
NPP
tweetup

1
00:00:06,950 --> 00:00:04,870
hello everyone and welcome to nasa's

2
00:00:09,669 --> 00:00:06,960
resident office at vandenberg air force

3
00:00:11,110 --> 00:00:09,679
base in california i'm steve cole from

4
00:00:13,990 --> 00:00:11,120
nasa's headquarters office of

5
00:00:15,829 --> 00:00:14,000
communications welcome to the 29th nasa

6
00:00:18,310 --> 00:00:15,839
tweet up we're here

7
00:00:20,630 --> 00:00:18,320
on the occasion of the launch of the npp

8
00:00:23,509 --> 00:00:20,640
satellite that stands for the npo's

9
00:00:24,790 --> 00:00:23,519
preparatory project from vandenberg

10
00:00:26,550 --> 00:00:24,800
later tonight

11
00:00:30,070 --> 00:00:26,560
early friday morning

12
00:00:31,750 --> 00:00:30,080
npp is nasa's first climate and weather

13
00:00:33,270 --> 00:00:31,760

satellite we've launched a lot of

14
00:00:35,110 --> 00:00:33,280
satellites doing earth science from

15
00:00:37,430 --> 00:00:35,120
vandenberg but this is the first one

16
00:00:39,990 --> 00:00:37,440
designed to to do both climate

17
00:00:41,510 --> 00:00:40,000
observations and weather satellite

18
00:00:42,709 --> 00:00:41,520
observations

19
00:00:44,630 --> 00:00:42,719
so we're really excited to have

20
00:00:47,590 --> 00:00:44,640
everybody here for the tweet up we've

21
00:00:50,229 --> 00:00:47,600
got a big day of activities it's a

22
00:00:52,150 --> 00:00:50,239
really nice day outside today so and the

23
00:00:53,590 --> 00:00:52,160
weather forecast for launch tonight is

24
00:00:54,470 --> 00:00:53,600
looking really good

25
00:00:56,630 --> 00:00:54,480
so

26
00:00:58,150 --> 00:00:56,640
everything's everything's moving forward

27
00:01:00,069 --> 00:00:58,160
we've got a full day of activities

28
00:01:03,110 --> 00:01:00,079
planned for the tweet up today

29
00:01:05,830 --> 00:01:03,120
and launch is scheduled for just about

30
00:01:07,910 --> 00:01:05,840
17 hours and 15 minutes or so from right

31
00:01:10,710 --> 00:01:07,920
now so

32
00:01:14,630 --> 00:01:10,720
if you want to follow along on twitter

33
00:01:16,630 --> 00:01:14,640
the hashtag for the tweet up is hashtag

34
00:01:18,390 --> 00:01:16,640
nasa tweetup

35
00:01:19,510 --> 00:01:18,400
you can also follow the activities

36
00:01:23,270 --> 00:01:19,520
online

37
00:01:28,870 --> 00:01:26,550
npp there's a lot of videos photos and

38
00:01:31,510 --> 00:01:28,880

we'll even have live launch coverage on

39
00:01:33,109 --> 00:01:31,520
the website later tonight

40
00:01:34,870 --> 00:01:33,119
in the next hour and a half we're going

41
00:01:36,870 --> 00:01:34,880
to be hearing from five speakers who

42
00:01:39,910 --> 00:01:36,880
work on the npp mission

43
00:01:40,870 --> 00:01:39,920
and also do a lot of interesting earth

44
00:01:42,469 --> 00:01:40,880
science

45
00:01:44,469 --> 00:01:42,479
that nasa is

46
00:01:47,030 --> 00:01:44,479
pretty well known for

47
00:01:48,789 --> 00:01:47,040
most people however know nasa as getting

48
00:01:49,910 --> 00:01:48,799
people into space

49
00:01:51,749 --> 00:01:49,920
making

50
00:01:54,630 --> 00:01:51,759
amazing discoveries about the solar

51
00:01:57,190 --> 00:01:54,640
system and and the whole universe uh but

52
00:01:58,550 --> 00:01:57,200
not as many people are as aware of all

53
00:02:00,709 --> 00:01:58,560
that work we do

54
00:02:02,630 --> 00:02:00,719
on earth looking at earth

55
00:02:05,030 --> 00:02:02,640
trying to better understand what's going

56
00:02:08,070 --> 00:02:05,040
on with us so we can understand what our

57
00:02:10,469 --> 00:02:08,080
future uh will be here on the planet to

58
00:02:12,390 --> 00:02:10,479
give you a quick overview

59
00:02:14,630 --> 00:02:12,400
uh of some of this and the mission i put

60
00:02:16,309 --> 00:02:14,640
together a one-minute video that will

61
00:02:18,309 --> 00:02:16,319
roll in just a second to give you an

62
00:02:20,229 --> 00:02:18,319
idea of

63
00:02:22,550 --> 00:02:20,239

the mission and how we study plan what

64
00:02:24,309 --> 00:02:22,560
nasa does to study planet earth so if

65
00:02:26,470 --> 00:02:24,319
you could roll the video

66
00:02:28,550 --> 00:02:26,480
npp will join over a dozen nasa

67
00:02:30,949 --> 00:02:28,560
satellites zipping around the planet

68
00:02:33,110 --> 00:02:30,959
what they show us is global like globe

69
00:02:35,589 --> 00:02:33,120
like temperature of the oceans chemical

70
00:02:38,630 --> 00:02:35,599
makeup of the atmosphere and the pulsing

71
00:02:40,949 --> 00:02:38,640
life of our planet's biosphere on land

72
00:02:42,710 --> 00:02:40,959
and in the oceans they also zoom into

73
00:02:46,070 --> 00:02:42,720
detail things like hurricanes and

74
00:02:47,910 --> 00:02:46,080
wildfires coral reefs and ice sheets and

75
00:02:50,229 --> 00:02:47,920
here's npp which is going to take us

76
00:02:51,990 --> 00:02:50,239
into the future with a multi-talented

77
00:02:53,990 --> 00:02:52,000
suite of instruments

78
00:02:56,309 --> 00:02:54,000
the next stage of npp's journey begins

79
00:02:58,229 --> 00:02:56,319
tomorrow morning with a ride into space

80
00:03:00,229 --> 00:02:58,239
on a delta ii rocket

81
00:03:02,869 --> 00:03:00,239
the trajectory takes it south over the

82
00:03:04,710 --> 00:03:02,879
pacific as it climbs into its pole to

83
00:03:06,710 --> 00:03:04,720
pole orbit

84
00:03:09,190 --> 00:03:06,720
there npp begins its work life

85
00:03:11,270 --> 00:03:09,200
collecting round-the-clock data critical

86
00:03:14,070 --> 00:03:11,280
to climate research and weather

87
00:03:15,350 --> 00:03:14,080
forecasting here on earth

88
00:03:16,949 --> 00:03:15,360

our speakers will give you a lot more

89
00:03:19,670 --> 00:03:16,959
detail about the mission and the earth

90
00:03:21,670 --> 00:03:19,680
science research that nasa does so let's

91
00:03:24,149 --> 00:03:21,680
start with our first speaker

92
00:03:26,789 --> 00:03:24,159
first speaker is astronaut pier sellers

93
00:03:29,030 --> 00:03:26,799
who is currently deputy director

94
00:03:31,990 --> 00:03:29,040
nasa goddard's science and exploration

95
00:03:34,070 --> 00:03:32,000
directorate now pierce is a unique nasa

96
00:03:35,750 --> 00:03:34,080
employee and that he both

97
00:03:37,990 --> 00:03:35,760
uh i think just about over a year ago he

98
00:03:39,670 --> 00:03:38,000
was in space on one of the

99
00:03:41,110 --> 00:03:39,680
space shuttle missions and he does earth

100
00:03:43,190 --> 00:03:41,120
science research

101
00:03:45,830 --> 00:03:43,200
at nasa goddard space flight plan center

102
00:03:48,070 --> 00:03:45,840
which is in maryland

103
00:03:50,789 --> 00:03:48,080
research focuses on the interaction

104
00:03:51,750 --> 00:03:50,799
between earth's biosphere the land the

105
00:03:54,070 --> 00:03:51,760
oceans

106
00:03:56,550 --> 00:03:54,080
and the atmosphere he's done

107
00:03:59,270 --> 00:03:56,560
field work in such places as russia

108
00:04:01,270 --> 00:03:59,280
africa and brazil

109
00:04:03,190 --> 00:04:01,280
and kansas

110
00:04:05,030 --> 00:04:03,200
distant distant kansas

111
00:04:07,670 --> 00:04:05,040
um and he's going to talk to us a little

112
00:04:11,750 --> 00:04:07,680
bit about why nasa does earth science

113
00:04:16,150 --> 00:04:13,270

i think i have to keep everything to 140

114
00:04:17,909 --> 00:04:16,160
characters or less right

115
00:04:19,270 --> 00:04:17,919
i'm very glad to see you all here today

116
00:04:20,550 --> 00:04:19,280
i'm very excited about this mission

117
00:04:22,390 --> 00:04:20,560
that's coming up

118
00:04:25,110 --> 00:04:22,400
um a couple of things

119
00:04:27,830 --> 00:04:25,120
uh before i went off to the astronaut

120
00:04:29,430 --> 00:04:27,840
corps i was like him that's jim gleason

121
00:04:30,469 --> 00:04:29,440
who's the project scientist for this

122
00:04:33,350 --> 00:04:30,479
platform

123
00:04:36,469 --> 00:04:33,360
but for the an earlier version the eos

124
00:04:38,870 --> 00:04:36,479
terra t not terror terra

125
00:04:41,430 --> 00:04:38,880
t-e-r-r-a platform

126
00:04:42,550 --> 00:04:41,440
it was launched in 98 from here from

127
00:04:44,629 --> 00:04:42,560
vandenberg

128
00:04:47,110 --> 00:04:44,639
and that was a large polar orbiting

129
00:04:48,230 --> 00:04:47,120
satellite that was monitoring the

130
00:04:49,110 --> 00:04:48,240
earth's

131
00:04:52,150 --> 00:04:49,120
you know

132
00:04:53,350 --> 00:04:52,160
total system atmosphere oceans land ice

133
00:04:55,189 --> 00:04:53,360
biosphere

134
00:04:57,909 --> 00:04:55,199
npp hopefully will continue the

135
00:05:00,469 --> 00:04:57,919
tradition because terra and aqua the

136
00:05:01,990 --> 00:05:00,479
sister platforms are getting a bit long

137
00:05:03,270 --> 00:05:02,000
in the tooth

138
00:05:05,350 --> 00:05:03,280

and we're hoping that they're going to

139
00:05:06,310 --> 00:05:05,360
last for two or three more years but who

140
00:05:09,430 --> 00:05:06,320
knows

141
00:05:10,629 --> 00:05:09,440
so nbps arriving in the nick of time

142
00:05:13,270 --> 00:05:10,639
um

143
00:05:17,830 --> 00:05:13,280
why do we do what we do

144
00:05:18,870 --> 00:05:17,840
i feel like i feel like elvis here

145
00:05:20,310 --> 00:05:18,880
i know

146
00:05:21,990 --> 00:05:20,320
why do we do what we do

147
00:05:23,830 --> 00:05:22,000
nasa's can make a really unique

148
00:05:25,990 --> 00:05:23,840
contribution to the whole business of

149
00:05:27,749 --> 00:05:26,000
climate science you know from your perch

150
00:05:29,749 --> 00:05:27,759
up there in orbit

151
00:05:31,990 --> 00:05:29,759
mapping the whole world in one day which

152
00:05:35,189 --> 00:05:32,000
is what npb will do it'll provide a

153
00:05:36,629 --> 00:05:35,199
wall-to-wall imaging of the whole world

154
00:05:38,390 --> 00:05:36,639
every day

155
00:05:40,790 --> 00:05:38,400
and such as a really clever trick when

156
00:05:42,870 --> 00:05:40,800
you launch from california you can map

157
00:05:44,469 --> 00:05:42,880
the world while it's sunlit because you

158
00:05:47,029 --> 00:05:44,479
kind of chase the sun around the world

159
00:05:47,990 --> 00:05:47,039
it's it's really ingenious

160
00:05:50,070 --> 00:05:48,000
um

161
00:05:50,790 --> 00:05:50,080
and these data are going to be essential

162
00:05:53,110 --> 00:05:50,800
for

163
00:05:55,670 --> 00:05:53,120

basically understanding climate change

164
00:05:58,150 --> 00:05:55,680
looking at small changes over years and

165
00:06:00,150 --> 00:05:58,160
decades and trying to uh understand

166
00:06:01,510 --> 00:06:00,160
what's going on

167
00:06:03,189 --> 00:06:01,520
so with that

168
00:06:07,110 --> 00:06:03,199
i'm open for questions or what do we do

169
00:06:08,710 --> 00:06:07,120
now do we go straight into jim jim

170
00:06:10,390 --> 00:06:08,720
your turn

171
00:06:12,710 --> 00:06:10,400
questions all right i thought i was

172
00:06:14,070 --> 00:06:12,720
going to get off the hook

173
00:06:15,909 --> 00:06:14,080
questions don't ask me anything really

174
00:06:18,550 --> 00:06:15,919
really hard

175
00:06:20,469 --> 00:06:18,560
be sure to wait for a microphone

176
00:06:23,430 --> 00:06:20,479
if you've got a question

177
00:06:28,469 --> 00:06:26,309
so um i know that npp is is often

178
00:06:30,230 --> 00:06:28,479
described as a risk reduct reduction

179
00:06:31,990 --> 00:06:30,240
mission a preparatory mission but it's

180
00:06:34,150 --> 00:06:32,000
also talked about as a replacement for

181
00:06:34,950 --> 00:06:34,160
an aging terror in aqua how i mean it's

182
00:06:37,029 --> 00:06:34,960
got

183
00:06:39,110 --> 00:06:37,039
which one does it is it more of uh as

184
00:06:41,270 --> 00:06:39,120
far as nasa is concerned i think i think

185
00:06:43,430 --> 00:06:41,280
it's both um

186
00:06:45,110 --> 00:06:43,440
it's got four new instruments on it so

187
00:06:47,510 --> 00:06:45,120
which are meant to be the pioneering

188
00:06:49,749 --> 00:06:47,520

sort of marks of instruments will be

189
00:06:51,830 --> 00:06:49,759
used on successive platforms into the

190
00:06:54,629 --> 00:06:51,840
future so i guess the first of anything

191
00:06:55,909 --> 00:06:54,639
is risk reduction right

192
00:06:59,350 --> 00:06:55,919
on the other hand

193
00:07:01,189 --> 00:06:59,360
it would be bad or not good

194
00:07:04,070 --> 00:07:01,199
if this didn't work out for us because

195
00:07:06,790 --> 00:07:04,080
it's unlikely that terror and aqua last

196
00:07:08,390 --> 00:07:06,800
until the next in the series

197
00:07:10,070 --> 00:07:08,400
so um

198
00:07:12,070 --> 00:07:10,080
yeah these the first

199
00:07:15,990 --> 00:07:12,080
you know operational versions of these

200
00:07:20,710 --> 00:07:18,390
other questions

201
00:07:22,870 --> 00:07:20,720
how did being an astronaut in space

202
00:07:24,390 --> 00:07:22,880
change your view of earth

203
00:07:26,870 --> 00:07:24,400
oh uh

204
00:07:29,270 --> 00:07:26,880
well it no radical changes just a few

205
00:07:30,870 --> 00:07:29,280
very nice surprises

206
00:07:32,309 --> 00:07:30,880
it's beautiful to actually watch the you

207
00:07:34,469 --> 00:07:32,319
know see the world

208
00:07:35,909 --> 00:07:34,479
through your own eyes once around every

209
00:07:37,990 --> 00:07:35,919
hundred minutes

210
00:07:40,710 --> 00:07:38,000
it's really it's really quite a thrill

211
00:07:42,710 --> 00:07:40,720
one of the things that surprised me um

212
00:07:44,629 --> 00:07:42,720
i spent a lot of time studying the

213
00:07:46,710 --> 00:07:44,639

atmosphere and modeling and modeling and

214
00:07:48,150 --> 00:07:46,720
i thought i knew everything you know

215
00:07:50,070 --> 00:07:48,160
but i was surprised when i got up there

216
00:07:51,990 --> 00:07:50,080
how thin the atmosphere is it's really

217
00:07:53,990 --> 00:07:52,000
really thin it's like an onion skin

218
00:07:55,430 --> 00:07:54,000
around the world and all the systems

219
00:07:57,430 --> 00:07:55,440
that you see like hurricanes they're

220
00:07:59,189 --> 00:07:57,440
very flat they look like um

221
00:08:01,430 --> 00:07:59,199
basically

222
00:08:03,830 --> 00:08:01,440
slicks of oil on on a puddle when you

223
00:08:05,909 --> 00:08:03,840
see the very very thin system spread on

224
00:08:12,629 --> 00:08:05,919
this very very thin layer

225
00:08:16,790 --> 00:08:14,950
i just wanted to ask what hurricane did

226
00:08:18,390 --> 00:08:16,800
you see

227
00:08:19,830 --> 00:08:18,400
uh

228
00:08:21,589 --> 00:08:19,840
i can't remember there's a big typhoon

229
00:08:22,629 --> 00:08:21,599
in the pacific oh okay i could have

230
00:08:24,230 --> 00:08:22,639
named it

231
00:08:29,430 --> 00:08:24,240
i don't know because no one else had yet

232
00:08:34,469 --> 00:08:32,310
leah is anybody asking questions online

233
00:08:36,070 --> 00:08:34,479
take any questions from nasa tweet up

234
00:08:37,990 --> 00:08:36,080
hashtag

235
00:08:38,829 --> 00:08:38,000
anyone watching at home emily you have

236
00:08:41,350 --> 00:08:38,839
another

237
00:08:43,269 --> 00:08:41,360
question um i know that terra and aqua

238
00:08:45,670 --> 00:08:43,279

orbit at different local times of day

239
00:08:47,829 --> 00:08:45,680
npp is only going to be at 130. um is

240
00:08:49,910 --> 00:08:47,839
that going to replace the capability of

241
00:08:53,190 --> 00:08:49,920
having two satellites in orbit how um

242
00:08:56,310 --> 00:08:53,200
how can npp replace both of those

243
00:08:58,870 --> 00:08:56,320
it can't replace both um

244
00:09:01,670 --> 00:08:58,880
terror is a morning satellite uh 10 30 i

245
00:09:04,949 --> 00:09:01,680
think and uh aquarius afternoon 1 30 and

246
00:09:05,750 --> 00:09:04,959
this is the one o'clock 1 1 30. okay

247
00:09:07,030 --> 00:09:05,760
so

248
00:09:09,190 --> 00:09:07,040
i'm not sure

249
00:09:10,870 --> 00:09:09,200
when that there will be a series of nasa

250
00:09:12,790 --> 00:09:10,880
research satellites scattered around

251
00:09:18,870 --> 00:09:12,800
during the daytime i'm not sure when the

252
00:09:22,070 --> 00:09:20,630
the main satellite that'll be picking up

253
00:09:25,190 --> 00:09:22,080
from that would be essentially the

254
00:09:28,310 --> 00:09:25,200
european med-op which is at at 9 30 and

255
00:09:30,870 --> 00:09:28,320
they're currently flying avhrrs but in

256
00:09:34,070 --> 00:09:30,880
the jpss one time frame the next

257
00:09:35,990 --> 00:09:34,080
generation will have a modis-like

258
00:09:40,710 --> 00:09:36,000
viirs-like imager on the next generation

259
00:09:44,389 --> 00:09:42,470
gotcha so this is really fully filling

260
00:09:46,949 --> 00:09:44,399
the anchor slot

261
00:09:53,269 --> 00:09:49,190
other questions for astronaut pierce

262
00:09:56,070 --> 00:09:54,630
okay

263
00:10:04,150 --> 00:09:56,080

um

264
00:10:05,590 --> 00:10:04,160
and the 930 thing means does that mean

265
00:10:07,590 --> 00:10:05,600
it's

266
00:10:09,990 --> 00:10:07,600
i don't understand the timing

267
00:10:12,310 --> 00:10:10,000
the orbits designed so that when you're

268
00:10:14,310 --> 00:10:12,320
flying around the world underneath you

269
00:10:15,350 --> 00:10:14,320
on the daylight side that is the time of

270
00:10:17,430 --> 00:10:15,360
day

271
00:10:19,030 --> 00:10:17,440
as the satellite comes over and it kind

272
00:10:20,550 --> 00:10:19,040
of chases the sun it's called sun

273
00:10:22,389 --> 00:10:20,560
synchronous it kind of chases the sun

274
00:10:24,069 --> 00:10:22,399
around the planet so approximately

275
00:10:29,509 --> 00:10:24,079
that's the local time of day when you're

276
00:10:34,710 --> 00:10:32,470
very clever i think it took me quite a

277
00:10:36,630 --> 00:10:34,720
while to understand how it works

278
00:10:38,550 --> 00:10:36,640
hi i was just curious having worked on

279
00:10:40,710 --> 00:10:38,560
tara what has impressed you about the

280
00:10:42,069 --> 00:10:40,720
data that it's brought back to earth and

281
00:10:45,670 --> 00:10:42,079
what are your feelings knowing that it's

282
00:10:47,190 --> 00:10:45,680
aging and going into retirement

283
00:10:49,110 --> 00:10:47,200
well uh you know i have feelings in

284
00:10:51,590 --> 00:10:49,120
common with terror of course

285
00:10:55,910 --> 00:10:53,590
i can't afford to retire though

286
00:10:57,269 --> 00:10:55,920
um

287
00:10:59,190 --> 00:10:57,279
a couple of things i think that came out

288
00:11:02,069 --> 00:10:59,200

of terror that were really super one was

289
00:11:03,430 --> 00:11:02,079
the modis instrument which is this

290
00:11:06,470 --> 00:11:03,440
beautiful instrument that maps the whole

291
00:11:07,190 --> 00:11:06,480
world at 250 meter resolution

292
00:11:08,389 --> 00:11:07,200
but

293
00:11:10,710 --> 00:11:08,399
every day

294
00:11:13,190 --> 00:11:10,720
and that's been an astounding success

295
00:11:15,910 --> 00:11:13,200
for all kinds of science you know

296
00:11:17,990 --> 00:11:15,920
oceans land atmosphere iced a lot it's

297
00:11:19,590 --> 00:11:18,000
been been a real home run

298
00:11:21,590 --> 00:11:19,600
so the two modis instruments one on

299
00:11:22,710 --> 00:11:21,600
terra one on aqua have done really good

300
00:11:25,190 --> 00:11:22,720
service

301
00:11:27,110 --> 00:11:25,200
the other thing is that on um

302
00:11:28,630 --> 00:11:27,120
on aqua and i'm going to change here a

303
00:11:29,590 --> 00:11:28,640
little bit on aqua there's a sounder

304
00:11:30,550 --> 00:11:29,600
suite

305
00:11:32,230 --> 00:11:30,560
that

306
00:11:34,230 --> 00:11:32,240
profiles the atmosphere temperature and

307
00:11:36,230 --> 00:11:34,240
humidity and stuff like that

308
00:11:41,750 --> 00:11:36,240
and those data have been really very

309
00:11:41,760 --> 00:11:44,870
so we've got our money's worth

310
00:11:48,470 --> 00:11:46,710
any other questions

311
00:11:54,230 --> 00:11:48,480
okay way in the back let me get back

312
00:11:57,670 --> 00:11:55,910
um having been to space how do you feel

313
00:11:59,509 --> 00:11:57,680

about the commercial space industry and

314
00:12:00,470 --> 00:11:59,519
space tourism

315
00:12:01,590 --> 00:12:00,480
well i

316
00:12:03,990 --> 00:12:01,600
haven't been to space i wish i could

317
00:12:05,750 --> 00:12:04,000
take everybody with me so you know it's

318
00:12:06,550 --> 00:12:05,760
that much fun

319
00:12:08,870 --> 00:12:06,560
so

320
00:12:14,870 --> 00:12:08,880
i wish them well

321
00:12:19,910 --> 00:12:15,990
so

322
00:12:21,990 --> 00:12:19,920
maybe one day who knows keep saving

323
00:12:23,509 --> 00:12:22,000
i think you should go

324
00:12:25,910 --> 00:12:23,519
very good

325
00:12:30,949 --> 00:12:25,920
any other questions

326
00:12:33,829 --> 00:12:32,790
i've got a i've got a question from

327
00:12:35,910 --> 00:12:33,839
twitter

328
00:12:37,910 --> 00:12:35,920
um what does it sound like to astronauts

329
00:12:40,310 --> 00:12:37,920
inside the iss when astronauts are

330
00:12:42,629 --> 00:12:40,320
working outside during a spacewalk

331
00:12:45,269 --> 00:12:42,639
it sounds like a bunch of rhinos banging

332
00:12:46,710 --> 00:12:45,279
around on that outside the hull you know

333
00:12:48,629 --> 00:12:46,720
when they're working on the

334
00:12:50,150 --> 00:12:48,639
pressurized segment you can hear them

335
00:12:51,750 --> 00:12:50,160
bang bang bang bang going all the way

336
00:12:53,670 --> 00:12:51,760
down clattering with all their tools and

337
00:12:55,910 --> 00:12:53,680
bang bang bang all the way back

338
00:12:57,190 --> 00:12:55,920

so you generally know where they are

339
00:13:03,269 --> 00:12:57,200
and you hope they're not doing anything

340
00:13:09,829 --> 00:13:06,790
question over here okay

341
00:13:11,590 --> 00:13:09,839
hi um i've heard that space smells like

342
00:13:15,269 --> 00:13:11,600
something do you know what that's it

343
00:13:17,110 --> 00:13:15,279
smells like and um could you describe it

344
00:13:18,710 --> 00:13:17,120
the the russians talk about this smell

345
00:13:20,629 --> 00:13:18,720
of space when people come back in from a

346
00:13:22,550 --> 00:13:20,639
space walk and you pop them out the

347
00:13:24,470 --> 00:13:22,560
airlock and still in their spacesuit

348
00:13:26,230 --> 00:13:24,480
there's a smell which to me smells like

349
00:13:28,069 --> 00:13:26,240
roast pork

350
00:13:32,790 --> 00:13:28,079
or maybe bacon

351
00:13:35,910 --> 00:13:35,030
which is the smell of space

352
00:13:37,509 --> 00:13:35,920
but

353
00:13:39,030 --> 00:13:37,519
you know bacon or whatever it is is

354
00:13:41,350 --> 00:13:39,040
actually just some

355
00:13:43,269 --> 00:13:41,360
material boiling off the suit

356
00:13:48,949 --> 00:13:43,279
we think

357
00:13:52,150 --> 00:13:50,790
actually on that note um

358
00:13:54,470 --> 00:13:52,160
i want to know more about the food that

359
00:13:55,990 --> 00:13:54,480
you have to eat in space right this is

360
00:13:57,269 --> 00:13:56,000
the last one i'm going to do on on the

361
00:13:59,189 --> 00:13:57,279
uh astronaut thing we're going to go

362
00:14:01,750 --> 00:13:59,199
back to npp

363
00:14:02,949 --> 00:14:01,760

that's all right food food um food's not

364
00:14:04,629 --> 00:14:02,959
bad

365
00:14:06,470 --> 00:14:04,639
uh the food would be really great if

366
00:14:07,670 --> 00:14:06,480
your taste buds worked okay in space but

367
00:14:09,509 --> 00:14:07,680
they don't you know because of the

368
00:14:11,269 --> 00:14:09,519
gravity shift and stuff everything

369
00:14:12,310 --> 00:14:11,279
tastes like cardboard

370
00:14:14,550 --> 00:14:12,320
so um

371
00:14:17,670 --> 00:14:14,560
you know people take up a lot of tabasco

372
00:14:19,670 --> 00:14:17,680
sauce with them to make things bearable

373
00:14:22,550 --> 00:14:19,680
there you go

374
00:14:27,350 --> 00:14:22,560
okay back to npp any other questions mpp

375
00:14:31,509 --> 00:14:29,189
so i go to terra and aqua all the time

376
00:14:33,750 --> 00:14:31,519
whenever there's a wildfire near la and

377
00:14:36,790 --> 00:14:33,760
i'm wondering how npp will improve on

378
00:14:38,790 --> 00:14:36,800
their capability to monitor wildfires

379
00:14:40,629 --> 00:14:38,800
well uh npp

380
00:14:43,110 --> 00:14:40,639
the veers instrument

381
00:14:44,790 --> 00:14:43,120
has a fire channel so you should be able

382
00:14:47,189 --> 00:14:44,800
to keep track of the fire in your back

383
00:14:49,030 --> 00:14:47,199
back garden still

384
00:14:50,069 --> 00:14:49,040
i think there'll be a continuing fire

385
00:14:51,350 --> 00:14:50,079
product

386
00:14:53,910 --> 00:14:51,360
uh that'll go

387
00:14:55,110 --> 00:14:53,920
more or less seamlessly with uh the one

388
00:14:57,030 --> 00:14:55,120

from terra

389
00:15:02,470 --> 00:14:57,040
will its resolution improve on terra and

390
00:15:02,480 --> 00:15:06,230
how big is your yard

391
00:15:10,949 --> 00:15:08,550
i had a question uh pierce the work you

392
00:15:13,990 --> 00:15:10,959
did in the field in exotic places like

393
00:15:15,910 --> 00:15:14,000
kansas russia africa uh what were you

394
00:15:19,030 --> 00:15:15,920
doing what were you studying down there

395
00:15:20,629 --> 00:15:19,040
well we started off trying to model um

396
00:15:21,990 --> 00:15:20,639
interactions between the land surface

397
00:15:23,509 --> 00:15:22,000
and the atmosphere to improve our

398
00:15:25,750 --> 00:15:23,519
climate models and we found out we

399
00:15:27,110 --> 00:15:25,760
weren't doing a very good job so

400
00:15:28,150 --> 00:15:27,120
go out to the field and measure the

401
00:15:29,829 --> 00:15:28,160
stuff

402
00:15:31,430 --> 00:15:29,839
so what we would do is measure the

403
00:15:33,350 --> 00:15:31,440
interactions between the surface and the

404
00:15:34,949 --> 00:15:33,360
lower atmosphere with all kinds of

405
00:15:36,550 --> 00:15:34,959
little instruments on the ground

406
00:15:38,389 --> 00:15:36,560
and then fly aircraft over it to

407
00:15:40,470 --> 00:15:38,399
integrate over a large area and then

408
00:15:41,910 --> 00:15:40,480
time it all so that you were doing that

409
00:15:43,030 --> 00:15:41,920
when a satellite came over that you were

410
00:15:44,710 --> 00:15:43,040
interested in

411
00:15:46,470 --> 00:15:44,720
and the idea was that if we could make

412
00:15:48,389 --> 00:15:46,480
it all work we could use the satellite

413
00:15:49,430 --> 00:15:48,399

to spread that information

414
00:15:51,430 --> 00:15:49,440
globally

415
00:15:52,949 --> 00:15:51,440
and it really worked we improved the

416
00:15:56,069 --> 00:15:52,959
models and managed to spread all the

417
00:15:58,470 --> 00:15:56,079
data globally using the satellites

418
00:16:01,910 --> 00:15:58,480
a lot of fun

419
00:16:11,910 --> 00:16:01,920
thank you any other questions for peers

420
00:16:16,710 --> 00:16:14,230
okay our next speaker is jim gleason and

421
00:16:18,870 --> 00:16:16,720
he's the npp project scientist so he's

422
00:16:21,509 --> 00:16:18,880
the head scientist for the whole mission

423
00:16:23,350 --> 00:16:21,519
uh he also works at goddard in maryland

424
00:16:25,829 --> 00:16:23,360
and his research

425
00:16:26,870 --> 00:16:25,839
expertise is atmospheric chemistry ozone

426
00:16:28,870 --> 00:16:26,880
layer

427
00:16:30,629 --> 00:16:28,880
did some work with the mount pinatubo

428
00:16:31,590 --> 00:16:30,639
eruption when that went off several

429
00:16:33,990 --> 00:16:31,600
years ago

430
00:16:35,189 --> 00:16:34,000
uh made a big impact on the globe so

431
00:16:36,949 --> 00:16:35,199
he's going to talk a little bit about

432
00:16:38,550 --> 00:16:36,959
npp how it's going to be used for both

433
00:16:40,949 --> 00:16:38,560
scientific research and practical

434
00:16:43,430 --> 00:16:40,959
applications here on earth thanks jim

435
00:16:45,829 --> 00:16:43,440
okay thanks um

436
00:16:48,790 --> 00:16:45,839
can we go back to the

437
00:16:50,949 --> 00:16:48,800
hold of this one by any chance

438
00:16:52,870 --> 00:16:50,959

so it doesn't loop for a minute or is it

439
00:16:54,550 --> 00:16:52,880
just going to loop so

440
00:17:01,350 --> 00:16:54,560
is it better to work off the video

441
00:17:05,270 --> 00:17:02,470
okay

442
00:17:06,309 --> 00:17:05,280
npp flying along as we said we have five

443
00:17:10,150 --> 00:17:06,319
instruments

444
00:17:13,590 --> 00:17:11,350
okay

445
00:17:15,429 --> 00:17:13,600
large instrument on the front

446
00:17:17,510 --> 00:17:15,439
is our imager

447
00:17:20,390 --> 00:17:17,520
viirs and there'll be a test on this

448
00:17:23,350 --> 00:17:20,400
later on what every acronym means

449
00:17:26,949 --> 00:17:23,360
visible infrared imaging radiometer

450
00:17:28,870 --> 00:17:26,959
sweet okay that should fit in a tweet

451
00:17:30,390 --> 00:17:28,880
barely veers

452
00:17:33,510 --> 00:17:30,400
all right this is a 22 channel

453
00:17:34,710 --> 00:17:33,520
instrument that basically takes

454
00:17:38,789 --> 00:17:34,720
all of the

455
00:17:40,710 --> 00:17:38,799
really cool pictures you see generally

456
00:17:43,190 --> 00:17:40,720
are from an imaging instrument they're

457
00:17:45,270 --> 00:17:43,200
from v they're from modis

458
00:17:48,150 --> 00:17:45,280
um there we go that's

459
00:17:51,029 --> 00:17:48,160
the the viirs instrument there um

460
00:17:52,950 --> 00:17:51,039
22 channels at two different

461
00:17:55,669 --> 00:17:52,960
resolutions uh

462
00:17:57,510 --> 00:17:55,679
350 and 750

463
00:17:59,190 --> 00:17:57,520

square kilometers and basically that's

464
00:18:02,549 --> 00:17:59,200
what takes all the cool cool pictures

465
00:18:04,789 --> 00:18:03,669
npp

466
00:18:06,310 --> 00:18:04,799
and

467
00:18:08,710 --> 00:18:06,320
is a

468
00:18:11,350 --> 00:18:08,720
essentially a continuation mission it's

469
00:18:13,110 --> 00:18:11,360
an extension of

470
00:18:15,990 --> 00:18:13,120
what we learned from nasa research

471
00:18:17,990 --> 00:18:16,000
missions to shown to be how valuable it

472
00:18:19,590 --> 00:18:18,000
was and worth continuing

473
00:18:20,630 --> 00:18:19,600
for a lot of different reasons and one

474
00:18:21,350 --> 00:18:20,640
of the

475
00:18:29,669 --> 00:18:21,360
the

476
00:18:32,630 --> 00:18:29,679
things so we were just about in time for

477
00:18:34,630 --> 00:18:32,640
the essentially the generational

478
00:18:37,190 --> 00:18:34,640
upgrade of the weather satellite

479
00:18:39,430 --> 00:18:37,200
instruments and and system

480
00:18:41,270 --> 00:18:39,440
and to do that we essentially launched

481
00:18:43,830 --> 00:18:41,280
the eos missions

482
00:18:46,230 --> 00:18:43,840
um very complicated instruments lots of

483
00:18:48,870 --> 00:18:46,240
them to see what really worked what what

484
00:18:50,950 --> 00:18:48,880
was interesting and essentially the

485
00:18:52,870 --> 00:18:50,960
the best of that or the most useful

486
00:18:54,950 --> 00:18:52,880
suite of that instruments has been

487
00:18:57,510 --> 00:18:54,960
distilled down into the npp plat

488
00:18:58,870 --> 00:18:57,520

platform so we we have the viirs

489
00:19:01,190 --> 00:18:58,880
instrument which is a little smaller

490
00:19:03,750 --> 00:19:01,200
than modis has less less channels but

491
00:19:05,909 --> 00:19:03,760
really has the sort of optimum suite for

492
00:19:07,830 --> 00:19:05,919
doing the things that need to continue

493
00:19:11,270 --> 00:19:07,840
the next two instruments

494
00:19:12,390 --> 00:19:11,280
are the chris crosstrack infrared

495
00:19:15,029 --> 00:19:12,400
sounder

496
00:19:16,630 --> 00:19:15,039
and atms the advanced technology

497
00:19:18,710 --> 00:19:16,640
microwave sounder

498
00:19:21,190 --> 00:19:18,720
the chris instrument essentially is a is

499
00:19:24,310 --> 00:19:21,200
a infrared spec spectrometer takes the

500
00:19:26,710 --> 00:19:24,320
infrared spectrum of of the earth and

501
00:19:29,909 --> 00:19:26,720
the advance that eos made

502
00:19:31,669 --> 00:19:29,919
was that prior to that the infrared

503
00:19:33,909 --> 00:19:31,679
instruments on the polar orbiting were

504
00:19:35,750 --> 00:19:33,919
um discrete channels so you had five or

505
00:19:36,789 --> 00:19:35,760
six channels and that's how they would

506
00:19:38,390 --> 00:19:36,799
do the

507
00:19:41,029 --> 00:19:38,400
the temperature measurement

508
00:19:42,710 --> 00:19:41,039
the air's instrument on the aqua

509
00:19:45,430 --> 00:19:42,720
satellite was the first one to take

510
00:19:48,230 --> 00:19:45,440
essentially the complete spectrum

511
00:19:51,590 --> 00:19:48,240
for doing research we had measured

512
00:19:53,590 --> 00:19:51,600
the earth's infrared spectrum before

513
00:19:56,789 --> 00:19:53,600

on the nimbus 4

514
00:19:59,510 --> 00:19:56,799
satellite between 1970 and 74 and we

515
00:20:02,630 --> 00:19:59,520
didn't get back to it until uh the airs

516
00:20:04,230 --> 00:20:02,640
instrument which was launched in 2002.

517
00:20:05,830 --> 00:20:04,240
so

518
00:20:08,710 --> 00:20:05,840
since we've learned everything about

519
00:20:11,029 --> 00:20:08,720
sort of how having that more more

520
00:20:12,950 --> 00:20:11,039
spectrum more channels really improves

521
00:20:15,270 --> 00:20:12,960
both the temperature and more more

522
00:20:17,430 --> 00:20:15,280
importantly the water vapor profile the

523
00:20:19,190 --> 00:20:17,440
water vapor distributions

524
00:20:21,270 --> 00:20:19,200
and that's coupled to

525
00:20:22,549 --> 00:20:21,280
the advanced technology microwave

526
00:20:24,310 --> 00:20:22,559
sounder

527
00:20:27,190 --> 00:20:24,320
which is a microwave instrument so it

528
00:20:29,590 --> 00:20:27,200
also measures temperature and

529
00:20:31,029 --> 00:20:29,600
moisture in the microwave region and the

530
00:20:32,870 --> 00:20:31,039
the great thing about the microwave

531
00:20:35,590 --> 00:20:32,880
instrument is it's not sensitive to

532
00:20:37,909 --> 00:20:35,600
clouds so you can see around and through

533
00:20:39,990 --> 00:20:37,919
clouds so the combination of the

534
00:20:41,669 --> 00:20:40,000
infrared which has better

535
00:20:43,990 --> 00:20:41,679
vertical resolution

536
00:20:45,270 --> 00:20:44,000
but you can't see around clouds and as

537
00:20:47,909 --> 00:20:45,280
you guys know

538
00:20:49,669 --> 00:20:47,919

interesting weather occurs around clouds

539
00:20:51,909 --> 00:20:49,679
so it's a little you're sort of one of

540
00:20:53,590 --> 00:20:51,919
these betwixt in betweens i get really

541
00:20:55,270 --> 00:20:53,600
good resolution but i can't see through

542
00:20:57,430 --> 00:20:55,280
it so you couple it with a microwave and

543
00:20:58,870 --> 00:20:57,440
you really do that the cool thing about

544
00:21:00,950 --> 00:20:58,880
atms is

545
00:21:03,830 --> 00:21:00,960
it's essentially the same

546
00:21:05,510 --> 00:21:03,840
instruments the same data

547
00:21:06,549 --> 00:21:05,520
as three instruments on the aqua

548
00:21:09,029 --> 00:21:06,559
platform

549
00:21:10,870 --> 00:21:09,039
so essentially they've taken three boxes

550
00:21:12,789 --> 00:21:10,880
and put them into one and if you're

551
00:21:14,070 --> 00:21:12,799
trying to put things in space

552
00:21:16,390 --> 00:21:14,080
real estate

553
00:21:18,149 --> 00:21:16,400
mass power is really really expensive so

554
00:21:19,750 --> 00:21:18,159
you can get if you can get the

555
00:21:22,149 --> 00:21:19,760
efficiencies of putting

556
00:21:24,710 --> 00:21:22,159
three three three boxes in one everyone

557
00:21:29,029 --> 00:21:26,870
the on the aft

558
00:21:31,909 --> 00:21:29,039
right there facing facing backwards is

559
00:21:33,909 --> 00:21:31,919
the omps instrument which carries on the

560
00:21:37,350 --> 00:21:33,919
ozone layer measurements

561
00:21:41,029 --> 00:21:39,110
two instruments on it one that looks

562
00:21:43,750 --> 00:21:41,039
nader which basically carries on the

563
00:21:45,590 --> 00:21:43,760

toms and sbuv maps of of the ozone hull

564
00:21:47,350 --> 00:21:45,600
that you guys have been seeing and then

565
00:21:49,750 --> 00:21:47,360
there's the limb instrument which scott

566
00:21:53,029 --> 00:21:49,760
talked about which actually measures the

567
00:21:54,870 --> 00:21:53,039
limb which is that little that kind of

568
00:21:56,789 --> 00:21:54,880
blue line right there between the white

569
00:21:58,230 --> 00:21:56,799
of the clouds and the dark of space

570
00:22:00,789 --> 00:21:58,240
that's essentially the atmosphere

571
00:22:02,070 --> 00:22:00,799
scattering the sunlight and the om slim

572
00:22:04,070 --> 00:22:02,080
instrument just looks at that little

573
00:22:05,590 --> 00:22:04,080
blue line and measures the amount of

574
00:22:07,669 --> 00:22:05,600
ozone in that little blue line and

575
00:22:09,909 --> 00:22:07,679
that's how you get you very good way of

576
00:22:12,470 --> 00:22:09,919
measuring the vertical distribution how

577
00:22:14,149 --> 00:22:12,480
the ozone changes between the surface

578
00:22:17,190 --> 00:22:14,159
and space

579
00:22:19,029 --> 00:22:17,200
and then then the the last instrument

580
00:22:21,909 --> 00:22:19,039
is the series instrument

581
00:22:25,750 --> 00:22:21,919
which is a basically our energy balance

582
00:22:27,990 --> 00:22:25,760
instrument which looks at how the energy

583
00:22:31,350 --> 00:22:28,000
coming back from the earth

584
00:22:32,549 --> 00:22:31,360
is distributed in the visible and in the

585
00:22:34,070 --> 00:22:32,559
thermal in

586
00:22:36,950 --> 00:22:34,080
infrared so if you're trying to

587
00:22:40,149 --> 00:22:36,960
understand constant solar input

588
00:22:41,909 --> 00:22:40,159

how is how is the surface and clouds

589
00:22:43,190 --> 00:22:41,919
changing in terms of the energy balance

590
00:22:44,789 --> 00:22:43,200
to understand

591
00:22:46,149 --> 00:22:44,799
what's happening

592
00:22:47,510 --> 00:22:46,159
in terms of how

593
00:22:50,149 --> 00:22:47,520
clouds and

594
00:22:52,070 --> 00:22:50,159
surface effects the entire energy

595
00:22:52,950 --> 00:22:52,080
balance and where heat is going in the

596
00:22:57,510 --> 00:22:52,960
earth

597
00:22:59,909 --> 00:22:57,520
so that's our our five instruments

598
00:23:01,830 --> 00:22:59,919
we have

599
00:23:03,350 --> 00:23:01,840
over 30 direct

600
00:23:05,669 --> 00:23:03,360
data products that are made by the

601
00:23:06,950 --> 00:23:05,679
ground system which then fan out to

602
00:23:08,310 --> 00:23:06,960
different

603
00:23:10,310 --> 00:23:08,320
weather centrals in each of the weather

604
00:23:12,710 --> 00:23:10,320
centrals does their own custom

605
00:23:13,909 --> 00:23:12,720
processing of different specialized

606
00:23:16,149 --> 00:23:13,919
products so

607
00:23:17,590 --> 00:23:16,159
product counts are kind of a

608
00:23:19,909 --> 00:23:17,600
nebulous thing in terms of how you want

609
00:23:22,310 --> 00:23:19,919
to do the bookkeeping but it's over 30

610
00:23:24,630 --> 00:23:22,320
different direct products from the data

611
00:23:27,190 --> 00:23:24,640
processing system that we have that's

612
00:23:29,909 --> 00:23:27,200
done in essentially

613
00:23:32,470 --> 00:23:29,919

almost sort of real time

614
00:23:34,710 --> 00:23:32,480
there's a downlink every orbit and then

615
00:23:36,470 --> 00:23:34,720
the data products are out about 40

616
00:23:38,149 --> 00:23:36,480
minutes after the downlink

617
00:23:39,350 --> 00:23:38,159
at svalbard

618
00:23:41,269 --> 00:23:39,360
and then they go from the weather

619
00:23:44,470 --> 00:23:41,279
centrals direct to the weather centrals

620
00:23:47,190 --> 00:23:44,480
and then all the data goes to an archive

621
00:23:48,549 --> 00:23:47,200
which is the national center for climate

622
00:23:50,470 --> 00:23:48,559
data record

623
00:23:53,590 --> 00:23:50,480
national climate data center and you

624
00:23:55,750 --> 00:23:53,600
guys can log on to your class system and

625
00:23:58,870 --> 00:23:55,760
get the data probably two hours after

626
00:24:04,549 --> 00:24:02,390
so um that's what npp does

627
00:24:07,190 --> 00:24:04,559
um it's both

628
00:24:09,909 --> 00:24:07,200
so if you sort of take a top level you

629
00:24:11,990 --> 00:24:09,919
know npp makes observations

630
00:24:13,750 --> 00:24:12,000
that are used for a lot of different

631
00:24:16,549 --> 00:24:13,760
applications almost anything you can

632
00:24:17,510 --> 00:24:16,559
think of on any kind of time scale

633
00:24:20,390 --> 00:24:17,520
from

634
00:24:21,990 --> 00:24:20,400
weather which has to be done right now

635
00:24:24,470 --> 00:24:22,000
smoke

636
00:24:26,470 --> 00:24:24,480
fire floods right right now to

637
00:24:28,870 --> 00:24:26,480
essentially using np

638
00:24:31,430 --> 00:24:28,880

npp data to

639
00:24:33,269 --> 00:24:31,440
add to long-term data records to see

640
00:24:35,830 --> 00:24:33,279
what's is

641
00:24:38,630 --> 00:24:35,840
has the have things changed from now to

642
00:24:40,310 --> 00:24:38,640
where they were in the in the past

643
00:24:42,470 --> 00:24:40,320
and the other critical thing the reason

644
00:24:44,549 --> 00:24:42,480
why we spend a lot of time on this npp

645
00:24:46,710 --> 00:24:44,559
data is one of the few data sets that

646
00:24:47,830 --> 00:24:46,720
actually gets more valuable as it gets

647
00:24:49,590 --> 00:24:47,840
older

648
00:24:50,390 --> 00:24:49,600
because what we're going to be looking

649
00:24:52,710 --> 00:24:50,400
back

650
00:24:55,190 --> 00:24:52,720
is people who are going to be looking at

651
00:24:57,950 --> 00:24:55,200
you know jpss three and four

652
00:25:00,390 --> 00:24:57,960
and looking at multi-decadal records in

653
00:25:02,789 --> 00:25:00,400
2040 and they're going to want to look

654
00:25:04,549 --> 00:25:02,799
look look back and see

655
00:25:06,549 --> 00:25:04,559
what were those instruments how are they

656
00:25:08,630 --> 00:25:06,559
calibrated what's going on

657
00:25:11,269 --> 00:25:08,640
and really understand

658
00:25:13,029 --> 00:25:11,279
what's what those measurements were and

659
00:25:14,630 --> 00:25:13,039
we've and that's one of the advances

660
00:25:17,350 --> 00:25:14,640
we've done when we talk about making a

661
00:25:19,590 --> 00:25:17,360
climate instrument it's characterizing

662
00:25:21,990 --> 00:25:19,600
and calibrating an instrument so when

663
00:25:23,669 --> 00:25:22,000

you look back on that data

664
00:25:27,029 --> 00:25:23,679
you can really understand what's going

665
00:25:28,390 --> 00:25:27,039
on we spend a lot of time in my group

666
00:25:30,789 --> 00:25:28,400
trying to understand

667
00:25:33,350 --> 00:25:30,799
ozone from the nimbus 4 instrument which

668
00:25:36,310 --> 00:25:33,360
is in 1970 and we don't have a lot of

669
00:25:38,470 --> 00:25:36,320
data we have the actual data

670
00:25:40,470 --> 00:25:38,480
but the calibration

671
00:25:42,149 --> 00:25:40,480
the measurements all of the support

672
00:25:44,230 --> 00:25:42,159
things that went along with it aren't

673
00:25:46,070 --> 00:25:44,240
aren't there and that affects the the

674
00:25:48,149 --> 00:25:46,080
quality of our analysis

675
00:25:51,110 --> 00:25:48,159
the data is what it is but trying to

676
00:25:53,830 --> 00:25:51,120
understand it and put error bars and try

677
00:25:57,269 --> 00:25:53,840
to see was it the instrument or

678
00:26:01,590 --> 00:25:57,279
were the ozone levels really at that

679
00:26:02,710 --> 00:26:01,600
time in 1970s so as we go forward npp

680
00:26:05,110 --> 00:26:02,720
eos

681
00:26:07,590 --> 00:26:05,120
really that careful characterization and

682
00:26:09,750 --> 00:26:07,600
calibration of the data putting it all

683
00:26:12,070 --> 00:26:09,760
in the archive makes it incredibly

684
00:26:13,750 --> 00:26:12,080
valuable for future

685
00:26:17,430 --> 00:26:13,760
researchers

686
00:26:25,669 --> 00:26:18,390
and

687
00:26:32,230 --> 00:26:29,029
yes uh two questions

688
00:26:34,470 --> 00:26:32,240

from the time somebody conceived of this

689
00:26:37,269 --> 00:26:34,480
satellite that's going up tonight how

690
00:26:39,430 --> 00:26:37,279
long ago was that and how soon after

691
00:26:41,590 --> 00:26:39,440
launch does it is it actually

692
00:26:42,470 --> 00:26:41,600
operational

693
00:26:44,549 --> 00:26:42,480
um

694
00:26:45,990 --> 00:26:44,559
satellites have very long gestational

695
00:26:48,549 --> 00:26:46,000
periods

696
00:26:50,070 --> 00:26:48,559
i would say probably

697
00:27:00,950 --> 00:26:50,080
in the

698
00:27:01,909 --> 00:27:00,960
um as eos was starting to get

699
00:27:02,870 --> 00:27:01,919
reach

700
00:27:04,070 --> 00:27:02,880
its

701
00:27:06,230 --> 00:27:04,080
um

702
00:27:07,750 --> 00:27:06,240
hadn't been launched yet was but on the

703
00:27:09,909 --> 00:27:07,760
path for launch

704
00:27:12,470 --> 00:27:09,919
what was going to follow eos

705
00:27:14,789 --> 00:27:12,480
and then if you look at the fly-outs

706
00:27:16,870 --> 00:27:14,799
of where you know how many

707
00:27:18,549 --> 00:27:16,880
post satellites there were

708
00:27:20,950 --> 00:27:18,559
um people were looking at sort of

709
00:27:24,070 --> 00:27:20,960
probably doing that in the early

710
00:27:25,350 --> 00:27:24,080
early 90s probably really got to

711
00:27:29,510 --> 00:27:25,360
um

712
00:27:33,669 --> 00:27:31,669
august 98 was sort of

713
00:27:35,669 --> 00:27:33,679

the the easton workshop was sort of the

714
00:27:39,110 --> 00:27:35,679
formal

715
00:27:40,710 --> 00:27:39,120
decision that nasa should work with noaa

716
00:27:43,190 --> 00:27:40,720
and

717
00:27:44,950 --> 00:27:43,200
you know figure out how to infuse the

718
00:27:47,029 --> 00:27:44,960
eos

719
00:27:50,070 --> 00:27:47,039
observations into the next

720
00:27:52,950 --> 00:27:50,080
generation of operational measurements

721
00:27:56,310 --> 00:27:52,960
when will npp data be operational

722
00:27:58,710 --> 00:27:56,320
uh sort of a spectrum it depends

723
00:27:59,750 --> 00:27:58,720
the compe the complexity of the data

724
00:28:02,230 --> 00:27:59,760
product

725
00:28:03,990 --> 00:28:02,240
and the performance of the instrument so

726
00:28:06,389 --> 00:28:04,000
we have brand new instruments brand new

727
00:28:07,750 --> 00:28:06,399
spacecraft brand new ground system

728
00:28:09,830 --> 00:28:07,760
everyone's a little

729
00:28:11,350 --> 00:28:09,840
you know don't want to give

730
00:28:13,110 --> 00:28:11,360
exact things but

731
00:28:16,389 --> 00:28:13,120
i would say for a straightforward

732
00:28:18,230 --> 00:28:16,399
instrument like the microwave radiance

733
00:28:20,230 --> 00:28:18,240
which is a critical

734
00:28:22,470 --> 00:28:20,240
ins you know

735
00:28:23,350 --> 00:28:22,480
measurement that the fork forecasters

736
00:28:26,389 --> 00:28:23,360
want

737
00:28:28,310 --> 00:28:26,399
we do satellite checkout for 90 days

738
00:28:30,710 --> 00:28:28,320

i would expect to see

739
00:28:33,909 --> 00:28:30,720
absent any major issues with the

740
00:28:36,630 --> 00:28:33,919
instrument um the first

741
00:28:41,510 --> 00:28:36,640
uh use of atms data probably

742
00:28:46,789 --> 00:28:44,870
i know that would be 60. no not yeah six

743
00:28:48,710 --> 00:28:46,799
months

744
00:28:51,750 --> 00:28:48,720
i'm sorry i'm you're right

745
00:28:53,190 --> 00:28:51,760
how long does it take to build

746
00:28:54,389 --> 00:28:53,200
um

747
00:28:57,750 --> 00:28:54,399
the build

748
00:28:59,830 --> 00:28:57,760
to the this is this is not a traditional

749
00:29:02,230 --> 00:28:59,840
satellite okay this is

750
00:29:03,909 --> 00:29:02,240
um this the bus took

751
00:29:04,789 --> 00:29:03,919
three years

752
00:29:06,630 --> 00:29:04,799
um

753
00:29:08,230 --> 00:29:06,640
atms probably took

754
00:29:09,510 --> 00:29:08,240
three years

755
00:29:14,549 --> 00:29:09,520
um

756
00:29:18,389 --> 00:29:16,310
so

757
00:29:21,510 --> 00:29:18,399
this was a development

758
00:29:22,549 --> 00:29:21,520
in a brand new programmatic approach

759
00:29:27,350 --> 00:29:22,559
and it

760
00:29:27,360 --> 00:29:32,389
okay other questions

761
00:29:35,990 --> 00:29:34,710
um so knowing that you're sending this

762
00:29:37,669 --> 00:29:36,000
very new

763
00:29:40,470 --> 00:29:37,679

satellite with a lot of new technology

764
00:29:42,630 --> 00:29:40,480
up to orbit on top of a very old and

765
00:29:44,310 --> 00:29:42,640
tried and true rocket system

766
00:29:46,710 --> 00:29:44,320
when will you personally be the most

767
00:29:48,389 --> 00:29:46,720
nervous launch time or

768
00:29:49,830 --> 00:29:48,399
once the satellite starts to go through

769
00:29:50,950 --> 00:29:49,840
its checkout and the data starts coming

770
00:29:55,269 --> 00:29:50,960
in

771
00:29:57,110 --> 00:29:55,279
it's like children

772
00:30:01,430 --> 00:29:57,120
you know they move out but you still

773
00:30:04,630 --> 00:30:02,630
having had

774
00:30:07,590 --> 00:30:04,640
some less than successful launches

775
00:30:09,510 --> 00:30:07,600
recently everyone is of course nervous

776
00:30:10,870 --> 00:30:09,520
um but there's a lot of confidence in

777
00:30:12,710 --> 00:30:10,880
the delta ii i think that's one of the

778
00:30:15,590 --> 00:30:12,720
great things about this is it's the

779
00:30:17,350 --> 00:30:15,600
delta ii it's an excellent team

780
00:30:19,830 --> 00:30:17,360
it's still a rocket

781
00:30:21,830 --> 00:30:19,840
you know i think the the ula motto of

782
00:30:23,430 --> 00:30:21,840
one launch at a time is actually the

783
00:30:25,110 --> 00:30:23,440
right way to think about it

784
00:30:28,630 --> 00:30:25,120
um

785
00:30:30,310 --> 00:30:28,640
150 successful ones prior previous

786
00:30:31,669 --> 00:30:30,320
performance is no guarantee of future

787
00:30:34,149 --> 00:30:31,679
success

788
00:30:35,590 --> 00:30:34,159

but very serious team they work real

789
00:30:36,549 --> 00:30:35,600
real real hard at it and i think we're

790
00:30:39,830 --> 00:30:36,559
all

791
00:30:42,149 --> 00:30:39,840
the fact that this is a very successful

792
00:30:47,269 --> 00:30:42,159
launch vehicle with an excellent team

793
00:30:50,950 --> 00:30:49,590
since it takes eight years to build this

794
00:30:52,389 --> 00:30:50,960
what do you do with advances in

795
00:30:54,070 --> 00:30:52,399
technology

796
00:30:56,070 --> 00:30:54,080
as they happen do you try to keep up

797
00:30:57,590 --> 00:30:56,080
with that or do is it planned and you go

798
00:30:59,350 --> 00:30:57,600
right ahead

799
00:31:01,909 --> 00:30:59,360
um

800
00:31:03,669 --> 00:31:01,919
advances in technology for space things

801
00:31:04,789 --> 00:31:03,679
is a little tricky

802
00:31:06,710 --> 00:31:04,799
because

803
00:31:09,750 --> 00:31:06,720
you'd you want to be just a little bit

804
00:31:11,029 --> 00:31:09,760
backwards a little bit back because

805
00:31:13,190 --> 00:31:11,039
we're going to launch it it's got to

806
00:31:14,789 --> 00:31:13,200
last seven years in space in a hostile

807
00:31:16,470 --> 00:31:14,799
environment you really want to

808
00:31:18,789 --> 00:31:16,480
understand what's going on

809
00:31:20,549 --> 00:31:18,799
so for these operational missions which

810
00:31:21,990 --> 00:31:20,559
have very long lives

811
00:31:23,830 --> 00:31:22,000
you tend to be

812
00:31:25,669 --> 00:31:23,840
not bleeding edge because you want to

813
00:31:27,830 --> 00:31:25,679

know that things really really work and

814
00:31:29,590 --> 00:31:27,840
there's a very complicated qualification

815
00:31:32,549 --> 00:31:29,600
process for

816
00:31:34,470 --> 00:31:32,559
parts and systems and things like that

817
00:31:36,389 --> 00:31:34,480
so we do take advantage of

818
00:31:37,669 --> 00:31:36,399
technologies but we're not always at the

819
00:31:39,269 --> 00:31:37,679
cutting edge

820
00:31:41,029 --> 00:31:39,279
because we want to make sure that

821
00:31:42,070 --> 00:31:41,039
they're they can actually work in this

822
00:31:44,870 --> 00:31:42,080
environment

823
00:31:47,909 --> 00:31:44,880
for the length of time that we want to

824
00:31:49,430 --> 00:31:47,919
do things so we we have fairly advanced

825
00:31:55,269 --> 00:31:49,440
technology but i'm not sure it's like

826
00:31:55,279 --> 00:32:00,870
okay another question in the back

827
00:32:04,789 --> 00:32:02,710
hi can you give an approximation of how

828
00:32:07,029 --> 00:32:04,799
much data volume the npp will produce in

829
00:32:08,149 --> 00:32:07,039
about a day

830
00:32:09,590 --> 00:32:08,159
we do

831
00:32:12,070 --> 00:32:09,600
sort of uh

832
00:32:14,950 --> 00:32:12,080
the generic if you were to say

833
00:32:17,190 --> 00:32:14,960
i need to get all the npp data

834
00:32:18,470 --> 00:32:17,200
you would sort of have to do the sort of

835
00:32:20,230 --> 00:32:18,480
quick rule of thumb is about four

836
00:32:22,230 --> 00:32:20,240
terabytes a day

837
00:32:24,789 --> 00:32:22,240
you know is what you would have to have

838
00:32:25,830 --> 00:32:24,799

a dedicated line for and storage for and

839
00:32:26,830 --> 00:32:25,840
all that

840
00:32:28,549 --> 00:32:26,840
um you

841
00:32:30,549 --> 00:32:28,559
can

842
00:32:31,830 --> 00:32:30,559
proliferate beyond that depending on the

843
00:32:34,149 --> 00:32:31,840
volume of things you want to do and

844
00:32:35,430 --> 00:32:34,159
extra special products and how much

845
00:32:37,509 --> 00:32:35,440
other things you but if you were just a

846
00:32:38,630 --> 00:32:37,519
generic user for four terabytes would

847
00:32:42,630 --> 00:32:38,640
get you

848
00:32:45,029 --> 00:32:42,640
the you know pretty much everything

849
00:32:46,389 --> 00:32:45,039
um i just joined nasa in february of

850
00:32:48,389 --> 00:32:46,399
this year and before then i worked with

851
00:32:50,630 --> 00:32:48,399
the u.s coast guard and the last almost

852
00:32:52,630 --> 00:32:50,640
all of 2010 was spent

853
00:32:54,950 --> 00:32:52,640
uh in the gulf of mexico working on the

854
00:32:56,470 --> 00:32:54,960
deepwater horizon oil spill

855
00:32:58,149 --> 00:32:56,480
one of the most invaluable tools that we

856
00:33:00,549 --> 00:32:58,159
had as we were working through the daily

857
00:33:01,990 --> 00:33:00,559
cleanup operations was satellite imagery

858
00:33:04,149 --> 00:33:02,000
that was coming in from nasa and noaa

859
00:33:05,830 --> 00:33:04,159
that gave us a better real-time

860
00:33:07,430 --> 00:33:05,840
operational picture of where the oil was

861
00:33:08,870 --> 00:33:07,440
in the maritime environment does this

862
00:33:10,230 --> 00:33:08,880
system that's going up have that same

863
00:33:11,590 --> 00:33:10,240

type of capabilities i don't know which

864
00:33:13,350 --> 00:33:11,600
satellite was feeding us at the time

865
00:33:15,190 --> 00:33:13,360
yeah the pictures you were looking at

866
00:33:17,990 --> 00:33:15,200
were modis pictures

867
00:33:19,830 --> 00:33:18,000
and they were either from terra or aqua

868
00:33:21,830 --> 00:33:19,840
probably depending on

869
00:33:23,029 --> 00:33:21,840
either both and depending on what you're

870
00:33:25,190 --> 00:33:23,039
looking at would just be depending on

871
00:33:27,190 --> 00:33:25,200
what the local cloud cover was but yes

872
00:33:29,990 --> 00:33:27,200
we have in those channels we have the

873
00:33:31,590 --> 00:33:30,000
same imagery and it's about the same

874
00:33:34,389 --> 00:33:31,600
physical resolution

875
00:33:40,070 --> 00:33:34,399
so you will get it get that same data as

876
00:33:48,389 --> 00:33:42,710
thank you other questions

877
00:33:51,909 --> 00:33:50,070
um i was just wondering what are some of

878
00:33:53,669 --> 00:33:51,919
the tests you put the satellite through

879
00:33:58,149 --> 00:33:53,679
before sending it into orbit making sure

880
00:34:03,830 --> 00:34:01,110
we okay we do a whole

881
00:34:05,669 --> 00:34:03,840
everything is tested okay so we start

882
00:34:07,029 --> 00:34:05,679
with

883
00:34:09,430 --> 00:34:07,039
an instrument

884
00:34:11,589 --> 00:34:09,440
is built up of lots of little subsystems

885
00:34:14,550 --> 00:34:11,599
all those subsystems are tested

886
00:34:16,869 --> 00:34:14,560
do they work they get put together

887
00:34:18,950 --> 00:34:16,879
and then the instrument is tested as a

888
00:34:20,389 --> 00:34:18,960

whole

889
00:34:21,669 --> 00:34:20,399
does it all work and then the instrument

890
00:34:24,869 --> 00:34:21,679
is calibrated

891
00:34:27,669 --> 00:34:24,879
um so it goes through a thermal vacuum

892
00:34:31,030 --> 00:34:27,679
test to make sure that it can stand the

893
00:34:33,190 --> 00:34:31,040
thermal cycling in space it's shaken so

894
00:34:36,310 --> 00:34:33,200
it goes on a shaker table so it goes you

895
00:34:39,270 --> 00:34:36,320
know backwards forwards and up and down

896
00:34:40,950 --> 00:34:39,280
does what's called emi electromagnetic

897
00:34:42,869 --> 00:34:40,960
interference to make sure that it's not

898
00:34:43,990 --> 00:34:42,879
picking up things from other

899
00:34:46,470 --> 00:34:44,000
other things

900
00:34:49,430 --> 00:34:46,480
um all of the data sets all of the data

901
00:34:50,629 --> 00:34:49,440
formats all of the output is checked

902
00:34:52,230 --> 00:34:50,639
readers

903
00:34:54,310 --> 00:34:52,240
to your reader's work

904
00:34:57,109 --> 00:34:54,320
you know have you got the right drivers

905
00:34:58,950 --> 00:34:57,119
all the standard stuff that all goes

906
00:35:01,190 --> 00:34:58,960
that's all tested it all goes on the

907
00:35:03,510 --> 00:35:01,200
spacecraft and essentially that whole

908
00:35:05,750 --> 00:35:03,520
testing cycle is repeated

909
00:35:07,589 --> 00:35:05,760
um you do the

910
00:35:09,910 --> 00:35:07,599
you saw i don't know it was on this one

911
00:35:14,550 --> 00:35:09,920
you instruments are bolted on

912
00:35:18,390 --> 00:35:16,710
vibration you do acoustics where

913
00:35:20,470 --> 00:35:18,400

essentially they bring

914
00:35:22,470 --> 00:35:20,480
literally it's maryland sound systems

915
00:35:23,990 --> 00:35:22,480
the same guy the two same people that do

916
00:35:26,230 --> 00:35:24,000
rock concerts come and they put the

917
00:35:27,750 --> 00:35:26,240
great wall of speakers next to it and

918
00:35:30,069 --> 00:35:27,760
they blast it with sound because the

919
00:35:31,829 --> 00:35:30,079
launch is extremely noisy so it's can it

920
00:35:34,710 --> 00:35:31,839
withstand that type of

921
00:35:35,750 --> 00:35:34,720
vibration you do emi emc to make sure

922
00:35:37,109 --> 00:35:35,760
the the

923
00:35:39,030 --> 00:35:37,119
data from

924
00:35:40,390 --> 00:35:39,040
signals from veers aren't coming up on

925
00:35:42,390 --> 00:35:40,400
the atms

926
00:35:45,109 --> 00:35:42,400
you know line

927
00:35:47,270 --> 00:35:45,119
another thermal thermal vac and then

928
00:35:48,790 --> 00:35:47,280
all of this is coupled with ground

929
00:35:50,550 --> 00:35:48,800
system tests

930
00:35:52,069 --> 00:35:50,560
so essentially there's a complete ground

931
00:35:55,430 --> 00:35:52,079
system test so

932
00:35:57,349 --> 00:35:55,440
the data comes down in svalbard norway

933
00:35:59,990 --> 00:35:57,359
um and what they do is they actually do

934
00:36:01,190 --> 00:36:00,000
and they take a an rf transmitter they

935
00:36:04,390 --> 00:36:01,200
put it on the

936
00:36:07,109 --> 00:36:04,400
other side of the fjord and they beam rf

937
00:36:09,750 --> 00:36:07,119
data to svalbard send it through to

938
00:36:11,910 --> 00:36:09,760

ensof and then back to the satellite at

939
00:36:13,670 --> 00:36:11,920
ball so there is a complete end-to-end

940
00:36:14,630 --> 00:36:13,680
test of the ground system

941
00:36:16,470 --> 00:36:14,640
and then

942
00:36:18,230 --> 00:36:16,480
the ground data processing system goes

943
00:36:21,510 --> 00:36:18,240
through all the tests

944
00:36:23,910 --> 00:36:21,520
to everybody you know all of the

945
00:36:25,990 --> 00:36:23,920
users at noaa users at the air force the

946
00:36:28,390 --> 00:36:26,000
archive can the does the archive get the

947
00:36:30,390 --> 00:36:28,400
data so there's a complete end-to-end

948
00:36:32,069 --> 00:36:30,400
testing and we've been doing this

949
00:36:34,710 --> 00:36:32,079
for the whole end to end testing for

950
00:36:35,670 --> 00:36:34,720
about 18 months now

951
00:36:36,950 --> 00:36:35,680
and

952
00:36:39,109 --> 00:36:36,960
of course

953
00:36:40,950 --> 00:36:39,119
there's lots of paperwork

954
00:36:42,870 --> 00:36:40,960
and you you laugh but that's what keeps

955
00:36:44,870 --> 00:36:42,880
it all you know

956
00:36:45,990 --> 00:36:44,880
does the file format meet the

957
00:36:47,829 --> 00:36:46,000
description

958
00:36:49,270 --> 00:36:47,839
that you know you you said it did and

959
00:36:52,470 --> 00:36:49,280
when it doesn't

960
00:36:57,030 --> 00:36:55,109
that's your punishment right um i know

961
00:36:58,390 --> 00:36:57,040
how uh funding for scientists works on

962
00:36:59,910 --> 00:36:58,400
deep space missions but i get the idea

963
00:37:01,109 --> 00:36:59,920

that it's different on earth missions

964
00:37:03,030 --> 00:37:01,119
who

965
00:37:04,950 --> 00:37:03,040
gets funded to do research with the data

966
00:37:05,829 --> 00:37:04,960
and where does their funding come from

967
00:37:07,190 --> 00:37:05,839
uh

968
00:37:08,790 --> 00:37:07,200
the

969
00:37:11,430 --> 00:37:08,800
funding

970
00:37:13,270 --> 00:37:11,440
for scientists is pretty much the same

971
00:37:15,990 --> 00:37:13,280
people write proposals and they're

972
00:37:19,030 --> 00:37:16,000
competitively chosen and you get to

973
00:37:20,630 --> 00:37:19,040
analyze data the if this were a nasa

974
00:37:22,870 --> 00:37:20,640
mission

975
00:37:25,109 --> 00:37:22,880
you would be a competitively s

976
00:37:26,790 --> 00:37:25,119
selected for the instrument and or for

977
00:37:29,750 --> 00:37:26,800
the science team

978
00:37:31,910 --> 00:37:29,760
so you know when i did my omino two work

979
00:37:33,990 --> 00:37:31,920
i wrote a proposal and i was chosen to

980
00:37:35,510 --> 00:37:34,000
do to make the data product and we make

981
00:37:37,190 --> 00:37:35,520
the data product and we

982
00:37:38,630 --> 00:37:37,200
that was the original one was a

983
00:37:40,790 --> 00:37:38,640
five-year proposal and now we're on

984
00:37:42,630 --> 00:37:40,800
three-year proposal cycles so basically

985
00:37:44,069 --> 00:37:42,640
every three years people write a

986
00:37:46,310 --> 00:37:44,079
proposal for

987
00:37:48,550 --> 00:37:46,320
um continuing to do the work and then

988
00:37:53,109 --> 00:37:48,560

there's money to do science which is

989
00:37:58,069 --> 00:37:55,589
i've got another question from twitter

990
00:38:00,069 --> 00:37:58,079
how are the jpss satellites better than

991
00:38:01,750 --> 00:38:00,079
the eos satellites at understanding

992
00:38:03,430 --> 00:38:01,760
monitoring and predicting what happens

993
00:38:04,630 --> 00:38:03,440
on earth

994
00:38:08,310 --> 00:38:04,640
um

995
00:38:11,829 --> 00:38:09,270
there

996
00:38:13,190 --> 00:38:11,839
i would say this

997
00:38:15,349 --> 00:38:13,200
they're going to be better because

998
00:38:17,670 --> 00:38:15,359
they're going to keep on going

999
00:38:18,710 --> 00:38:17,680
and that's really the key thing here is

1000
00:38:21,190 --> 00:38:18,720
it's not

1001
00:38:23,109 --> 00:38:21,200
better as in new and improved it's the

1002
00:38:25,510 --> 00:38:23,119
longer we take these excellent

1003
00:38:28,470 --> 00:38:25,520
measurements the more we learn

1004
00:38:31,349 --> 00:38:28,480
and and the more we look for for changes

1005
00:38:33,829 --> 00:38:31,359
so because it's an operational system

1006
00:38:36,069 --> 00:38:33,839
you don't see dramatic improvements i

1007
00:38:37,510 --> 00:38:36,079
mean the current post satellites have

1008
00:38:40,230 --> 00:38:37,520
been flying essentially the same

1009
00:38:41,190 --> 00:38:40,240
instrument suites since the early 80s

1010
00:38:44,630 --> 00:38:41,200
until

1011
00:38:47,750 --> 00:38:44,640
no uh 19 launched in 2009

1012
00:38:50,150 --> 00:38:47,760
so with the exception of a few minor

1013
00:38:52,550 --> 00:38:50,160

changes my noah colleagues will tell me

1014
00:38:53,670 --> 00:38:52,560
about how they improved avhrr but it's

1015
00:38:56,150 --> 00:38:53,680
essentially

1016
00:38:58,470 --> 00:38:56,160
the same thing for 20 years which is how

1017
00:39:01,349 --> 00:38:58,480
you can afford to keep doing this it's

1018
00:39:03,589 --> 00:39:01,359
very expensive to build one-of-a-kinds

1019
00:39:04,870 --> 00:39:03,599
um so if you're a noaa

1020
00:39:06,390 --> 00:39:04,880
you and you're good you know you're

1021
00:39:08,230 --> 00:39:06,400
going to want to build

1022
00:39:09,270 --> 00:39:08,240
you know you have to keep making these

1023
00:39:10,630 --> 00:39:09,280
measurements

1024
00:39:12,310 --> 00:39:10,640
so you're going to try to build them as

1025
00:39:15,670 --> 00:39:12,320
efficiently as you can so you try to

1026
00:39:18,630 --> 00:39:15,680
build the same thing and because

1027
00:39:19,990 --> 00:39:18,640
one your primary users for noaa are the

1028
00:39:20,870 --> 00:39:20,000
weather centrals and they want the same

1029
00:39:21,829 --> 00:39:20,880
data

1030
00:39:25,750 --> 00:39:21,839
and

1031
00:39:28,069 --> 00:39:25,760
the the better part of jpss is that we

1032
00:39:29,910 --> 00:39:28,079
know it's out there and from a science

1033
00:39:31,990 --> 00:39:29,920
perspective we know we're going to get

1034
00:39:34,710 --> 00:39:32,000
the data sets for the next

1035
00:39:38,470 --> 00:39:37,510
all right any other questions

1036
00:39:42,550 --> 00:39:38,480
one more

1037
00:39:44,230 --> 00:39:42,560
um i know that everything at nasa

1038
00:39:46,870 --> 00:39:44,240

you know takes a huge team of people to

1039
00:39:48,470 --> 00:39:46,880
build it's not just the people out front

1040
00:39:51,190 --> 00:39:48,480
so um i was wondering if you could speak

1041
00:39:54,150 --> 00:39:51,200
to i mean how the size of the team and

1042
00:39:55,750 --> 00:39:54,160
uh just you know what they do

1043
00:39:57,349 --> 00:39:55,760
um

1044
00:39:59,910 --> 00:39:57,359
we okay

1045
00:40:00,950 --> 00:39:59,920
the team is at multiple levels

1046
00:40:02,069 --> 00:40:00,960
so

1047
00:40:06,630 --> 00:40:02,079
um

1048
00:40:09,750 --> 00:40:06,640
scott how many people did you have

1049
00:40:12,550 --> 00:40:09,760
building omps

1050
00:40:14,470 --> 00:40:12,560
okay so you had 120 and that ranges

1051
00:40:17,349 --> 00:40:14,480
everywhere from essentially optical

1052
00:40:19,190 --> 00:40:17,359
designers to a scheduler and a

1053
00:40:21,589 --> 00:40:19,200
configuration management person all

1054
00:40:23,030 --> 00:40:21,599
these people work on the team the viirs

1055
00:40:24,950 --> 00:40:23,040
larger instruments were probably in

1056
00:40:25,990 --> 00:40:24,960
excess of 300.

1057
00:40:27,990 --> 00:40:26,000
um

1058
00:40:29,589 --> 00:40:28,000
so you're sort of in that so multiply

1059
00:40:32,870 --> 00:40:29,599
that times five

1060
00:40:35,030 --> 00:40:32,880
uh spacecraft

1061
00:40:36,829 --> 00:40:35,040
another hundreds or so at the space

1062
00:40:41,349 --> 00:40:36,839
spacecraft

1063
00:40:43,030 --> 00:40:41,359

npp is probably 150 on the npp project

1064
00:40:46,390 --> 00:40:43,040
now you got to throw in

1065
00:40:48,390 --> 00:40:46,400
the raytheon ground system people

1066
00:40:50,150 --> 00:40:48,400
450

1067
00:40:52,230 --> 00:40:50,160
people at the archive

1068
00:40:54,710 --> 00:40:52,240
the weather centrals all who are part of

1069
00:40:57,670 --> 00:40:54,720
the team all adding up so

1070
00:40:59,270 --> 00:40:57,680
round numbers what are we at a thousand

1071
00:41:01,270 --> 00:40:59,280
you know something like that just sort

1072
00:41:02,390 --> 00:41:01,280
of one significant figure

1073
00:41:04,790 --> 00:41:02,400
okay

1074
00:41:07,349 --> 00:41:04,800
so easy

1075
00:41:08,790 --> 00:41:07,359
so that's why you had

1076
00:41:11,190 --> 00:41:08,800
that's why there are 800 people coming

1077
00:41:14,470 --> 00:41:11,200
to watch

1078
00:41:24,630 --> 00:41:16,470
all right i think that's all the time we

1079
00:41:28,790 --> 00:41:26,550
okay our next speaker is janice smith

1080
00:41:31,510 --> 00:41:28,800
also from nasa's goddard space flight

1081
00:41:33,589 --> 00:41:31,520
center in maryland um janice is going to

1082
00:41:35,030 --> 00:41:33,599
has been working on the data processing

1083
00:41:37,270 --> 00:41:35,040
system for

1084
00:41:39,430 --> 00:41:37,280
npp and for quite a number of other

1085
00:41:40,790 --> 00:41:39,440
missions that have come out of goddard i

1086
00:41:42,870 --> 00:41:40,800
see here that

1087
00:41:45,270 --> 00:41:42,880
worked on the data system for one of the

1088
00:41:48,069 --> 00:41:45,280

space lab missions

1089
00:41:50,550 --> 00:41:48,079
also for the ur satellite which made

1090
00:41:52,710 --> 00:41:50,560
headlines recently as it came down

1091
00:41:53,510 --> 00:41:52,720
somewhere in the pacific ocean we hope

1092
00:41:55,910 --> 00:41:53,520
um

1093
00:41:57,670 --> 00:41:55,920
so janus will talk to us about the i

1094
00:41:59,349 --> 00:41:57,680
guess really where the

1095
00:42:01,349 --> 00:41:59,359
rubber meets the road for npp is

1096
00:42:02,550 --> 00:42:01,359
delivering the data how it gets out to

1097
00:42:05,829 --> 00:42:02,560
people

1098
00:42:08,790 --> 00:42:07,109
thank you

1099
00:42:10,870 --> 00:42:08,800
as as you've heard that

1100
00:42:14,309 --> 00:42:10,880
the npp mission is actually

1101
00:42:17,109 --> 00:42:14,319
a mission to monitor the health of earth

1102
00:42:19,910 --> 00:42:17,119
from space um obviously it's continuity

1103
00:42:23,829 --> 00:42:19,920
for for noaa and nasa in different

1104
00:42:25,750 --> 00:42:23,839
capacities for nasa this is a continuity

1105
00:42:29,270 --> 00:42:25,760
mission for as you've heard from pearson

1106
00:42:31,430 --> 00:42:29,280
gym both for the climate research

1107
00:42:33,349 --> 00:42:31,440
earth science climate research

1108
00:42:36,470 --> 00:42:33,359
for noaa and

1109
00:42:39,109 --> 00:42:36,480
and also for the dod it is

1110
00:42:41,190 --> 00:42:39,119
appropriate for them in terms of doing

1111
00:42:43,190 --> 00:42:41,200
weather forecasting so you've got dual

1112
00:42:45,670 --> 00:42:43,200
objectives and also there's special

1113
00:42:47,990 --> 00:42:45,680

events as you heard hurricanes fires and

1114
00:42:48,870 --> 00:42:48,000
things like that are also very key

1115
00:42:51,670 --> 00:42:48,880
to

1116
00:42:53,750 --> 00:42:51,680
the activities that are going on but the

1117
00:42:56,630 --> 00:42:53,760
service that mpp will bring to bear to

1118
00:42:58,870 --> 00:42:56,640
both the science and weather forecasting

1119
00:43:00,710 --> 00:42:58,880
communities

1120
00:43:03,910 --> 00:43:00,720
npp is actually going to be launching

1121
00:43:05,510 --> 00:43:03,920
this evening early tomorrow morning and

1122
00:43:07,990 --> 00:43:05,520
it will get

1123
00:43:11,190 --> 00:43:08,000
launched inserted into orbit and

1124
00:43:14,230 --> 00:43:11,200
ultimately will fly at 512 miles above

1125
00:43:18,710 --> 00:43:14,240
the earth it will go through 14 orbits a

1126
00:43:22,870 --> 00:43:18,720
day um so of about 101 minutes orbit per

1127
00:43:24,950 --> 00:43:22,880
day and the uh the satellite will

1128
00:43:27,109 --> 00:43:24,960
collect scientific data from the five

1129
00:43:29,109 --> 00:43:27,119
instruments as well as health and safety

1130
00:43:32,150 --> 00:43:29,119
data from the instruments and the

1131
00:43:35,030 --> 00:43:32,160
spacecraft a little nuance so we refer

1132
00:43:37,030 --> 00:43:35,040
to the spacecraft as the bus the five

1133
00:43:39,829 --> 00:43:37,040
instruments we're collecting the science

1134
00:43:41,270 --> 00:43:39,839
data equate to a satellite so when we

1135
00:43:43,589 --> 00:43:41,280
say satellite we're talking about the

1136
00:43:45,910 --> 00:43:43,599
complement of the payload and the

1137
00:43:48,950 --> 00:43:45,920
spacecraft itself

1138
00:43:52,069 --> 00:43:48,960

with that once we get into orbit we'll

1139
00:43:55,030 --> 00:43:52,079
go through a 90-day checkout period

1140
00:43:56,710 --> 00:43:55,040
activating the bus first and then

1141
00:43:58,309 --> 00:43:56,720
incrementally bringing on

1142
00:44:00,390 --> 00:43:58,319
the instruments until we have a fully

1143
00:44:02,870 --> 00:44:00,400
functioning satellite at the end of

1144
00:44:04,470 --> 00:44:02,880
approximately 90 days

1145
00:44:06,790 --> 00:44:04,480
once we're in orbit

1146
00:44:09,109 --> 00:44:06,800
though the rocket has done its service

1147
00:44:11,510 --> 00:44:09,119
and we're now now

1148
00:44:13,829 --> 00:44:11,520
in place we go through

1149
00:44:15,270 --> 00:44:13,839
a series of command and control

1150
00:44:17,829 --> 00:44:15,280
activities

1151
00:44:20,470 --> 00:44:17,839
as well as data processing on the ground

1152
00:44:22,950 --> 00:44:20,480
the the data so while we talk about the

1153
00:44:24,710 --> 00:44:22,960
flight system being about the spacecraft

1154
00:44:26,950 --> 00:44:24,720
we call it the space segment and the

1155
00:44:29,589 --> 00:44:26,960
launch services excuse me the launch

1156
00:44:31,109 --> 00:44:29,599
supports segment which is for the rocket

1157
00:44:33,510 --> 00:44:31,119
we now have a ground system that's

1158
00:44:35,750 --> 00:44:33,520
comprised of four segments the command

1159
00:44:38,470 --> 00:44:35,760
control and communication segment does

1160
00:44:41,109 --> 00:44:38,480
the commanding of the spacecraft also

1161
00:44:43,750 --> 00:44:41,119
health and monitoring and any kind of

1162
00:44:45,430 --> 00:44:43,760
loads and and software updates that have

1163
00:44:47,510 --> 00:44:45,440

to be

1164
00:44:49,910 --> 00:44:47,520
sent up to the spacecraft we have one

1165
00:44:52,630 --> 00:44:49,920
ground system excuse me ground station

1166
00:44:55,190 --> 00:44:52,640
that's located in svalbard norway

1167
00:44:56,630 --> 00:44:55,200
it's in the arctic circle about 78

1168
00:44:58,950 --> 00:44:56,640
degrees north

1169
00:45:01,430 --> 00:44:58,960
and it's a perfect location because it

1170
00:45:03,349 --> 00:45:01,440
sees the spacecraft

1171
00:45:05,190 --> 00:45:03,359
on every orbit

1172
00:45:07,829 --> 00:45:05,200
so being at that high latitude it gives

1173
00:45:10,309 --> 00:45:07,839
us a chance to see it very

1174
00:45:12,790 --> 00:45:10,319
every orbit and we downlink our science

1175
00:45:15,990 --> 00:45:12,800
data from that location

1176
00:45:18,309 --> 00:45:16,000
routed back to to the us for data

1177
00:45:20,390 --> 00:45:18,319
processing so we go through monitoring

1178
00:45:23,270 --> 00:45:20,400
data processing creating data products

1179
00:45:25,190 --> 00:45:23,280
as jim said of approximately 30 data

1180
00:45:26,470 --> 00:45:25,200
products that are made available for

1181
00:45:27,750 --> 00:45:26,480
both the science and the weather

1182
00:45:30,630 --> 00:45:27,760
communities

1183
00:45:32,630 --> 00:45:30,640
once it comes back down to the c-cube

1184
00:45:34,950 --> 00:45:32,640
system it's routed to the idps the

1185
00:45:37,109 --> 00:45:34,960
informa interface data processing

1186
00:45:39,670 --> 00:45:37,119
segment for data processing and from

1187
00:45:41,829 --> 00:45:39,680
there it's propagated further into a

1188
00:45:43,829 --> 00:45:41,839

science data segment as well as the

1189
00:45:46,630 --> 00:45:43,839
archive and distribution segment for

1190
00:45:49,270 --> 00:45:46,640
additional evaluation for climate usage

1191
00:45:51,670 --> 00:45:49,280
or for archiving and distribution for

1192
00:45:53,990 --> 00:45:51,680
for people that come in and request it

1193
00:45:54,790 --> 00:45:54,000
from the idps we also

1194
00:45:57,589 --> 00:45:54,800
put

1195
00:46:02,150 --> 00:45:57,599
make the data directly available to two

1196
00:46:04,390 --> 00:46:02,160
weather centrals one for the noaa nesdis

1197
00:46:06,790 --> 00:46:04,400
community and another for the air force

1198
00:46:09,270 --> 00:46:06,800
weather agency

1199
00:46:11,829 --> 00:46:09,280
in omaha nebraska so from there they can

1200
00:46:14,790 --> 00:46:11,839
do additional data processing or making

1201
00:46:17,670 --> 00:46:14,800
the data and their products available to

1202
00:46:18,630 --> 00:46:17,680
their their users in their field

1203
00:46:21,430 --> 00:46:18,640
and

1204
00:46:22,790 --> 00:46:21,440
likewise for the scientific community

1205
00:46:24,309 --> 00:46:22,800
um

1206
00:46:26,950 --> 00:46:24,319
let's see

1207
00:46:28,790 --> 00:46:26,960
i think i hit pretty much everything one

1208
00:46:31,270 --> 00:46:28,800
other thing that may be of interest to

1209
00:46:33,910 --> 00:46:31,280
folks is since we do have the the

1210
00:46:36,870 --> 00:46:33,920
svalbard ground station is key

1211
00:46:38,309 --> 00:46:36,880
we adopted a mascot very early on in our

1212
00:46:39,670 --> 00:46:38,319
our mission

1213
00:46:41,430 --> 00:46:39,680

some of you may have already heard it

1214
00:46:42,390 --> 00:46:41,440
some of you may have seen the little

1215
00:46:44,390 --> 00:46:42,400
logos

1216
00:46:46,069 --> 00:46:44,400
is there is a polar bear since we are in

1217
00:46:49,030 --> 00:46:46,079
the arctic circle that's correct we have

1218
00:46:50,950 --> 00:46:49,040
the polar bear and he has become a team

1219
00:46:51,829 --> 00:46:50,960
builder throughout the life of our our

1220
00:46:54,309 --> 00:46:51,839
mission

1221
00:46:55,510 --> 00:46:54,319
and development activities and he's been

1222
00:46:58,870 --> 00:46:55,520
to uh

1223
00:47:01,829 --> 00:46:58,880
numerous places north pole south pole

1224
00:47:03,910 --> 00:47:01,839
throughout the u.s and other continents

1225
00:47:06,790 --> 00:47:03,920
he is a team builder in the sense that

1226
00:47:08,870 --> 00:47:06,800
he's rotated to various members of our

1227
00:47:10,790 --> 00:47:08,880
thousand plus individuals and uh has

1228
00:47:13,430 --> 00:47:10,800
made their trips are on various

1229
00:47:18,230 --> 00:47:13,440
locations and travels around the world

1230
00:47:22,150 --> 00:47:20,390
thank you janice um let's see if we have

1231
00:47:33,270 --> 00:47:22,160
any questions

1232
00:47:37,430 --> 00:47:35,589
thank you um you mentioned briefly sort

1233
00:47:38,950 --> 00:47:37,440
of the process uh the

1234
00:47:40,470 --> 00:47:38,960
prospect of

1235
00:47:43,190 --> 00:47:40,480
sending various

1236
00:47:44,710 --> 00:47:43,200
like firmware software updates to the

1237
00:47:47,829 --> 00:47:44,720
satellite can you talk a little bit more

1238
00:47:50,230 --> 00:47:47,839

about sort of what that process entails

1239
00:47:51,910 --> 00:47:50,240
well we have to uh continue to monitor

1240
00:47:53,829 --> 00:47:51,920
the satellite and the instruments as we

1241
00:47:56,470 --> 00:47:53,839
go through through mission then at some

1242
00:47:57,910 --> 00:47:56,480
point in time there are changes in in

1243
00:48:00,390 --> 00:47:57,920
degradation potentially of the

1244
00:48:02,790 --> 00:48:00,400
instrument or fine-tuning so we do go

1245
00:48:03,750 --> 00:48:02,800
through an upload table load software

1246
00:48:06,470 --> 00:48:03,760
loads

1247
00:48:08,630 --> 00:48:06,480
that are provided by the various

1248
00:48:11,109 --> 00:48:08,640
instrument teams and folks doing

1249
00:48:13,349 --> 00:48:11,119
calibration and assessments

1250
00:48:15,270 --> 00:48:13,359
as they go through algorithm data

1251
00:48:17,589 --> 00:48:15,280
processing on the ground so at that

1252
00:48:20,710 --> 00:48:17,599
point in time we get upgrades to those

1253
00:48:23,190 --> 00:48:20,720
tables and provide them through uh to

1254
00:48:24,790 --> 00:48:23,200
our command and control center um the

1255
00:48:26,230 --> 00:48:24,800
mission operations center in suitland

1256
00:48:28,390 --> 00:48:26,240
maryland at the noaa satellite

1257
00:48:30,630 --> 00:48:28,400
operations facility and then they are

1258
00:48:32,470 --> 00:48:30,640
uploaded via the uh the ground station

1259
00:48:34,390 --> 00:48:32,480
to the satellite when it's in orbit uh

1260
00:48:41,109 --> 00:48:34,400
when it's in view of the

1261
00:48:45,910 --> 00:48:43,670
hi just like my system i do multiple

1262
00:48:48,549 --> 00:48:45,920
backups what do you do in space when

1263
00:48:49,910 --> 00:48:48,559

you're doing an upgrade and

1264
00:48:52,309 --> 00:48:49,920
you're in the middle of it is there a

1265
00:48:54,390 --> 00:48:52,319
backup system on board or several or

1266
00:48:56,150 --> 00:48:54,400
redundancy how does that work there

1267
00:48:58,150 --> 00:48:56,160
there are different uh loads in the

1268
00:49:02,069 --> 00:48:58,160
system where we we don't necessarily

1269
00:49:03,829 --> 00:49:02,079
directly load these tables into uh the

1270
00:49:05,750 --> 00:49:03,839
we are loaded into a separate storage

1271
00:49:08,230 --> 00:49:05,760
area so we can check that out before we

1272
00:49:10,470 --> 00:49:08,240
migrate so there is a a redundancy on

1273
00:49:12,309 --> 00:49:10,480
the spacecraft in terms of uh making

1274
00:49:15,349 --> 00:49:12,319
sure we haven't eliminated our

1275
00:49:17,270 --> 00:49:15,359
operational tables to begin with

1276
00:49:19,430 --> 00:49:17,280
so you go through that and yes and make

1277
00:49:21,270 --> 00:49:19,440
sure that it's working beforehand and we

1278
00:49:24,470 --> 00:49:21,280
also have the capability to check out

1279
00:49:27,190 --> 00:49:24,480
those loads on the ground um with our

1280
00:49:30,950 --> 00:49:29,030
our flight vehicle simulators on the

1281
00:49:34,470 --> 00:49:30,960
ground before we load them up so we have

1282
00:49:34,480 --> 00:49:38,950
other questions

1283
00:49:42,069 --> 00:49:39,829
hi

1284
00:49:43,510 --> 00:49:42,079
um you mentioned that data goes from

1285
00:49:45,430 --> 00:49:43,520
norway to the united states for

1286
00:49:47,270 --> 00:49:45,440
processing yes um

1287
00:49:49,109 --> 00:49:47,280
during that trip is there any type of

1288
00:49:51,030 --> 00:49:49,119

error checking that happens so that way

1289
00:49:53,430 --> 00:49:51,040
we can be sure that data coming from the

1290
00:49:54,790 --> 00:49:53,440
spacecraft down is correct and going

1291
00:49:56,549 --> 00:49:54,800
across

1292
00:49:58,549 --> 00:49:56,559
is correct as well right we do have we

1293
00:50:01,030 --> 00:49:58,559
do have error checking read solomon

1294
00:50:02,549 --> 00:50:01,040
coding so we do have a data check so we

1295
00:50:04,150 --> 00:50:02,559
know that what was sent

1296
00:50:06,549 --> 00:50:04,160
what was received we have the way to

1297
00:50:08,790 --> 00:50:06,559
validate we've received everything okay

1298
00:50:11,270 --> 00:50:08,800
and can you speak um as to how long it

1299
00:50:14,309 --> 00:50:11,280
takes for data to be processed from the

1300
00:50:16,470 --> 00:50:14,319
united states to becoming open to

1301
00:50:17,670 --> 00:50:16,480
scientists and other people well let's

1302
00:50:19,349 --> 00:50:17,680
see um

1303
00:50:21,030 --> 00:50:19,359
there is uh

1304
00:50:22,790 --> 00:50:21,040
it depends on what community you're

1305
00:50:25,190 --> 00:50:22,800
talking about but if you're talking

1306
00:50:27,510 --> 00:50:25,200
about getting the data directly in from

1307
00:50:29,589 --> 00:50:27,520
the archive the archive segment there's

1308
00:50:31,510 --> 00:50:29,599
about a six hour delay in terms of the

1309
00:50:33,829 --> 00:50:31,520
data processing to point what's in

1310
00:50:36,870 --> 00:50:33,839
available in the archive received in the

1311
00:50:39,190 --> 00:50:36,880
archive data system um from the point of

1312
00:50:41,829 --> 00:50:39,200
observation on the spacecraft to data

1313
00:50:43,510 --> 00:50:41,839

products out the back end of our system

1314
00:50:46,870 --> 00:50:43,520
is um

1315
00:50:48,549 --> 00:50:46,880
approximately uh 140 to 180 minutes so

1316
00:50:50,630 --> 00:50:48,559
by the time that the data is being

1317
00:50:52,950 --> 00:50:50,640
downlinked from the spacecraft it's

1318
00:50:54,150 --> 00:50:52,960
already being routed transatlantically

1319
00:50:55,990 --> 00:50:54,160
fiber ii

1320
00:50:57,910 --> 00:50:56,000
back to conus so that we have the

1321
00:51:01,270 --> 00:50:57,920
ability to start processing before we've

1322
00:51:03,670 --> 00:51:01,280
even completed the contact at svalbard

1323
00:51:04,870 --> 00:51:03,680
so it's uh we're already processing the

1324
00:51:06,630 --> 00:51:04,880
beginning of the

1325
00:51:08,630 --> 00:51:06,640
that particular downlink before we've

1326
00:51:10,549 --> 00:51:08,640
even received the end of the pass

1327
00:51:12,950 --> 00:51:10,559
and this is all part of the open data

1328
00:51:15,510 --> 00:51:12,960
initiative by nasa right

1329
00:51:17,349 --> 00:51:15,520
open data initiative uh i'm not sure

1330
00:51:19,109 --> 00:51:17,359
exactly in terms of the data is

1331
00:51:21,829 --> 00:51:19,119
available to the public in the in the

1332
00:51:25,109 --> 00:51:21,839
archive but we also have direct

1333
00:51:26,870 --> 00:51:25,119
users that we propagate the data through

1334
00:51:29,990 --> 00:51:26,880
to in terms of the air force weather

1335
00:51:32,230 --> 00:51:30,000
agency the the noaa

1336
00:51:33,349 --> 00:51:32,240
weather central and the science data

1337
00:51:35,270 --> 00:51:33,359
segment

1338
00:51:37,349 --> 00:51:35,280

for evaluation requirement research

1339
00:51:38,710 --> 00:51:37,359
those as jim was mentioning are are

1340
00:51:40,950 --> 00:51:38,720
selected

1341
00:51:44,950 --> 00:51:40,960
instrumenters and science members

1342
00:51:48,950 --> 00:51:46,790
both you and jim have talked about the

1343
00:51:50,790 --> 00:51:48,960
archive and how the data gets more

1344
00:51:51,990 --> 00:51:50,800
important as it gets older

1345
00:51:54,069 --> 00:51:52,000
how do you plan for that kind of

1346
00:51:57,670 --> 00:51:54,079
archiving how do you plan for having

1347
00:51:59,510 --> 00:51:57,680
data from 2011 being available in 2040

1348
00:52:01,270 --> 00:51:59,520
from an i.t perspective

1349
00:52:03,829 --> 00:52:01,280
well there is certainly an upgrade

1350
00:52:05,589 --> 00:52:03,839
process or a technology refresh that in

1351
00:52:07,349 --> 00:52:05,599
this case noah has to go through in

1352
00:52:08,230 --> 00:52:07,359
terms of the

1353
00:52:09,990 --> 00:52:08,240
the

1354
00:52:12,870 --> 00:52:10,000
archiving distribution segment which is

1355
00:52:15,829 --> 00:52:12,880
part of a larger comprehensive uh data

1356
00:52:18,390 --> 00:52:15,839
archive and they've got data in there

1357
00:52:22,230 --> 00:52:18,400
from many other programs as well as what

1358
00:52:23,670 --> 00:52:22,240
will be npp going forward so they have

1359
00:52:25,430 --> 00:52:23,680
the need to

1360
00:52:27,430 --> 00:52:25,440
archive data for perpetuity in

1361
00:52:30,470 --> 00:52:27,440
perpetuity so you have the data

1362
00:52:31,510 --> 00:52:30,480
available it becomes a matter of

1363
00:52:33,190 --> 00:52:31,520

how you

1364
00:52:35,589 --> 00:52:33,200
you store the data in terms of the data

1365
00:52:38,950 --> 00:52:35,599
format the metadata for its easy access

1366
00:52:41,270 --> 00:52:38,960
and research uh research extraction

1367
00:52:44,950 --> 00:52:41,280
thank you

1368
00:52:49,589 --> 00:52:47,030
oh here we go

1369
00:52:51,430 --> 00:52:49,599
hi so uh as i understand this was

1370
00:52:53,589 --> 00:52:51,440
initially mpb was initially going to be

1371
00:52:54,630 --> 00:52:53,599
the first generation of a collaboration

1372
00:52:56,790 --> 00:52:54,640
between

1373
00:52:58,309 --> 00:52:56,800
noaa and the department of defense and

1374
00:52:59,750 --> 00:52:58,319
now that's not quite going to happen but

1375
00:53:02,069 --> 00:52:59,760
you're still going to share some of the

1376
00:53:03,670 --> 00:53:02,079
common ground infrastructure

1377
00:53:05,190 --> 00:53:03,680
and can you talk about some of the

1378
00:53:08,069 --> 00:53:05,200
things you'll be testing and learning on

1379
00:53:11,030 --> 00:53:08,079
the ground as part of that collaboration

1380
00:53:12,790 --> 00:53:11,040
or not right well actually at the

1381
00:53:16,549 --> 00:53:12,800
beginning of the

1382
00:53:20,470 --> 00:53:16,559
specifically it was a partnership

1383
00:53:22,630 --> 00:53:20,480
between noaa nasa and dod

1384
00:53:25,589 --> 00:53:22,640
since the program the end pros program

1385
00:53:27,990 --> 00:53:25,599
has has been altered uh the jpss is

1386
00:53:30,549 --> 00:53:28,000
actually looking at only the the jps the

1387
00:53:31,270 --> 00:53:30,559
future jpss which mpp is the predecessor

1388
00:53:35,349 --> 00:53:31,280

for

1389
00:53:37,589 --> 00:53:35,359
now and so

1390
00:53:39,990 --> 00:53:37,599
our architecture our our mission system

1391
00:53:42,870 --> 00:53:40,000
architecture already included many of

1392
00:53:46,230 --> 00:53:42,880
those k aspects on the ground so in

1393
00:53:48,230 --> 00:53:46,240
terms of interface uh definitions and uh

1394
00:53:50,309 --> 00:53:48,240
concepts of where these physical

1395
00:53:53,030 --> 00:53:50,319
locations and the processing capability

1396
00:53:54,710 --> 00:53:53,040
of these other sites have been in place

1397
00:53:57,670 --> 00:53:54,720
and being tested throughout the life of

1398
00:54:00,309 --> 00:53:57,680
the development effort so we have in the

1399
00:54:03,270 --> 00:54:00,319
future going forward there would be the

1400
00:54:04,710 --> 00:54:03,280
potential for two additional um dod

1401
00:54:06,950 --> 00:54:04,720
weather essentials to be added into the

1402
00:54:10,069 --> 00:54:06,960
mix that we have the two for mpp

1403
00:54:12,390 --> 00:54:10,079
so that that is a continually evolving

1404
00:54:15,670 --> 00:54:12,400
development effort so while npp ground

1405
00:54:17,910 --> 00:54:15,680
system is uh developed

1406
00:54:19,270 --> 00:54:17,920
and will be upgraded as we move forward

1407
00:54:20,790 --> 00:54:19,280
into the next generations of those

1408
00:54:23,510 --> 00:54:20,800
satellites so in a sense we're

1409
00:54:24,710 --> 00:54:23,520
continually testing implementing testing

1410
00:54:27,109 --> 00:54:24,720
and bringing online different

1411
00:54:29,109 --> 00:54:27,119
capabilities

1412
00:54:32,790 --> 00:54:29,119
we have uh two questions from twitter

1413
00:54:35,109 --> 00:54:32,800

one from navy singer 117 and it's can

1414
00:54:39,510 --> 00:54:35,119
you explain how one can gain access to

1415
00:54:42,150 --> 00:54:39,520
the high rate data capability of mpp

1416
00:54:43,510 --> 00:54:42,160
oh the hr uh okay high date high data

1417
00:54:46,390 --> 00:54:43,520
rate capability i

1418
00:54:48,549 --> 00:54:46,400
um let's see here uh let me go back and

1419
00:54:49,670 --> 00:54:48,559
explain what that is first and and then

1420
00:54:52,309 --> 00:54:49,680
we'll see if we can answer the real

1421
00:54:55,270 --> 00:54:52,319
question um there is also a capability

1422
00:54:58,470 --> 00:54:55,280
on the mpp spacecraft for high data rate

1423
00:55:00,150 --> 00:54:58,480
um uh broadcast direct broadcast

1424
00:55:01,430 --> 00:55:00,160
um for

1425
00:55:04,150 --> 00:55:01,440
uh

1426
00:55:07,430 --> 00:55:04,160
for people that are have regional

1427
00:55:09,190 --> 00:55:07,440
uh data systems or antenna systems we

1428
00:55:12,470 --> 00:55:09,200
have the ability or they have the

1429
00:55:14,230 --> 00:55:12,480
ability to collect data in real time as

1430
00:55:16,230 --> 00:55:14,240
the satellite is passing over their

1431
00:55:18,309 --> 00:55:16,240
particular locations they have the

1432
00:55:21,030 --> 00:55:18,319
capability of the equipment to to

1433
00:55:22,710 --> 00:55:21,040
receive that data so many of the

1434
00:55:25,190 --> 00:55:22,720
universities and some of the other

1435
00:55:27,510 --> 00:55:25,200
regional users that feel like they need

1436
00:55:31,109 --> 00:55:27,520
and want the data for their particular

1437
00:55:34,230 --> 00:55:31,119
region can receive that data in terms of

1438
00:55:36,309 --> 00:55:34,240

uh um accepting it it's not the science

1439
00:55:38,390 --> 00:55:36,319
downlink that is directly for svalbard

1440
00:55:43,750 --> 00:55:38,400
but there's another antenna system on

1441
00:55:49,750 --> 00:55:47,349
this is the science mission downlink the

1442
00:55:51,750 --> 00:55:49,760
high data rate broadcast that's

1443
00:55:54,710 --> 00:55:51,760
continuing in real time throughout the

1444
00:55:56,470 --> 00:55:54,720
life of the mission and then the tdrs uh

1445
00:55:58,710 --> 00:55:56,480
tdrs antenna as well for uh

1446
00:56:01,670 --> 00:55:58,720
communications as need be this is the

1447
00:56:02,870 --> 00:56:01,680
high date data rate uh antenna system of

1448
00:56:04,950 --> 00:56:02,880
which

1449
00:56:06,710 --> 00:56:04,960
people that are interested have the

1450
00:56:08,710 --> 00:56:06,720
ability to create

1451
00:56:10,870 --> 00:56:08,720
generate their own receive stations and

1452
00:56:12,789 --> 00:56:10,880
collect that data in terms of the

1453
00:56:15,270 --> 00:56:12,799
details for uh

1454
00:56:17,109 --> 00:56:15,280
setting up that type of capability um

1455
00:56:18,870 --> 00:56:17,119
there are there is information on the

1456
00:56:20,710 --> 00:56:18,880
website for that but i i don't have the

1457
00:56:22,710 --> 00:56:20,720
specific details at hand

1458
00:56:24,630 --> 00:56:22,720
because it's more of an external

1459
00:56:27,030 --> 00:56:24,640
capability for those that want to go but

1460
00:56:29,670 --> 00:56:27,040
we do have the information on the

1461
00:56:32,309 --> 00:56:29,680
on the website the website being

1462
00:56:34,789 --> 00:56:32,319
mpp.gsfc.nasa.gov

1463
00:56:37,190 --> 00:56:34,799

and there is also a link to the direct

1464
00:56:39,109 --> 00:56:37,200
readout capability web uh

1465
00:56:40,630 --> 00:56:39,119
location that gives you more information

1466
00:56:42,390 --> 00:56:40,640
about them

1467
00:56:45,510 --> 00:56:42,400
to 100k for

1468
00:56:47,109 --> 00:56:45,520
a regional station okay

1469
00:56:52,950 --> 00:56:47,119
we'll put that website up on the twitter

1470
00:56:57,910 --> 00:56:54,630
yeah there's a there's another question

1471
00:56:59,990 --> 00:56:57,920
from uh twitter and that is uh from the

1472
00:57:01,990 --> 00:57:00,000
real jd flux

1473
00:57:03,750 --> 00:57:02,000
what type of systems are used to process

1474
00:57:07,030 --> 00:57:03,760
the npp data

1475
00:57:09,510 --> 00:57:07,040
linux unix windows super computers

1476
00:57:13,030 --> 00:57:09,520
well that's a combination um right now

1477
00:57:14,950 --> 00:57:13,040
and we're going through uh evaluation

1478
00:57:16,390 --> 00:57:14,960
oh yeah that's a really that's more of a

1479
00:57:18,069 --> 00:57:16,400
technical question

1480
00:57:20,230 --> 00:57:18,079
um

1481
00:57:24,390 --> 00:57:20,240
we're ibm based

1482
00:57:30,309 --> 00:57:27,270
have the details on that i might have to

1483
00:57:32,230 --> 00:57:30,319
it's my mostly ibm based for the the

1484
00:57:34,710 --> 00:57:32,240
interface data processing where the data

1485
00:57:36,789 --> 00:57:34,720
products are actually uh generated um we

1486
00:57:39,430 --> 00:57:36,799
are looking at some as we go forward

1487
00:57:41,670 --> 00:57:39,440
with some additional upgrades

1488
00:57:46,230 --> 00:57:41,680

and enhancements but the base system

1489
00:57:52,950 --> 00:57:48,230
okay i think we have time for one more

1490
00:57:57,670 --> 00:57:55,510
um well i wanted to know as a as an

1491
00:58:02,549 --> 00:57:57,680
expert uh where do you get your weather

1492
00:58:06,630 --> 00:58:04,630
it probably depends i i when i'm

1493
00:58:09,349 --> 00:58:06,640
watching the local news at home and

1494
00:58:11,270 --> 00:58:09,359
being in the washington dc area and

1495
00:58:13,589 --> 00:58:11,280
close to goddard there's frequently the

1496
00:58:15,510 --> 00:58:13,599
weather reports on the news and and it's

1497
00:58:18,150 --> 00:58:15,520
always oh there's one of our satellites

1498
00:58:20,230 --> 00:58:18,160
um otherwise it's frequently i will go

1499
00:58:22,789 --> 00:58:20,240
to the the weather

1500
00:58:25,109 --> 00:58:22,799
the weather channel websites

1501
00:58:26,549 --> 00:58:25,119
or other other websites and and some of

1502
00:58:30,069 --> 00:58:26,559
the nasa direct websites uh the

1503
00:58:30,079 --> 00:58:38,150
okay thank you thank you janice

1504
00:58:43,109 --> 00:58:40,230
okay our next speaker is scott asbury

1505
00:58:45,430 --> 00:58:43,119
and he is senior program manager at ball

1506
00:58:48,309 --> 00:58:45,440
aerospace and technology corporation in

1507
00:58:50,789 --> 00:58:48,319
colorado they built npp and a lot of the

1508
00:58:52,390 --> 00:58:50,799
instruments that are on it um scott

1509
00:58:55,990 --> 00:58:52,400
specifically i think this was mentioned

1510
00:58:57,910 --> 00:58:56,000
earlier worked on the ozone measuring

1511
00:58:59,670 --> 00:58:57,920
omps instrument on the satellite and

1512
00:59:01,430 --> 00:58:59,680
he's going to talk a bit about how you

1513
00:59:03,190 --> 00:59:01,440

build a satellite and the instruments

1514
00:59:05,829 --> 00:59:03,200
that are on npp

1515
00:59:07,270 --> 00:59:05,839
scott

1516
00:59:09,510 --> 00:59:07,280
thank you

1517
00:59:11,270 --> 00:59:09,520
good morning and we provided a handout

1518
00:59:13,270 --> 00:59:11,280
that you can pull out and look at and we

1519
00:59:15,270 --> 00:59:13,280
can talk about how we actually

1520
00:59:17,270 --> 00:59:15,280
build a spacecraft

1521
00:59:20,390 --> 00:59:17,280
it took about three years to build the

1522
00:59:22,069 --> 00:59:20,400
basic npp spacecraft bus as we call it

1523
00:59:23,270 --> 00:59:22,079
and from that point we began to

1524
00:59:25,190 --> 00:59:23,280
integrate instruments as they were

1525
00:59:26,789 --> 00:59:25,200
delivered to the spacecraft over the

1526
00:59:27,829 --> 00:59:26,799
period of about another another three

1527
00:59:29,190 --> 00:59:27,839
years

1528
00:59:30,470 --> 00:59:29,200
so when you look at the photos you can

1529
00:59:32,549 --> 00:59:30,480
see that the first thing we do is we

1530
00:59:34,390 --> 00:59:32,559
build a structure called the bus

1531
00:59:35,589 --> 00:59:34,400
and the bus is basically the basic

1532
00:59:37,510 --> 00:59:35,599
spacecraft

1533
00:59:38,870 --> 00:59:37,520
minus its instruments

1534
00:59:40,789 --> 00:59:38,880
and

1535
00:59:43,190 --> 00:59:40,799
once the bus structure is built there's

1536
00:59:44,390 --> 00:59:43,200
a wire harnessing it goes on so that is

1537
00:59:45,750 --> 00:59:44,400
putting all the wiring into the

1538
00:59:47,670 --> 00:59:45,760

spacecraft to talk to all the

1539
00:59:50,309 --> 00:59:47,680
instruments and all the other systems

1540
00:59:51,829 --> 00:59:50,319
on the spacecraft

1541
00:59:53,270 --> 00:59:51,839
the spacecraft subsystems that are

1542
00:59:56,069 --> 00:59:53,280
integrated they include things like

1543
00:59:58,470 --> 00:59:56,079
avionics and batteries computers on

1544
01:00:00,470 --> 00:59:58,480
board the systems on the spacecraft that

1545
01:00:02,710 --> 01:00:00,480
operate it the telecommunications system

1546
01:00:04,470 --> 01:00:02,720
that control the the

1547
01:00:06,390 --> 01:00:04,480
s and x-band

1548
01:00:08,470 --> 01:00:06,400
antenna systems

1549
01:00:10,150 --> 01:00:08,480
and those are integrated we have a star

1550
01:00:11,670 --> 01:00:10,160
tracker on board ball built star

1551
01:00:13,670 --> 01:00:11,680
trackers that

1552
01:00:15,910 --> 01:00:13,680
basically track the position of the

1553
01:00:18,069 --> 01:00:15,920
spacecraft as it flies along and on

1554
01:00:20,549 --> 01:00:18,079
board the spacecraft are reaction

1555
01:00:23,510 --> 01:00:20,559
control wheels and torque rods and what

1556
01:00:25,510 --> 01:00:23,520
those do as those keep the spacecraft

1557
01:00:26,950 --> 01:00:25,520
properly oriented and accurately

1558
01:00:29,030 --> 01:00:26,960
pointing at the earth

1559
01:00:31,430 --> 01:00:29,040
pointing requirements and pointing

1560
01:00:32,390 --> 01:00:31,440
knowledge and stability is extremely

1561
01:00:34,630 --> 01:00:32,400
important

1562
01:00:36,710 --> 01:00:34,640
the spacecraft does not want to be

1563
01:00:39,190 --> 01:00:36,720

shaking as it flies along that would

1564
01:00:41,349 --> 01:00:39,200
result in blurred images so it's what we

1565
01:00:43,270 --> 01:00:41,359
call jitter has to be controlled as the

1566
01:00:45,990 --> 01:00:43,280
spacecraft flies along we have a

1567
01:00:47,910 --> 01:00:46,000
propulsion system on board that's

1568
01:00:49,990 --> 01:00:47,920
used for orbital maintenance

1569
01:00:52,230 --> 01:00:50,000
and it's also used at the end of the

1570
01:00:53,990 --> 01:00:52,240
mission for a deorbit burn so you've

1571
01:00:55,829 --> 01:00:54,000
heard about spacecraft re-entering

1572
01:00:57,270 --> 01:00:55,839
recently out of control not knowing

1573
01:00:59,109 --> 01:00:57,280
where they're going to hit

1574
01:01:01,270 --> 01:00:59,119
when npp is decommissioned on orbit and

1575
01:01:02,710 --> 01:01:01,280
its life is over the propulsion system

1576
01:01:04,950 --> 01:01:02,720
will be used to

1577
01:01:06,470 --> 01:01:04,960
target a specific area

1578
01:01:09,030 --> 01:01:06,480
over the ocean and that's where the

1579
01:01:11,349 --> 01:01:09,040
spacecraft will be dropped in a long

1580
01:01:13,589 --> 01:01:11,359
long time from now so

1581
01:01:16,309 --> 01:01:13,599
yeah the solar array is what provides

1582
01:01:17,510 --> 01:01:16,319
the power for the spacecraft so it's uh

1583
01:01:18,710 --> 01:01:17,520
it's folded

1584
01:01:20,069 --> 01:01:18,720
at launch

1585
01:01:22,230 --> 01:01:20,079
stored up against the side of the

1586
01:01:24,309 --> 01:01:22,240
spacecraft and that solar array is

1587
01:01:26,549 --> 01:01:24,319
deployed shortly after launch it's an

1588
01:01:27,990 --> 01:01:26,559

automated deployment sequence

1589
01:01:29,589 --> 01:01:28,000
so one of the first things you want to

1590
01:01:30,470 --> 01:01:29,599
do once you separate from the launch

1591
01:01:32,549 --> 01:01:30,480
vehicle

1592
01:01:34,309 --> 01:01:32,559
is to get in a positive power mode get

1593
01:01:35,430 --> 01:01:34,319
the spacecraft properly pointing and

1594
01:01:37,349 --> 01:01:35,440
orient

1595
01:01:39,670 --> 01:01:37,359
just get the solar array pointed at the

1596
01:01:41,349 --> 01:01:39,680
sun and begin to generate power because

1597
01:01:42,870 --> 01:01:41,359
the batteries on board the spacecraft

1598
01:01:45,589 --> 01:01:42,880
will not last very long without the

1599
01:01:47,430 --> 01:01:45,599
ability to replenish them by generating

1600
01:01:50,549 --> 01:01:47,440
power when you're in the sun

1601
01:01:55,270 --> 01:01:52,870
solar array that's probably one of the

1602
01:01:56,789 --> 01:01:55,280
things i worry about the most because

1603
01:01:59,430 --> 01:01:56,799
if it doesn't deploy you don't have a

1604
01:02:01,270 --> 01:01:59,440
mission so there are multiple automated

1605
01:02:03,349 --> 01:02:01,280
deployment attempts

1606
01:02:05,349 --> 01:02:03,359
so if it doesn't deploy initially will

1607
01:02:09,029 --> 01:02:05,359
be another attempt a few minutes later

1608
01:02:10,630 --> 01:02:09,039
to automatically deploy that solar array

1609
01:02:12,390 --> 01:02:10,640
once the bus is done when all the

1610
01:02:15,589 --> 01:02:12,400
systems are on board and you begin to

1611
01:02:17,430 --> 01:02:15,599
integrate instruments over time

1612
01:02:18,710 --> 01:02:17,440
basically it's about a one month center

1613
01:02:20,950 --> 01:02:18,720

for integrating instruments so there's

1614
01:02:22,630 --> 01:02:20,960
five instruments so you could if all the

1615
01:02:23,990 --> 01:02:22,640
instruments came in right on time you

1616
01:02:26,390 --> 01:02:24,000
could integrate all five of those

1617
01:02:28,150 --> 01:02:26,400
instruments in about five months of time

1618
01:02:30,950 --> 01:02:28,160
and the instruments that were integrated

1619
01:02:34,549 --> 01:02:30,960
the first was atms that jim talked about

1620
01:02:36,390 --> 01:02:34,559
that was built by northrop grumman

1621
01:02:39,109 --> 01:02:36,400
series was also built by northrop

1622
01:02:41,910 --> 01:02:39,119
grumman that was integrated second

1623
01:02:43,829 --> 01:02:41,920
then omps was built by ball aerospace

1624
01:02:45,670 --> 01:02:43,839
and the team i led it took about six

1625
01:02:47,190 --> 01:02:45,680
years to build omps from beginning to

1626
01:02:49,190 --> 01:02:47,200
end so it was

1627
01:02:52,230 --> 01:02:49,200
it took quite a while to do that

1628
01:02:54,789 --> 01:02:52,240
um there's the visible imager which is a

1629
01:02:56,309 --> 01:02:54,799
huge instrument on the spacecraft and

1630
01:02:57,670 --> 01:02:56,319
it's the main reason this spacecraft is

1631
01:02:59,670 --> 01:02:57,680
shaped like a wedge

1632
01:03:01,670 --> 01:02:59,680
that instrument is so large that we had

1633
01:03:03,910 --> 01:03:01,680
to design the structure to accept the

1634
01:03:05,430 --> 01:03:03,920
instrument you can see on the front we

1635
01:03:07,190 --> 01:03:05,440
had designed the structure to accept the

1636
01:03:09,589 --> 01:03:07,200
instrument and still fit within the

1637
01:03:11,670 --> 01:03:09,599
delta ii fairing so that was the driver

1638
01:03:12,950 --> 01:03:11,680

for why the spacecraft is shaped the way

1639
01:03:15,190 --> 01:03:12,960
it is

1640
01:03:16,950 --> 01:03:15,200
the last instrument integrated was the

1641
01:03:19,510 --> 01:03:16,960
crosstrack infrared sounder that was

1642
01:03:21,430 --> 01:03:19,520
done in mid 2010

1643
01:03:23,430 --> 01:03:21,440
so once all the instruments are on board

1644
01:03:25,510 --> 01:03:23,440
from that point to launch is

1645
01:03:27,349 --> 01:03:25,520
approximately another year

1646
01:03:29,589 --> 01:03:27,359
to a little bit more than a year to do

1647
01:03:30,630 --> 01:03:29,599
what we call the full satellite level

1648
01:03:32,549 --> 01:03:30,640
testing

1649
01:03:34,710 --> 01:03:32,559
once all the instruments are aboard

1650
01:03:36,470 --> 01:03:34,720
then we take the satellite we basically

1651
01:03:38,150 --> 01:03:36,480
subject it at the satellite level with

1652
01:03:40,309 --> 01:03:38,160
all its instruments to what it's going

1653
01:03:42,710 --> 01:03:40,319
to experience over its life both through

1654
01:03:44,870 --> 01:03:42,720
launch the ascent phase

1655
01:03:47,589 --> 01:03:44,880
the release and then the

1656
01:03:49,910 --> 01:03:47,599
it's on orbit phase so we go through

1657
01:03:52,150 --> 01:03:49,920
vibration testing so this simulates the

1658
01:03:54,789 --> 01:03:52,160
launch loads with with margin so what we

1659
01:03:56,549 --> 01:03:54,799
do is we actually subject the spacecraft

1660
01:03:58,309 --> 01:03:56,559
and all its instruments to

1661
01:03:59,910 --> 01:03:58,319
more force and more loads than it will

1662
01:04:01,589 --> 01:03:59,920
actually see in the launch vehicle and

1663
01:04:03,589 --> 01:04:01,599

that gives us margin and the confidence

1664
01:04:05,589 --> 01:04:03,599
to know that our design is sound the

1665
01:04:06,710 --> 01:04:05,599
spacecraft will withstand the launch

1666
01:04:09,270 --> 01:04:06,720
environment

1667
01:04:10,950 --> 01:04:09,280
we also do acoustic level testing

1668
01:04:12,870 --> 01:04:10,960
basically launch vehicles as you'll see

1669
01:04:15,430 --> 01:04:12,880
tomorrow tonight i guess tomorrow

1670
01:04:17,190 --> 01:04:15,440
morning early they're quite loud

1671
01:04:19,589 --> 01:04:17,200
and the spacecraft is sitting right on

1672
01:04:22,390 --> 01:04:19,599
top of that so it's going to experience

1673
01:04:25,029 --> 01:04:22,400
you know in excess of right around 140

1674
01:04:26,710 --> 01:04:25,039
decibels of sound that's quite loud so

1675
01:04:29,510 --> 01:04:26,720
what we actually did

1676
01:04:31,349 --> 01:04:29,520
is uh we set up 144

1677
01:04:33,270 --> 01:04:31,359
rock concert speakers around the

1678
01:04:34,150 --> 01:04:33,280
spacecraft you can see that in your

1679
01:04:37,109 --> 01:04:34,160
picture

1680
01:04:38,950 --> 01:04:37,119
we blasted it with 144 decibels of sound

1681
01:04:40,390 --> 01:04:38,960
and that amount of acoustic energy is

1682
01:04:41,990 --> 01:04:40,400
actually unbelievable

1683
01:04:45,349 --> 01:04:42,000
you don't want to be around it when it

1684
01:04:46,710 --> 01:04:45,359
happens it's absolutely deafening

1685
01:04:49,430 --> 01:04:46,720
after that we go to electronic

1686
01:04:52,069 --> 01:04:49,440
electromagnetic interference or emi emc

1687
01:04:53,349 --> 01:04:52,079
testing and what we do is we basically

1688
01:04:55,589 --> 01:04:53,359

turn all the systems on on the

1689
01:04:57,510 --> 01:04:55,599
spacecraft all the instruments on and

1690
01:04:59,750 --> 01:04:57,520
then we hit it with electromagnetic

1691
01:05:01,910 --> 01:04:59,760
energy and we make sure that the

1692
01:05:03,990 --> 01:05:01,920
electronics in the instruments in the

1693
01:05:05,990 --> 01:05:04,000
systems don't pick that up what you

1694
01:05:07,750 --> 01:05:06,000
don't want in your design is you don't

1695
01:05:09,029 --> 01:05:07,760
want to design an antenna in your

1696
01:05:11,190 --> 01:05:09,039
instrument

1697
01:05:12,630 --> 01:05:11,200
not knowing you did that and have that

1698
01:05:14,710 --> 01:05:12,640
pick that signal up when another

1699
01:05:16,549 --> 01:05:14,720
instrument's operating if you do that

1700
01:05:18,789 --> 01:05:16,559
you can actually absolutely

1701
01:05:20,630 --> 01:05:18,799
get bad data out of your instrument so

1702
01:05:22,710 --> 01:05:20,640
we run a lot of tests to make sure that

1703
01:05:24,950 --> 01:05:22,720
our emi emc

1704
01:05:26,309 --> 01:05:24,960
compatibility is correct and the

1705
01:05:27,750 --> 01:05:26,319
instruments will perform their mission

1706
01:05:28,789 --> 01:05:27,760
and the spacecraft will operate as

1707
01:05:30,390 --> 01:05:28,799
planned

1708
01:05:32,549 --> 01:05:30,400
after that we go into a large thermal

1709
01:05:35,029 --> 01:05:32,559
vacuum chamber so we put the satellite

1710
01:05:37,670 --> 01:05:35,039
down into a huge a very large chamber

1711
01:05:38,789 --> 01:05:37,680
and we flood that chamber with liquid

1712
01:05:40,230 --> 01:05:38,799
nitrogen

1713
01:05:42,870 --> 01:05:40,240

the shroud actually goes down to about

1714
01:05:45,670 --> 01:05:42,880
100 minus 190c

1715
01:05:46,470 --> 01:05:45,680
spacecraft doesn't quite get that cold

1716
01:05:47,910 --> 01:05:46,480
but

1717
01:05:50,950 --> 01:05:47,920
we put it down in there we do it at

1718
01:05:54,309 --> 01:05:50,960
vacuum and then in a vacuum we sit and

1719
01:05:55,990 --> 01:05:54,319
we cycle the temperature up and down

1720
01:05:59,109 --> 01:05:56,000
and as we're doing that we go to we'll

1721
01:06:00,710 --> 01:05:59,119
go to a cold state and hold and operate

1722
01:06:02,230 --> 01:06:00,720
the systems and make sure they operate

1723
01:06:04,150 --> 01:06:02,240
properly in the cold

1724
01:06:05,750 --> 01:06:04,160
and then we'll turn and alternate to hot

1725
01:06:07,829 --> 01:06:05,760
and we'll operate the systems as we do

1726
01:06:09,430 --> 01:06:07,839
that and we'll monitor the systems on

1727
01:06:11,190 --> 01:06:09,440
board as you can imagine

1728
01:06:12,789 --> 01:06:11,200
very large thermal gradients across the

1729
01:06:14,950 --> 01:06:12,799
spacecraft and the instruments but you

1730
01:06:16,470 --> 01:06:14,960
want them to stay in focus you want

1731
01:06:18,150 --> 01:06:16,480
these pretty pictures from veers that

1732
01:06:19,029 --> 01:06:18,160
are properly focused and properly

1733
01:06:20,710 --> 01:06:19,039
pointing

1734
01:06:22,470 --> 01:06:20,720
you have to design your system and the

1735
01:06:24,309 --> 01:06:22,480
structure and the optics and the

1736
01:06:27,029 --> 01:06:24,319
mechanisms so they continue to operate

1737
01:06:29,349 --> 01:06:27,039
over wild temperature extremes

1738
01:06:31,430 --> 01:06:29,359

after that then we pack the satellite up

1739
01:06:34,069 --> 01:06:31,440
and we we drive it all away from boulder

1740
01:06:35,430 --> 01:06:34,079
colorado to vandenberg air force base

1741
01:06:36,710 --> 01:06:35,440
if there was one job i wouldn't want to

1742
01:06:38,549 --> 01:06:36,720
have on the program that's the truck

1743
01:06:40,309 --> 01:06:38,559
driver

1744
01:06:43,190 --> 01:06:40,319
because you're driving a satellite worth

1745
01:06:45,430 --> 01:06:43,200
1.5 billion dollars

1746
01:06:47,270 --> 01:06:45,440
down the road

1747
01:06:48,870 --> 01:06:47,280
it's not something i'd want to do the

1748
01:06:52,230 --> 01:06:48,880
satellite arrives here at vandenberg

1749
01:06:53,990 --> 01:06:52,240
just a short distance from here and that

1750
01:06:57,109 --> 01:06:54,000
processing goes on to make sure the

1751
01:06:59,349 --> 01:06:57,119
satellite survived its trip from boulder

1752
01:07:01,349 --> 01:06:59,359
and we fueled the spacecraft the

1753
01:07:03,349 --> 01:07:01,359
propulsion system gets fueled

1754
01:07:05,829 --> 01:07:03,359
and we get it ready to move it out to

1755
01:07:07,510 --> 01:07:05,839
the launch site it gets put inside a

1756
01:07:09,829 --> 01:07:07,520
canister or a can

1757
01:07:11,750 --> 01:07:09,839
and wrapped up and protected it's driven

1758
01:07:13,750 --> 01:07:11,760
out to the launch complex

1759
01:07:15,670 --> 01:07:13,760
and it's hoisted to the top of the delta

1760
01:07:17,029 --> 01:07:15,680
ii rocket and it's bolted on

1761
01:07:19,430 --> 01:07:17,039
and it's uh

1762
01:07:21,990 --> 01:07:19,440
last thing we do is we pull off all the

1763
01:07:22,870 --> 01:07:22,000

all the removed before flight

1764
01:07:24,470 --> 01:07:22,880
tags

1765
01:07:25,910 --> 01:07:24,480
do you see on aircraft we have those on

1766
01:07:28,710 --> 01:07:25,920
satellites too

1767
01:07:30,309 --> 01:07:28,720
we we vacuum it believe it or not

1768
01:07:31,990 --> 01:07:30,319
we clean it up we make sure it's

1769
01:07:32,870 --> 01:07:32,000
pristine

1770
01:07:36,870 --> 01:07:32,880
and

1771
01:07:38,230 --> 01:07:36,880
next thing that we'll see is the uh

1772
01:07:39,990 --> 01:07:38,240
we'll see space when the fairing

1773
01:07:40,710 --> 01:07:40,000
releases after launch

1774
01:07:43,109 --> 01:07:40,720
so

1775
01:07:44,309 --> 01:07:43,119
it's pretty exciting um jim talked about

1776
01:07:47,589 --> 01:07:44,319
paper

1777
01:07:49,190 --> 01:07:47,599
and you know it's time to launch when

1778
01:07:51,670 --> 01:07:49,200
the weight of the paper equals the

1779
01:07:54,230 --> 01:07:51,680
weight of the satellite

1780
01:07:57,910 --> 01:07:54,240
and that's about uh all the size of your

1781
01:07:58,710 --> 01:07:57,920
suv little 4 500 pounds

1782
01:08:00,950 --> 01:07:58,720
so

1783
01:08:02,870 --> 01:08:00,960
the power on board is about 2500 watts

1784
01:08:04,789 --> 01:08:02,880
and if you want an idea is if you if you

1785
01:08:06,470 --> 01:08:04,799
buy a coleman generator or a backup

1786
01:08:08,069 --> 01:08:06,480
generator and put it up

1787
01:08:10,069 --> 01:08:08,079
beside your house when the power goes

1788
01:08:12,630 --> 01:08:10,079

out you're probably generating about

1789
01:08:15,190 --> 01:08:12,640
2500 watts to run your refrigerator and

1790
01:08:17,510 --> 01:08:15,200
your computer and your tv

1791
01:08:19,110 --> 01:08:17,520
and a few lights so it's not a very high

1792
01:08:20,709 --> 01:08:19,120
power system believe it or not because

1793
01:08:22,070 --> 01:08:20,719
you have to generate all this power and

1794
01:08:24,870 --> 01:08:22,080
space

1795
01:08:26,229 --> 01:08:24,880
through these solar panels

1796
01:08:27,749 --> 01:08:26,239
so with that i'll be happy to take

1797
01:08:30,789 --> 01:08:27,759
questions about building an instrument

1798
01:08:33,430 --> 01:08:31,669
scott

1799
01:08:36,149 --> 01:08:33,440
any questions

1800
01:08:39,829 --> 01:08:37,829
in the in the handout in the labels

1801
01:08:41,749 --> 01:08:39,839
there's you talk about installation of

1802
01:08:43,110 --> 01:08:41,759
electronics but integration of

1803
01:08:45,430 --> 01:08:43,120
instruments and i'm wondering if you can

1804
01:08:47,110 --> 01:08:45,440
talk about what those two words mean to

1805
01:08:48,390 --> 01:08:47,120
you um right and

1806
01:08:49,590 --> 01:08:48,400
how they're different from how we might

1807
01:08:51,749 --> 01:08:49,600
perceive them

1808
01:08:53,030 --> 01:08:51,759
right so the electronic systems on board

1809
01:08:54,789 --> 01:08:53,040
this satellite there are actually quite

1810
01:08:55,829 --> 01:08:54,799
a few different boxes as we call them

1811
01:08:58,390 --> 01:08:55,839
and they're all

1812
01:08:59,749 --> 01:08:58,400
basically black boxes that we bolt on

1813
01:09:01,269 --> 01:08:59,759

everything from the command and data

1814
01:09:03,510 --> 01:09:01,279
handling system to the attitude

1815
01:09:06,070 --> 01:09:03,520
determination and control system all the

1816
01:09:07,990 --> 01:09:06,080
systems that make the spacecraft operate

1817
01:09:09,990 --> 01:09:08,000
and live the systems that

1818
01:09:12,390 --> 01:09:10,000
we have a

1819
01:09:14,470 --> 01:09:12,400
spacecraft control processor on board

1820
01:09:15,990 --> 01:09:14,480
it's a rad 750 computer on new

1821
01:09:17,590 --> 01:09:16,000
satellites on

1822
01:09:20,550 --> 01:09:17,600
on npp it's an older even an older

1823
01:09:21,910 --> 01:09:20,560
generation processor

1824
01:09:29,510 --> 01:09:21,920
the

1825
01:09:31,829 --> 01:09:29,520
spacecraft in a solid state recorder and

1826
01:09:34,789 --> 01:09:31,839
so those those are all boxes that get

1827
01:09:37,749 --> 01:09:34,799
installed or bolted onto the spacecraft

1828
01:09:39,430 --> 01:09:37,759
it's a little these boxes are

1829
01:09:43,110 --> 01:09:39,440
you know designed to just to be you know

1830
01:09:45,749 --> 01:09:43,120
bolted on and hooked up electrically

1831
01:09:47,349 --> 01:09:45,759
an instrument is a pretty delicate thing

1832
01:09:48,470 --> 01:09:47,359
that we do so as we go through an

1833
01:09:51,110 --> 01:09:48,480
instrument

1834
01:09:52,870 --> 01:09:51,120
integration process

1835
01:09:54,550 --> 01:09:52,880
there's a lot of care taken in the

1836
01:09:56,550 --> 01:09:54,560
handling of those there are when we

1837
01:09:58,630 --> 01:09:56,560
install boxes as well but the

1838
01:10:00,950 --> 01:09:58,640

instruments are pretty special

1839
01:10:03,669 --> 01:10:00,960
aveers cost a lot of money the

1840
01:10:05,990 --> 01:10:03,679
instruments each instrument

1841
01:10:07,430 --> 01:10:06,000
can cost close to the same amount as the

1842
01:10:10,229 --> 01:10:07,440
actual bus

1843
01:10:12,790 --> 01:10:10,239
so instruments are where all the uh a

1844
01:10:14,870 --> 01:10:12,800
lot of the expenses on the satellite so

1845
01:10:16,870 --> 01:10:14,880
we treat those with kid gloves and when

1846
01:10:18,550 --> 01:10:16,880
we integrate them to the spacecraft we

1847
01:10:20,630 --> 01:10:18,560
have to make sure that they're

1848
01:10:21,990 --> 01:10:20,640
absolutely aligned where they need to be

1849
01:10:24,870 --> 01:10:22,000
we have to know when we put them on the

1850
01:10:27,430 --> 01:10:24,880
spacecraft that they're aligned down to

1851
01:10:29,590 --> 01:10:27,440
you know thousands of an inch

1852
01:10:31,510 --> 01:10:29,600
and get them exactly positioned so

1853
01:10:33,910 --> 01:10:31,520
that's probably a little bit of the

1854
01:10:35,430 --> 01:10:33,920
difference is when you get into

1855
01:10:38,709 --> 01:10:35,440
integrating instruments you're into

1856
01:10:38,719 --> 01:10:41,830
okay next question

1857
01:10:45,669 --> 01:10:43,750
since precise instruments are very

1858
01:10:47,830 --> 01:10:45,679
important and obviously you don't want

1859
01:10:49,350 --> 01:10:47,840
your hard drives to fail do you make

1860
01:10:51,590 --> 01:10:49,360
your own hard drives do you use

1861
01:10:54,790 --> 01:10:51,600
commercial hard drives do you use

1862
01:10:57,430 --> 01:10:54,800
special super space hard drives

1863
01:10:59,510 --> 01:10:57,440

um it varies actually what we do is we

1864
01:11:01,910 --> 01:10:59,520
use a combination of

1865
01:11:04,390 --> 01:11:01,920
of commercial items that we will go

1866
01:11:06,229 --> 01:11:04,400
procure and then qualify for space

1867
01:11:07,110 --> 01:11:06,239
and there are vendors out there who who

1868
01:11:10,149 --> 01:11:07,120
build

1869
01:11:12,070 --> 01:11:10,159
items that you may find like the

1870
01:11:13,510 --> 01:11:12,080
batteries for example or lithium-ion

1871
01:11:15,830 --> 01:11:13,520
batteries it's the same battery you have

1872
01:11:18,070 --> 01:11:15,840
in your laptop basically we use i know

1873
01:11:19,510 --> 01:11:18,080
in jpss which i'm starting the process

1874
01:11:20,870 --> 01:11:19,520
of building right now

1875
01:11:23,669 --> 01:11:20,880
we're using

1876
01:11:25,830 --> 01:11:23,679
sony batteries and there's a company

1877
01:11:27,990 --> 01:11:25,840
called absl that will take those

1878
01:11:30,310 --> 01:11:28,000
batteries they'll integrate them into a

1879
01:11:32,229 --> 01:11:30,320
large so you take a bunch of those

1880
01:11:34,550 --> 01:11:32,239
battery cells like in your laptop put

1881
01:11:36,709 --> 01:11:34,560
them together to a lithium-ion battery

1882
01:11:38,310 --> 01:11:36,719
and then you test them and qualify them

1883
01:11:40,550 --> 01:11:38,320
they've done that before

1884
01:11:42,550 --> 01:11:40,560
and they have flown in space so those

1885
01:11:44,630 --> 01:11:42,560
are space qualified so you might start

1886
01:11:47,270 --> 01:11:44,640
with a product that's built for

1887
01:11:49,910 --> 01:11:47,280
a a a regular application and then you

1888
01:11:52,070 --> 01:11:49,920

might what we call up screen or qualify

1889
01:11:55,189 --> 01:11:52,080
that for space flight other things are

1890
01:11:57,590 --> 01:11:55,199
built specifically for space mechanisms

1891
01:12:00,550 --> 01:11:57,600
they may be designed specifically for a

1892
01:12:02,870 --> 01:12:00,560
space application so it varies it really

1893
01:12:06,390 --> 01:12:02,880
does and we have a lot of vendors

1894
01:12:08,790 --> 01:12:06,400
ball doesn't go build elect the

1895
01:12:10,870 --> 01:12:08,800
the guts of the electronics we we buy a

1896
01:12:13,030 --> 01:12:10,880
lot of the a lot of the systems and then

1897
01:12:15,350 --> 01:12:13,040
integrate those we do build

1898
01:12:17,510 --> 01:12:15,360
uh components we build the star trackers

1899
01:12:20,630 --> 01:12:17,520
we build the structure it just really

1900
01:12:22,390 --> 01:12:20,640
varies but we we buy a lot of things and

1901
01:12:23,990 --> 01:12:22,400
and bring those in and part of the

1902
01:12:25,669 --> 01:12:24,000
process of building a satellite while it

1903
01:12:27,430 --> 01:12:25,679
takes so long is just the procurement

1904
01:12:30,070 --> 01:12:27,440
process alone can take

1905
01:12:31,990 --> 01:12:30,080
a year to a year and a half from order

1906
01:12:34,790 --> 01:12:32,000
to receipt of the item because we ask

1907
01:12:37,030 --> 01:12:34,800
our vendors to actually test the items

1908
01:12:38,950 --> 01:12:37,040
at the component level

1909
01:12:40,630 --> 01:12:38,960
so it's kind of a spiral development as

1910
01:12:41,830 --> 01:12:40,640
you build a satellite

1911
01:12:49,750 --> 01:12:41,840
you

1912
01:12:51,990 --> 01:12:49,760
that's part of what generates a lot of

1913
01:12:53,990 --> 01:12:52,000

that paper because somewhere down the

1914
01:12:55,990 --> 01:12:54,000
road if you have a problem you may have

1915
01:12:58,149 --> 01:12:56,000
to back up and figure out why is this

1916
01:12:59,910 --> 01:12:58,159
problem occurring where did it happen

1917
01:13:01,990 --> 01:12:59,920
and we trace all the way every part's

1918
01:13:03,910 --> 01:13:02,000
traced to its slot date code to where it

1919
01:13:05,270 --> 01:13:03,920
was manufactured and when we can trace

1920
01:13:06,950 --> 01:13:05,280
all the way back

1921
01:13:08,310 --> 01:13:06,960
nasa has a system in place called

1922
01:13:09,990 --> 01:13:08,320
actually a guide up system where they

1923
01:13:11,990 --> 01:13:10,000
can basically go

1924
01:13:13,669 --> 01:13:12,000
if a part has a problem somewhere on

1925
01:13:15,510 --> 01:13:13,679
another program

1926
01:13:17,110 --> 01:13:15,520
and they determine that part system that

1927
01:13:18,550 --> 01:13:17,120
problem systemic to the part they can

1928
01:13:20,550 --> 01:13:18,560
send out an alert

1929
01:13:22,390 --> 01:13:20,560
and they can say check these parts with

1930
01:13:24,550 --> 01:13:22,400
these lot date codes and we can pull out

1931
01:13:26,550 --> 01:13:24,560
our documentation and say oh yeah we got

1932
01:13:29,910 --> 01:13:26,560
one we better look at it or no we don't

1933
01:13:33,350 --> 01:13:31,910
okay we have time for one more question

1934
01:13:35,990 --> 01:13:33,360
for scott

1935
01:13:37,830 --> 01:13:36,000
i'm trying to make it a good one um

1936
01:13:40,709 --> 01:13:37,840
about the star trackers uh two-part

1937
01:13:41,990 --> 01:13:40,719
question number one what stars does it

1938
01:13:44,070 --> 01:13:42,000

use to

1939
01:13:47,270 --> 01:13:44,080
keep itself aligned and number two who's

1940
01:13:50,070 --> 01:13:47,280
responsible for watching that and making

1941
01:13:51,750 --> 01:13:50,080
orbital corrections down the line

1942
01:13:53,750 --> 01:13:51,760
so the star trackers themselves they

1943
01:13:55,669 --> 01:13:53,760
basically look at the star field so they

1944
01:13:57,270 --> 01:13:55,679
don't look at they they look at the pick

1945
01:13:58,950 --> 01:13:57,280
of the whole picture the scene they're

1946
01:14:01,430 --> 01:13:58,960
seeing and they can use that to figure

1947
01:14:03,030 --> 01:14:01,440
out exactly where you're pointing those

1948
01:14:04,709 --> 01:14:03,040
star trackers are built by ball

1949
01:14:06,950 --> 01:14:04,719
aerospace and boulders that's one of the

1950
01:14:08,709 --> 01:14:06,960
things we we did we built a most of the

1951
01:14:10,790 --> 01:14:08,719
star trackers that flew on the shuttle

1952
01:14:12,070 --> 01:14:10,800
i've been building those for a long time

1953
01:14:13,990 --> 01:14:12,080
the data that comes from the star

1954
01:14:16,070 --> 01:14:14,000
tracker feeds into the attitude

1955
01:14:18,630 --> 01:14:16,080
determination and control system

1956
01:14:20,390 --> 01:14:18,640
so what it does is it looks at that data

1957
01:14:21,669 --> 01:14:20,400
it compares it looks at the start the

1958
01:14:23,430 --> 01:14:21,679
star tracker data we also have an

1959
01:14:26,149 --> 01:14:23,440
inertial reference unit on board that

1960
01:14:26,870 --> 01:14:26,159
basically says which weighs up

1961
01:14:29,030 --> 01:14:26,880
and

1962
01:14:31,430 --> 01:14:29,040
of course ups relative in space but it

1963
01:14:33,430 --> 01:14:31,440

tells you which way you're pointing and

1964
01:14:35,030 --> 01:14:33,440
all that data is continuously fed into

1965
01:14:37,510 --> 01:14:35,040
the spacecraft systems and it will it

1966
01:14:41,990 --> 01:14:37,520
will correct itself spacecraft can also

1967
01:14:44,870 --> 01:14:42,000
be controlled from the ground as well

1968
01:14:46,950 --> 01:14:44,880
not burns those are usually uh

1969
01:14:48,470 --> 01:14:46,960
the reaction control wheels operating

1970
01:14:51,430 --> 01:14:48,480
inside the spacecraft those are those

1971
01:14:52,870 --> 01:14:51,440
are minor corrections uh burns are are

1972
01:14:54,830 --> 01:14:52,880
typically

1973
01:14:57,270 --> 01:14:54,840
not made very often those are orbital

1974
01:14:59,270 --> 01:14:57,280
maintenance burns or a collision

1975
01:15:00,950 --> 01:14:59,280
avoidance burn if those have to happen

1976
01:15:03,990 --> 01:15:00,960
those are made from the ground yeah we

1977
01:15:07,750 --> 01:15:04,000
do worry about debris in space and

1978
01:15:07,760 --> 01:15:15,750
all right thank you scott thank you

1979
01:15:20,229 --> 01:15:17,669
all right our next speaker and our last

1980
01:15:23,030 --> 01:15:20,239
speaker for this segment of the tweet up

1981
01:15:24,550 --> 01:15:23,040
is tim dunn tim is the launch director

1982
01:15:26,790 --> 01:15:24,560
at nasa's launch

1983
01:15:29,510 --> 01:15:26,800
launch services program based at kennedy

1984
01:15:31,830 --> 01:15:29,520
space center uh he's the guy that's in

1985
01:15:33,030 --> 01:15:31,840
charge of getting these rockets like the

1986
01:15:35,030 --> 01:15:33,040
delta ii

1987
01:15:36,470 --> 01:15:35,040
which he's worked with extensively up

1988
01:15:37,750 --> 01:15:36,480

into space

1989
01:15:39,510 --> 01:15:37,760
a couple of the missions that he's

1990
01:15:43,110 --> 01:15:39,520
worked on recently you might have heard

1991
01:15:46,470 --> 01:15:43,120
of uh the messenger mission to mercury

1992
01:15:49,189 --> 01:15:46,480
and the kepler astronomical observatory

1993
01:15:51,990 --> 01:15:49,199
so uh tim's gonna talk to us about how

1994
01:15:54,149 --> 01:15:52,000
uh nasa deals with uh they're called

1995
01:15:55,750 --> 01:15:54,159
expendable launch vehicles elv will be

1996
01:15:57,990 --> 01:15:55,760
the acronym you'll hear

1997
01:16:00,630 --> 01:15:58,000
uh you gotta know the acronyms if you're

1998
01:16:02,550 --> 01:16:00,640
gonna know what nasa does so

1999
01:16:04,470 --> 01:16:02,560
so tim

2000
01:16:06,470 --> 01:16:04,480
thank you steve

2001
01:16:09,510 --> 01:16:06,480
good morning

2002
01:16:11,910 --> 01:16:09,520
okay this is my first tweet up

2003
01:16:15,430 --> 01:16:11,920
so uh bear with me and help me along you

2004
01:16:20,470 --> 01:16:17,750
well i'm glad to be here today uh very

2005
01:16:22,790 --> 01:16:20,480
excited to be here at vandenberg ready

2006
01:16:25,430 --> 01:16:22,800
uh just less than one day away from

2007
01:16:27,669 --> 01:16:25,440
launching the mpp spacecraft that

2008
01:16:29,750 --> 01:16:27,679
is very exciting for our launch team

2009
01:16:32,070 --> 01:16:29,760
i'll tell you just a little bit about uh

2010
01:16:33,669 --> 01:16:32,080
what i do uh where i came from how i got

2011
01:16:35,830 --> 01:16:33,679
to where i am now

2012
01:16:38,630 --> 01:16:35,840
as dave mentioned i am uh the launch

2013
01:16:41,350 --> 01:16:38,640

director for npp my call sign

2014
01:16:43,270 --> 01:16:41,360
uh for launch countdown is nasa launch

2015
01:16:45,350 --> 01:16:43,280
manager nlm

2016
01:16:47,990 --> 01:16:45,360
so i'm the guy responsible for making

2017
01:16:50,790 --> 01:16:48,000
sure all of the entities all of the very

2018
01:16:51,910 --> 01:16:50,800
various elements of our team are ready

2019
01:16:55,750 --> 01:16:51,920
to go

2020
01:16:59,110 --> 01:16:55,760
contractor safety quality spacecraft

2021
01:17:01,830 --> 01:16:59,120
range assets everything and so once

2022
01:17:03,669 --> 01:17:01,840
we're all good i give the final go and

2023
01:17:06,070 --> 01:17:03,679
then we turn it over to our contract

2024
01:17:08,149 --> 01:17:06,080
launch director and performs that final

2025
01:17:11,270 --> 01:17:08,159
countdown

2026
01:17:12,229 --> 01:17:11,280
this is my second mission as launch

2027
01:17:14,470 --> 01:17:12,239
director

2028
01:17:17,270 --> 01:17:14,480
so that may surprise or scare some of

2029
01:17:19,189 --> 01:17:17,280
you

2030
01:17:22,709 --> 01:17:19,199
so i've been around

2031
01:17:23,430 --> 01:17:22,719
the launch business for uh over 20 years

2032
01:17:25,750 --> 01:17:23,440
but

2033
01:17:28,390 --> 01:17:25,760
just recently uh attained the position

2034
01:17:30,470 --> 01:17:28,400
of launch director earlier this year

2035
01:17:32,630 --> 01:17:30,480
my first mission as primary launch

2036
01:17:35,270 --> 01:17:32,640
director was on the grail mission just

2037
01:17:37,830 --> 01:17:35,280
about seven weeks ago from florida

2038
01:17:41,590 --> 01:17:37,840

very successful there very excited

2039
01:17:43,830 --> 01:17:41,600
they've allowed me to do uh the last two

2040
01:17:46,470 --> 01:17:43,840
currently contracted delta ii missions

2041
01:17:48,390 --> 01:17:46,480
those being grail and npp

2042
01:17:50,790 --> 01:17:48,400
because that's where all my background

2043
01:17:52,709 --> 01:17:50,800
was i kind of grew up in the launch

2044
01:17:54,310 --> 01:17:52,719
business primarily on the delta ii

2045
01:17:55,910 --> 01:17:54,320
rocket so

2046
01:17:58,070 --> 01:17:55,920
this little rocket is near and dear to

2047
01:17:59,590 --> 01:17:58,080
my heart and i'll talk to you guys a lot

2048
01:18:01,189 --> 01:17:59,600
about that

2049
01:18:04,070 --> 01:18:01,199
and i'll be glad to answer a lot of

2050
01:18:05,750 --> 01:18:04,080
questions on the rocket

2051
01:18:09,270 --> 01:18:05,760
started out uh

2052
01:18:11,189 --> 01:18:09,280
my education uh back in the eighties uh

2053
01:18:13,030 --> 01:18:11,199
proud to say i'm a graduate of the

2054
01:18:15,030 --> 01:18:13,040
university of alabama

2055
01:18:16,630 --> 01:18:15,040
so we've got a little bit of a game

2056
01:18:18,870 --> 01:18:16,640
we're looking forward to uh in a couple

2057
01:18:21,350 --> 01:18:18,880
of weeks against some bengal tigers from

2058
01:18:25,430 --> 01:18:21,360
lsu so if you can tweet anything about

2059
01:18:27,510 --> 01:18:25,440
bama or crimson tide i'd appreciate it

2060
01:18:29,110 --> 01:18:27,520
uh got an electrical engineering degree

2061
01:18:31,910 --> 01:18:29,120
uh the air force helped get me through

2062
01:18:34,149 --> 01:18:31,920
school on an rotc scholarship so went

2063
01:18:36,550 --> 01:18:34,159

off and served nine years with the

2064
01:18:37,830 --> 01:18:36,560
united states air force in uh

2065
01:18:39,110 --> 01:18:37,840
the space

2066
01:18:40,709 --> 01:18:39,120
segment

2067
01:18:43,590 --> 01:18:40,719
i got to fly

2068
01:18:46,149 --> 01:18:43,600
gps satellites in colorado springs so i

2069
01:18:47,590 --> 01:18:46,159
was on the in the master control station

2070
01:18:50,709 --> 01:18:47,600
for gps

2071
01:18:53,270 --> 01:18:50,719
so i was there flying the very last of

2072
01:18:55,590 --> 01:18:53,280
the old gps satellites that were

2073
01:18:59,270 --> 01:18:55,600
launched here from vandenberg back in

2074
01:19:00,870 --> 01:18:59,280
the 80s or late 70s early 80s and then

2075
01:19:19,669 --> 01:19:00,880
i

2076
01:19:22,390 --> 01:19:19,679
has been very good to me personally

2077
01:19:24,709 --> 01:19:22,400
it's been very good to our nation and

2078
01:19:27,189 --> 01:19:24,719
i'm sure it's touched all of our lives

2079
01:19:28,470 --> 01:19:27,199
you know i like to say that uh

2080
01:19:30,070 --> 01:19:28,480
delta ii

2081
01:19:33,430 --> 01:19:30,080
uh has

2082
01:19:34,470 --> 01:19:33,440
sent rovers to mars and put gps in our

2083
01:19:37,110 --> 01:19:34,480
cars

2084
01:19:38,470 --> 01:19:37,120
because i'm sure we all have a new v or

2085
01:19:41,669 --> 01:19:38,480
a tom tom

2086
01:19:43,990 --> 01:19:41,679
telling us where to go these days

2087
01:19:47,030 --> 01:19:44,000
after some time in the air force

2088
01:19:48,830 --> 01:19:47,040

the air force made the mistake of

2089
01:19:50,709 --> 01:19:48,840
sending me around various

2090
01:19:53,189 --> 01:19:50,719
assignments but then they sent me to

2091
01:19:54,870 --> 01:19:53,199
cape canaveral and put me on the titan

2092
01:19:57,189 --> 01:19:54,880
iv launch team

2093
01:19:58,790 --> 01:19:57,199
and uh that that was when i was hooked

2094
01:20:00,709 --> 01:19:58,800
launch was it for me

2095
01:20:02,950 --> 01:20:00,719
and i knew that was the segment of the

2096
01:20:05,590 --> 01:20:02,960
space industry that i wanted to stay in

2097
01:20:07,990 --> 01:20:05,600
so i did three years on a

2098
01:20:09,910 --> 01:20:08,000
titan iv launch team i got to launch a

2099
01:20:12,310 --> 01:20:09,920
few of the big rockets

2100
01:20:13,990 --> 01:20:12,320
and then i transitioned over to the

2101
01:20:15,590 --> 01:20:14,000
civilian workforce

2102
01:20:16,629 --> 01:20:15,600
worked for mcdonald douglas for five

2103
01:20:19,189 --> 01:20:16,639
years

2104
01:20:21,750 --> 01:20:19,199
on this little baby the delta ii rocket

2105
01:20:23,270 --> 01:20:21,760
uh launched a lot of rockets as a

2106
01:20:25,350 --> 01:20:23,280
guidance engineer

2107
01:20:26,629 --> 01:20:25,360
for mcdonald douglas then had the

2108
01:20:31,350 --> 01:20:26,639
opportunity to come back with the

2109
01:20:34,310 --> 01:20:31,360
government in 2000 so 11 years ago now

2110
01:20:35,430 --> 01:20:34,320
and came on with nasa then

2111
01:20:37,590 --> 01:20:35,440
and

2112
01:20:38,950 --> 01:20:37,600
worked my way through various positions

2113
01:20:40,310 --> 01:20:38,960

most recently before i was launch

2114
01:20:42,470 --> 01:20:40,320
director i was a vehicle systems

2115
01:20:43,990 --> 01:20:42,480
engineer so working with all of our

2116
01:20:48,070 --> 01:20:44,000
various

2117
01:20:50,790 --> 01:20:48,080
disciplines of engineering that we have

2118
01:20:52,310 --> 01:20:50,800
to assure readiness of the rocket

2119
01:20:55,110 --> 01:20:52,320
and

2120
01:20:57,910 --> 01:20:55,120
that's how i got to where i am today so

2121
01:20:59,990 --> 01:20:57,920
very happy to be here uh

2122
01:21:00,870 --> 01:21:00,000
launch director is a it's a thrilling

2123
01:21:02,470 --> 01:21:00,880
job

2124
01:21:06,629 --> 01:21:02,480
uh

2125
01:21:08,470 --> 01:21:06,639
lot of excitement

2126
01:21:11,430 --> 01:21:08,480
but it's also you know a lot of pressure

2127
01:21:14,149 --> 01:21:11,440
at times uh you feel a little bit of the

2128
01:21:17,990 --> 01:21:14,159
weight of the agency on your shoulders

2129
01:21:20,149 --> 01:21:18,000
at times they they task uh our position

2130
01:21:22,470 --> 01:21:20,159
uh i work for lsp now let me get that

2131
01:21:24,870 --> 01:21:22,480
out there launch services program so

2132
01:21:27,270 --> 01:21:24,880
within lsp we have two launch directors

2133
01:21:30,070 --> 01:21:27,280
myself and omar baez

2134
01:21:32,550 --> 01:21:30,080
so while i'm focused on this rocket

2135
01:21:34,070 --> 01:21:32,560
and this mission omar's backing me up so

2136
01:21:36,790 --> 01:21:34,080
you'll see him

2137
01:21:38,629 --> 01:21:36,800
on nasa tv sitting to my right

2138
01:21:40,950 --> 01:21:38,639

so making sure that i'm doing all the

2139
01:21:42,870 --> 01:21:40,960
right things omar's been around the

2140
01:21:45,030 --> 01:21:42,880
launch director business for about 10

2141
01:21:47,669 --> 01:21:45,040
years now so well-seasoned launch

2142
01:21:49,669 --> 01:21:47,679
director and he's off focusing on his

2143
01:21:51,830 --> 01:21:49,679
primary mission in

2144
01:21:53,750 --> 01:21:51,840
about a month from now the msl mission

2145
01:21:54,550 --> 01:21:53,760
from the cape on atlas 5.

2146
01:21:56,310 --> 01:21:54,560
so

2147
01:21:59,669 --> 01:21:56,320
we're very excited very busy at launch

2148
01:22:04,149 --> 01:22:01,590
so let me let me talk a little bit about

2149
01:22:06,390 --> 01:22:04,159
what lsp does uh you guys may have heard

2150
01:22:07,910 --> 01:22:06,400
lsp we use that acronym for launch

2151
01:22:11,270 --> 01:22:07,920
services program

2152
01:22:13,750 --> 01:22:11,280
the nasa agency or the nasa organization

2153
01:22:16,310 --> 01:22:13,760
within the agency that i work for

2154
01:22:18,310 --> 01:22:16,320
we broker uh the business between the

2155
01:22:20,870 --> 01:22:18,320
spacecraft community and the launch

2156
01:22:23,350 --> 01:22:20,880
vehicles so we put all of the launch

2157
01:22:25,590 --> 01:22:23,360
vehicles uh that

2158
01:22:26,470 --> 01:22:25,600
are domestically available in the united

2159
01:22:27,270 --> 01:22:26,480
states

2160
01:22:28,870 --> 01:22:27,280
uh

2161
01:22:31,750 --> 01:22:28,880
in a bidding process

2162
01:22:34,310 --> 01:22:31,760
and they are able to get onto what we

2163
01:22:35,590 --> 01:22:34,320

call the nasa launch services contract

2164
01:22:37,830 --> 01:22:35,600
nls

2165
01:22:40,149 --> 01:22:37,840
and that enables them to then be

2166
01:22:41,750 --> 01:22:40,159
qualified to compete

2167
01:22:44,470 --> 01:22:41,760
to launch all of our spacecraft

2168
01:22:45,270 --> 01:22:44,480
communities assets

2169
01:22:47,189 --> 01:22:45,280
so

2170
01:22:49,229 --> 01:22:47,199
when a one of our spacecraft customers

2171
01:22:51,669 --> 01:22:49,239
comes to us and says i want to launch in

2172
01:22:53,669 --> 01:22:51,679
2014 2015

2173
01:22:55,750 --> 01:22:53,679
we say great let's go look at the stable

2174
01:22:57,910 --> 01:22:55,760
of rockets that are qualified to launch

2175
01:23:00,070 --> 01:22:57,920
you then we open up the bidding and then

2176
01:23:02,629 --> 01:23:00,080
those contractors that are qualified to

2177
01:23:04,149 --> 01:23:02,639
bid for that uh can can bid for that

2178
01:23:06,950 --> 01:23:04,159
service so

2179
01:23:09,430 --> 01:23:06,960
npp came to us uh many years ago

2180
01:23:12,390 --> 01:23:09,440
uh they were of the the weight and range

2181
01:23:15,030 --> 01:23:12,400
that a delta ii vehicle was ideal for

2182
01:23:19,270 --> 01:23:15,040
them uh went through that process we

2183
01:23:21,430 --> 01:23:19,280
awarded united launch alliance uh ula

2184
01:23:24,070 --> 01:23:21,440
which is the builds the delta ii rocket

2185
01:23:27,910 --> 01:23:24,080
also builds atlas 5 rockets we awarded

2186
01:23:30,310 --> 01:23:27,920
them the contract to launch npp

2187
01:23:31,830 --> 01:23:30,320
a little bit about um

2188
01:23:33,270 --> 01:23:31,840

let's see what else would you guys like

2189
01:23:35,830 --> 01:23:33,280
to know let me let me talk a little bit

2190
01:23:37,750 --> 01:23:35,840
about npp itself i'm going to give you

2191
01:23:41,030 --> 01:23:37,760
some numbers because it's fun to tweet

2192
01:23:45,750 --> 01:23:44,149
npp is going to be the 357th

2193
01:23:47,990 --> 01:23:45,760
delta launch

2194
01:23:49,590 --> 01:23:48,000
so that goes all the way back to may of

2195
01:23:51,990 --> 01:23:49,600
1960.

2196
01:23:53,669 --> 01:23:52,000
so a lot of delta launches now that

2197
01:23:56,070 --> 01:23:53,679
obviously is the original version of

2198
01:23:59,270 --> 01:23:56,080
delta delta 1 which launched from

2199
01:24:02,709 --> 01:23:59,280
the 60s up through 1989

2200
01:24:05,510 --> 01:24:02,719
that includes a hundred and fifty

2201
01:24:09,030 --> 01:24:05,520
launches of delta ii to date

2202
01:24:11,910 --> 01:24:09,040
so npp will be the 151st delta ii

2203
01:24:13,830 --> 01:24:11,920
configuration to launch

2204
01:24:15,830 --> 01:24:13,840
of those 151

2205
01:24:18,870 --> 01:24:15,840
delta twos

2206
01:24:21,990 --> 01:24:18,880
npp will be the 50th

2207
01:24:24,629 --> 01:24:22,000
nasa mission on a delta ii

2208
01:24:26,390 --> 01:24:24,639
so that's significant for us

2209
01:24:28,229 --> 01:24:26,400
yes steve

2210
01:24:29,910 --> 01:24:28,239
see if we got some questions we're just

2211
01:24:30,629 --> 01:24:29,920
about running out of time okay sure but

2212
01:24:32,390 --> 01:24:30,639
uh

2213
01:24:34,149 --> 01:24:32,400

any questions here

2214
01:24:36,229 --> 01:24:34,159
let's start with you

2215
01:24:37,910 --> 01:24:36,239
um

2216
01:24:41,910 --> 01:24:37,920
can you tell us a little bit about the

2217
01:24:45,270 --> 01:24:41,920
personality of the delta ii uh rocket uh

2218
01:24:48,229 --> 01:24:45,280
uh what makes it so good and uh

2219
01:24:50,870 --> 01:24:48,239
so why are we stopping with it

2220
01:24:54,629 --> 01:24:50,880
i guess the personality of the rocket uh

2221
01:24:57,030 --> 01:24:54,639
very dependable a workhorse for

2222
01:25:01,669 --> 01:24:57,040
our nation a workhorse certainly for

2223
01:25:03,990 --> 01:25:01,679
nasa in the medium lift category

2224
01:25:07,990 --> 01:25:04,000
what makes it dependable is

2225
01:25:10,629 --> 01:25:08,000
the heritage of it those 356 launches

2226
01:25:13,669 --> 01:25:10,639
that have preceded mpp

2227
01:25:15,990 --> 01:25:13,679
all of the processes and the people

2228
01:25:17,830 --> 01:25:16,000
that have uh been

2229
01:25:20,149 --> 01:25:17,840
uh building that rocket throughout the

2230
01:25:21,750 --> 01:25:20,159
years uh have have given it this is

2231
01:25:22,790 --> 01:25:21,760
tremendous success rate that it has

2232
01:25:25,510 --> 01:25:22,800
today

2233
01:25:28,470 --> 01:25:25,520
uh why we are moving away from it is

2234
01:25:34,709 --> 01:25:32,390
we lsp look to the commercial u.s launch

2235
01:25:35,830 --> 01:25:34,719
industry for our rockets

2236
01:25:38,070 --> 01:25:35,840
and

2237
01:25:39,669 --> 01:25:38,080
right now that industry seems to be

2238
01:25:43,189 --> 01:25:39,679

moving toward

2239
01:25:47,110 --> 01:25:45,430
trying to

2240
01:25:48,709 --> 01:25:47,120
obviously get the prices down for their

2241
01:25:50,310 --> 01:25:48,719
commercial customers and for government

2242
01:25:53,430 --> 01:25:50,320
customers the united states air force

2243
01:25:56,470 --> 01:25:53,440
being one and so ula the contractor for

2244
01:25:58,709 --> 01:25:56,480
delta ii in particular

2245
01:26:00,470 --> 01:25:58,719
would like to offer the delta ii

2246
01:26:02,629 --> 01:26:00,480
if there is the need for it but

2247
01:26:04,470 --> 01:26:02,639
satellites have grown bigger

2248
01:26:06,870 --> 01:26:04,480
and it seems to be more of the demand

2249
01:26:08,550 --> 01:26:06,880
that is in the larger class the delta iv

2250
01:26:10,470 --> 01:26:08,560
the atlas v

2251
01:26:12,870 --> 01:26:10,480
class so

2252
01:26:15,669 --> 01:26:12,880
and that's basically the answer another

2253
01:26:17,430 --> 01:26:15,679
question steve next question

2254
01:26:20,149 --> 01:26:17,440
this uh this launch vehicle is flying in

2255
01:26:22,470 --> 01:26:20,159
the 7920 configuration is it that's

2256
01:26:24,070 --> 01:26:22,480
correct um how does launch processing

2257
01:26:25,830 --> 01:26:24,080
differ from each version of the delta ii

2258
01:26:27,830 --> 01:26:25,840
rocket like with the four solid rocket

2259
01:26:29,189 --> 01:26:27,840
motors or whatever how does how does

2260
01:26:30,470 --> 01:26:29,199
launch processing differ from each

2261
01:26:32,709 --> 01:26:30,480
launch

2262
01:26:34,470 --> 01:26:32,719
uh depending on the uh the configuration

2263
01:26:36,870 --> 01:26:34,480

that we're in you mentioned uh npp

2264
01:26:40,629 --> 01:26:36,880
flying in 7 900 that means we have nine

2265
01:26:42,550 --> 01:26:40,639
solids uh so that's an extra two days of

2266
01:26:43,510 --> 01:26:42,560
processing of putting the solids on

2267
01:26:46,070 --> 01:26:43,520
early

2268
01:26:47,669 --> 01:26:46,080
but for as far as the solids go it's

2269
01:26:50,870 --> 01:26:47,679
nothing more than that we generally have

2270
01:26:52,790 --> 01:26:50,880
about a 45-day processing flow on the

2271
01:26:54,950 --> 01:26:52,800
pad so you're talking about a couple of

2272
01:26:57,110 --> 01:26:54,960
extra days

2273
01:26:59,590 --> 01:26:57,120
the other configuration changes would

2274
01:27:01,110 --> 01:26:59,600
have been a few years ago we were flying

2275
01:27:02,790 --> 01:27:01,120
third stages so that would have been a

2276
01:27:05,350 --> 01:27:02,800
79-25

2277
01:27:07,270 --> 01:27:05,360
at the end that would have entailed some

2278
01:27:08,709 --> 01:27:07,280
additional third stage testing added

2279
01:27:11,350 --> 01:27:08,719
another day and a half or two to the

2280
01:27:13,590 --> 01:27:11,360
processing schedule for over so overall

2281
01:27:14,870 --> 01:27:13,600
it's not a significant uh

2282
01:27:17,110 --> 01:27:14,880
lengthening

2283
01:27:19,110 --> 01:27:17,120
or shortening of the processing schedule

2284
01:27:21,189 --> 01:27:19,120
based on the configuration

2285
01:27:24,870 --> 01:27:21,199
okay we have time for one last question

2286
01:27:29,270 --> 01:27:27,590
uh i know i saw mention of uh some other

2287
01:27:31,030 --> 01:27:29,280
smaller crafts that were hitching a ride

2288
01:27:32,790 --> 01:27:31,040

on this launch can you talk about any of

2289
01:27:36,149 --> 01:27:32,800
those yeah i'm glad you brought that up

2290
01:27:40,070 --> 01:27:36,159
uh nasa is pleased to be launching

2291
01:27:41,510 --> 01:27:40,080
six cubesats on this uh this delta ii

2292
01:27:44,550 --> 01:27:41,520
npp mission

2293
01:27:47,669 --> 01:27:44,560
uh these are also called nano satellites

2294
01:27:48,950 --> 01:27:47,679
they're roughly uh four inch cubes

2295
01:27:51,270 --> 01:27:48,960
yay big

2296
01:27:53,350 --> 01:27:51,280
and they will they are mounted on the

2297
01:27:55,270 --> 01:27:53,360
second stage of delta ii so obviously

2298
01:27:56,950 --> 01:27:55,280
our primary mission is mpp

2299
01:27:58,830 --> 01:27:56,960
about an hour into launch we're going to

2300
01:28:02,229 --> 01:27:58,840
separate the npp

2301
01:28:05,990 --> 01:28:02,239
payload about 20 minutes after that

2302
01:28:09,110 --> 01:28:06,000
we'll then eject the first of these uh

2303
01:28:11,910 --> 01:28:09,120
series of six cubesats we put them in

2304
01:28:14,310 --> 01:28:11,920
what we call p-pods which is a canister

2305
01:28:17,910 --> 01:28:14,320
mounted to the second stage structure

2306
01:28:19,830 --> 01:28:17,920
and these p-pods will be ejecting aft

2307
01:28:21,189 --> 01:28:19,840
there is one p-pod that contains three

2308
01:28:23,110 --> 01:28:21,199
cubesats

2309
01:28:24,629 --> 01:28:23,120
uh a second p-pod that contains two

2310
01:28:26,709 --> 01:28:24,639
cubesats and a third one that has a

2311
01:28:30,310 --> 01:28:26,719
single cubesat in it

2312
01:28:33,030 --> 01:28:30,320
and uh the in the uh universities uh and

2313
01:28:35,030 --> 01:28:33,040

students uh it's an education program

2314
01:28:37,830 --> 01:28:35,040
and we're really proud to uh host this

2315
01:28:38,870 --> 01:28:37,840
on this delta ii launch

2316
01:28:44,870 --> 01:28:38,880
thank you tim

2317
01:28:50,470 --> 01:28:44,880
and while we give a hand to all of our

2318
01:28:55,669 --> 01:28:52,629
uh checking the clock i see we are now

2319
01:28:57,669 --> 01:28:55,679
just about 16 hours away from launch

2320
01:29:00,390 --> 01:28:57,679
to watch it tonight it will be televised

2321
01:29:02,390 --> 01:29:00,400
our on uh television coverage begins at

2322
01:29:03,990 --> 01:29:02,400
1201 pacific

2323
01:29:06,790 --> 01:29:04,000
so tune back in

2324
01:29:09,350 --> 01:29:06,800
about six 14 hours and the launch is

2325
01:29:12,070 --> 01:29:09,360
scheduled for 2 48

2326
01:29:14,229 --> 01:29:12,080
a.m pacific friday morning so thank you

2327
01:29:16,229 --> 01:29:14,239
all for watching make sure to follow

2328
01:29:18,950 --> 01:29:16,239
today nasa

2329
01:29:20,629 --> 01:29:18,960
tweet up for the continuing activities