820
one to five it was a g3 storm caused by

1232
00:46:59,870 --> 00:46:58,320
a CME and it was interesting because in

1233
00:47:02,359 --> 00:46:59,880
this case the cm II was not easy to

1234
00:47:05,480 --> 00:47:02,369
detect the first detection we had of it

1235
00:47:06,710 --> 00:47:05,490
was at the a satellite at l1 and then

1236
00:47:09,320 --> 00:47:06,720
shortly thereafter it hit the earth with

1237
00:47:12,589 --> 00:47:09,330
a relatively strong effect that we

1238
00:47:14,240 --> 00:47:12,599

weren't predicting at that time so as I

1239
00:47:15,890 --> 00:47:14,250
want to follow up on my my answer to my

1240
00:47:17,870 --> 00:47:15,900
answer to the last question as well

1241
00:47:19,760 --> 00:47:17,880
which is that the first indication we

1242
00:47:21,770 --> 00:47:19,770
have of something coming towards us in a

1243
00:47:23,359 --> 00:47:21,780
geomagnetic storm is from looking at

1244
00:47:25,339 --> 00:47:23,369
telescopic observations of the Sun and

1245
00:47:26,750 --> 00:47:25,349
seeing an eruption come off the Sun so

1246
00:47:28,339 --> 00:47:26,760
that's the first indication we have the

1247
00:47:31,940 --> 00:47:28,349
second one would be when it hits the Ace

1248
00:47:34,820 --> 00:47:31,950
or Discoverer satellite at l1 and that

1249
00:47:36,620 --> 00:47:34,830
verifies the what you see coming off of

1250
00:47:39,620 --> 00:47:36,630
the Sun in general in the case of the

1251
00:47:41,359 --> 00:47:39,630
January storm the g3 there was a very

1252
00:47:44,660 --> 00:47:41,369
very faint eruption and so it was a very

1253
00:47:47,599 --> 00:47:44,670
surprisingly strong storm that occurred

1254
00:47:49,520 --> 00:47:47,609
due to this faint eruption and that's

1255
00:47:52,010 --> 00:47:49,530
that's just goes to the fact that we

1256
00:47:54,020 --> 00:47:52,020
need more research done on how CME's are

1257
00:47:55,520 --> 00:47:54,030
formed how strong they can be how strong

1258
00:47:57,109 --> 00:47:55,530
the magnetic interaction can be with the

1259
00:47:59,599 --> 00:47:57,119
Earth's magnetosphere to cause

1260
00:48:01,880 --> 00:47:59,609
geomagnetic storm and it's an ongoing

1261
00:48:04,600 --> 00:48:01,890
project between NASA and NOAA

1262
00:48:07,490 --> 00:48:04,610
to better forecast these events

1263
00:48:09,320 --> 00:48:07,500

follow-up was there any disruptions that

1264
00:48:11,720 --> 00:48:09,330
you know of 20 satellites airline

1265
00:48:13,190 --> 00:48:11,730
traffic not that we know it for that

1266
00:48:14,810 --> 00:48:13,200
event it's still early there may be some

1267
00:48:17,360 --> 00:48:14,820
out there and we are researching that

1268
00:48:19,130 --> 00:48:17,370
okay and for mister clinics Minh what do

1269
00:48:21,080 --> 00:48:19,140
you expect the peak altitude of the

1270
00:48:25,220 --> 00:48:21,090
booster to be before it starts its

1271
00:48:27,410 --> 00:48:25,230
descent altitude what's what's your

1272
00:48:29,690 --> 00:48:27,420
maximum altitude are you anticipating

1273
00:48:31,130 --> 00:48:29,700
for the booster for a landing test

1274
00:48:37,070 --> 00:48:31,140
yeah the booster goes to an Apogee of

1275
00:48:39,320 --> 00:48:37,080
about 130 kilometers James James Dean

1276
00:48:42,670 --> 00:48:39,330
floor today Hans wonderfully just recap

1277
00:48:46,010 --> 00:48:42,680
again sort of the the the recovery team

1278
00:48:47,870 --> 00:48:46,020
stationing out there with the more

1279
00:48:50,510 --> 00:48:47,880
aggressive you know trajectory do they

1280
00:48:53,540 --> 00:48:50,520
have to be further away how quickly do

1281
00:48:56,900 --> 00:48:53,550
you expect to kind of know the outcome

1282
00:48:58,700 --> 00:48:56,910
of the of the booster landing actually

1283
00:49:02,600 --> 00:48:58,710
they actually are further away from the

1284
00:49:06,500 --> 00:49:02,610
from the drone ship there's more safety

1285
00:49:08,570 --> 00:49:06,510
distance this time I still believe that

1286
00:49:12,920 --> 00:49:08,580
the response will roughly be the same

1287
00:49:16,070 --> 00:49:12,930
that we had last time takes us a couple

1288
00:49:18,260 --> 00:49:16,080

hours to sort things out and and in this

1289
00:49:21,290 --> 00:49:18,270
case in this particular case at six six

1290
00:49:23,800 --> 00:49:21,300
block at night I would guess next

1291
00:49:26,110 --> 00:49:23,810
morning in that timeframe

1292
00:49:27,760 --> 00:49:26,120
and then with with the last attempt I

1293
00:49:29,500 --> 00:49:27,770
mean we you you guys were nice enough to

1294
00:49:31,750 --> 00:49:29,510
release a little bit of video that was

1295
00:49:34,270 --> 00:49:31,760
pretty cool but I wondered and you know

1296
00:49:36,760 --> 00:49:34,280
we had the initial close but no cigar

1297
00:49:39,460 --> 00:49:36,770
comment I mean I wonder if you could

1298
00:49:42,480 --> 00:49:39,470
just give a sense recap you know those

1299
00:49:44,710 --> 00:49:42,490
final moments how close was it you know

1300
00:49:45,910 --> 00:49:44,720
basically just just that you know I mean

1301
00:49:47,080 --> 00:49:45,920
what did you have to come away with that

1302
00:49:48,820 --> 00:49:47,090
from a sense if we were we were almost

1303
00:49:50,740 --> 00:49:48,830
there or there's you know probably a

1304
00:49:54,010 --> 00:49:50,750
long way to go so we ran though the

1305
00:49:57,190 --> 00:49:54,020
hydraulic fluid about shortly after the

1306
00:49:59,440 --> 00:49:57,200
landing burns started so it was close I

1307
00:50:01,150 --> 00:49:59,450
would call this I mean it's but

1308
00:50:03,340 --> 00:50:01,160
personally I feel this last time was

1309
00:50:05,490 --> 00:50:03,350
really an enormous accomplishment on the

1310
00:50:11,680 --> 00:50:05,500
way to achieve refurbishment and

1311
00:50:13,480 --> 00:50:11,690
reusability of vehicles so I don't see

1312
00:50:15,910 --> 00:50:13,490
this as a failure at all to me it's just

1313
00:50:17,920 --> 00:50:15,920

the development step and an improvement

1314
00:50:19,930 --> 00:50:17,930
is coming this time it's continuous

1315
00:50:22,990 --> 00:50:19,940
improvement basically we have plenty of

1316
00:50:24,970 --> 00:50:23,000
opportunities over the next year to to

1317
00:50:28,420 --> 00:50:24,980
try this out and to perfect-perfect the

1318
00:50:30,600 --> 00:50:28,430
the landing part very important not to

1319
00:50:33,070 --> 00:50:30,610
get distracted from the primary mission

1320
00:50:34,300 --> 00:50:33,080
we have we'll take one more here and

1321
00:50:36,700 --> 00:50:34,310
then we'll go back to Steve Cole for

1322
00:50:38,890 --> 00:50:36,710
some more questions from the hashtag ask

1323
00:50:40,810 --> 00:50:38,900
discover Phil Gellin from Space Flight

1324
00:50:42,820 --> 00:50:40,820
Insider talking about the CME's there

1325
00:50:45,160 --> 00:50:42,830
was talk of adding an extra instrument

1326
00:50:48,130 --> 00:50:45,170
to detect CME's but there was no budget

1327
00:50:49,600 --> 00:50:48,140
for that so how much better would it

1328
00:50:51,310 --> 00:50:49,610
have been had you had that instrument

1329
00:50:53,680 --> 00:50:51,320
added and how are you detecting CME's

1330
00:50:55,120 --> 00:50:53,690
without that well it's a very similar

1331
00:50:56,410 --> 00:50:55,130
story to the solar wind measuring

1332
00:50:57,850 --> 00:50:56,420
instruments in the sense that there is a

1333
00:51:00,490 --> 00:50:57,860
craft out there called the Soho

1334
00:51:02,560 --> 00:51:00,500
satellite with a coronagraph on board

1335
00:51:05,350 --> 00:51:02,570
this is the telescopic instrumentation

1336
00:51:07,390 --> 00:51:05,360
that sees the corona erupt and so you

1337
00:51:09,280 --> 00:51:07,400
can detect a CME using this instrument

1338
00:51:11,410 --> 00:51:09,290

so we have a coronagraph

1339
00:51:12,930 --> 00:51:11,420
onboard the Soho satellite that we use

1340
00:51:16,210 --> 00:51:12,940
as our primary Earth's Sun line

1341
00:51:19,630 --> 00:51:16,220
indication of a CME heading towards

1342
00:51:21,000 --> 00:51:19,640
Earth we did hope at one point to put a

1343
00:51:23,170 --> 00:51:21,010
chronograph on Discoverer

1344
00:51:25,840 --> 00:51:23,180
however as you point out budgetarily it

1345
00:51:28,810 --> 00:51:25,850
didn't work out the Soho satellite like

1346
00:51:31,600 --> 00:51:28,820
Ace is quite beyond its mission lifetime

1347
00:51:32,800 --> 00:51:31,610
I think it's 15 years old so we are

1348
00:51:34,420 --> 00:51:32,810
hoping that it will hold out as well

1349
00:51:37,210 --> 00:51:34,430
being our primary chronograph

1350
00:51:40,450 --> 00:51:37,220
instrumentation and we do plan for a

1351
00:51:42,880 --> 00:51:40,460
placement chronograph at l1 hopefully

1352
00:51:45,550 --> 00:51:42,890
within the next five to ten years so if

1353
00:51:47,650 --> 00:51:45,560
discover has a 60-minute 15 to 16 minute

1354
00:51:50,290 --> 00:51:47,660
head start the telescope that actually

1355
00:51:51,490 --> 00:51:50,300
sees the eruption how how far in advance

1356
00:51:53,620 --> 00:51:51,500
does that happen

1357
00:51:54,820 --> 00:51:53,630
that's instantaneous so we you know that

1358
00:51:56,470 --> 00:51:54,830
the photons are traveling at the speed

1359
00:51:57,910 --> 00:51:56,480
of light so we see the eruption come in

1360
00:51:59,230 --> 00:51:57,920
from so there is some latency and the

1361
00:52:01,240 --> 00:51:59,240
data from so because it comes down

1362
00:52:02,920 --> 00:52:01,250
through the DSN system we don't get

1363
00:52:04,960 --> 00:52:02,930

continuous coverage from Soho so it's

1364
00:52:06,660 --> 00:52:04,970
periodically throughout the day we can

1365
00:52:09,280 --> 00:52:06,670
take down these images and look to see

1366
00:52:11,950 --> 00:52:09,290
if the flare we see through other

1367
00:52:14,410 --> 00:52:11,960
telescopes did and did indeed produce a

1368
00:52:15,880 --> 00:52:14,420
CME we can use those Soho data to

1369
00:52:19,000 --> 00:52:15,890
predict the speed of the CME and

1370
00:52:20,770 --> 00:52:19,010
therefore its travel time to earth with

1371
00:52:22,780 --> 00:52:20,780
the telescope do you have several hours

1372
00:52:24,190 --> 00:52:22,790
ahead of time or is it just well the the

1373
00:52:26,170 --> 00:52:24,200
fastest CMI's in history have been

1374
00:52:29,440 --> 00:52:26,180
between sort of fourteen to fifteen

1375
00:52:31,359 --> 00:52:29,450
hours those are very rare from anywhere

1376
00:52:33,760 --> 00:52:31,369
from there until two to three days is

1377
00:52:36,010 --> 00:52:33,770
the typical arrival time of a CME so the

1378
00:52:37,420 --> 00:52:36,020
telescopic information gives us input to

1379
00:52:40,540 --> 00:52:37,430
models which then gives us that first

1380
00:52:42,010 --> 00:52:40,550
stab at a prediction and it depending on

1381
00:52:43,990 --> 00:52:42,020
that speed again could be anywhere from

1382
00:52:45,849 --> 00:52:44,000
fifteen hours to several days and then

1383
00:52:47,320 --> 00:52:45,859
the l1 instruments out there are the

1384
00:52:49,150 --> 00:52:47,330
ones that really feel the shockwave and

1385
00:52:51,030 --> 00:52:49,160
tell us exactly how accurate our

1386
00:52:53,440 --> 00:52:51,040
predictions were at that point

1387
00:52:55,420 --> 00:52:53,450
okay Steve Cole has been monitoring the

1388
00:52:57,370 --> 00:52:55,430

questions coming in on social media and

1389
00:52:58,089 --> 00:52:57,380
Steve have you got some more questions

1390
00:53:00,609 --> 00:52:58,099
yes we do

1391
00:53:02,790 --> 00:53:00,619
how is discover shielded against the

1392
00:53:08,349 --> 00:53:02,800
very particles that it is monitoring

1393
00:53:11,650 --> 00:53:08,359
coming to earth well excuse me it does

1394
00:53:14,079 --> 00:53:11,660
have a onboard that is facing that Sun

1395
00:53:17,440 --> 00:53:14,089
the Sun side so it does protect the

1396
00:53:19,900 --> 00:53:17,450
instruments with that sunshade follow-up

1397
00:53:21,460 --> 00:53:19,910
one of the key improvements of discover

1398
00:53:23,470 --> 00:53:21,470
instrumentation over the older ACE

1399
00:53:25,120 --> 00:53:23,480
instrumentation is that it's more robust

1400
00:53:26,650 --> 00:53:25,130
to the radiation in particular the solar

1401
00:53:28,570 --> 00:53:26,660
wind measuring instrument the Faraday

1402
00:53:30,130 --> 00:53:28,580
cup we call it is more robust to

1403
00:53:32,140 --> 00:53:30,140
radiation storm so we will be taking

1404
00:53:33,520 --> 00:53:32,150
data through radiation storms where

1405
00:53:37,690 --> 00:53:33,530
previous instruments might have started

1406
00:53:39,579 --> 00:53:37,700
to block out a bit what precautions can

1407
00:53:42,099 --> 00:53:39,589
be taken on the ground given a warning

1408
00:53:45,370 --> 00:53:42,109
of an incoming coronal mass ejection

1409
00:53:46,990 --> 00:53:45,380
detected by Discoverer I'll take that

1410
00:53:48,400 --> 00:53:47,000
and there's a lot of things that you can

1411
00:53:49,970 --> 00:53:48,410
do as I mentioned earlier airlines can

1412
00:53:51,980 --> 00:53:49,980
mitigate against the radiation in

1413
00:53:53,180 --> 00:53:51,990

coming by taking different routes away

1414
00:53:54,710 --> 00:53:53,190
from the magnetic poles of the earth

1415
00:53:57,050 --> 00:53:54,720
where a lot of these particles come in

1416
00:53:58,580 --> 00:53:57,060
they can go to lower altitudes power

1417
00:53:59,930 --> 00:53:58,590
companies when we give them a warning of

1418
00:54:01,609 --> 00:53:59,940
a geomagnetic storm can immediately

1419
00:54:03,680 --> 00:54:01,619
begin to balance their loads on their

1420
00:54:05,210 --> 00:54:03,690
grids so that if there are these large

1421
00:54:07,670 --> 00:54:05,220
currents that are generated in the

1422
00:54:09,859 --> 00:54:07,680
ground from the geomagnetic storm above

1423
00:54:11,420 --> 00:54:09,869
the earth these currents can go into the

1424
00:54:14,030 --> 00:54:11,430
power grid without upsetting it too much

1425
00:54:16,490 --> 00:54:14,040
so there are a lot of things that can be

1426
00:54:18,470 --> 00:54:16,500
done on the ground in particular with

1427
00:54:19,970 --> 00:54:18,480
with power grid systems to begin to

1428
00:54:21,890 --> 00:54:19,980
balance the loads and protect against

1429
00:54:24,470 --> 00:54:21,900
the incoming currents if any and they do

1430
00:54:26,150 --> 00:54:24,480
typically do this at the g3 level and

1431
00:54:28,660 --> 00:54:26,160
above power companies will be taking

1432
00:54:31,070 --> 00:54:28,670
actions to mitigate against potential

1433
00:54:34,820 --> 00:54:31,080
geomagnetic aliy induced currents as we

1434
00:54:40,760 --> 00:54:34,830
call them how close will discover be to

1435
00:54:43,070 --> 00:54:40,770
other satellites at that l1 orbit that's

1436
00:54:46,310 --> 00:54:43,080
it that's a tough one I you know space

1437
00:54:47,960 --> 00:54:46,320
is very large out there so and an l1

1438
00:54:50,720 --> 00:54:47,970

just happens to be one point between the

1439
00:54:53,930 --> 00:54:50,730
Sun and the earth I wouldn't classify it

1440
00:54:57,170 --> 00:54:53,940
to be close to another spacecraft it's

1441
00:54:59,570 --> 00:54:57,180
going to be in its own Lisa do orbit so

1442
00:55:03,470 --> 00:54:59,580
I really couldn't comment on an actual

1443
00:55:04,760 --> 00:55:03,480
value in distance satellites are

1444
00:55:06,020 --> 00:55:04,770
orbiting around that point they're not

1445
00:55:09,349 --> 00:55:06,030
all trying to get to that one point

1446
00:55:11,030 --> 00:55:09,359
right thank you will discover take over

1447
00:55:14,270 --> 00:55:11,040
the functions of the Soho satellite

1448
00:55:17,240 --> 00:55:14,280
should that satellite fail no it won't

1449
00:55:18,790 --> 00:55:17,250
as I mentioned earlier Soho is unique in

1450
00:55:22,190 --> 00:55:18,800
that it has a coronagraph telescope

1451
00:55:24,859 --> 00:55:22,200
which is our one L one-line coronagraph

1452
00:55:28,340 --> 00:55:24,869
for visualizing coronal mass ejections

1453
00:55:29,690 --> 00:55:28,350
coming off of the Sun and discovered

1454
00:55:32,870 --> 00:55:29,700
does not include coronagraph

1455
00:55:35,900 --> 00:55:32,880
instrumentation so if Soho were to fail

1456
00:55:38,090 --> 00:55:35,910
we would be dependent on ground-based

1457
00:55:40,099 --> 00:55:38,100
instrumentation primarily and perhaps

1458
00:55:41,300 --> 00:55:40,109
one or two other NASA assets that have

1459
00:55:43,490 --> 00:55:41,310
coronagraphs but are currently around

1460
00:55:45,140 --> 00:55:43,500
the backside of the Sun and so aren't

1461
00:55:47,000 --> 00:55:45,150
very useful right now as they orbit

1462
00:55:48,290 --> 00:55:47,010
around from the Sun they may become

1463
00:55:52,090 --> 00:55:48,300

useful again and they're coronagraphs

1464
00:55:55,370 --> 00:55:52,100
may serve forecasting purposes again

1465
00:56:00,520 --> 00:55:55,380
will there be a live video of the spacex

1466
00:56:03,440 --> 00:56:00,530
first stage landing on the barge no the

1467
00:56:05,660 --> 00:56:03,450
video that we can see from here

1468
00:56:08,000 --> 00:56:05,670
it's below the horizon from from the

1469
00:56:11,480 --> 00:56:08,010
Cape again so we won't see a live video

1470
00:56:19,250 --> 00:56:11,490
at the boat is going to record that and

1471
00:56:20,780 --> 00:56:19,260
then we will share this eventually we

1472
00:56:23,270 --> 00:56:20,790
only have time for one more question so

1473
00:56:25,760 --> 00:56:23,280
I will well let Irene have the last

1474
00:56:29,289 --> 00:56:25,770
question of the day I'll take advantage

1475
00:56:32,559 --> 00:56:29,299
and ask three real quick ones for Hans

1476
00:56:35,539 --> 00:56:32,569
what's the targeted altitude of the

1477
00:56:40,339 --> 00:56:35,549
Falcon upper stage for spacecraft

1478
00:56:43,910 --> 00:56:40,349
separation is the first one so the over

1479
00:56:45,770 --> 00:56:43,920
this 185 kilometers so we do the second

1480
00:56:47,780 --> 00:56:45,780
version and it might rise in those 5

1481
00:56:50,539 --> 00:56:47,790
minutes I'm not sure how much but it's

1482
00:56:53,539 --> 00:56:50,549
it's it's in the low hundreds basically

1483
00:56:57,200 --> 00:56:53,549
still and then the stage of course rises

1484
00:56:59,930 --> 00:56:57,210
up to 2 almost almost the same trailing

1485
00:57:01,849 --> 00:56:59,940
the spacecraft basically thanks and them

1486
00:57:03,740 --> 00:57:01,859
I know you took a crack at this before

1487
00:57:06,230 --> 00:57:03,750
but is there a way to put in miles per

1488
00:57:08,450 --> 00:57:06,240

hour kilometers per hour the speed of

1489
00:57:12,230 --> 00:57:08,460
the Falcon first stage before the

1490
00:57:14,599 --> 00:57:12,240
landing burn is there ever said what can

1491
00:57:16,730 --> 00:57:14,609
you give us some sense of what the speed

1492
00:57:20,410 --> 00:57:16,740
projected speed of the Falcon first

1493
00:57:22,880 --> 00:57:20,420
stage is before the final landing

1494
00:57:26,720 --> 00:57:22,890
burning run basically reduces the speech

1495
00:57:30,950 --> 00:57:26,730
speed to a few meters per second before

1496
00:57:34,400 --> 00:57:30,960
that burn before that burn that travels

1497
00:57:36,680 --> 00:57:34,410
at low hundreds meters per second thank

1498
00:57:40,250 --> 00:57:36,690
you and then the last question is if

1499
00:57:42,710 --> 00:57:40,260
this launch goes as planned tomorrow how

1500
00:57:45,559 --> 00:57:42,720
quickly are you planning on turning the

1501
00:57:47,569 --> 00:57:45,569
pad around for the I'm sorry I can't

1502
00:57:51,680 --> 00:57:47,579
remember which satellite you tell us at

1503
00:57:53,059 --> 00:57:51,690
maybe and when that would be scheduled

1504
00:57:55,849 --> 00:57:53,069
and if you'd also would be able to

1505
00:57:59,089 --> 00:57:55,859
attempt a fly back on that very very

1506
00:58:01,309 --> 00:57:59,099
quick turnaround on this one the launch

1507
00:58:03,440 --> 00:58:01,319
is scheduled by the end of February I

1508
00:58:06,970 --> 00:58:03,450
think I have the 27th of the 28th in my

1509
00:58:13,579 --> 00:58:06,980
head but in that in that timeframe right

1510
00:58:15,569 --> 00:58:13,589
27 tonight and I don't think this one

1511
00:58:19,829 --> 00:58:15,579
will be a fly bag this one has

1512
00:58:21,390 --> 00:58:19,839
no thanks okay I want to thank all you

1513
00:58:22,920 --> 00:58:21,400

gentlemen for being here this has been

1514
00:58:25,349 --> 00:58:22,930
very enlightening we are flat out of

1515
00:58:28,349 --> 00:58:25,359
time unfortunately and thank you for

1516
00:58:30,779 --> 00:58:28,359
coming to keep in mind that Discover is

1517
00:58:33,569 --> 00:58:30,789
scheduled to launch tomorrow at 6 10 and

1518
00:58:35,789 --> 00:58:33,579
12 seconds p.m. Eastern Time on a SpaceX

1519
00:58:38,789 --> 00:58:35,799
Falcon 9 rocket from Cape Canaveral Air

1520
00:58:40,829 --> 00:58:38,799
Force Station Space Launch Complex 40

1521
00:58:42,959 --> 00:58:40,839
hour NASA television coverage will begin

1522
00:58:45,599 --> 00:58:42,969
at 3:30 in the afternoon tomorrow and

1523
00:58:47,880 --> 00:58:45,609
between now and then and throughout the

1524
00:58:49,469 --> 00:58:47,890
mission you can keep track of everything

1525
00:58:55,469 --> 00:58:49,479
that's happening with discover by going