1
00:00:07,430 --> 00:00:05,269
welcome to nasa headquarters in

2
00:00:09,910 --> 00:00:07,440
washington d.c i'm steve cole from the

3
00:00:11,830 --> 00:00:09,920
office of communications nasa is getting

4
00:00:14,390 --> 00:00:11,840
ready to launch its first earth science

5
00:00:16,630 --> 00:00:14,400
satellite in two years dedicated to

6
00:00:17,990 --> 00:00:16,640
tackling some of the toughest questions

7
00:00:20,630 --> 00:00:18,000
about our earth's

8
00:00:22,630 --> 00:00:20,640
changing climate the mission is glory

9
00:00:25,189 --> 00:00:22,640
and it will join a fleet of nasa

10
00:00:27,189 --> 00:00:25,199
satellites already in orbit circling the

11
00:00:30,070 --> 00:00:27,199
globe every day

12
00:00:32,470 --> 00:00:30,080
glory is scheduled to rocket into space

13
00:00:35,030 --> 00:00:32,480

on the early in the morning of february

14
00:00:37,270 --> 00:00:35,040
23rd from vandenberg air force base in

15
00:00:40,470 --> 00:00:37,280
southern california on its way to an

16
00:00:42,150 --> 00:00:40,480
eventual orbit of nearly 440 miles above

17
00:00:44,069 --> 00:00:42,160
the earth

18
00:00:45,910 --> 00:00:44,079
today we're giving you a preview of this

19
00:00:48,150 --> 00:00:45,920
mission with some of the key people who

20
00:00:50,790 --> 00:00:48,160
have made glory possible let me

21
00:00:53,270 --> 00:00:50,800
introduce you to our panelists

22
00:00:55,990 --> 00:00:53,280
troy brethauer from nasa headquarters is

23
00:00:58,549 --> 00:00:56,000
the glory program executive

24
00:01:00,950 --> 00:00:58,559
brian faithful from nasa's goddard space

25
00:01:03,510 --> 00:01:00,960
flight center in greenbelt maryland is

26
00:01:05,830 --> 00:01:03,520
glory project manager

27
00:01:08,469 --> 00:01:05,840
michael mischenko from nasa's goddard

28
00:01:11,590 --> 00:01:08,479
institute for space studies in new york

29
00:01:13,670 --> 00:01:11,600
is the glory project scientist

30
00:01:16,310 --> 00:01:13,680
greg kopp from the university of

31
00:01:18,550 --> 00:01:16,320
colorado's laboratory for atmospheric

32
00:01:20,870 --> 00:01:18,560
and space physics in boulder

33
00:01:23,350 --> 00:01:20,880
is the instrument scientist for the

34
00:01:25,670 --> 00:01:23,360
total irradiance monitor

35
00:01:27,590 --> 00:01:25,680
and finally brian cairns also from

36
00:01:30,390 --> 00:01:27,600
nasa's goddard institute for space

37
00:01:33,670 --> 00:01:30,400
studies is the instrument scientist for

38
00:01:36,069 --> 00:01:33,680

the aerosol polarimetery sensor

39
00:01:38,550 --> 00:01:36,079
after our panel's presentations we'll

40
00:01:40,789 --> 00:01:38,560
take questions here in the auditorium

41
00:01:43,590 --> 00:01:40,799
and on the phone line from the media

42
00:01:45,270 --> 00:01:43,600
so let's get started our first speaker

43
00:01:47,109 --> 00:01:45,280
joy

44
00:01:49,109 --> 00:01:47,119
now i'll talk about why glory is

45
00:01:51,190 --> 00:01:49,119
important to us may i have the first

46
00:01:53,030 --> 00:01:51,200
graphic please

47
00:01:55,190 --> 00:01:53,040
glory is the next launch and the

48
00:01:57,990 --> 00:01:55,200
president's climate initiative to

49
00:02:00,389 --> 00:01:58,000
address key climate problems and is

50
00:02:02,230 --> 00:02:00,399
nasa's next earth observing research

51
00:02:03,590 --> 00:02:02,240
mission that will join 14 other

52
00:02:05,590 --> 00:02:03,600
satellites

53
00:02:06,870 --> 00:02:05,600
glory will improve our understanding of

54
00:02:08,710 --> 00:02:06,880
how the sun

55
00:02:11,190 --> 00:02:08,720
and tiny airborne particles called

56
00:02:12,390 --> 00:02:11,200
aerosols affect the earth's climate

57
00:02:14,390 --> 00:02:12,400
changes

58
00:02:16,470 --> 00:02:14,400
as the glory program executive for the

59
00:02:19,190 --> 00:02:16,480
earth science division i am responsible

60
00:02:21,270 --> 00:02:19,200
for the overall technical cost schedule

61
00:02:23,510 --> 00:02:21,280
and program management of the glory

62
00:02:26,630 --> 00:02:23,520
mission for nasa headquarters

63
00:02:30,309 --> 00:02:26,640

nasa's rigorous practices standards and

64
00:02:33,750 --> 00:02:30,319
processes have prepared us to launch the

65
00:02:35,509 --> 00:02:33,760
observatory and the launch vehicle

66
00:02:37,270 --> 00:02:35,519
project management for the glory mission

67
00:02:39,270 --> 00:02:37,280
is provided by the goddard space flight

68
00:02:41,430 --> 00:02:39,280
center o'brien faithful is the project

69
00:02:43,430 --> 00:02:41,440
manager and michael michenko is the

70
00:02:45,750 --> 00:02:43,440
project scientist

71
00:02:47,270 --> 00:02:45,760
the taurus xl launch vehicle which was

72
00:02:50,710 --> 00:02:47,280
procured through the nasa launch

73
00:02:53,030 --> 00:02:50,720
services program at kennedy space center

74
00:02:55,110 --> 00:02:53,040
will launch the glory observatory

75
00:02:57,910 --> 00:02:55,120
which will then ascend into the a train

76
00:03:00,390 --> 00:02:57,920
or the afternoon constellation

77
00:03:03,350 --> 00:03:00,400
the low earth orbit a train

78
00:03:05,589 --> 00:03:03,360
consists of multiple spacecraft

79
00:03:06,710 --> 00:03:05,599
flying in close proximity

80
00:03:09,030 --> 00:03:06,720
to

81
00:03:11,270 --> 00:03:09,040
create basically the first ever super

82
00:03:13,830 --> 00:03:11,280
observatory that'll give us near

83
00:03:17,509 --> 00:03:13,840
simultaneous observations of the earth

84
00:03:19,670 --> 00:03:17,519
including land ocean and atmosphere

85
00:03:22,070 --> 00:03:19,680
the highly accurate and precise data

86
00:03:23,990 --> 00:03:22,080
from glory in combination with

87
00:03:27,030 --> 00:03:24,000
observations from the rest of the a

88
00:03:29,670 --> 00:03:27,040

train will enable researchers to improve

89
00:03:32,630 --> 00:03:29,680
our understanding of the earth system

90
00:03:35,270 --> 00:03:32,640
by improving our ability

91
00:03:38,309 --> 00:03:35,280
to predict future climate

92
00:03:39,830 --> 00:03:38,319
i like the next graphic please

93
00:03:41,190 --> 00:03:39,840
the glory mission will assist

94
00:03:44,390 --> 00:03:41,200
researchers

95
00:03:47,190 --> 00:03:44,400
in revealing the effects of aerosols and

96
00:03:49,270 --> 00:03:47,200
solar radiance on climate

97
00:03:50,869 --> 00:03:49,280
changes in the composition of the

98
00:03:53,509 --> 00:03:50,879
earth's atmosphere

99
00:03:55,830 --> 00:03:53,519
or in the total solar irradiance can

100
00:03:57,589 --> 00:03:55,840
lead to global climate change

101
00:03:59,670 --> 00:03:57,599
the knowledge obtained from the glory

102
00:04:02,149 --> 00:03:59,680
mission will help us better predict the

103
00:04:04,309 --> 00:04:02,159
future of our planet

104
00:04:06,229 --> 00:04:04,319
the glory mission responds to the

105
00:04:09,270 --> 00:04:06,239
intergovernmental panel on climate

106
00:04:12,070 --> 00:04:09,280
change by continuing and improving on

107
00:04:13,589 --> 00:04:12,080
nasa's earth science research on future

108
00:04:15,589 --> 00:04:13,599
climate

109
00:04:18,310 --> 00:04:15,599
the scientific knowledge provided by the

110
00:04:20,150 --> 00:04:18,320
glory mission is essential to improving

111
00:04:21,909 --> 00:04:20,160
climate models that predict future

112
00:04:24,629 --> 00:04:21,919
climate change

113
00:04:27,430 --> 00:04:24,639

this understanding is also essential for

114
00:04:28,390 --> 00:04:27,440
making scientifically based economic

115
00:04:30,790 --> 00:04:28,400
health

116
00:04:32,629 --> 00:04:30,800
and policy decisions related to

117
00:04:34,469 --> 00:04:32,639
environmental change

118
00:04:35,749 --> 00:04:34,479
the glory mission has two science

119
00:04:37,909 --> 00:04:35,759
objectives

120
00:04:40,870 --> 00:04:37,919
the first objective is to continue our

121
00:04:44,150 --> 00:04:40,880
32-year record of measuring the sun's

122
00:04:46,070 --> 00:04:44,160
direct and indirect effects on climate

123
00:04:48,390 --> 00:04:46,080
the second objective

124
00:04:51,189 --> 00:04:48,400
is to increase our understanding of how

125
00:04:54,469 --> 00:04:51,199
natural and man-made aerosols affect

126
00:04:58,870 --> 00:04:56,469
the glory mission will address the

127
00:05:00,870 --> 00:04:58,880
largest uncertainty in our understanding

128
00:05:04,150 --> 00:05:00,880
of the earth system

129
00:05:06,150 --> 00:05:04,160
basically the aerosol climate effect

130
00:05:08,390 --> 00:05:06,160
we'd like to better understand how

131
00:05:11,189 --> 00:05:08,400
aerosols influence solar energy in the

132
00:05:13,830 --> 00:05:11,199
earth's system there are uncertainties

133
00:05:15,990 --> 00:05:13,840
in how the solar energy influences

134
00:05:20,070 --> 00:05:16,000
excuse me they're understanding there

135
00:05:22,469 --> 00:05:20,080
are uncertainties in how aerosols

136
00:05:25,029 --> 00:05:22,479
contribute to basically the absorption

137
00:05:27,830 --> 00:05:25,039
and reflection of solar energy

138
00:05:30,950 --> 00:05:27,840

as well as in how aerosols impact cloud

139
00:05:32,629 --> 00:05:30,960
formation and properties

140
00:05:35,029 --> 00:05:32,639
i'd like the next

141
00:05:38,150 --> 00:05:35,039
graphic thank you

142
00:05:39,749 --> 00:05:38,160
aerosols are tiny airborne solid or

143
00:05:41,510 --> 00:05:39,759
liquid particles

144
00:05:43,189 --> 00:05:41,520
that are sized from nanometers to

145
00:05:45,510 --> 00:05:43,199
micrometers

146
00:05:47,830 --> 00:05:45,520
that may be either natural or man-made

147
00:05:50,790 --> 00:05:47,840
in origin and they come from sources

148
00:05:53,670 --> 00:05:50,800
like this graphic desert dust the next

149
00:05:56,870 --> 00:05:53,680
graphic please volcanoes

150
00:05:58,710 --> 00:05:56,880
the next graphic and air pollution

151
00:06:01,430 --> 00:05:58,720
that contribute to either

152
00:06:04,710 --> 00:06:01,440
the warming or the cooling of the earth

153
00:06:06,550 --> 00:06:04,720
man-made aerosols are created by

154
00:06:08,469 --> 00:06:06,560
burning either fossil fuels or

155
00:06:11,029 --> 00:06:08,479
intentionally burning trees and they

156
00:06:13,510 --> 00:06:11,039
contribute to the warming of the earth

157
00:06:15,749 --> 00:06:13,520
while sulfates which are also created by

158
00:06:18,150 --> 00:06:15,759
burning fossil fuels can come from

159
00:06:21,510 --> 00:06:18,160
sources like volcanoes and air pollution

160
00:06:24,390 --> 00:06:21,520
contribute to the cooling of the earth

161
00:06:26,950 --> 00:06:24,400
i'd like to show the next animation

162
00:06:29,510 --> 00:06:26,960
this animation of is a model basically

163
00:06:31,590 --> 00:06:29,520

of aerosol transport

164
00:06:34,550 --> 00:06:31,600
glory will help us to improve

165
00:06:37,510 --> 00:06:34,560
atmospheric models that predict aerosol

166
00:06:40,390 --> 00:06:37,520
transport this model is an atmospheric

167
00:06:43,270 --> 00:06:40,400
model demonstrating the

168
00:06:45,670 --> 00:06:43,280
eruption of mount pinatubo

169
00:06:47,510 --> 00:06:45,680
this is not obviously glory's data but

170
00:06:49,029 --> 00:06:47,520
an example of a model that glory can

171
00:06:51,270 --> 00:06:49,039
contribute to

172
00:06:53,990 --> 00:06:51,280
now unlike greenhouse gases which can

173
00:06:56,710 --> 00:06:54,000
remain in the atmosphere for years

174
00:06:59,270 --> 00:06:56,720
these tiny particles remain airborne for

175
00:07:01,749 --> 00:06:59,280
at most a couple of weeks during which

176
00:07:04,070 --> 00:07:01,759
time they can be transported globally

177
00:07:06,070 --> 00:07:04,080
thousands of miles

178
00:07:08,309 --> 00:07:06,080
glory is nasa's first satellite that

179
00:07:09,990 --> 00:07:08,319
will make unique

180
00:07:11,189 --> 00:07:10,000
highly accurate measurements of light

181
00:07:13,670 --> 00:07:11,199
properties

182
00:07:15,830 --> 00:07:13,680
as a means of identifying

183
00:07:17,189 --> 00:07:15,840
the size shape and composition of

184
00:07:19,270 --> 00:07:17,199
aerosols

185
00:07:21,749 --> 00:07:19,280
these first ever measurements from

186
00:07:23,830 --> 00:07:21,759
glory's aerosol polarimetry sensor

187
00:07:26,629 --> 00:07:23,840
instrument will help in determining the

188
00:07:28,550 --> 00:07:26,639

global distribution of both natural and

189
00:07:31,110 --> 00:07:28,560
man-made aerosols

190
00:07:33,430 --> 00:07:31,120
as well as how aerosols interact with

191
00:07:35,909 --> 00:07:33,440
other components in the atmosphere as

192
00:07:37,749 --> 00:07:35,919
they are transported globally and affect

193
00:07:40,309 --> 00:07:37,759
climate change

194
00:07:42,870 --> 00:07:40,319
brian cairns will address the aerosol

195
00:07:45,830 --> 00:07:42,880
science for the glory mission later

196
00:07:48,309 --> 00:07:45,840
and i'd like the final graphic thank you

197
00:07:50,550 --> 00:07:48,319
gloria's other science objective is to

198
00:07:53,430 --> 00:07:50,560
understand how changes in the sun's

199
00:07:55,270 --> 00:07:53,440
energy can cause climate change

200
00:07:57,749 --> 00:07:55,280
our sun's energy

201
00:07:59,990 --> 00:07:57,759
our sun provides the energy that fuels

202
00:08:02,550 --> 00:08:00,000
earth's climate it's the most dominant

203
00:08:04,550 --> 00:08:02,560
factor driving the climate

204
00:08:07,350 --> 00:08:04,560
the highly accurate measurements from

205
00:08:09,909 --> 00:08:07,360
glory's total irradiance monitor will

206
00:08:12,869 --> 00:08:09,919
help us to understand the sun's major

207
00:08:14,790 --> 00:08:12,879
effect on earth's climate with improved

208
00:08:17,110 --> 00:08:14,800
accuracy and stability

209
00:08:20,070 --> 00:08:17,120
and will also help to continue more than

210
00:08:22,629 --> 00:08:20,080
32 years of critical critical solar

211
00:08:24,950 --> 00:08:22,639
irradiance data

212
00:08:27,589 --> 00:08:24,960
grey kopp will address the total

213
00:08:29,189 --> 00:08:27,599

irradiance science for the glory mission

214
00:08:31,510 --> 00:08:29,199
at a later time

215
00:08:33,990 --> 00:08:31,520
and in summary the glory mission will

216
00:08:36,389 --> 00:08:34,000
provide the highly accurate aerosol and

217
00:08:38,790 --> 00:08:36,399
solar radiance data measurements

218
00:08:40,949 --> 00:08:38,800
that are vital to improving climate

219
00:08:43,430 --> 00:08:40,959
models and more accurately predicting

220
00:08:45,509 --> 00:08:43,440
the earth's future climate

221
00:08:48,550 --> 00:08:45,519
additionally this will serve as a

222
00:08:51,829 --> 00:08:48,560
resource for making scientifically based

223
00:08:55,269 --> 00:08:51,839
economic health and policy decisions

224
00:08:56,710 --> 00:08:55,279
related to environmental change and now

225
00:08:58,389 --> 00:08:56,720
i'd like to turn it over to brian

226
00:09:01,110 --> 00:08:58,399
faithful who will talk about the glory

227
00:09:03,590 --> 00:09:01,120
observatory and as well as the launch

228
00:09:05,110 --> 00:09:03,600
site activities for our upcoming launch

229
00:09:06,389 --> 00:09:05,120
thank you joy

230
00:09:08,150 --> 00:09:06,399
i'd like to thank everybody for being

231
00:09:09,990 --> 00:09:08,160
here today and tell you how excited we

232
00:09:11,910 --> 00:09:10,000
are to be at this point in the program

233
00:09:14,070 --> 00:09:11,920
can i have the first graphic

234
00:09:16,150 --> 00:09:14,080
i'm happy to report that the observatory

235
00:09:18,070 --> 00:09:16,160
arrives safely at vandenberg on tuesday

236
00:09:19,910 --> 00:09:18,080
january the 11th

237
00:09:22,310 --> 00:09:19,920
we have successfully completed all

238
00:09:24,790 --> 00:09:22,320

post-shipment inspections and functional

239
00:09:26,389 --> 00:09:24,800
tests kind of next graphic

240
00:09:28,389 --> 00:09:26,399
and the engineering team is currently

241
00:09:29,750 --> 00:09:28,399
preparing the satellite to start fueling

242
00:09:31,350 --> 00:09:29,760
this weekend

243
00:09:33,990 --> 00:09:31,360
after that we will be ready for fairing

244
00:09:34,829 --> 00:09:34,000
installation early february

245
00:09:36,790 --> 00:09:34,839
next

246
00:09:39,269 --> 00:09:36,800
graphic

247
00:09:41,190 --> 00:09:39,279
in early february excuse me uh in in

248
00:09:43,350 --> 00:09:41,200
addition to the observatory work uh the

249
00:09:45,509 --> 00:09:43,360
the taurus rocket is uh is making

250
00:09:47,829 --> 00:09:45,519
significant progress as well and in fact

251
00:09:49,030 --> 00:09:47,839
on this past monday they erected the

252
00:09:50,230 --> 00:09:49,040
first stage

253
00:09:51,750 --> 00:09:50,240
at the launch site which you're seeing

254
00:09:53,350 --> 00:09:51,760
on the picture now

255
00:09:54,389 --> 00:09:53,360
if we could start the animation i'd like

256
00:09:57,190 --> 00:09:54,399
to talk a little bit more about the

257
00:10:01,110 --> 00:09:59,350
as was previously mentioned by joy glory

258
00:10:02,870 --> 00:10:01,120
is a key part of nasa's climate research

259
00:10:04,710 --> 00:10:02,880
program and it will fly in the afternoon

260
00:10:06,790 --> 00:10:04,720
constellation with several other earth

261
00:10:08,550 --> 00:10:06,800
observing satellites

262
00:10:11,030 --> 00:10:08,560
it is a unique satellite and it's really

263
00:10:13,350 --> 00:10:11,040

two scientific missions in one

264
00:10:15,430 --> 00:10:13,360
it contains a sun pointing instrument

265
00:10:17,509 --> 00:10:15,440
that measures solar energy and an earth

266
00:10:20,389 --> 00:10:17,519
pointing instrument that will study

267
00:10:21,990 --> 00:10:20,399
aerosols the total radiance monitor

268
00:10:23,590 --> 00:10:22,000
built by the university of colorado's

269
00:10:25,110 --> 00:10:23,600
laboratory for atmospheric and space

270
00:10:27,430 --> 00:10:25,120
physics in boulder colorado will

271
00:10:29,670 --> 00:10:27,440
continue a 32-year spaceborne data

272
00:10:31,509 --> 00:10:29,680
record of the total solar irradiance

273
00:10:33,590 --> 00:10:31,519
measurement while the aerosol

274
00:10:36,230 --> 00:10:33,600
polarimetry sensor that was built by

275
00:10:38,069 --> 00:10:36,240
raytheon's space and airborne systems in

276
00:10:40,069 --> 00:10:38,079
el segundo california will help

277
00:10:42,069 --> 00:10:40,079
scientists better understand

278
00:10:44,630 --> 00:10:42,079
the effect of both man-made and

279
00:10:46,949 --> 00:10:44,640
naturally occurring aerosols in the in

280
00:10:47,750 --> 00:10:46,959
the atmosphere

281
00:10:51,350 --> 00:10:47,760
um

282
00:10:53,509 --> 00:10:51,360
cloud cameras which were built by ball

283
00:10:56,150 --> 00:10:53,519
aerospace and technologies corporation

284
00:10:58,550 --> 00:10:56,160
and they are used to assist in cloud

285
00:11:00,790 --> 00:10:58,560
clearing for the aerosol retrievals

286
00:11:02,790 --> 00:11:00,800
uh i must say that all the instruments

287
00:11:04,550 --> 00:11:02,800
on glory have have outstanding

288
00:11:07,190 --> 00:11:04,560

performance and have performed

289
00:11:08,949 --> 00:11:07,200
flawlessly throughout the

290
00:11:09,910 --> 00:11:08,959
long environmental program that we've

291
00:11:12,069 --> 00:11:09,920
had

292
00:11:16,710 --> 00:11:12,079
um could we uh start the spacecraft

293
00:11:21,030 --> 00:11:19,350
glory used an existing spacecraft bus

294
00:11:22,949 --> 00:11:21,040
that was available

295
00:11:24,389 --> 00:11:22,959
from a program that didn't fly and in

296
00:11:26,150 --> 00:11:24,399
order to accommodate glory's two

297
00:11:28,630 --> 00:11:26,160
scientific instruments

298
00:11:29,350 --> 00:11:28,640
extensive modifications and in general

299
00:11:35,750 --> 00:11:29,360
re

300
00:11:37,430 --> 00:11:35,760
this very challenging transformation was

301
00:11:40,310 --> 00:11:37,440
successfully performed by orbital

302
00:11:42,230 --> 00:11:40,320
sciences corporation in dulles virginia

303
00:11:44,069 --> 00:11:42,240
and i'm glad to say that it meets all

304
00:11:46,550 --> 00:11:44,079
its performance requirements

305
00:11:48,550 --> 00:11:46,560
uh can i have the next graphic uh before

306
00:11:50,710 --> 00:11:48,560
i uh hand this off to michael to talk

307
00:11:53,030 --> 00:11:50,720
more about glory science i want to

308
00:11:55,350 --> 00:11:53,040
express how happy the team is and

309
00:11:57,350 --> 00:11:55,360
excited to be here and to let you know

310
00:11:59,590 --> 00:11:57,360
that the glory observatory is ready to

311
00:12:00,470 --> 00:11:59,600
uh launch and do its mission

312
00:12:01,670 --> 00:12:00,480
michael

313
00:12:04,550 --> 00:12:01,680

thank you brian

314
00:12:06,389 --> 00:12:04,560
uh my first graphic will tell you that

315
00:12:08,310 --> 00:12:06,399
essentially all of the energy that fuels

316
00:12:09,590 --> 00:12:08,320
the climate system comes directly from

317
00:12:11,590 --> 00:12:09,600
the sun

318
00:12:12,470 --> 00:12:11,600
this means that even small changes in

319
00:12:14,550 --> 00:12:12,480
the

320
00:12:17,430 --> 00:12:14,560
solar energy input can have profound

321
00:12:19,350 --> 00:12:17,440
consequences for the earth's climate

322
00:12:22,069 --> 00:12:19,360
this means that we have to measure the

323
00:12:24,230 --> 00:12:22,079
solar energy input over an extended

324
00:12:26,230 --> 00:12:24,240
period of time with a very high accuracy

325
00:12:28,629 --> 00:12:26,240
and this is precisely what the glory

326
00:12:31,269 --> 00:12:28,639
team is going to do

327
00:12:33,910 --> 00:12:31,279
it will continue the 32-year

328
00:12:36,470 --> 00:12:33,920
uninterrupted record of total solely

329
00:12:39,030 --> 00:12:36,480
radiance measurements from space in fact

330
00:12:42,069 --> 00:12:39,040
this instrument is significantly more

331
00:12:43,990 --> 00:12:42,079
accurate than all his predecessors and

332
00:12:46,230 --> 00:12:44,000
will help us to improve

333
00:12:48,310 --> 00:12:46,240
the overall accuracy of the existing

334
00:12:50,389 --> 00:12:48,320
composite record

335
00:12:52,629 --> 00:12:50,399
of satellite measurements

336
00:12:53,829 --> 00:12:52,639
once the solar energy enters the climate

337
00:12:55,829 --> 00:12:53,839
system

338
00:12:57,670 --> 00:12:55,839

it can be partially absorbed at the

339
00:13:00,069 --> 00:12:57,680
surface or in the atmosphere and can be

340
00:13:02,150 --> 00:13:00,079
partially reflected back to space

341
00:13:04,310 --> 00:13:02,160
in fact it is this delicate balance

342
00:13:06,470 --> 00:13:04,320
between the incoming solar radiation and

343
00:13:07,829 --> 00:13:06,480
the outgoing radiation that defines the

344
00:13:09,509 --> 00:13:07,839
earth's climate

345
00:13:11,350 --> 00:13:09,519
an extremely important role in this

346
00:13:13,269 --> 00:13:11,360
redistribution of the solar energy in

347
00:13:14,550 --> 00:13:13,279
the atmosphere is played by tiny yet

348
00:13:16,389 --> 00:13:14,560
ubiquitous

349
00:13:18,230 --> 00:13:16,399
particles airborne particles called

350
00:13:20,230 --> 00:13:18,240
aerosols

351
00:13:22,310 --> 00:13:20,240
these particles can affect the climate

352
00:13:23,269 --> 00:13:22,320
directly by absorbing or reflecting

353
00:13:25,269 --> 00:13:23,279
light

354
00:13:27,430 --> 00:13:25,279
so depending on the chemical composition

355
00:13:29,350 --> 00:13:27,440
they can contribute to warming or to the

356
00:13:31,990 --> 00:13:29,360
cooling of the atmosphere

357
00:13:33,910 --> 00:13:32,000
they can also affect climate indirectly

358
00:13:35,750 --> 00:13:33,920
by modifying the properties of clouds

359
00:13:37,590 --> 00:13:35,760
which are significant reflectors you can

360
00:13:39,910 --> 00:13:37,600
see from this picture

361
00:13:41,670 --> 00:13:39,920
and modulating precipitation

362
00:13:43,030 --> 00:13:41,680
so this tells us that

363
00:13:45,030 --> 00:13:43,040

because of this important role the

364
00:13:47,750 --> 00:13:45,040
aerosols playing the redistribution of

365
00:13:49,189 --> 00:13:47,760
the energy in the climate system we need

366
00:13:51,030 --> 00:13:49,199
to know their distribution global

367
00:13:53,269 --> 00:13:51,040
distribution and properties with very

368
00:13:55,110 --> 00:13:53,279
high accuracy and this is the major

369
00:13:57,590 --> 00:13:55,120
scientific objective of the glory

370
00:14:00,949 --> 00:13:57,600
aerosol polarimetry sensor

371
00:14:05,269 --> 00:14:00,959
the next graphic is is a

372
00:14:07,030 --> 00:14:05,279
is a computer simulation uh it was

373
00:14:09,430 --> 00:14:07,040
it was created using a theoretical

374
00:14:12,150 --> 00:14:09,440
computer model and shows you the

375
00:14:14,230 --> 00:14:12,160
transport of tiny suit or black carbon

376
00:14:16,629 --> 00:14:14,240
particles in the atmosphere so we have

377
00:14:18,069 --> 00:14:16,639
this theoretical modeling tools but we

378
00:14:19,990 --> 00:14:18,079
still know that

379
00:14:22,629 --> 00:14:20,000
the accuracy of these tools is

380
00:14:24,629 --> 00:14:22,639
insufficient and needs to be improved we

381
00:14:27,110 --> 00:14:24,639
know that the aerosols

382
00:14:28,550 --> 00:14:27,120
affect climates

383
00:14:30,310 --> 00:14:28,560
the effect climate

384
00:14:32,150 --> 00:14:30,320
defect on climate by aerosols is

385
00:14:34,470 --> 00:14:32,160
comparable in magnitude to that of the

386
00:14:36,470 --> 00:14:34,480
greenhouse gases yet the existing

387
00:14:39,590 --> 00:14:36,480
uncertainty in the climate forcing due

388
00:14:41,990 --> 00:14:39,600

to aerosols is as big as the estimated

389
00:14:44,550 --> 00:14:42,000
forcing itself

390
00:14:46,230 --> 00:14:44,560
also if you look at the anthropogenic or

391
00:14:48,310 --> 00:14:46,240
man-made contribution to the global

392
00:14:49,590 --> 00:14:48,320
climate change there is an uncertainty

393
00:14:51,590 --> 00:14:49,600
in that and it's a significant

394
00:14:53,350 --> 00:14:51,600
uncertainty and almost all of it comes

395
00:14:55,350 --> 00:14:53,360
from the poorer knowledge of aerosol

396
00:14:56,949 --> 00:14:55,360
particles so this all tells us we need

397
00:14:59,030 --> 00:14:56,959
to know these particles much better than

398
00:15:01,430 --> 00:14:59,040
we do but it's not easy to do there are

399
00:15:03,189 --> 00:15:01,440
several factors which make this problem

400
00:15:06,310 --> 00:15:03,199
quite complicated

401
00:15:07,990 --> 00:15:06,320
their souls come in all sizes shapes and

402
00:15:09,590 --> 00:15:08,000
chemical compositions

403
00:15:11,509 --> 00:15:09,600
there are different types of aerosols

404
00:15:13,750 --> 00:15:11,519
which can coexist within the field of

405
00:15:15,590 --> 00:15:13,760
view of a satellite instrument making

406
00:15:17,750 --> 00:15:15,600
the problem of the determination of the

407
00:15:19,590 --> 00:15:17,760
aerosol properties highly complicated

408
00:15:21,110 --> 00:15:19,600
these particles are shortly even highly

409
00:15:22,949 --> 00:15:21,120
variable

410
00:15:26,310 --> 00:15:22,959
yet they can be transported thousands of

411
00:15:28,550 --> 00:15:26,320
kilometers and even over the globe

412
00:15:30,550 --> 00:15:28,560
these complexifying factors call for a

413
00:15:33,509 --> 00:15:30,560

very special instrument to study

414
00:15:35,670 --> 00:15:33,519
aerosols and in fact the glory versus

415
00:15:38,710 --> 00:15:35,680
oil polarimeter sensor is the first

416
00:15:40,550 --> 00:15:38,720
earth orbiting instrument of its kind

417
00:15:42,550 --> 00:15:40,560
it will measure not just the intensity

418
00:15:44,310 --> 00:15:42,560
of the reflected sunlight but it will

419
00:15:45,350 --> 00:15:44,320
also measure the polarization state of

420
00:15:46,949 --> 00:15:45,360
this light

421
00:15:48,069 --> 00:15:46,959
and it will do that with very high

422
00:15:50,470 --> 00:15:48,079
accuracy

423
00:15:52,310 --> 00:15:50,480
it will measure uh the reflected

424
00:15:55,030 --> 00:15:52,320
intensity and polarization for a scene

425
00:15:57,269 --> 00:15:55,040
location from 250 different angles in

426
00:15:58,629 --> 00:15:57,279
nine spectral bands covering a wide

427
00:16:00,470 --> 00:15:58,639
spectral range

428
00:16:02,629 --> 00:16:00,480
so aps will provide a wealth of

429
00:16:04,710 --> 00:16:02,639
information for each syn location and

430
00:16:06,710 --> 00:16:04,720
this wealth of information is precisely

431
00:16:08,069 --> 00:16:06,720
what will help us to determine the

432
00:16:11,269 --> 00:16:08,079
properties of aerosols with the

433
00:16:14,069 --> 00:16:11,279
requisite accuracy and specificity

434
00:16:15,910 --> 00:16:14,079
uh the next graphic uh tells you that uh

435
00:16:18,710 --> 00:16:15,920
the glory spacecraft will be flown in

436
00:16:20,710 --> 00:16:18,720
the so-called afternoon constellation of

437
00:16:22,150 --> 00:16:20,720
satellites

438
00:16:23,990 --> 00:16:22,160

for team for the team instrument it

439
00:16:25,430 --> 00:16:24,000
doesn't matter how we fly it because all

440
00:16:28,069 --> 00:16:25,440
it does is to look at the sun and

441
00:16:30,069 --> 00:16:28,079
measure its energy output but for the

442
00:16:31,509 --> 00:16:30,079
glory aps flying in the atrium can be

443
00:16:33,509 --> 00:16:31,519
quite beneficial

444
00:16:34,790 --> 00:16:33,519
because there are multiple other

445
00:16:36,710 --> 00:16:34,800
instruments looking at the same scene

446
00:16:39,189 --> 00:16:36,720
location at about the same

447
00:16:40,949 --> 00:16:39,199
moment in time and by combining these

448
00:16:42,629 --> 00:16:40,959
measurements we can come up with a

449
00:16:44,710 --> 00:16:42,639
product that is better than the product

450
00:16:46,310 --> 00:16:44,720
of each of the individual instruments

451
00:16:48,870 --> 00:16:46,320
i'll give you just one example glory

452
00:16:51,670 --> 00:16:48,880
will fly right behind the calypso

453
00:16:52,949 --> 00:16:51,680
spacecraft carrying a lidar

454
00:16:54,790 --> 00:16:52,959
the lighter measurements are very

455
00:16:57,350 --> 00:16:54,800
sensitive to the vertical location of

456
00:17:00,230 --> 00:16:57,360
the aerosol particles but a relatively

457
00:17:02,150 --> 00:17:00,240
insensitive to the particle properties

458
00:17:03,829 --> 00:17:02,160
with the glory polarization measurements

459
00:17:05,750 --> 00:17:03,839
we have extreme sensitivity to the

460
00:17:07,270 --> 00:17:05,760
particle microphysical properties and

461
00:17:09,590 --> 00:17:07,280
little sensitivity to the vertical

462
00:17:11,909 --> 00:17:09,600
position so by combining these two types

463
00:17:14,069 --> 00:17:11,919

of measurements uh we will for the first

464
00:17:16,309 --> 00:17:14,079
time determine the vertical distribution

465
00:17:18,630 --> 00:17:16,319
of aerosol physical properties this has

466
00:17:19,669 --> 00:17:18,640
not has not been done before

467
00:17:21,350 --> 00:17:19,679
and now

468
00:17:23,110 --> 00:17:21,360
greg kopp will tell you more about the

469
00:17:24,949 --> 00:17:23,120
team science

470
00:17:27,669 --> 00:17:24,959
thank you michael

471
00:17:30,789 --> 00:17:27,679
the total irradiance monitor on glory is

472
00:17:32,789 --> 00:17:30,799
looking at the sun and as michael said

473
00:17:34,470 --> 00:17:32,799
the sun is providing nearly all the

474
00:17:36,710 --> 00:17:34,480
energy input that drives the earth's

475
00:17:38,549 --> 00:17:36,720
climate system

476
00:17:40,549 --> 00:17:38,559
the sun provides

477
00:17:42,549 --> 00:17:40,559
ten thousand times more energy than the

478
00:17:44,150 --> 00:17:42,559
next dominant source four thousand times

479
00:17:47,029 --> 00:17:44,160
as much energy to the earth's climate

480
00:17:49,590 --> 00:17:47,039
system as all the other sources combined

481
00:17:51,270 --> 00:17:49,600
and that energy from the sun incident at

482
00:17:53,110 --> 00:17:51,280
the top of the earth's atmosphere varies

483
00:17:54,390 --> 00:17:53,120
with time as you can see in this first

484
00:17:58,549 --> 00:17:54,400
animation

485
00:18:01,029 --> 00:17:58,559
you the

486
00:18:03,029 --> 00:18:01,039
tsi total solar irradiance energy

487
00:18:04,630 --> 00:18:03,039
radiant energy from the sun at the top

488
00:18:06,070 --> 00:18:04,640

of the earth's atmosphere driving our

489
00:18:07,029 --> 00:18:06,080
climate system and you can see that it

490
00:18:08,950 --> 00:18:07,039
varies

491
00:18:10,950 --> 00:18:08,960
solar activity such as the passage of

492
00:18:13,430 --> 00:18:10,960
these dark sunspots across the solar

493
00:18:15,350 --> 00:18:13,440
disk cause short-term decreases in the

494
00:18:18,470 --> 00:18:15,360
sun's output these are decreases on the

495
00:18:20,870 --> 00:18:18,480
order of 0.1 to 0.3 percent

496
00:18:22,870 --> 00:18:20,880
and they can occur rapidly over days to

497
00:18:25,270 --> 00:18:22,880
weeks as you're seeing here

498
00:18:27,830 --> 00:18:25,280
this animation spans about three months

499
00:18:29,909 --> 00:18:27,840
of the sun's output

500
00:18:32,070 --> 00:18:29,919
these short-term fluctuations although

501
00:18:33,669 --> 00:18:32,080
large have very little effect on earth's

502
00:18:36,950 --> 00:18:33,679
climate because the climate system

503
00:18:38,630 --> 00:18:36,960
doesn't respond very quickly to changes

504
00:18:41,510 --> 00:18:38,640
in the sun's output but knowing that the

505
00:18:43,830 --> 00:18:41,520
sun can respond and change this quickly

506
00:18:46,150 --> 00:18:43,840
we'd like to know long term how the sun

507
00:18:47,990 --> 00:18:46,160
changes over decades over centuries

508
00:18:50,230 --> 00:18:48,000
things that can be much more relevant to

509
00:18:51,590 --> 00:18:50,240
climate change on the earth

510
00:18:53,830 --> 00:18:51,600
and

511
00:18:55,750 --> 00:18:53,840
being able to measure something such as

512
00:18:58,070 --> 00:18:55,760
these small scale changes on the sun

513
00:18:59,270 --> 00:18:58,080

over decades to centuries drives real

514
00:19:01,270 --> 00:18:59,280
stringent

515
00:19:02,710 --> 00:19:01,280
accuracy and stability requirements

516
00:19:05,590 --> 00:19:02,720
which we're going to be achieving with

517
00:19:08,470 --> 00:19:05,600
the team instrument on glory

518
00:19:11,110 --> 00:19:08,480
the next animation shows the 32-year

519
00:19:12,070 --> 00:19:11,120
long record that scientists currently

520
00:19:14,470 --> 00:19:12,080
have

521
00:19:16,549 --> 00:19:14,480
from space of total solar irradiance

522
00:19:18,150 --> 00:19:16,559
measurements the different colors on

523
00:19:20,150 --> 00:19:18,160
here represent measurements from

524
00:19:22,150 --> 00:19:20,160
different instruments

525
00:19:23,909 --> 00:19:22,160
and you'll see that they're each

526
00:19:25,830 --> 00:19:23,919
following the same sort of curve the

527
00:19:27,909 --> 00:19:25,840
same output that the sun has the same

528
00:19:29,669 --> 00:19:27,919
variability that it has but you'll also

529
00:19:31,029 --> 00:19:29,679
see that there are offsets between each

530
00:19:33,669 --> 00:19:31,039
of these different instruments and those

531
00:19:36,230 --> 00:19:33,679
are due to calibration differences

532
00:19:38,070 --> 00:19:36,240
what's helped this record has been that

533
00:19:39,909 --> 00:19:38,080
we've had overlap between each of these

534
00:19:40,870 --> 00:19:39,919
different instruments each instrument

535
00:19:42,870 --> 00:19:40,880
has

536
00:19:45,029 --> 00:19:42,880
taken simultaneous measurements of the

537
00:19:46,310 --> 00:19:45,039
same sun at the same time as prior

538
00:19:48,630 --> 00:19:46,320

instruments

539
00:19:50,710 --> 00:19:48,640
and that's what's let us overcome these

540
00:19:53,590 --> 00:19:50,720
offsets to be able to as the next

541
00:19:55,029 --> 00:19:53,600
animation or the next slide shows to be

542
00:19:57,750 --> 00:19:55,039
able to offset these different

543
00:20:00,549 --> 00:19:57,760
measurements to form one continual

544
00:20:02,149 --> 00:20:00,559
record of what the sun has been doing

545
00:20:04,070 --> 00:20:02,159
we use that then to determine

546
00:20:05,110 --> 00:20:04,080
sensitivity of the earth's climate

547
00:20:07,110 --> 00:20:05,120
system

548
00:20:09,350 --> 00:20:07,120
to solar output

549
00:20:10,950 --> 00:20:09,360
but we need to continue this record we

550
00:20:12,549 --> 00:20:10,960
need this overlap with prior

551
00:20:14,390 --> 00:20:12,559
measurements still

552
00:20:15,830 --> 00:20:14,400
and so glory as shown in the next

553
00:20:18,310 --> 00:20:15,840
animation

554
00:20:19,990 --> 00:20:18,320
will be following on to the total

555
00:20:23,029 --> 00:20:20,000
irradiance monitor that's currently

556
00:20:25,669 --> 00:20:23,039
flying on nasa's source mission

557
00:20:27,669 --> 00:20:25,679
and the total irradiance monitor on that

558
00:20:29,510 --> 00:20:27,679
spacecraft mission glory will be

559
00:20:30,950 --> 00:20:29,520
continuing that record

560
00:20:33,350 --> 00:20:30,960
to make sure that we don't have any

561
00:20:36,310 --> 00:20:33,360
interruptions in this data set

562
00:20:39,669 --> 00:20:36,320
so with this long ongoing record as

563
00:20:42,230 --> 00:20:39,679

shown two slides back

564
00:20:44,870 --> 00:20:42,240
we're going to be continuing this

565
00:20:46,390 --> 00:20:44,880
measurement record to take care of these

566
00:20:49,029 --> 00:20:46,400
offsets glory also is going to have

567
00:20:51,270 --> 00:20:49,039
improved accuracy which will make the

568
00:20:53,270 --> 00:20:51,280
future record less susceptible to gaps

569
00:20:55,270 --> 00:20:53,280
in the data because we'll know with very

570
00:20:57,430 --> 00:20:55,280
good absolute accuracy

571
00:21:00,070 --> 00:20:57,440
what the value of total solar irradiance

572
00:21:01,830 --> 00:21:00,080
is right now

573
00:21:03,350 --> 00:21:01,840
by extending this record as shown in the

574
00:21:05,510 --> 00:21:03,360
next view graph

575
00:21:06,630 --> 00:21:05,520
by continuing this record we'll be able

576
00:21:11,029 --> 00:21:06,640
to

577
00:21:13,750 --> 00:21:11,039
irradiance value truly is

578
00:21:15,830 --> 00:21:13,760
will be able to

579
00:21:18,070 --> 00:21:15,840
determine what solar features are

580
00:21:19,830 --> 00:21:18,080
causing the variability that we're

581
00:21:21,830 --> 00:21:19,840
seeing in tsi

582
00:21:24,789 --> 00:21:21,840
we'll want to be looking at long term

583
00:21:27,590 --> 00:21:24,799
decadal century level time scales one

584
00:21:30,390 --> 00:21:27,600
one slide prior to this please

585
00:21:32,390 --> 00:21:30,400
decatal and century level time scales

586
00:21:34,789 --> 00:21:32,400
what kind of long-term variability we're

587
00:21:36,470 --> 00:21:34,799
seeing from the sun and ultimately we're

588
00:21:39,190 --> 00:21:36,480

going to be determining

589
00:21:41,669 --> 00:21:39,200
what the earth's sensitivity to these

590
00:21:43,510 --> 00:21:41,679
solar fluctuations is

591
00:21:45,110 --> 00:21:43,520
so this is going to be giving us a very

592
00:21:46,950 --> 00:21:45,120
accurate measurement of the incoming

593
00:21:48,390 --> 00:21:46,960
radiation and next brian will be telling

594
00:21:51,110 --> 00:21:48,400
you a little bit about how glory is

595
00:21:53,270 --> 00:21:51,120
going to be tracking that radiation as

596
00:21:55,750 --> 00:21:53,280
it's scattered or reflected by aerosols

597
00:21:56,830 --> 00:21:55,760
in the earth's atmosphere

598
00:21:59,590 --> 00:21:56,840
thank you

599
00:22:01,830 --> 00:21:59,600
greg as you've heard the aerosol

600
00:22:03,510 --> 00:22:01,840
polarimetry sensor is designed to detect

601
00:22:05,510 --> 00:22:03,520
and characterize

602
00:22:08,230 --> 00:22:05,520
particles in the air all the way from

603
00:22:10,230 --> 00:22:08,240
small smoke particles and pollution that

604
00:22:12,630 --> 00:22:10,240
are smaller than a human hair all the

605
00:22:14,630 --> 00:22:12,640
way up to very large particles such as

606
00:22:17,350 --> 00:22:14,640
those in ice clouds

607
00:22:19,270 --> 00:22:17,360
um can you show the first image please

608
00:22:20,549 --> 00:22:19,280
this just shows that you can go from the

609
00:22:22,390 --> 00:22:20,559
very small

610
00:22:24,549 --> 00:22:22,400
particles to the very big particles very

611
00:22:26,310 --> 00:22:24,559
quickly on the left side is pollution

612
00:22:27,669 --> 00:22:26,320
flowing out of mexico city across the

613
00:22:29,990 --> 00:22:27,679

high plains

614
00:22:31,990 --> 00:22:30,000
and coming up against a cloud

615
00:22:35,350 --> 00:22:32,000
in the coastal range and the volcano in

616
00:22:37,190 --> 00:22:35,360
the middle is the pico de aruzaba

617
00:22:39,350 --> 00:22:37,200
this image was taken during a field

618
00:22:42,310 --> 00:22:39,360
campaign the nasa intex b field

619
00:22:44,470 --> 00:22:42,320
experiment and we flew our airborne

620
00:22:46,710 --> 00:22:44,480
simulator of the aps

621
00:22:48,390 --> 00:22:46,720
during this experiment

622
00:22:50,070 --> 00:22:48,400
what the polarization measurements that

623
00:22:52,390 --> 00:22:50,080
we take allow us to do

624
00:22:55,029 --> 00:22:52,400
is to detect and characterize the

625
00:22:57,270 --> 00:22:55,039
aerosols over the bright high plain

626
00:22:59,590 --> 00:22:57,280
in a way that is not possible with

627
00:23:01,029 --> 00:22:59,600
measurements just of intensity

628
00:23:02,789 --> 00:23:01,039
um and

629
00:23:04,630 --> 00:23:02,799
if you're looking at a nice fluffy cloud

630
00:23:06,549 --> 00:23:04,640
like the one in this image the best way

631
00:23:08,710 --> 00:23:06,559
to figure out what the size of the drops

632
00:23:10,070 --> 00:23:08,720
in that cloud is is to look at the

633
00:23:13,830 --> 00:23:10,080
polarization

634
00:23:17,990 --> 00:23:15,430
typically when walking around on the

635
00:23:19,750 --> 00:23:18,000
ground and you look up at a cloud it's

636
00:23:22,710 --> 00:23:19,760
you don't normally see the rainbow this

637
00:23:24,149 --> 00:23:22,720
is for two reasons one is the geometry

638
00:23:26,230 --> 00:23:24,159

is often not right and the other thing

639
00:23:27,990 --> 00:23:26,240
is the cloud is bright and the sheer

640
00:23:29,510 --> 00:23:28,000
brightness of the cloud doesn't allow

641
00:23:31,750 --> 00:23:29,520
you to see the rainbow

642
00:23:33,590 --> 00:23:31,760
these two images are taken of clouds a

643
00:23:35,909 --> 00:23:33,600
few seconds the same cloud a few seconds

644
00:23:38,149 --> 00:23:35,919
apart and on the left the polarizer is

645
00:23:39,990 --> 00:23:38,159
used so that you can see the rainbow and

646
00:23:42,870 --> 00:23:40,000
on the right there is no polarizer used

647
00:23:44,870 --> 00:23:42,880
and the rainbow is no longer visible

648
00:23:46,789 --> 00:23:44,880
what we can use the rainbow for is to

649
00:23:49,190 --> 00:23:46,799
determine the size of the droplets in a

650
00:23:51,430 --> 00:23:49,200
cloud with exquisite accuracy so you can

651
00:23:53,269 --> 00:23:51,440
determine how big those droplets are to

652
00:23:54,630 --> 00:23:53,279
within a tenth of a micron and you can

653
00:23:57,029 --> 00:23:54,640
determine the width of the size

654
00:23:59,110 --> 00:23:57,039
distribution as well

655
00:24:01,990 --> 00:23:59,120
next spear graph please

656
00:24:04,230 --> 00:24:02,000
as we've discussed aerosols are one of

657
00:24:06,630 --> 00:24:04,240
the things that can change the climate

658
00:24:09,029 --> 00:24:06,640
here you can see that the aerosols

659
00:24:11,190 --> 00:24:09,039
obviously scattering light over los

660
00:24:13,510 --> 00:24:11,200
angeles and so they can scatter light

661
00:24:15,590 --> 00:24:13,520
back out to space cooling the earth they

662
00:24:16,950 --> 00:24:15,600
can absorb light within the atmosphere

663
00:24:18,630 --> 00:24:16,960

and that can warm the atmosphere and

664
00:24:20,630 --> 00:24:18,640
change its stability

665
00:24:22,470 --> 00:24:20,640
so they can have two effects one is on

666
00:24:24,310 --> 00:24:22,480
the the thermal state of the earth

667
00:24:27,430 --> 00:24:24,320
they're cooling or warming it and the

668
00:24:29,350 --> 00:24:27,440
other is on changing the the water cycle

669
00:24:30,710 --> 00:24:29,360
by changing the amount of evaporation at

670
00:24:33,029 --> 00:24:30,720
the surface

671
00:24:35,750 --> 00:24:33,039
not only can aerosols to have those kind

672
00:24:37,669 --> 00:24:35,760
of effects on the climates of the earth

673
00:24:39,669 --> 00:24:37,679
next view graph please

674
00:24:41,430 --> 00:24:39,679
but they can also modify clouds and this

675
00:24:42,870 --> 00:24:41,440
is a cartoon just showing one of the

676
00:24:44,390 --> 00:24:42,880
possible effects that these little

677
00:24:46,710 --> 00:24:44,400
particles can have

678
00:24:49,350 --> 00:24:46,720
every single droplet or ice particle in

679
00:24:51,830 --> 00:24:49,360
a cloud is formed on a small

680
00:24:53,269 --> 00:24:51,840
dirt particle initially

681
00:24:54,950 --> 00:24:53,279
and depending on how many of those

682
00:24:56,789 --> 00:24:54,960
little particles you have

683
00:24:59,110 --> 00:24:56,799
how big they are and what they're made

684
00:25:00,870 --> 00:24:59,120
out of determines how many droplets you

685
00:25:02,789 --> 00:25:00,880
get and this is just showing that if you

686
00:25:05,029 --> 00:25:02,799
take the same amount of water and split

687
00:25:07,590 --> 00:25:05,039
it amongst multiple droplets as opposed

688
00:25:09,669 --> 00:25:07,600

to having a fewer number of droplets you

689
00:25:12,470 --> 00:25:09,679
can make your clouds a lot brighter and

690
00:25:14,070 --> 00:25:12,480
obviously this can have a huge effect on

691
00:25:16,149 --> 00:25:14,080
how much light gets the surface of the

692
00:25:17,990 --> 00:25:16,159
earth and this is the reason why we not

693
00:25:20,549 --> 00:25:18,000
only want to detect and characterize the

694
00:25:22,630 --> 00:25:20,559
aerosols but also to determine the size

695
00:25:25,430 --> 00:25:22,640
distribution of the droplets

696
00:25:28,230 --> 00:25:25,440
in clouds and also ice particles

697
00:25:30,549 --> 00:25:28,240
so in summary the aps is designed to

698
00:25:32,870 --> 00:25:30,559
detect and characterize both aerosols

699
00:25:35,029 --> 00:25:32,880
and clouds and improve our understanding

700
00:25:37,830 --> 00:25:35,039
of aerosols and clouds and their effects

701
00:25:39,430 --> 00:25:37,840
on climate and back to you steve

702
00:25:41,830 --> 00:25:39,440
okay thank you and thank you to all the

703
00:25:43,110 --> 00:25:41,840
panelists um we'll first tr take

704
00:25:44,950 --> 00:25:43,120
questions here

705
00:25:47,029 --> 00:25:44,960
in the auditorium from any media and

706
00:25:49,190 --> 00:25:47,039
then go to the phone lines

707
00:25:51,590 --> 00:25:49,200
if there are any questions

708
00:25:52,950 --> 00:25:51,600
at this point um

709
00:25:54,390 --> 00:25:52,960
um

710
00:25:55,510 --> 00:25:54,400
actually before we go to the phone lines

711
00:25:57,190 --> 00:25:55,520
let me just

712
00:25:58,310 --> 00:25:57,200
ask one question that i had you

713
00:26:00,310 --> 00:25:58,320

mentioned that

714
00:26:03,029 --> 00:26:00,320
nasa has many satellites up there earth

715
00:26:05,510 --> 00:26:03,039
observing satellites 14 i think you said

716
00:26:06,549 --> 00:26:05,520
how does glory fit in in the cost range

717
00:26:09,909 --> 00:26:06,559
of

718
00:26:12,870 --> 00:26:09,919
have some big ones some small ones how

719
00:26:15,190 --> 00:26:12,880
does glory fit into that range

720
00:26:17,430 --> 00:26:15,200
of the 16 missions that are currently in

721
00:26:19,110 --> 00:26:17,440
nasa's portfolio in our science

722
00:26:21,510 --> 00:26:19,120
portfolio

723
00:26:24,390 --> 00:26:21,520
the glory mission compares pretty well

724
00:26:25,830 --> 00:26:24,400
near the bottom range of cost

725
00:26:28,950 --> 00:26:25,840
in that existing

726
00:26:30,950 --> 00:26:28,960
scale of missions that we have right now

727
00:26:34,549 --> 00:26:30,960
okay thank you joy

728
00:26:37,990 --> 00:26:34,559
again any questions here from the media

729
00:26:40,710 --> 00:26:39,830
you for getting one question

730
00:26:42,789 --> 00:26:40,720
hi

731
00:26:47,510 --> 00:26:42,799
uh could you tell me how long

732
00:26:49,190 --> 00:26:47,520
will glory be measuring the atmosphere

733
00:26:51,430 --> 00:26:49,200
i can answer that um

734
00:26:52,870 --> 00:26:51,440
gloria's designed for a three-year

735
00:26:55,510 --> 00:26:52,880
mission lifetime

736
00:27:02,470 --> 00:26:55,520
and we're sized for five years with

737
00:27:05,830 --> 00:27:03,669
after that

738
00:27:07,750 --> 00:27:05,840

we'd have a review

739
00:27:09,669 --> 00:27:07,760
that would then determine

740
00:27:11,269 --> 00:27:09,679
when and how long the glory mission

741
00:27:13,029 --> 00:27:11,279
would go into what's called extended

742
00:27:15,430 --> 00:27:13,039
operations

743
00:27:17,590 --> 00:27:15,440
so that would have to be another gate or

744
00:27:19,990 --> 00:27:17,600
approval in the process after the

745
00:27:22,149 --> 00:27:20,000
baseline mission is completed

746
00:27:25,909 --> 00:27:22,159
so in other words if this works for you

747
00:27:27,190 --> 00:27:25,919
guys then you'll make do a continuation

748
00:27:29,669 --> 00:27:27,200
with another

749
00:27:31,190 --> 00:27:29,679
rocket or satellite

750
00:27:33,029 --> 00:27:31,200
yeah that decision will be determined

751
00:27:34,870 --> 00:27:33,039
based upon i guess the performance of

752
00:27:36,950 --> 00:27:34,880
glory as well as the other missions that

753
00:27:39,110 --> 00:27:36,960
are in the pipeline right now

754
00:27:41,510 --> 00:27:39,120
okay thank you if the satellite is still

755
00:27:43,350 --> 00:27:41,520
working the satellites beg to keep keep

756
00:27:45,909 --> 00:27:43,360
taking measurements they never want to

757
00:27:49,190 --> 00:27:47,590
okay uh we don't have any media

758
00:27:51,190 --> 00:27:49,200
questions on the phone line so i'll

759
00:27:53,029 --> 00:27:51,200
throw out one more and give the media

760
00:27:54,470 --> 00:27:53,039
and the audience a chance to ask one

761
00:27:56,950 --> 00:27:54,480
more um

762
00:27:58,310 --> 00:27:56,960
distinguishing the sources of aerosols

763
00:28:00,149 --> 00:27:58,320

uh based on the different types of

764
00:28:02,470 --> 00:28:00,159
ourselves seems to be a key

765
00:28:05,029 --> 00:28:02,480
question for glory could somebody speak

766
00:28:06,389 --> 00:28:05,039
to how well we understand the percentage

767
00:28:07,909 --> 00:28:06,399
of aerosols coming from different

768
00:28:10,230 --> 00:28:07,919
sources now

769
00:28:12,789 --> 00:28:10,240
and how do we how will that improve that

770
00:28:14,950 --> 00:28:12,799
estimate of the what's coming from what

771
00:28:16,789 --> 00:28:14,960
sources volcanoes desert dust into the

772
00:28:19,190 --> 00:28:16,799
future with glory data

773
00:28:22,070 --> 00:28:19,200
well maybe i'll answer

774
00:28:23,909 --> 00:28:22,080
at this point the only estimates of how

775
00:28:25,909 --> 00:28:23,919
how much of their soils are natural and

776
00:28:27,110 --> 00:28:25,919
how much a man made these estimates come

777
00:28:29,110 --> 00:28:27,120
from models

778
00:28:31,590 --> 00:28:29,120
because satellites satellite instruments

779
00:28:33,430 --> 00:28:31,600
that have been in operation so far they

780
00:28:35,750 --> 00:28:33,440
simply cannot discriminate between

781
00:28:37,909 --> 00:28:35,760
natural and man-made particles the only

782
00:28:39,510 --> 00:28:37,919
way to do that indirectly is to

783
00:28:40,870 --> 00:28:39,520
determine the refractive index of the

784
00:28:43,110 --> 00:28:40,880
original particles and this is where

785
00:28:44,630 --> 00:28:43,120
polarization is especially powerful

786
00:28:46,789 --> 00:28:44,640
because the polarization state of the

787
00:28:48,789 --> 00:28:46,799
reflected light is very sensitive to the

788
00:28:50,950 --> 00:28:48,799

particle refractive index which is a

789
00:28:53,830 --> 00:28:50,960
proxy to the chemical composition so in

790
00:28:55,029 --> 00:28:53,840
this respect the glory aps will start a

791
00:28:56,389 --> 00:28:55,039
new record

792
00:29:00,950 --> 00:28:56,399
of

793
00:29:02,149 --> 00:29:00,960
uh refractive index and chemical

794
00:29:04,389 --> 00:29:02,159
composition

795
00:29:06,630 --> 00:29:04,399
uh from the models uh i think the models

796
00:29:08,149 --> 00:29:06,640
range quite a bit uh in

797
00:29:09,990 --> 00:29:08,159
in estimating the percentage of the

798
00:29:12,310 --> 00:29:10,000
particles that are natural and man-made

799
00:29:13,430 --> 00:29:12,320
there's a whole range of estimates and i

800
00:29:14,950 --> 00:29:13,440
don't think there is there is a

801
00:29:16,789 --> 00:29:14,960
consensus

802
00:29:19,269 --> 00:29:16,799
all right thank you we do have a

803
00:29:21,590 --> 00:29:19,279
phone question uh from nora wallace at

804
00:29:27,430 --> 00:29:21,600
the santa barbara news press please go

805
00:29:27,440 --> 00:29:31,669
nora are you there

806
00:29:35,830 --> 00:29:33,110
we're not hearing any questions from

807
00:29:44,230 --> 00:29:37,669
okay we have a second question we'll go

808
00:29:49,190 --> 00:29:48,070
we're still not hearing any question but

809
00:29:51,269 --> 00:29:49,200
let's see

810
00:29:53,110 --> 00:29:51,279
if there's any other no no we're not

811
00:29:54,789 --> 00:29:53,120
getting that question from

812
00:29:56,710 --> 00:29:54,799
florida today either

813
00:29:59,430 --> 00:29:56,720

well once again around the uh if there's

814
00:30:01,430 --> 00:29:59,440
no more questions in the media

815
00:30:03,269 --> 00:30:01,440
from the audience

816
00:30:04,789 --> 00:30:03,279
we'll wrap up the briefing i wanted to

817
00:30:07,110 --> 00:30:04,799
say that if you're interested in getting

818
00:30:09,269 --> 00:30:07,120
more information on the glory mission

819
00:30:12,950 --> 00:30:09,279
please go to our website and that is

820
00:30:17,190 --> 00:30:14,310
glory