1
00:00:16,630 --> 00:00:14,549
i'd like to welcome everybody to

2
00:00:18,230 --> 00:00:16,640
nasa's guided space flight center

3
00:00:20,790 --> 00:00:18,240
we're holding this uh special briefing

4
00:00:22,710 --> 00:00:20,800
today to discuss the largest fragment of

5
00:00:23,910 --> 00:00:22,720
comet shoemaker levy to strike jupiter

6
00:00:26,150 --> 00:00:23,920
so far

7
00:00:27,830 --> 00:00:26,160
that fragment fragment g

8
00:00:30,070 --> 00:00:27,840
struck the planet early this morning and

9
00:00:31,189 --> 00:00:30,080
has produced some pretty exciting uh

10
00:00:33,590 --> 00:00:31,199
results

11
00:00:35,510 --> 00:00:33,600
with us here are gene shoemaker

12
00:00:36,310 --> 00:00:35,520
co-discoverer of the comet

13
00:00:38,709 --> 00:00:36,320

and

14
00:00:39,670 --> 00:00:38,719
with him heidi hamill of mit

15
00:00:41,590 --> 00:00:39,680
gene

16
00:00:43,590 --> 00:00:41,600
thanks mike

17
00:00:46,069 --> 00:00:43,600
we're really here to hear from heidi

18
00:00:46,950 --> 00:00:46,079
who's got some spectacular stuff to show

19
00:00:50,630 --> 00:00:46,960
you

20
00:00:52,549 --> 00:00:50,640
the principal investigator the leader of

21
00:00:55,029 --> 00:00:52,559
the imaging team

22
00:00:57,029 --> 00:00:55,039
on hubble for these observations so

23
00:00:58,709 --> 00:00:57,039
she's re reporting for

24
00:00:59,750 --> 00:00:58,719
for the team for these very exciting

25
00:01:01,270 --> 00:00:59,760
results

26
00:01:05,109 --> 00:01:01,280
thanks gene

27
00:01:07,270 --> 00:01:05,119
it was just 12 hours ago that g hit

28
00:01:09,109 --> 00:01:07,280
so we've been working very hard in the

29
00:01:10,550 --> 00:01:09,119
last half day to be to be able to bring

30
00:01:12,550 --> 00:01:10,560
you these images

31
00:01:14,469 --> 00:01:12,560
and i'm sure that in a few days we'll

32
00:01:16,390 --> 00:01:14,479
have a lot more to show you right now we

33
00:01:18,630 --> 00:01:16,400
just have black and white pictures no

34
00:01:20,950 --> 00:01:18,640
color just hang on

35
00:01:23,510 --> 00:01:20,960
so i'll just uh cut straight to it and

36
00:01:25,910 --> 00:01:23,520
show you some of the images we were

37
00:01:27,510 --> 00:01:25,920
lucky enough to be observing right when

38
00:01:29,270 --> 00:01:27,520

this thing happened

39
00:01:31,429 --> 00:01:29,280
we have one image before the sequence

40
00:01:33,990 --> 00:01:31,439
which shows nothing then you can see a

41
00:01:36,069 --> 00:01:34,000
tiny tip of the fireball

42
00:01:39,590 --> 00:01:36,079
and just a few minutes later five

43
00:01:41,270 --> 00:01:39,600
minutes later the the plume is growing

44
00:01:42,390 --> 00:01:41,280
three minutes later it's grown even

45
00:01:44,230 --> 00:01:42,400
larger

46
00:01:46,870 --> 00:01:44,240
three minutes after that it seems to

47
00:01:49,429 --> 00:01:46,880
have stabilized reached peak altitude

48
00:01:51,670 --> 00:01:49,439
but started to spread and then we have a

49
00:01:53,510 --> 00:01:51,680
seven minute gap and you can see that

50
00:01:56,230 --> 00:01:53,520
it's completely flattened out into that

51
00:01:58,230 --> 00:01:56,240
pancake again we have about

52
00:02:01,590 --> 00:01:58,240
three or four more images all showing

53
00:02:03,990 --> 00:02:01,600
that that flat pancake just hanging in

54
00:02:05,830 --> 00:02:04,000
there and then we start to see it rotate

55
00:02:08,389 --> 00:02:05,840
onto the disc

56
00:02:11,190 --> 00:02:08,399
we then an hour and a half later took a

57
00:02:13,030 --> 00:02:11,200
series of images with this impact site

58
00:02:15,910 --> 00:02:13,040
rotated onto the disk and i'd like to

59
00:02:18,869 --> 00:02:15,920
show you that particular view right now

60
00:02:20,710 --> 00:02:18,879
we were using the planetary camera and

61
00:02:22,550 --> 00:02:20,720
we can't fit the whole image of jupiter

62
00:02:24,949 --> 00:02:22,560
in the planetary camera because it's

63
00:02:27,670 --> 00:02:24,959

very high resolution camera you can

64
00:02:28,630 --> 00:02:27,680
clearly see the impact site

65
00:02:30,390 --> 00:02:28,640
now

66
00:02:32,630 --> 00:02:30,400
remember a few days ago i showed you a

67
00:02:35,589 --> 00:02:32,640
picture with a box and i said the box

68
00:02:37,910 --> 00:02:35,599
was the size two earth diameters let me

69
00:02:40,630 --> 00:02:37,920
give you a sense of scale here

70
00:02:42,390 --> 00:02:40,640
you can see a little bright ring and if

71
00:02:45,110 --> 00:02:42,400
you could keep the graphic up so people

72
00:02:47,430 --> 00:02:45,120
can see it at the other places

73
00:02:49,589 --> 00:02:47,440
there's a bright spot and there's a

74
00:02:52,229 --> 00:02:49,599
little dark ring you can see around the

75
00:02:54,229 --> 00:02:52,239
spot and then you see a larger sort of

76
00:02:56,869 --> 00:02:54,239
smudge to the south

77
00:02:59,830 --> 00:02:56,879
that little dark ring is 80 percent of

78
00:03:02,550 --> 00:02:59,840
the size of the earth

79
00:03:05,990 --> 00:03:02,560
that large ring that big smudge you

80
00:03:07,589 --> 00:03:06,000
could easily fit the earth inside that

81
00:03:11,350 --> 00:03:07,599
diameter

82
00:03:13,350 --> 00:03:11,360
this is one big impact site

83
00:03:16,229 --> 00:03:13,360
it looks a little oval because we're

84
00:03:17,589 --> 00:03:16,239
very far south and we're also close to

85
00:03:19,589 --> 00:03:17,599
the edge of jupiter so you have an

86
00:03:21,830 --> 00:03:19,599
interesting projection effect let me

87
00:03:23,670 --> 00:03:21,840
show you a blow up of that this is a

88
00:03:25,430 --> 00:03:23,680

blow up in the green wavelength and then

89
00:03:28,470 --> 00:03:25,440
you can see more clearly that ring i was

90
00:03:30,390 --> 00:03:28,480
talking about now when we project that

91
00:03:31,750 --> 00:03:30,400
out as to what it would look like if we

92
00:03:33,830 --> 00:03:31,760
were looking straight on that ring is

93
00:03:36,309 --> 00:03:33,840
perfectly circular

94
00:03:37,750 --> 00:03:36,319
and so is that larger white ring around

95
00:03:46,229 --> 00:03:37,760
it

96
00:03:48,229 --> 00:03:46,239
earlier and so g just barely missed

97
00:03:49,750 --> 00:03:48,239
hitting d and i'll get back to that

98
00:03:50,710 --> 00:03:49,760
effect later on

99
00:03:52,630 --> 00:03:50,720
um

100
00:03:54,229 --> 00:03:52,640
what something very interesting that you

101
00:03:55,190 --> 00:03:54,239
might be able to see in these graphics

102
00:03:57,110 --> 00:03:55,200
is that

103
00:03:59,110 --> 00:03:57,120
as before there's sort of a streak

104
00:04:01,670 --> 00:03:59,120
there's the center of the ring and then

105
00:04:04,070 --> 00:04:01,680
a smudge off to the side very black sort

106
00:04:06,710 --> 00:04:04,080
of thing if you look very carefully now

107
00:04:09,429 --> 00:04:06,720
in that smudge around to the south

108
00:04:11,110 --> 00:04:09,439
you might see rays

109
00:04:13,670 --> 00:04:11,120
you see those rays

110
00:04:16,629 --> 00:04:13,680
okay if you look very carefully you will

111
00:04:19,590 --> 00:04:16,639
notice that those rays do not appear to

112
00:04:21,830 --> 00:04:19,600
point to the center of the ring

113
00:04:24,390 --> 00:04:21,840

they appear to a point they appear to

114
00:04:26,710 --> 00:04:24,400
point towards where that smudge

115
00:04:29,110 --> 00:04:26,720
intersects the ring

116
00:04:30,790 --> 00:04:29,120
that's very interesting

117
00:04:33,110 --> 00:04:30,800
let's show the next image this is a

118
00:04:35,270 --> 00:04:33,120
green image the following image you see

119
00:04:37,189 --> 00:04:35,280
is the methane band image which i've

120
00:04:39,430 --> 00:04:37,199
shown you before remember i talked about

121
00:04:41,350 --> 00:04:39,440
green visual wavelengths it's dark in

122
00:04:43,350 --> 00:04:41,360
the methane band image it's bright and

123
00:04:45,030 --> 00:04:43,360
there you can see this even more clearly

124
00:04:47,189 --> 00:04:45,040
you see those rays that are emanating

125
00:04:49,909 --> 00:04:47,199
from that intersection of the bright

126
00:04:52,710 --> 00:04:49,919
ring and that central streak

127
00:04:55,909 --> 00:04:52,720
we don't know quite what this means yet

128
00:04:57,430 --> 00:04:55,919
but but i have a theory and and i'm sure

129
00:04:58,790 --> 00:04:57,440
everybody has theories but since i'm

130
00:05:00,870 --> 00:04:58,800
here in front of you i'll tell you my

131
00:05:04,790 --> 00:05:00,880
theory and then gene can tell you his

132
00:05:08,390 --> 00:05:04,800
theory uh my theory is this that the the

133
00:05:10,790 --> 00:05:08,400
lower southern portion of that streak

134
00:05:12,710 --> 00:05:10,800
is the impact site itself

135
00:05:15,189 --> 00:05:12,720
and that what happens is this thing

136
00:05:16,870 --> 00:05:15,199
streaks in there keep the graphic up so

137
00:05:19,110 --> 00:05:16,880
people can visualize what i'm saying

138
00:05:21,510 --> 00:05:19,120

here either either color

139
00:05:23,909 --> 00:05:21,520
it's it goes into the lower part and

140
00:05:27,110 --> 00:05:23,919
streaks down into the atmosphere and at

141
00:05:29,270 --> 00:05:27,120
some point it explodes and that cir that

142
00:05:30,870 --> 00:05:29,280
bright circular ring is centered on the

143
00:05:33,270 --> 00:05:30,880
impact site

144
00:05:34,150 --> 00:05:33,280
right then the fireball

145
00:05:35,990 --> 00:05:34,160
comes

146
00:05:38,550 --> 00:05:36,000
portions of the fireball move back out

147
00:05:41,029 --> 00:05:38,560
the impact site and spew out when they

148
00:05:42,950 --> 00:05:41,039
get to the to the top to the hole and

149
00:05:45,670 --> 00:05:42,960
that's why those rays are centered on

150
00:05:46,710 --> 00:05:45,680
the end and not on the center of the

151
00:05:49,029 --> 00:05:46,720
ring

152
00:05:51,350 --> 00:05:49,039
now remind you this is just my theory

153
00:05:53,110 --> 00:05:51,360
and i'm not a theorist i'm an

154
00:05:55,590 --> 00:05:53,120
observational astronomer but that's what

155
00:05:57,189 --> 00:05:55,600
the observations sure look like to me

156
00:05:59,110 --> 00:05:57,199
now the question is why is that whole

157
00:06:00,870 --> 00:05:59,120
streak bright

158
00:06:03,670 --> 00:06:00,880
and that could very well be that that

159
00:06:05,350 --> 00:06:03,680
whole tube is just very very very hot

160
00:06:07,270 --> 00:06:05,360
and it's ionized and

161
00:06:09,430 --> 00:06:07,280
and gene might tell you later that that

162
00:06:11,430 --> 00:06:09,440
all of it's rising but that some of it

163
00:06:13,909 --> 00:06:11,440

spews out the end there

164
00:06:16,150 --> 00:06:13,919
so so that's my that's my personal

165
00:06:18,230 --> 00:06:16,160
theory about what that image shows but

166
00:06:19,990 --> 00:06:18,240
we're going to have to do a lot of work

167
00:06:21,590 --> 00:06:20,000
before we can say for sure that's what's

168
00:06:24,150 --> 00:06:21,600
really happening

169
00:06:30,230 --> 00:06:25,590
the

170
00:06:33,029 --> 00:06:30,240
was probably about 25 times larger than

171
00:06:35,350 --> 00:06:33,039
that first impact we showed you and that

172
00:06:38,390 --> 00:06:35,360
jives very well with the sizes of these

173
00:06:39,510 --> 00:06:38,400
things this is a much larger splotch on

174
00:06:41,830 --> 00:06:39,520
jupiter

175
00:06:44,550 --> 00:06:41,840
and very likely this splotch will be

176
00:06:45,909 --> 00:06:44,560
spreading out as the days go by one

177
00:06:47,430 --> 00:06:45,919
interesting thing that i don't have a

178
00:06:49,909 --> 00:06:47,440
graphic to show you but i'll share with

179
00:06:52,390 --> 00:06:49,919
you is in one of our wavelengths

180
00:06:55,110 --> 00:06:52,400
we can tell that this material is very

181
00:06:57,830 --> 00:06:55,120
very thin this big that big brown smudge

182
00:07:00,150 --> 00:06:57,840
the the black eye on jupiter as it were

183
00:07:02,070 --> 00:07:00,160
that smudge is very thin because we can

184
00:07:02,950 --> 00:07:02,080
see the bands of jupiter right through

185
00:07:07,350 --> 00:07:02,960
it

186
00:07:09,189 --> 00:07:07,360
so

187
00:07:11,189 --> 00:07:09,199
i think that's about all i have to say

188
00:07:13,510 --> 00:07:11,199

right now we're going to be working very

189
00:07:16,710 --> 00:07:13,520
hard over the next few days to analyze

190
00:07:18,870 --> 00:07:16,720
these data and i should add that we are

191
00:07:21,029 --> 00:07:18,880
not the only observatory in the world

192
00:07:23,589 --> 00:07:21,039
watching this many observatories around

193
00:07:25,670 --> 00:07:23,599
the country have been focused on this

194
00:07:27,510 --> 00:07:25,680
and are reporting very exciting results

195
00:07:29,430 --> 00:07:27,520
in the infrared they've been studying

196
00:07:32,390 --> 00:07:29,440
that plume in the infrared they're

197
00:07:34,070 --> 00:07:32,400
seeing the spot in the infrared

198
00:07:35,749 --> 00:07:34,080
all over the world people are tracking

199
00:07:37,510 --> 00:07:35,759
this

200
00:07:39,990 --> 00:07:37,520
okay thanks heidi

201
00:07:42,070 --> 00:07:40,000
uh i wonder if you want to mention

202
00:07:43,749 --> 00:07:42,080
uh the actual height the maximum height

203
00:07:45,270 --> 00:07:43,759
that we see above the limb there i don't

204
00:07:47,830 --> 00:07:45,280
think you may that's a good thing to

205
00:07:50,309 --> 00:07:47,840
mention um in that plume when we saw

206
00:07:52,790 --> 00:07:50,319
where it peaked out at some level

207
00:07:56,869 --> 00:07:52,800
that we looks like we are seeing that

208
00:07:59,189 --> 00:07:56,879
about 2 200 kilometers above the limb of

209
00:08:01,909 --> 00:07:59,199
jupiter and i'll remind you that the

210
00:08:05,189 --> 00:08:01,919
impact sequence we showed a few whenever

211
00:08:06,150 --> 00:08:05,199
it was yesterday um there you go that

212
00:08:08,070 --> 00:08:06,160
only

213
00:08:10,830 --> 00:08:08,080

got about a little over a thousand

214
00:08:13,510 --> 00:08:10,840
kilometers so this is a factor of two

215
00:08:16,790 --> 00:08:13,520
higher okay great

216
00:08:19,110 --> 00:08:16,800
uh i'd like to make a uh

217
00:08:21,430 --> 00:08:19,120
heidi mentioned the energies

218
00:08:23,670 --> 00:08:21,440
and we sort of had a top of the

219
00:08:25,189 --> 00:08:23,680
head estimate of the energy this morning

220
00:08:26,629 --> 00:08:25,199
which i hadn't had a chance to actually

221
00:08:29,189 --> 00:08:26,639
calculate out i like to make a

222
00:08:31,749 --> 00:08:29,199
correction for everybody

223
00:08:33,430 --> 00:08:31,759
because we were multiplying by the wrong

224
00:08:35,509 --> 00:08:33,440
number to begin with it doesn't change

225
00:08:36,870 --> 00:08:35,519
our estimates of the sizes of the

226
00:08:40,149 --> 00:08:36,880
objects

227
00:08:42,790 --> 00:08:40,159
or the energy in ergs but it is a change

228
00:08:44,550 --> 00:08:42,800
if you want to put it into megatons so

229
00:08:46,870 --> 00:08:44,560
our best estimate or my best estimate

230
00:08:49,829 --> 00:08:46,880
for the energy for g

231
00:08:52,230 --> 00:08:49,839
uh is not the 250 million megatons we

232
00:08:53,670 --> 00:08:52,240
mentioned this morning but it's six

233
00:08:56,470 --> 00:08:53,680
6 million

234
00:08:58,470 --> 00:08:56,480
megatons that's still a lot of megatons

235
00:09:00,230 --> 00:08:58,480
but please make that correction and

236
00:09:02,790 --> 00:09:00,240
correspondingly for

237
00:09:06,870 --> 00:09:02,800
for a the real number should be about

238
00:09:09,750 --> 00:09:06,880

225 000 megatons that's still a lot of

239
00:09:12,630 --> 00:09:09,760
megatons uh but those uh that's just

240
00:09:14,630 --> 00:09:12,640
just a slip uh in in the ballpark

241
00:09:15,590 --> 00:09:14,640
estimate i made earlier so please

242
00:09:18,630 --> 00:09:15,600
correct

243
00:09:20,949 --> 00:09:18,640
uh those numbers if you will

244
00:09:23,190 --> 00:09:20,959
mike we'll turn it back to you okay

245
00:09:24,470 --> 00:09:23,200
we'll take questions now and uh later

246
00:09:26,870 --> 00:09:24,480
see if there are questions from any

247
00:09:28,470 --> 00:09:26,880
other nasa centers uh please wait for

248
00:09:31,910 --> 00:09:28,480
the mic and state your name and

249
00:09:34,310 --> 00:09:33,350
bob cook newsday you mentioned there

250
00:09:35,910 --> 00:09:34,320
might be so you're going to talk

251
00:09:39,430 --> 00:09:35,920
something about the interaction between

252
00:09:41,350 --> 00:09:39,440
g and d perhaps that's great um actually

253
00:09:42,710 --> 00:09:41,360
that was a teaser so someone asked me

254
00:09:44,310 --> 00:09:42,720
this question because i have something

255
00:09:46,790 --> 00:09:44,320
that i want to talk about that's even

256
00:09:49,430 --> 00:09:46,800
more exciting and that is some of you

257
00:09:52,790 --> 00:09:49,440
have heard about the q impact q used to

258
00:09:54,230 --> 00:09:52,800
be the brightest one before g took over

259
00:09:55,990 --> 00:09:54,240
and for a lot when we were doing our

260
00:09:58,470 --> 00:09:56,000
planning sequences early on we were

261
00:09:59,430 --> 00:09:58,480
planning on q as our primary target not

262
00:10:00,389 --> 00:09:59,440
g

263
00:10:02,470 --> 00:10:00,399

well

264
00:10:04,790 --> 00:10:02,480
when q goes in and i don't remember the

265
00:10:06,230 --> 00:10:04,800
time the date some sometime tomorrow or

266
00:10:07,590 --> 00:10:06,240
the next day

267
00:10:08,710 --> 00:10:07,600
a very interesting thing is going to

268
00:10:11,829 --> 00:10:08,720
happen

269
00:10:15,110 --> 00:10:11,839
q is going to go in and exactly one

270
00:10:18,150 --> 00:10:15,120
jovian rotation later 10 hours

271
00:10:21,269 --> 00:10:18,160
r is going to hit right next to the very

272
00:10:24,710 --> 00:10:21,279
same longitude as q

273
00:10:26,949 --> 00:10:24,720
and one jovian rotation after that s is

274
00:10:27,990 --> 00:10:26,959
going to hit the same longitude on

275
00:10:30,710 --> 00:10:28,000
jupiter

276
00:10:32,389 --> 00:10:30,720
so you're going to have three boom boom

277
00:10:34,949 --> 00:10:32,399
boom right on the very

278
00:10:36,630 --> 00:10:34,959
very small range of longitude

279
00:10:38,630 --> 00:10:36,640
and that is going to make one heck of a

280
00:10:40,150 --> 00:10:38,640
mess

281
00:10:42,310 --> 00:10:40,160
well we're really looking forward to

282
00:10:44,310 --> 00:10:42,320
that that's the um

283
00:10:45,990 --> 00:10:44,320
well not messes but we're looking

284
00:10:48,069 --> 00:10:46,000
forward to some really interesting

285
00:10:49,110 --> 00:10:48,079
chemistry because what that means is you

286
00:10:50,470 --> 00:10:49,120
know you're not just taking the

287
00:10:52,790 --> 00:10:50,480
atmosphere and stirring it up a little

288
00:10:55,750 --> 00:10:52,800

bit you're really stirring the

289
00:10:57,670 --> 00:10:55,760
atmosphere up a lot so that that'll be

290
00:10:59,430 --> 00:10:57,680
very interesting and that's that's why i

291
00:11:01,350 --> 00:10:59,440
mentioned those the proximity of those

292
00:11:03,110 --> 00:11:01,360
two impact sites

293
00:11:07,590 --> 00:11:03,120
bill

294
00:11:11,430 --> 00:11:07,600
one the the very clearly defined ring

295
00:11:13,190 --> 00:11:11,440
around the central thing

296
00:11:15,430 --> 00:11:13,200
great question awfully sharply defined

297
00:11:17,509 --> 00:11:15,440
and the other one is if you can see the

298
00:11:19,190 --> 00:11:17,519
cloud bands below the smudge you're

299
00:11:21,350 --> 00:11:19,200
seeing through it i suppose

300
00:11:22,949 --> 00:11:21,360
is there no wind at all at the altitude

301
00:11:24,470 --> 00:11:22,959
these things are would you expect that

302
00:11:25,430 --> 00:11:24,480
to change pretty rapidly if it's that

303
00:11:28,389 --> 00:11:25,440
thin

304
00:11:30,790 --> 00:11:28,399
all right great question that ring

305
00:11:32,470 --> 00:11:30,800
there are some theorists who would love

306
00:11:34,389 --> 00:11:32,480
to believe that that ring is an

307
00:11:36,150 --> 00:11:34,399
atmospheric wave

308
00:11:37,590 --> 00:11:36,160
it's too small to be a seismic wave but

309
00:11:39,829 --> 00:11:37,600
it could be one of these atmospheric

310
00:11:41,590 --> 00:11:39,839
waves that many theorists have been been

311
00:11:43,990 --> 00:11:41,600
predicting andy ingersoll and tim

312
00:11:46,790 --> 00:11:44,000
dowling and joe harrington

313
00:11:49,910 --> 00:11:46,800

they would love to believe that now

314
00:11:52,870 --> 00:11:49,920
if that ring expands then we'll believe

315
00:11:55,190 --> 00:11:52,880
it's a wave if that ring does not expand

316
00:11:57,670 --> 00:11:55,200
with time i'm talking about if it does

317
00:11:59,509 --> 00:11:57,680
not expand with time then we have to go

318
00:12:01,350 --> 00:11:59,519
back to the drawing board

319
00:12:03,350 --> 00:12:01,360
we're waiting to get the next sequence

320
00:12:05,110 --> 00:12:03,360
of images down so that we see what

321
00:12:07,990 --> 00:12:05,120
happens to that ring

322
00:12:08,870 --> 00:12:08,000
so it may be a wave it may not time will

323
00:12:11,350 --> 00:12:08,880
tell

324
00:12:13,670 --> 00:12:11,360
the other question was about the wind

325
00:12:15,829 --> 00:12:13,680
speed this image was only taken an hour

326
00:12:17,509 --> 00:12:15,839
and a half after the impact so in an

327
00:12:19,430 --> 00:12:17,519
hour and a half the winds aren't strong

328
00:12:21,350 --> 00:12:19,440
enough to perturb it on the scales that

329
00:12:23,910 --> 00:12:21,360
we're seeing here

330
00:12:26,470 --> 00:12:23,920
certainly over the next few days we will

331
00:12:28,310 --> 00:12:26,480
be watching all that material

332
00:12:30,710 --> 00:12:28,320
very closely to see how the winds

333
00:12:32,230 --> 00:12:30,720
distribute it and it will be distributed

334
00:12:34,389 --> 00:12:32,240
there's no question

335
00:12:36,310 --> 00:12:34,399
how do you want to mention that it looks

336
00:12:39,350 --> 00:12:36,320
as though some of the material in the

337
00:12:40,870 --> 00:12:39,360
spot from the a impact is being smeared

338
00:12:41,990 --> 00:12:40,880

out that's a good point gene yeah it

339
00:12:44,310 --> 00:12:42,000
does look like that in some of our

340
00:12:47,110 --> 00:12:44,320
recent images the the a impact site is

341
00:12:48,550 --> 00:12:47,120
not as crisp and sharp as it once was it

342
00:12:50,949 --> 00:12:48,560
looks kind of

343
00:12:52,790 --> 00:12:50,959
messy so as that material gets followed

344
00:12:54,949 --> 00:12:52,800
in fact it will be a very nice tracer

345
00:12:56,710 --> 00:12:54,959
for the velocities of these upper

346
00:12:58,870 --> 00:12:56,720
atmosphere winds for which there

347
00:13:00,550 --> 00:12:58,880
actually is no previous information so

348
00:13:02,230 --> 00:13:00,560
very important information about jupiter

349
00:13:03,829 --> 00:13:02,240
will come up from that

350
00:13:05,350 --> 00:13:03,839
take a question over here yeah i have

351
00:13:06,470 --> 00:13:05,360
two questions one can you estimate the

352
00:13:08,949 --> 00:13:06,480
distance between

353
00:13:11,590 --> 00:13:08,959
that d impact site and the new one the g

354
00:13:13,350 --> 00:13:11,600
one and also this morning john clark

355
00:13:15,110 --> 00:13:13,360
showed us uv um

356
00:13:17,430 --> 00:13:15,120
images that show that these impact sites

357
00:13:18,870 --> 00:13:17,440
when imaging the uv are much bigger than

358
00:13:20,550 --> 00:13:18,880
they are visually

359
00:13:22,550 --> 00:13:20,560
you suspect the same is true of this and

360
00:13:24,389 --> 00:13:22,560
that it is in fact even larger the area

361
00:13:25,829 --> 00:13:24,399
of disturbances in

362
00:13:28,310 --> 00:13:25,839
uv

363
00:13:30,069 --> 00:13:28,320

well i'll answer the second part first

364
00:13:32,470 --> 00:13:30,079
we'll wait and see when we get some uv

365
00:13:34,870 --> 00:13:32,480
images for sure it sure looks like that

366
00:13:37,030 --> 00:13:34,880
from the other three impact sites so

367
00:13:38,150 --> 00:13:37,040
probably yes probably it will be larger

368
00:13:39,110 --> 00:13:38,160
in the uv

369
00:13:40,790 --> 00:13:39,120
and

370
00:13:42,949 --> 00:13:40,800
what was the first question what's the

371
00:13:46,870 --> 00:13:42,959
what's the separation yeah can we do

372
00:13:48,629 --> 00:13:46,880
that yes we can have we done it not yet

373
00:13:50,069 --> 00:13:48,639
we'll get to it

374
00:13:53,430 --> 00:13:50,079
maybe they've done it already by the

375
00:13:57,990 --> 00:13:55,190
we'll take a question back here

376
00:13:59,750 --> 00:13:58,000
uh hi john rutherford with nbc can you

377
00:14:01,189 --> 00:13:59,760
talk about the uh what kind of impact

378
00:14:03,750 --> 00:14:01,199
this would have on earth if these things

379
00:14:05,670 --> 00:14:03,760
were hitting earth instead of jupiter

380
00:14:07,269 --> 00:14:05,680
well i i told gene i'd get them up here

381
00:14:09,590 --> 00:14:07,279
to answer that question well let me just

382
00:14:11,350 --> 00:14:09,600
point out again the scale remember that

383
00:14:13,590 --> 00:14:11,360
the earth is

384
00:14:15,189 --> 00:14:13,600
you know about the size of that ring you

385
00:14:17,910 --> 00:14:15,199
saw all right

386
00:14:19,189 --> 00:14:17,920
so the the scale the physical scale of

387
00:14:21,350 --> 00:14:19,199
this effect

388
00:14:23,189 --> 00:14:21,360

is terrestrial

389
00:14:25,750 --> 00:14:23,199
it's that big

390
00:14:28,069 --> 00:14:25,760
you know i i i wouldn't want to be on

391
00:14:29,670 --> 00:14:28,079
earth if one of these pieces landed on

392
00:14:31,670 --> 00:14:29,680
earth

393
00:14:33,590 --> 00:14:31,680
if you were going to ask what's the size

394
00:14:35,269 --> 00:14:33,600
crater this would made on on the earth

395
00:14:37,189 --> 00:14:35,279
if we're right about our estimate of the

396
00:14:38,470 --> 00:14:37,199
size and the energy

397
00:14:41,590 --> 00:14:38,480
if it hit

398
00:14:43,910 --> 00:14:41,600
a continent it would make a 60 kilometer

399
00:14:45,430 --> 00:14:43,920
diameter crater there abouts well how

400
00:14:47,509 --> 00:14:45,440
does that compare to the size of a state

401
00:14:49,269 --> 00:14:47,519
for example rhode island oh it's about

402
00:14:50,949 --> 00:14:49,279
40 well it would it would pretty well

403
00:14:52,389 --> 00:14:50,959
the crater would pretty well cover rhode

404
00:14:53,269 --> 00:14:52,399
island yes

405
00:14:54,949 --> 00:14:53,279
uh

406
00:14:57,189 --> 00:14:54,959
the and the other thing is if you look

407
00:14:59,430 --> 00:14:57,199
at the size of of the material that's

408
00:15:01,430 --> 00:14:59,440
actually spread out and remember that's

409
00:15:04,150 --> 00:15:01,440
now gone up very high that would just go

410
00:15:06,150 --> 00:15:04,160
out ballistically all over the earth it

411
00:15:08,150 --> 00:15:06,160
it's enveloped the earth

412
00:15:11,269 --> 00:15:08,160
completely enveloped it's gone all over

413
00:15:13,670 --> 00:15:11,279

the earth so so that the material that's

414
00:15:16,069 --> 00:15:13,680
blown out of that crater

415
00:15:18,710 --> 00:15:16,079
would essentially blanket the earth with

416
00:15:20,870 --> 00:15:18,720
a layer of fine debris that would just

417
00:15:23,910 --> 00:15:20,880
block sunlight you just get dark all

418
00:15:26,710 --> 00:15:25,110
right over here

419
00:15:27,910 --> 00:15:26,720
uh this is mark caro the houston

420
00:15:30,870 --> 00:15:27,920
chronicle

421
00:15:33,189 --> 00:15:30,880
regarding the sequence of three

422
00:15:35,829 --> 00:15:33,199
that happened every 12 hours later in

423
00:15:37,990 --> 00:15:35,839
the week could you is it possible to be

424
00:15:40,150 --> 00:15:38,000
a little more descriptive about how

425
00:15:41,350 --> 00:15:40,160
close those would be together and in

426
00:15:43,350 --> 00:15:41,360
some

427
00:15:45,350 --> 00:15:43,360
you said the same latitude but i didn't

428
00:15:47,829 --> 00:15:45,360
know that you meant the same

429
00:15:49,829 --> 00:15:47,839
quarter of the planet or stretched

430
00:15:51,509 --> 00:15:49,839
you know one third of the way around

431
00:15:53,269 --> 00:15:51,519
okay it's every 10 hours it's every

432
00:15:54,389 --> 00:15:53,279
jovian rotation

433
00:15:55,269 --> 00:15:54,399
and

434
00:15:59,269 --> 00:15:55,279
um

435
00:16:00,949 --> 00:15:59,279
they're very close in longitude

436
00:16:02,790 --> 00:16:00,959
on jupiter all of these are close in

437
00:16:05,030 --> 00:16:02,800
latitude they're all in the same band

438
00:16:06,550 --> 00:16:05,040

around the planet what these are

439
00:16:08,230 --> 00:16:06,560
striking about that group of three

440
00:16:10,949 --> 00:16:08,240
coming up is that they're all close in

441
00:16:12,790 --> 00:16:10,959
longitude and i i can't remember the

442
00:16:14,870 --> 00:16:12,800
number off the top of my head i think it

443
00:16:17,430 --> 00:16:14,880
might be within 10 degrees

444
00:16:20,069 --> 00:16:17,440
certainly all if they have sizes

445
00:16:22,389 --> 00:16:20,079
comparable to say a or

446
00:16:23,910 --> 00:16:22,399
c or e which we've we saw

447
00:16:28,949 --> 00:16:23,920
earlier this morning

448
00:16:33,189 --> 00:16:30,550
okay we've we've got a question right

449
00:16:36,790 --> 00:16:35,269
deborah savarenko at reuters this is a

450
00:16:38,069 --> 00:16:36,800
really elementary question but my

451
00:16:41,030 --> 00:16:38,079
editors have been asking and i haven't

452
00:16:43,430 --> 00:16:41,040
come up with a good response

453
00:16:45,430 --> 00:16:43,440
i need to make clear to our readers the

454
00:16:47,509 --> 00:16:45,440
difference in size between earth and

455
00:16:51,110 --> 00:16:47,519
jupiter how many more times

456
00:16:53,030 --> 00:16:51,120
bigger is jupiter than earth

457
00:16:55,030 --> 00:16:53,040
well i like to put it in terms of the

458
00:16:56,230 --> 00:16:55,040
great red spot the storm you see on

459
00:16:58,230 --> 00:16:56,240
jupiter

460
00:17:00,550 --> 00:16:58,240
you're familiar with the red spot you

461
00:17:03,110 --> 00:17:00,560
could fit two earths there it is you

462
00:17:05,990 --> 00:17:03,120
could fit two earths inside that red

463
00:17:09,829 --> 00:17:07,590

that

464
00:17:12,949 --> 00:17:09,839
how many do you know the number the

465
00:17:15,829 --> 00:17:12,959
diameter is about 12 times greater for

466
00:17:19,110 --> 00:17:15,839
jupiter 12 times 12 earth diameters

467
00:17:30,150 --> 00:17:21,029
paul

468
00:17:33,190 --> 00:17:30,160
in jupiter's black eye there the pupil

469
00:17:34,950 --> 00:17:33,200
of it there is a white spot uh

470
00:17:36,630 --> 00:17:34,960
i noticed in the earlier earlier

471
00:17:39,029 --> 00:17:36,640
pictures do you have any idea what that

472
00:17:40,470 --> 00:17:39,039
white spot is an artifact or is that uh

473
00:17:42,150 --> 00:17:40,480
i'd have to see the graphic to know

474
00:17:43,190 --> 00:17:42,160
exactly what you're talking about see

475
00:17:45,190 --> 00:17:43,200
that uh

476
00:17:47,430 --> 00:17:45,200
right right above the pupil there i

477
00:17:49,590 --> 00:17:47,440
would guess that's just a cosmic ray we

478
00:17:52,150 --> 00:17:49,600
that's a an instrumental effect in the

479
00:17:54,549 --> 00:17:52,160
detector it's not a real white it's not

480
00:17:55,990 --> 00:17:54,559
a white spot okay i'll look at it we

481
00:17:58,390 --> 00:17:56,000
didn't have time to really clean these

482
00:17:59,830 --> 00:17:58,400
images in the last 10 hours and i want

483
00:18:02,630 --> 00:17:59,840
to make very sure i understand the

484
00:18:04,390 --> 00:18:02,640
comparative sizes here uh in fact this

485
00:18:05,669 --> 00:18:04,400
is this is three concentric rings you

486
00:18:07,909 --> 00:18:05,679
got a dark

487
00:18:10,230 --> 00:18:07,919
um element in the very center then you

488
00:18:11,430 --> 00:18:10,240

got you got a very uh uh nearly perfect

489
00:18:13,350 --> 00:18:11,440
ring around it and then you got the

490
00:18:16,470 --> 00:18:13,360
smudge on the outside the earth is the

491
00:18:18,390 --> 00:18:16,480
size of what exactly of those three okay

492
00:18:20,310 --> 00:18:18,400
i'll give you some numbers to chew on

493
00:18:23,350 --> 00:18:20,320
well can you just compare it to that

494
00:18:25,270 --> 00:18:23,360
yeah well yeah the the

495
00:18:29,669 --> 00:18:25,280
the earth is a little bit larger than

496
00:18:31,190 --> 00:18:29,679
that the black ring the sharp black ring

497
00:18:33,909 --> 00:18:31,200
the earth is a little bit larger than

498
00:18:37,990 --> 00:18:33,919
the sharp black ring but the earth is

499
00:18:43,029 --> 00:18:38,000
smaller than the whole smudge area

500
00:18:48,150 --> 00:18:45,909
on the far end over right over here

501
00:18:50,710 --> 00:18:48,160
uh david chandler from the boston globe

502
00:18:53,110 --> 00:18:50,720
um i know when these images first came

503
00:18:54,950 --> 00:18:53,120
in saturday night you were surprised to

504
00:18:56,710 --> 00:18:54,960
see black smudges rather than white

505
00:18:57,909 --> 00:18:56,720
smudges and i don't know if i've missed

506
00:18:59,590 --> 00:18:57,919
something in between but what's your

507
00:19:02,710 --> 00:18:59,600
best thinking at this point about why

508
00:19:04,310 --> 00:19:02,720
these smudges are black

509
00:19:07,190 --> 00:19:04,320
i think our

510
00:19:08,549 --> 00:19:07,200
the theories are are numerous um

511
00:19:11,029 --> 00:19:08,559
many people

512
00:19:14,470 --> 00:19:11,039
are theorizing that a lot of what we're

513
00:19:16,230 --> 00:19:14,480

seeing is is some commentary material

514
00:19:17,270 --> 00:19:16,240
comets are very dark

515
00:19:19,430 --> 00:19:17,280
and

516
00:19:21,590 --> 00:19:19,440
it also might be material from jupiter

517
00:19:23,990 --> 00:19:21,600
that's deeper down that we're not used

518
00:19:25,270 --> 00:19:24,000
to seeing higher up and that material

519
00:19:26,470 --> 00:19:25,280
could very well be a very different

520
00:19:27,830 --> 00:19:26,480
color

521
00:19:29,270 --> 00:19:27,840
i don't have a very good answer for that

522
00:19:31,750 --> 00:19:29,280
question right now

523
00:19:33,270 --> 00:19:31,760
i think i was surprised because

524
00:19:38,630 --> 00:19:33,280
most of the

525
00:19:41,510 --> 00:19:38,640
on these outer planets that i'm aware of

526
00:19:43,029 --> 00:19:41,520
tend to be white and bright and so

527
00:19:47,510 --> 00:19:43,039
that's why i expected them to be that

528
00:19:50,870 --> 00:19:49,270
in the plume picture that you showed

529
00:19:53,270 --> 00:19:50,880
today and as well as on the earlier

530
00:19:55,750 --> 00:19:53,280
plume pictures you see a bright plume

531
00:19:57,590 --> 00:19:55,760
and then there's a dark region before

532
00:20:00,630 --> 00:19:57,600
the limb of the planet

533
00:20:02,630 --> 00:20:00,640
why why is there that dark region great

534
00:20:04,390 --> 00:20:02,640
question there's two reasons there's

535
00:20:08,150 --> 00:20:04,400
there's a dark region there the first is

536
00:20:10,950 --> 00:20:08,160
that we're seeing the crescent

537
00:20:14,230 --> 00:20:10,960
of the shadow of jupiter jupiter is not

538
00:20:16,230 --> 00:20:14,240

fully illuminated okay the sun is a

539
00:20:18,549 --> 00:20:16,240
little bit off to an angle about 10

540
00:20:20,630 --> 00:20:18,559
degrees so there's a little tiny sliver

541
00:20:22,950 --> 00:20:20,640
that's unilluminated just like we see

542
00:20:25,190 --> 00:20:22,960
the moon in the sky has pieces that

543
00:20:26,150 --> 00:20:25,200
aren't always illuminated that's part of

544
00:20:28,149 --> 00:20:26,160
it

545
00:20:29,990 --> 00:20:28,159
but the other part is that these plumes

546
00:20:32,950 --> 00:20:30,000
are so high

547
00:20:34,470 --> 00:20:32,960
that the shadow of jupiter

548
00:20:36,549 --> 00:20:34,480
just a little sliver of the shadow of

549
00:20:40,070 --> 00:20:36,559
jupiter itself

550
00:20:42,310 --> 00:20:40,080
is is illuminating is is preventing the

551
00:20:43,909 --> 00:20:42,320
sunlight from reaching that

552
00:20:47,029 --> 00:20:43,919
and we're doing some calculations right

553
00:20:49,510 --> 00:20:47,039
now to tell you very precise heights of

554
00:20:52,470 --> 00:20:49,520
these things we're working on it right

555
00:20:55,110 --> 00:20:52,480
now but most of that is the

556
00:20:57,350 --> 00:20:55,120
limb of the planet a good way to look is

557
00:21:00,870 --> 00:20:57,360
the bottom image if you could put the

558
00:21:03,430 --> 00:21:00,880
graphic up the bottom image you see the

559
00:21:06,230 --> 00:21:03,440
edge of jupiter and then you see that

560
00:21:08,549 --> 00:21:06,240
smear the pancake that pancake is

561
00:21:10,710 --> 00:21:08,559
sitting on the planet okay that

562
00:21:12,789 --> 00:21:10,720
pancake's not floating in outer space

563
00:21:15,110 --> 00:21:12,799

the pancake is in the atmosphere and

564
00:21:17,830 --> 00:21:15,120
that thin little strip there

565
00:21:22,870 --> 00:21:17,840
that is the that's the

566
00:21:26,710 --> 00:21:24,310
question over here

567
00:21:28,549 --> 00:21:26,720
yes jan smith with fox television in

568
00:21:30,789 --> 00:21:28,559
revising this morning's estimate of the

569
00:21:32,789 --> 00:21:30,799
power of the explosion how do you now

570
00:21:35,029 --> 00:21:32,799
compare it to the size of the world's

571
00:21:37,510 --> 00:21:35,039
bomb arsenal

572
00:21:40,630 --> 00:21:39,029
putting it in megadens i didn't really

573
00:21:41,510 --> 00:21:40,640
change my estimate of the energy i just

574
00:21:44,390 --> 00:21:41,520
made it

575
00:21:45,990 --> 00:21:44,400
error in converting it to megatons and i

576
00:21:48,390 --> 00:21:46,000
guess we have a little disagreement the

577
00:21:51,990 --> 00:21:48,400
number i've always used as the world's

578
00:21:53,830 --> 00:21:52,000
arsenals is 10 000 megatons but there

579
00:21:56,310 --> 00:21:53,840
are other numbers floating around and i

580
00:21:58,390 --> 00:21:56,320
guess the real number is still a state

581
00:22:00,950 --> 00:21:58,400
secret

582
00:22:02,230 --> 00:22:00,960
so i've used what's been commonly used

583
00:22:04,230 --> 00:22:02,240
in some of the literature at ten

584
00:22:06,390 --> 00:22:04,240
thousand megatons so

585
00:22:09,990 --> 00:22:06,400
uh if you compare that with the energy

586
00:22:13,430 --> 00:22:10,000
for new our estimate of nucleus a

587
00:22:15,830 --> 00:22:13,440
nucleus a energy is about 20 times that

588
00:22:18,390 --> 00:22:15,840

now i've heard bandied about just in

589
00:22:20,149 --> 00:22:18,400
this room in the last half hour a much

590
00:22:23,270 --> 00:22:20,159
higher figure for the nuclear arsenal

591
00:22:25,029 --> 00:22:23,280
something like about 80 000 megatons so

592
00:22:26,789 --> 00:22:25,039
then it would only be about a factor of

593
00:22:29,909 --> 00:22:26,799
three higher

594
00:22:32,310 --> 00:22:29,919
when you get to six million megatons

595
00:22:35,029 --> 00:22:32,320
that's a whole lot higher i mean that's

596
00:22:36,310 --> 00:22:35,039
getting in the ballpark of 400 or 500

597
00:22:38,230 --> 00:22:36,320
times the

598
00:22:39,590 --> 00:22:38,240
what i think is the more conventional

599
00:22:42,630 --> 00:22:39,600
published estimate of the world's

600
00:22:47,029 --> 00:22:42,640
nuclear arsenal

601
00:22:50,710 --> 00:22:48,710
chris leach nhk

602
00:22:53,110 --> 00:22:50,720
what was the the actual size of the

603
00:22:55,190 --> 00:22:53,120
fragment and also what was the the time

604
00:22:56,789 --> 00:22:55,200
that the fragment actually impacted into

605
00:22:58,789 --> 00:22:56,799
jupiter

606
00:23:01,270 --> 00:22:58,799
those are two questions for which we

607
00:23:02,470 --> 00:23:01,280
would very much like to have the answers

608
00:23:03,830 --> 00:23:02,480
to

609
00:23:06,950 --> 00:23:03,840
um

610
00:23:08,630 --> 00:23:06,960
the time betw between uh well the time

611
00:23:10,390 --> 00:23:08,640
of that first image that i showed you

612
00:23:13,590 --> 00:23:10,400
with the tiny tip of the plume was

613
00:23:15,909 --> 00:23:13,600

sticking over that was 7 33

614
00:23:18,310 --> 00:23:15,919
that probably happened that image

615
00:23:20,630 --> 00:23:18,320
probably occurred within say five

616
00:23:22,390 --> 00:23:20,640
minutes of the impact itself i would

617
00:23:25,990 --> 00:23:22,400
guess there's probably only a delay of a

618
00:23:28,149 --> 00:23:26,000
couple of minutes right so so 7 33

619
00:23:30,549 --> 00:23:28,159
minus five minutes somewhere in that

620
00:23:31,590 --> 00:23:30,559
time period is when the impact occurred

621
00:23:32,710 --> 00:23:31,600
and

622
00:23:35,029 --> 00:23:32,720
i can't remember the other question

623
00:23:38,710 --> 00:23:36,950
we still don't know the sizes of these

624
00:23:40,789 --> 00:23:38,720
fragments i think if hal were here he'd

625
00:23:42,310 --> 00:23:40,799
probably say that this was three three

626
00:23:44,789 --> 00:23:42,320
kilometer body

627
00:23:45,750 --> 00:23:44,799
i i would say the height of the plume

628
00:23:47,669 --> 00:23:45,760
now

629
00:23:50,149 --> 00:23:47,679
based on the modeling that we've done

630
00:23:52,710 --> 00:23:50,159
for a one kilometer impactor is

631
00:23:54,950 --> 00:23:52,720
consistent with that in other words

632
00:23:56,950 --> 00:23:54,960
you know that that that estimate by hal

633
00:24:00,070 --> 00:23:56,960
weaver for of three kilometers looks

634
00:24:02,549 --> 00:24:00,080
looks pretty golden to me

635
00:24:06,710 --> 00:24:02,559
uh universal time right eastern daylight

636
00:24:11,029 --> 00:24:06,720
time that was uh subtract four hours

637
00:24:18,310 --> 00:24:12,789
okay can we take a question in the far

638
00:24:23,590 --> 00:24:20,950

jim reston for esquire i have two

639
00:24:26,470 --> 00:24:23,600
questions if you could see the full

640
00:24:27,830 --> 00:24:26,480
plume without the shadow

641
00:24:28,789 --> 00:24:27,840
would it mimic

642
00:24:33,750 --> 00:24:28,799
the

643
00:24:38,470 --> 00:24:35,190
we don't think so

644
00:24:40,950 --> 00:24:38,480
no what happens in this case is that

645
00:24:42,310 --> 00:24:40,960
the plume is erupting from substantial

646
00:24:44,630 --> 00:24:42,320
depth

647
00:24:46,470 --> 00:24:44,640
uh and so there is a column that goes

648
00:24:48,870 --> 00:24:46,480
down below the cloud tops that you don't

649
00:24:51,029 --> 00:24:48,880
see but what we see at the surface is

650
00:24:53,909 --> 00:24:51,039
just this big bump that comes up

651
00:24:56,310 --> 00:24:53,919
initially now as it flattens out it will

652
00:24:59,110 --> 00:24:56,320
kind of get kind of mushroom mushroomy

653
00:25:01,669 --> 00:24:59,120
out at the edges so that there is a gap

654
00:25:04,789 --> 00:25:01,679
between the bottom of that

655
00:25:06,630 --> 00:25:04,799
and the and the ammonia cloud deck

656
00:25:08,390 --> 00:25:06,640
and you can really in fact you could i

657
00:25:11,029 --> 00:25:08,400
think you could actually see that it's

658
00:25:13,750 --> 00:25:11,039
very high that pancake's very high up as

659
00:25:15,590 --> 00:25:13,760
you saw in that last frame and if also

660
00:25:18,070 --> 00:25:15,600
we noticed that the plume was somewhat

661
00:25:20,149 --> 00:25:18,080
asymmetric and i think that's because

662
00:25:22,630 --> 00:25:20,159
this is a directional

663
00:25:25,029 --> 00:25:22,640

thing this this this thing the comet

664
00:25:27,110 --> 00:25:25,039
pieces are not coming straight down onto

665
00:25:29,269 --> 00:25:27,120
the atmosphere they're coming in at some

666
00:25:31,029 --> 00:25:29,279
angle and

667
00:25:33,669 --> 00:25:31,039
so in that sense it's a very different

668
00:25:35,669 --> 00:25:33,679
kind of morphology different shape and

669
00:25:37,750 --> 00:25:35,679
also in the little scenario i sketched

670
00:25:39,909 --> 00:25:37,760
for you earlier um the plume doesn't

671
00:25:42,549 --> 00:25:39,919
really necessarily rise straight up it

672
00:25:44,710 --> 00:25:42,559
might come out that too blows outside it

673
00:25:46,070 --> 00:25:44,720
blows out sideways

674
00:25:49,029 --> 00:25:46,080
maybe

675
00:25:51,190 --> 00:25:49,039
the second question is

676
00:25:53,669 --> 00:25:51,200
when these three

677
00:25:56,230 --> 00:25:53,679
fragments hit in the same location q r

678
00:25:57,830 --> 00:25:56,240
and s does that increase the chances of

679
00:25:59,669 --> 00:25:57,840
a cyclone effect

680
00:26:01,750 --> 00:25:59,679
or an anticyclone that could be

681
00:26:04,710 --> 00:26:01,760
permanent i'll tell you the answer to

682
00:26:06,630 --> 00:26:04,720
that in about two or three days

683
00:26:10,070 --> 00:26:06,640
after it happens

684
00:26:12,230 --> 00:26:10,080
it does increase it or it has no effect

685
00:26:13,990 --> 00:26:12,240
i really can't even speculate at this

686
00:26:16,230 --> 00:26:14,000
point none of this stuff is something

687
00:26:16,950 --> 00:26:16,240
that that we had expected to really see

688
00:26:19,350 --> 00:26:16,960

so

689
00:26:21,350 --> 00:26:19,360
um we're we're moving well into the

690
00:26:23,269 --> 00:26:21,360
realm of speculation certainly it's

691
00:26:25,990 --> 00:26:23,279
going to disturb the atmosphere a lot

692
00:26:27,029 --> 00:26:26,000
more than a single impact on one site

693
00:26:29,750 --> 00:26:27,039
would

694
00:26:31,830 --> 00:26:29,760
i won't go much further than that though

695
00:26:33,269 --> 00:26:31,840
okay we've got uh we've got time for one

696
00:26:35,669 --> 00:26:33,279
more question before we go to the jet

697
00:26:40,789 --> 00:26:35,679
propulsion laboratory

698
00:26:46,630 --> 00:26:43,590
an automotive kyodo news service uh i

699
00:26:48,230 --> 00:26:46,640
heard that japanese radio astronomers

700
00:26:49,430 --> 00:26:48,240
reported that

701
00:26:50,310 --> 00:26:49,440
they

702
00:26:51,269 --> 00:26:50,320
had

703
00:26:55,110 --> 00:26:51,279
seen

704
00:26:58,789 --> 00:26:55,120
some something which indicates that

705
00:27:01,510 --> 00:26:58,799
the fragment broke into two pieces uh

706
00:27:03,590 --> 00:27:01,520
before impact and i'm wondering whether

707
00:27:05,510 --> 00:27:03,600
the irregular shape

708
00:27:06,870 --> 00:27:05,520
has something to do with that would you

709
00:27:09,110 --> 00:27:06,880
comment on that

710
00:27:13,190 --> 00:27:09,120
i saw a report on the internet about

711
00:27:15,350 --> 00:27:13,200
some unusual radio signals and

712
00:27:18,230 --> 00:27:15,360
all i can say to that is that the

713
00:27:22,070 --> 00:27:18,240

signature of this impact the g

714
00:27:24,470 --> 00:27:22,080
is very very similar to that scene for a

715
00:27:27,430 --> 00:27:24,480
c and e the ones that we have good

716
00:27:30,390 --> 00:27:27,440
images of so far does not appear to be

717
00:27:33,750 --> 00:27:30,400
anything other than a solid single

718
00:27:36,870 --> 00:27:33,760
main body or explosion or rubber rubble

719
00:27:38,070 --> 00:27:36,880
pile it seems to be only one that i i

720
00:27:40,230 --> 00:27:38,080
wanted to make sure to mention that

721
00:27:41,990 --> 00:27:40,240
other site nearby to make sure that you

722
00:27:44,470 --> 00:27:42,000
understood that that was an old impact

723
00:27:46,789 --> 00:27:44,480
site that it was not related to g

724
00:27:48,390 --> 00:27:46,799
so it doesn't look like a double one

725
00:27:49,510 --> 00:27:48,400
from these images

726
00:27:51,909 --> 00:27:49,520
okay we're going to go to the jet

727
00:27:53,990 --> 00:27:51,919
propulsion laboratory now

728
00:27:56,870 --> 00:27:54,000
jpl if you'd please state your name and

729
00:28:00,830 --> 00:27:56,880
affiliation before asking your question

730
00:28:05,590 --> 00:28:03,190
ahead you said you had some actual

731
00:28:07,590 --> 00:28:05,600
numbers on the sizes of the spot and the

732
00:28:09,750 --> 00:28:07,600
rings and the spot and the smudge

733
00:28:14,070 --> 00:28:09,760
i wonder what those are can you can you

734
00:28:19,110 --> 00:28:17,110
uh am i coming through now okay this is

735
00:28:20,630 --> 00:28:19,120
robert lee host of the los angeles times

736
00:28:22,549 --> 00:28:20,640
uh you mentioned a moment ago that you

737
00:28:25,190 --> 00:28:22,559
had some actual numbers

738
00:28:27,029 --> 00:28:25,200

on the uh estimated sizes of the spot

739
00:28:28,710 --> 00:28:27,039
and the ring and the smudge

740
00:28:30,070 --> 00:28:28,720
uh i wonder if we could hear those

741
00:28:31,909 --> 00:28:30,080
numbers and then i have two quick

742
00:28:33,430 --> 00:28:31,919
follow-ups

743
00:28:35,750 --> 00:28:33,440
all right these are very very

744
00:28:38,870 --> 00:28:35,760
preliminary preliminary we haven't had

745
00:28:42,230 --> 00:28:38,880
much time to do detailed analysis

746
00:28:44,470 --> 00:28:42,240
for our first cut analysis the diameter

747
00:28:46,310 --> 00:28:44,480
of the black ring and if you show the

748
00:28:48,310 --> 00:28:46,320
blow up version they'll have a better

749
00:28:50,070 --> 00:28:48,320
idea of what i'm talking about

750
00:28:52,070 --> 00:28:50,080
or the white ring if you have a methane

751
00:28:55,830 --> 00:28:52,080
image available

752
00:28:59,190 --> 00:28:55,840
the diameter of that sharp thin ring is

753
00:28:59,990 --> 00:28:59,200
about 7 500 kilometers

754
00:29:02,389 --> 00:29:00,000
and

755
00:29:03,350 --> 00:29:02,399
the diameter of the

756
00:29:07,350 --> 00:29:03,360
white

757
00:29:10,470 --> 00:29:07,360
ring surrounding that the inside of the

758
00:29:12,789 --> 00:29:10,480
black eye as it were that's about

759
00:29:17,110 --> 00:29:12,799
15 thousand four hundred and fifty

760
00:29:22,630 --> 00:29:19,510
are there any other questions yes

761
00:29:24,389 --> 00:29:22,640
just two quick uh follow-ups um

762
00:29:25,909 --> 00:29:24,399
i wonder uh

763
00:29:27,510 --> 00:29:25,919

and perhaps this is for gene shoemaker

764
00:29:31,110 --> 00:29:27,520
if you could compare

765
00:29:32,070 --> 00:29:31,120
uh in your mind the uh size and energy

766
00:29:34,389 --> 00:29:32,080
of this

767
00:29:37,430 --> 00:29:34,399
fragment to the object that is believed

768
00:29:40,230 --> 00:29:37,440
to have caused the chixel upgrader

769
00:29:41,909 --> 00:29:40,240
okay the minimum size of the chigzelub

770
00:29:44,789 --> 00:29:41,919
crater and it's still a matter of

771
00:29:47,269 --> 00:29:44,799
controversy the full crater i prefer the

772
00:29:50,470 --> 00:29:47,279
to use the minimum value which is about

773
00:29:53,110 --> 00:29:50,480
180 kilometers in diameter

774
00:29:56,149 --> 00:29:53,120
so we're talking about something that's

775
00:29:58,230 --> 00:29:56,159
uh three times smaller

776
00:30:03,110 --> 00:29:58,240
and the energy

777
00:30:04,630 --> 00:30:03,120
here then is 27 roughly about 27 times

778
00:30:05,990 --> 00:30:04,640
less

779
00:30:08,789 --> 00:30:06,000
so this is uh

780
00:30:12,310 --> 00:30:08,799
this is a big event uh but it still

781
00:30:17,190 --> 00:30:14,870
do we have any more questions from jpl

782
00:30:19,110 --> 00:30:17,200
for us the level of uh internet email

783
00:30:23,350 --> 00:30:19,120
traffic that you're seeing how crowded

784
00:30:27,430 --> 00:30:24,470
well

785
00:30:29,350 --> 00:30:27,440
we have a a an email distribution

786
00:30:31,430 --> 00:30:29,360
network set up for the professional

787
00:30:33,990 --> 00:30:31,440
astronomy community and that is actually

788
00:30:36,549 --> 00:30:34,000

working extraordinarily well people are

789
00:30:39,430 --> 00:30:36,559
being very concise about reporting their

790
00:30:42,630 --> 00:30:39,440
observations and therefore we are we

791
00:30:44,070 --> 00:30:42,640
have in our parlance very high signal to

792
00:30:45,590 --> 00:30:44,080
noise

793
00:30:47,269 --> 00:30:45,600
a very good amount of information is

794
00:30:49,590 --> 00:30:47,279
coming through

795
00:30:51,350 --> 00:30:49,600
i when i saw there this morning that

796
00:30:53,830 --> 00:30:51,360
that one of the um

797
00:30:56,630 --> 00:30:53,840
images from the irtf showing the g

798
00:30:59,190 --> 00:30:56,640
impact plume was posted on one of the

799
00:31:01,909 --> 00:30:59,200
mosaic bulletin boards i tried to

800
00:31:03,750 --> 00:31:01,919
connect and i could not get through and

801
00:31:05,909 --> 00:31:03,760
they said that there was so much traffic

802
00:31:08,470 --> 00:31:05,919
um on the networks trying to reach some

803
00:31:09,990 --> 00:31:08,480
of these very popular sites that that uh

804
00:31:12,070 --> 00:31:10,000
you know things are getting there

805
00:31:14,070 --> 00:31:12,080
there's a big traffic jam on the

806
00:31:15,669 --> 00:31:14,080
information super highway right now but

807
00:31:17,269 --> 00:31:15,679
this is an extraordinary event i think

808
00:31:21,590 --> 00:31:17,279
that's why normally we don't have that

809
00:31:26,389 --> 00:31:23,510
are there any more questions from jpm

810
00:31:27,590 --> 00:31:26,399
blackburn kcop tv in los angeles are you

811
00:31:29,590 --> 00:31:27,600
getting any

812
00:31:31,430 --> 00:31:29,600
readings yet to tell you the depth to

813
00:31:33,750 --> 00:31:31,440

which these

814
00:31:35,110 --> 00:31:33,760
impacts are going and or does it look

815
00:31:38,070 --> 00:31:35,120
pretty much as though it's staying very

816
00:31:39,509 --> 00:31:38,080
high in the atmosphere of jupiter

817
00:31:41,509 --> 00:31:39,519
i don't think we have a good answer for

818
00:31:43,669 --> 00:31:41,519
that question yet we're working on that

819
00:31:45,110 --> 00:31:43,679
that kind of a question

820
00:31:46,549 --> 00:31:45,120
you know we know something more about

821
00:31:48,310 --> 00:31:46,559
the heights because we can see them

822
00:31:50,470 --> 00:31:48,320
sticking away from jupiter it's awfully

823
00:31:53,750 --> 00:31:50,480
hard to know about probing deep

824
00:31:55,590 --> 00:31:53,760
one thing that will tell us for sure

825
00:31:57,269 --> 00:31:55,600
is some spectroscopy that's being

826
00:31:59,990 --> 00:31:57,279
planned by many telescopes around the

827
00:32:02,310 --> 00:32:00,000
world including the irtf including the

828
00:32:04,950 --> 00:32:02,320
kuiper airborne observatory and many

829
00:32:07,350 --> 00:32:04,960
others looking for water the signature

830
00:32:09,029 --> 00:32:07,360
of water if we see that

831
00:32:10,149 --> 00:32:09,039
then we will know

832
00:32:12,070 --> 00:32:10,159
how far

833
00:32:14,070 --> 00:32:12,080
at least that particular

834
00:32:15,909 --> 00:32:14,080
explosion went how far deep that

835
00:32:18,230 --> 00:32:15,919
impacting body went because we

836
00:32:21,190 --> 00:32:18,240
hypothesized the level at which the

837
00:32:23,110 --> 00:32:21,200
water clouds reside we can't see it it's

838
00:32:26,070 --> 00:32:23,120

below the visible cloud deck so that'll

839
00:32:27,909 --> 00:32:26,080
be a clue as to the depth it could be

840
00:32:28,950 --> 00:32:27,919
too that from these images we might be

841
00:32:30,870 --> 00:32:28,960
able to pull out some of this

842
00:32:33,509 --> 00:32:30,880
information that's going to take some

843
00:32:36,230 --> 00:32:33,519
very clever thinking on our part and on

844
00:32:38,630 --> 00:32:36,240
the part of the modelers to pull this

845
00:32:41,509 --> 00:32:38,640
all together and and make a coherent

846
00:32:44,149 --> 00:32:41,519
story i think we're still

847
00:32:47,830 --> 00:32:44,159
far too premature to be able to answer

848
00:32:52,470 --> 00:32:50,470
walter richards of ktla los angeles i

849
00:32:55,350 --> 00:32:52,480
have two questions would anything be

850
00:32:57,830 --> 00:32:55,360
left of jupiter once this is all over

851
00:32:59,909 --> 00:32:57,840
and uh what impact

852
00:33:03,990 --> 00:32:59,919
would be what would the impact be on los

853
00:33:06,710 --> 00:33:05,509
i i think jupiter is going to hang in

854
00:33:08,789 --> 00:33:06,720
there

855
00:33:11,269 --> 00:33:08,799
it's pretty big planet and we're seeing

856
00:33:13,110 --> 00:33:11,279
these these big splotches and black eyes

857
00:33:15,269 --> 00:33:13,120
and bruises i feel sorry for jupiter

858
00:33:16,470 --> 00:33:15,279
it's really getting pummeled but but i i

859
00:33:19,029 --> 00:33:16,480
think it's going to hang in there and

860
00:33:21,830 --> 00:33:19,039
the bruises will fade after some period

861
00:33:23,509 --> 00:33:21,840
of time which which we don't know yet

862
00:33:28,549 --> 00:33:23,519
i'll turn the los angeles question over

863
00:33:32,710 --> 00:33:30,630

well if this 60 kilometer crater is the

864
00:33:35,110 --> 00:33:32,720
right estimate i think it's pretty good

865
00:33:37,590 --> 00:33:35,120
and you put a bullseye over

866
00:33:40,549 --> 00:33:37,600
city hall in los angeles that's going to

867
00:33:43,350 --> 00:33:40,559
take out everything in the crater

868
00:33:45,190 --> 00:33:43,360
it'll it'll take out all of la county

869
00:33:51,350 --> 00:33:45,200
and in fact i just wouldn't want to be

870
00:33:55,750 --> 00:33:52,950
okay if there are no more questions from

871
00:33:58,149 --> 00:33:55,760
jpl we'll go to a marshall space flight

872
00:34:00,070 --> 00:33:58,159
center uh once again please uh state

873
00:34:02,710 --> 00:34:00,080
your name and affiliation before asking

874
00:34:06,870 --> 00:34:05,269
um oh this is masahiro takimura a

875
00:34:08,950 --> 00:34:06,880
science writer for japanese newspaper

876
00:34:12,790 --> 00:34:08,960
the yo miri shimbun i have questions

877
00:34:17,109 --> 00:34:12,800
about the impact energy of fragments

878
00:34:22,790 --> 00:34:17,909
the

879
00:34:25,750 --> 00:34:22,800
cubit radius of

880
00:34:28,629 --> 00:34:25,760
a fragment when the impact velocity is

881
00:34:30,470 --> 00:34:28,639
the same is it all right

882
00:34:32,550 --> 00:34:30,480
yes that's right the impact energy is

883
00:34:36,869 --> 00:34:32,560
proportional the cube of the radius and

884
00:34:43,109 --> 00:34:39,829
do you have the estimated

885
00:34:45,750 --> 00:34:43,119
figure of energy in terms of tnt

886
00:34:47,510 --> 00:34:45,760
which is caused by the

887
00:34:50,069 --> 00:34:47,520
impacts of all the

888
00:34:52,950 --> 00:34:50,079

all the fragments of the

889
00:34:59,990 --> 00:34:56,310
well you can start to add them up

890
00:35:03,430 --> 00:35:00,000
we've seen perhaps the biggest

891
00:35:07,670 --> 00:35:03,440
i'd multiply that by

892
00:35:09,430 --> 00:35:07,680
a factor of uh maybe six to eight

893
00:35:10,950 --> 00:35:09,440
might give us the total some somewhere

894
00:35:13,670 --> 00:35:10,960
in that ballpark

895
00:35:15,109 --> 00:35:13,680
so we're we're talking about something

896
00:35:17,750 --> 00:35:15,119
of the order

897
00:35:19,510 --> 00:35:17,760
of 40 million

898
00:35:20,790 --> 00:35:19,520
megatons perhaps

899
00:35:22,470 --> 00:35:20,800
of energy

900
00:35:24,950 --> 00:35:22,480
very rough ballpark

901
00:35:28,069 --> 00:35:24,960
give that a slosh of at least a factor

902
00:35:29,990 --> 00:35:28,079
of 10 million megatons either way or

903
00:35:33,190 --> 00:35:30,000
more because we you know we're just

904
00:35:34,550 --> 00:35:33,200
going on what we've seen so far

905
00:35:36,310 --> 00:35:34,560
okay we're going to leave marshall and

906
00:35:43,589 --> 00:35:36,320
come back here to goddard to take any

907
00:35:46,630 --> 00:35:45,510
um it's kind of an elementary school

908
00:35:47,430 --> 00:35:46,640
question but

909
00:35:49,589 --> 00:35:47,440
since

910
00:35:50,550 --> 00:35:49,599
um jupiter is so much more massive than

911
00:35:52,390 --> 00:35:50,560
earth

912
00:35:53,910 --> 00:35:52,400
and gravity is pulling these guys in

913
00:35:55,270 --> 00:35:53,920

therefore it's got a stronger stronger

914
00:35:57,670 --> 00:35:55,280
gravity

915
00:35:59,349 --> 00:35:57,680
wouldn't the comparable mass hit

916
00:36:02,150 --> 00:35:59,359
jupiter with greater

917
00:36:05,589 --> 00:36:02,160
velocity and therefore energy than than

918
00:36:09,510 --> 00:36:07,430
if i understand your question is if you

919
00:36:11,030 --> 00:36:09,520
have the same mass

920
00:36:12,710 --> 00:36:11,040
one's falling in jupiter and one's

921
00:36:14,790 --> 00:36:12,720
falling on earth would you get would it

922
00:36:16,870 --> 00:36:14,800
have more energy is that the question

923
00:36:18,790 --> 00:36:16,880
we have more energy on jupiter because

924
00:36:20,470 --> 00:36:18,800
jupiter has a larger mass and therefore

925
00:36:22,950 --> 00:36:20,480
exactly

926
00:36:24,470 --> 00:36:22,960
uh jupiter is accelerating these objects

927
00:36:26,870 --> 00:36:24,480
as they come in

928
00:36:28,390 --> 00:36:26,880
and in fact the the velocity with which

929
00:36:30,150 --> 00:36:28,400
these fragments are hitting jupiter

930
00:36:32,790 --> 00:36:30,160
essentially is the escape velocity from

931
00:36:33,910 --> 00:36:32,800
jupiter's very and that's 60 kilometers

932
00:36:36,310 --> 00:36:33,920
per second

933
00:36:38,230 --> 00:36:36,320
whereas uh if you had an object that

934
00:36:40,710 --> 00:36:38,240
just fell in at the escape velocity on

935
00:36:42,790 --> 00:36:40,720
the earth that's only 11.2 kilometers

936
00:36:45,109 --> 00:36:42,800
per second and the energy's going is the

937
00:36:46,950 --> 00:36:45,119
square of the difference so it's it's a

938
00:36:50,069 --> 00:36:46,960

factor of five and a half or something

939
00:36:52,069 --> 00:36:50,079
like that square it so it's a factor of

940
00:36:54,710 --> 00:36:52,079
difference of 30 in the energy that you

941
00:36:57,430 --> 00:36:54,720
would get if so something just falls in

942
00:37:00,069 --> 00:36:57,440
at the escape velocity

943
00:37:02,870 --> 00:37:00,079
uh this is mark of houston chronicle i

944
00:37:05,109 --> 00:37:02,880
think i appreciate how optimally the

945
00:37:06,870 --> 00:37:05,119
planet was turned to get this picture

946
00:37:09,829 --> 00:37:06,880
but i'm just curious

947
00:37:12,310 --> 00:37:09,839
if this impact had had happened sooner

948
00:37:13,910 --> 00:37:12,320
would it have been on the far side and

949
00:37:15,030 --> 00:37:13,920
you would have missed it is there any

950
00:37:17,510 --> 00:37:15,040
kind of a

951
00:37:20,870 --> 00:37:17,520
a timing you can give us as to how how

952
00:37:22,870 --> 00:37:20,880
lucky you were to capture this thing

953
00:37:25,670 --> 00:37:22,880
well there the impacts are always

954
00:37:27,829 --> 00:37:25,680
occurring on the far side timing is

955
00:37:29,910 --> 00:37:27,839
irrelevant because they're coming in on

956
00:37:33,109 --> 00:37:29,920
a line that always is the same

957
00:37:33,829 --> 00:37:33,119
orientation relative for us and jupiter

958
00:37:35,510 --> 00:37:33,839
so

959
00:37:38,630 --> 00:37:35,520
it wouldn't matter if it came in earlier

960
00:37:41,109 --> 00:37:38,640
late we would never be able to see it

961
00:37:42,630 --> 00:37:41,119
in terms of the timing of the imaging

962
00:37:46,150 --> 00:37:42,640
that we took

963
00:37:48,870 --> 00:37:46,160

that for for our program was really

964
00:37:51,270 --> 00:37:48,880
limited by the rotation of the hubble

965
00:37:53,910 --> 00:37:51,280
the um the hubble space telescopes orbit

966
00:37:56,069 --> 00:37:53,920
around the earth it orbits every 96

967
00:37:58,069 --> 00:37:56,079
minutes and obviously we can only look

968
00:38:00,150 --> 00:37:58,079
at it at jupiter when the space

969
00:38:02,310 --> 00:38:00,160
telescope is on the side of the earth

970
00:38:04,710 --> 00:38:02,320
that jupiter is visible you can't look

971
00:38:07,270 --> 00:38:04,720
through the earth so

972
00:38:09,910 --> 00:38:07,280
in some sense we have been extremely

973
00:38:12,150 --> 00:38:09,920
lucky to have captured three of these

974
00:38:14,950 --> 00:38:12,160
impact events in the middle of one of

975
00:38:18,550 --> 00:38:14,960
the hubble's visibility windows

976
00:38:20,790 --> 00:38:18,560
and it's almost by definition if if that

977
00:38:23,670 --> 00:38:20,800
impact plume is visible

978
00:38:26,230 --> 00:38:23,680
then one and a half hours later we'll be

979
00:38:27,829 --> 00:38:26,240
able to take a picture of the site on

980
00:38:30,470 --> 00:38:27,839
just on the disk of the planet because

981
00:38:31,349 --> 00:38:30,480
that's how fast jupiter rotates

982
00:38:33,990 --> 00:38:31,359
so

983
00:38:35,589 --> 00:38:34,000
we were fortunate to have the hubble in

984
00:38:37,589 --> 00:38:35,599
the right place at the right time to be

985
00:38:38,950 --> 00:38:37,599
able to capture this one we couldn't

986
00:38:40,870 --> 00:38:38,960
have done anything if the hubble had

987
00:38:42,470 --> 00:38:40,880
been on the other side of the earth

988
00:38:45,270 --> 00:38:42,480

i think part of the answer the question

989
00:38:46,790 --> 00:38:45,280
heidi is that we already had very good

990
00:38:48,550 --> 00:38:46,800
predictions

991
00:38:51,670 --> 00:38:48,560
of the impact times they were they were

992
00:38:53,990 --> 00:38:51,680
certainly good to within 15 minutes

993
00:38:57,349 --> 00:38:54,000
and so that that was extraordinarily

994
00:38:59,910 --> 00:38:57,359
important in the timing and the planning

995
00:39:01,190 --> 00:38:59,920
for uh for these images that was a very

996
00:39:02,950 --> 00:39:01,200
essential part

997
00:39:04,950 --> 00:39:02,960
not really gene

998
00:39:08,069 --> 00:39:04,960
because we we had to do the planning in

999
00:39:10,630 --> 00:39:08,079
the sequences many weeks ago months ago

1000
00:39:11,910 --> 00:39:10,640
and the impact times were not well known

1001
00:39:13,510 --> 00:39:11,920
and the hubble's orbit was not

1002
00:39:15,510 --> 00:39:13,520
particularly well known either because

1003
00:39:18,550 --> 00:39:15,520
that has to be adjusted fairly

1004
00:39:21,750 --> 00:39:18,560
frequently and so at in some sense it

1005
00:39:24,710 --> 00:39:21,760
was potluck and and as as the predicts

1006
00:39:26,950 --> 00:39:24,720
were coming in and changing forward

1007
00:39:28,870 --> 00:39:26,960
backwards for they would be hopping in

1008
00:39:30,950 --> 00:39:28,880
and out of orbits and i'd be getting

1009
00:39:33,670 --> 00:39:30,960
very nervous and then i'd be very happy

1010
00:39:35,750 --> 00:39:33,680
and i'd be nervous again and and so i

1011
00:39:36,950 --> 00:39:35,760
ended up being very happy but but you

1012
00:39:39,030 --> 00:39:36,960
certainly were doing your initial

1013
00:39:40,870 --> 00:39:39,040

planning based based on that of course

1014
00:39:42,710 --> 00:39:40,880
from the chodest and yeoman's pre-that's

1015
00:39:44,230 --> 00:39:42,720
right but there were victims but it was

1016
00:39:45,910 --> 00:39:44,240
but there was a lot of luck that it came

1017
00:39:47,670 --> 00:39:45,920
out a lot of luck we've been very

1018
00:39:54,829 --> 00:39:47,680
fortunate

1019
00:39:59,829 --> 00:39:57,510
here tracy watson u.s news and world

1020
00:40:01,510 --> 00:39:59,839
report first of all um i'd heard that

1021
00:40:04,710 --> 00:40:01,520
looking at the plume may indicate

1022
00:40:07,190 --> 00:40:04,720
sometime what the composition of the

1023
00:40:08,470 --> 00:40:07,200
impactors was and will eventually tell

1024
00:40:10,230 --> 00:40:08,480
us whether it really was a comet or

1025
00:40:11,270 --> 00:40:10,240
whether it was an asteroid how long do

1026
00:40:13,430 --> 00:40:11,280
you think it'll take you to come out

1027
00:40:15,510 --> 00:40:13,440
with that kind of information

1028
00:40:17,990 --> 00:40:15,520
i'm not sure we'll get that information

1029
00:40:19,990 --> 00:40:18,000
from the plume itself although we'll

1030
00:40:21,910 --> 00:40:20,000
have to think about that for a while i

1031
00:40:23,430 --> 00:40:21,920
think it's more likely that kind of

1032
00:40:25,349 --> 00:40:23,440
information is going to come from

1033
00:40:28,150 --> 00:40:25,359
spectroscopy

1034
00:40:30,470 --> 00:40:28,160
of the impact sites the fresh impact

1035
00:40:33,030 --> 00:40:30,480
sites and that work will be done with a

1036
00:40:35,030 --> 00:40:33,040
variety of instruments hubble is one of

1037
00:40:37,510 --> 00:40:35,040
them in fact we had a very exciting

1038
00:40:39,430 --> 00:40:37,520

exercise this morning where we got that

1039
00:40:40,710 --> 00:40:39,440
first image that i showed you of the

1040
00:40:44,630 --> 00:40:40,720
impact site

1041
00:40:46,950 --> 00:40:44,640
on the limb and in real time we measured

1042
00:40:48,310 --> 00:40:46,960
exactly where the space tells telescope

1043
00:40:50,310 --> 00:40:48,320
was pointing

1044
00:40:54,069 --> 00:40:50,320
and then offset the telescope to be

1045
00:40:55,670 --> 00:40:54,079
pointing exactly at the impact site and

1046
00:40:57,510 --> 00:40:55,680
sent the instructions up to the

1047
00:40:59,589 --> 00:40:57,520
spacecraft normally we don't do that we

1048
00:41:01,270 --> 00:40:59,599
plan weeks and months in advance and

1049
00:41:03,910 --> 00:41:01,280
keith knoll is the principal

1050
00:41:06,390 --> 00:41:03,920
investigator of that experiment and at

1051
00:41:08,950 --> 00:41:06,400
some point in the near future i i hope

1052
00:41:10,390 --> 00:41:08,960
that he has some good results to

1053
00:41:12,630 --> 00:41:10,400
to share with you

1054
00:41:14,630 --> 00:41:12,640
other telescopes like the irtf and

1055
00:41:16,710 --> 00:41:14,640
nasa's kuiper airborne observatory will

1056
00:41:19,750 --> 00:41:16,720
be instrumental in doing the kind of

1057
00:41:22,790 --> 00:41:19,760
spectroscopy to probe the chemistry of

1058
00:41:24,470 --> 00:41:22,800
the atmosphere and of you know any

1059
00:41:27,430 --> 00:41:24,480
mushed up comet that happened to be

1060
00:41:31,589 --> 00:41:29,910
bill harwood cb cbs again

1061
00:41:32,710 --> 00:41:31,599
i think i know the answer but this this

1062
00:41:34,390 --> 00:41:32,720
is something that should be clearly

1063
00:41:36,710 --> 00:41:34,400

visible to amateurs is it not i mean

1064
00:41:38,069 --> 00:41:36,720
given its size or is the wavelength such

1065
00:41:39,109 --> 00:41:38,079
that it's not going to be visible like

1066
00:41:40,950 --> 00:41:39,119
which

1067
00:41:43,349 --> 00:41:40,960
well these black spots are starting to

1068
00:41:45,030 --> 00:41:43,359
get pretty darn big and

1069
00:41:46,550 --> 00:41:45,040
you know close to the size of the great

1070
00:41:48,150 --> 00:41:46,560
red spot

1071
00:41:50,230 --> 00:41:48,160
and i believe there have been some

1072
00:41:52,470 --> 00:41:50,240
reports from visual observers who are

1073
00:41:54,790 --> 00:41:52,480
starting to see them now remember

1074
00:41:56,150 --> 00:41:54,800
you have a very high resolution image in

1075
00:41:58,150 --> 00:41:56,160
front of you with the hubble space

1076
00:42:01,190 --> 00:41:58,160
telescope and with the ground-based

1077
00:42:03,750 --> 00:42:01,200
telescope much of this is smeared out

1078
00:42:05,670 --> 00:42:03,760
so it isn't anything like you're seeing

1079
00:42:08,470 --> 00:42:05,680
here through a ground-based telescope

1080
00:42:10,390 --> 00:42:08,480
but the short answer is that yes it

1081
00:42:12,950 --> 00:42:10,400
these are this is starting to get large

1082
00:42:14,950 --> 00:42:12,960
enough that that amateurs may be able to

1083
00:42:17,190 --> 00:42:14,960
spot these if they're very careful

1084
00:42:20,550 --> 00:42:17,200
observers and know what to look for and

1085
00:42:22,470 --> 00:42:20,560
that three three impact sequence

1086
00:42:25,109 --> 00:42:22,480
may stir up a real big portion of

1087
00:42:28,390 --> 00:42:25,119
atmosphere may get very dark it's also

1088
00:42:30,069 --> 00:42:28,400

possible that with time as the winds on

1089
00:42:31,430 --> 00:42:30,079
jupiter start to distribute this

1090
00:42:33,670 --> 00:42:31,440
material

1091
00:42:36,390 --> 00:42:33,680
it's possible that a slightly darker

1092
00:42:38,150 --> 00:42:36,400
band will will develop in this in this

1093
00:42:40,150 --> 00:42:38,160
latitudinal region

1094
00:42:42,870 --> 00:42:40,160
we say it's possible because as i

1095
00:42:46,309 --> 00:42:42,880
mentioned this material appears to be

1096
00:42:48,390 --> 00:42:46,319
very thinly deposited over that region

1097
00:42:50,630 --> 00:42:48,400
and so it's not clear if you start

1098
00:42:51,990 --> 00:42:50,640
spreading out that thin layer whether or

1099
00:42:54,710 --> 00:42:52,000
not there's enough there to make the

1100
00:42:56,630 --> 00:42:54,720
band dark we'll see that as it develops

1101
00:42:58,950 --> 00:42:56,640
over the next week or two

1102
00:43:01,270 --> 00:42:58,960
i think there's a good chance that that

1103
00:43:03,670 --> 00:43:01,280
amateurs with eight inch diameter

1104
00:43:06,150 --> 00:43:03,680
telescopes or bigger

1105
00:43:07,670 --> 00:43:06,160
in good sites where they have very good

1106
00:43:10,230 --> 00:43:07,680
seeing

1107
00:43:11,990 --> 00:43:10,240
will be able to see these i think and

1108
00:43:14,630 --> 00:43:12,000
already there are reports from from

1109
00:43:16,309 --> 00:43:14,640
quite reliable observers there's a

1110
00:43:18,390 --> 00:43:16,319
graphic we can show you that was shown

1111
00:43:20,550 --> 00:43:18,400
this morning which is the full disk of

1112
00:43:22,550 --> 00:43:20,560
jupiter and the three impact sites on

1113
00:43:25,270 --> 00:43:22,560

the bottom and i believe they have that

1114
00:43:27,190 --> 00:43:25,280
they can put on there it is you can see

1115
00:43:29,349 --> 00:43:27,200
the bands on jupiter this is roughly a

1116
00:43:31,190 --> 00:43:29,359
visual image this is a green wavelength

1117
00:43:33,109 --> 00:43:31,200
and that's more or less you know what

1118
00:43:34,790 --> 00:43:33,119
you would see with your eye and you can

1119
00:43:36,870 --> 00:43:34,800
see the bands and you can see the great

1120
00:43:39,589 --> 00:43:36,880
red spot and you can see the little dark

1121
00:43:40,390 --> 00:43:39,599
splotches following after the great red

1122
00:43:41,829 --> 00:43:40,400
spot

1123
00:43:45,030 --> 00:43:41,839
all right so if you can see the great

1124
00:43:46,950 --> 00:43:45,040
red spot moving it would start on on the

1125
00:43:48,710 --> 00:43:46,960
left of this image and move to the right

1126
00:43:50,790 --> 00:43:48,720
then look further south for that little

1127
00:43:54,309 --> 00:43:50,800
train of dark features and

1128
00:43:56,069 --> 00:43:54,319
you may see it

1129
00:43:57,670 --> 00:43:56,079
all right if there are no more questions

1130
00:43:59,510 --> 00:43:57,680
we'll wrap it up here we want to thank

1131
00:44:04,230 --> 00:43:59,520
everybody for their interest and we'll

1132
00:44:08,710 --> 00:44:06,470
okay if any if people want to stay we're

1133
00:44:12,950 --> 00:44:08,720
going to roll some uh some visuals uh up

1134
00:44:12,960 --> 00:48:55,190
good stuff that's good good good report

1135
00:49:01,030 --> 00:48:58,150
for more information about the nasa sti

1136
00:49:04,309 --> 00:49:01,040
program please write to the nasa center