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AMERICAN  
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**Shantanu Naidu**

Division of Planetary Sciences Press Officer



1  
00:00:06,710 --> 00:00:04,630  
hello and welcome everyone to the juno

2  
00:00:09,190 --> 00:00:06,720  
press briefing at the joint meeting of

3  
00:00:11,270 --> 00:00:09,200  
the division for planetary sciences and

4  
00:00:14,549 --> 00:00:11,280  
the european planetary science con

5  
00:00:16,870 --> 00:00:14,559  
congress at pasadena in california

6  
00:00:18,950 --> 00:00:16,880  
my name is shantanu naidu i'm the press

7  
00:00:20,550 --> 00:00:18,960  
officer of the division for planetary

8  
00:00:23,429 --> 00:00:20,560  
sciences

9  
00:00:26,310 --> 00:00:23,439  
today we have three speakers uh who will

10  
00:00:30,310 --> 00:00:26,320  
give us uh juno's mission status update

11  
00:00:33,990 --> 00:00:30,320  
and science uh result uh science updates

12  
00:00:38,869 --> 00:00:34,000  
on my left is david david sher deputy

13  
00:00:44,310 --> 00:00:42,069

to his left is scott bolton juno

14

00:00:48,470 --> 00:00:44,320

principal investigator at the southwest

15

00:00:54,069 --> 00:00:51,430

to his left is candy hansen juno

16

00:00:55,910 --> 00:00:54,079

co-investigator at planetary science

17

00:00:57,990 --> 00:00:55,920

institute

18

00:01:00,630 --> 00:00:58,000

before we begin the presentations i

19

00:01:03,110 --> 00:01:00,640

would request everyone to silence their

20

00:01:05,429 --> 00:01:03,120

cell phones after all the presentations

21

00:01:07,750 --> 00:01:05,439

are done we'll take questions from those

22

00:01:11,590 --> 00:01:07,760

present here and

23

00:01:13,830 --> 00:01:11,600

members of the media on watching online

24

00:01:19,350 --> 00:01:13,840

and with that i'll pass it off to david

25

00:01:22,390 --> 00:01:21,350

good afternoon today we'll be updating

26

00:01:25,670 --> 00:01:22,400

the

27

00:01:27,910 --> 00:01:25,680

science and mission status from juno

28

00:01:29,590 --> 00:01:27,920

juno successfully arrived at jupiter

29

00:01:30,710 --> 00:01:29,600

july 4th of this year

30

00:01:32,310 --> 00:01:30,720

it's the

31

00:01:34,950 --> 00:01:32,320

second of our

32

00:01:36,870 --> 00:01:34,960

new frontiers missions new frontiers is

33

00:01:38,149 --> 00:01:36,880

our program that

34

00:01:41,109 --> 00:01:38,159

solicits

35

00:01:43,510 --> 00:01:41,119

pi led competitively awarded what we

36

00:01:45,429 --> 00:01:43,520

call uh medium class missions for

37

00:01:47,190 --> 00:01:45,439

planetary science

38

00:01:49,429 --> 00:01:47,200

uh the last 18 months have been very

39

00:01:51,429 --> 00:01:49,439

busy for the new frontiers program we

40

00:01:52,870 --> 00:01:51,439

have the first in our series new

41

00:01:55,749 --> 00:01:52,880

horizons

42

00:01:57,670 --> 00:01:55,759

flew by pluto july of last year and is

43

00:02:00,709 --> 00:01:57,680

on its way to a kuiper belt object for

44

00:02:02,630 --> 00:02:00,719

uh january 2019.

45

00:02:04,469 --> 00:02:02,640

the third mission that had been selected

46

00:02:05,990 --> 00:02:04,479

in this series was osiris-rex which

47

00:02:08,469 --> 00:02:06,000

launched successfully last month and

48

00:02:10,710 --> 00:02:08,479

it's on its way to bennu a near-earth

49

00:02:13,589 --> 00:02:10,720

asteroid will arrive in 2018 and

50

00:02:15,350 --> 00:02:13,599

ultimately bring back a sample

51  
00:02:17,510 --> 00:02:15,360  
and we've been talking about new

52  
00:02:19,510 --> 00:02:17,520  
frontiers for it's the next announcement

53  
00:02:22,229 --> 00:02:19,520  
of opportunity for this program will

54  
00:02:24,070 --> 00:02:22,239  
come out by the january time frame so in

55  
00:02:25,190 --> 00:02:24,080  
the last 18 months for a program that's

56  
00:02:26,470 --> 00:02:25,200  
been around for quite a while we're

57  
00:02:28,229 --> 00:02:26,480  
starting to get some science and you'll

58  
00:02:30,070 --> 00:02:28,239  
hear today about what juno has

59  
00:02:32,390 --> 00:02:30,080  
discovered

60  
00:02:34,470 --> 00:02:32,400  
we did notify late last week that we had

61  
00:02:36,710 --> 00:02:34,480  
postponed the period reduction maneuver

62  
00:02:39,190 --> 00:02:36,720  
that was planned for today and instead

63  
00:02:42,630 --> 00:02:39,200

had replaced it with a science pass

64

00:02:44,949 --> 00:02:42,640

as of last evening 10 47 local time the

65

00:02:46,229 --> 00:02:44,959

spacecraft did go into safe mode so the

66

00:02:47,430 --> 00:02:46,239

science pass

67

00:02:48,710 --> 00:02:47,440

was not performed today all the

68

00:02:51,190 --> 00:02:48,720

instruments were turned off as part of

69

00:02:53,350 --> 00:02:51,200

the safe mode and scott will talk to you

70

00:02:55,270 --> 00:02:53,360

about the current status of the the

71

00:02:57,830 --> 00:02:55,280

spacecraft as well as the science that

72

00:03:06,710 --> 00:02:57,840

we've seen so far with that turn over to

73

00:03:10,149 --> 00:03:08,869

okay thanks uh

74

00:03:12,630 --> 00:03:10,159

i'm scott bolton the principal

75

00:03:14,710 --> 00:03:12,640

investigator for juno i'm gonna talk to

76

00:03:17,110 --> 00:03:14,720

you about a couple of different topics

77

00:03:18,710 --> 00:03:17,120

as you heard from from david the

78

00:03:19,509 --> 00:03:18,720

spacecraft went into safe mode last

79

00:03:21,509 --> 00:03:19,519

night

80

00:03:24,229 --> 00:03:21,519

uh so i'm going to address that

81

00:03:26,070 --> 00:03:24,239

and of course the the delay that we had

82

00:03:27,430 --> 00:03:26,080

um for our rocket firing which was

83

00:03:29,509 --> 00:03:27,440

originally planned

84

00:03:33,910 --> 00:03:29,519

and then i'll go in to the fun stuff the

85

00:03:35,910 --> 00:03:33,920

science and um so as we speak right now

86

00:03:38,630 --> 00:03:35,920

uh the spacecraft has just passed

87

00:03:40,949 --> 00:03:38,640

jupiter so we had a pair of job which is

88

00:03:43,750 --> 00:03:40,959

when you get really close to jupiter we

89

00:03:44,630 --> 00:03:43,760

get about 5 000 kilometers or about 3000

90

00:03:46,630 --> 00:03:44,640

miles

91

00:03:47,670 --> 00:03:46,640

away from its cloud tops

92

00:03:49,430 --> 00:03:47,680

and so

93

00:03:52,229 --> 00:03:49,440

within the last hour we've actually gone

94

00:03:55,270 --> 00:03:52,239

that close and and are starting to move

95

00:03:57,670 --> 00:03:55,280

away from the planet the spacecraft's in

96

00:03:59,990 --> 00:03:57,680

totally safe condition everything's

97

00:04:02,149 --> 00:04:00,000

working and functioning as normal right

98

00:04:03,750 --> 00:04:02,159

now as we pass that now what happened

99

00:04:05,670 --> 00:04:03,760

was is on the way in

100

00:04:06,949 --> 00:04:05,680

uh last night when we were still pretty

101  
00:04:09,429 --> 00:04:06,959  
far away from jupiter because we're

102  
00:04:10,869 --> 00:04:09,439  
moving really fast

103  
00:04:14,390 --> 00:04:10,879  
the spacecraft went into a safe mode

104  
00:04:16,949 --> 00:04:14,400  
what that means is that the spacecraft

105  
00:04:18,789 --> 00:04:16,959  
it's like a smart robot has a very

106  
00:04:20,550 --> 00:04:18,799  
smart computer on it

107  
00:04:23,670 --> 00:04:20,560  
detected a condition that was not

108  
00:04:25,510 --> 00:04:23,680  
expected it did exactly what

109  
00:04:27,510 --> 00:04:25,520  
it was supposed to do when it detects a

110  
00:04:30,310 --> 00:04:27,520  
condition that's not expected is it

111  
00:04:32,469 --> 00:04:30,320  
evaluates the situation and then takes

112  
00:04:35,430 --> 00:04:32,479  
an action in this case

113  
00:04:38,390 --> 00:04:35,440

it turns off unnecessary uh

114

00:04:41,270 --> 00:04:38,400

subsystems it points itself and if not

115

00:04:43,270 --> 00:04:41,280

already pointed to point at the sun go

116

00:04:45,350 --> 00:04:43,280

power positive

117

00:04:47,830 --> 00:04:45,360

link up the communications to the earth

118

00:04:50,310 --> 00:04:47,840

and then wait uh for direction and for

119

00:04:52,950 --> 00:04:50,320

the humans back home to evaluate the

120

00:04:55,350 --> 00:04:52,960

situation and decide what the next uh

121

00:04:57,030 --> 00:04:55,360

forward step would be so it did exactly

122

00:04:58,870 --> 00:04:57,040

what it was supposed to do

123

00:05:01,350 --> 00:04:58,880

that software is called fault protection

124

00:05:03,670 --> 00:05:01,360

it's worked perfectly

125

00:05:05,510 --> 00:05:03,680

the the situation at this point is is

126  
00:05:07,990 --> 00:05:05,520  
where we just passed through jupiter and

127  
00:05:09,749 --> 00:05:08,000  
the impact was that we shut down our

128  
00:05:12,150 --> 00:05:09,759  
science instruments in order to make

129  
00:05:14,390 --> 00:05:12,160  
sure that nothing uh unnecessary was

130  
00:05:16,390 --> 00:05:14,400  
being done on the spacecraft as we went

131  
00:05:18,390 --> 00:05:16,400  
by jupiter

132  
00:05:21,029 --> 00:05:18,400  
so we went through another set of

133  
00:05:23,110 --> 00:05:21,039  
radiation belts and nothing else

134  
00:05:24,629 --> 00:05:23,120  
happened that we are aware of at this

135  
00:05:27,510 --> 00:05:24,639  
point

136  
00:05:29,909 --> 00:05:27,520  
now that was part of a plan uh

137  
00:05:32,070 --> 00:05:29,919  
prior that we were on this particular

138  
00:05:34,390 --> 00:05:32,080

orbit we were going to fire our rocket

139

00:05:36,950 --> 00:05:34,400

motor we call it period reduction

140

00:05:38,629 --> 00:05:36,960

maneuver prm and what that was going to

141

00:05:40,710 --> 00:05:38,639

do was the same rocket that we used the

142

00:05:43,350 --> 00:05:40,720

droop at orbit insertion it was going to

143

00:05:45,510 --> 00:05:43,360

slow uh the orbit down even more as we

144

00:05:47,270 --> 00:05:45,520

passed by jupiter and change the orbit

145

00:05:50,230 --> 00:05:47,280

from being 53

146

00:05:51,830 --> 00:05:50,240

uh and a half days long to 14 days and

147

00:05:53,909 --> 00:05:51,840

then we would be going around jupiter

148

00:05:56,390 --> 00:05:53,919

every two weeks

149

00:05:57,830 --> 00:05:56,400

um and after when we were preparing for

150

00:05:59,990 --> 00:05:57,840

that

151  
00:06:02,309 --> 00:06:00,000  
we detected as we were pressurizing the

152  
00:06:04,870 --> 00:06:02,319  
propulsion system basically we were

153  
00:06:07,350 --> 00:06:04,880  
turning on the the getting ready to fire

154  
00:06:09,749 --> 00:06:07,360  
the rocket we noticed a different

155  
00:06:11,189 --> 00:06:09,759  
condition in the in the valves that

156  
00:06:13,189 --> 00:06:11,199  
actually open up

157  
00:06:15,909 --> 00:06:13,199  
and pressurize the system

158  
00:06:17,270 --> 00:06:15,919  
they behaved with a little bit of delay

159  
00:06:19,189 --> 00:06:17,280  
which meant maybe the valves were a

160  
00:06:22,550 --> 00:06:19,199  
little sticky we didn't want to take any

161  
00:06:24,950 --> 00:06:22,560  
chances that the some adverse type of

162  
00:06:27,749 --> 00:06:24,960  
condition would cause the the burn to go

163  
00:06:30,230 --> 00:06:27,759

in a way that we didn't expect and so we

164

00:06:32,710 --> 00:06:30,240

decided to postpone and delay that burn

165

00:06:34,710 --> 00:06:32,720

and at that time we did it early enough

166

00:06:37,270 --> 00:06:34,720

that we were thinking that we would turn

167

00:06:40,550 --> 00:06:37,280

this flyby into a science pass and get

168

00:06:41,909 --> 00:06:40,560

some science of course the spacecraft

169

00:06:44,150 --> 00:06:41,919

safe mode

170

00:06:46,309 --> 00:06:44,160

condition eliminated the science but

171

00:06:48,550 --> 00:06:46,319

everything's okay and we retain the

172

00:06:50,390 --> 00:06:48,560

ability to do that rocket firing

173

00:06:52,070 --> 00:06:50,400

sometime in the future so we have a

174

00:06:54,309 --> 00:06:52,080

couple of tasks that we have to do one

175

00:06:56,070 --> 00:06:54,319

we have to go analyze and understand

176  
00:06:58,150 --> 00:06:56,080  
what just happened with the spacecraft

177  
00:07:01,029 --> 00:06:58,160  
safe mode entry and make sure that

178  
00:07:03,510 --> 00:07:01,039  
that's all working and understood and we

179  
00:07:05,430 --> 00:07:03,520  
also are going to go in and look at

180  
00:07:07,350 --> 00:07:05,440  
the valves and what was going on with

181  
00:07:09,350 --> 00:07:07,360  
the propulsion system basically it's a

182  
00:07:12,150 --> 00:07:09,360  
it's a every propulsion system on all

183  
00:07:14,070 --> 00:07:12,160  
spacecraft are have a fairly complex

184  
00:07:17,029 --> 00:07:14,080  
plumbing system you can think of it as

185  
00:07:19,029 --> 00:07:17,039  
just a plumbing system that's had a

186  
00:07:20,950 --> 00:07:19,039  
little bit of unexpected behavior to it

187  
00:07:22,550 --> 00:07:20,960  
so we will go in and analyze that and

188  
00:07:23,909 --> 00:07:22,560

then once we figure that out we'll

189

00:07:26,550 --> 00:07:23,919

decide

190

00:07:28,950 --> 00:07:26,560

where to go next we're in no rush to

191

00:07:31,430 --> 00:07:28,960

make any of these changes

192

00:07:33,430 --> 00:07:31,440

fortunately the way we designed juno in

193

00:07:35,990 --> 00:07:33,440

the orbit that we went into

194

00:07:39,189 --> 00:07:36,000

um was very flexible it allows very

195

00:07:40,950 --> 00:07:39,199

flexible science so the the science that

196

00:07:41,990 --> 00:07:40,960

we get on juno all of the goals and

197

00:07:44,070 --> 00:07:42,000

objectives

198

00:07:45,029 --> 00:07:44,080

tied to the scientific investigation of

199

00:07:47,909 --> 00:07:45,039

juno

200

00:07:51,029 --> 00:07:47,919

are really related to the to the details

201  
00:07:52,550 --> 00:07:51,039  
right around pera jove so let me show

202  
00:07:54,950 --> 00:07:52,560  
you what that looks like so here's a

203  
00:07:56,550 --> 00:07:54,960  
figure of a perijove trajectory and you

204  
00:07:59,029 --> 00:07:56,560  
can see here's jupiter and the

205  
00:08:01,270 --> 00:07:59,039  
trajectory going by

206  
00:08:02,869 --> 00:08:01,280  
so these time ticks are about one hour

207  
00:08:04,390 --> 00:08:02,879  
so you can see it takes about two hours

208  
00:08:07,189 --> 00:08:04,400  
to go from the north pole to the south

209  
00:08:09,350 --> 00:08:07,199  
pole we're moving very very fast

210  
00:08:12,390 --> 00:08:09,360  
it's in that time frame where the

211  
00:08:14,230 --> 00:08:12,400  
critical science that juno obtains

212  
00:08:16,629 --> 00:08:14,240  
in order to accomplish its

213  
00:08:17,990 --> 00:08:16,639

objectives that's where it's obtained

214

00:08:19,430 --> 00:08:18,000

and so

215

00:08:21,189 --> 00:08:19,440

the difference between that the

216

00:08:23,189 --> 00:08:21,199

trajectory i'm showing you here which is

217

00:08:25,350 --> 00:08:23,199

a 53-day orbit and if i were to show you

218

00:08:27,350 --> 00:08:25,360

the 14-day orbit it basically looks the

219

00:08:30,390 --> 00:08:27,360

same the difference is how far away you

220

00:08:32,949 --> 00:08:30,400

get from jupiter but the close-in

221

00:08:34,149 --> 00:08:32,959

geometry right around jupiter is almost

222

00:08:34,949 --> 00:08:34,159

identical

223

00:08:37,909 --> 00:08:34,959

so

224

00:08:39,110 --> 00:08:37,919

we can obtain all of the science goals

225

00:08:41,750 --> 00:08:39,120

of juno

226

00:08:42,870 --> 00:08:41,760

if even if we stay in a 53-day

227

00:08:45,750 --> 00:08:42,880

orbit

228

00:08:48,389 --> 00:08:45,760

each pass is has the same value that a

229

00:08:50,710 --> 00:08:48,399

14-day orbit would have passed we were

230

00:08:51,990 --> 00:08:50,720

changing to 14 days

231

00:08:53,829 --> 00:08:52,000

primarily

232

00:08:56,389 --> 00:08:53,839

because we were we wanted the science

233

00:08:58,550 --> 00:08:56,399

faster and but there was no requirement

234

00:08:59,670 --> 00:08:58,560

to do that

235

00:09:01,590 --> 00:08:59,680

so

236

00:09:03,350 --> 00:09:01,600

with that i'm going to go on to the

237

00:09:05,269 --> 00:09:03,360

science so keep this picture in mind

238

00:09:08,310 --> 00:09:05,279

because this is actually a picture from

239

00:09:09,430 --> 00:09:08,320

so this is the trajectory that we

240

00:09:12,070 --> 00:09:09,440

used

241

00:09:13,590 --> 00:09:12,080

back on august 27th

242

00:09:15,750 --> 00:09:13,600

and the science data that i'm going to

243

00:09:18,150 --> 00:09:15,760

describe to you today

244

00:09:21,670 --> 00:09:18,160

it comes from that day from primarily or

245

00:09:23,269 --> 00:09:21,680

that approach and and after

246

00:09:25,670 --> 00:09:23,279

and so this is what the trajectory looks

247

00:09:28,710 --> 00:09:25,680

like and you can see the orbits of two

248

00:09:30,389 --> 00:09:28,720

of jupiter's galilean moons here to

249

00:09:32,230 --> 00:09:30,399

guide you in how close we are to the

250

00:09:35,110 --> 00:09:32,240

planet so there's io and europa the two

251

00:09:37,269 --> 00:09:35,120

red circles and the inner gray one is

252

00:09:39,030 --> 00:09:37,279

thea which is a moon that's embedded in

253

00:09:41,110 --> 00:09:39,040

jupiter's radiation belts and so you can

254

00:09:43,030 --> 00:09:41,120

see that what we do is we come in from

255

00:09:45,269 --> 00:09:43,040

the north and we slide between the

256

00:09:47,430 --> 00:09:45,279

radiation belts on jupiter and out and

257

00:09:51,190 --> 00:09:47,440

that's basically the design and so where

258

00:09:53,190 --> 00:09:51,200

we are today is not much past where the

259

00:09:56,150 --> 00:09:53,200

spacecraft is shown on this trajectory

260

00:09:57,990 --> 00:09:56,160

right now we're basically in a gi in an

261

00:10:00,550 --> 00:09:58,000

orbit that's just where the blue

262

00:10:02,230 --> 00:10:00,560

spacecraft is just a little bit below

263

00:10:04,870 --> 00:10:02,240

what you see right now that's where we

264

00:10:06,710 --> 00:10:04,880

are right right this second

265

00:10:08,870 --> 00:10:06,720

okay so

266

00:10:11,190 --> 00:10:08,880

one of the investigations on jupiter is

267

00:10:13,750 --> 00:10:11,200

called the microwave radiometer we call

268

00:10:16,069 --> 00:10:13,760

it mwr for short

269

00:10:17,910 --> 00:10:16,079

it's actually six different instruments

270

00:10:20,389 --> 00:10:17,920

they're all microwave radiometers

271

00:10:21,590 --> 00:10:20,399

they're basically antennas that measure

272

00:10:24,630 --> 00:10:21,600

radio

273

00:10:26,550 --> 00:10:24,640

microwave regime

274

00:10:27,750 --> 00:10:26,560

and here you see on this particular

275

00:10:30,310 --> 00:10:27,760

graphic

276

00:10:31,910 --> 00:10:30,320

five of those antennas i show this to

277

00:10:33,350 --> 00:10:31,920

you so that you can understand that this

278

00:10:35,430 --> 00:10:33,360

instrument is not like what you might

279

00:10:38,069 --> 00:10:35,440

think of as a radio antenna they don't

280

00:10:40,630 --> 00:10:38,079

look like your directv dish antennas or

281

00:10:42,949 --> 00:10:40,640

even the deep space networks dish type

282

00:10:45,430 --> 00:10:42,959

antennas these are flat panels and each

283

00:10:48,710 --> 00:10:45,440

one is customized specifically to be

284

00:10:50,949 --> 00:10:48,720

used at jupiter for as part of this juno

285

00:10:53,110 --> 00:10:50,959

investigation here you see five of them

286

00:10:55,750 --> 00:10:53,120

each one is a different frequency or

287

00:10:57,750 --> 00:10:55,760

wavelength and the larger ones are the

288

00:10:59,990 --> 00:10:57,760

lower frequencies or longer wavelengths

289

00:11:01,590 --> 00:11:00,000

and then it gets progressively smaller

290

00:11:04,389 --> 00:11:01,600

and at the very top

291

00:11:06,150 --> 00:11:04,399

i'll show you here this is the horn so

292

00:11:07,750 --> 00:11:06,160

when i get to a high enough frequency it

293

00:11:10,230 --> 00:11:07,760

almost looks like a horn

294

00:11:11,670 --> 00:11:10,240

like i um like a musical instrument and

295

00:11:14,069 --> 00:11:11,680

then here's the next one and the next

296

00:11:16,630 --> 00:11:14,079

one bigger and they keep getting bigger

297

00:11:18,710 --> 00:11:16,640

and that's uh this instrument was

298

00:11:21,030 --> 00:11:18,720

basically invented for juno this is the

299

00:11:23,350 --> 00:11:21,040

first time this instrument has ever been

300

00:11:25,590 --> 00:11:23,360

used nobody's ever created an instrument

301  
00:11:27,430 --> 00:11:25,600  
like this and its primary objective is

302  
00:11:28,630 --> 00:11:27,440  
to look at jupiter's atmosphere and see

303  
00:11:29,990 --> 00:11:28,640  
beneath

304  
00:11:32,069 --> 00:11:30,000  
the clouds

305  
00:11:33,269 --> 00:11:32,079  
and that's what it's helping us see the

306  
00:11:35,750 --> 00:11:33,279  
invisible

307  
00:11:37,670 --> 00:11:35,760  
so on the other side of the spacecraft

308  
00:11:39,110 --> 00:11:37,680  
is the largest antenna the lowest

309  
00:11:42,550 --> 00:11:39,120  
frequency the thing that sees the

310  
00:11:44,470 --> 00:11:42,560  
deepest into jupiter and in fact this

311  
00:11:47,910 --> 00:11:44,480  
particular antenna is what drove the

312  
00:11:50,310 --> 00:11:47,920  
design of juno we wanted the largest

313  
00:11:52,150 --> 00:11:50,320

antenna we could and so we designed this

314

00:11:55,110 --> 00:11:52,160

antenna and basically the spacecraft was

315

00:11:58,150 --> 00:11:55,120

built and designed around this this

316

00:11:59,430 --> 00:11:58,160

antenna shape and size

317

00:12:01,269 --> 00:11:59,440

and again

318

00:12:02,310 --> 00:12:01,279

even though it doesn't look like a radio

319

00:12:04,389 --> 00:12:02,320

antenna

320

00:12:06,230 --> 00:12:04,399

it is a very advanced one

321

00:12:08,710 --> 00:12:06,240

okay so

322

00:12:10,629 --> 00:12:08,720

this particular instrument gets to see

323

00:12:11,910 --> 00:12:10,639

beneath the clouds so if if we were

324

00:12:14,949 --> 00:12:11,920

flying

325

00:12:16,550 --> 00:12:14,959

by jupiter and you had x-ray vision you

326

00:12:18,069 --> 00:12:16,560

might be able to see beneath the zones

327

00:12:20,710 --> 00:12:18,079

and belts and the beautiful stripes that

328

00:12:23,190 --> 00:12:20,720

jupiter has and even see where how deep

329

00:12:24,389 --> 00:12:23,200

are the roots to the great red spot and

330

00:12:26,870 --> 00:12:24,399

things like that

331

00:12:29,430 --> 00:12:26,880

and so you can imagine if jupiter has

332

00:12:31,509 --> 00:12:29,440

different layers of its atmosphere as we

333

00:12:33,829 --> 00:12:31,519

uh go down it's a giant ball of gas and

334

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

they have different layers as we go down

335

00:12:37,829 --> 00:12:35,920

into the atmosphere this instrument is

336

00:12:40,230 --> 00:12:37,839

capable of basically peeling those

337

00:12:41,990 --> 00:12:40,240

layers back as if jupiter was an onion

338

00:12:43,190 --> 00:12:42,000

right and i can peel off the layer of

339

00:12:45,350 --> 00:12:43,200

that

340

00:12:46,949 --> 00:12:45,360

one by one of the onion and see what

341

00:12:48,230 --> 00:12:46,959

it's like inside

342

00:12:49,750 --> 00:12:48,240

and so i'm going to show you for the

343

00:12:51,509 --> 00:12:49,760

first time

344

00:12:53,670 --> 00:12:51,519

an artist's conception

345

00:12:55,910 --> 00:12:53,680

based on our data

346

00:12:58,310 --> 00:12:55,920

to see what jupiter looks like

347

00:13:00,310 --> 00:12:58,320

underneath this came from the first the

348

00:13:02,389 --> 00:13:00,320

first and only past right now on on

349

00:13:04,629 --> 00:13:02,399

august 27th where we had this instrument

350

00:13:06,949 --> 00:13:04,639

on we will get many of these passes in

351  
00:13:08,310 --> 00:13:06,959  
the future but in the very first one you

352  
00:13:10,389 --> 00:13:08,320  
see

353  
00:13:12,470 --> 00:13:10,399  
okay so here's jupiter from a visible

354  
00:13:15,430 --> 00:13:12,480  
cloud the visible clouds that you would

355  
00:13:17,590 --> 00:13:15,440  
see from a normal color camera okay so

356  
00:13:19,590 --> 00:13:17,600  
this is what jupiter looks like to most

357  
00:13:21,670 --> 00:13:19,600  
of us it's all recognizable here's the

358  
00:13:23,990 --> 00:13:21,680  
great red spot okay so you see these

359  
00:13:26,550 --> 00:13:24,000  
zones and belts the orange and white and

360  
00:13:27,910 --> 00:13:26,560  
gray stripes and as you look down to the

361  
00:13:30,069 --> 00:13:27,920  
next level

362  
00:13:32,629 --> 00:13:30,079  
that's our first uh

363  
00:13:34,870 --> 00:13:32,639

high frequency receiver and then each

364

00:13:36,710 --> 00:13:34,880

level goes to the longer and longer

365

00:13:39,110 --> 00:13:36,720

wavelengths until i see all the way down

366

00:13:40,629 --> 00:13:39,120

when i get down to the bottom here the

367

00:13:43,910 --> 00:13:40,639

lowest layer

368

00:13:46,069 --> 00:13:43,920

i'm looking about 350 to 400 kilometers

369

00:13:48,629 --> 00:13:46,079

into jupiter

370

00:13:51,110 --> 00:13:48,639

okay and what you've the first thing you

371

00:13:53,430 --> 00:13:51,120

can see from this is that the structure

372

00:13:55,269 --> 00:13:53,440

of the zones and belts

373

00:13:57,430 --> 00:13:55,279

still exists

374

00:13:59,269 --> 00:13:57,440

deep down in jupiter so whatever's

375

00:14:02,230 --> 00:13:59,279

making those colors whatever is making

376

00:14:04,629 --> 00:14:02,240

those stripes is still existing pretty

377

00:14:06,230 --> 00:14:04,639

far down into jupiter so that came as a

378

00:14:08,150 --> 00:14:06,240

surprise to many of the scientists we

379

00:14:10,790 --> 00:14:08,160

didn't know if this was very

380

00:14:13,189 --> 00:14:10,800

skin deep you know just a really thin

381

00:14:14,870 --> 00:14:13,199

layer or whether it goes down the other

382

00:14:17,030 --> 00:14:14,880

thing that was is surprising and very

383

00:14:19,350 --> 00:14:17,040

interesting about this is that while the

384

00:14:21,590 --> 00:14:19,360

zones and belts appear to exist deep

385

00:14:24,230 --> 00:14:21,600

down they're evolving they're not

386

00:14:26,550 --> 00:14:24,240

staying the same they're changing as we

387

00:14:27,990 --> 00:14:26,560

go down and you can see that by the fact

388

00:14:29,350 --> 00:14:28,000

that

389

00:14:31,829 --> 00:14:29,360

this one

390

00:14:33,829 --> 00:14:31,839

changes as we go down and actually it

391

00:14:35,750 --> 00:14:33,839

becomes less apparent way down but it

392

00:14:36,710 --> 00:14:35,760

still starts moving around some of this

393

00:14:39,110 --> 00:14:36,720

white

394

00:14:41,829 --> 00:14:39,120

is orangy down here and then this one

395

00:14:45,030 --> 00:14:41,839

seems to disappear and another belt goes

396

00:14:47,189 --> 00:14:45,040

down here so deep down jupiter is

397

00:14:49,430 --> 00:14:47,199

similar but also very different

398

00:14:50,629 --> 00:14:49,440

than what we see on the surface and this

399

00:14:52,470 --> 00:14:50,639

tells scientists and we're still

400

00:14:54,150 --> 00:14:52,480

evaluating this i can't tell you all of

401  
00:14:55,350 --> 00:14:54,160  
what this means yet because we're still

402  
00:14:57,269 --> 00:14:55,360  
interpreting it

403  
00:14:59,590 --> 00:14:57,279  
but what it's telling us is hints about

404  
00:15:01,430 --> 00:14:59,600  
the deep dynamics

405  
00:15:03,189 --> 00:15:01,440  
and the chemistry of jupiter's

406  
00:15:06,150 --> 00:15:03,199  
atmosphere and this is the first time

407  
00:15:08,069 --> 00:15:06,160  
we've seen any giant planet atmosphere

408  
00:15:10,310 --> 00:15:08,079  
underneath its layer so we're learning

409  
00:15:12,949 --> 00:15:10,320  
about atmospheric dynamics at a very

410  
00:15:15,269 --> 00:15:12,959  
basic rate and level

411  
00:15:17,829 --> 00:15:15,279  
okay i'd like to jump to another

412  
00:15:20,550 --> 00:15:17,839  
instrument which is the juno cam which

413  
00:15:22,150 --> 00:15:20,560

is our visible camera and if it was used

414

00:15:23,590 --> 00:15:22,160

it would take a picture of jupiter that

415

00:15:25,350 --> 00:15:23,600

looks just like

416

00:15:27,990 --> 00:15:25,360

this

417

00:15:29,990 --> 00:15:28,000

except we used it when we went over the

418

00:15:32,310 --> 00:15:30,000

poll we we got some pictures like the

419

00:15:33,269 --> 00:15:32,320

other one as well but here's a the first

420

00:15:34,949 --> 00:15:33,279

picture

421

00:15:36,550 --> 00:15:34,959

of jupiter's polls that we took on

422

00:15:37,910 --> 00:15:36,560

august 27th

423

00:15:39,590 --> 00:15:37,920

and

424

00:15:41,910 --> 00:15:39,600

this was pretty remarkable because it

425

00:15:44,710 --> 00:15:41,920

told us right away

426

00:15:47,110 --> 00:15:44,720

some some things knew about jupiter's

427

00:15:49,030 --> 00:15:47,120

atmosphere and in particular the polar

428

00:15:50,710 --> 00:15:49,040

the first thing was is there was no

429

00:15:52,230 --> 00:15:50,720

hexagon shape

430

00:15:54,870 --> 00:15:52,240

like you see

431

00:15:56,790 --> 00:15:54,880

on saturn with cassini

432

00:15:58,710 --> 00:15:56,800

so we weren't really sure what the poles

433

00:16:01,110 --> 00:15:58,720

look like but you can see clearly

434

00:16:02,870 --> 00:16:01,120

there's no hexagonal shape of the storms

435

00:16:05,749 --> 00:16:02,880

the second is as you see many of these

436

00:16:06,829 --> 00:16:05,759

cyclones around some of them small

437

00:16:08,870 --> 00:16:06,839

moving very

438

00:16:11,030 --> 00:16:08,880

quickly these are

439

00:16:12,150 --> 00:16:11,040

these are things that are seen

440

00:16:15,030 --> 00:16:12,160

a little bit

441

00:16:16,870 --> 00:16:15,040

at the lower latitudes but not as many

442

00:16:17,670 --> 00:16:16,880

and the polls are filled with these

443

00:16:19,910 --> 00:16:17,680

things

444

00:16:21,670 --> 00:16:19,920

and that was kind of a surprise and then

445

00:16:24,230 --> 00:16:21,680

lastly what i'm going to focus on right

446

00:16:26,150 --> 00:16:24,240

now is as we came across

447

00:16:28,310 --> 00:16:26,160

we're always flying over the terminator

448

00:16:30,629 --> 00:16:28,320

that's our orbit it's called dust dawn

449

00:16:32,550 --> 00:16:30,639

so we fly around the terminator which is

450

00:16:34,550 --> 00:16:32,560

where the sunlight

451  
00:16:37,430 --> 00:16:34,560  
stops right that's what this the shadow

452  
00:16:39,910 --> 00:16:37,440  
is jupiter is always half lit

453  
00:16:40,870 --> 00:16:39,920  
here to us so we're flying right across

454  
00:16:42,550 --> 00:16:40,880  
this

455  
00:16:44,069 --> 00:16:42,560  
and when we look down

456  
00:16:46,790 --> 00:16:44,079  
of course when you see something on the

457  
00:16:48,150 --> 00:16:46,800  
terminator you can see topology

458  
00:16:50,629 --> 00:16:48,160  
or you know

459  
00:16:52,949 --> 00:16:50,639  
you can see the 3d effects a little bit

460  
00:16:54,069 --> 00:16:52,959  
so when i give talks at schools you know

461  
00:16:55,509 --> 00:16:54,079  
kids are saying i got a pair of

462  
00:16:57,269 --> 00:16:55,519  
binoculars i have a telescope what

463  
00:16:58,629 --> 00:16:57,279

should i look at i always say the first

464

00:17:00,790 --> 00:16:58,639

thing you should look at is look at the

465

00:17:03,990 --> 00:17:00,800

moon and look right at the line the

466

00:17:06,069 --> 00:17:04,000

terminator where the light and shade are

467

00:17:08,390 --> 00:17:06,079

because that's when you can see the

468

00:17:10,630 --> 00:17:08,400

craters and the moons you're seeing

469

00:17:12,230 --> 00:17:10,640

topology right you can see the the

470

00:17:14,549 --> 00:17:12,240

3d effects

471

00:17:17,110 --> 00:17:14,559

we're seeing for the first time the 3d

472

00:17:18,949 --> 00:17:17,120

effects of jupiter's atmosphere and i

473

00:17:20,630 --> 00:17:18,959

can show that to you

474

00:17:22,230 --> 00:17:20,640

and this came as a surprise to us as

475

00:17:24,549 --> 00:17:22,240

well right here

476

00:17:26,549 --> 00:17:24,559

this one cyclone

477

00:17:29,430 --> 00:17:26,559

shows shadows

478

00:17:32,710 --> 00:17:29,440

which right away told us this part of

479

00:17:34,789 --> 00:17:32,720

that storm system is elevated

480

00:17:36,230 --> 00:17:34,799

above jupiter's base

481

00:17:37,110 --> 00:17:36,240

atmosphere

482

00:17:39,110 --> 00:17:37,120

now

483

00:17:41,350 --> 00:17:39,120

if you were to ask me why didn't i think

484

00:17:43,270 --> 00:17:41,360

of that before i i would say i should

485

00:17:45,110 --> 00:17:43,280

have

486

00:17:46,390 --> 00:17:45,120

that the reality was if you think about

487

00:17:47,909 --> 00:17:46,400

it the earth's atmosphere is a little

488

00:17:49,669 --> 00:17:47,919

bit like that you go on an airplane you

489

00:17:51,909 --> 00:17:49,679

see different layers of clouds so

490

00:17:53,350 --> 00:17:51,919

jupiter must have had that but nobody

491

00:17:55,190 --> 00:17:53,360

had ever been able to see it before but

492

00:17:56,310 --> 00:17:55,200

you just had to get lucky and go of

493

00:17:58,710 --> 00:17:56,320

course we're going to go over the

494

00:18:00,630 --> 00:17:58,720

terminator many times and so we may see

495

00:18:02,870 --> 00:18:00,640

many examples of this in the future but

496

00:18:05,510 --> 00:18:02,880

on the very first pass we got lucky and

497

00:18:07,990 --> 00:18:05,520

we saw one the one of these cyclones has

498

00:18:10,230 --> 00:18:08,000

to be just in the right spot in order to

499

00:18:11,270 --> 00:18:10,240

see that shadow

500

00:18:12,789 --> 00:18:11,280

now when you

501  
00:18:14,470 --> 00:18:12,799  
here's a close-up

502  
00:18:16,950 --> 00:18:14,480  
of that shadow

503  
00:18:19,510 --> 00:18:16,960  
and you can start to see the shape

504  
00:18:21,750 --> 00:18:19,520  
and so what's amazing about this shadow

505  
00:18:23,110 --> 00:18:21,760  
is so we've done some calculations based

506  
00:18:24,150 --> 00:18:23,120  
on this first

507  
00:18:25,750 --> 00:18:24,160  
image

508  
00:18:27,590 --> 00:18:25,760  
and

509  
00:18:30,710 --> 00:18:27,600  
this this shadow

510  
00:18:35,590 --> 00:18:30,720  
or this i should say this cyclonic storm

511  
00:18:38,150 --> 00:18:35,600  
is about 7 000 kilometers across

512  
00:18:39,750 --> 00:18:38,160  
so that's more than half the size of the

513  
00:18:41,430 --> 00:18:39,760

earth

514

00:18:44,150 --> 00:18:41,440

so this

515

00:18:46,549 --> 00:18:44,160

this storm is more than half the size of

516

00:18:48,630 --> 00:18:46,559

the earth and its elevation based on

517

00:18:50,470 --> 00:18:48,640

these on our estimate of this and

518

00:18:53,110 --> 00:18:50,480

looking at the the shadow and the rest

519

00:18:54,870 --> 00:18:53,120

of the geometry is that it's vertically

520

00:18:58,390 --> 00:18:54,880

towering up

521

00:19:00,549 --> 00:18:58,400

about 85 kilometers or more

522

00:19:01,750 --> 00:19:00,559

and so you can imagine

523

00:19:03,430 --> 00:19:01,760

um

524

00:19:05,350 --> 00:19:03,440

the kind of atmosphere you're dealing

525

00:19:06,950 --> 00:19:05,360

with if you were a jupiter and you're

526

00:19:09,110 --> 00:19:06,960

flying a plane

527

00:19:10,870 --> 00:19:09,120

through it or unlucky enough to be in a

528

00:19:14,150 --> 00:19:10,880

balloon and you're you're looking at a

529

00:19:16,390 --> 00:19:14,160

thunderstorm that's a or a tornado that

530

00:19:18,950 --> 00:19:16,400

is half the size of the earth and a

531

00:19:19,830 --> 00:19:18,960

hundred kilometers tall

532

00:19:23,430 --> 00:19:19,840

so

533

00:19:25,510 --> 00:19:23,440

it is a a truly towering beast

534

00:19:27,510 --> 00:19:25,520

of a storm probably the biggest thing

535

00:19:29,990 --> 00:19:27,520

we've ever seen

536

00:19:32,230 --> 00:19:30,000

and so this is what jupiter is really

537

00:19:33,590 --> 00:19:32,240

faced with now junocam

538

00:19:35,510 --> 00:19:33,600

the interesting one of the things that's

539

00:19:37,350 --> 00:19:35,520

interesting is junocam is an outreach

540

00:19:39,909 --> 00:19:37,360

camera we put it on in order to connect

541

00:19:43,350 --> 00:19:39,919

to the public but it clearly has science

542

00:19:45,830 --> 00:19:43,360

value and we're already reaping that

543

00:19:47,110 --> 00:19:45,840

but it is primarily aimed at reaching

544

00:19:49,750 --> 00:19:47,120

out to the public and allowing the

545

00:19:52,310 --> 00:19:49,760

public to get engaged and process their

546

00:19:54,390 --> 00:19:52,320

own images and get involved in science

547

00:19:57,110 --> 00:19:54,400

and also to do some artistic work with

548

00:19:59,590 --> 00:19:57,120

it and we've already gotten that you can

549

00:20:02,149 --> 00:19:59,600

go onto our website you can see posted

550

00:20:03,750 --> 00:20:02,159

images that are raw the public can

551  
00:20:05,029 --> 00:20:03,760  
process those

552  
00:20:06,390 --> 00:20:05,039  
post them

553  
00:20:08,230 --> 00:20:06,400  
sometimes they're scientifically

554  
00:20:09,909 --> 00:20:08,240  
interesting sometimes they just make a

555  
00:20:11,430 --> 00:20:09,919  
an artistic gesture

556  
00:20:13,830 --> 00:20:11,440  
and so

557  
00:20:15,510 --> 00:20:13,840  
i'd like to now turn to candy hanson

558  
00:20:17,029 --> 00:20:15,520  
who's going to tell you about that

559  
00:20:19,350 --> 00:20:17,039  
public

560  
00:20:23,830 --> 00:20:19,360  
camera and how it's working to touch the

561  
00:20:28,870 --> 00:20:26,230  
thank you scott

562  
00:20:32,470 --> 00:20:28,880  
so i'm going to be talking about junocam

563  
00:20:33,590 --> 00:20:32,480

which is the camera shown right here

564

00:20:35,990 --> 00:20:33,600

and

565

00:20:39,029 --> 00:20:36,000

scott's vision back in the days when we

566

00:20:41,029 --> 00:20:39,039

were actually just writing the proposal

567

00:20:43,510 --> 00:20:41,039

was to find a way

568

00:20:47,190 --> 00:20:43,520

to involve the public in

569

00:20:50,310 --> 00:20:47,200

the the process of space exploration the

570

00:20:53,510 --> 00:20:50,320

good days and the more challenging days

571

00:20:54,950 --> 00:20:53,520

and to sort of live our lives with us

572

00:20:57,909 --> 00:20:54,960

and so

573

00:21:01,510 --> 00:20:57,919

what we decided was that we would

574

00:21:03,590 --> 00:21:01,520

involve the public in every aspect of

575

00:21:05,990 --> 00:21:03,600

what an imaging team

576

00:21:09,430 --> 00:21:06,000

would ordinarily be doing

577

00:21:11,029 --> 00:21:09,440

and so my first uh exhibit here is an

578

00:21:13,590 --> 00:21:11,039

image processed

579

00:21:16,390 --> 00:21:13,600

by one of our amateur community so let

580

00:21:17,990 --> 00:21:16,400

me tell you a little bit more about how

581

00:21:21,029 --> 00:21:18,000

we're doing this

582

00:21:23,590 --> 00:21:21,039

we have developed four ways for the

583

00:21:26,310 --> 00:21:23,600

public to engage

584

00:21:27,590 --> 00:21:26,320

with us in a participatory way not a

585

00:21:29,270 --> 00:21:27,600

passive way

586

00:21:32,630 --> 00:21:29,280

and so

587

00:21:35,669 --> 00:21:32,640

we have amateur astronomers uplinking

588

00:21:38,149 --> 00:21:35,679

uploading their telescopic images that

589

00:21:40,710 --> 00:21:38,159

they're taking here on planet earth of

590

00:21:43,350 --> 00:21:40,720

jupiter that we can then use

591

00:21:44,630 --> 00:21:43,360

for planning purposes and the we in this

592

00:21:47,029 --> 00:21:44,640

case is

593

00:21:49,430 --> 00:21:47,039

the entire public not just

594

00:21:50,789 --> 00:21:49,440

the tiny little imaging team

595

00:21:53,669 --> 00:21:50,799

uh and then

596

00:21:55,750 --> 00:21:53,679

uh the discussion page is where we go to

597

00:21:56,870 --> 00:21:55,760

talk about the pros and cons and what's

598

00:21:58,549 --> 00:21:56,880

interesting

599

00:22:00,470 --> 00:21:58,559

of all these different atmospheric

600

00:22:02,470 --> 00:22:00,480

features

601  
00:22:04,390 --> 00:22:02,480  
we will have voting coming in the future

602  
00:22:05,590 --> 00:22:04,400  
it won't be november it'll probably be

603  
00:22:07,110 --> 00:22:05,600  
february

604  
00:22:08,870 --> 00:22:07,120  
maybe november

605  
00:22:11,430 --> 00:22:08,880  
and then but what i'm going to talk

606  
00:22:12,789 --> 00:22:11,440  
about today is the image processing

607  
00:22:16,310 --> 00:22:12,799  
piece of this

608  
00:22:19,750 --> 00:22:16,320  
and you you can see the url right there

609  
00:22:22,549 --> 00:22:19,760  
takes you right to this page

610  
00:22:25,990 --> 00:22:22,559  
what we are doing with our little ops

611  
00:22:27,350 --> 00:22:26,000  
team is we are staging the raw data from

612  
00:22:30,470 --> 00:22:27,360  
junocam

613  
00:22:33,110 --> 00:22:30,480

so we get the data back in a series of

614

00:22:35,350 --> 00:22:33,120

strips and we put the little strips back

615

00:22:38,549 --> 00:22:35,360

together again into

616

00:22:41,270 --> 00:22:38,559

red green and blue and then we do a very

617

00:22:44,230 --> 00:22:41,280

preliminary color reconstruction that

618

00:22:47,350 --> 00:22:44,240

tends to have artifacts like the big

619

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

slash you see in the picture above

620

00:22:51,990 --> 00:22:49,360

those are then

621

00:22:53,270 --> 00:22:52,000

anybody can download those images and

622

00:22:55,110 --> 00:22:53,280

they can do

623

00:22:57,270 --> 00:22:55,120

anything they want with them

624

00:23:00,390 --> 00:22:57,280

and so what i'm going to share with you

625

00:23:03,669 --> 00:23:00,400

are some of the really fabulous products

626  
00:23:06,789 --> 00:23:03,679  
that are show and and then we tell them

627  
00:23:09,510 --> 00:23:06,799  
please if you don't mind upload your

628  
00:23:11,590 --> 00:23:09,520  
contribution back onto the website for

629  
00:23:13,669 --> 00:23:11,600  
everyone to admire and learn from and

630  
00:23:15,510 --> 00:23:13,679  
and use um

631  
00:23:17,510 --> 00:23:15,520  
you know don't just stick it on your

632  
00:23:18,549 --> 00:23:17,520  
private facebook page we we all want to

633  
00:23:19,590 --> 00:23:18,559  
share

634  
00:23:22,549 --> 00:23:19,600  
and so

635  
00:23:24,390 --> 00:23:22,559  
uh here's a a beautiful

636  
00:23:28,630 --> 00:23:24,400  
contribution

637  
00:23:31,270 --> 00:23:28,640  
where you can see that the processing

638  
00:23:33,830 --> 00:23:31,280

that this person has done has brought

639

00:23:35,510 --> 00:23:33,840

out detail in the cloud features

640

00:23:36,470 --> 00:23:35,520

all the way from the terminator the

641

00:23:38,310 --> 00:23:36,480

shadow

642

00:23:40,549 --> 00:23:38,320

out to the bright limb

643

00:23:42,549 --> 00:23:40,559

and that's actually

644

00:23:43,830 --> 00:23:42,559

pretty tricky to do

645

00:23:45,510 --> 00:23:43,840

but in

646

00:23:48,149 --> 00:23:45,520

in order to go a step further and help

647

00:23:51,029 --> 00:23:48,159

us really appreciate these features

648

00:23:53,590 --> 00:23:51,039

in the atmosphere he helpfully put boxes

649

00:23:56,789 --> 00:23:53,600

around them and enlarged them

650

00:23:59,510 --> 00:23:56,799

and so to really draw all of our eyes to

651  
00:24:01,029 --> 00:23:59,520  
these wonderful sort of pinwheel shaped

652  
00:24:04,549 --> 00:24:01,039  
storms

653  
00:24:06,630 --> 00:24:04,559  
that scott was just describing

654  
00:24:08,630 --> 00:24:06,640  
there's a particular community at

655  
00:24:09,830 --> 00:24:08,640  
unmanned space flight flight dot com

656  
00:24:12,470 --> 00:24:09,840  
that has been

657  
00:24:14,070 --> 00:24:12,480  
particularly engaged in all of this and

658  
00:24:16,390 --> 00:24:14,080  
incredibly helpful

659  
00:24:19,590 --> 00:24:16,400  
and one of their members actually

660  
00:24:20,549 --> 00:24:19,600  
annotated his contribution with how he

661  
00:24:21,350 --> 00:24:20,559  
did it

662  
00:24:23,750 --> 00:24:21,360  
so

663  
00:24:24,549 --> 00:24:23,760

it's a community that's not only helping

664

00:24:26,630 --> 00:24:24,559

us

665

00:24:28,789 --> 00:24:26,640

but talking to each other and sharing

666

00:24:32,950 --> 00:24:28,799

tips and and

667

00:24:37,350 --> 00:24:34,710

i don't want you to try to read the fine

668

00:24:39,669 --> 00:24:37,360

print here what i want to uh the message

669

00:24:40,710 --> 00:24:39,679

i want to give with this particular

670

00:24:43,669 --> 00:24:40,720

choice

671

00:24:46,870 --> 00:24:43,679

is that we also have people jumping in

672

00:24:48,950 --> 00:24:46,880

to help us with the science analysis

673

00:24:51,110 --> 00:24:48,960

and so

674

00:24:53,430 --> 00:24:51,120

these are

675

00:24:56,070 --> 00:24:53,440

all junocam pictures

676  
00:24:57,909 --> 00:24:56,080  
but they've been labeled with features

677  
00:25:00,070 --> 00:24:57,919  
that have been followed

678  
00:25:02,710 --> 00:25:00,080  
from the ground over the years and i'll

679  
00:25:05,590 --> 00:25:02,720  
just take a second here to uh point out

680  
00:25:07,909 --> 00:25:05,600  
this uh here's that storm feature that

681  
00:25:10,470 --> 00:25:07,919  
scott was just talking about this

682  
00:25:12,230 --> 00:25:10,480  
particular uh the way this particular

683  
00:25:13,430 --> 00:25:12,240  
image was processed by this particular

684  
00:25:15,510 --> 00:25:13,440  
amateur

685  
00:25:19,909 --> 00:25:15,520  
brings it out very nicely right here on

686  
00:25:25,190 --> 00:25:22,710  
here's another example where

687  
00:25:27,909 --> 00:25:25,200  
features in the junocam

688  
00:25:29,990 --> 00:25:27,919

close-up images have been correlated

689

00:25:32,870 --> 00:25:30,000

again with features seen in the

690

00:25:36,390 --> 00:25:32,880

ground-based data and that allows us to

691

00:25:37,990 --> 00:25:36,400

connect what we're seeing from our very

692

00:25:38,950 --> 00:25:38,000

different perspective

693

00:25:40,789 --> 00:25:38,960

to the

694

00:25:47,029 --> 00:25:40,799

historical record

695

00:25:52,789 --> 00:25:48,470

sometimes

696

00:25:55,350 --> 00:25:52,799

people have experimented with different

697

00:25:57,590 --> 00:25:55,360

color ratios and

698

00:26:00,230 --> 00:25:57,600

this happens to be just happens to be

699

00:26:03,190 --> 00:26:00,240

one of my particular favorites in in the

700

00:26:05,430 --> 00:26:03,200

color choice selection that this person

701  
00:26:07,269 --> 00:26:05,440  
made

702  
00:26:09,669 --> 00:26:07,279  
here's a fun one

703  
00:26:11,110 --> 00:26:09,679  
does everybody see the happy face

704  
00:26:13,190 --> 00:26:11,120  
the two eyes

705  
00:26:16,149 --> 00:26:13,200  
and the big smile

706  
00:26:18,390 --> 00:26:16,159  
this is a reflection basically this

707  
00:26:19,269 --> 00:26:18,400  
person mirrored the south pole

708  
00:26:21,190 --> 00:26:19,279  
image

709  
00:26:27,750 --> 00:26:21,200  
to get the um

710  
00:26:36,549 --> 00:26:29,669  
do you recognize this one van gogh's

711  
00:26:40,789 --> 00:26:39,269  
and this is um one of the newest

712  
00:26:41,669 --> 00:26:40,799  
contributions

713  
00:26:44,310 --> 00:26:41,679

um

714

00:26:46,870 --> 00:26:44,320

one of the things right now is that

715

00:26:47,990 --> 00:26:46,880

jupiter is quite close to the sun

716

00:26:50,630 --> 00:26:48,000

and so

717

00:26:53,669 --> 00:26:50,640

from the earth right now

718

00:26:55,350 --> 00:26:53,679

we're not able to get images

719

00:26:57,590 --> 00:26:55,360

so we've been taking

720

00:26:58,789 --> 00:26:57,600

sort of low resolution images with

721

00:27:00,310 --> 00:26:58,799

junocam

722

00:27:03,909 --> 00:27:00,320

to fill in

723

00:27:04,950 --> 00:27:03,919

while the amateur astronomers cannot

724

00:27:07,110 --> 00:27:04,960

provide

725

00:27:10,950 --> 00:27:07,120

data from their own telescopes

726

00:27:13,350 --> 00:27:10,960

and so here's a nice cylindrical map

727

00:27:15,510 --> 00:27:13,360

that we are going to post in our

728

00:27:23,269 --> 00:27:15,520

discussion page

729

00:27:34,389 --> 00:27:24,630

and backwards

730

00:27:38,549 --> 00:27:36,789

uh so if you have any questions please

731

00:27:40,710 --> 00:27:38,559

raise your hand and when you get the

732

00:27:48,230 --> 00:27:40,720

microphone please identify yourself

733

00:27:52,230 --> 00:27:50,470

thanks alex woodsy with nature for scott

734

00:27:54,789 --> 00:27:52,240

could you talk a little bit about what

735

00:27:57,350 --> 00:27:54,799

happens if you stay in a 50-day orbit

736

00:27:59,750 --> 00:27:57,360

for some time what expendables are there

737

00:28:02,310 --> 00:27:59,760

on the spacecraft that would determine

738

00:28:04,710 --> 00:28:02,320

lifetime and or what does that say about

739

00:28:06,950 --> 00:28:04,720

radiation exposure if you're on this

740

00:28:08,070 --> 00:28:06,960

longer orbit is that more of a problem

741

00:28:10,470 --> 00:28:08,080

or not

742

00:28:13,269 --> 00:28:10,480

sure so um

743

00:28:15,110 --> 00:28:13,279

as far as the expendable go uh we don't

744

00:28:17,110 --> 00:28:15,120

know of any as far as the ex that the

745

00:28:19,590 --> 00:28:17,120

extra time would prevent prevent

746

00:28:23,110 --> 00:28:19,600

anything we can stay in the 53-day orbit

747

00:28:25,990 --> 00:28:23,120

and every subsystem can can survive that

748

00:28:27,590 --> 00:28:26,000

the extra time doesn't cause a problem

749

00:28:29,510 --> 00:28:27,600

the radiation

750

00:28:31,830 --> 00:28:29,520

also doesn't change because the

751

00:28:34,950 --> 00:28:31,840

radiation that juno gets is only around

752

00:28:38,149 --> 00:28:34,960

the closest approach and so it's mostly

753

00:28:40,070 --> 00:28:38,159

orbit driven so the number of orbits is

754

00:28:40,870 --> 00:28:40,080

what drives the radiation

755

00:28:42,950 --> 00:28:40,880

up

756

00:28:44,870 --> 00:28:42,960

and the evolution of the orbits which is

757

00:28:47,990 --> 00:28:44,880

also orbit driven and doesn't change a

758

00:28:50,789 --> 00:28:48,000

lot between the 14 and the 53 day orbit

759

00:28:52,630 --> 00:28:50,799

periods so the radiation dose per orbit

760

00:28:53,909 --> 00:28:52,640

will be about the same like it might be

761

00:28:56,549 --> 00:28:53,919

a little less

762

00:28:58,870 --> 00:28:56,559

in fact and the duration i don't think

763

00:29:02,230 --> 00:28:58,880

causes an issue so you can stay in the

764

00:29:03,909 --> 00:29:02,240

53-day orbits and continue to collect

765

00:29:05,669 --> 00:29:03,919

essentially almost identical science

766

00:29:07,669 --> 00:29:05,679

that you would have gotten on the 14-day

767

00:29:10,710 --> 00:29:07,679

with respect to our

768

00:29:12,950 --> 00:29:10,720

main science objectives and goals

769

00:29:14,630 --> 00:29:12,960

you do run into an issue over a long

770

00:29:16,470 --> 00:29:14,640

period of time if you just stay in there

771

00:29:18,470 --> 00:29:16,480

indefinitely

772

00:29:21,110 --> 00:29:18,480

because eventually jupiter will start

773

00:29:22,549 --> 00:29:21,120

will move around the sun and the orbit

774

00:29:25,430 --> 00:29:22,559

plane will stay

775

00:29:27,350 --> 00:29:25,440

roughly in the same orientation and so

776

00:29:29,590 --> 00:29:27,360

at some point and this is a few years

777

00:29:32,389 --> 00:29:29,600

away you will run into a place where you

778

00:29:34,310 --> 00:29:32,399

have a short eclipse of of maybe six

779

00:29:35,029 --> 00:29:34,320

hours or something we've been able to

780

00:29:37,029 --> 00:29:35,039

see

781

00:29:39,510 --> 00:29:37,039

so if you stayed in the 53-day orbit

782

00:29:41,909 --> 00:29:39,520

eventually you would go into

783

00:29:43,510 --> 00:29:41,919

the shadow of jupiter and we would have

784

00:29:54,549 --> 00:29:43,520

to

785

00:30:01,830 --> 00:29:54,559

haven't really looked at that particular

786

00:30:04,789 --> 00:30:03,070

hi calla

787

00:30:08,149 --> 00:30:04,799

cofieldwithspace.com i just want to

788

00:30:10,070 --> 00:30:08,159

clarify something about with the bands

789

00:30:11,750 --> 00:30:10,080

you said that they're

790

00:30:13,430 --> 00:30:11,760

similar but but there are also

791

00:30:16,710 --> 00:30:13,440

noticeable differences but just to

792

00:30:17,990 --> 00:30:16,720

clarify so far the team thinks that

793

00:30:19,669 --> 00:30:18,000

with those observations you can

794

00:30:22,630 --> 00:30:19,679

definitely say that those bands are

795

00:30:23,669 --> 00:30:22,640

being caused by something below

796

00:30:25,350 --> 00:30:23,679

that

797

00:30:27,669 --> 00:30:25,360

first layer of atmosphere i believe

798

00:30:28,950 --> 00:30:27,679

that's what you said

799

00:30:30,789 --> 00:30:28,960

i don't know if i said that they were

800

00:30:32,230 --> 00:30:30,799

caused by something below although it is

801  
00:30:34,070 --> 00:30:32,240  
telling us something about the deep

802  
00:30:35,830 --> 00:30:34,080  
dynamics

803  
00:30:37,830 --> 00:30:35,840  
i'm not sure i can say anything at this

804  
00:30:40,230 --> 00:30:37,840  
point about what causes those bands it

805  
00:30:42,710 --> 00:30:40,240  
may be chemistry or composition

806  
00:30:46,549 --> 00:30:42,720  
but whatever it is that's causing that

807  
00:30:48,149 --> 00:30:46,559  
is present at the deeper layers um and

808  
00:30:51,269 --> 00:30:48,159  
and although

809  
00:30:53,750 --> 00:30:51,279  
it's evolving so so you know whatever's

810  
00:30:55,830 --> 00:30:53,760  
tied to creating those bands is being

811  
00:30:56,789 --> 00:30:55,840  
twisted around by the dynamics to some

812  
00:30:59,029 --> 00:30:56,799  
extent

813  
00:31:01,190 --> 00:30:59,039

and allowing those bands to move or

814

00:31:02,789 --> 00:31:01,200

change and evolve a little bit as we go

815

00:31:04,710 --> 00:31:02,799

down to deeper layers

816

00:31:06,310 --> 00:31:04,720

um i don't think it's i don't think i

817

00:31:07,909 --> 00:31:06,320

can say anything about

818

00:31:09,509 --> 00:31:07,919

whether the bands are created in those

819

00:31:11,269 --> 00:31:09,519

layers or somewhere deeper down and then

820

00:31:12,789 --> 00:31:11,279

transported up i mean that's something

821

00:31:16,149 --> 00:31:12,799

we may be able to investigate in the

822

00:31:16,159 --> 00:31:21,669

uh yes

823

00:31:26,470 --> 00:31:24,070

patrick so griffith observatory are

824

00:31:30,549 --> 00:31:26,480

there any plans to take images of

825

00:31:35,830 --> 00:31:32,950

yeah uh you want me to sure yeah uh the

826

00:31:38,470 --> 00:31:35,840

answer is yes uh we did actually take

827

00:31:39,669 --> 00:31:38,480

some pictures at perijove on the last

828

00:31:41,590 --> 00:31:39,679

flyby

829

00:31:43,509 --> 00:31:41,600

but what we found was that we had not

830

00:31:45,029 --> 00:31:43,519

set our exposure settings too long

831

00:31:47,509 --> 00:31:45,039

enough we're

832

00:31:49,350 --> 00:31:47,519

taking pictures of a cloud right near

833

00:31:51,430 --> 00:31:49,360

the shadow

834

00:31:53,669 --> 00:31:51,440

so

835

00:31:56,470 --> 00:31:53,679

in a lot of ways that was a test run for

836

00:31:59,269 --> 00:31:56,480

us pair job one and so now we know you

837

00:32:01,190 --> 00:31:59,279

know how much we have to boost our

838

00:32:03,350 --> 00:32:01,200

our exposure time

839

00:32:05,350 --> 00:32:03,360

so you know i i forgot to say something

840

00:32:08,389 --> 00:32:05,360

i want to add we took a real leap of

841

00:32:09,509 --> 00:32:08,399

faith with this um experiment with the

842

00:32:12,070 --> 00:32:09,519

public

843

00:32:14,789 --> 00:32:12,080

that people would actually

844

00:32:16,310 --> 00:32:14,799

think this was cool and and participate

845

00:32:17,990 --> 00:32:16,320

and um

846

00:32:18,789 --> 00:32:18,000

i'm really

847

00:32:20,950 --> 00:32:18,799

so

848

00:32:23,190 --> 00:32:20,960

pleased with the response that we've

849

00:32:26,149 --> 00:32:23,200

gotten i really feel like our leap of

850

00:32:28,149 --> 00:32:26,159

faith was justified

851  
00:32:29,830 --> 00:32:28,159  
yeah let me add something so that you

852  
00:32:31,830 --> 00:32:29,840  
understand uh

853  
00:32:33,750 --> 00:32:31,840  
so when we flew by for the first time

854  
00:32:37,029 --> 00:32:33,760  
with our science instruments on which

855  
00:32:38,950 --> 00:32:37,039  
was august 27th what we call pj-1

856  
00:32:40,310 --> 00:32:38,960  
prior to that we'd gone close to jupiter

857  
00:32:41,990 --> 00:32:40,320  
but everything was turned off because we

858  
00:32:43,909 --> 00:32:42,000  
were getting into orbit right we did an

859  
00:32:47,830 --> 00:32:43,919  
orbit insertion burn

860  
00:32:49,669 --> 00:32:47,840  
so the first flyby on august 27th was

861  
00:32:51,190 --> 00:32:49,679  
not really part of the science mission

862  
00:32:53,590 --> 00:32:51,200  
we had all the science instruments on

863  
00:32:55,509 --> 00:32:53,600

but we wanted to do was test them

864

00:32:58,070 --> 00:32:55,519

calibrate them make sure we understand

865

00:33:00,789 --> 00:32:58,080

how they work close to jupiter

866

00:33:03,110 --> 00:33:00,799

and originally this flyby that was

867

00:33:04,549 --> 00:33:03,120

happened that happens today

868

00:33:07,430 --> 00:33:04,559

was designed to actually change the

869

00:33:09,029 --> 00:33:07,440

orbit and when we opted to go ahead and

870

00:33:11,669 --> 00:33:09,039

put on these science instruments it was

871

00:33:14,710 --> 00:33:11,679

still sort of to just get extra science

872

00:33:17,750 --> 00:33:14,720

our overall plan

873

00:33:20,310 --> 00:33:17,760

didn't really start the primary mapping

874

00:33:22,470 --> 00:33:20,320

phase and data collection that goes into

875

00:33:25,509 --> 00:33:22,480

the gathering the science objectives

876

00:33:28,630 --> 00:33:25,519

until the fourth flyby which it wasn't

877

00:33:29,830 --> 00:33:28,640

scheduled for until another month or so

878

00:33:32,789 --> 00:33:29,840

and so

879

00:33:34,789 --> 00:33:32,799

the data that we collected on pj1 as

880

00:33:36,549 --> 00:33:34,799

candy pointed out was really a test case

881

00:33:39,350 --> 00:33:36,559

we were using that

882

00:33:41,269 --> 00:33:39,360

time to test out exposure rates for the

883

00:33:43,190 --> 00:33:41,279

cameras what are the right ones to use

884

00:33:45,110 --> 00:33:43,200

we've never been this close to jupiter

885

00:33:47,110 --> 00:33:45,120

and all of the instruments had some

886

00:33:49,190 --> 00:33:47,120

aspect like that

887

00:33:51,029 --> 00:33:49,200

obviously most of them got great science

888

00:33:53,029 --> 00:33:51,039

you saw these incredible images that we

889

00:33:56,470 --> 00:33:53,039

got i just showed you the microwave data

890

00:33:57,190 --> 00:33:56,480

that each data set is remarkably uh you

891

00:33:59,750 --> 00:33:57,200

know

892

00:34:01,909 --> 00:33:59,760

unique and discovery like we are seeing

893

00:34:03,750 --> 00:34:01,919

things that we didn't expect

894

00:34:06,870 --> 00:34:03,760

across the board

895

00:34:09,109 --> 00:34:06,880

the magnetic field the aurora the

896

00:34:09,909 --> 00:34:09,119

vis the gravity field every one of them

897

00:34:12,869 --> 00:34:09,919

have

898

00:34:14,470 --> 00:34:12,879

produced outstanding new science results

899

00:34:16,230 --> 00:34:14,480

but this all came somewhat

900

00:34:18,389 --> 00:34:16,240

serendipitously because we were this was

901  
00:34:19,990 --> 00:34:18,399  
really a calibration flyby

902  
00:34:21,909 --> 00:34:20,000  
so we haven't even really started the

903  
00:34:23,750 --> 00:34:21,919  
main science so there's a lot more to

904  
00:34:27,990 --> 00:34:23,760  
come

905  
00:34:31,990 --> 00:34:29,510  
emily lochtawa with the planetary

906  
00:34:34,230 --> 00:34:32,000  
society can you talk anything more about

907  
00:34:36,470 --> 00:34:34,240  
what the spacecraft reported that caused

908  
00:34:38,710 --> 00:34:36,480  
it to enter the safe mode and then can

909  
00:34:40,470 --> 00:34:38,720  
you say anything about the results on

910  
00:34:41,829 --> 00:34:40,480  
any science results on magnetic field or

911  
00:34:43,750 --> 00:34:41,839  
aurora that you've gotten from the first

912  
00:34:44,950 --> 00:34:43,760  
flyby

913  
00:34:45,909 --> 00:34:44,960

um

914

00:34:48,470 --> 00:34:45,919

so

915

00:34:49,909 --> 00:34:48,480

the data is still being looked at and

916

00:34:51,510 --> 00:34:49,919

trying to be understood so i can't

917

00:34:53,349 --> 00:34:51,520

really uh

918

00:34:55,589 --> 00:34:53,359

even take a good educated guess as to

919

00:34:56,950 --> 00:34:55,599

what caused it yet i mean we've we're

920

00:34:58,710 --> 00:34:56,960

we've been able to

921

00:35:01,030 --> 00:34:58,720

make sure the spacecraft was safe we've

922

00:35:03,270 --> 00:35:01,040

changed the data rates to a higher rate

923

00:35:06,230 --> 00:35:03,280

so that we can get the data down and

924

00:35:08,870 --> 00:35:06,240

analyze it but i think it's too early to

925

00:35:10,870 --> 00:35:08,880

take a guess as to what caused it

926

00:35:12,950 --> 00:35:10,880

it did happen pretty far away from

927

00:35:15,349 --> 00:35:12,960

jupiter and so

928

00:35:17,030 --> 00:35:15,359

you know my my instinct is is that it

929

00:35:20,150 --> 00:35:17,040

may not been tied to the intense

930

00:35:21,670 --> 00:35:20,160

radiation belts that we're so fearful of

931

00:35:23,190 --> 00:35:21,680

um that doesn't mean that there isn't

932

00:35:25,030 --> 00:35:23,200

something else in jupiter's environment

933

00:35:27,190 --> 00:35:25,040

that may have caused it there's a lot

934

00:35:30,630 --> 00:35:27,200

there even if you're far away

935

00:35:33,349 --> 00:35:30,640

um now as far as the science results um

936

00:35:36,069 --> 00:35:33,359

we're still uh analyzing a lot of the

937

00:35:38,310 --> 00:35:36,079

stuff was uh was brand new and discovery

938

00:35:40,230 --> 00:35:38,320

like from august 27th

939

00:35:42,790 --> 00:35:40,240

we saw some stuff on the aurora we

940

00:35:45,109 --> 00:35:42,800

released an infrared image that was

941

00:35:47,349 --> 00:35:45,119

pretty remarkable i'll show that again

942

00:35:49,190 --> 00:35:47,359

at the talk later today

943

00:35:51,829 --> 00:35:49,200

but we're still analyzing what all that

944

00:35:54,069 --> 00:35:51,839

means as far as the magnetic field it

945

00:35:56,630 --> 00:35:54,079

also when we got really close we saw

946

00:35:57,990 --> 00:35:56,640

that the magnetic field was stronger and

947

00:35:59,349 --> 00:35:58,000

which means it's a little different than

948

00:36:01,190 --> 00:35:59,359

we expected

949

00:36:03,430 --> 00:36:01,200

but we're still analyzing what that all

950

00:36:05,270 --> 00:36:03,440

means and you may need more flybys to

951

00:36:06,950 --> 00:36:05,280

fully sort that out

952

00:36:09,910 --> 00:36:06,960

so there are some great discoveries

953

00:36:12,310 --> 00:36:09,920

coming um but we're not quite ready to

954

00:36:14,069 --> 00:36:12,320

tell you uh what the interpretation is

955

00:36:15,109 --> 00:36:14,079

because we're it's sort of work in

956

00:36:17,990 --> 00:36:15,119

progress

957

00:36:21,829 --> 00:36:18,000

we are aiming toward um

958

00:36:24,550 --> 00:36:21,839

talks at the agu a few months from now

959

00:36:26,390 --> 00:36:24,560

and the first science papers and so we

960

00:36:28,710 --> 00:36:26,400

hope that we'll have more of

961

00:36:31,990 --> 00:36:28,720

this data interpreted and presented

962

00:36:35,670 --> 00:36:32,870

uh

963

00:36:37,990 --> 00:36:35,680

rick do we have any questions online

964

00:36:39,430 --> 00:36:38,000

yes we have quite a few i apologize if

965

00:36:41,589 --> 00:36:39,440

some of these overlap with some of the

966

00:36:43,990 --> 00:36:41,599

other ones there's such a stream of text

967

00:36:45,670 --> 00:36:44,000

here that it's hard to sort it all out

968

00:36:48,390 --> 00:36:45,680

this first set of questions comes from

969

00:36:50,870 --> 00:36:48,400

dave mosher from business insider

970

00:36:52,310 --> 00:36:50,880

um well actually he just asked what what

971

00:36:53,910 --> 00:36:52,320

do you think caused the safe mode but

972

00:36:55,589 --> 00:36:53,920

that's been answered so

973

00:36:58,630 --> 00:36:55,599

how long might the mission have to be

974

00:37:01,190 --> 00:36:58,640

extended if the mission or if the engine

975

00:37:03,349 --> 00:37:01,200

is never fired and the spacecraft is

976  
00:37:05,109 --> 00:37:03,359  
stuck in 53-day orbits

977  
00:37:06,950 --> 00:37:05,119  
are you guaranteed some minimum number

978  
00:37:09,910 --> 00:37:06,960  
of passes or would you are you

979  
00:37:10,870 --> 00:37:09,920  
guaranteed an extension or not

980  
00:37:12,870 --> 00:37:10,880  
well

981  
00:37:16,150 --> 00:37:12,880  
we know

982  
00:37:17,990 --> 00:37:16,160  
we can stay in that 53-day orbit

983  
00:37:20,790 --> 00:37:18,000  
as far as safety goes

984  
00:37:24,310 --> 00:37:20,800  
we do run into the eclipses eventually

985  
00:37:27,430 --> 00:37:24,320  
and those are i think in the um

986  
00:37:29,510 --> 00:37:27,440  
the middle of 2019 and so

987  
00:37:32,710 --> 00:37:29,520  
we can get um

988  
00:37:35,109 --> 00:37:32,720

i don't think that happens until like 20

989

00:37:37,270 --> 00:37:35,119

53 day orbit so you get a lot of orbits

990

00:37:39,510 --> 00:37:37,280

and you have a lot of time to to study

991

00:37:41,750 --> 00:37:39,520

the rocket motor or decide if there's a

992

00:37:43,430 --> 00:37:41,760

way to get around the eclipses

993

00:37:47,190 --> 00:37:43,440

and you can accomplish an incredible

994

00:37:52,230 --> 00:37:49,589

a related question from maddie stone of

995

00:37:55,829 --> 00:37:52,240

gizmodo is

996

00:37:57,750 --> 00:37:55,839

how long do you have to decide uh or how

997

00:37:59,670 --> 00:37:57,760

late can you decide when to switch to a

998

00:38:01,430 --> 00:37:59,680

14-day orbit or is there some point in

999

00:38:04,870 --> 00:38:01,440

the mission where you just kind of have

1000

00:38:07,589 --> 00:38:04,880

to stay in the longer orbit there's no

1001  
00:38:10,150 --> 00:38:07,599  
specific time that uh where you run out

1002  
00:38:11,430 --> 00:38:10,160  
and you can't change to a 14-day orbit

1003  
00:38:14,150 --> 00:38:11,440  
that's one of the beauties of the

1004  
00:38:15,829 --> 00:38:14,160  
flexibility we have in the design

1005  
00:38:18,390 --> 00:38:15,839  
we can do that at almost any time once

1006  
00:38:20,870 --> 00:38:18,400  
we decide we're ready to do it

1007  
00:38:23,349 --> 00:38:20,880  
again you would need to do it sometime

1008  
00:38:25,349 --> 00:38:23,359  
prior to the eclipse or have some way to

1009  
00:38:27,109 --> 00:38:25,359  
get through the eclipse if you did it

1010  
00:38:29,190 --> 00:38:27,119  
really late

1011  
00:38:29,990 --> 00:38:29,200  
but that that decision wouldn't happen

1012  
00:38:31,190 --> 00:38:30,000  
until

1013  
00:38:32,630 --> 00:38:31,200

i mean you won't

1014

00:38:36,630 --> 00:38:32,640

get to that point where you have to make

1015

00:38:38,310 --> 00:38:36,640

that kind of a decision until 2019.

1016

00:38:42,230 --> 00:38:38,320

okay and here's a quick question from

1017

00:38:44,310 --> 00:38:42,240

alex telechev of ria novosti in russia

1018

00:38:46,150 --> 00:38:44,320

this question also for scott what do you

1019

00:38:48,550 --> 00:38:46,160

think at this point is the worst case

1020

00:38:55,510 --> 00:38:48,560

scenario

1021

00:38:59,510 --> 00:38:57,430

where science is still going to be

1022

00:39:01,510 --> 00:38:59,520

obtained in the exact same way that we

1023

00:39:02,790 --> 00:39:01,520

had planned the 53-day geometry is

1024

00:39:06,069 --> 00:39:02,800

pretty much the same the science

1025

00:39:09,109 --> 00:39:07,190

i get

1026  
00:39:11,510 --> 00:39:09,119  
there's a plus side we have more time to

1027  
00:39:13,430 --> 00:39:11,520  
analyze and interpret the science

1028  
00:39:15,270 --> 00:39:13,440  
and so you can dive in deeper to each

1029  
00:39:19,030 --> 00:39:15,280  
data set than you were going to be able

1030  
00:39:21,990 --> 00:39:19,040  
to but the bottom line is is i have to

1031  
00:39:25,910 --> 00:39:22,000  
to wait and i'm generally impatient and

1032  
00:39:35,270 --> 00:39:27,109  
okay

1033  
00:39:39,829 --> 00:39:37,109  
matt kaplan also from the planetary

1034  
00:39:41,190 --> 00:39:39,839  
society for candice orscott

1035  
00:39:43,109 --> 00:39:41,200  
with that remarkable image of the

1036  
00:39:45,190 --> 00:39:43,119  
cyclone on the terminator or for any

1037  
00:39:47,109 --> 00:39:45,200  
other reason are there new science

1038  
00:39:51,990 --> 00:39:47,119

objectives for junocam that would

1039

00:39:55,910 --> 00:39:54,069

so we've always

1040

00:39:59,829 --> 00:39:55,920

thought that we would do some science

1041

00:40:02,069 --> 00:39:59,839

with junocam but because it's um

1042

00:40:03,430 --> 00:40:02,079

one of the main goals is to do the

1043

00:40:05,910 --> 00:40:03,440

outreach

1044

00:40:07,910 --> 00:40:05,920

what i have told my colleagues

1045

00:40:10,710 --> 00:40:07,920

is that if they want a picture of a

1046

00:40:12,870 --> 00:40:10,720

particular storm or belt or zone they

1047

00:40:14,150 --> 00:40:12,880

need to put a point of interest into our

1048

00:40:16,790 --> 00:40:14,160

database

1049

00:40:18,630 --> 00:40:16,800

they need to discuss why it's important

1050

00:40:21,829 --> 00:40:18,640

and then they have to round up the votes

1051

00:40:24,870 --> 00:40:21,839

when it comes time to vote

1052

00:40:26,470 --> 00:40:24,880

and be a part of the process and i think

1053

00:40:28,230 --> 00:40:26,480

that will add a

1054

00:40:30,309 --> 00:40:28,240

a very a lot of richness to the

1055

00:40:33,990 --> 00:40:30,319

conversation because we'll have

1056

00:40:37,589 --> 00:40:34,000

scientists advocating for their targets

1057

00:40:38,950 --> 00:40:37,599

in the midst of a public discussion

1058

00:40:40,550 --> 00:40:38,960

um

1059

00:40:42,950 --> 00:40:40,560

i think we're all gonna

1060

00:40:45,670 --> 00:40:42,960

have fun doing that

1061

00:40:47,109 --> 00:40:45,680

okay one last question

1062

00:40:51,349 --> 00:40:47,119

emily

1063

00:40:53,990 --> 00:40:51,359

know that your plans have now had to

1064

00:40:55,829 --> 00:40:54,000

change for imaging for um going through

1065

00:40:57,430 --> 00:40:55,839

the next apo jove and next pair joe can

1066

00:40:59,109 --> 00:40:57,440

you talk a little bit about how your uh

1067

00:41:00,870 --> 00:40:59,119

imaging plans have changed uh when's the

1068

00:41:02,710 --> 00:41:00,880

camera going to turn back on and when

1069

00:41:04,790 --> 00:41:02,720

can we start seeing rapid release of the

1070

00:41:06,950 --> 00:41:04,800

raw images

1071

00:41:08,470 --> 00:41:06,960

uh yeah i mean we thought we would have

1072

00:41:10,710 --> 00:41:08,480

some today

1073

00:41:12,470 --> 00:41:10,720

uh there is a piece of spacecraft data

1074

00:41:15,190 --> 00:41:12,480

that we have to wait for

1075

00:41:16,790 --> 00:41:15,200

uh to to complete the the raw the

1076

00:41:18,790 --> 00:41:16,800

initial processing

1077

00:41:20,390 --> 00:41:18,800

uh that has to do with the rotation rate

1078

00:41:23,750 --> 00:41:20,400

of the spacecraft so

1079

00:41:26,630 --> 00:41:23,760

that it is like two days so our plan on

1080

00:41:29,430 --> 00:41:26,640

every uh perijove is that as soon as we

1081

00:41:32,230 --> 00:41:29,440

get that spacecraft data we start

1082

00:41:34,309 --> 00:41:32,240

posting our images so there's no

1083

00:41:35,750 --> 00:41:34,319

holding back or validating or anything

1084

00:41:37,910 --> 00:41:35,760

like that they'll go right out as soon

1085

00:41:40,790 --> 00:41:37,920

as we have that last piece

1086

00:41:41,589 --> 00:41:40,800

um now obviously we won't have any going

1087

00:41:43,430 --> 00:41:41,599

out

1088

00:41:44,230 --> 00:41:43,440

it would would have been friday of this

1089

00:41:46,870 --> 00:41:44,240

week

1090

00:41:49,510 --> 00:41:46,880

um at the next pair of jove however

1091

00:41:51,829 --> 00:41:49,520

uh we we will

1092

00:41:53,829 --> 00:41:51,839

plan to take images

1093

00:41:55,990 --> 00:41:53,839

um one of the things that we learned

1094

00:41:59,670 --> 00:41:56,000

from the first perijove flyby is that

1095

00:42:02,390 --> 00:41:59,680

it's very important to get context

1096

00:42:05,270 --> 00:42:02,400

so we will take a series of images as

1097

00:42:07,670 --> 00:42:05,280

we're approaching the last 10 hours

1098

00:42:09,430 --> 00:42:07,680

and then we will do a series through the

1099

00:42:10,870 --> 00:42:09,440

pair joe pass

1100

00:42:14,870 --> 00:42:10,880

and then

1101  
00:42:21,190 --> 00:42:18,390  
now we've been debating about putting

1102  
00:42:24,230 --> 00:42:21,200  
that out for a vote because we're not

1103  
00:42:25,190 --> 00:42:24,240  
really quite done with our our testing

1104  
00:42:26,550 --> 00:42:25,200  
um

1105  
00:42:28,470 --> 00:42:26,560  
because of some of the things that we

1106  
00:42:29,430 --> 00:42:28,480  
learned at perijove1 we want to try some

1107  
00:42:31,510 --> 00:42:29,440  
new things

1108  
00:42:33,589 --> 00:42:31,520  
the next time we image

1109  
00:42:34,790 --> 00:42:33,599  
but we probably will put maybe half the

1110  
00:42:35,589 --> 00:42:34,800  
data volume

1111  
00:42:37,829 --> 00:42:35,599  
uh

1112  
00:42:40,390 --> 00:42:37,839  
we'll allocate to be

1113  
00:42:42,150 --> 00:42:40,400

chosen by vote and and reserve half for

1114

00:42:44,470 --> 00:42:42,160

testing but but that's not our plan

1115

00:42:46,309 --> 00:42:44,480

going forward our plan as soon as we've

1116

00:42:48,710 --> 00:42:46,319

figured out how to really get the best

1117

00:42:49,510 --> 00:42:48,720

out of these the camera settings

1118

00:42:52,069 --> 00:42:49,520

then

1119

00:42:54,309 --> 00:42:52,079

we will have it all by public debate and

1120

00:42:56,950 --> 00:42:54,319

voting

1121

00:42:59,430 --> 00:42:56,960

okay uh with that we'll conclude this

1122

00:43:01,589 --> 00:42:59,440

press conference we thank david shirts

1123

00:43:03,270 --> 00:43:01,599

scott bolton and candy hanson

1124

00:43:05,430 --> 00:43:03,280

for the wonderful presentations and

1125

00:43:07,510 --> 00:43:05,440

everyone else for being here uh please

1126

00:43:09,990 --> 00:43:07,520

join us tomorrow at

1127

00:43:11,670 --> 00:43:10,000

12 30 for the last press conference of

1128

00:43:14,150 --> 00:43:11,680

this meeting

1129

00:43:15,589 --> 00:43:14,160

we have a wide variety of interesting