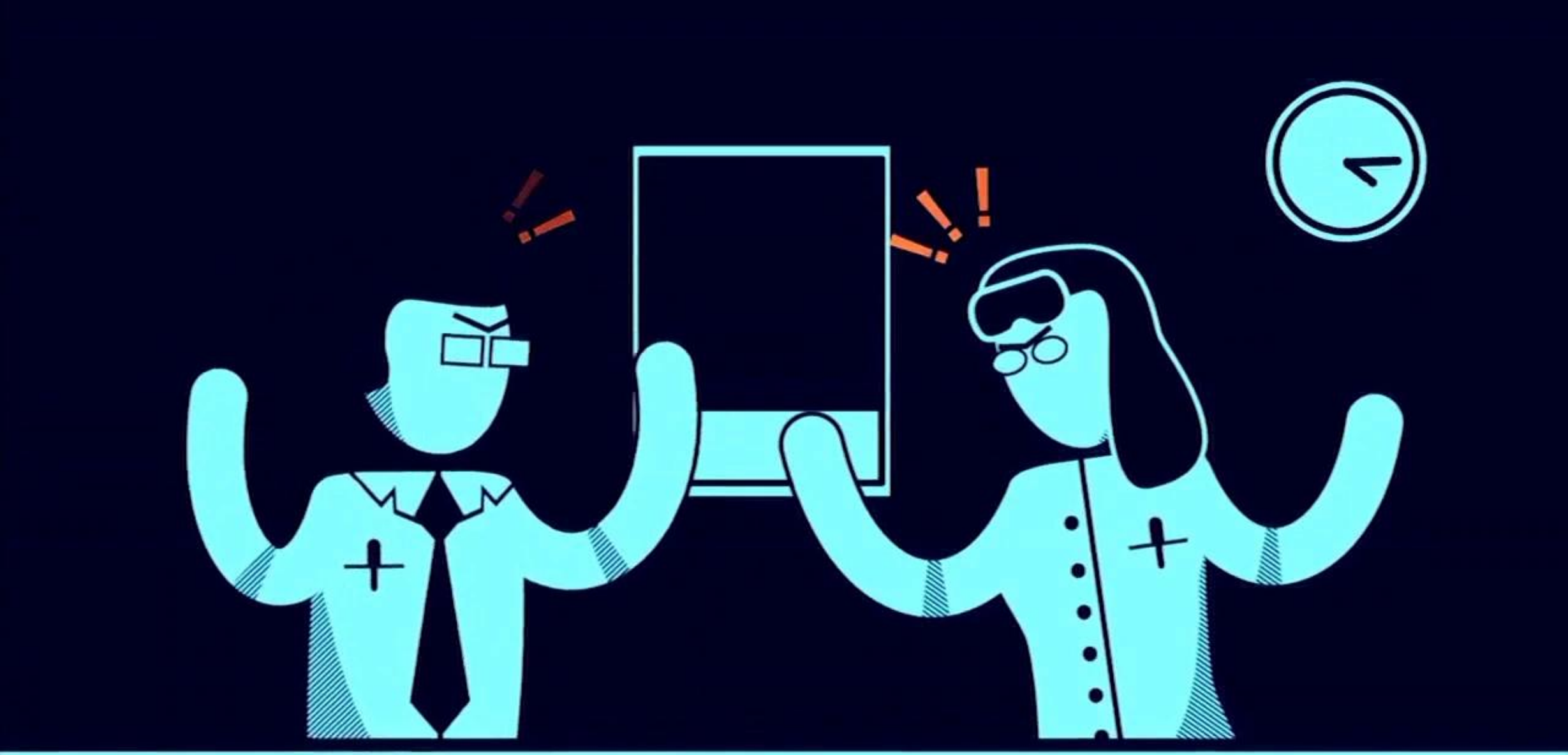

1
00:00:08,230 --> 00:00:06,070
good afternoon welcome to the goes-r

2
00:00:16,310 --> 00:00:08,240
preview event at nasa kennedy space

3
00:00:19,910 --> 00:00:17,990
thank you i'm joined here by kyle

4
00:00:21,349 --> 00:00:19,920
herring with noah and today we're going

5
00:00:23,109 --> 00:00:21,359
to learn everything you ever want to

6
00:00:25,429 --> 00:00:23,119
know about the goes-r mission which is

7
00:00:27,910 --> 00:00:25,439
noaa nasa's next generation weather

8
00:00:31,189 --> 00:00:27,920
satellite it's launching tomorrow at 5

9
00:00:32,630 --> 00:00:31,199
42 pm eastern time right here in florida

10
00:00:34,630 --> 00:00:32,640
in the room with us today our group of

11
00:00:36,790 --> 00:00:34,640
social media followers uh they're here

12
00:00:38,310 --> 00:00:36,800
to learn about nasa uh and noah's

13
00:00:40,709 --> 00:00:38,320

mission and also

14
00:00:41,750 --> 00:00:40,719
to um to to ask questions of the

15
00:00:43,350 --> 00:00:41,760
panelists we're gonna have today with a

16
00:00:45,110 --> 00:00:43,360
whole cadre of people there and tell us

17
00:00:47,110 --> 00:00:45,120
more about the mission uh if you're

18
00:00:49,190 --> 00:00:47,120
watching at home uh feel free to use the

19
00:00:50,790 --> 00:00:49,200
hashtag askgoes if you have a question

20
00:00:52,310 --> 00:00:50,800
and we'll try to get to it and answer it

21
00:00:53,270 --> 00:00:52,320
when we either on social media or here

22
00:00:55,590 --> 00:00:53,280
in the room

23
00:00:58,549 --> 00:00:55,600
uh with that let's get started kyle

24
00:01:00,790 --> 00:00:58,559
thanks john um as my colleague said uh

25
00:01:02,150 --> 00:01:00,800
this is a noaa nasa mission and noah's

26
00:01:03,990 --> 00:01:02,160
really excited this is our first social

27
00:01:05,509 --> 00:01:04,000
we've done with nasa so we're really

28
00:01:08,070 --> 00:01:05,519
excited to have you all here and work

29
00:01:10,550 --> 00:01:08,080
with uh nasa on this project so to kick

30
00:01:13,429 --> 00:01:10,560
it all off we're gonna have dr vols come

31
00:01:15,590 --> 00:01:13,439
up and introduce the noaa mission so dr

32
00:01:17,190 --> 00:01:15,600
steven volt is the head of noaa

33
00:01:18,870 --> 00:01:17,200
satellites he's going to talk a little

34
00:01:24,149 --> 00:01:18,880
about what noaa satellites is and what

35
00:01:26,710 --> 00:01:25,030
so

36
00:01:28,310 --> 00:01:26,720
thanks kyle thanks john and thanks

37
00:01:31,109 --> 00:01:28,320
everybody for being here um i hope

38
00:01:32,870 --> 00:01:31,119

you're as excited as i am um this is uh

39
00:01:35,030 --> 00:01:32,880
i will dispel one thing that john said

40
00:01:36,390 --> 00:01:35,040
at the start uh you're not gonna learn

41
00:01:38,390 --> 00:01:36,400
everything you need to know about goes-r

42
00:01:39,510 --> 00:01:38,400
in 90 minutes it's taken 20 years to get

43
00:01:41,270 --> 00:01:39,520
here it's going to take more than 90

44
00:01:43,830 --> 00:01:41,280
minutes to explain it all but

45
00:01:45,429 --> 00:01:43,840
but what does it mean for for us at noaa

46
00:01:48,069 --> 00:01:45,439
and at nasa specifically the satellite

47
00:01:51,350 --> 00:01:48,079
information services is goes-r is really

48
00:01:53,350 --> 00:01:51,360
the it's the first of a new generation

49
00:01:55,109 --> 00:01:53,360
of geostationary satellites we've been

50
00:01:56,789 --> 00:01:55,119
building with nasa's help uh

51
00:01:57,830 --> 00:01:56,799
geostationary satellites since the early

52
00:01:59,749 --> 00:01:57,840
70s

53
00:02:01,670 --> 00:01:59,759
the goes program this is the first

54
00:02:04,550 --> 00:02:01,680
redesign from the ground up from the

55
00:02:05,429 --> 00:02:04,560
start um in about 20 years and maybe 40

56
00:02:06,550 --> 00:02:05,439
years when you think about the

57
00:02:08,150 --> 00:02:06,560
technology that's in the current

58
00:02:08,949 --> 00:02:08,160
satellite systems we have on on orbit

59
00:02:11,190 --> 00:02:08,959
now

60
00:02:12,790 --> 00:02:11,200
so what we and and the other part that's

61
00:02:14,229 --> 00:02:12,800
key about this mission i think is a

62
00:02:16,070 --> 00:02:14,239
little bit different is when you think

63
00:02:18,550 --> 00:02:16,080

about designing geostationary

64
00:02:20,309 --> 00:02:18,560
observations 20 30 40 years ago we were

65
00:02:22,470 --> 00:02:20,319
still in the threshold of learning what

66
00:02:23,750 --> 00:02:22,480
it is to do meteorology from space the

67
00:02:25,589 --> 00:02:23,760
models were

68
00:02:27,190 --> 00:02:25,599
generations younger than they are now

69
00:02:29,190 --> 00:02:27,200
you know fortran computing programming

70
00:02:30,869 --> 00:02:29,200
et cetera think about what you've done

71
00:02:34,150 --> 00:02:30,879
what we've seen in the last 20 years

72
00:02:35,830 --> 00:02:34,160
from 1970 to 1990 to 2000 that kind of

73
00:02:38,790 --> 00:02:35,840
learning curve went into the design of

74
00:02:40,949 --> 00:02:38,800
the go satellite so it's not only faster

75
00:02:43,110 --> 00:02:40,959
with a higher rate

76
00:02:44,869 --> 00:02:43,120
assessment of imaging of the earth with

77
00:02:46,229 --> 00:02:44,879
more channels with more weather with

78
00:02:47,509 --> 00:02:46,239
more frequency channels so you can look

79
00:02:49,509 --> 00:02:47,519
at water at different levels you can

80
00:02:51,509 --> 00:02:49,519
look at infrared in multiple bands and

81
00:02:53,670 --> 00:02:51,519
with with red green and blue full color

82
00:02:55,190 --> 00:02:53,680
imagery and with higher resolution but

83
00:02:56,869 --> 00:02:55,200
it also is doing all of those

84
00:02:58,550 --> 00:02:56,879
measurements with a much stronger

85
00:02:59,990 --> 00:02:58,560
observing system a much stronger

86
00:03:01,990 --> 00:03:00,000
numerical weather modeling prediction

87
00:03:03,910 --> 00:03:02,000
capability and a much smarter clientele

88
00:03:05,910 --> 00:03:03,920

both on the meteorology side and the

89
00:03:07,830 --> 00:03:05,920
science and the research side so that we

90
00:03:09,030 --> 00:03:07,840
know what we think we can do with all

91
00:03:10,229 --> 00:03:09,040
these great data that are coming down

92
00:03:12,149 --> 00:03:10,239
from goes-r

93
00:03:13,750 --> 00:03:12,159
so what happens within nez is he as the

94
00:03:15,750 --> 00:03:13,760
intro tell you about what nesdis and

95
00:03:17,270 --> 00:03:15,760
noah does with this this we have not

96
00:03:19,270 --> 00:03:17,280
only the observing system in space which

97
00:03:20,869 --> 00:03:19,280
is the satellite you see here all the

98
00:03:22,949 --> 00:03:20,879
ground systems which have to transmit

99
00:03:24,949 --> 00:03:22,959
the the multi-megabits per second data

100
00:03:26,710 --> 00:03:24,959
rate down to our ground stations to

101
00:03:28,390 --> 00:03:26,720
process what actually will happen is the

102
00:03:30,070 --> 00:03:28,400
data will come from goes come to our

103
00:03:31,509 --> 00:03:30,080
ground stations get sent to our

104
00:03:34,550 --> 00:03:31,519
processing system built by one of some

105
00:03:36,309 --> 00:03:34,560
of our major uh partners in the system

106
00:03:38,149 --> 00:03:36,319
turned from these raw data into

107
00:03:39,830 --> 00:03:38,159
observations and products and then

108
00:03:41,750 --> 00:03:39,840
retransmitted back up to the ghost

109
00:03:43,830 --> 00:03:41,760
satellite and then broadcast to the

110
00:03:45,509 --> 00:03:43,840
whole western hemisphere so goes is not

111
00:03:47,830 --> 00:03:45,519
only an observing satellite it's a

112
00:03:49,430 --> 00:03:47,840
broadcast it's a major

113
00:03:51,670 --> 00:03:49,440

communications and broadcast satellite

114
00:03:53,750 --> 00:03:51,680
as well so anybody with the right dish

115
00:03:55,830 --> 00:03:53,760
with the right antenna can downlink at

116
00:03:57,830 --> 00:03:55,840
the same rate and same real time the

117
00:03:59,270 --> 00:03:57,840
data that the meteorologists here in the

118
00:04:01,110 --> 00:03:59,280
u.s the national weather service will

119
00:04:03,350 --> 00:04:01,120
use so they'll get that same near real

120
00:04:04,869 --> 00:04:03,360
time imagery the the global lightning

121
00:04:05,830 --> 00:04:04,879
mapper and all the other geostationary

122
00:04:07,589 --> 00:04:05,840
lightning map or all the other

123
00:04:10,309 --> 00:04:07,599
measurements as well in near real time

124
00:04:11,990 --> 00:04:10,319
so goes as part of a much larger system

125
00:04:13,270 --> 00:04:12,000
an integrated system of observations and

126
00:04:15,509 --> 00:04:13,280
capabilities

127
00:04:17,430 --> 00:04:15,519
from a nez's point of view is we have to

128
00:04:19,590 --> 00:04:17,440
not only fly the satellite

129
00:04:21,349 --> 00:04:19,600
build and make the measurements take the

130
00:04:22,790 --> 00:04:21,359
data down integrate it do those products

131
00:04:25,189 --> 00:04:22,800
and services but then store it in our

132
00:04:27,430 --> 00:04:25,199
archives so that we can match those data

133
00:04:29,350 --> 00:04:27,440
with our low earth orbit satellites our

134
00:04:31,590 --> 00:04:29,360
archival data sets the models that the

135
00:04:33,350 --> 00:04:31,600
national weather service uses to to

136
00:04:35,590 --> 00:04:33,360
enhance the entire environmental

137
00:04:37,909 --> 00:04:35,600
information system that we are part of

138
00:04:39,749 --> 00:04:37,919

providing for the nation so it's really

139
00:04:41,830 --> 00:04:39,759
the the shining the sort of the the

140
00:04:43,030 --> 00:04:41,840
peace to resist stones the top of a of a

141
00:04:45,350 --> 00:04:43,040
very large

142
00:04:47,510 --> 00:04:45,360
cake or our empire of data and

143
00:04:48,870 --> 00:04:47,520
information this is the new coin the new

144
00:04:50,629 --> 00:04:48,880
the new prize that we have that we're

145
00:04:52,070 --> 00:04:50,639
going to be bringing forward into it um

146
00:04:53,830 --> 00:04:52,080
you're going to hear from steve goodman

147
00:04:55,189 --> 00:04:53,840
and from the instrument instrumentalists

148
00:04:57,270 --> 00:04:55,199
and from the ground system folks about

149
00:04:58,950 --> 00:04:57,280
all those other pieces i just described

150
00:05:00,790 --> 00:04:58,960
but from nezus it allows us then to

151
00:05:02,469 --> 00:05:00,800
bring this great satellite capability

152
00:05:04,390 --> 00:05:02,479
with our ground systems and our modeling

153
00:05:06,870 --> 00:05:04,400
and our information technology to get

154
00:05:08,390 --> 00:05:06,880
all that together now and and this great

155
00:05:09,510 --> 00:05:08,400
leap forward in terms of capabilities

156
00:05:11,029 --> 00:05:09,520
and science

157
00:05:12,629 --> 00:05:11,039
and the last part i'll say before i turn

158
00:05:14,550 --> 00:05:12,639
it over i might go over to my partner

159
00:05:15,270 --> 00:05:14,560
from nasa is that

160
00:05:17,110 --> 00:05:15,280
the

161
00:05:19,189 --> 00:05:17,120
what we're finding now that again what

162
00:05:20,790 --> 00:05:19,199
we didn't know 20 and 30 years ago is

163
00:05:22,469 --> 00:05:20,800

it's not just the individual measurement

164
00:05:24,070 --> 00:05:22,479
that counts it's how that measurement

165
00:05:26,310 --> 00:05:24,080
matches up with other measurements we've

166
00:05:27,510 --> 00:05:26,320
taken so we have very capable low-earth

167
00:05:29,670 --> 00:05:27,520
orbit imagers which have higher

168
00:05:31,430 --> 00:05:29,680
resolution than goes which have more

169
00:05:33,909 --> 00:05:31,440
spectral bands than goes which have more

170
00:05:35,110 --> 00:05:33,919
information on an image by image basis

171
00:05:36,790 --> 00:05:35,120
than goes has

172
00:05:38,870 --> 00:05:36,800
now we have goes which is going to be

173
00:05:40,469 --> 00:05:38,880
providing with clearly almost the same

174
00:05:42,870 --> 00:05:40,479
time stamp with close to the same

175
00:05:45,270 --> 00:05:42,880
resolution and bands frequency bands the

176
00:05:47,909 --> 00:05:45,280
same information but real time so the

177
00:05:50,550 --> 00:05:47,919
combination of that leo and geo the

178
00:05:53,110 --> 00:05:50,560
staring and then the higher resolution

179
00:05:54,710 --> 00:05:53,120
bandpass swipes will allow us to do

180
00:05:56,070 --> 00:05:54,720
weather modeling and information in a

181
00:05:57,510 --> 00:05:56,080
way that we've never had before so

182
00:06:00,390 --> 00:05:57,520
bringing these data together these big

183
00:06:01,990 --> 00:06:00,400
data into a way into an integration so

184
00:06:03,670 --> 00:06:02,000
that we can now explore and develop the

185
00:06:05,830 --> 00:06:03,680
capabilities and the ways that we're not

186
00:06:07,029 --> 00:06:05,840
sure yet what will be the outcome but we

187
00:06:08,870 --> 00:06:07,039
know it'll be more than what we've

188
00:06:11,270 --> 00:06:08,880

promised always under promise and over

189
00:06:12,790 --> 00:06:11,280
perform so we under promised with this

190
00:06:14,790 --> 00:06:12,800
great satellite but we expect to over

191
00:06:16,390 --> 00:06:14,800
perform over the coming decades with all

192
00:06:18,309 --> 00:06:16,400
the integration

193
00:06:20,230 --> 00:06:18,319
so with that i think i turn i'll turn

194
00:06:22,309 --> 00:06:20,240
the mic over to dr thomas irbukin who's

195
00:06:29,990 --> 00:06:22,319
the head of the saddle of nasa's science

196
00:06:34,230 --> 00:06:31,590
i'm really excited to uh be here

197
00:06:37,189 --> 00:06:34,240
together with our partners noah you know

198
00:06:39,430 --> 00:06:37,199
nasa is the civilian agency that builds

199
00:06:41,510 --> 00:06:39,440
spacecraft and so basically we're

200
00:06:42,790 --> 00:06:41,520
working together with noaa a lot of nasa

201
00:06:45,029 --> 00:06:42,800
people are working there together with

202
00:06:47,110 --> 00:06:45,039
many industrial partners to build a

203
00:06:48,710 --> 00:06:47,120
spacecraft as powerful as

204
00:06:50,629 --> 00:06:48,720
as goes are

205
00:06:52,790 --> 00:06:50,639
so for me one of the things that you

206
00:06:55,270 --> 00:06:52,800
learn when you work at nasa and i i'm

207
00:06:57,589 --> 00:06:55,280
sure it's exactly the same way i know is

208
00:07:00,230 --> 00:06:57,599
everybody who works there knows why they

209
00:07:01,990 --> 00:07:00,240
work there and they're really strong in

210
00:07:03,350 --> 00:07:02,000
their belief that what they're doing has

211
00:07:05,909 --> 00:07:03,360
an impact

212
00:07:07,909 --> 00:07:05,919
in everyday's life and this spacecraft

213
00:07:10,710 --> 00:07:07,919

is one of those

214
00:07:12,870 --> 00:07:10,720
tools that was put together one of those

215
00:07:15,589 --> 00:07:12,880
machines that was put together by many

216
00:07:18,469 --> 00:07:15,599
different people it started of course

217
00:07:21,430 --> 00:07:18,479
by learning about nature many of these

218
00:07:24,070 --> 00:07:21,440
programs projects were funded by nasa

219
00:07:26,070 --> 00:07:24,080
initially on the other agencies national

220
00:07:27,350 --> 00:07:26,080
science foundation and then it comes

221
00:07:29,909 --> 00:07:27,360
forward with innovators like you're

222
00:07:31,350 --> 00:07:29,919
going to hear about you know talk about

223
00:07:33,270 --> 00:07:31,360
like how do you

224
00:07:35,270 --> 00:07:33,280
so if you learn about lightning and what

225
00:07:37,589 --> 00:07:35,280
happens with updrafts and so forth how

226
00:07:39,510 --> 00:07:37,599
do you make an instrument that actually

227
00:07:42,469 --> 00:07:39,520
can do that operationally this is the

228
00:07:44,230 --> 00:07:42,479
stuff that noah does and you know like

229
00:07:47,350 --> 00:07:44,240
we don't do at nasa at all right you

230
00:07:49,029 --> 00:07:47,360
know operationally every day so that

231
00:07:51,110 --> 00:07:49,039
works so it's that kind of innovation

232
00:07:51,990 --> 00:07:51,120
that goes into it and then it's a big

233
00:07:54,469 --> 00:07:52,000
team

234
00:07:56,309 --> 00:07:54,479
both at nasa and partners that then put

235
00:07:59,270 --> 00:07:56,319
it together and interface with that

236
00:08:01,749 --> 00:07:59,280
system see the previous type of

237
00:08:03,909 --> 00:08:01,759
spacecraft that the ghost spacecraft up

238
00:08:06,710 --> 00:08:03,919

there they were built before you had the

239
00:08:09,670 --> 00:08:06,720
weather in your pocket on your phone

240
00:08:11,670 --> 00:08:09,680
they were built before you expected that

241
00:08:14,390 --> 00:08:11,680
every minute if you wanted to you can

242
00:08:15,990 --> 00:08:14,400
see where that front is right now and

243
00:08:18,790 --> 00:08:16,000
you want to go observe that natural

244
00:08:21,029 --> 00:08:18,800
phenomenon what goes art as it delivers

245
00:08:22,390 --> 00:08:21,039
on that kind of thing it's it's really a

246
00:08:24,070 --> 00:08:22,400
weather satellite for the next

247
00:08:26,550 --> 00:08:24,080
generation the generation that we're

248
00:08:28,710 --> 00:08:26,560
used to being now with the internet in

249
00:08:29,990 --> 00:08:28,720
our pockets and so for me that's really

250
00:08:32,310 --> 00:08:30,000
exciting

251
00:08:33,829 --> 00:08:32,320
the other thing that i believe also very

252
00:08:36,230 --> 00:08:33,839
strongly remember how i said how it

253
00:08:37,990 --> 00:08:36,240
starts with research

254
00:08:39,829 --> 00:08:38,000
he's talked about operation many of you

255
00:08:41,589 --> 00:08:39,839
will i want to talk about research what

256
00:08:43,190 --> 00:08:41,599
will happen the moment we have these

257
00:08:45,750 --> 00:08:43,200
data

258
00:08:48,630 --> 00:08:45,760
amazing researchers around the world

259
00:08:50,710 --> 00:08:48,640
some of them just on their own computers

260
00:08:52,870 --> 00:08:50,720
at home that's possible now right we'll

261
00:08:54,470 --> 00:08:52,880
pick up those data that are public

262
00:08:56,150 --> 00:08:54,480
published by noaa

263
00:08:58,230 --> 00:08:56,160

some of them are at nasa we're going to

264
00:09:00,550 --> 00:08:58,240
put grants out there and again we'll

265
00:09:03,269 --> 00:09:00,560
pick up that data and learn more about

266
00:09:05,670 --> 00:09:03,279
making predictions learn more about how

267
00:09:08,470 --> 00:09:05,680
nature works and learn more about how we

268
00:09:11,829 --> 00:09:08,480
can protect lives and how we can provide

269
00:09:13,509 --> 00:09:11,839
value in society like gosar will and so

270
00:09:15,430 --> 00:09:13,519
that's the other thing i'm excited so

271
00:09:17,750 --> 00:09:15,440
yes we're involved in building it but

272
00:09:20,949 --> 00:09:17,760
i'm also really excited to work with

273
00:09:22,949 --> 00:09:20,959
noaa and the community overall to fund

274
00:09:24,710 --> 00:09:22,959
science projects that really look at the

275
00:09:25,670 --> 00:09:24,720
next generation because we will never

276
00:09:27,829 --> 00:09:25,680
stop

277
00:09:30,630 --> 00:09:27,839
as we want to go forward and and make

278
00:09:34,389 --> 00:09:30,640
life better and learn about nature

279
00:09:36,389 --> 00:09:34,399
better than we we know today so that

280
00:09:38,389 --> 00:09:36,399
is the second point i wanted to make and

281
00:09:45,990 --> 00:09:38,399
with that i'll stop and turn it over to

282
00:09:49,829 --> 00:09:47,910
so next up we're going to have mike

283
00:09:51,350 --> 00:09:49,839
stringer and ed grigsby come up they're

284
00:09:54,070 --> 00:09:51,360
going to tell you a little bit about the

285
00:09:55,509 --> 00:09:54,080
goes-r mission the goes-r program

286
00:09:58,389 --> 00:09:55,519
and a little bit about the noaa nasa

287
00:10:00,710 --> 00:09:58,399
partnership so ed and mike are from nasa

288
00:10:03,590 --> 00:10:00,720

and noaa but they both work to help

289
00:10:04,790 --> 00:10:03,600
manage the goes-r program before we do

290
00:10:06,470 --> 00:10:04,800
that though we're going to play a little

291
00:10:09,829 --> 00:10:06,480
video about how you actually build a

292
00:10:12,389 --> 00:10:10,949
say you've been observing earth's

293
00:10:14,470 --> 00:10:12,399
weather using goes satellites for the

294
00:10:15,829 --> 00:10:14,480
past 40 years and suddenly you realize

295
00:10:17,110 --> 00:10:15,839
you need to launch another satellite to

296
00:10:19,030 --> 00:10:17,120
keep doing it because it's really

297
00:10:21,110 --> 00:10:19,040
important naturally you might think to

298
00:10:23,110 --> 00:10:21,120
yourself great let's just box up parts

299
00:10:24,310 --> 00:10:23,120
from the previous satellites launch them

300
00:10:26,069 --> 00:10:24,320
into space

301
00:10:27,829 --> 00:10:26,079
and let them do their thing

302
00:10:29,829 --> 00:10:27,839
unfortunately that's just not how it

303
00:10:31,030 --> 00:10:29,839
works scientists and engineers are

304
00:10:32,710 --> 00:10:31,040
always looking for better ways to

305
00:10:34,550 --> 00:10:32,720
improve the weather forecast and for

306
00:10:36,870 --> 00:10:34,560
them images like this from decades-old

307
00:10:38,550 --> 00:10:36,880
satellites just aren't quite up to snuff

308
00:10:40,230 --> 00:10:38,560
thankfully scientists and engineers have

309
00:10:42,150 --> 00:10:40,240
been busy working with meteorologists to

310
00:10:43,829 --> 00:10:42,160
improve things so they have an idea what

311
00:10:45,030 --> 00:10:43,839
data is needed next

312
00:10:46,470 --> 00:10:45,040
that way when they launch a new

313
00:10:47,990 --> 00:10:46,480

satellite they're adding to what they've

314
00:10:50,150 --> 00:10:48,000
learned before which means even better

315
00:10:51,509 --> 00:10:50,160
weather forecasts for the rest of us so

316
00:10:54,230 --> 00:10:51,519
when you build a satellite and noaa's

317
00:10:56,389 --> 00:10:54,240
nor go series called goes-r it naturally

318
00:10:57,670 --> 00:10:56,399
sets off a flurry of activity

319
00:10:59,110 --> 00:10:57,680
because they always want to improve

320
00:11:00,790 --> 00:10:59,120
things engineers might change the

321
00:11:02,470 --> 00:11:00,800
satellite platform upgrade all the

322
00:11:04,069 --> 00:11:02,480
instruments and because it's meant to

323
00:11:05,350 --> 00:11:04,079
improve the forecast add something

324
00:11:07,590 --> 00:11:05,360
totally new that's never been done

325
00:11:09,269 --> 00:11:07,600
before like a new lightning map

326
00:11:10,870 --> 00:11:09,279
after months of constructive debates and

327
00:11:12,870 --> 00:11:10,880
probably more than a few late nights

328
00:11:14,389 --> 00:11:12,880
they'll finally come to an agreement

329
00:11:15,829 --> 00:11:14,399
once everything's been approved the

330
00:11:17,190 --> 00:11:15,839
engineers get to design and put the

331
00:11:18,790 --> 00:11:17,200
satellite together

332
00:11:20,710 --> 00:11:18,800
however even though they've built go

333
00:11:21,910 --> 00:11:20,720
satellites before it's not just a matter

334
00:11:23,670 --> 00:11:21,920
of pulling out the old designs and

335
00:11:25,190 --> 00:11:23,680
bolting everything together because

336
00:11:27,990 --> 00:11:25,200
there's new science to be done things

337
00:11:31,030 --> 00:11:28,000
have to be redesigned modified upgraded

338
00:11:32,710 --> 00:11:31,040

built tested re-tested tested some more

339
00:11:34,389 --> 00:11:32,720
and finally delivered so that at the end

340
00:11:36,470 --> 00:11:34,399
of the day it all fits neatly atop a

341
00:11:38,230 --> 00:11:36,480
giant rocket once all that's finished

342
00:11:39,910 --> 00:11:38,240
the satellite launches into space the

343
00:11:41,509 --> 00:11:39,920
scientists and engineers celebrate and

344
00:11:42,870 --> 00:11:41,519
lots of new data starts coming in that

345
00:11:57,910 --> 00:11:42,880
improves the weather forecast for us

346
00:12:08,790 --> 00:12:03,269
so

347
00:12:10,870 --> 00:12:08,800
gonna have mike and ed come up and tell

348
00:12:12,389 --> 00:12:10,880
you a little about uh about the goes our

349
00:12:14,710 --> 00:12:12,399
mission

350
00:12:17,110 --> 00:12:14,720
kind of my first slide please

351
00:12:19,190 --> 00:12:17,120
i'm mike sterner the assistant director

352
00:12:20,710 --> 00:12:19,200
assistant program director for the

353
00:12:22,389 --> 00:12:20,720
goes-r

354
00:12:25,430 --> 00:12:22,399
satellite series

355
00:12:27,350 --> 00:12:25,440
goes is the geosynchronous operational

356
00:12:29,750 --> 00:12:27,360
environmental satellites

357
00:12:34,069 --> 00:12:29,760
um and we've been building them and

358
00:12:37,110 --> 00:12:34,079
flying them for uh 41 years so october

359
00:12:38,949 --> 00:12:37,120
of 1975 is when goes one was first

360
00:12:40,550 --> 00:12:38,959
launched and you can see from the

361
00:12:43,509 --> 00:12:40,560
graphic there we've had the different

362
00:12:46,310 --> 00:12:43,519
goes versions and goes-r

363
00:12:49,670 --> 00:12:46,320

series is the next generation we're

364
00:12:50,550 --> 00:12:49,680
building four identical satellites r s t

365
00:12:52,870 --> 00:12:50,560
and u

366
00:12:54,550 --> 00:12:52,880
and the one being launched tomorrow is

367
00:12:56,470 --> 00:12:54,560
goes-r

368
00:12:58,629 --> 00:12:56,480
next satellite

369
00:13:04,310 --> 00:12:58,639
our next

370
00:13:11,350 --> 00:13:08,230
so the goes-r series uh has three

371
00:13:13,590 --> 00:13:11,360
times the channels so on the current

372
00:13:16,069 --> 00:13:13,600
series we have five channels

373
00:13:19,509 --> 00:13:16,079
and on this series we're going to have

374
00:13:22,790 --> 00:13:19,519
16 channels so this allows us to see

375
00:13:25,750 --> 00:13:22,800
the clouds differently and see

376
00:13:28,230 --> 00:13:25,760
dust and volcanic ash and be able to

377
00:13:30,069 --> 00:13:28,240
predict what's going on and track what's

378
00:13:31,590 --> 00:13:30,079
happening with that so if you remember

379
00:13:33,350 --> 00:13:31,600
when there was a volcano that was

380
00:13:36,150 --> 00:13:33,360
erupting and they had to clear the air

381
00:13:38,389 --> 00:13:36,160
space very wide to avoid that volcanic

382
00:13:39,750 --> 00:13:38,399
ash or any chance of it well now we'll

383
00:13:42,230 --> 00:13:39,760
be able to see

384
00:13:43,750 --> 00:13:42,240
more detail where that ashes and

385
00:13:47,189 --> 00:13:43,760
hopefully be able to reduce that

386
00:13:49,829 --> 00:13:47,199
restricted airspace that they flying

387
00:13:53,030 --> 00:13:49,839
it has four times better resolution so

388
00:13:55,509 --> 00:13:53,040

the resolution uh allows us to see more

389
00:13:58,790 --> 00:13:55,519
clearly and see what's going on with

390
00:14:02,629 --> 00:13:58,800
finer detail and then finally it has

391
00:14:05,430 --> 00:14:02,639
five times the speed so currently

392
00:14:06,790 --> 00:14:05,440
it takes roughly 30 minutes to scan the

393
00:14:09,670 --> 00:14:06,800
full disk

394
00:14:11,430 --> 00:14:09,680
with the current on-orbit sensor well

395
00:14:14,949 --> 00:14:11,440
with the new sensor we'll be able to

396
00:14:17,030 --> 00:14:14,959
scan the disk in 15 minutes while also

397
00:14:18,629 --> 00:14:17,040
scanning the continental u.s

398
00:14:20,069 --> 00:14:18,639
every five minutes

399
00:14:22,470 --> 00:14:20,079
and be able to

400
00:14:25,509 --> 00:14:22,480
scan a mesial scale or roughly a

401
00:14:27,750 --> 00:14:25,519
thousand by thousand kilometer area as

402
00:14:29,670 --> 00:14:27,760
often as every 30 seconds

403
00:14:32,629 --> 00:14:29,680
so now we can actually look at a

404
00:14:35,030 --> 00:14:32,639
hurricane eye or look at developing

405
00:14:37,670 --> 00:14:35,040
thunderstorms and watch what that's

406
00:14:40,550 --> 00:14:37,680
happening essentially in real time so

407
00:14:43,829 --> 00:14:40,560
instead of today where the the weather

408
00:14:46,949 --> 00:14:43,839
service gets the data you know probably

409
00:14:49,110 --> 00:14:46,959
on the order of 10 to 15 minutes after

410
00:14:51,110 --> 00:14:49,120
it's been collected and so right now

411
00:14:53,990 --> 00:14:51,120
they tell us that's kind of telling us

412
00:14:55,910 --> 00:14:54,000
what happened with goes-r it'll be

413
00:14:57,350 --> 00:14:55,920

what's happening now

414
00:15:03,590 --> 00:14:57,360
so i'm going to turn it over to ed from

415
00:15:03,600 --> 00:15:07,990
thanks mike is this mike on mike

416
00:15:12,790 --> 00:15:10,470
okay i'm ed grigsby i'm the

417
00:15:13,829 --> 00:15:12,800
deputy system program director for

418
00:15:15,910 --> 00:15:13,839
goes-r

419
00:15:16,790 --> 00:15:15,920
um i just took that job about two months

420
00:15:18,949 --> 00:15:16,800
ago

421
00:15:21,269 --> 00:15:18,959
i was the chief engineer for goes-r for

422
00:15:23,829 --> 00:15:21,279
five years so

423
00:15:27,189 --> 00:15:23,839
they came and asked me what did nasa do

424
00:15:29,749 --> 00:15:27,199
to uh for goes-r with their noah partner

425
00:15:32,550 --> 00:15:29,759
well let me tell you

426
00:15:35,269 --> 00:15:32,560
nasa has a rich history of making

427
00:15:36,949 --> 00:15:35,279
science vision a reality and that's what

428
00:15:39,990 --> 00:15:36,959
we did for noaa

429
00:15:41,030 --> 00:15:40,000
we brought the brilliant engineers from

430
00:15:44,230 --> 00:15:41,040
goddard

431
00:15:46,470 --> 00:15:44,240
and all over the uh nasa center

432
00:15:48,310 --> 00:15:46,480
headquarters nasa centers brought them

433
00:15:50,150 --> 00:15:48,320
together and we made

434
00:15:52,230 --> 00:15:50,160
goes-r what it is today and what you're

435
00:15:55,670 --> 00:15:52,240
going to see launch tomorrow and what's

436
00:15:58,389 --> 00:15:55,680
going to save lives in the future

437
00:16:02,949 --> 00:15:58,399
the program office that was built

438
00:16:04,389 --> 00:16:02,959

2005 2006 time frame was really

439
00:16:05,829 --> 00:16:04,399
the turning point for the gozar

440
00:16:08,870 --> 00:16:05,839
development because that started the

441
00:16:11,189 --> 00:16:08,880
implementation phase of goes-r

442
00:16:13,110 --> 00:16:11,199
and what happened at that point was nasa

443
00:16:15,350 --> 00:16:13,120
and noah brought together

444
00:16:18,949 --> 00:16:15,360
a partnership that nobody's ever seen

445
00:16:21,189 --> 00:16:18,959
before we have an integrated program

446
00:16:23,350 --> 00:16:21,199
noaa nasa the program management team

447
00:16:24,230 --> 00:16:23,360
for goes-r sitting right here

448
00:16:25,749 --> 00:16:24,240
we

449
00:16:27,430 --> 00:16:25,759
have a program

450
00:16:29,430 --> 00:16:27,440
project director

451
00:16:32,710 --> 00:16:29,440
who is a nasa lead

452
00:16:33,829 --> 00:16:32,720
we have a noaa deputy for her

453
00:16:35,189 --> 00:16:33,839
we have a

454
00:16:37,350 --> 00:16:35,199
nasa

455
00:16:38,389 --> 00:16:37,360
deputy for the ground system

456
00:16:40,389 --> 00:16:38,399
and a

457
00:16:41,590 --> 00:16:40,399
noaa lead for that ground system

458
00:16:43,509 --> 00:16:41,600
development

459
00:16:45,670 --> 00:16:43,519
so it's highly integrated every single

460
00:16:48,069 --> 00:16:45,680
functional area has a highly integrated

461
00:16:50,389 --> 00:16:48,079
noaa nasa team

462
00:16:51,910 --> 00:16:50,399
that's what made it a success and that's

463
00:16:53,910 --> 00:16:51,920

what you're going to see make goes-r

464
00:16:56,710 --> 00:16:53,920
successful

465
00:17:00,629 --> 00:16:58,550
great guys thank you so we're going to

466
00:17:02,470 --> 00:17:00,639
hang on to the q a

467
00:17:04,069 --> 00:17:02,480
great so we're now going to do a short q

468
00:17:05,829 --> 00:17:04,079
a section so if you have a question

469
00:17:07,029 --> 00:17:05,839
raise your hand john and i will be

470
00:17:08,949 --> 00:17:07,039
around the size we'll pass out

471
00:17:12,309 --> 00:17:08,959
microphones also if you're on social

472
00:17:13,590 --> 00:17:12,319
media you can use the hashtag go ask

473
00:17:14,949 --> 00:17:13,600
goes

474
00:17:16,549 --> 00:17:14,959
and we'll try and pull some questions

475
00:17:18,949 --> 00:17:16,559
from twitter as well

476
00:17:22,470 --> 00:17:18,959
all right do we have a first question

477
00:17:25,750 --> 00:17:24,549
was there anything that was implemented

478
00:17:27,750 --> 00:17:25,760
early on

479
00:17:29,830 --> 00:17:27,760
with goes-r that

480
00:17:32,230 --> 00:17:29,840
when when you got to 10 years after the

481
00:17:33,990 --> 00:17:32,240
fact you had to then revisit and say oh

482
00:17:35,909 --> 00:17:34,000
we can do better in this

483
00:17:43,029 --> 00:17:35,919
you know this whatever technology for

484
00:17:47,909 --> 00:17:44,710
i think i think we've had a lot of

485
00:17:49,590 --> 00:17:47,919
lessons learned from 10 years ago i

486
00:17:51,830 --> 00:17:49,600
started on goes-r

487
00:17:53,510 --> 00:17:51,840
2002

488
00:17:55,990 --> 00:17:53,520

was on for a couple of years then went

489
00:17:58,789 --> 00:17:56,000
to another program and then came back

490
00:18:00,549 --> 00:17:58,799
always come back to goes-r

491
00:18:02,710 --> 00:18:00,559
and during that time frame i think uh

492
00:18:04,390 --> 00:18:02,720
some of the lessons learned were really

493
00:18:06,390 --> 00:18:04,400
about interfaces

494
00:18:08,789 --> 00:18:06,400
making sure from my perspective again

495
00:18:10,950 --> 00:18:08,799
i'm a system engineer so it all boils

496
00:18:12,230 --> 00:18:10,960
down to making sure all the pieces work

497
00:18:13,110 --> 00:18:12,240
together

498
00:18:15,669 --> 00:18:13,120
right

499
00:18:16,630 --> 00:18:15,679
so one of those really critical pieces

500
00:18:19,990 --> 00:18:16,640
is

501
00:18:21,430 --> 00:18:20,000
when it goes out to the national weather

502
00:18:24,710 --> 00:18:21,440
service

503
00:18:26,230 --> 00:18:24,720
well we had one format

504
00:18:29,190 --> 00:18:26,240
and we were marching along with that

505
00:18:31,270 --> 00:18:29,200
format but during that time frame guess

506
00:18:33,830 --> 00:18:31,280
what

507
00:18:35,669 --> 00:18:33,840
different formats started creeping in

508
00:18:37,270 --> 00:18:35,679
so we had to we had to kind of adjust

509
00:18:39,190 --> 00:18:37,280
the format of the data out i think that

510
00:18:42,870 --> 00:18:39,200
was one of the

511
00:18:45,430 --> 00:18:42,880
good examples that i can give you

512
00:18:47,830 --> 00:18:45,440
uh what kind of updates are

513
00:18:49,830 --> 00:18:47,840

what you've updated the spacecraft to

514
00:18:52,070 --> 00:18:49,840
provide more data what kind of updates

515
00:18:54,150 --> 00:18:52,080
had to be done to ground installations

516
00:18:56,470 --> 00:18:54,160
to support all this additional data that

517
00:18:59,270 --> 00:18:56,480
you're producing from the spacecraft so

518
00:19:00,870 --> 00:18:59,280
for the ground system uh we had to do a

519
00:19:04,150 --> 00:19:00,880
whole new ground system because we need

520
00:19:05,750 --> 00:19:04,160
to be turning all this extra you know

521
00:19:07,990 --> 00:19:05,760
vast amount of data

522
00:19:10,070 --> 00:19:08,000
out in a near real-time fashion out to

523
00:19:12,470 --> 00:19:10,080
the weather service so one of the main

524
00:19:15,029 --> 00:19:12,480
things that we we did is of course all

525
00:19:17,669 --> 00:19:15,039
the processing power for that but then

526
00:19:20,390 --> 00:19:17,679
also we had to build new antennas for

527
00:19:23,029 --> 00:19:20,400
that and so harris

528
00:19:26,630 --> 00:19:23,039
who's our prime for the ground system

529
00:19:28,470 --> 00:19:26,640
built 16.4 meter antennas three of them

530
00:19:30,390 --> 00:19:28,480
at wallops and three of them at our

531
00:19:36,870 --> 00:19:30,400
backup at

532
00:19:36,880 --> 00:19:41,110
yes

533
00:19:45,110 --> 00:19:42,549
weather forecasting on earth but how

534
00:19:47,110 --> 00:19:45,120
will it help to also forecast for space

535
00:19:50,150 --> 00:19:47,120
with space weather

536
00:19:52,150 --> 00:19:50,160
so for space weather we have uh

537
00:19:54,789 --> 00:19:52,160
multiple instruments we have the suvi

538
00:19:57,350 --> 00:19:54,799

which is looking at the ultraviolet

539
00:19:59,909 --> 00:19:57,360
images of the sun we have excess which

540
00:20:03,029 --> 00:19:59,919
is looking at the energy coming off the

541
00:20:05,669 --> 00:20:03,039
sun in x-ray irradiance we also have

542
00:20:07,110 --> 00:20:05,679
magnetometers and

543
00:20:07,990 --> 00:20:07,120
scis which is

544
00:20:11,430 --> 00:20:08,000
check

545
00:20:13,270 --> 00:20:11,440
looking at the protons and electrons and

546
00:20:17,909 --> 00:20:13,280
particles that are impacting the

547
00:20:22,950 --> 00:20:19,830
will this satellite help in tracking

548
00:20:27,990 --> 00:20:24,710
you're asking some really good questions

549
00:20:30,789 --> 00:20:28,000
about science and in just one second

550
00:20:32,230 --> 00:20:30,799
that guy right there is going to come up

551
00:20:34,230 --> 00:20:32,240
steve goodman

552
00:20:37,430 --> 00:20:34,240
and he's he can answer those questions

553
00:20:39,750 --> 00:20:37,440
much better than mike or i could ever

554
00:20:42,070 --> 00:20:39,760
but but in general it'll be adding to

555
00:20:44,390 --> 00:20:42,080
the climate records and and having all

556
00:20:45,990 --> 00:20:44,400
that and all that data will be stored

557
00:20:51,750 --> 00:20:46,000
and be able to access by the

558
00:20:54,470 --> 00:20:53,510
on that note we are going to move on to

559
00:20:56,470 --> 00:20:54,480
steve

560
00:21:04,070 --> 00:20:56,480
so we can talk about the science of it

561
00:21:07,909 --> 00:21:05,029
so

562
00:21:10,950 --> 00:21:07,919
this is dr steve goodman he is the

563
00:21:13,110 --> 00:21:10,960

senior chief scientist for goes-r

564
00:21:14,390 --> 00:21:13,120
uh and he's going to tell you all about

565
00:21:16,149 --> 00:21:14,400
all the science behind goes-r you've

566
00:21:17,110 --> 00:21:16,159
heard about why all the program now

567
00:21:18,310 --> 00:21:17,120
you're gonna hear about all the amazing

568
00:21:20,310 --> 00:21:18,320
things it can do

569
00:21:22,630 --> 00:21:20,320
in in five minutes or less two minutes

570
00:21:25,190 --> 00:21:22,640
or less

571
00:21:27,110 --> 00:21:25,200
all right so uh rapidly go through this

572
00:21:28,950 --> 00:21:27,120
so i'm gonna forget my animation so i

573
00:21:30,950 --> 00:21:28,960
want to start with my

574
00:21:33,430 --> 00:21:30,960
animation of a severe storm outbreak

575
00:21:35,590 --> 00:21:33,440
which i think had about 50 severe storms

576
00:21:37,270 --> 00:21:35,600
tornadoes hail storms

577
00:21:38,549 --> 00:21:37,280
win and i want you to notice this is

578
00:21:40,549 --> 00:21:38,559
what we mean

579
00:21:42,950 --> 00:21:40,559
by weather as it happens

580
00:21:44,870 --> 00:21:42,960
takes only 23 seconds for us to scan one

581
00:21:46,950 --> 00:21:44,880
of these regional scenes

582
00:21:48,710 --> 00:21:46,960
and it's just a minute or less before we

583
00:21:49,669 --> 00:21:48,720
get it out to the forecast you see that

584
00:21:51,270 --> 00:21:49,679
line

585
00:21:52,870 --> 00:21:51,280
of clouds and we know what's going to

586
00:21:54,710 --> 00:21:52,880
happen when that hits developing clouds

587
00:21:56,390 --> 00:21:54,720
are going to explode because

588
00:21:57,990 --> 00:21:56,400

there's a convergence boundary so you

589
00:21:59,110 --> 00:21:58,000
see those clouds grew the one in the

590
00:22:01,590 --> 00:21:59,120
upper right

591
00:22:03,350 --> 00:22:01,600
had multiple tornadoes in it and we can

592
00:22:05,110 --> 00:22:03,360
see cloud top features because of our

593
00:22:07,029 --> 00:22:05,120
four times better resolution and there

594
00:22:08,710 --> 00:22:07,039
are certain features you see

595
00:22:10,470 --> 00:22:08,720
at the top of the cloud that are related

596
00:22:12,549 --> 00:22:10,480
to the intensity of the storm updraft

597
00:22:15,750 --> 00:22:12,559
and then are related to the likelihood

598
00:22:17,669 --> 00:22:15,760
of severe weather now imagine we combine

599
00:22:19,990 --> 00:22:17,679
that rapid scan imagery with the

600
00:22:21,990 --> 00:22:20,000
lightning mappers so you all go outside

601
00:22:23,830 --> 00:22:22,000
in daylight and tell me how much

602
00:22:26,310 --> 00:22:23,840
lightning you can see well you can't see

603
00:22:28,870 --> 00:22:26,320
any but we have a really neat instrument

604
00:22:31,350 --> 00:22:28,880
that takes 500 pictures a second from

605
00:22:33,990 --> 00:22:31,360
above the clouds and it differences

606
00:22:35,029 --> 00:22:34,000
those uh successive images at every

607
00:22:37,270 --> 00:22:35,039
pixel

608
00:22:39,750 --> 00:22:37,280
and when we see a small change of light

609
00:22:41,430 --> 00:22:39,760
output at each pixel and we see multiple

610
00:22:43,669 --> 00:22:41,440
light outputs then we know that that's

611
00:22:45,110 --> 00:22:43,679
not random noise but it's lightning and

612
00:22:47,350 --> 00:22:45,120
that's how we detect lightning during

613
00:22:49,350 --> 00:22:47,360

the daytime that's the challenge and

614
00:22:50,950 --> 00:22:49,360
we're sending that data down at 7.7

615
00:22:52,149 --> 00:22:50,960
megabits per second and then we can

616
00:22:54,470 --> 00:22:52,159
filter out

617
00:22:55,990 --> 00:22:54,480
artifacts that are in the data stream

618
00:22:57,909 --> 00:22:56,000
and we can do all that in about 10

619
00:22:59,669 --> 00:22:57,919
seconds and the weather service said

620
00:23:02,630 --> 00:22:59,679
well we don't need it that fast 20

621
00:23:04,470 --> 00:23:02,640
seconds is good enough so okay fine so

622
00:23:06,230 --> 00:23:04,480
we get it to them within 20 seconds so

623
00:23:07,430 --> 00:23:06,240
within half a minute you have all these

624
00:23:09,190 --> 00:23:07,440
beautiful

625
00:23:11,510 --> 00:23:09,200
structures you see from the imagery you

626
00:23:13,110 --> 00:23:11,520
have the lightning which you can't see

627
00:23:15,270 --> 00:23:13,120
during the daytime we can do it at night

628
00:23:17,029 --> 00:23:15,280
the astronauts have been showing us

629
00:23:19,110 --> 00:23:17,039
since the 60s you can see lightning from

630
00:23:20,549 --> 00:23:19,120
space but at night time you can see it

631
00:23:22,390 --> 00:23:20,559
with your eye but you can't see it

632
00:23:24,390 --> 00:23:22,400
during the day so that's the major

633
00:23:26,149 --> 00:23:24,400
innovation for the lightning mapper and

634
00:23:27,430 --> 00:23:26,159
you say oh gee i see lightning striking

635
00:23:29,029 --> 00:23:27,440
the ground well how do you see that from

636
00:23:30,470 --> 00:23:29,039
space well we don't see

637
00:23:31,830 --> 00:23:30,480
the strike the ground that you see but

638
00:23:33,830 --> 00:23:31,840

the channels from that lightning

639
00:23:35,430 --> 00:23:33,840
actually go up into the cloud and that

640
00:23:36,950 --> 00:23:35,440
light then makes its way to cloud top

641
00:23:38,710 --> 00:23:36,960
and then makes a puddle of light and

642
00:23:40,149 --> 00:23:38,720
that's what we see so that's how we're

643
00:23:42,149 --> 00:23:40,159
able to detect lightning with high

644
00:23:43,590 --> 00:23:42,159
efficiency and it doesn't matter if it's

645
00:23:44,789 --> 00:23:43,600
just in the cloud or if it went to

646
00:23:47,350 --> 00:23:44,799
ground we see

647
00:23:49,669 --> 00:23:47,360
all types of lightning and that is a new

648
00:23:52,710 --> 00:23:49,679
hopefully revolutionary measurement

649
00:23:53,909 --> 00:23:52,720
telling us about the intensity of storms

650
00:23:56,390 --> 00:23:53,919
you're probably interested what happened

651
00:23:58,310 --> 00:23:56,400
to hurricane matthew recently and i

652
00:24:00,070 --> 00:23:58,320
asked the hurricane center forecasters

653
00:24:01,750 --> 00:24:00,080
and said i'm going to be asked what

654
00:24:03,990 --> 00:24:01,760
might goes-r have done if it was already

655
00:24:05,830 --> 00:24:04,000
taking data on orbit and one of the

656
00:24:08,630 --> 00:24:05,840
things that happened with matthew was

657
00:24:10,630 --> 00:24:08,640
early on when it was in the caribbean

658
00:24:12,630 --> 00:24:10,640
it was not correctly predicted that the

659
00:24:15,430 --> 00:24:12,640
storm was going to

660
00:24:16,950 --> 00:24:15,440
rapidly intensify and the kinds of

661
00:24:19,110 --> 00:24:16,960
measurements we get from goes-r the

662
00:24:20,630 --> 00:24:19,120
lightning gives us an indicator about

663
00:24:23,830 --> 00:24:20,640

changes in the eye wall of the

664
00:24:26,310 --> 00:24:23,840
developing hurricane and also we're able

665
00:24:28,310 --> 00:24:26,320
to track the clouds and the water vapor

666
00:24:30,390 --> 00:24:28,320
we call those motion vectors

667
00:24:32,390 --> 00:24:30,400
and that information actually goes into

668
00:24:35,190 --> 00:24:32,400
the global forecast model so you say how

669
00:24:37,669 --> 00:24:35,200
does goes-r help forecast as opposed to

670
00:24:40,470 --> 00:24:37,679
like the now casting in the short term

671
00:24:43,430 --> 00:24:40,480
we call it in the zero to 60 minute time

672
00:24:46,070 --> 00:24:43,440
period for warnings the the four times

673
00:24:47,990 --> 00:24:46,080
better resolution tells us more about

674
00:24:49,350 --> 00:24:48,000
the attributes of the cloud so instead

675
00:24:51,190 --> 00:24:49,360
of mis

676
00:24:52,870 --> 00:24:51,200
assigning where the height of those

677
00:24:54,950 --> 00:24:52,880
motion vectors are that we're tracking

678
00:24:56,870 --> 00:24:54,960
we can do that more accurately we can

679
00:24:58,950 --> 00:24:56,880
reduce the speed bias that we have in

680
00:25:01,510 --> 00:24:58,960
the current models and by putting into

681
00:25:03,269 --> 00:25:01,520
the global forecast system the more the

682
00:25:05,269 --> 00:25:03,279
regional forecast models say for

683
00:25:07,830 --> 00:25:05,279
hurricane development are embedded or

684
00:25:09,590 --> 00:25:07,840
nested within these larger scale models

685
00:25:12,310 --> 00:25:09,600
and so that's how we're going to help

686
00:25:14,070 --> 00:25:12,320
the forecast of tropical storms and the

687
00:25:16,310 --> 00:25:14,080
forecasters are telling us if you go in

688
00:25:18,470 --> 00:25:16,320

this rapid scan mode that i showed you

689
00:25:20,310 --> 00:25:18,480
as soon as we get daylight that's the

690
00:25:21,990 --> 00:25:20,320
first indication of where that eye is

691
00:25:24,310 --> 00:25:22,000
and how it's changed overnight because

692
00:25:25,750 --> 00:25:24,320
it's hard to see in the infrared so as

693
00:25:27,190 --> 00:25:25,760
soon as they get that we're in rapid

694
00:25:28,789 --> 00:25:27,200
scan mode immediately they have

695
00:25:30,950 --> 00:25:28,799
information to improve their track

696
00:25:32,789 --> 00:25:30,960
forecast so these are the ways that

697
00:25:34,470 --> 00:25:32,799
we're going to help you fires as well

698
00:25:35,909 --> 00:25:34,480
volcanic eruptions

699
00:25:37,830 --> 00:25:35,919
it's not just the higher spatial

700
00:25:39,190 --> 00:25:37,840
resolution it's not just the spectral

701
00:25:40,950 --> 00:25:39,200
channels it's not

702
00:25:42,390 --> 00:25:40,960
just the temporal refresh it's all that

703
00:25:43,830 --> 00:25:42,400
combined which is truly going to be

704
00:25:51,830 --> 00:25:43,840
revolutionary

705
00:25:54,310 --> 00:25:52,630
yep

706
00:25:56,230 --> 00:25:54,320
yes we need you to stay we need you to

707
00:25:58,230 --> 00:25:56,240
answer questions

708
00:25:59,669 --> 00:25:58,240
yes so we are going to do a q a now

709
00:26:00,710 --> 00:25:59,679
again so go ahead and raise your hands

710
00:26:02,549 --> 00:26:00,720
you have questions and we'll try and

711
00:26:08,310 --> 00:26:02,559
pull some for the internet as well

712
00:26:12,950 --> 00:26:10,630
when will the information uh and the

713
00:26:15,110 --> 00:26:12,960

data collected by goes-r be available

714
00:26:16,870 --> 00:26:15,120
for meteorologists around the country to

715
00:26:19,430 --> 00:26:16,880
actually include in their in their

716
00:26:20,470 --> 00:26:19,440
forecasts and the and the things that

717
00:26:22,710 --> 00:26:20,480
you know

718
00:26:24,789 --> 00:26:22,720
that that impact people on it on a daily

719
00:26:26,950 --> 00:26:24,799
basis right well we'll do it as soon as

720
00:26:29,190 --> 00:26:26,960
we can so because these we have a lot of

721
00:26:30,070 --> 00:26:29,200
new instruments we need about six months

722
00:26:32,310 --> 00:26:30,080
total

723
00:26:34,470 --> 00:26:32,320
to do the on-orbit checkout and the

724
00:26:37,029 --> 00:26:34,480
validation of our products that we're

725
00:26:38,549 --> 00:26:37,039
going to be making and we'll start

726
00:26:41,110 --> 00:26:38,559
making them available to our science

727
00:26:43,430 --> 00:26:41,120
teams for calibration validation

728
00:26:45,269 --> 00:26:43,440
see if the predicted pre-launch

729
00:26:46,470 --> 00:26:45,279
specifications for those products are

730
00:26:47,750 --> 00:26:46,480
going to be met

731
00:26:50,549 --> 00:26:47,760
and then we'll be able to give it to

732
00:26:52,950 --> 00:26:50,559
some of the forecasters to evaluate to

733
00:26:54,950 --> 00:26:52,960
help us say yeah that product works fine

734
00:26:56,470 --> 00:26:54,960
then we'll turn on the data stream and

735
00:26:58,549 --> 00:26:56,480
then

736
00:27:00,390 --> 00:26:58,559
roughly six months after launch or so

737
00:27:01,590 --> 00:27:00,400
even while we're in extended validation

738
00:27:03,190 --> 00:27:01,600

the products

739
00:27:04,630 --> 00:27:03,200
will be made available i should say

740
00:27:06,390 --> 00:27:04,640
we've been working

741
00:27:07,669 --> 00:27:06,400
diligently with the broadcast

742
00:27:10,149 --> 00:27:07,679
meteorology

743
00:27:12,390 --> 00:27:10,159
uh providers to make sure that the data

744
00:27:13,909 --> 00:27:12,400
don't fall on the floor and i had one of

745
00:27:15,510 --> 00:27:13,919
them come up to me at a meeting in hong

746
00:27:18,310 --> 00:27:15,520
kong with a cell phone showing the

747
00:27:21,350 --> 00:27:18,320
japanese himawari imager which is the

748
00:27:23,830 --> 00:27:21,360
same nominally the same as our goes-r

749
00:27:25,510 --> 00:27:23,840
uh instrument with many the harris made

750
00:27:27,430 --> 00:27:25,520
seven of these instruments four of them

751
00:27:28,870 --> 00:27:27,440
for us and he showed me on his cell

752
00:27:30,310 --> 00:27:28,880
phone he says hey look at this thing

753
00:27:31,430 --> 00:27:30,320
isn't that great i said does that mean

754
00:27:34,470 --> 00:27:31,440
you're going to get that out to the

755
00:27:36,630 --> 00:27:34,480
broadcasters and he said yes so they're

756
00:27:38,470 --> 00:27:36,640
very much incentivized to make sure

757
00:27:40,549 --> 00:27:38,480
these rapid scan images that you see

758
00:27:41,990 --> 00:27:40,559
here get to you and that's important

759
00:27:43,669 --> 00:27:42,000
because you guys are the last mile to

760
00:27:46,149 --> 00:27:43,679
the public so even though we get it to

761
00:27:48,630 --> 00:27:46,159
the forecaster here in the united states

762
00:27:50,789 --> 00:27:48,640
in particular the broadcast

763
00:27:52,470 --> 00:27:50,799

community is what's key to get it to the

764
00:27:55,110 --> 00:27:52,480
individual so they'll take some action

765
00:27:56,950 --> 00:27:55,120
to save themselves if need be and so by

766
00:27:58,389 --> 00:27:56,960
getting you that getting it on the air i

767
00:27:59,830 --> 00:27:58,399
think people will personalize the

768
00:28:01,430 --> 00:27:59,840
potential risk

769
00:28:03,510 --> 00:28:01,440
to themselves and that's how we're going

770
00:28:06,070 --> 00:28:03,520
to help people react to these new

771
00:28:10,870 --> 00:28:08,389
is the resolution on the lightning map

772
00:28:13,350 --> 00:28:10,880
or is that the same uh half kilometer

773
00:28:14,710 --> 00:28:13,360
resolution is it better than that

774
00:28:16,710 --> 00:28:14,720
for there's good reasons why it

775
00:28:19,110 --> 00:28:16,720
shouldn't be

776
00:28:20,630 --> 00:28:19,120
for example when we the the pool of

777
00:28:23,029 --> 00:28:20,640
light i told you about at the top of the

778
00:28:24,710 --> 00:28:23,039
cloud typically that fills the whole

779
00:28:26,870 --> 00:28:24,720
top of the cloud so the optimizer

780
00:28:29,029 --> 00:28:26,880
signaled the noise for detecting that

781
00:28:30,789 --> 00:28:29,039
you want your pixel on the order of what

782
00:28:32,230 --> 00:28:30,799
that pool of light is

783
00:28:33,990 --> 00:28:32,240
think of it during the daytime i've got

784
00:28:35,110 --> 00:28:34,000
this bright sun shining on the top of

785
00:28:37,590 --> 00:28:35,120
the cloud

786
00:28:39,110 --> 00:28:37,600
and i want as little of that signal as

787
00:28:41,190 --> 00:28:39,120
getting into the instrument but i want

788
00:28:44,070 --> 00:28:41,200

as much of the lightning pool of light

789
00:28:46,549 --> 00:28:44,080
to get in so if we optimize the spatial

790
00:28:47,990 --> 00:28:46,559
pixel to that size which is on the order

791
00:28:50,389 --> 00:28:48,000
of four to eight kilometers so we have

792
00:28:52,710 --> 00:28:50,399
an eight kilometer pixel across much of

793
00:28:55,269 --> 00:28:52,720
the field of view to optimize that we

794
00:28:56,630 --> 00:28:55,279
also look at a near-infrared spectral

795
00:28:58,950 --> 00:28:56,640
line where about ten percent of the

796
00:29:01,269 --> 00:28:58,960
lightning total energy occurs so we try

797
00:29:04,310 --> 00:29:01,279
and get that and we're coming down where

798
00:29:06,789 --> 00:29:04,320
the sun is got its maximum output so we

799
00:29:08,950 --> 00:29:06,799
try and minimize the sunlight energy

800
00:29:10,549 --> 00:29:08,960
even during the daytime and then we do

801
00:29:12,470 --> 00:29:10,559
this background subtraction i was

802
00:29:13,990 --> 00:29:12,480
telling about to try and raise the

803
00:29:17,590 --> 00:29:14,000
signal of the noise ratio to get the

804
00:29:22,070 --> 00:29:20,149
yeah hello how quickly would natural

805
00:29:24,149 --> 00:29:22,080
disaster emergency planning go into

806
00:29:27,190 --> 00:29:24,159
effect estimated that we now have this

807
00:29:29,430 --> 00:29:27,200
rapid gain of information of what like

808
00:29:32,070 --> 00:29:29,440
by tracking hurricanes uh doing

809
00:29:33,350 --> 00:29:32,080
hurricane watch tornado watch how

810
00:29:34,310 --> 00:29:33,360
quickly do you think we'll be able to

811
00:29:36,870 --> 00:29:34,320
actually

812
00:29:38,549 --> 00:29:36,880
start to now take effect right so let me

813
00:29:41,110 --> 00:29:38,559

start the tornado one which i've been

814
00:29:42,789 --> 00:29:41,120
working on for 40 years

815
00:29:44,789 --> 00:29:42,799
so for that one

816
00:29:47,350 --> 00:29:44,799
the storm prediction center who puts out

817
00:29:48,950 --> 00:29:47,360
the watches so that's the first step

818
00:29:50,870 --> 00:29:48,960
they tell us that

819
00:29:52,789 --> 00:29:50,880
first that they wanted this imagery the

820
00:29:54,470 --> 00:29:52,799
rapid scan imagery yesterday so they

821
00:29:56,710 --> 00:29:54,480
love it when we've been demonstrating it

822
00:29:59,190 --> 00:29:56,720
to them and what they're telling us is

823
00:30:00,470 --> 00:29:59,200
that about 12 hours out from when the

824
00:30:02,230 --> 00:30:00,480
time of severe weather event would

825
00:30:03,909 --> 00:30:02,240
happen they start intently looking at

826
00:30:05,990 --> 00:30:03,919
satellite imagery so they start with the

827
00:30:08,230 --> 00:30:06,000
models then they look at the imagery and

828
00:30:09,909 --> 00:30:08,240
they're looking at changes so i see

829
00:30:11,430 --> 00:30:09,919
these boundaries and things occurring

830
00:30:13,430 --> 00:30:11,440
the models can't predict those so you

831
00:30:15,029 --> 00:30:13,440
need to be able to see those

832
00:30:17,269 --> 00:30:15,039
those features and so when they see that

833
00:30:19,110 --> 00:30:17,279
and they know that like that line of

834
00:30:20,870 --> 00:30:19,120
that outflow boundary that went and hit

835
00:30:22,470 --> 00:30:20,880
the clouds that were developing

836
00:30:24,149 --> 00:30:22,480
they know that in two hours it's going

837
00:30:25,669 --> 00:30:24,159
to reach that and if the atmosphere is

838
00:30:28,310 --> 00:30:25,679

unstable something good is going to

839
00:30:30,310 --> 00:30:28,320
happen or bad i guess something

840
00:30:32,230 --> 00:30:30,320
interesting is going to happen and so

841
00:30:34,070 --> 00:30:32,240
that gives them some earlier lead time

842
00:30:36,470 --> 00:30:34,080
and what will happen and has happened

843
00:30:37,990 --> 00:30:36,480
actually so you see a line of storms

844
00:30:40,070 --> 00:30:38,000
that's propagating and they put out

845
00:30:42,070 --> 00:30:40,080
warnings like county by county or state

846
00:30:43,830 --> 00:30:42,080
by state so when you get into the next

847
00:30:45,830 --> 00:30:43,840
county warning area for particular

848
00:30:47,510 --> 00:30:45,840
weather service office when they see

849
00:30:49,029 --> 00:30:47,520
that this is going to happen this

850
00:30:51,669 --> 00:30:49,039
convergence of

851
00:30:53,750 --> 00:30:51,679
boundaries into unstable atmosphere then

852
00:30:55,510 --> 00:30:53,760
they're going to extend their watch so

853
00:30:57,590 --> 00:30:55,520
they use that information of what

854
00:31:00,070 --> 00:30:57,600
they're seeing happening in real time to

855
00:31:01,830 --> 00:31:00,080
know whether it's a likelihood that say

856
00:31:04,230 --> 00:31:01,840
in the next two hours or four hours

857
00:31:06,070 --> 00:31:04,240
storms will still continue to be very

858
00:31:07,990 --> 00:31:06,080
strong and need to be concerned with

859
00:31:08,950 --> 00:31:08,000
them for the hurricane problem

860
00:31:10,950 --> 00:31:08,960
i think

861
00:31:13,509 --> 00:31:10,960
following the track forecast getting the

862
00:31:15,590 --> 00:31:13,519
models more accurate if the tracks are

863
00:31:17,269 --> 00:31:15,600

divergent you've seen the spaghetti maps

864
00:31:18,950 --> 00:31:17,279
where they're all over the place so

865
00:31:21,190 --> 00:31:18,960
hopefully we can converge that and that

866
00:31:24,710 --> 00:31:21,200
will help emergency managers get more

867
00:31:25,909 --> 00:31:24,720
confidence say three or four days out

868
00:31:28,470 --> 00:31:25,919
see we're gonna take a question from

869
00:31:30,470 --> 00:31:28,480
social media

870
00:31:32,230 --> 00:31:30,480
all right this one comes from twitter

871
00:31:37,029 --> 00:31:32,240
what potential hazards could you

872
00:31:41,350 --> 00:31:38,870
could the spacecraft encounter during

873
00:31:46,789 --> 00:31:44,470
maybe i'll turn that one back over to uh

874
00:31:49,830 --> 00:31:46,799
to who

875
00:31:52,789 --> 00:31:49,840
to add so um well we know that um

876
00:31:55,110 --> 00:31:52,799
radiation um you know these particles

877
00:31:56,630 --> 00:31:55,120
that penetrate the spacecraft so that

878
00:31:58,310 --> 00:31:56,640
that could be a potential issue we're

879
00:31:59,430 --> 00:31:58,320
monitoring them and that fact that's why

880
00:32:01,590 --> 00:31:59,440
we we

881
00:32:04,149 --> 00:32:01,600
collect that information so that future

882
00:32:06,470 --> 00:32:04,159
spacecraft can be hardened against the

883
00:32:07,590 --> 00:32:06,480
space environment which is a nasty

884
00:32:09,830 --> 00:32:07,600
environment so we're worried about

885
00:32:12,149 --> 00:32:09,840
radiation we're worried about

886
00:32:14,950 --> 00:32:12,159
the uh effects from the sun and putting

887
00:32:16,310 --> 00:32:14,960
out solar storms those kind of things so

888
00:32:17,830 --> 00:32:16,320

i mean you have to live through that

889
00:32:19,830 --> 00:32:17,840
sometimes you save the

890
00:32:21,669 --> 00:32:19,840
satellite turn off the instruments if

891
00:32:23,750 --> 00:32:21,679
you have to

892
00:32:25,190 --> 00:32:23,760
the solar eclipse is is something that

893
00:32:26,710 --> 00:32:25,200
we do much better with now because it

894
00:32:28,950 --> 00:32:26,720
runs down our batteries when we don't

895
00:32:31,350 --> 00:32:28,960
get any sun on the satellite

896
00:32:32,230 --> 00:32:31,360
solar wings so right now we have a very

897
00:32:34,230 --> 00:32:32,240
small

898
00:32:35,590 --> 00:32:34,240
outage period but we do get stray light

899
00:32:36,950 --> 00:32:35,600
that can come into the instrument

900
00:32:38,389 --> 00:32:36,960
telescopes

901
00:32:39,430 --> 00:32:38,399
during the eclipse period so that's

902
00:32:41,430 --> 00:32:39,440
something that we're going to be

903
00:32:43,269 --> 00:32:41,440
checking out once we're on orbit and see

904
00:32:44,870 --> 00:32:43,279
if we can mitigate or minimize some of

905
00:32:47,909 --> 00:32:44,880
those effects

906
00:32:49,909 --> 00:32:47,919
we have time for one more question

907
00:32:52,389 --> 00:32:49,919
good afternoon my name's gray bright

908
00:32:54,549 --> 00:32:52,399
if i was to give you an unlimited amount

909
00:32:56,710 --> 00:32:54,559
of cash and remove a whole lot of

910
00:32:59,430 --> 00:32:56,720
technical complexities

911
00:33:02,149 --> 00:32:59,440
what instruments would you put on your

912
00:33:04,549 --> 00:33:02,159
perfect satellite to

913
00:33:06,470 --> 00:33:04,559

take us to a stage where weather's no

914
00:33:08,830 --> 00:33:06,480
longer a forecast but more like the

915
00:33:10,549 --> 00:33:08,840
closest that we could get to accurate

916
00:33:13,909 --> 00:33:10,559
prediction

917
00:33:18,470 --> 00:33:15,430
the big what do they say the bigger the

918
00:33:19,750 --> 00:33:18,480
boy the bigger the toy or whatever it is

919
00:33:21,990 --> 00:33:19,760
there's a cuff there's some things that

920
00:33:23,990 --> 00:33:22,000
we don't do in the u.s that are of great

921
00:33:26,310 --> 00:33:24,000
interest one is a scatterometer it's an

922
00:33:28,230 --> 00:33:26,320
active instrument that measures ocean

923
00:33:29,909 --> 00:33:28,240
wind speed not that you have to have

924
00:33:31,509 --> 00:33:29,919
that in geostationary but we don't even

925
00:33:32,950 --> 00:33:31,519
have it in low earth orbit steve volts

926
00:33:35,269 --> 00:33:32,960
was telling you that it's the

927
00:33:36,870 --> 00:33:35,279
constellation of observations

928
00:33:38,389 --> 00:33:36,880
you know all combined together with the

929
00:33:40,070 --> 00:33:38,399
models it's important

930
00:33:42,389 --> 00:33:40,080
there is one instrument we were supposed

931
00:33:44,870 --> 00:33:42,399
to have on goes-r but we lo we lost it

932
00:33:47,430 --> 00:33:44,880
due to risk and cost and everything else

933
00:33:48,870 --> 00:33:47,440
called a hyper-spectral infrared sounder

934
00:33:51,509 --> 00:33:48,880
the europeans and the chinese are going

935
00:33:53,669 --> 00:33:51,519
to fly such an instrument the first time

936
00:33:55,430 --> 00:33:53,679
and we have it's something we're looking

937
00:33:58,310 --> 00:33:55,440
at for the next genera generation what

938
00:34:00,149 --> 00:33:58,320

will that do for you so that that same

939
00:34:02,070 --> 00:34:00,159
storm system i showed you

940
00:34:03,590 --> 00:34:02,080
we don't know what the instability is of

941
00:34:06,710 --> 00:34:03,600
the atmosphere there however with this

942
00:34:08,470 --> 00:34:06,720
infrared hyperspectral instrument with a

943
00:34:10,389 --> 00:34:08,480
couple thousand different spectral bands

944
00:34:12,629 --> 00:34:10,399
you can see profiles of the structure of

945
00:34:14,310 --> 00:34:12,639
temperature and moisture the atmosphere

946
00:34:15,669 --> 00:34:14,320
so steve volts is telling you well we do

947
00:34:17,669 --> 00:34:15,679
that today but we do it from low earth

948
00:34:20,389 --> 00:34:17,679
orbit and we get a snapshot every 12

949
00:34:22,710 --> 00:34:20,399
hours a lot happens as you can see in 12

950
00:34:25,030 --> 00:34:22,720
hours and so if we could do that like

951
00:34:27,030 --> 00:34:25,040
every five minutes you could do a small

952
00:34:28,470 --> 00:34:27,040
area scene and get the temperature

953
00:34:30,710 --> 00:34:28,480
moisture profile at five or ten

954
00:34:33,510 --> 00:34:30,720
kilometer resolution which is the

955
00:34:35,190 --> 00:34:33,520
objective then we can see storms going

956
00:34:36,790 --> 00:34:35,200
into unstable environment you know

957
00:34:37,990 --> 00:34:36,800
they're going to go and grow they go

958
00:34:40,069 --> 00:34:38,000
into a stable environment they're going

959
00:34:41,669 --> 00:34:40,079
to collapse and die so that'd be very

960
00:34:43,589 --> 00:34:41,679
valuable information and whether or not

961
00:34:45,349 --> 00:34:43,599
we're able to afford it in the next

962
00:34:47,510 --> 00:34:45,359
generation architecture you know i don't

963
00:34:48,389 --> 00:34:47,520

know but that would be in my

964
00:34:51,829 --> 00:34:48,399
in my

965
00:34:51,839 --> 00:35:00,230
thanks steven really appreciate it

966
00:35:03,270 --> 00:35:01,750
our next speaker is going to talk a

967
00:35:05,270 --> 00:35:03,280
little about the goes-r spacecraft

968
00:35:08,950 --> 00:35:05,280
itself let me introduce calvin craig

969
00:35:13,910 --> 00:35:11,270
thanks john

970
00:35:16,230 --> 00:35:13,920
all right are we on um apparently

971
00:35:18,870 --> 00:35:16,240
all right so um our job at lockheed

972
00:35:20,150 --> 00:35:18,880
martin um is to take all these wonderful

973
00:35:21,270 --> 00:35:20,160
requirements and these wonderful

974
00:35:22,950 --> 00:35:21,280
instruments that everybody's been

975
00:35:24,790 --> 00:35:22,960
talking about and actually build a

976
00:35:27,030 --> 00:35:24,800
spacecraft bus that can support the

977
00:35:28,470 --> 00:35:27,040
capabilities that they've requested um

978
00:35:30,790 --> 00:35:28,480
if i could have my first slide please

979
00:35:32,710 --> 00:35:30,800
i'd appreciate it um so i'm sure you

980
00:35:34,950 --> 00:35:32,720
guys have have uh been out seen the

981
00:35:37,109 --> 00:35:34,960
rocket seen that big fairing on top with

982
00:35:38,710 --> 00:35:37,119
the uh what looks to be very voluminous

983
00:35:40,230 --> 00:35:38,720
inside well what's filling that volume

984
00:35:41,990 --> 00:35:40,240
inside is what you see in front of you

985
00:35:43,670 --> 00:35:42,000
here on this slide which is the the

986
00:35:45,270 --> 00:35:43,680
satellite that has all those instruments

987
00:35:46,950 --> 00:35:45,280
on it um

988
00:35:48,870 --> 00:35:46,960

as we got these requirements in the

989
00:35:50,710 --> 00:35:48,880
beginning of the program

990
00:35:52,790 --> 00:35:50,720
we realized that we were going to have

991
00:35:54,710 --> 00:35:52,800
to pull from our cadre of many different

992
00:35:56,230 --> 00:35:54,720
vehicles that we had built prior to this

993
00:35:58,470 --> 00:35:56,240
and come up with some new technologies

994
00:36:00,790 --> 00:35:58,480
in order to accomplish this mission so

995
00:36:02,790 --> 00:36:00,800
um we pulled from our a 2100 commercial

996
00:36:05,190 --> 00:36:02,800
series of satellites that flies at

997
00:36:07,109 --> 00:36:05,200
geosynchronous orbit all the time we

998
00:36:08,630 --> 00:36:07,119
pulled from our interplanetary line of

999
00:36:10,390 --> 00:36:08,640
satellites that

1000
00:36:12,230 --> 00:36:10,400
flies to other planets and has to be

1001
00:36:13,430 --> 00:36:12,240
very autonomous and protect themselves

1002
00:36:15,510 --> 00:36:13,440
against some of these dangers that

1003
00:36:17,670 --> 00:36:15,520
people were asking about earlier

1004
00:36:19,990 --> 00:36:17,680
just to comment on that real quickly we

1005
00:36:21,349 --> 00:36:20,000
have about 30 000 pieces of telemetry on

1006
00:36:23,190 --> 00:36:21,359
board the vehicle that tells us what's

1007
00:36:25,349 --> 00:36:23,200
going on with the vehicle and fully half

1008
00:36:27,190 --> 00:36:25,359
of them are dedicated to actually

1009
00:36:28,950 --> 00:36:27,200
protecting against failures or faults

1010
00:36:30,870 --> 00:36:28,960
that could occur on the vehicle so that

1011
00:36:32,550 --> 00:36:30,880
it can autonomously recover even if a

1012
00:36:35,109 --> 00:36:32,560
ground station isn't there and then we

1013
00:36:36,470 --> 00:36:35,119

also drew from a number of different

1014
00:36:38,630 --> 00:36:36,480
satellites that we've built that have

1015
00:36:40,230 --> 00:36:38,640
very stable observational platforms like

1016
00:36:41,829 --> 00:36:40,240
an icono satellite or a mars

1017
00:36:43,829 --> 00:36:41,839
reconnaissance orbiter satellite that

1018
00:36:46,630 --> 00:36:43,839
we've built that actually allow us to

1019
00:36:48,470 --> 00:36:46,640
point very accurately and keep those

1020
00:36:50,550 --> 00:36:48,480
images at that high resolution without

1021
00:36:52,790 --> 00:36:50,560
blurriness in the pixels so if we can go

1022
00:36:54,790 --> 00:36:52,800
to the next next slide

1023
00:36:56,550 --> 00:36:54,800
this is a different view of the

1024
00:36:58,150 --> 00:36:56,560
satellite here with the actual solar

1025
00:37:01,109 --> 00:36:58,160
wing deployed it gives you kind of an

1026
00:37:04,790 --> 00:37:01,119
idea of the scale of the satellite

1027
00:37:06,950 --> 00:37:04,800
fully loaded it is about 5 200 kilograms

1028
00:37:09,349 --> 00:37:06,960
about half of that give or take is fuel

1029
00:37:11,430 --> 00:37:09,359
so it's about 2 800 kilograms of actual

1030
00:37:13,510 --> 00:37:11,440
satellite with about 2 400 kilograms of

1031
00:37:16,310 --> 00:37:13,520
fuel on board um

1032
00:37:18,950 --> 00:37:16,320
and so that uh the sat the solar array

1033
00:37:22,230 --> 00:37:18,960
that you see here is about 250 square

1034
00:37:25,190 --> 00:37:22,240
feet or so of solar array cells that

1035
00:37:27,349 --> 00:37:25,200
puts out about six kilowatts of uh power

1036
00:37:30,150 --> 00:37:27,359
which is enough to power about five

1037
00:37:31,430 --> 00:37:30,160
average uh u.s households if you will um

1038
00:37:33,750 --> 00:37:31,440

satellite as you can see is somewhere

1039
00:37:35,109 --> 00:37:33,760
around 20 feet taller so the two the

1040
00:37:37,670 --> 00:37:35,119
instruments are on the very top of the

1041
00:37:39,030 --> 00:37:37,680
satellite here that point towards the um

1042
00:37:40,150 --> 00:37:39,040
towards the earth and then there's also

1043
00:37:42,069 --> 00:37:40,160
the solar pointing instruments which

1044
00:37:43,510 --> 00:37:42,079
haven't been talked about a lot here um

1045
00:37:45,510 --> 00:37:43,520
but the the two solar pointing

1046
00:37:48,390 --> 00:37:45,520
instruments are on a platform in there

1047
00:37:50,710 --> 00:37:48,400
that basically can tilt and point those

1048
00:37:52,790 --> 00:37:50,720
instruments straight at the sun

1049
00:37:54,550 --> 00:37:52,800
so this is about as as close to an

1050
00:37:57,270 --> 00:37:54,560
in-flight picture as you can get on the

1051
00:37:58,790 --> 00:37:57,280
ground obviously with the limitations of

1052
00:38:00,310 --> 00:37:58,800
deploying things on the ground with

1053
00:38:02,069 --> 00:38:00,320
gravitational effects and those types of

1054
00:38:03,670 --> 00:38:02,079
things we can't build them to support

1055
00:38:05,430 --> 00:38:03,680
their own weight in a lot of cases on

1056
00:38:07,430 --> 00:38:05,440
the ground so we have to have to kind of

1057
00:38:08,790 --> 00:38:07,440
support things as you can see the rails

1058
00:38:11,030 --> 00:38:08,800
on top of the solar array so let's go on

1059
00:38:12,550 --> 00:38:11,040
to the next slide

1060
00:38:13,430 --> 00:38:12,560
and in this next slide this will kind of

1061
00:38:14,150 --> 00:38:13,440
be in

1062
00:38:15,990 --> 00:38:14,160
just

1063
00:38:17,430 --> 00:38:16,000

an in-flight view if you will and i want

1064
00:38:19,510 --> 00:38:17,440
to talk a little bit about some of the

1065
00:38:22,069 --> 00:38:19,520
the capabilities of the satellite and

1066
00:38:23,510 --> 00:38:22,079
the simultaneous uh requirements or the

1067
00:38:24,790 --> 00:38:23,520
simultaneous nature of some of these

1068
00:38:26,390 --> 00:38:24,800
requirements

1069
00:38:28,790 --> 00:38:26,400
those instruments that are pointing at

1070
00:38:31,270 --> 00:38:28,800
the planet basically we have to point

1071
00:38:32,710 --> 00:38:31,280
those within a few arc seconds of a

1072
00:38:34,630 --> 00:38:32,720
certain point on the ground you say okay

1073
00:38:35,990 --> 00:38:34,640
what the heck's an arc second so if i

1074
00:38:37,670 --> 00:38:36,000
just compare that to something that you

1075
00:38:39,910 --> 00:38:37,680
might understand the

1076
00:38:41,670 --> 00:38:39,920
if you were to throw a dart at a

1077
00:38:43,670 --> 00:38:41,680
dartboard and try to hit a bullseye you

1078
00:38:46,150 --> 00:38:43,680
would be hitting a bullseye from about a

1079
00:38:48,390 --> 00:38:46,160
quarter mile away that's how accurately

1080
00:38:50,630 --> 00:38:48,400
we have to point the spacecraft so we're

1081
00:38:52,310 --> 00:38:50,640
whipping around at about 3 500 miles an

1082
00:38:53,910 --> 00:38:52,320
hour basically to stay at a stationary

1083
00:38:55,670 --> 00:38:53,920
point it looks stationary from the earth

1084
00:38:57,589 --> 00:38:55,680
but we're whipping around at about 3 500

1085
00:38:59,510 --> 00:38:57,599
miles an hour and trying to keep that

1086
00:39:01,349 --> 00:38:59,520
thing pointed that accurately at the

1087
00:39:03,190 --> 00:39:01,359
same time we're also rotating the solar

1088
00:39:04,470 --> 00:39:03,200

array trying to keep it on the sun and

1089
00:39:06,230 --> 00:39:04,480
rotating those solar pointing

1090
00:39:07,670 --> 00:39:06,240
instruments so that they're pointed at

1091
00:39:09,430 --> 00:39:07,680
the sun with exactly the same amount of

1092
00:39:11,030 --> 00:39:09,440
accuracy so now i've got my two hands

1093
00:39:12,550 --> 00:39:11,040
pointing in different directions

1094
00:39:14,470 --> 00:39:12,560
rotating as the spacecraft's going

1095
00:39:17,190 --> 00:39:14,480
around in its orbit

1096
00:39:19,109 --> 00:39:17,200
in addition to that

1097
00:39:20,550 --> 00:39:19,119
geostationary satellites make great

1098
00:39:22,790 --> 00:39:20,560
communication satellites so as you've

1099
00:39:25,430 --> 00:39:22,800
heard not only do we downlink the raw

1100
00:39:27,430 --> 00:39:25,440
data but we also take other data back up

1101
00:39:28,710 --> 00:39:27,440
and then basically take that package

1102
00:39:30,390 --> 00:39:28,720
data and send it down to all those

1103
00:39:31,750 --> 00:39:30,400
meteorological users we were talking

1104
00:39:32,790 --> 00:39:31,760
about before

1105
00:39:34,390 --> 00:39:32,800
we have

1106
00:39:36,390 --> 00:39:34,400
and then let's not even talk about

1107
00:39:38,069 --> 00:39:36,400
things like for instance the buoys that

1108
00:39:39,510 --> 00:39:38,079
are at sea that detects tsunamis those

1109
00:39:41,109 --> 00:39:39,520
types of things they have to communicate

1110
00:39:43,510 --> 00:39:41,119
somewhere where they communicate they

1111
00:39:45,430 --> 00:39:43,520
communicate with the gosar satellite

1112
00:39:46,230 --> 00:39:45,440
we also have search and rescue band on

1113
00:39:49,349 --> 00:39:46,240

this

1114
00:39:51,190 --> 00:39:49,359
about 250 people a year are rescued

1115
00:39:52,790 --> 00:39:51,200
via this search and rescue band where

1116
00:39:55,030 --> 00:39:52,800
they basically have beacons as they get

1117
00:39:57,190 --> 00:39:55,040
lost at sea or wherever

1118
00:39:58,550 --> 00:39:57,200
and they're able to be located because

1119
00:40:00,630 --> 00:39:58,560
of the search and rescue band that we

1120
00:40:02,230 --> 00:40:00,640
have on board the vehicle the long boom

1121
00:40:03,349 --> 00:40:02,240
that you see is a magnetometer that's

1122
00:40:04,069 --> 00:40:03,359
part of our

1123
00:40:06,390 --> 00:40:04,079
our

1124
00:40:07,829 --> 00:40:06,400
i'll say space weather instruments if

1125
00:40:08,710 --> 00:40:07,839
you will that's measuring the magnetic

1126
00:40:10,069 --> 00:40:08,720
field

1127
00:40:11,430 --> 00:40:10,079
along with the particle counters that

1128
00:40:12,950 --> 00:40:11,440
you heard earlier you can't really

1129
00:40:14,150 --> 00:40:12,960
there's a small cabinet on the bottom

1130
00:40:16,470 --> 00:40:14,160
that you can see there that has some of

1131
00:40:17,430 --> 00:40:16,480
the the particle counters that count the

1132
00:40:18,790 --> 00:40:17,440
the uh

1133
00:40:20,069 --> 00:40:18,800
charged particles as we go through the

1134
00:40:21,270 --> 00:40:20,079
orbit

1135
00:40:22,309 --> 00:40:21,280
so let's go ahead and go on to the next

1136
00:40:24,710 --> 00:40:22,319
slide

1137
00:40:26,550 --> 00:40:24,720
um this is this is a picture of the

1138
00:40:29,589 --> 00:40:26,560

satellite as it was getting ready to go

1139
00:40:31,829 --> 00:40:29,599
into its thermal vacuum testing uh which

1140
00:40:34,790 --> 00:40:31,839
is basically a test where we we subject

1141
00:40:36,710 --> 00:40:34,800
the satellite to very cold and very warm

1142
00:40:38,710 --> 00:40:36,720
temperatures for that matter um to make

1143
00:40:40,150 --> 00:40:38,720
sure that it that it survives those

1144
00:40:41,510 --> 00:40:40,160
temperatures make sure that our thermal

1145
00:40:42,950 --> 00:40:41,520
protection system works the way that

1146
00:40:44,470 --> 00:40:42,960
it's supposed to work make sure the

1147
00:40:45,750 --> 00:40:44,480
heaters turn on and off et cetera et

1148
00:40:47,349 --> 00:40:45,760
cetera

1149
00:40:49,270 --> 00:40:47,359
in order to do this we have to flood

1150
00:40:51,589 --> 00:40:49,280
those walls of that chamber with liquid

1151
00:40:53,430 --> 00:40:51,599
nitrogen that's running at about 321

1152
00:40:55,270 --> 00:40:53,440
degrees below zero

1153
00:40:57,750 --> 00:40:55,280
in order to get that chamber cold enough

1154
00:40:59,670 --> 00:40:57,760
to simulate those cold conditions uh we

1155
00:41:01,750 --> 00:40:59,680
pump so much liquid nitrogen into there

1156
00:41:04,069 --> 00:41:01,760
that it boils off constantly we

1157
00:41:06,390 --> 00:41:04,079
literally have to semi truck a trailer

1158
00:41:07,829 --> 00:41:06,400
full of liquid nitrogen every day in to

1159
00:41:09,190 --> 00:41:07,839
just basically keep that chamber cold

1160
00:41:10,150 --> 00:41:09,200
enough to simulate that space

1161
00:41:11,190 --> 00:41:10,160
environment that we're trying to

1162
00:41:13,190 --> 00:41:11,200
simulate

1163
00:41:14,550 --> 00:41:13,200

um that's just one of our environmental

1164
00:41:15,990 --> 00:41:14,560
tests we have a number of other ones

1165
00:41:17,910 --> 00:41:16,000
that do vibration testing and those

1166
00:41:20,230 --> 00:41:17,920
types of things to make sure it survives

1167
00:41:21,829 --> 00:41:20,240
our launch vehicle environments if you

1168
00:41:24,790 --> 00:41:21,839
look at the load that the satellite

1169
00:41:26,710 --> 00:41:24,800
actually has to has to carry on its its

1170
00:41:29,349 --> 00:41:26,720
axial direction basically straight up

1171
00:41:31,510 --> 00:41:29,359
and down from the uh from the rocket

1172
00:41:33,349 --> 00:41:31,520
it's somewhere around a tractor trailer

1173
00:41:36,710 --> 00:41:33,359
a fully loaded tractor trailer's worth

1174
00:41:39,750 --> 00:41:36,720
of weight on top of that satellite so

1175
00:41:43,109 --> 00:41:39,760
it's it's particularly light and rigid

1176
00:41:44,710 --> 00:41:43,119
in order to support that type of load

1177
00:41:47,109 --> 00:41:44,720
so i think if we go on to the last slide

1178
00:41:49,270 --> 00:41:47,119
here this is basically just a precursor

1179
00:41:51,910 --> 00:41:49,280
to say we're doing these in parallel

1180
00:41:53,270 --> 00:41:51,920
almost um the the goes-s vehicle uh

1181
00:41:54,870 --> 00:41:53,280
which is on the right in the picture

1182
00:41:57,270 --> 00:41:54,880
here that goes our vehicle is on the

1183
00:41:59,430 --> 00:41:57,280
left um that goes s vehicle will be

1184
00:42:02,630 --> 00:41:59,440
launching in february of 2018. so we see

1185
00:42:04,230 --> 00:42:02,640
you guys back here in a year and a half

1186
00:42:06,150 --> 00:42:04,240
and and that will be launching in

1187
00:42:08,870 --> 00:42:06,160
february 2018 and then we have another

1188
00:42:11,270 --> 00:42:08,880

one goes t that goes up in 2019 and then

1189
00:42:13,190 --> 00:42:11,280
goes u fully fills out the fleet

1190
00:42:15,510 --> 00:42:13,200
after a pretty long storage period and

1191
00:42:17,270 --> 00:42:15,520
somewhere around 2024. so those are the

1192
00:42:19,589 --> 00:42:17,280
the launch dates of the satellites that

1193
00:42:21,670 --> 00:42:19,599
are coming up um so a lot of activity

1194
00:42:23,829 --> 00:42:21,680
going on and so that's trying to

1195
00:42:25,589 --> 00:42:23,839
summarize literally millions and

1196
00:42:26,950 --> 00:42:25,599
millions of work hours that go into

1197
00:42:29,589 --> 00:42:26,960
designing testing and building the

1198
00:42:31,990 --> 00:42:29,599
satellite in five minutes so um

1199
00:42:35,910 --> 00:42:32,000
questions

1200
00:42:37,589 --> 00:42:35,920
calvin so i don't understand all four

1201
00:42:40,069 --> 00:42:37,599
spacecraft are

1202
00:42:41,670 --> 00:42:40,079
are very similar or identical yeah but

1203
00:42:42,950 --> 00:42:41,680
you said goes u launches way down the

1204
00:42:44,790 --> 00:42:42,960
road is there any possibility if a new

1205
00:42:46,950 --> 00:42:44,800
technology came along you could augment

1206
00:42:48,870 --> 00:42:46,960
the spacecraft um

1207
00:42:51,750 --> 00:42:48,880
certainly there are possibilities there

1208
00:42:53,349 --> 00:42:51,760
are no plans at the moment um but

1209
00:42:55,430 --> 00:42:53,359
certainly you know

1210
00:42:56,790 --> 00:42:55,440
if noah came to us with new instruments

1211
00:42:59,349 --> 00:42:56,800
or something like that and said hey we

1212
00:43:01,750 --> 00:42:59,359
want wanna we want to absorb the the uh

1213
00:43:03,349 --> 00:43:01,760

extra cost and or schedule to go do such

1214
00:43:06,230 --> 00:43:03,359
a thing um it's certainly not out of the

1215
00:43:08,390 --> 00:43:06,240
realm of possibility gotcha

1216
00:43:09,510 --> 00:43:08,400
all right not seeing any questions um

1217
00:43:14,470 --> 00:43:09,520
thanks calvin appreciate you being

1218
00:43:18,309 --> 00:43:15,750
and just a reminder for those watching

1219
00:43:19,750 --> 00:43:18,319
at home please use the hashtag askgoes

1220
00:43:21,430 --> 00:43:19,760
if you have a question for any of our

1221
00:43:22,630 --> 00:43:21,440
panelists

1222
00:43:24,470 --> 00:43:22,640
to get you a little excited about

1223
00:43:26,069 --> 00:43:24,480
tomorrow's launch and

1224
00:43:35,270 --> 00:43:26,079
mission we have a short video for you

1225
00:43:40,790 --> 00:43:36,950
status check to proceed with terminal

1226
00:43:44,150 --> 00:43:42,710
atlas systems propulsion drove

1227
00:43:47,510 --> 00:43:44,160
hydraulics

1228
00:43:49,750 --> 00:43:47,520
pneumatics go hello2 go water go centaur

1229
00:44:03,430 --> 00:43:49,760
systems propulsion go range coordinator

1230
00:44:03,440 --> 00:44:16,710
liftoff

1231
00:44:20,230 --> 00:44:19,109
that's awesome our next two speakers are

1232
00:44:22,630 --> 00:44:20,240
here to talk a little bit about the

1233
00:44:25,270 --> 00:44:22,640
launch itself uh we have uh

1234
00:44:26,870 --> 00:44:25,280
mark mark weiss with um nasa's launch

1235
00:44:29,030 --> 00:44:26,880
services program and

1236
00:44:30,550 --> 00:44:29,040
amanda cooker with um united launch

1237
00:44:31,670 --> 00:44:30,560
lines mark amanda

1238
00:44:33,829 --> 00:44:31,680

thank you

1239
00:44:35,430 --> 00:44:33,839
good afternoon everybody so so who's

1240
00:44:36,870 --> 00:44:35,440
been kennedy before his first time for

1241
00:44:39,349 --> 00:44:36,880
some years or is this a lot of you've

1242
00:44:41,829 --> 00:44:39,359
been here before so how many first time

1243
00:44:43,990 --> 00:44:41,839
yeah so pretty cool right so

1244
00:44:45,430 --> 00:44:44,000
just watching that video every time gets

1245
00:44:46,950 --> 00:44:45,440
me excited so

1246
00:44:49,910 --> 00:44:46,960
launch service program been around at

1247
00:44:51,910 --> 00:44:49,920
kennedy since 1998. um obviously nasa's

1248
00:44:52,870 --> 00:44:51,920
been launching rockets for a long time

1249
00:44:53,990 --> 00:44:52,880
before that and they've been putting

1250
00:44:55,430 --> 00:44:54,000
satellites in orbit for a long time

1251
00:44:57,510 --> 00:44:55,440
before that each satellite organization

1252
00:44:58,790 --> 00:44:57,520
would focus on getting their ride

1253
00:45:00,230 --> 00:44:58,800
towards the end of their processing and

1254
00:45:01,910 --> 00:45:00,240
obviously you know a lot of work goes

1255
00:45:04,470 --> 00:45:01,920
into what you see on these go satellites

1256
00:45:06,309 --> 00:45:04,480
you know they're probably 15 years of

1257
00:45:07,589 --> 00:45:06,319
trying to get that right and then they

1258
00:45:09,430 --> 00:45:07,599
have to go find a launch vehicle so in

1259
00:45:11,270 --> 00:45:09,440
98 they consolidated all that rocket

1260
00:45:12,870 --> 00:45:11,280
engineering expertise across the agency

1261
00:45:14,470 --> 00:45:12,880
and brought it here to kennedy so we're

1262
00:45:16,230 --> 00:45:14,480
lucky we get to live here at america's

1263
00:45:18,390 --> 00:45:16,240

premier spaceport the 21st century

1264
00:45:19,990 --> 00:45:18,400
launch complex that's you know history

1265
00:45:21,750 --> 00:45:20,000
of launch on the shuttle and

1266
00:45:23,829 --> 00:45:21,760
you know human access to space and a

1267
00:45:26,309 --> 00:45:23,839
great future for us as well so

1268
00:45:27,750 --> 00:45:26,319
lsp goes out and and works with these

1269
00:45:29,510 --> 00:45:27,760
spacecraft customers once they start

1270
00:45:30,710 --> 00:45:29,520
getting ready to to figure out how to

1271
00:45:32,950 --> 00:45:30,720
get to space

1272
00:45:34,870 --> 00:45:32,960
so we've got a great team of engineers

1273
00:45:36,069 --> 00:45:34,880
and analysts back here that that will

1274
00:45:37,430 --> 00:45:36,079
work through all the iterations of

1275
00:45:39,430 --> 00:45:37,440
what's the right size of rocket they

1276
00:45:41,030 --> 00:45:39,440
need what's the you know how do we

1277
00:45:42,390 --> 00:45:41,040
mitigate the loads and the environments

1278
00:45:44,069 --> 00:45:42,400
that that spacecraft might see on its

1279
00:45:46,390 --> 00:45:44,079
way uphill to make sure it gets there

1280
00:45:49,030 --> 00:45:46,400
safe and it gets there in good shape

1281
00:45:50,870 --> 00:45:49,040
so for goes for the the our launch that

1282
00:45:53,109 --> 00:45:50,880
we're going to do tomorrow we went out

1283
00:45:55,030 --> 00:45:53,119
back in 2011 and started working to

1284
00:45:57,829 --> 00:45:55,040
procure a launch service for noaa and

1285
00:46:00,230 --> 00:45:57,839
nasa we bought both goes-r and goes-s's

1286
00:46:01,829 --> 00:46:00,240
launch vehicle back in 2012 contracted

1287
00:46:04,309 --> 00:46:01,839
with united launch alliance who amanda's

1288
00:46:05,829 --> 00:46:04,319

here to represent and found that right

1289
00:46:07,270 --> 00:46:05,839
balance between the past performance of

1290
00:46:09,349 --> 00:46:07,280
the rocket the cost and how we wanted to

1291
00:46:11,270 --> 00:46:09,359
make sure we got this to orbit and then

1292
00:46:12,790 --> 00:46:11,280
for the next five years or so we've been

1293
00:46:14,309 --> 00:46:12,800
working the integration and working real

1294
00:46:16,390 --> 00:46:14,319
close with the spacecraft project to

1295
00:46:17,829 --> 00:46:16,400
make sure you know all every step along

1296
00:46:19,829 --> 00:46:17,839
the way to mechanically integrate that

1297
00:46:21,030 --> 00:46:19,839
spacecraft electrically making sure we

1298
00:46:22,710 --> 00:46:21,040
keep it at the right temperature when

1299
00:46:24,069 --> 00:46:22,720
the spacecraft gets here get them a

1300
00:46:25,829 --> 00:46:24,079
processing facility make sure

1301
00:46:27,349 --> 00:46:25,839
everything's choreographed just right to

1302
00:46:29,109 --> 00:46:27,359
get them out to the launch pad and get

1303
00:46:30,710 --> 00:46:29,119
them ready and then along with that

1304
00:46:32,150 --> 00:46:30,720
we're working close hand in hand with

1305
00:46:33,829 --> 00:46:32,160
our partners with united launch alliance

1306
00:46:35,109 --> 00:46:33,839
to to make sure the rocket's ready make

1307
00:46:36,390 --> 00:46:35,119
sure we understand all the changes

1308
00:46:38,790 --> 00:46:36,400
they're doing as they upgrade this

1309
00:46:40,470 --> 00:46:38,800
rocket and get it ready to launch so

1310
00:46:42,150 --> 00:46:40,480
we're proud to be part of this noaa nasa

1311
00:46:44,710 --> 00:46:42,160
partnership you know we've launched the

1312
00:46:47,430 --> 00:46:44,720
the l m satellite back in early 2000

1313
00:46:49,430 --> 00:46:47,440

2001. um we've helped when when goes

1314
00:46:50,470 --> 00:46:49,440
went out and launched no and p later in

1315
00:46:52,069 --> 00:46:50,480
the year and now we're here for this

1316
00:46:54,309 --> 00:46:52,079
next generation which is it's really

1317
00:46:55,750 --> 00:46:54,319
neat so let amanda kind of give you an

1318
00:46:57,670 --> 00:46:55,760
overview of the rocket and then open it

1319
00:46:59,990 --> 00:46:57,680
up for questions

1320
00:47:01,990 --> 00:47:00,000
thank you so i'm andy cooker with united

1321
00:47:04,230 --> 00:47:02,000
launch alliance and we are america's

1322
00:47:06,470 --> 00:47:04,240
ride to space we are the nation's

1323
00:47:08,870 --> 00:47:06,480
premier launch provider with our atlas v

1324
00:47:09,829 --> 00:47:08,880
and delta iv launch vehicle families and

1325
00:47:11,990 --> 00:47:09,839
the lunch tomorrow is going to be

1326
00:47:13,109 --> 00:47:12,000
launching on an atlas 5 rocket so i'm

1327
00:47:14,550 --> 00:47:13,119
going to show you guys a little bit what

1328
00:47:17,270 --> 00:47:14,560
that rocket looks like if i could get my

1329
00:47:20,309 --> 00:47:18,309
awesome so these are the different

1330
00:47:21,510 --> 00:47:20,319
components of the atlas 5 rocket and

1331
00:47:24,309 --> 00:47:21,520
tomorrow we're going to be launching a

1332
00:47:25,430 --> 00:47:24,319
541 configuration so what that means is

1333
00:47:26,950 --> 00:47:25,440
we're going to have our five meter

1334
00:47:29,030 --> 00:47:26,960
payload fairing so that's the larger of

1335
00:47:31,109 --> 00:47:29,040
our payload fairings and then four solid

1336
00:47:32,790 --> 00:47:31,119
rocket boosters so those solid rocket

1337
00:47:34,309 --> 00:47:32,800
boosters will attach on to our core

1338
00:47:36,150 --> 00:47:34,319

booster and really give us a little bit

1339
00:47:37,990 --> 00:47:36,160
of extra lift off the launch pad a

1340
00:47:39,589 --> 00:47:38,000
little extra oomph and this this

1341
00:47:41,270 --> 00:47:39,599
rocket's going to have about two and a

1342
00:47:42,870 --> 00:47:41,280
quarter million pounds of thrust coming

1343
00:47:44,309 --> 00:47:42,880
off the launch pad

1344
00:47:46,309 --> 00:47:44,319
so the different components you can see

1345
00:47:48,390 --> 00:47:46,319
here on the screen we start with our

1346
00:47:50,549 --> 00:47:48,400
rd180 engine which powers the first

1347
00:47:52,069 --> 00:47:50,559
stage booster and the booster is kind of

1348
00:47:53,990 --> 00:47:52,079
that copper colored piece you can see

1349
00:47:56,710 --> 00:47:54,000
there and that booster contains two

1350
00:47:58,549 --> 00:47:56,720
separate liquid cryogenic fuel tanks so

1351
00:48:00,710 --> 00:47:58,559
we have liquid oxygen and liquid rp1

1352
00:48:02,470 --> 00:48:00,720
which combine to create the thrust for

1353
00:48:03,990 --> 00:48:02,480
the first stage

1354
00:48:05,670 --> 00:48:04,000
so in between our first stage and our

1355
00:48:07,030 --> 00:48:05,680
second stage we have our interstage

1356
00:48:09,349 --> 00:48:07,040
adapters which connect those two

1357
00:48:11,030 --> 00:48:09,359
separate components and our second stage

1358
00:48:12,549 --> 00:48:11,040
is called the centaur and it's one of

1359
00:48:14,470 --> 00:48:12,559
the most efficient mass efficient

1360
00:48:16,470 --> 00:48:14,480
vehicles in the world it's pretty

1361
00:48:18,470 --> 00:48:16,480
amazing the structure of the centaur is

1362
00:48:20,390 --> 00:48:18,480
but just about the thickness of a soda

1363
00:48:22,790 --> 00:48:20,400

can if you can think of how than that is

1364
00:48:24,630 --> 00:48:22,800
but it's a huge structure and it's so

1365
00:48:26,710 --> 00:48:24,640
efficient so that we can carry as much

1366
00:48:28,309 --> 00:48:26,720
payload mass to orbit as possible and

1367
00:48:30,309 --> 00:48:28,319
keep the mass of our launch vehicle down

1368
00:48:32,150 --> 00:48:30,319
so we can provide capability so we can

1369
00:48:33,670 --> 00:48:32,160
have more science instruments put up

1370
00:48:35,510 --> 00:48:33,680
into space

1371
00:48:36,790 --> 00:48:35,520
so then we have our payload fairing like

1372
00:48:38,790 --> 00:48:36,800
we talked about and the purpose of the

1373
00:48:40,309 --> 00:48:38,800
payload fairing is to protect the

1374
00:48:41,990 --> 00:48:40,319
centaur vehicle and the satellite

1375
00:48:45,030 --> 00:48:42,000
through launch because the whole purpose

1376
00:48:47,510 --> 00:48:45,040
of this entire huge 200 foot rocket is

1377
00:48:49,349 --> 00:48:47,520
to get that satellite into space so we

1378
00:48:51,109 --> 00:48:49,359
need a lot of power

1379
00:48:52,630 --> 00:48:51,119
it takes a lot to get you know it looks

1380
00:48:54,470 --> 00:48:52,640
really small when you see it on a screen

1381
00:48:55,670 --> 00:48:54,480
like that but you saw the size of the

1382
00:48:58,150 --> 00:48:55,680
spacecraft when they talked about it

1383
00:48:59,670 --> 00:48:58,160
before so it's pretty incredible to be a

1384
00:49:01,270 --> 00:48:59,680
part of the team that gets to build this

1385
00:49:08,470 --> 00:49:01,280
rocket and launch it and we're really

1386
00:49:12,309 --> 00:49:10,549
thank you we probably have time for one

1387
00:49:13,829 --> 00:49:12,319
question maybe two

1388
00:49:15,829 --> 00:49:13,839

sorry we also have a mission profile

1389
00:49:17,349 --> 00:49:15,839
video to show real quick if that's okay

1390
00:49:18,710 --> 00:49:17,359
i forgot about that let's go let's watch

1391
00:49:20,790 --> 00:49:18,720
it so this will take you through the

1392
00:49:22,230 --> 00:49:20,800
entire process of the launch profile

1393
00:49:25,750 --> 00:49:22,240
details

1394
00:49:26,790 --> 00:49:25,760
of this mission using approximate times

1395
00:49:27,829 --> 00:49:26,800
five

1396
00:49:28,870 --> 00:49:27,839
four

1397
00:49:29,670 --> 00:49:28,880
three

1398
00:49:31,349 --> 00:49:29,680
two

1399
00:49:34,309 --> 00:49:31,359
we have ignition

1400
00:49:37,190 --> 00:49:34,319
and liftoff

1401
00:49:39,670 --> 00:49:37,200
the atlas v rd 180 main engine and four

1402
00:49:41,910 --> 00:49:39,680
solid rocket boosters ignite to generate

1403
00:49:44,230 --> 00:49:41,920
the two and a quarter million pounds of

1404
00:49:47,349 --> 00:49:44,240
thrust to lift the rocket away from the

1405
00:49:51,910 --> 00:49:49,510
shortly after liftoff atlas begins its

1406
00:49:54,230 --> 00:49:51,920
initial pitch yaw and roll maneuvers to

1407
00:49:58,710 --> 00:49:54,240
attain the proper ascent profile and

1408
00:50:03,910 --> 00:50:01,270
the atlas 5 reaches mach 1 the speed of

1409
00:50:06,790 --> 00:50:03,920
sound at 35 seconds

1410
00:50:10,309 --> 00:50:06,800
at 46 seconds the vehicle experiences

1411
00:50:12,390 --> 00:50:10,319
maximum dynamic pressure

1412
00:50:15,109 --> 00:50:12,400
the first two solid rocket boosters or

1413
00:50:17,030 --> 00:50:15,119

srbs are jettisoned at one minute 50

1414
00:50:21,430 --> 00:50:17,040
seconds followed a second and a half

1415
00:50:23,430 --> 00:50:21,440
later by the third and fourth srbs

1416
00:50:26,470 --> 00:50:23,440
the payload fairing is jettisoned at

1417
00:50:28,630 --> 00:50:26,480
three and a half minutes

1418
00:50:30,630 --> 00:50:28,640
as it approaches booster engine cut off

1419
00:50:31,549 --> 00:50:30,640
the atlas 5 is burning propellant at the

1420
00:50:34,790 --> 00:50:31,559
rate of

1421
00:50:35,750 --> 00:50:34,800
1856 pounds per second traveling at over

1422
00:50:39,510 --> 00:50:35,760
12

1423
00:50:45,990 --> 00:50:39,520
440 miles per hour and located 92 miles

1424
00:50:51,829 --> 00:50:47,829
booster engine cutoff occurs four

1425
00:50:53,990 --> 00:50:51,839
minutes 21 seconds after liftoff

1426
00:50:56,069 --> 00:50:54,000
six seconds later the booster stage is

1427
00:50:58,069 --> 00:50:56,079
jettisoned the vehicle now weighs a

1428
00:51:00,309 --> 00:50:58,079
little more than five percent of what it

1429
00:51:02,549 --> 00:51:00,319
did at liftoff four and one half minutes

1430
00:51:04,630 --> 00:51:02,559
earlier the first centaur main engine

1431
00:51:06,870 --> 00:51:04,640
start takes place 10 seconds after

1432
00:51:08,470 --> 00:51:06,880
booster separation

1433
00:51:11,270 --> 00:51:08,480
cut cutoff of the centaur main engine

1434
00:51:13,270 --> 00:51:11,280
occurs just over 12 minutes after launch

1435
00:51:15,190 --> 00:51:13,280
the mission now enters a nearly 10

1436
00:51:17,670 --> 00:51:15,200
minute coast phase

1437
00:51:19,030 --> 00:51:17,680
at 22 minutes the centaur main engine is

1438
00:51:21,109 --> 00:51:19,040

restarted

1439
00:51:23,030 --> 00:51:21,119
this burn will last five and a half

1440
00:51:25,030 --> 00:51:23,040
minutes

1441
00:51:27,990 --> 00:51:25,040
following the second centaur main engine

1442
00:51:30,309 --> 00:51:28,000
cutoff at 27 minutes 35 seconds the

1443
00:51:32,390 --> 00:51:30,319
mission now enters a three hour coast

1444
00:51:34,710 --> 00:51:32,400
phase

1445
00:51:37,430 --> 00:51:34,720
at three hours 27 and a half minutes

1446
00:51:40,870 --> 00:51:37,440
after liftoff the centaur is started for

1447
00:51:43,349 --> 00:51:40,880
a third and final burn

1448
00:51:46,870 --> 00:51:43,359
a minute and a half later final cutoff

1449
00:51:49,589 --> 00:51:46,880
of the centaur main engine occurs

1450
00:51:52,950 --> 00:51:49,599
at just under 3 hours 32 minutes centaur

1451
00:52:01,589 --> 00:51:52,960
releases the goes-r satellite for noaa

1452
00:52:05,030 --> 00:52:03,750
hi this could have been uh for any

1453
00:52:06,150 --> 00:52:05,040
anyone but i'll put you on the spot

1454
00:52:07,670 --> 00:52:06,160
maybe all right

1455
00:52:10,069 --> 00:52:07,680
there are a lot of puzzle pieces to make

1456
00:52:13,190 --> 00:52:10,079
this happen i mean ula and lockheed and

1457
00:52:15,589 --> 00:52:13,200
goes and and nasa noah and then here at

1458
00:52:17,510 --> 00:52:15,599
kennedy how does that work and what what

1459
00:52:19,349 --> 00:52:17,520
challenges or difficulties are there to

1460
00:52:21,270 --> 00:52:19,359
work with so many

1461
00:52:22,870 --> 00:52:21,280
organizations or other entities

1462
00:52:24,309 --> 00:52:22,880
to make this happen

1463
00:52:26,390 --> 00:52:24,319

so i think it's really just about all

1464
00:52:28,950 --> 00:52:26,400
the teams really working together to get

1465
00:52:30,630 --> 00:52:28,960
it done us knowing what what we need to

1466
00:52:32,870 --> 00:52:30,640
provide to our customers what what they

1467
00:52:34,230 --> 00:52:32,880
need from us and i think all all of the

1468
00:52:36,069 --> 00:52:34,240
people that work together work together

1469
00:52:37,430 --> 00:52:36,079
very well just to make sure that you

1470
00:52:39,109 --> 00:52:37,440
know we all want the same thing we all

1471
00:52:41,109 --> 00:52:39,119
want this thing up in space working

1472
00:52:43,109 --> 00:52:41,119
providing these capabilities to everyone

1473
00:52:44,150 --> 00:52:43,119
so we all have our little piece of that

1474
00:52:46,230 --> 00:52:44,160
little chunk of that that we're

1475
00:52:47,750 --> 00:52:46,240
responsible for doing and we're all

1476
00:52:49,510 --> 00:52:47,760
responsible to each other to make that

1477
00:52:51,030 --> 00:52:49,520
happen so that we can provide this so

1478
00:52:52,710 --> 00:52:51,040
it's really just all about mission

1479
00:52:54,870 --> 00:52:52,720
success for us at ula and mission

1480
00:52:57,430 --> 00:52:54,880
success means making our customers happy

1481
00:52:59,190 --> 00:52:57,440
and delivering the satellite to orbit

1482
00:53:01,349 --> 00:52:59,200
and we have a focus process where we put

1483
00:53:03,030 --> 00:53:01,359
together a mission integration team that

1484
00:53:05,670 --> 00:53:03,040
there's a whole template series of

1485
00:53:07,589 --> 00:53:05,680
meetings that we do with ula with goes

1486
00:53:09,510 --> 00:53:07,599
we document a whole interface control

1487
00:53:11,349 --> 00:53:09,520
document and work through that

1488
00:53:13,030 --> 00:53:11,359

meticulously for a couple years to make

1489
00:53:14,549 --> 00:53:13,040
sure everything's choreographed to go

1490
00:53:15,829 --> 00:53:14,559
the way we want it to go and then always

1491
00:53:17,270 --> 00:53:15,839
be ready for you know all the little

1492
00:53:20,870 --> 00:53:17,280
hiccups that come along the way because

1493
00:53:24,630 --> 00:53:22,790
amanda mark thank you for being here

1494
00:53:29,349 --> 00:53:24,640
appreciate it go goes thank you thank

1495
00:53:33,430 --> 00:53:31,750
our next speaker is

1496
00:53:35,589 --> 00:53:33,440
romney eliason

1497
00:53:37,510 --> 00:53:35,599
uh with the um going to talk a little

1498
00:53:39,910 --> 00:53:37,520
bit about ground systems here there you

1499
00:53:42,069 --> 00:53:39,920
go romney thank you very much i think

1500
00:53:43,510 --> 00:53:42,079
for everyone who has been on the space

1501
00:53:46,309 --> 00:53:43,520
coast we all have a pretty good

1502
00:53:47,990 --> 00:53:46,319
appreciation of how incredible it is

1503
00:53:49,910 --> 00:53:48,000
to see a launch and we understand what

1504
00:53:52,069 --> 00:53:49,920
the rocket is and we understand what the

1505
00:53:53,750 --> 00:53:52,079
spacecraft is

1506
00:53:55,829 --> 00:53:53,760
my job here today is to give you a

1507
00:53:57,349 --> 00:53:55,839
little insight and understanding what a

1508
00:53:59,270 --> 00:53:57,359
ground system is and you're going to say

1509
00:54:00,950 --> 00:53:59,280
ramy isn't every system that's on the

1510
00:54:02,950 --> 00:54:00,960
ground isn't that a ground system well

1511
00:54:06,470 --> 00:54:02,960
yes and no

1512
00:54:08,790 --> 00:54:06,480
if you go to the first chart please

1513
00:54:11,190 --> 00:54:08,800

let me start by what the job of the

1514
00:54:13,910 --> 00:54:11,200
ground system is first and foremost as

1515
00:54:16,150 --> 00:54:13,920
calvin was talking about all of the

1516
00:54:17,589 --> 00:54:16,160
telemetry and the commanding and the

1517
00:54:19,030 --> 00:54:17,599
signals that are going through that

1518
00:54:20,870 --> 00:54:19,040
spacecraft

1519
00:54:22,870 --> 00:54:20,880
there's instructions that are sent to

1520
00:54:24,790 --> 00:54:22,880
that to make that happen and that's sent

1521
00:54:26,630 --> 00:54:24,800
by the by the ground system we actually

1522
00:54:29,030 --> 00:54:26,640
fly the spacecraft

1523
00:54:31,030 --> 00:54:29,040
so as we speak we've got engineers that

1524
00:54:33,190 --> 00:54:31,040
are going up to suitland on the

1525
00:54:35,190 --> 00:54:33,200
operations facility they're sitting down

1526
00:54:36,549 --> 00:54:35,200
next to side by side with the noaa

1527
00:54:38,309 --> 00:54:36,559
operators

1528
00:54:39,349 --> 00:54:38,319
and over the next three to four weeks

1529
00:54:41,510 --> 00:54:39,359
they're going to be working with

1530
00:54:42,789 --> 00:54:41,520
lockheed martin engineers and the noaa

1531
00:54:44,710 --> 00:54:42,799
operators to make sure that that

1532
00:54:47,190 --> 00:54:44,720
spacecraft gets to the orbit that it

1533
00:54:49,190 --> 00:54:47,200
needs to be in to provide uh the data

1534
00:54:50,630 --> 00:54:49,200
that we're depending on it to do

1535
00:54:52,710 --> 00:54:50,640
uh the other thing it's doing is it's

1536
00:54:54,870 --> 00:54:52,720
commanding all the instruments

1537
00:54:56,630 --> 00:54:54,880
making sure that they're good to go

1538
00:54:58,390 --> 00:54:56,640

they turn on they're providing all of

1539
00:55:00,950 --> 00:54:58,400
the calibration and validation that

1540
00:55:02,630 --> 00:55:00,960
steve uh referred to and then we're

1541
00:55:05,430 --> 00:55:02,640
going to go about the business of

1542
00:55:07,589 --> 00:55:05,440
processing the data and that's if you

1543
00:55:10,549 --> 00:55:07,599
will the secret sauce of this particular

1544
00:55:12,710 --> 00:55:10,559
bird uh if you look at the uh instrument

1545
00:55:14,950 --> 00:55:12,720
panel over there uh we've heard a lot

1546
00:55:16,870 --> 00:55:14,960
about that there are actually four

1547
00:55:19,589 --> 00:55:16,880
instruments that are not facing the

1548
00:55:20,950 --> 00:55:19,599
earth uh that are facing into space

1549
00:55:23,510 --> 00:55:20,960
they're they're going to take some

1550
00:55:25,829 --> 00:55:23,520
extremely important measurements

1551
00:55:28,470 --> 00:55:25,839
uh all of those solar

1552
00:55:30,150 --> 00:55:28,480
coronal mass ejections the solar fluxes

1553
00:55:32,870 --> 00:55:30,160
all of those things are really really

1554
00:55:34,789 --> 00:55:32,880
important to our communication systems

1555
00:55:36,549 --> 00:55:34,799
our navigation systems all those things

1556
00:55:38,630 --> 00:55:36,559
that we take for granted because we want

1557
00:55:39,910 --> 00:55:38,640
them and we want them available all the

1558
00:55:42,309 --> 00:55:39,920
time

1559
00:55:44,950 --> 00:55:42,319
because of those

1560
00:55:46,870 --> 00:55:44,960
those anomalies that can happen in space

1561
00:55:49,990 --> 00:55:46,880
it's really important that we get that

1562
00:55:51,589 --> 00:55:50,000
information to the engineers or i should

1563
00:55:53,349 --> 00:55:51,599

say the scientists and the researchers

1564
00:55:55,910 --> 00:55:53,359
at the space weather environmental

1565
00:55:58,230 --> 00:55:55,920
prediction center on boulder colorado

1566
00:56:00,789 --> 00:55:58,240
we actually have to do that within two

1567
00:56:02,069 --> 00:56:00,799
seconds imagine that within two seconds

1568
00:56:03,349 --> 00:56:02,079
of that instrument taking that

1569
00:56:04,710 --> 00:56:03,359
measurement

1570
00:56:06,230 --> 00:56:04,720
that's pretty incredible if you think

1571
00:56:09,030 --> 00:56:06,240
about the time that takes you to take a

1572
00:56:10,710 --> 00:56:09,040
selfie upload it and post it on facebook

1573
00:56:11,670 --> 00:56:10,720
think about that

1574
00:56:13,030 --> 00:56:11,680
so

1575
00:56:15,109 --> 00:56:13,040
those are the four

1576
00:56:17,270 --> 00:56:15,119
sensors that are facing space and of

1577
00:56:19,589 --> 00:56:17,280
course we talked a lot today about the

1578
00:56:21,349 --> 00:56:19,599
two sensors that are facing the earth

1579
00:56:23,270 --> 00:56:21,359
and observing the earth if you go to the

1580
00:56:25,349 --> 00:56:23,280
next chart

1581
00:56:27,750 --> 00:56:25,359
obviously if you start looking at the

1582
00:56:29,349 --> 00:56:27,760
advanced baseline imagery and all of the

1583
00:56:31,829 --> 00:56:29,359
parameters that mike talked about you've

1584
00:56:33,990 --> 00:56:31,839
got three times the content

1585
00:56:36,069 --> 00:56:34,000
by having all those spectral bands

1586
00:56:38,230 --> 00:56:36,079
you've got four times the resolution and

1587
00:56:40,710 --> 00:56:38,240
it's coming at us five times faster so

1588
00:56:42,470 --> 00:56:40,720

when the engineers at harris corporation

1589
00:56:45,270 --> 00:56:42,480
started studying how they were going to

1590
00:56:47,829 --> 00:56:45,280
handle this payload and the data back in

1591
00:56:49,910 --> 00:56:47,839
the early 2000s they really had to

1592
00:56:52,390 --> 00:56:49,920
create a way that they could break that

1593
00:56:54,630 --> 00:56:52,400
data up instantaneously when it first

1594
00:56:55,910 --> 00:56:54,640
hits the ground system and comes into

1595
00:56:57,510 --> 00:56:55,920
that that

1596
00:56:59,670 --> 00:56:57,520
all of those computers that are

1597
00:57:02,309 --> 00:56:59,680
processing and they are processing it

1598
00:57:04,950 --> 00:57:02,319
okay ready for this 40 trillion

1599
00:57:06,710 --> 00:57:04,960
operations per second think about that

1600
00:57:08,789 --> 00:57:06,720
in order to produce that data and get

1601
00:57:10,309 --> 00:57:08,799
that out in the order of seconds

1602
00:57:11,910 --> 00:57:10,319
that's the kind of processing speed that

1603
00:57:15,510 --> 00:57:11,920
you have to have so if you go to the

1604
00:57:19,910 --> 00:57:17,750
so what we have captured for you here

1605
00:57:21,430 --> 00:57:19,920
today and unfortunately it's not going

1606
00:57:23,910 --> 00:57:21,440
to be looping we actually have these

1607
00:57:26,150 --> 00:57:23,920
visualizations on a looping feed

1608
00:57:27,910 --> 00:57:26,160
this is actually from the himawari bird

1609
00:57:29,349 --> 00:57:27,920
and what you start to see is the

1610
00:57:31,349 --> 00:57:29,359
contrast that you're going to get

1611
00:57:33,430 --> 00:57:31,359
amongst the different layers of the

1612
00:57:35,190 --> 00:57:33,440
atmosphere and how that's going to start

1613
00:57:37,109 --> 00:57:35,200

playing into the numerical weather

1614
00:57:39,270 --> 00:57:37,119
prediction models

1615
00:57:41,190 --> 00:57:39,280
okay next chart

1616
00:57:42,950 --> 00:57:41,200
somebody was asking earlier if you keep

1617
00:57:45,030 --> 00:57:42,960
going they were asking about climate and

1618
00:57:46,710 --> 00:57:45,040
will it help you with climate uh the

1619
00:57:48,470 --> 00:57:46,720
answer is absolutely the more

1620
00:57:49,910 --> 00:57:48,480
information you have

1621
00:57:51,750 --> 00:57:49,920
the more knowledge you're going to

1622
00:57:53,910 --> 00:57:51,760
acquire and then we're going to be able

1623
00:57:56,069 --> 00:57:53,920
to put that in the hands of researchers

1624
00:57:58,230 --> 00:57:56,079
one of the important facets of this

1625
00:58:00,789 --> 00:57:58,240
ground system is to make it very very

1626
00:58:03,190 --> 00:58:00,799
easy to go from research to operations

1627
00:58:05,109 --> 00:58:03,200
and operations to research and that's so

1628
00:58:06,710 --> 00:58:05,119
that that numerical weather prediction

1629
00:58:09,109 --> 00:58:06,720
can continually improve so that

1630
00:58:11,109 --> 00:58:09,119
broadcast meteorologists can actually

1631
00:58:13,270 --> 00:58:11,119
absolutely bring better content and data

1632
00:58:14,789 --> 00:58:13,280
to the viewers if you keep going this is

1633
00:58:17,030 --> 00:58:14,799
a dust storm and you see the paints in

1634
00:58:19,589 --> 00:58:17,040
there that's the dust separated by all

1635
00:58:21,750 --> 00:58:19,599
the cloud layers very very important

1636
00:58:23,990 --> 00:58:21,760
this is looking at the typhoon that hit

1637
00:58:25,349 --> 00:58:24,000
fiji earlier this year

1638
00:58:27,270 --> 00:58:25,359

again the resolution and this is

1639
00:58:29,750 --> 00:58:27,280
actually compressed content because we

1640
00:58:31,270 --> 00:58:29,760
put it onto a powerpoint slide but when

1641
00:58:33,270 --> 00:58:31,280
you're looking at it looping in real

1642
00:58:34,710 --> 00:58:33,280
time and that processing speed that i

1643
00:58:36,630 --> 00:58:34,720
talked about within the ground segment

1644
00:58:39,109 --> 00:58:36,640
you hear a lot of people saying that

1645
00:58:41,109 --> 00:58:39,119
it's like going from stills to a looping

1646
00:58:42,630 --> 00:58:41,119
real time video and that's absolutely

1647
00:58:44,789 --> 00:58:42,640
the case

1648
00:58:47,109 --> 00:58:44,799
the advanced baseline imager is that

1649
00:58:50,230 --> 00:58:47,119
that's taken a five minute full scan of

1650
00:58:52,470 --> 00:58:50,240
the whole western hemisphere within 30

1651
00:58:53,990 --> 00:58:52,480
seconds all right within 30 seconds of

1652
00:58:55,910 --> 00:58:54,000
that instrument starting to make those

1653
00:58:57,670 --> 00:58:55,920
measurements we're starting to push that

1654
00:58:59,589 --> 00:58:57,680
data out to the national weather service

1655
00:59:02,150 --> 00:58:59,599
so they can start using that so it's a

1656
00:59:03,990 --> 00:59:02,160
continuous feed of that and you you need

1657
00:59:05,990 --> 00:59:04,000
that real-time information in order to

1658
00:59:07,750 --> 00:59:06,000
make those informed decisions is if you

1659
00:59:09,829 --> 00:59:07,760
continue you have a few more that do get

1660
00:59:11,750 --> 00:59:09,839
you into more of the climate here's

1661
00:59:13,990 --> 00:59:11,760
environmental monitoring looking at the

1662
00:59:15,829 --> 00:59:14,000
quality of reefs i've been a scuba diver

1663
00:59:17,510 --> 00:59:15,839

over 35 years

1664
00:59:19,430 --> 00:59:17,520
i can tell you that things are changing

1665
00:59:22,230 --> 00:59:19,440
below the water

1666
00:59:23,030 --> 00:59:22,240
and this allows you to to again look at

1667
00:59:24,470 --> 00:59:23,040
that

1668
00:59:26,789 --> 00:59:24,480
understand what's happening to the

1669
00:59:27,990 --> 00:59:26,799
environment if you go to the next next

1670
00:59:30,230 --> 00:59:28,000
slide

1671
00:59:31,430 --> 00:59:30,240
here's one off the mekong delta vietnam

1672
00:59:33,190 --> 00:59:31,440
and you can actually see some of the

1673
00:59:36,069 --> 00:59:33,200
discharges having to do with pollution

1674
00:59:37,750 --> 00:59:36,079
so a very powerful instrument

1675
00:59:40,069 --> 00:59:37,760
but the power in that is the data and

1676
00:59:42,630 --> 00:59:40,079
put into the right hands and that's what

1677
00:59:48,150 --> 00:59:42,640
the ground system is intended to do can

1678
00:59:51,430 --> 00:59:50,150
john

1679
00:59:56,630 --> 00:59:51,440
i don't have a question i was saying

1680
01:00:01,430 --> 00:59:59,190
so you said that after 30 seconds the

1681
01:00:03,430 --> 01:00:01,440
nws will be able to see will this also

1682
01:00:05,270 --> 01:00:03,440
go down to other partners

1683
01:00:07,270 --> 01:00:05,280
within 30 seconds say like other

1684
01:00:09,030 --> 01:00:07,280
broadcasters

1685
01:00:11,750 --> 01:00:09,040
private companies very very good

1686
01:00:13,430 --> 01:00:11,760
question one of the important functions

1687
01:00:15,750 --> 01:00:13,440
that i should have spent a little bit

1688
01:00:17,030 --> 01:00:15,760

more time on on the ground system

1689
01:00:19,670 --> 01:00:17,040
uh when

1690
01:00:21,829 --> 01:00:19,680
when the signals are first coming down

1691
01:00:23,670 --> 01:00:21,839
to wallops virginia

1692
01:00:25,109 --> 01:00:23,680
they're actually going to be

1693
01:00:25,990 --> 01:00:25,119
processed and a couple of things are

1694
01:00:28,230 --> 01:00:26,000
going to happen they're going to

1695
01:00:30,710 --> 01:00:28,240
register where it is that it's occurring

1696
01:00:32,309 --> 01:00:30,720
on earth right you see this weather

1697
01:00:34,470 --> 01:00:32,319
where is that happening where is that

1698
01:00:36,309 --> 01:00:34,480
atmospheric anomalies happening so you

1699
01:00:37,589 --> 01:00:36,319
register it then you you do the

1700
01:00:40,230 --> 01:00:37,599
calibration of all the instruments then

1701
01:00:41,750 --> 01:00:40,240
we actually push it back up if you will

1702
01:00:44,309 --> 01:00:41,760
to the satellite for the goes our

1703
01:00:46,470 --> 01:00:44,319
rebroadcast that signal will be

1704
01:00:48,230 --> 01:00:46,480
transmitted from the spacecraft across

1705
01:00:50,390 --> 01:00:48,240
the whole western hemisphere

1706
01:00:52,230 --> 01:00:50,400
uh that will allow you to get that

1707
01:00:58,710 --> 01:00:52,240
content and that information on the

1708
01:01:02,230 --> 01:01:00,150
all right this is coming from social

1709
01:01:04,309 --> 01:01:02,240
media via twitter

1710
01:01:05,910 --> 01:01:04,319
will goes-r have downlinks that the

1711
01:01:07,750 --> 01:01:05,920
public will be able to receive at home

1712
01:01:09,670 --> 01:01:07,760
like older satellites

1713
01:01:13,030 --> 01:01:09,680

i won't be able to receive it at home

1714
01:01:14,950 --> 01:01:13,040
it's not it's not your dad's g var uh

1715
01:01:16,470 --> 01:01:14,960
which is the current link that uh that

1716
01:01:19,190 --> 01:01:16,480
is there today so

1717
01:01:21,270 --> 01:01:19,200
because of the signal level the the

1718
01:01:22,549 --> 01:01:21,280
amount of data coming down

1719
01:01:24,390 --> 01:01:22,559
you're really going to have to upgrade

1720
01:01:26,150 --> 01:01:24,400
that direct readout terminal

1721
01:01:28,549 --> 01:01:26,160
there's a number of vendors that do

1722
01:01:30,309 --> 01:01:28,559
provide those direct readouts

1723
01:01:32,710 --> 01:01:30,319
including ourselves

1724
01:01:35,109 --> 01:01:32,720
but very very important that we get that

1725
01:01:36,470 --> 01:01:35,119
information and content to all of the

1726
01:01:38,230 --> 01:01:36,480
users across the whole western

1727
01:01:39,750 --> 01:01:38,240
hemisphere so that they can protect

1728
01:01:41,349 --> 01:01:39,760
lives and property but no you won't be

1729
01:01:42,549 --> 01:01:41,359
able to get that at home

1730
01:01:44,549 --> 01:01:42,559
but you will have to upgrade that

1731
01:01:45,750 --> 01:01:44,559
terminal it's a good question

1732
01:01:50,829 --> 01:01:45,760
romney i think that's all the time we

1733
01:01:55,990 --> 01:01:53,829
it thanks romney so we've talked a lot

1734
01:01:58,549 --> 01:01:56,000
about the launch uh but as we've kind of

1735
01:02:00,230 --> 01:01:58,559
hinted at there is life for goes-r after

1736
01:02:03,029 --> 01:02:00,240
tomorrow so to kind of talk about the

1737
01:02:05,029 --> 01:02:03,039
users of goes-r i'm gonna invite joe

1738
01:02:07,430 --> 01:02:05,039

pica from national weather service brian

1739
01:02:09,589 --> 01:02:07,440
mata from national weather service and

1740
01:02:11,109 --> 01:02:09,599
uh bob rutledge who's from the space

1741
01:02:13,430 --> 01:02:11,119
weather prediction center to talk about

1742
01:02:17,510 --> 01:02:13,440
using goes-r data so joe you want to

1743
01:02:21,589 --> 01:02:20,309
all right good afternoon thank you um we

1744
01:02:23,750 --> 01:02:21,599
at the national weather service are very

1745
01:02:25,750 --> 01:02:23,760
excited about uh the noaa goes our

1746
01:02:27,270 --> 01:02:25,760
satellite getting up into orbit and

1747
01:02:29,109 --> 01:02:27,280
being able to use that and so let us

1748
01:02:30,789 --> 01:02:29,119
talk a little bit about some pro

1749
01:02:33,270 --> 01:02:30,799
products that we're going to see maybe

1750
01:02:37,190 --> 01:02:33,280
that you might not necessarily uh

1751
01:02:39,349 --> 01:02:37,200
consider uh at first glance so we've uh

1752
01:02:40,950 --> 01:02:39,359
you've probably heard uh three times

1753
01:02:43,349 --> 01:02:40,960
many spectral bands four times the

1754
01:02:45,910 --> 01:02:43,359
resolution five times the update rate so

1755
01:02:53,670 --> 01:02:45,920
what does that mean uh for some of our

1756
01:02:57,349 --> 01:02:55,589
so one of the things we did

1757
01:02:59,270 --> 01:02:57,359
as part of the proving ground and this

1758
01:03:02,230 --> 01:02:59,280
is one of the things i i try to give

1759
01:03:04,230 --> 01:03:02,240
credit to the noaa goes-r program for

1760
01:03:06,390 --> 01:03:04,240
organizing with the weather services we

1761
01:03:08,950 --> 01:03:06,400
took advantage of other instruments that

1762
01:03:11,510 --> 01:03:08,960
are out there in this case the japanese

1763
01:03:13,670 --> 01:03:11,520

satellite himalay and basically what

1764
01:03:15,990 --> 01:03:13,680
you're seeing is

1765
01:03:18,710 --> 01:03:16,000
atmospheric motion vectors so these are

1766
01:03:21,109 --> 01:03:18,720
cloud derived water vapor derived

1767
01:03:23,510 --> 01:03:21,119
motion vectors and we're basically

1768
01:03:27,190 --> 01:03:23,520
seeing how how dense they're going to be

1769
01:03:29,029 --> 01:03:27,200
goes-r is going to make these very dense

1770
01:03:30,950 --> 01:03:29,039
all across the

1771
01:03:33,510 --> 01:03:30,960
western hemisphere where we have goes

1772
01:03:34,789 --> 01:03:33,520
right now and we're able to use these to

1773
01:03:36,630 --> 01:03:34,799
inform

1774
01:03:38,069 --> 01:03:36,640
aviation weather so situational

1775
01:03:39,190 --> 01:03:38,079
awareness to where the winds are in the

1776
01:03:41,349 --> 01:03:39,200
atmosphere

1777
01:03:42,630 --> 01:03:41,359
so that's that's the right now aspect

1778
01:03:44,309 --> 01:03:42,640
but then we're also going to be able to

1779
01:03:46,630 --> 01:03:44,319
feed this into our numerical weather

1780
01:03:49,109 --> 01:03:46,640
prediction models to improve those

1781
01:03:50,870 --> 01:03:49,119
short-term forecasts of severe weather

1782
01:03:53,510 --> 01:03:50,880
where tropical cyclones are going to be

1783
01:03:54,950 --> 01:03:53,520
going so this is one of those those key

1784
01:03:55,990 --> 01:03:54,960
ways in which we're going to be able to

1785
01:03:58,870 --> 01:03:56,000
use this

1786
01:04:00,950 --> 01:03:58,880
for me i'm a former ship captain

1787
01:04:02,789 --> 01:04:00,960
so right now we're looking at

1788
01:04:04,150 --> 01:04:02,799

uh the north pacific and that's one of

1789
01:04:05,829 --> 01:04:04,160
those areas where we don't have a lot of

1790
01:04:07,510 --> 01:04:05,839
radio signs or other observations that

1791
01:04:09,750 --> 01:04:07,520
tell you the structure of the atmosphere

1792
01:04:12,630 --> 01:04:09,760
so being able to see these atmospheric

1793
01:04:14,069 --> 01:04:12,640
motion vectors is very key to what's the

1794
01:04:16,470 --> 01:04:14,079
weather going to be like on the ocean

1795
01:04:18,309 --> 01:04:16,480
and the ocean prediction is one of our

1796
01:04:19,270 --> 01:04:18,319
one of our roles as well

1797
01:04:22,069 --> 01:04:19,280
so

1798
01:04:24,630 --> 01:04:22,079
let me go to another another aspect

1799
01:04:26,390 --> 01:04:24,640
so next slide and there's uh there's

1800
01:04:27,910 --> 01:04:26,400
actually a movie

1801
01:04:30,470 --> 01:04:27,920
so one of the things we do again for

1802
01:04:31,349 --> 01:04:30,480
aviation weather is we track volcanic

1803
01:04:32,309 --> 01:04:31,359
ash

1804
01:04:35,190 --> 01:04:32,319
so

1805
01:04:37,589 --> 01:04:35,200
this is one of the the very first

1806
01:04:39,349 --> 01:04:37,599
eruption that was seen by that himawari

1807
01:04:42,470 --> 01:04:39,359
satellite this is on the russian

1808
01:04:43,750 --> 01:04:42,480
kentucka peninsula and so in the center

1809
01:04:46,630 --> 01:04:43,760
center of the screen you can see the

1810
01:04:48,789 --> 01:04:46,640
plume of volcanic ash coming up and so

1811
01:04:50,309 --> 01:04:48,799
this is a bad day for any aircraft that

1812
01:04:51,910 --> 01:04:50,319
are flying in that area and so we try

1813
01:04:53,990 --> 01:04:51,920

and get the word out and we're going to

1814
01:04:56,630 --> 01:04:54,000
be able to do this so much faster with

1815
01:05:00,150 --> 01:04:56,640
goes-r than we've ever been able to do

1816
01:05:01,910 --> 01:05:00,160
so here's a couple of of examples on the

1817
01:05:03,670 --> 01:05:01,920
ways that goes-r is going to make a

1818
01:05:05,270 --> 01:05:03,680
difference

1819
01:05:07,349 --> 01:05:05,280
with that i'll turn it over to my

1820
01:05:11,670 --> 01:05:07,359
colleagues brian

1821
01:05:14,630 --> 01:05:13,270
okay i'm brian mata with the national

1822
01:05:17,430 --> 01:05:14,640
weather service

1823
01:05:19,990 --> 01:05:17,440
if we could take the first animation

1824
01:05:22,309 --> 01:05:20,000
we have a group of meteorologists called

1825
01:05:24,549 --> 01:05:22,319
national aviation meteorologists that

1826
01:05:27,430 --> 01:05:24,559
work with the faa

1827
01:05:29,270 --> 01:05:27,440
national command center in virginia

1828
01:05:31,349 --> 01:05:29,280
and what this is showing you is a

1829
01:05:33,190 --> 01:05:31,359
satellite animation in the area of

1830
01:05:35,109 --> 01:05:33,200
chicago and you can see

1831
01:05:36,950 --> 01:05:35,119
over the great lakes there there's

1832
01:05:39,349 --> 01:05:36,960
orange and red colors

1833
01:05:42,069 --> 01:05:39,359
those are indicative of

1834
01:05:44,390 --> 01:05:42,079
instrument flight rules or ifr

1835
01:05:45,990 --> 01:05:44,400
and the conditions causing that are fog

1836
01:05:48,549 --> 01:05:46,000
and low stratus

1837
01:05:50,470 --> 01:05:48,559
and so in this particular event the

1838
01:05:52,150 --> 01:05:50,480

weather service national weather service

1839
01:05:54,789 --> 01:05:52,160
worked with the faa

1840
01:05:57,190 --> 01:05:54,799
to reconfigure the air traffic

1841
01:05:58,549 --> 01:05:57,200
so that the planes in the air could land

1842
01:05:59,589 --> 01:05:58,559
safely

1843
01:06:01,750 --> 01:05:59,599
and

1844
01:06:02,870 --> 01:06:01,760
they didn't have to divert to other

1845
01:06:04,789 --> 01:06:02,880
airports

1846
01:06:06,309 --> 01:06:04,799
essentially saving on the order of six

1847
01:06:07,510 --> 01:06:06,319
hundred thousand dollars for this

1848
01:06:09,270 --> 01:06:07,520
particular

1849
01:06:10,230 --> 01:06:09,280
event this was in the early morning

1850
01:06:12,789 --> 01:06:10,240
hours

1851
01:06:15,029 --> 01:06:12,799
uh in the chicago area so

1852
01:06:16,870 --> 01:06:15,039
that's one example of the where the sort

1853
01:06:18,710 --> 01:06:16,880
of the rubber meets the road

1854
01:06:20,470 --> 01:06:18,720
and the cost savings can really be

1855
01:06:22,630 --> 01:06:20,480
demonstrated

1856
01:06:24,950 --> 01:06:22,640
in this one particular instance

1857
01:06:27,349 --> 01:06:24,960
we also have another

1858
01:06:28,710 --> 01:06:27,359
example here animation and steve was

1859
01:06:31,109 --> 01:06:28,720
talking

1860
01:06:32,470 --> 01:06:31,119
about severe storms and here's a case in

1861
01:06:34,470 --> 01:06:32,480
oklahoma

1862
01:06:37,270 --> 01:06:34,480
where this initial storm

1863
01:06:39,430 --> 01:06:37,280

begins to develop but then stops

1864
01:06:42,150 --> 01:06:39,440
and this next storm develops and

1865
01:06:44,870 --> 01:06:42,160
actually does produce a tornado so

1866
01:06:47,510 --> 01:06:44,880
the meteorologists will get actually

1867
01:06:50,470 --> 01:06:47,520
earlier indications before

1868
01:06:53,270 --> 01:06:50,480
storms actually appear on radar of

1869
01:06:54,230 --> 01:06:53,280
whether a given storm is developing

1870
01:06:57,270 --> 01:06:54,240
enough

1871
01:06:59,190 --> 01:06:57,280
produce

1872
01:07:01,029 --> 01:06:59,200
severe weather

1873
01:07:06,789 --> 01:07:01,039
uh with those two examples i'll stop and

1874
01:07:10,630 --> 01:07:08,390
thank you brian so we've talked

1875
01:07:12,069 --> 01:07:10,640
lightning we've talked clouds now i get

1876
01:07:14,309 --> 01:07:12,079
to do the space stuff which you can't

1877
01:07:15,829 --> 01:07:14,319
see or feel or touch which is always

1878
01:07:17,190 --> 01:07:15,839
challenging for me but

1879
01:07:20,069 --> 01:07:17,200
it's already been highlighted that the

1880
01:07:22,390 --> 01:07:20,079
the goes r series continues the long

1881
01:07:23,910 --> 01:07:22,400
history of providing the observations of

1882
01:07:26,390 --> 01:07:23,920
the sun that really form the basis of

1883
01:07:27,910 --> 01:07:26,400
the forecast that my forecasters make as

1884
01:07:32,230 --> 01:07:27,920
was said they stare at those two second

1885
01:07:34,150 --> 01:07:32,240
values all day long every day 24 7 365.

1886
01:07:36,230 --> 01:07:34,160
uh you know the sun is all

1887
01:07:37,829 --> 01:07:36,240
activity is always possible

1888
01:07:39,430 --> 01:07:37,839

and not only does it form the basis of

1889
01:07:41,910 --> 01:07:39,440
our forecast but it really forms the

1890
01:07:44,230 --> 01:07:41,920
basis of any space with a forecast

1891
01:07:46,150 --> 01:07:44,240
product or service really worldwide so

1892
01:07:48,150 --> 01:07:46,160
this data is exceedingly important and

1893
01:07:49,750 --> 01:07:48,160
it's not duplicated elsewhere it's

1894
01:07:51,589 --> 01:07:49,760
probably easiest to talk through what

1895
01:07:54,549 --> 01:07:51,599
happens on the sun and how we use this

1896
01:07:55,750 --> 01:07:54,559
data so so solar activity is really any

1897
01:07:57,510 --> 01:07:55,760
changes on the sun that affect

1898
01:07:59,750 --> 01:07:57,520
technology or affect the near-earth

1899
01:08:01,670 --> 01:07:59,760
environment and uh that generally comes

1900
01:08:03,829 --> 01:08:01,680
from large eruptions from sun spots or

1901
01:08:05,190 --> 01:08:03,839
active regions we watch those uh the

1902
01:08:07,270 --> 01:08:05,200
enhanced imagery will help us better

1903
01:08:09,270 --> 01:08:07,280
characterize those better forecast

1904
01:08:11,270 --> 01:08:09,280
what's likely to happen and then once

1905
01:08:13,029 --> 01:08:11,280
things start to happen the measurements

1906
01:08:14,069 --> 01:08:13,039
of the x-ray radiance from the sun that

1907
01:08:15,829 --> 01:08:14,079
we get in

1908
01:08:17,030 --> 01:08:15,839
every two seconds will help us

1909
01:08:19,349 --> 01:08:17,040
understand when we start to see that

1910
01:08:20,709 --> 01:08:19,359
eruption that's really the first key uh

1911
01:08:22,950 --> 01:08:20,719
that something is happening so that's

1912
01:08:24,950 --> 01:08:22,960
fed into models that describe the high

1913
01:08:26,309 --> 01:08:24,960

frequency impacts on the daylight side

1914
01:08:29,030 --> 01:08:26,319
of the earth for example so if you're

1915
01:08:31,269 --> 01:08:29,040
flying from la to hawaii you could have

1916
01:08:32,550 --> 01:08:31,279
an aircraft that's impacted it also does

1917
01:08:34,149 --> 01:08:32,560
a great job of characterizing the

1918
01:08:36,630 --> 01:08:34,159
radiation that can change not only for

1919
01:08:38,390 --> 01:08:36,640
the satellite's health itself but also

1920
01:08:41,189 --> 01:08:38,400
for other satellites in geostationary

1921
01:08:43,349 --> 01:08:41,199
orbit as well as aviation radiation

1922
01:08:45,349 --> 01:08:43,359
exposures communications outages near

1923
01:08:47,590 --> 01:08:45,359
the poles for different reasons

1924
01:08:49,669 --> 01:08:47,600
and just changes overall to

1925
01:08:51,430 --> 01:08:49,679
to that environment the last piece the

1926
01:08:53,349 --> 01:08:51,440
one that has a lot of attention

1927
01:08:55,269 --> 01:08:53,359
worldwide is is the geomagnetic storm

1928
01:08:57,510 --> 01:08:55,279
piece so the same phenomena that drives

1929
01:08:59,990 --> 01:08:57,520
the aurora can also cause risk to long

1930
01:09:02,309 --> 01:09:00,000
conductors on the ground which would be

1931
01:09:04,149 --> 01:09:02,319
the bulk power system um

1932
01:09:06,390 --> 01:09:04,159
and that can be a serious serious risk

1933
01:09:08,390 --> 01:09:06,400
if in the extreme event so the the

1934
01:09:10,070 --> 01:09:08,400
observations characterizing those active

1935
01:09:12,309 --> 01:09:10,080
regions watching those eruptions really

1936
01:09:13,910 --> 01:09:12,319
is that first step in saying that

1937
01:09:15,749 --> 01:09:13,920
something is possible and something big

1938
01:09:17,189 --> 01:09:15,759

could happen uh in the near term and

1939
01:09:19,829 --> 01:09:17,199
many observations go into that but

1940
01:09:21,669 --> 01:09:19,839
certainly goes has a key uh role to play

1941
01:09:23,669 --> 01:09:21,679
so this is great continuity for us and

1942
01:09:25,430 --> 01:09:23,679
we're looking forward to the data

1943
01:09:33,749 --> 01:09:25,440
better in every way as you've heard and

1944
01:09:36,309 --> 01:09:34,870
i time we have time for a couple

1945
01:09:37,749 --> 01:09:36,319
questions with this uh these three

1946
01:09:39,669 --> 01:09:37,759
panelists here they'll all come up the

1947
01:09:41,269 --> 01:09:39,679
stage uh this is your last group

1948
01:09:42,309 --> 01:09:41,279
panelist so if you have some burning

1949
01:09:43,349 --> 01:09:42,319
ghost question you want to ask

1950
01:09:49,189 --> 01:09:43,359
especially on the subjects they just

1951
01:09:54,550 --> 01:09:52,470
so the idea of goes being able to help

1952
01:09:56,870 --> 01:09:54,560
with space weather and and solar

1953
01:09:59,669 --> 01:09:56,880
outbursts and things like that is it at

1954
01:10:02,390 --> 01:09:59,679
an altitude that's actually uh uh

1955
01:10:04,229 --> 01:10:02,400
effective for pred i mean if you can if

1956
01:10:06,149 --> 01:10:04,239
you can spot it but if the space weather

1957
01:10:08,229 --> 01:10:06,159
is actually happening at that altitude

1958
01:10:10,870 --> 01:10:08,239
of 22 000 miles isn't isn't it just too

1959
01:10:12,470 --> 01:10:10,880
close by that point to to do much so so

1960
01:10:14,229 --> 01:10:12,480
there really are two categories so when

1961
01:10:16,229 --> 01:10:14,239
it when the sun erupts when the light

1962
01:10:18,310 --> 01:10:16,239
and radio waves makes it to earth we're

1963
01:10:19,510 --> 01:10:18,320

measuring it at earth so that's that's

1964
01:10:20,630 --> 01:10:19,520
very good information to know though and

1965
01:10:22,630 --> 01:10:20,640
that's how we characterize the whole

1966
01:10:23,990 --> 01:10:22,640
globe so that's kind of an in situ

1967
01:10:25,910 --> 01:10:24,000
measurement same with the radiation it's

1968
01:10:27,350 --> 01:10:25,920
what's happening right near you and then

1969
01:10:29,270 --> 01:10:27,360
taking the pictures of the sun really

1970
01:10:31,350 --> 01:10:29,280
you can do that remotely from you know

1971
01:10:33,430 --> 01:10:31,360
from afar so it's very very good at that

1972
01:10:35,270 --> 01:10:33,440
and it's a nice stable place to get that

1973
01:10:36,470 --> 01:10:35,280
with very very few eclipse periods so it

1974
01:10:38,630 --> 01:10:36,480
kind of depends what you're measuring

1975
01:10:41,750 --> 01:10:38,640
but it is it's well suited uh for really

1976
01:10:43,110 --> 01:10:41,760
many of the applications we need

1977
01:10:45,590 --> 01:10:43,120
all right this next one comes from

1978
01:10:49,830 --> 01:10:45,600
twitter uh will goes-r be able to

1979
01:10:53,669 --> 01:10:50,630
so

1980
01:10:55,350 --> 01:10:53,679
as i showed with the hemi himawari we're

1981
01:10:57,510 --> 01:10:55,360
actually going to be able to show

1982
01:10:58,790 --> 01:10:57,520
atmospheric motion vectors so we will be

1983
01:11:01,270 --> 01:10:58,800
able to do that

1984
01:11:04,149 --> 01:11:01,280
in in storms using that so it's

1985
01:11:06,470 --> 01:11:04,159
basically cloud motion derived water

1986
01:11:10,830 --> 01:11:06,480
vapor derived

1987
01:11:14,790 --> 01:11:13,430
storm okay not seeing any more questions

1988
01:11:19,910 --> 01:11:14,800

thanks gentlemen appreciate you joining

1989
01:11:24,709 --> 01:11:22,310
well that wraps up our program uh as a

1990
01:11:27,430 --> 01:11:24,719
reminder launch tomorrow is at 5 42 p.m

1991
01:11:29,590 --> 01:11:27,440
eastern time launch coverage starts at 4

1992
01:11:31,189 --> 01:11:29,600
45 pm eastern

1993
01:11:35,030 --> 01:11:31,199
you can watch that live

1994
01:11:36,950 --> 01:11:35,040
online on at www.nasa.gov

1995
01:11:39,110 --> 01:11:36,960
nasa tv if you want to follow the

1996
01:11:41,669 --> 01:11:39,120
mission online on twitter you can go to