1
00:00:09,270 --> 00:00:06,710
hello again everyone and welcome to the

2
00:00:12,709 --> 00:00:09,280
iris mission science briefing

3
00:00:15,749 --> 00:00:12,719
here to talk about the iris mission

4
00:00:20,550 --> 00:00:15,759
is dr pete warden the center director

5
00:00:25,029 --> 00:00:23,029
jeffrey newmark the iris program

6
00:00:28,150 --> 00:00:25,039
scientist from nasa headquarters in

7
00:00:33,270 --> 00:00:31,029
and alan teitel the iris principal

8
00:00:35,430 --> 00:00:33,280
investigator from lockheed martin's

9
00:00:37,830 --> 00:00:35,440
advanced technology center solar and

10
00:00:39,670 --> 00:00:37,840
astrophysics laboratory

11
00:00:41,990 --> 00:00:39,680
and we'll begin first with comments from

12
00:00:42,869 --> 00:00:42,000
the nasa ames center director dr pete

13
00:00:45,510 --> 00:00:42,879

wharton

14
00:00:46,950 --> 00:00:45,520
thank you george this is an incredibly

15
00:00:48,630 --> 00:00:46,960
exciting mission

16
00:00:50,869 --> 00:00:48,640
i'll let dr title tell you a little bit

17
00:00:54,150 --> 00:00:50,879
about the details of the science

18
00:00:55,430 --> 00:00:54,160
but uh from our perspective at nasa ames

19
00:00:57,110 --> 00:00:55,440
there's two

20
00:00:59,189 --> 00:00:57,120
really important points

21
00:01:01,110 --> 00:00:59,199
the first one is that

22
00:01:02,869 --> 00:01:01,120
this is a low-cost mission it's a small

23
00:01:05,910 --> 00:01:02,879
explorer

24
00:01:07,190 --> 00:01:05,920
and it demonstrates the i think the wave

25
00:01:10,390 --> 00:01:07,200
of the future that we're going to be

26
00:01:12,070 --> 00:01:10,400
doing a lot more with lower cost smaller

27
00:01:14,870 --> 00:01:12,080
emissions at the same time getting

28
00:01:16,630 --> 00:01:14,880
really earth-shaking science uh is i

29
00:01:19,109 --> 00:01:16,640
think you'll hear this is the first

30
00:01:21,510 --> 00:01:19,119
mission that will really tell us the

31
00:01:23,749 --> 00:01:21,520
detailed physics that's going on at the

32
00:01:25,350 --> 00:01:23,759
at the solar surface in the atmosphere

33
00:01:28,789 --> 00:01:25,360
above it

34
00:01:31,429 --> 00:01:28,799
it's also a real opportunity to

35
00:01:33,109 --> 00:01:31,439
interact with the

36
00:01:34,710 --> 00:01:33,119
computational work

37
00:01:37,429 --> 00:01:34,720
nasa ames

38
00:01:39,190 --> 00:01:37,439

is the center at nasa that has the

39
00:01:41,910 --> 00:01:39,200
agency supercomputer

40
00:01:44,069 --> 00:01:41,920
and we are able to work

41
00:01:46,069 --> 00:01:44,079
the computer with the

42
00:01:47,670 --> 00:01:46,079
data we have to really understand what's

43
00:01:49,910 --> 00:01:47,680
going on in fact that works been going

44
00:01:52,310 --> 00:01:49,920
on for several years so we're very

45
00:01:54,630 --> 00:01:52,320
excited about that the second key point

46
00:01:55,990 --> 00:01:54,640
though is that the sun

47
00:01:58,310 --> 00:01:56,000
is increasingly important to our

48
00:02:00,550 --> 00:01:58,320
environment and as those of you that

49
00:02:02,950 --> 00:02:00,560
were listening a little earlier uh saw

50
00:02:04,389 --> 00:02:02,960
the effect of power outages

51
00:02:07,749 --> 00:02:04,399
well

52
00:02:09,910 --> 00:02:07,759
we believe that

53
00:02:12,390 --> 00:02:09,920
maybe a lot of power outages actually

54
00:02:14,070 --> 00:02:12,400
have a lot to do with solar activity so

55
00:02:15,670 --> 00:02:14,080
the better we can understand the physics

56
00:02:17,990 --> 00:02:15,680
going on the better we can understand

57
00:02:19,270 --> 00:02:18,000
that activity the better that we could

58
00:02:22,070 --> 00:02:19,280
potentially

59
00:02:24,790 --> 00:02:22,080
uh predict and mitigate some of these

60
00:02:27,350 --> 00:02:24,800
problems so it was sort of in some sense

61
00:02:29,110 --> 00:02:27,360
unfortunate to delay the launch but it's

62
00:02:31,509 --> 00:02:29,120
also fortuitous to highlight the

63
00:02:33,110 --> 00:02:31,519

importance of this mission thank you

64
00:02:35,589 --> 00:02:33,120
thank you dr warden

65
00:02:38,790 --> 00:02:35,599
and now to jeffrey newmark the iris

66
00:02:41,270 --> 00:02:38,800
program scientist from nasa headquarters

67
00:02:43,910 --> 00:02:41,280
well thank you i'm very pleased to be

68
00:02:45,910 --> 00:02:43,920
here today to introduce the the science

69
00:02:48,630 --> 00:02:45,920
of of iris

70
00:02:51,350 --> 00:02:48,640
iris is our newest member of our

71
00:02:52,630 --> 00:02:51,360
heliophysics fleet

72
00:02:54,470 --> 00:02:52,640
and hope to

73
00:02:56,150 --> 00:02:54,480
by by the end of this press conference

74
00:02:59,350 --> 00:02:56,160
you get an idea of the exciting science

75
00:03:01,030 --> 00:02:59,360
that we were doing uh in heliophysics uh

76
00:03:03,350 --> 00:03:01,040
i should step back and say what is

77
00:03:05,430 --> 00:03:03,360
heliophysics heliophysics

78
00:03:07,509 --> 00:03:05,440
is the oldest science known to man it's

79
00:03:09,830 --> 00:03:07,519
the study of the sun and it's also the

80
00:03:11,589 --> 00:03:09,840
newest science it's the studying of its

81
00:03:13,830 --> 00:03:11,599
interaction with the earth our

82
00:03:15,589 --> 00:03:13,840
technology

83
00:03:17,270 --> 00:03:15,599
and the rest of the planets throughout

84
00:03:21,910 --> 00:03:17,280
the solar system

85
00:03:25,509 --> 00:03:23,430
most people think of the sun as a

86
00:03:27,910 --> 00:03:25,519
constant source of heat and light that

87
00:03:29,589 --> 00:03:27,920
bathe our planet this is how we see the

88
00:03:31,670 --> 00:03:29,599

sun though quite different than a

89
00:03:33,509 --> 00:03:31,680
constant source

90
00:03:35,830 --> 00:03:33,519
you see here

91
00:03:37,670 --> 00:03:35,840
uh images of the atmosphere of the sun

92
00:03:40,309 --> 00:03:37,680
the outer atmosphere of the sun

93
00:03:42,229 --> 00:03:40,319
and you see the tremendous amounts of of

94
00:03:43,190 --> 00:03:42,239
activity that is going on throughout

95
00:03:45,830 --> 00:03:43,200
these

96
00:03:47,270 --> 00:03:45,840
video i should point out that everyone

97
00:03:48,869 --> 00:03:47,280
when we see these pictures today people

98
00:03:50,869 --> 00:03:48,879
think of computer graphics these are

99
00:03:52,550 --> 00:03:50,879
real images taken from our current

100
00:03:53,670 --> 00:03:52,560
spacecraft these are these are not

101
00:03:55,270 --> 00:03:53,680
generated

102
00:03:57,110 --> 00:03:55,280
so all the movies i'll show you today

103
00:03:59,030 --> 00:03:57,120
are real images

104
00:04:02,149 --> 00:03:59,040
uh what we're seeing here

105
00:04:05,429 --> 00:04:02,159
is the sun is is a giant huge nuclear

106
00:04:07,190 --> 00:04:05,439
fusion reactor at the center it is tens

107
00:04:09,110 --> 00:04:07,200
of millions of degrees

108
00:04:11,589 --> 00:04:09,120
and over a half a million miles as it

109
00:04:13,990 --> 00:04:11,599
goes outward to the surface of the sun

110
00:04:15,990 --> 00:04:14,000
it slowly cools and where the surface is

111
00:04:17,590 --> 00:04:16,000
about ten thousand degrees

112
00:04:19,189 --> 00:04:17,600
then something very strange and

113
00:04:20,870 --> 00:04:19,199

mysterious happens

114
00:04:23,590 --> 00:04:20,880
in the next just a couple of thousand

115
00:04:25,909 --> 00:04:23,600
miles the temperature rises again to the

116
00:04:28,230 --> 00:04:25,919
out in the outer atmosphere to again

117
00:04:30,870 --> 00:04:28,240
millions of degrees what causes this

118
00:04:33,430 --> 00:04:30,880
rise how does the energy transfer from

119
00:04:36,870 --> 00:04:33,440
the surface the cool surface to this hot

120
00:04:38,629 --> 00:04:36,880
outer atmosphere this is the questions

121
00:04:41,510 --> 00:04:38,639
that iris the science of virus is going

122
00:04:46,790 --> 00:04:43,350
one might ask why do we care about the

123
00:04:51,430 --> 00:04:49,590
what are we gonna learn what

124
00:04:53,350 --> 00:04:51,440
haven't we seen a number of these

125
00:04:55,270 --> 00:04:53,360
graphics before

126
00:04:57,110 --> 00:04:55,280
as we see these images can we explain it

127
00:04:59,110 --> 00:04:57,120
from just this

128
00:05:01,909 --> 00:04:59,120
and as i hope to show you that no we

129
00:05:08,550 --> 00:05:01,919
there is more to be to be gained

130
00:05:12,870 --> 00:05:11,270
if you could show the second video

131
00:05:15,270 --> 00:05:12,880
if we step back

132
00:05:18,629 --> 00:05:15,280
and we look at the sun now as the small

133
00:05:21,029 --> 00:05:18,639
in the center we see the larger

134
00:05:22,310 --> 00:05:21,039
extended atmosphere of the sun

135
00:05:23,990 --> 00:05:22,320
we see

136
00:05:26,950 --> 00:05:24,000
a tremendous display of again of

137
00:05:28,950 --> 00:05:26,960
activity we see particles streaming away

138
00:05:30,469 --> 00:05:28,960

from the sun constantly this is known as

139
00:05:31,990 --> 00:05:30,479
the solar wind

140
00:05:33,029 --> 00:05:32,000
and then we see

141
00:05:40,629 --> 00:05:33,039
the

142
00:05:42,710 --> 00:05:40,639
system

143
00:05:44,870 --> 00:05:42,720
the snow-like features you see are

144
00:05:48,469 --> 00:05:44,880
actually high-energy particles

145
00:05:50,230 --> 00:05:48,479
streaming hitting our spacecraft

146
00:05:53,350 --> 00:05:50,240
and distributing the cameras these

147
00:05:54,950 --> 00:05:53,360
high-energy particles continue on in

148
00:05:56,230 --> 00:05:54,960
less than an hour later can hit the

149
00:05:59,189 --> 00:05:56,240
earth

150
00:06:00,870 --> 00:05:59,199
these as as dr warden mentioned these

151
00:06:02,230 --> 00:06:00,880
can have effects for us on earth they

152
00:06:05,830 --> 00:06:02,240
can affect our navigation our

153
00:06:07,830 --> 00:06:05,840
communications our power systems

154
00:06:10,469 --> 00:06:07,840
and especially our astronauts

155
00:06:12,309 --> 00:06:10,479
once they leave the protective lower

156
00:06:13,990 --> 00:06:12,319
earth's atmosphere they'll be quite

157
00:06:15,350 --> 00:06:14,000
vulnerable along with our other systems

158
00:06:17,110 --> 00:06:15,360
that leave the

159
00:06:18,629 --> 00:06:17,120
protective low earth they become

160
00:06:20,469 --> 00:06:18,639
vulnerable to these storms that are

161
00:06:21,590 --> 00:06:20,479
traveling

162
00:06:23,670 --> 00:06:21,600
so

163
00:06:24,790 --> 00:06:23,680

why why heliophysics what are we trying

164
00:06:27,270 --> 00:06:24,800
to study

165
00:06:29,189 --> 00:06:27,280
so he physics is broken down then into

166
00:06:31,189 --> 00:06:29,199
fundamental questions we're looking at

167
00:06:32,870 --> 00:06:31,199
what causes the sun to vary what are the

168
00:06:34,390 --> 00:06:32,880
fundamental physics processes that are

169
00:06:36,550 --> 00:06:34,400
going on

170
00:06:37,590 --> 00:06:36,560
how do these how does this variability

171
00:06:39,189 --> 00:06:37,600
in the

172
00:06:41,749 --> 00:06:39,199
interact with the earth

173
00:06:44,150 --> 00:06:41,759
and all of the planetary systems

174
00:06:46,550 --> 00:06:44,160
and what are the impacts on humanity and

175
00:06:50,230 --> 00:06:46,560
as we explore other worlds so that is

176
00:06:51,990 --> 00:06:50,240
the science of heliophysics

177
00:06:53,990 --> 00:06:52,000
i think by now it's obvious that we have

178
00:06:56,390 --> 00:06:54,000
a number of observatories to look at the

179
00:06:58,710 --> 00:06:56,400
sun we've seen these beautiful images

180
00:07:00,550 --> 00:06:58,720
uh if you could show my third graphic

181
00:07:03,110 --> 00:07:00,560
the question then is why is the new one

182
00:07:05,430 --> 00:07:03,120
why are we launching iris

183
00:07:07,270 --> 00:07:05,440
iris actually fills a crucial gap we've

184
00:07:08,309 --> 00:07:07,280
seen a lot of our current observatories

185
00:07:10,469 --> 00:07:08,319
look at the

186
00:07:11,909 --> 00:07:10,479
surface of the sun the photosphere for

187
00:07:13,830 --> 00:07:11,919
instance where i just showed you in the

188
00:07:16,230 --> 00:07:13,840

sunspot and then we have

189
00:07:19,029 --> 00:07:16,240
the full outer corona the million degree

190
00:07:22,710 --> 00:07:19,039
corona that we see in the full disc

191
00:07:24,309 --> 00:07:22,720
in between this interface region which

192
00:07:27,110 --> 00:07:24,319
you see in the inserts of some of these

193
00:07:29,350 --> 00:07:27,120
movies we've currently have

194
00:07:30,950 --> 00:07:29,360
just some observatories now

195
00:07:34,790 --> 00:07:30,960
that look at the

196
00:07:39,589 --> 00:07:37,029
cadence the and spatial resolution and

197
00:07:41,589 --> 00:07:39,599
spectroscopy to really unlock those

198
00:07:44,710 --> 00:07:41,599
mysteries of how the energy and matter

199
00:07:47,029 --> 00:07:44,720
flow what's driving the solar wind that

200
00:07:50,309 --> 00:07:47,039
comes from there all that is hoped to be

201
00:07:53,189 --> 00:07:50,319
learned from iris

202
00:07:55,189 --> 00:07:53,199
all right and thank you that's all

203
00:07:57,029 --> 00:07:55,199
all right thank you jeffrey and now to

204
00:08:00,469 --> 00:07:57,039
allen title the iris principal

205
00:08:01,830 --> 00:08:00,479
investigator alan thank you george

206
00:08:05,670 --> 00:08:01,840
you've heard so much about the sun

207
00:08:08,550 --> 00:08:05,680
there's not very much left for me to say

208
00:08:10,950 --> 00:08:08,560
what is this interface region

209
00:08:12,629 --> 00:08:10,960
and the answer is we don't know

210
00:08:15,749 --> 00:08:12,639
if it's so important

211
00:08:19,110 --> 00:08:15,759
why haven't we studied it in the past

212
00:08:21,350 --> 00:08:19,120
well the answer to that was hinted at

213
00:08:24,550 --> 00:08:21,360

by pete's comments

214
00:08:26,390 --> 00:08:24,560
that this the instruments that look at

215
00:08:28,710 --> 00:08:26,400
this region in the past

216
00:08:31,589 --> 00:08:28,720
have had about 20 times

217
00:08:34,070 --> 00:08:31,599
poorer resolution spatially

218
00:08:36,550 --> 00:08:34,080
and about 20 times poorer resolution

219
00:08:39,509 --> 00:08:36,560
spectrally and spectrally allows us to

220
00:08:41,509 --> 00:08:39,519
measure temperatures velocities

221
00:08:43,029 --> 00:08:41,519
pressures

222
00:08:46,310 --> 00:08:43,039
so it's it's important to have

223
00:08:48,470 --> 00:08:46,320
spectroscopic information

224
00:08:50,389 --> 00:08:48,480
but basically

225
00:08:54,150 --> 00:08:50,399
we've been looking

226
00:08:56,630 --> 00:08:54,160
at things that happen so fast

227
00:08:58,870 --> 00:08:56,640
that data taken as slowly as previous

228
00:09:01,990 --> 00:08:58,880
instruments have done

229
00:09:05,190 --> 00:09:02,000
really hasn't given us any information

230
00:09:07,269 --> 00:09:05,200
but even more fundamentally

231
00:09:10,230 --> 00:09:07,279
there's not been a push to under look at

232
00:09:11,509 --> 00:09:10,240
this region because the atomic physics

233
00:09:14,949 --> 00:09:11,519
in this region

234
00:09:17,910 --> 00:09:14,959
is very very very complicated and it's

235
00:09:20,150 --> 00:09:17,920
only been in the last decade or so

236
00:09:23,190 --> 00:09:20,160
that people have developed computer

237
00:09:26,150 --> 00:09:23,200
codes that can do in

238
00:09:28,790 --> 00:09:26,160

what we hope is an accurate job

239
00:09:31,350 --> 00:09:28,800
of simulating these regions and later in

240
00:09:34,389 --> 00:09:31,360
this talk i'll show you some examples

241
00:09:37,269 --> 00:09:34,399
but the pleiades culture

242
00:09:40,550 --> 00:09:37,279
computer cluster at

243
00:09:43,430 --> 00:09:40,560
ames has been

244
00:09:45,430 --> 00:09:43,440
instrumental in doing these simulations

245
00:09:47,750 --> 00:09:45,440
over the past

246
00:09:48,710 --> 00:09:47,760
three or four years we've used about 30

247
00:09:51,990 --> 00:09:48,720
million

248
00:09:54,870 --> 00:09:52,000
cpu hours a year

249
00:09:57,750 --> 00:09:54,880
at ames and a comparable amount on

250
00:10:00,470 --> 00:09:57,760
computers in europe so with the first

251
00:10:01,750 --> 00:10:00,480
slide let's look where the interface

252
00:10:04,069 --> 00:10:01,760
region is

253
00:10:06,230 --> 00:10:04,079
so what you can see in the center is a

254
00:10:07,110 --> 00:10:06,240
big yellow ball with little black dots

255
00:10:10,550 --> 00:10:07,120
on it

256
00:10:11,829 --> 00:10:10,560
those little black dots are sunspots

257
00:10:14,630 --> 00:10:11,839
and

258
00:10:16,870 --> 00:10:14,640
surrounding it is the corona

259
00:10:18,550 --> 00:10:16,880
and that was a picture taken on the 13th

260
00:10:21,190 --> 00:10:18,560
of november

261
00:10:23,590 --> 00:10:21,200
of 2012

262
00:10:27,269 --> 00:10:23,600
in cairns australia

263
00:10:29,829 --> 00:10:27,279

so this was last year's solar eclipse

264
00:10:32,150 --> 00:10:29,839
it's a particularly nice

265
00:10:33,829 --> 00:10:32,160
view and so the question that we're

266
00:10:36,150 --> 00:10:33,839
asking

267
00:10:39,030 --> 00:10:36,160
or hoping to answer

268
00:10:41,590 --> 00:10:39,040
is how we get from the bright yellow

269
00:10:43,269 --> 00:10:41,600
ball which is about 10 000 degrees

270
00:10:44,310 --> 00:10:43,279
fahrenheit

271
00:10:46,069 --> 00:10:44,320
to

272
00:10:48,069 --> 00:10:46,079
the atmosphere above it which is a

273
00:10:51,670 --> 00:10:48,079
couple three million degrees fahrenheit

274
00:10:56,949 --> 00:10:53,269
please

275
00:10:59,350 --> 00:10:56,959
we now see superimposed

276
00:11:01,509 --> 00:10:59,360
the top of the transition region

277
00:11:02,310 --> 00:11:01,519
and that's where it fits and you can see

278
00:11:05,110 --> 00:11:02,320
that

279
00:11:06,710 --> 00:11:05,120
it's not completely smooth around at the

280
00:11:09,269 --> 00:11:06,720
edges

281
00:11:11,350 --> 00:11:09,279
and that's because there are a lot of

282
00:11:14,470 --> 00:11:11,360
three-dimensional structure

283
00:11:16,389 --> 00:11:14,480
that protrudes from the surface into the

284
00:11:18,389 --> 00:11:16,399
corona

285
00:11:20,630 --> 00:11:18,399
and now we'll show you another movie but

286
00:11:23,030 --> 00:11:20,640
let's hold the movie for a second and so

287
00:11:26,389 --> 00:11:23,040
i can tell you what this movie is

288
00:11:28,230 --> 00:11:26,399

it's a series it's a movie

289
00:11:31,030 --> 00:11:28,240
of the edge of the sun seen with the

290
00:11:33,990 --> 00:11:31,040
hinode spacecraft

291
00:11:35,030 --> 00:11:34,000
taken about as fast as hinode can

292
00:11:37,829 --> 00:11:35,040
operate

293
00:11:38,949 --> 00:11:37,839
which is about one image every four

294
00:11:40,470 --> 00:11:38,959
seconds

295
00:11:44,389 --> 00:11:40,480
and what you'll see

296
00:11:46,630 --> 00:11:44,399
are a lot of little fine

297
00:11:47,670 --> 00:11:46,640
jets hair like structures on the edge of

298
00:11:49,670 --> 00:11:47,680
the sun

299
00:11:52,389 --> 00:11:49,680
and on the top is the direct tenno day

300
00:11:55,190 --> 00:11:52,399
image and on the bottom is an enhanced

301
00:11:57,190 --> 00:11:55,200
image and you can see the fine central

302
00:11:59,590 --> 00:11:57,200
cores of these structures

303
00:12:01,590 --> 00:11:59,600
these structures are about a hundred

304
00:12:02,949 --> 00:12:01,600
miles

305
00:12:06,470 --> 00:12:02,959
wide

306
00:12:09,430 --> 00:12:06,480
and about ten thousand miles long

307
00:12:12,550 --> 00:12:09,440
they go about 75

308
00:12:15,269 --> 00:12:12,560
miles per second

309
00:12:18,310 --> 00:12:15,279
and they last about 10 minutes and we

310
00:12:20,629 --> 00:12:18,320
discovered these structures on hino day

311
00:12:23,990 --> 00:12:20,639
and realized for the first time

312
00:12:26,310 --> 00:12:24,000
that four second exposures and just one

313
00:12:29,110 --> 00:12:26,320

wavelength wasn't enough to see them

314
00:12:30,550 --> 00:12:29,120
also on the frame of this movie is an

315
00:12:32,550 --> 00:12:30,560
image of the earth

316
00:12:35,269 --> 00:12:32,560
and so if we could have this my first

317
00:12:40,949 --> 00:12:38,629
so on the top you see these jets and on

318
00:12:43,269 --> 00:12:40,959
the bottom you can see these very fine

319
00:12:45,509 --> 00:12:43,279
central cores

320
00:12:46,629 --> 00:12:45,519
and you can see some of them are as big

321
00:12:48,710 --> 00:12:46,639
as the earth

322
00:12:49,750 --> 00:12:48,720
so they traverse the diameter of the

323
00:12:53,269 --> 00:12:49,760
earth

324
00:12:55,430 --> 00:12:53,279
in a time between 5 and 10 seconds

325
00:12:57,509 --> 00:12:55,440
they're really fantastic things they

326
00:12:59,350 --> 00:12:57,519
look like the smallest kinds of things

327
00:13:00,310 --> 00:12:59,360
that you see on the sun

328
00:13:03,750 --> 00:13:00,320
but

329
00:13:06,389 --> 00:13:03,760
they're the size of the los angeles area

330
00:13:08,069 --> 00:13:06,399
going 75 miles a second which is not

331
00:13:10,389 --> 00:13:08,079
quite as fast as you can drive on the

332
00:13:13,350 --> 00:13:10,399
freeways in los angeles

333
00:13:15,990 --> 00:13:13,360
so we could have the next movie

334
00:13:18,389 --> 00:13:16,000
which shows the sun over a sunspot

335
00:13:20,949 --> 00:13:18,399
and and in this movie if you look at the

336
00:13:24,069 --> 00:13:20,959
bottom you can actually see the origins

337
00:13:26,949 --> 00:13:24,079
of the jets and again that's very fast

338
00:13:29,190 --> 00:13:26,959

as the movie is now what i'm going to do

339
00:13:31,269 --> 00:13:29,200
is show you what we hope we'll see

340
00:13:33,829 --> 00:13:31,279
something like this is a numerical

341
00:13:36,870 --> 00:13:33,839
simulation

342
00:13:38,470 --> 00:13:36,880
it's 3 million cpu hours

343
00:13:40,310 --> 00:13:38,480
that means that if

344
00:13:41,590 --> 00:13:40,320
everybody in this room let's assume

345
00:13:44,550 --> 00:13:41,600
they're

346
00:13:46,310 --> 00:13:44,560
50 people in this room uh

347
00:13:48,710 --> 00:13:46,320
let's assume there are 30 people in this

348
00:13:51,590 --> 00:13:48,720
year room you all working on your

349
00:13:53,030 --> 00:13:51,600
computer for 10 000 years you could make

350
00:13:55,670 --> 00:13:53,040
this movie

351
00:13:56,949 --> 00:13:55,680
or you could go to ames and uh

352
00:13:58,230 --> 00:13:56,959
run it in a

353
00:14:00,069 --> 00:13:58,240
few hours

354
00:14:02,629 --> 00:14:00,079
actually it takes several weeks because

355
00:14:06,389 --> 00:14:02,639
you don't get the computer all the time

356
00:14:12,230 --> 00:14:09,430
and this pans over the movie so you can

357
00:14:14,550 --> 00:14:12,240
see the three-dimensional structure

358
00:14:18,310 --> 00:14:14,560
of the atmosphere

359
00:14:21,350 --> 00:14:18,320
in this wavelength which is on

360
00:14:23,829 --> 00:14:21,360
doubly ionized magnesium

361
00:14:25,110 --> 00:14:23,839
uh so

362
00:14:30,710 --> 00:14:25,120
that

363
00:14:33,189 --> 00:14:30,720

what only thing you got for your

364
00:14:34,470 --> 00:14:33,199
3 million cpu hours you got enough

365
00:14:36,629 --> 00:14:34,480
information

366
00:14:39,670 --> 00:14:36,639
to see what the spectrum would look like

367
00:14:40,710 --> 00:14:39,680
so the next movie

368
00:14:42,790 --> 00:14:40,720
shows

369
00:14:45,110 --> 00:14:42,800
the first movie head on

370
00:14:47,110 --> 00:14:45,120
and moving the spectrograph slit across

371
00:14:53,030 --> 00:14:47,120
it and seeing how the spectrum changes

372
00:14:57,189 --> 00:14:54,949
and you can see the spectral changes are

373
00:15:00,310 --> 00:14:57,199
very complicated

374
00:15:01,750 --> 00:15:00,320
the spectral line wiggles it widens the

375
00:15:04,389 --> 00:15:01,760
surroundings

376
00:15:06,389 --> 00:15:04,399
get bright and dark and that all encodes

377
00:15:07,750 --> 00:15:06,399
the physics of the process that's going

378
00:15:08,550 --> 00:15:07,760
on

379
00:15:10,230 --> 00:15:08,560
and

380
00:15:12,710 --> 00:15:10,240
without the interpretation that the

381
00:15:14,949 --> 00:15:12,720
computer provides from us it would be

382
00:15:16,790 --> 00:15:14,959
difficult and probably impossible to

383
00:15:19,430 --> 00:15:16,800
decode this

384
00:15:21,590 --> 00:15:19,440
so with that i'll stop

385
00:15:24,069 --> 00:15:21,600
and turn it back to george all right

386
00:15:25,189 --> 00:15:24,079
thank you alan and we're ready now for

387
00:15:27,509 --> 00:15:25,199
questions

388
00:15:29,110 --> 00:15:27,519

and once again please give your name and

389
00:15:32,710 --> 00:15:29,120
affiliation when you get the mic and

390
00:15:36,230 --> 00:15:33,670
thank you

391
00:15:38,150 --> 00:15:36,240
norah wallace santa barbara news press

392
00:15:40,629 --> 00:15:38,160
several of us have newspapers that are

393
00:15:42,150 --> 00:15:40,639
not oriented towards science and so i'm

394
00:15:43,189 --> 00:15:42,160
hoping that you can explain to our

395
00:15:45,829 --> 00:15:43,199
readers

396
00:15:48,710 --> 00:15:45,839
why this mission matters to their lives

397
00:15:54,870 --> 00:15:48,720
and what iris will bring to the to the

398
00:15:58,150 --> 00:15:55,990
pete

399
00:15:59,829 --> 00:15:58,160
hinted at it in the beginning or maybe

400
00:16:03,030 --> 00:15:59,839
not hinted at it

401
00:16:06,069 --> 00:16:03,040
uh my primary interest right now

402
00:16:08,629 --> 00:16:06,079
is how we take the kinds of discoveries

403
00:16:09,670 --> 00:16:08,639
that nasa makes

404
00:16:11,829 --> 00:16:09,680
and

405
00:16:16,230 --> 00:16:11,839
communicates with society

406
00:16:17,990 --> 00:16:16,240
so that the society can interact with

407
00:16:20,389 --> 00:16:18,000
what we learn as scientists because i'm

408
00:16:22,389 --> 00:16:20,399
well aware that all of these complicated

409
00:16:25,430 --> 00:16:22,399
details and

410
00:16:28,310 --> 00:16:25,440
3 million cpu hours of computer time

411
00:16:31,030 --> 00:16:28,320
doesn't really translate into something

412
00:16:33,910 --> 00:16:31,040
that's easily grasped what but what is

413
00:16:35,189 --> 00:16:33,920

easily grasped is the sun has massive

414
00:16:38,230 --> 00:16:35,199
explosions

415
00:16:43,350 --> 00:16:40,949
billions of tons of material

416
00:16:45,430 --> 00:16:43,360
moving tens of thousands of miles an

417
00:16:47,749 --> 00:16:45,440
hour into the earth's atmosphere

418
00:16:50,470 --> 00:16:47,759
they impact the earth and they cause

419
00:16:53,350 --> 00:16:50,480
problems in a variety of ways

420
00:16:55,430 --> 00:16:53,360
and many of these kinds of problems as

421
00:16:56,629 --> 00:16:55,440
pete mentioned we are now learning are

422
00:16:57,430 --> 00:16:56,639
not gone

423
00:16:59,430 --> 00:16:57,440
so

424
00:17:02,150 --> 00:16:59,440
you had a power system

425
00:17:04,549 --> 00:17:02,160
uh go out

426
00:17:06,630 --> 00:17:04,559
in the santa ynez valley

427
00:17:08,230 --> 00:17:06,640
and as a result of that as a secondary

428
00:17:10,390 --> 00:17:08,240
effect

429
00:17:13,750 --> 00:17:10,400
you had a bus bar

430
00:17:16,150 --> 00:17:13,760
fail in a transformer at ames

431
00:17:17,350 --> 00:17:16,160
in the motel that i'm staying at there

432
00:17:19,110 --> 00:17:17,360
was a

433
00:17:21,669 --> 00:17:19,120
a fire truck

434
00:17:23,750 --> 00:17:21,679
uh in front because when the power went

435
00:17:24,710 --> 00:17:23,760
out somebody got stuck in an elevator we

436
00:17:28,470 --> 00:17:24,720
live

437
00:17:30,630 --> 00:17:28,480
in a very very complex society

438
00:17:34,470 --> 00:17:30,640

and the sun has a very important role to

439
00:17:35,990 --> 00:17:34,480
play in it so people like myself

440
00:17:38,230 --> 00:17:36,000
look at what

441
00:17:40,230 --> 00:17:38,240
what may be perceived as tiny details

442
00:17:42,549 --> 00:17:40,240
but are in fact the engine that runs

443
00:17:45,430 --> 00:17:42,559
this system and the engine that fails

444
00:17:45,440 --> 00:17:49,669
perhaps i could add a little bit there

445
00:17:54,630 --> 00:17:51,750
the the field of heliospheric physics is

446
00:17:56,870 --> 00:17:54,640
often known as space weather

447
00:17:58,789 --> 00:17:56,880
and it's it's very similar to weather in

448
00:18:00,549 --> 00:17:58,799
many ways and if you can think of a

449
00:18:02,310 --> 00:18:00,559
hurricane for example

450
00:18:05,190 --> 00:18:02,320
you know the hurricane can have dramatic

451
00:18:09,350 --> 00:18:07,110
the number of hurricanes may be related

452
00:18:11,590 --> 00:18:09,360
to climate changes and so forth but in

453
00:18:13,669 --> 00:18:11,600
order to understand what's going on in

454
00:18:15,669 --> 00:18:13,679
that hurricane you have to to understand

455
00:18:17,669 --> 00:18:15,679
the detailed physics of it so you have

456
00:18:18,549 --> 00:18:17,679
to understand how the heat comes off the

457
00:18:19,750 --> 00:18:18,559
ocean

458
00:18:21,669 --> 00:18:19,760
uh how it

459
00:18:23,270 --> 00:18:21,679
interacts with the atmosphere how the

460
00:18:24,630 --> 00:18:23,280
hurricane starts

461
00:18:27,029 --> 00:18:24,640
in fact there's an old statement that

462
00:18:29,029 --> 00:18:27,039
says that it was a butterfly

463
00:18:30,950 --> 00:18:29,039

wings flying flapping in africa that

464
00:18:33,830 --> 00:18:30,960
started the hurricane and that's sort of

465
00:18:36,789 --> 00:18:33,840
what we're we're getting at here the sun

466
00:18:38,789 --> 00:18:36,799
dominates everything in the solar system

467
00:18:41,190 --> 00:18:38,799
uh it dominates our climate it dominates

468
00:18:42,710 --> 00:18:41,200
our weather in many respects so this is

469
00:18:44,390 --> 00:18:42,720
an important

470
00:18:46,710 --> 00:18:44,400
piece of understanding if you will that

471
00:18:49,590 --> 00:18:46,720
butterfly wing and how we can make those

472
00:18:51,350 --> 00:18:49,600
predictions that that in the end will

473
00:18:52,870 --> 00:18:51,360
help us understand

474
00:18:54,870 --> 00:18:52,880
you know power outages that we don't

475
00:18:57,830 --> 00:18:54,880
understand understand changes to the

476
00:18:58,789 --> 00:18:57,840
earth's climate some of which are due

477
00:19:00,630 --> 00:18:58,799
to

478
00:19:03,029 --> 00:19:00,640
influences the sun some of them are due

479
00:19:06,150 --> 00:19:03,039
to perhaps human influences and a lot of

480
00:19:07,350 --> 00:19:06,160
different factors so this is really

481
00:19:08,549 --> 00:19:07,360
ultimately

482
00:19:15,750 --> 00:19:08,559
about

483
00:19:20,470 --> 00:19:17,750
any further questions

484
00:19:23,669 --> 00:19:22,150
jeanine scully santa maria times long

485
00:19:25,430 --> 00:19:23,679
poke record you're talking about some

486
00:19:27,270 --> 00:19:25,440
cool science but you guys don't seem too

487
00:19:29,510 --> 00:19:27,280
excited that you're

488
00:19:31,590 --> 00:19:29,520

i guess now two days away from launch

489
00:19:33,909 --> 00:19:31,600
how excited are you to get this uh

490
00:19:37,110 --> 00:19:33,919
mission underway so you can get this

491
00:19:37,120 --> 00:19:43,110
we're not excited we're terrified

492
00:19:49,190 --> 00:19:45,830
a mission like this

493
00:19:49,200 --> 00:19:54,230
hundreds of people have worked very hard

494
00:19:59,110 --> 00:19:56,150
but in the end

495
00:20:04,310 --> 00:20:00,470
flying it

496
00:20:06,549 --> 00:20:04,320
on a device that's surprisingly reliable

497
00:20:09,029 --> 00:20:06,559
but ultimately it's in space

498
00:20:13,029 --> 00:20:09,039
it's a difficult complicated environment

499
00:20:17,110 --> 00:20:14,710
and

500
00:20:19,750 --> 00:20:17,120
it's a mistake ever to be

501
00:20:22,549 --> 00:20:19,760
too optimistic you have to look at every

502
00:20:23,990 --> 00:20:22,559
downside we've we've just met the last

503
00:20:27,590 --> 00:20:24,000
couple of days

504
00:20:29,990 --> 00:20:27,600
looking at all the way things can fail

505
00:20:31,190 --> 00:20:30,000
so it puts you in a sort of mood that

506
00:20:33,430 --> 00:20:31,200
you know you're not crossing your

507
00:20:35,750 --> 00:20:33,440
fingers you're you're really prepared

508
00:20:37,430 --> 00:20:35,760
but you're also prepared for the fact

509
00:20:39,270 --> 00:20:37,440
that this is not something that just

510
00:20:41,510 --> 00:20:39,280
happens this is something that's only

511
00:20:43,590 --> 00:20:41,520
the result of a lot of hard work it'll

512
00:20:45,830 --> 00:20:43,600
be exciting when the door opens and we

513
00:20:47,270 --> 00:20:45,840

get science and we see that everything

514
00:20:48,549 --> 00:20:47,280
we've thought about

515
00:20:51,590 --> 00:20:48,559
really had

516
00:20:53,110 --> 00:20:51,600
had come to roost and we get good data

517
00:20:54,950 --> 00:20:53,120
but until then

518
00:20:57,430 --> 00:20:54,960
you know it's it's more apprehension

519
00:20:59,830 --> 00:20:57,440
than science

520
00:21:02,789 --> 00:20:59,840
i'd just like to add not only

521
00:21:04,310 --> 00:21:02,799
i agree with alan and also

522
00:21:06,870 --> 00:21:04,320
i think one of the most exciting parts

523
00:21:08,950 --> 00:21:06,880
is not answering the questions that that

524
00:21:11,510 --> 00:21:08,960
we know it's the new things the

525
00:21:13,190 --> 00:21:11,520
discoveries that i'm i'm positive iris

526
00:21:14,630 --> 00:21:13,200
will will bring us every time we've

527
00:21:17,430 --> 00:21:14,640
looked at the sun

528
00:21:19,750 --> 00:21:17,440
in more detail than we ever have before

529
00:21:21,510 --> 00:21:19,760
it opens up a new window for us and and

530
00:21:27,590 --> 00:21:21,520
that's i think that's the most exciting

531
00:21:31,830 --> 00:21:29,750
dora

532
00:21:33,669 --> 00:21:31,840
nora wallace santa barbara newspress um

533
00:21:36,230 --> 00:21:33,679
when this information becomes available

534
00:21:38,470 --> 00:21:36,240
is there any way to quantify for us um

535
00:21:41,270 --> 00:21:38,480
the amount of data that you'll be

536
00:21:44,630 --> 00:21:41,280
receiving um and also who are the

537
00:21:45,590 --> 00:21:44,640
anticipated users beyond yourselves

538
00:21:49,830 --> 00:21:45,600

okay

539
00:21:53,990 --> 00:21:51,990
and

540
00:21:55,270 --> 00:21:54,000
this like all the other heliophysics

541
00:21:56,549 --> 00:21:55,280
experiments

542
00:22:00,950 --> 00:21:56,559
are available

543
00:22:03,110 --> 00:22:00,960
to all in near real time which means

544
00:22:05,029 --> 00:22:03,120
usually within a few hours and sometimes

545
00:22:07,029 --> 00:22:05,039
within a few minutes

546
00:22:09,430 --> 00:22:07,039
but they're available to all the

547
00:22:12,149 --> 00:22:09,440
scientists in the world and in fact

548
00:22:16,230 --> 00:22:12,159
anybody who wants to use the data

549
00:22:18,390 --> 00:22:16,240
without any restriction whatsoever

550
00:22:20,870 --> 00:22:18,400
and we have websites that

551
00:22:22,950 --> 00:22:20,880
you can log on to you can learn how the

552
00:22:24,789 --> 00:22:22,960
experiment works you can learn how to

553
00:22:26,950 --> 00:22:24,799
operate the experiment you can even

554
00:22:30,390 --> 00:22:26,960
learn how to propose to do experiments

555
00:22:32,549 --> 00:22:31,590
additionally

556
00:22:33,350 --> 00:22:32,559
uh

557
00:22:35,110 --> 00:22:33,360
it

558
00:22:37,350 --> 00:22:35,120
of course there's the science data that

559
00:22:39,350 --> 00:22:37,360
the science community will be looking at

560
00:22:41,510 --> 00:22:39,360
but there are as i mentioned the

561
00:22:43,190 --> 00:22:41,520
real-time movies is real-time data that

562
00:22:44,950 --> 00:22:43,200
that that normal citizens everyone can

563
00:22:47,110 --> 00:22:44,960

look at in in the movies that i showed

564
00:22:49,270 --> 00:22:47,120
and alan showed a lot of those are

565
00:22:52,230 --> 00:22:49,280
people look at them all the time we have

566
00:22:53,270 --> 00:22:52,240
the statistics on the web that people

567
00:22:55,430 --> 00:22:53,280
are are

568
00:22:56,549 --> 00:22:55,440
captivated by by the beauty and the the

569
00:22:59,350 --> 00:22:56,559
that this

570
00:23:02,390 --> 00:22:59,360
tremendous uh star right near next to us

571
00:23:04,549 --> 00:23:02,400
uh is what it's doing and so

572
00:23:05,990 --> 00:23:04,559
uh this data certainly will be available

573
00:23:07,750 --> 00:23:06,000
uh to all

574
00:23:09,110 --> 00:23:07,760
yeah and i might add one of the most

575
00:23:11,270 --> 00:23:09,120
important

576
00:23:13,190 --> 00:23:11,280
target audiences for this data of course

577
00:23:14,710 --> 00:23:13,200
it's the scientist uh you know i'm a

578
00:23:17,029 --> 00:23:14,720
co-investigator on it i can't wait to

579
00:23:19,750 --> 00:23:17,039
get my hands on it but it

580
00:23:21,510 --> 00:23:19,760
this is really data that that

581
00:23:23,830 --> 00:23:21,520
will help us uh

582
00:23:26,310 --> 00:23:23,840
get the next generation of students and

583
00:23:28,870 --> 00:23:26,320
young people excited about

584
00:23:31,830 --> 00:23:28,880
about the sun of how it

585
00:23:35,029 --> 00:23:31,840
it really dominates everything we do

586
00:23:37,430 --> 00:23:35,039
so there's a very active program to make

587
00:23:39,510 --> 00:23:37,440
this data available to students students

588
00:23:41,750 --> 00:23:39,520

uh at every level and so we're we're

589
00:23:44,549 --> 00:23:41,760
pretty excited about what we can do uh

590
00:23:46,630 --> 00:23:44,559
with uh with everyone and and you know

591
00:23:47,909 --> 00:23:46,640
it you know if you have children uh we

592
00:23:49,110 --> 00:23:47,919
hope that they'll be bringing some of

593
00:23:52,870 --> 00:23:49,120
this home and showing you what they're

594
00:23:52,880 --> 00:23:57,590
any further questions

595
00:24:00,630 --> 00:23:59,510
all right do we have

596
00:24:03,750 --> 00:24:00,640
some from

597
00:24:09,269 --> 00:24:06,390
hi uh questions from social media uh the

598
00:24:11,269 --> 00:24:09,279
sdo aia instrument uh views the the full

599
00:24:13,430 --> 00:24:11,279
disc of the sun how much of the sun or

600
00:24:17,029 --> 00:24:13,440
what percentage of the the sun will iris

601
00:24:23,029 --> 00:24:20,870
just just a few percent uh

602
00:24:25,269 --> 00:24:23,039
it's it has a very small

603
00:24:26,470 --> 00:24:25,279
field of view

604
00:24:28,310 --> 00:24:26,480
about

605
00:24:31,669 --> 00:24:28,320
40 arc seconds

606
00:24:34,310 --> 00:24:31,679
compared to 1920

607
00:24:39,590 --> 00:24:36,230
aia has

608
00:24:42,149 --> 00:24:39,600
and the reason is that

609
00:24:44,630 --> 00:24:42,159
we have higher resolution

610
00:24:47,110 --> 00:24:44,640
and higher cadence

611
00:24:49,990 --> 00:24:47,120
than aia

612
00:24:51,830 --> 00:24:50,000
and we don't

613
00:24:53,870 --> 00:24:51,840

have

614
00:25:13,350 --> 00:24:53,880
a

615
00:25:15,350 --> 00:25:13,360
so

616
00:25:17,190 --> 00:25:15,360
but this is it's an important

617
00:25:19,669 --> 00:25:17,200
interesting experiment

618
00:25:24,149 --> 00:25:19,679
uh that fills in a niche

619
00:25:27,350 --> 00:25:25,430
okay thank you

620
00:25:29,110 --> 00:25:27,360
tell us again when that data will be

621
00:25:31,909 --> 00:25:29,120
available

622
00:25:33,590 --> 00:25:31,919
we open the doors

623
00:25:37,909 --> 00:25:33,600
21 days

624
00:25:43,110 --> 00:25:39,750
and

625
00:25:46,870 --> 00:25:43,120
i imagine for a couple of weeks

626
00:25:49,350 --> 00:25:46,880
we'll be doing all kinds of calibrations

627
00:25:52,789 --> 00:25:49,360
but when we opened the doors

628
00:25:57,590 --> 00:25:55,110
we saw one of the most spectacular

629
00:25:59,590 --> 00:25:57,600
events that we've seen in the entire

630
00:26:00,950 --> 00:25:59,600
mission and that was broadcast all over

631
00:26:03,750 --> 00:26:00,960
everywhere

632
00:26:08,390 --> 00:26:03,760
and if we see something spectacular

633
00:26:11,669 --> 00:26:08,400
on day one it'll be all over the web too

634
00:26:11,679 --> 00:26:16,149
and back here any further questions

635
00:26:20,310 --> 00:26:17,830
all right in that event just a

636
00:26:23,190 --> 00:26:20,320
programming note uh there is no change

637
00:26:26,470 --> 00:26:23,200
to our nasa tv schedule on thursday the

638
00:26:29,190 --> 00:26:26,480

27th we will start our live coverage of

639
00:26:32,070 --> 00:26:29,200
the l-1011 departure

640
00:26:34,710 --> 00:26:32,080
at 6 p.m pacific time it's 9 00 pm

641
00:26:38,310 --> 00:26:34,720
eastern time and will continue through

642
00:26:40,870 --> 00:26:38,320
spacecraft separation

643
00:26:42,549 --> 00:26:40,880
and that will conclude our mission

644
00:26:44,549 --> 00:26:42,559
mission science briefing as well as our

645
00:26:50,950 --> 00:26:44,559
pre-launch news conference and thank you