
NASA
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1
00:00:13,270 --> 00:00:12,070
the last one was less than a decade ago

2
00:00:20,550 --> 00:00:13,280
before then

3
00:00:24,710 --> 00:00:21,990
and the next time

4
00:00:27,269 --> 00:00:24,720
it'll be 2117

5
00:00:29,269 --> 00:00:27,279
when few if any of us will be alive to

6
00:00:31,669 --> 00:00:29,279
see it

7
00:00:34,470 --> 00:00:31,679
among the most rare and predictable

8
00:00:36,870 --> 00:00:34,480
celestial events the sight of the planet

9
00:00:38,389 --> 00:00:36,880
venus slowly trekking across the face of

10
00:00:41,270 --> 00:00:38,399
the sun

11
00:00:45,190 --> 00:00:41,280
has been witnessed by humans only 53

12
00:00:47,110 --> 00:00:45,200
times since 2000 years bc

13
00:00:49,029 --> 00:00:47,120

what about the heavens have these

14
00:00:51,189 --> 00:00:49,039
phenomena taught us

15
00:00:53,750 --> 00:00:51,199
and what else might we discover about

16
00:00:58,150 --> 00:00:53,760
our place in the universe during these

17
00:01:25,190 --> 00:01:00,630
the venus transit 2012

18
00:01:32,149 --> 00:01:28,710
what you're seeing now is a live picture

19
00:01:33,670 --> 00:01:32,159
from norway one of the locations from

20
00:01:37,270 --> 00:01:33,680
that country we believe this is

21
00:01:40,870 --> 00:01:37,280
spitzbergen uh also known as falbard uh

22
00:01:41,830 --> 00:01:40,880
this is uh we're about almost two hours

23
00:01:44,950 --> 00:01:41,840
into

24
00:01:46,630 --> 00:01:44,960
the six hour and forty minute long

25
00:01:49,270 --> 00:01:46,640
2012

26
00:01:51,590 --> 00:01:49,280
venus transit and again this is from

27
00:01:53,910 --> 00:01:51,600
norway and hi welcome again al feinberg

28
00:01:55,830 --> 00:01:53,920
senior producer here at nasa tv with my

29
00:01:57,670 --> 00:01:55,840
colleague mr dwayne brown from the

30
00:01:59,510 --> 00:01:57,680
office of communications our lead

31
00:02:01,510 --> 00:01:59,520
science mission directorate public

32
00:02:04,149 --> 00:02:01,520
affairs officer and we've got some

33
00:02:05,990 --> 00:02:04,159
really cool stuff to show you okay

34
00:02:07,510 --> 00:02:06,000
and you know al

35
00:02:09,350 --> 00:02:07,520
we want to tell our listeners our

36
00:02:12,470 --> 00:02:09,360
viewers especially

37
00:02:13,910 --> 00:02:12,480
that uh this hour this section in this

38
00:02:15,990 --> 00:02:13,920

segment will have

39
00:02:18,229 --> 00:02:16,000
some incredible images from an

40
00:02:21,110 --> 00:02:18,239
incredible spacecraft in our first

41
00:02:23,990 --> 00:02:21,120
segment we had dr jim green who will

42
00:02:24,710 --> 00:02:24,000
join us again later in our show

43
00:02:26,710 --> 00:02:24,720
but

44
00:02:28,710 --> 00:02:26,720
now we're going to talk about the images

45
00:02:31,030 --> 00:02:28,720
with one of the premier

46
00:02:33,190 --> 00:02:31,040
scientists that

47
00:02:35,509 --> 00:02:33,200
study the field of heliophysics and

48
00:02:37,270 --> 00:02:35,519
you'll learn more about that but i think

49
00:02:39,750 --> 00:02:37,280
we need to go to our social media guy

50
00:02:41,830 --> 00:02:39,760
because he's been quite busy and jason

51
00:02:44,150 --> 00:02:41,840
townsend it's been some incredible stuff

52
00:02:45,830 --> 00:02:44,160
you've seen on there correct indeed hi

53
00:02:48,390 --> 00:02:45,840
guys how's everybody doing this is the

54
00:02:50,309 --> 00:02:48,400
venus transit 2012. so if you're just

55
00:02:52,150 --> 00:02:50,319
joining us we've managed to get out some

56
00:02:53,910 --> 00:02:52,160
awesome images from the solar dynamics

57
00:02:56,790 --> 00:02:53,920
observatory if you're following on

58
00:02:59,190 --> 00:02:56,800
twitter that's at nasa underscore sdo

59
00:03:01,110 --> 00:02:59,200
they've put up a variety of images that

60
00:03:02,790 --> 00:03:01,120
show the transit going on

61
00:03:04,390 --> 00:03:02,800
if you're also following along on the

62
00:03:05,630 --> 00:03:04,400
conversation make sure to be using the

63
00:03:07,750 --> 00:03:05,640

hashtag

64
00:03:10,149 --> 00:03:07,760
poundvenustransit that works on twitter

65
00:03:12,869 --> 00:03:10,159
that works on google plus follow us at

66
00:03:14,790 --> 00:03:12,879
nasa follow us on facebook look for nasa

67
00:03:16,309 --> 00:03:14,800
and also follow us on google plus out

68
00:03:17,589 --> 00:03:16,319
there if you're out there taking

69
00:03:19,190 --> 00:03:17,599
pictures though make sure you're doing

70
00:03:20,309 --> 00:03:19,200
it safely but once you've taken those

71
00:03:22,390 --> 00:03:20,319
pictures

72
00:03:24,149 --> 00:03:22,400
upload them to our flickr gallery that's

73
00:03:27,270 --> 00:03:24,159
available if you look on flickr search

74
00:03:28,390 --> 00:03:27,280
for the group venus transit so to take

75
00:03:29,990 --> 00:03:28,400
it away and explain some of these

76
00:03:31,430 --> 00:03:30,000
wonderful images here we're going to

77
00:03:32,390 --> 00:03:31,440
turn it over to our special guest this

78
00:03:35,190 --> 00:03:32,400
episode

79
00:03:38,070 --> 00:03:35,200
uh but first uh you you pulled up a

80
00:03:40,309 --> 00:03:38,080
couple of images from sdo solar dynamics

81
00:03:41,910 --> 00:03:40,319
observatory that just are fascinating

82
00:03:43,830 --> 00:03:41,920
can you uh get us into those and then

83
00:03:46,710 --> 00:03:43,840
we'll have our guests talk about them

84
00:03:48,309 --> 00:03:46,720
sure definitely definitely uh so what

85
00:03:50,229 --> 00:03:48,319
we're looking at here is a couple of

86
00:03:52,070 --> 00:03:50,239
images that were tweeted out a little

87
00:03:54,229 --> 00:03:52,080
bit ago and we posted them on facebook

88
00:03:57,350 --> 00:03:54,239

and google plus here it starts with the

89
00:03:59,509 --> 00:03:57,360
uh the venus ingressing here

90
00:04:01,509 --> 00:03:59,519
moving on we've got

91
00:04:03,350 --> 00:04:01,519
we've got a much better high definition

92
00:04:05,030 --> 00:04:03,360
shot from the solar dynamics observatory

93
00:04:07,509 --> 00:04:05,040
here of venus getting ready to enter

94
00:04:08,869 --> 00:04:07,519
into the sun for ingress the following

95
00:04:11,110 --> 00:04:08,879
shot we've got

96
00:04:12,630 --> 00:04:11,120
is a really awesome image look at look

97
00:04:14,229 --> 00:04:12,640
at that it's the sun it's just

98
00:04:16,150 --> 00:04:14,239
incredible we've got venus transiting

99
00:04:17,909 --> 00:04:16,160
right in front of it there it's underway

100
00:04:18,710 --> 00:04:17,919
this is uh from about an hour and a half

101
00:04:20,150 --> 00:04:18,720
ago

102
00:04:24,230 --> 00:04:20,160
a little bit more than that and then the

103
00:04:26,710 --> 00:04:24,240
last one is an incredible image here

104
00:04:28,150 --> 00:04:26,720
this one shows venus in the sun close up

105
00:04:29,749 --> 00:04:28,160
a little zoomed in there from the solar

106
00:04:31,590 --> 00:04:29,759
dynamics observatory and finally the

107
00:04:33,990 --> 00:04:31,600
full disc this is incredible and we're

108
00:04:36,310 --> 00:04:34,000
going to have lika here talk about this

109
00:04:38,150 --> 00:04:36,320
yes i think we need to this this special

110
00:04:40,150 --> 00:04:38,160
guest we have i think they can really

111
00:04:42,230 --> 00:04:40,160
she can really explain what we're seeing

112
00:04:48,150 --> 00:04:42,240
here so i'll i'll let you do the honors

113
00:04:52,950 --> 00:04:50,390

i'm very sorry we call her leaker g's to

114
00:04:55,350 --> 00:04:52,960
avoid things like that but lika is our

115
00:04:57,749 --> 00:04:55,360
lead scientist here at nasa for living

116
00:04:59,749 --> 00:04:57,759
with a star program and living with a

117
00:05:02,950 --> 00:04:59,759
star of course is the sun and lika tell

118
00:05:03,990 --> 00:05:02,960
us about some of these images and uh and

119
00:05:06,629 --> 00:05:04,000
then we could talk a little bit more

120
00:05:09,270 --> 00:05:06,639
about the transit itself

121
00:05:11,830 --> 00:05:09,280
well let me tell you just a few words

122
00:05:13,590 --> 00:05:11,840
about living with a star

123
00:05:14,469 --> 00:05:13,600
you know you're of course looking at the

124
00:05:18,790 --> 00:05:14,479
sun

125
00:05:20,790 --> 00:05:18,800
variable star

126
00:05:25,189 --> 00:05:20,800
but the fact that it's magnetically

127
00:05:29,110 --> 00:05:25,199
variable really produces this wind and

128
00:05:31,749 --> 00:05:29,120
storms and our planet is embedded in the

129
00:05:34,870 --> 00:05:31,759
outer atmosphere of this planet and so

130
00:05:37,189 --> 00:05:34,880
we feel uh the effect of living with the

131
00:05:39,830 --> 00:05:37,199
star and that's the genesis of the

132
00:05:41,430 --> 00:05:39,840
program living with the star but well

133
00:05:43,990 --> 00:05:41,440
i'll digress from that now and what

134
00:05:47,510 --> 00:05:44,000
you're looking at here is a

135
00:05:50,629 --> 00:05:47,520
helium 304 image now of course it's kind

136
00:05:52,469 --> 00:05:50,639
of complicated right it's a line that

137
00:05:57,110 --> 00:05:52,479
helium produces

138
00:06:00,309 --> 00:05:57,120

and uh it's 304 angstrom 10 to the power

139
00:06:03,189 --> 00:06:00,319
minus 8 centimeters and none of this

140
00:06:03,199 --> 00:06:08,469
please explain

141
00:06:12,950 --> 00:06:10,230
and and so

142
00:06:16,150 --> 00:06:12,960
what you're seeing is a full disc image

143
00:06:18,790 --> 00:06:16,160
of the sun and this is a very special

144
00:06:22,550 --> 00:06:18,800
observatory solar dynamics observatory

145
00:06:25,430 --> 00:06:22,560
it takes images that are about um 10

146
00:06:28,150 --> 00:06:25,440
times better than the high definition tv

147
00:06:30,950 --> 00:06:28,160
uh it's actually taking images at a

148
00:06:32,629 --> 00:06:30,960
temporal cadence of every 10 seconds

149
00:06:35,590 --> 00:06:32,639
this is something we have never had

150
00:06:38,309 --> 00:06:35,600
before and it's doing it at 10 different

151
00:06:41,110 --> 00:06:38,319
temperatures so the temperature scale if

152
00:06:44,550 --> 00:06:41,120
i would was to convert this image it

153
00:06:47,350 --> 00:06:44,560
would be about 50 000 degrees kelvin

154
00:06:49,029 --> 00:06:47,360
or maybe 90 000 degrees fahrenheit

155
00:06:53,270 --> 00:06:49,039
something like that in terms of

156
00:06:54,150 --> 00:06:53,280
fahrenheit and you're seeing uh venus in

157
00:06:56,550 --> 00:06:54,160
kind of

158
00:06:58,469 --> 00:06:56,560
really excuse the detail because of the

159
00:07:00,230 --> 00:06:58,479
spatial resolution now how about this

160
00:07:02,950 --> 00:07:00,240
next image we have here

161
00:07:05,909 --> 00:07:02,960
and so that that particular image is in

162
00:07:07,589 --> 00:07:05,919
in a wavelength band that's instead of

163
00:07:10,469 --> 00:07:07,599

304

164
00:07:12,550 --> 00:07:10,479
is 193 but let me convert it into a

165
00:07:15,670 --> 00:07:12,560
temperature scale and in terms of

166
00:07:16,749 --> 00:07:15,680
temperature scale this is of the order

167
00:07:20,070 --> 00:07:16,759
of

168
00:07:22,469 --> 00:07:20,080
1.5 to 2 million degrees kelvin this is

169
00:07:25,270 --> 00:07:22,479
the temperature of the corona and this

170
00:07:26,710 --> 00:07:25,280
is kind of a mystery if i may add i mean

171
00:07:29,270 --> 00:07:26,720
you might ask the question why do you

172
00:07:32,790 --> 00:07:29,280
look at the sun at all um you know if

173
00:07:35,110 --> 00:07:32,800
you look at the sun with unaided eyes

174
00:07:37,909 --> 00:07:35,120
you see this yellow ball

175
00:07:39,189 --> 00:07:37,919
that's about 5000 degrees kelvin

176
00:07:41,589 --> 00:07:39,199
temperature

177
00:07:43,510 --> 00:07:41,599
but if you actually look at the corona

178
00:07:45,029 --> 00:07:43,520
which is outside the sun it's like you

179
00:07:46,629 --> 00:07:45,039
are you know if you're near the stove

180
00:07:48,309 --> 00:07:46,639
and you're moving away from the stove

181
00:07:50,629 --> 00:07:48,319
you think that the temperature would go

182
00:07:53,670 --> 00:07:50,639
down well in this case what happens is

183
00:07:56,390 --> 00:07:53,680
that the temperature goes up so that

184
00:07:58,390 --> 00:07:56,400
temperature is in millions of degree

185
00:08:00,790 --> 00:07:58,400
kelvin and that's kind of a mystery you

186
00:08:02,869 --> 00:08:00,800
know like we're going to talk some more

187
00:08:05,430 --> 00:08:02,879
and ask you a question about some other

188
00:08:07,390 --> 00:08:05,440

some of the images but let me take a

189
00:08:09,830 --> 00:08:07,400
step back for our audience because

190
00:08:11,430 --> 00:08:09,840
astrophysicists you have planetary

191
00:08:15,510 --> 00:08:11,440
scientists

192
00:08:18,629 --> 00:08:15,520
but heliophysicists heliophysics explain

193
00:08:21,029 --> 00:08:18,639
to the audience what is heliophysics

194
00:08:24,150 --> 00:08:21,039
oh we have so much fun with heliophysics

195
00:08:27,670 --> 00:08:24,160
heliophysics wasn't even a ward up until

196
00:08:31,110 --> 00:08:27,680
maybe five ten years ago so remember

197
00:08:33,269 --> 00:08:31,120
scientists came up with this word right

198
00:08:36,389 --> 00:08:33,279
and so you can define it so we have

199
00:08:38,949 --> 00:08:36,399
given a meaning to this new discipline

200
00:08:41,990 --> 00:08:38,959
that we call heliophysics

201
00:08:45,350 --> 00:08:42,000
heliophysics is something like an

202
00:08:48,230 --> 00:08:45,360
environmental science with astrophysics

203
00:08:51,190 --> 00:08:48,240
really so you're studying the sun as an

204
00:08:54,710 --> 00:08:51,200
astrophysical entity but you're studying

205
00:08:57,350 --> 00:08:54,720
its impact not only on our planet but

206
00:09:00,710 --> 00:08:57,360
all other planetary environment so you

207
00:09:03,590 --> 00:09:00,720
are actually studying sort of the sun

208
00:09:06,310 --> 00:09:03,600
the heliosphere that the sun dominates

209
00:09:08,310 --> 00:09:06,320
with its magnetic field and all the

210
00:09:10,550 --> 00:09:08,320
interaction that takes place with this

211
00:09:13,350 --> 00:09:10,560
magnetic field and all planetary

212
00:09:15,590 --> 00:09:13,360
environment but of course to us what's

213
00:09:18,550 --> 00:09:15,600

most significant and important is that

214
00:09:20,630 --> 00:09:18,560
we understand the connection between sun

215
00:09:23,190 --> 00:09:20,640
and earth in great detail and that's the

216
00:09:24,470 --> 00:09:23,200
study of heliophysics now now these

217
00:09:26,630 --> 00:09:24,480
great pictures we're going to go to

218
00:09:28,230 --> 00:09:26,640
another one now can we go to this next

219
00:09:29,350 --> 00:09:28,240
one

220
00:09:32,630 --> 00:09:29,360
there

221
00:09:33,750 --> 00:09:32,640
besides giving us wonderful pictures of

222
00:09:36,150 --> 00:09:33,760
venus

223
00:09:38,710 --> 00:09:36,160
transiting the sun where

224
00:09:41,430 --> 00:09:38,720
sdl also obviously tells us a lot about

225
00:09:45,110 --> 00:09:41,440
the sun and as you said its effect on

226
00:09:49,509 --> 00:09:45,120
the solar system but also

227
00:09:51,990 --> 00:09:49,519
the impact of what happens on the sun

228
00:09:53,750 --> 00:09:52,000
on the earth and especially in the new

229
00:09:55,030 --> 00:09:53,760
uh uh

230
00:09:57,670 --> 00:09:55,040
i guess uh

231
00:09:58,470 --> 00:09:57,680
regime of uh solar weather if you will

232
00:09:59,750 --> 00:09:58,480
right

233
00:10:02,069 --> 00:09:59,760
something that's more and more in the

234
00:10:05,350 --> 00:10:02,079
new space weather yes yes explain them

235
00:10:07,590 --> 00:10:05,360
to us so but you know heliophysics we

236
00:10:09,670 --> 00:10:07,600
sometimes say is the science of space

237
00:10:12,630 --> 00:10:09,680
weather so space weather is again one of

238
00:10:14,949 --> 00:10:12,640

those new worlds uh we understand

239
00:10:15,829 --> 00:10:14,959
terrestrial weather it's meteorology you

240
00:10:19,030 --> 00:10:15,839
know it

241
00:10:21,670 --> 00:10:19,040
involves uh pressure temperature water

242
00:10:24,230 --> 00:10:21,680
vapor gravity etc

243
00:10:25,990 --> 00:10:24,240
what space weather is is really what

244
00:10:29,590 --> 00:10:26,000
happens on the sun

245
00:10:32,870 --> 00:10:29,600
and these are so sun produces particles

246
00:10:35,190 --> 00:10:32,880
and sun produces radiation and the comp

247
00:10:37,509 --> 00:10:35,200
and then sun produces storms so we get

248
00:10:39,670 --> 00:10:37,519
sometimes these dark regions on the sun

249
00:10:41,590 --> 00:10:39,680
and in probably you know some of your

250
00:10:43,670 --> 00:10:41,600
images when you bring up the full sun

251
00:10:46,949 --> 00:10:43,680
you'll see these dark blobs called

252
00:10:49,350 --> 00:10:46,959
sunspots they they are region of intense

253
00:10:52,790 --> 00:10:49,360
magnetic field and when you have intense

254
00:10:55,750 --> 00:10:52,800
magnetic field this magnetic field can

255
00:10:57,910 --> 00:10:55,760
actually rupture kind of like you know

256
00:10:59,750 --> 00:10:57,920
if you think of rubber band and you

257
00:11:02,230 --> 00:10:59,760
twist it and twist it and twist it you

258
00:11:04,389 --> 00:11:02,240
know the tension gives and it just

259
00:11:06,870 --> 00:11:04,399
breaks so magnetic field lines are kind

260
00:11:08,949 --> 00:11:06,880
of like that and so you know underneath

261
00:11:12,069 --> 00:11:08,959
this dark sunspot you have magnetic

262
00:11:14,069 --> 00:11:12,079
field that are just boiling and then

263
00:11:17,350 --> 00:11:14,079

they can rupture and produce coronal

264
00:11:19,590 --> 00:11:17,360
mass ejection solar flares etc so

265
00:11:21,829 --> 00:11:19,600
tremendous amount of energy and

266
00:11:24,230 --> 00:11:21,839
particles are then thrown out in the

267
00:11:27,509 --> 00:11:24,240
form of cloud that goes through the

268
00:11:29,670 --> 00:11:27,519
interplanetary medium 93 million miles

269
00:11:33,030 --> 00:11:29,680
it's a huge distance it takes light

270
00:11:36,389 --> 00:11:33,040
about eight minutes but these particles

271
00:11:38,470 --> 00:11:36,399
travel between about 400 to 1000

272
00:11:39,509 --> 00:11:38,480
kilometers per second so it takes them a

273
00:11:43,430 --> 00:11:39,519
few days

274
00:11:45,190 --> 00:11:43,440
when they arrive at earth they pushes on

275
00:11:48,470 --> 00:11:45,200
these particles push on the

276
00:11:50,710 --> 00:11:48,480
magnetosphere this is earth's own shield

277
00:11:53,750 --> 00:11:50,720
essentially that protects us from these

278
00:11:55,670 --> 00:11:53,760
particles and every once in a while the

279
00:11:57,509 --> 00:11:55,680
orientation of the

280
00:11:59,269 --> 00:11:57,519
particles the magnetic field of the

281
00:12:00,470 --> 00:11:59,279
particles that come from the sun the

282
00:12:02,629 --> 00:12:00,480
solar wind

283
00:12:05,110 --> 00:12:02,639
matches up syncs up with earth's

284
00:12:08,389 --> 00:12:05,120
magnetic field then these particles can

285
00:12:11,829 --> 00:12:08,399
penetrate into earth's geospace the

286
00:12:14,710 --> 00:12:11,839
first sign is of a geomagnetic storm is

287
00:12:16,949 --> 00:12:14,720
that we have aurora beautiful aurora and

288
00:12:18,870 --> 00:12:16,959

then any number of other disruptive

289
00:12:20,550 --> 00:12:18,880
phenomena can happen we're going to go

290
00:12:22,310 --> 00:12:20,560
now to one of your colleagues down at

291
00:12:24,949 --> 00:12:22,320
the marshall space flight center mitzi

292
00:12:27,509 --> 00:12:24,959
adams who i know is a colleague and

293
00:12:28,870 --> 00:12:27,519
friend of yours missy uh how are things

294
00:12:33,269 --> 00:12:28,880
looking down there at marshall what's

295
00:12:37,670 --> 00:12:36,310
well earlier earlier in the day we had

296
00:12:40,470 --> 00:12:37,680
clouds

297
00:12:41,910 --> 00:12:40,480
and we were really worried that we

298
00:12:43,590 --> 00:12:41,920
weren't going to be able to see the

299
00:12:46,710 --> 00:12:43,600
beginning of the transit

300
00:12:48,949 --> 00:12:46,720
but things cleared out and it's it's

301
00:12:50,150 --> 00:12:48,959
looking much better now

302
00:12:52,790 --> 00:12:50,160
that's great

303
00:12:55,350 --> 00:12:52,800
now have you uh been scanning like we

304
00:12:56,710 --> 00:12:55,360
have all the different websites uh

305
00:12:58,949 --> 00:12:56,720
around the world

306
00:13:01,269 --> 00:12:58,959
to see what's uh what's cooking there if

307
00:13:04,230 --> 00:13:01,279
you will

308
00:13:05,990 --> 00:13:04,240
a little bit um i was i was involved in

309
00:13:07,509 --> 00:13:06,000
answering some questions on the live

310
00:13:10,069 --> 00:13:07,519
chat

311
00:13:11,590 --> 00:13:10,079
i had my number 14 welder's glass and i

312
00:13:13,190 --> 00:13:11,600
went outside and

313
00:13:14,949 --> 00:13:13,200

and looked at the beginning of the

314
00:13:19,269 --> 00:13:14,959
transit

315
00:13:21,430 --> 00:13:19,279
i also looked at a feed from hawaii and

316
00:13:23,430 --> 00:13:21,440
um and from our own telescopes here in

317
00:13:25,990 --> 00:13:23,440
huntsville

318
00:13:29,110 --> 00:13:26,000
we're going to go now mitzi and lika and

319
00:13:31,430 --> 00:13:29,120
dwayne uh to another website that we've

320
00:13:33,910 --> 00:13:31,440
been talking about or teased before but

321
00:13:36,389 --> 00:13:33,920
haven't actually gone to is in the uk in

322
00:13:37,750 --> 00:13:36,399
lancashire mutual

323
00:13:43,189 --> 00:13:37,760
which is

324
00:13:44,949 --> 00:13:43,199
the home of jeremiah horox who in 1639

325
00:13:48,230 --> 00:13:44,959
was the first

326
00:13:50,230 --> 00:13:48,240
person to actually observe the transit

327
00:13:52,069 --> 00:13:50,240
and document it and

328
00:13:53,590 --> 00:13:52,079
this is saint michael's church can we go

329
00:13:56,069 --> 00:13:53,600
back to that for a second

330
00:13:58,710 --> 00:13:56,079
st michael's church where

331
00:14:01,829 --> 00:13:58,720
jeremiah horox was

332
00:14:03,829 --> 00:14:01,839
a curate and they have the stained glass

333
00:14:05,910 --> 00:14:03,839
window there as a matter of fact in in

334
00:14:08,949 --> 00:14:05,920
in his honor but they're having their

335
00:14:10,870 --> 00:14:08,959
own presentation there too but uh uh

336
00:14:12,310 --> 00:14:10,880
mitzi can you tell us a little bit more

337
00:14:15,430 --> 00:14:12,320
about um

338
00:14:17,990 --> 00:14:15,440

what uh impressions you've had so far

339
00:14:21,990 --> 00:14:18,000
and what you've been looking for in this

340
00:14:27,269 --> 00:14:24,310
i think most of my impressions of this

341
00:14:30,310 --> 00:14:27,279
transit have had to do with education

342
00:14:33,829 --> 00:14:30,320
and exciting the public about viewing

343
00:14:36,230 --> 00:14:33,839
the sky in general

344
00:14:39,590 --> 00:14:36,240
and and it's also interesting that uh at

345
00:14:41,030 --> 00:14:39,600
the time horox made his observation

346
00:14:42,710 --> 00:14:41,040
there were there was only one or two

347
00:14:45,110 --> 00:14:42,720
people who saw it

348
00:14:47,990 --> 00:14:45,120
he may have been the only one

349
00:14:50,230 --> 00:14:48,000
and the next time there was a transit

350
00:14:52,470 --> 00:14:50,240
you had a few more people observing it

351
00:14:53,990 --> 00:14:52,480
and the next time you had hundreds of

352
00:14:57,670 --> 00:14:54,000
people observing it

353
00:15:00,150 --> 00:14:57,680
and then our transit in 2004

354
00:15:02,150 --> 00:15:00,160
we had millions of people observing it

355
00:15:03,670 --> 00:15:02,160
and today

356
00:15:04,629 --> 00:15:03,680
we have even more

357
00:15:07,110 --> 00:15:04,639
so

358
00:15:09,269 --> 00:15:07,120
just in a few hundred years we've had

359
00:15:13,590 --> 00:15:09,279
this change in the way that we've been

360
00:15:16,949 --> 00:15:15,670
well let's see let's uh leek i have a

361
00:15:18,230 --> 00:15:16,959
question for you

362
00:15:20,230 --> 00:15:18,240
you explain

363
00:15:21,990 --> 00:15:20,240

the area

364
00:15:23,030 --> 00:15:22,000
heliophysics

365
00:15:24,629 --> 00:15:23,040
now

366
00:15:26,230 --> 00:15:24,639
your fellow

367
00:15:28,870 --> 00:15:26,240
colleagues out there and scientists that

368
00:15:30,710 --> 00:15:28,880
are looking at what what can we expect

369
00:15:31,990 --> 00:15:30,720
that you guys will take away from this i

370
00:15:34,870 --> 00:15:32,000
mean it won't happen again for another

371
00:15:37,509 --> 00:15:34,880
105 years but what what type of data why

372
00:15:39,509 --> 00:15:37,519
should people and we we asked dr jim

373
00:15:41,350 --> 00:15:39,519
green this book what is the why we

374
00:15:43,189 --> 00:15:41,360
should care factor not just for the the

375
00:15:45,030 --> 00:15:43,199
general public who know when your little

376
00:15:47,110 --> 00:15:45,040
kids know what the sun is but for the

377
00:15:49,670 --> 00:15:47,120
scientific so why we should care from a

378
00:15:51,910 --> 00:15:49,680
public view and certainly why the

379
00:15:53,829 --> 00:15:51,920
scientific significance of this oh i

380
00:15:55,030 --> 00:15:53,839
mean mitzy talked about the public view

381
00:15:58,470 --> 00:15:55,040
you know i mean

382
00:16:02,790 --> 00:15:58,480
how we people are curious beings and

383
00:16:06,470 --> 00:16:02,800
forever we have you know looked at the

384
00:16:09,430 --> 00:16:06,480
sky and astronomy has had impact in

385
00:16:11,990 --> 00:16:09,440
every culture but the reason

386
00:16:15,590 --> 00:16:12,000
we study this from the scientific point

387
00:16:18,870 --> 00:16:15,600
of view is really to understand

388
00:16:23,430 --> 00:16:18,880

the sun as a star the venus as a planet

389
00:16:25,749 --> 00:16:23,440
the connection between venus and the sun

390
00:16:28,949 --> 00:16:25,759
and so what we hope to do you know with

391
00:16:31,269 --> 00:16:28,959
sdo i mean it's a great opportunity

392
00:16:34,150 --> 00:16:31,279
solar dynamics observatory was really

393
00:16:37,430 --> 00:16:34,160
meant to study the sun but now that this

394
00:16:39,749 --> 00:16:37,440
opportunity has presented itself what we

395
00:16:42,230 --> 00:16:39,759
are going to have are actually

396
00:16:43,990 --> 00:16:42,240
observations in these various um

397
00:16:45,990 --> 00:16:44,000
temperature bands that you are looking

398
00:16:47,430 --> 00:16:46,000
at what's going to happen is we're going

399
00:16:50,470 --> 00:16:47,440
to get data

400
00:16:53,189 --> 00:16:50,480
that's going to venus has an atmosphere

401
00:16:57,269 --> 00:16:53,199
as as we know i mean even though it is

402
00:17:00,470 --> 00:16:57,279
the planet uh of you know uh goddess of

403
00:17:01,189 --> 00:17:00,480
love it's a hellish planet too we know

404
00:17:03,189 --> 00:17:01,199
that

405
00:17:05,750 --> 00:17:03,199
you know we couldn't survive there so

406
00:17:09,110 --> 00:17:05,760
it's got a thick atmosphere

407
00:17:11,350 --> 00:17:09,120
and these wavelength observations are

408
00:17:14,230 --> 00:17:11,360
going to give us a clue

409
00:17:17,669 --> 00:17:14,240
about the content of oxygen so venus

410
00:17:20,230 --> 00:17:17,679
atmosphere is largely carbon dioxide and

411
00:17:22,870 --> 00:17:20,240
nitrogen very little nitrogen pretty

412
00:17:26,309 --> 00:17:22,880
much all carbon dioxide which gets

413
00:17:29,830 --> 00:17:26,319

dissociated into carbon monoxide co and

414
00:17:32,230 --> 00:17:29,840
oxygen and so when you have these um

415
00:17:34,549 --> 00:17:32,240
soft x-rays go through this we we are

416
00:17:36,390 --> 00:17:34,559
going to be able to detangle

417
00:17:38,549 --> 00:17:36,400
actually the composition

418
00:17:40,549 --> 00:17:38,559
and how much oxygen is there fantastic

419
00:17:42,150 --> 00:17:40,559
isn't that that's that's very cool i

420
00:17:45,270 --> 00:17:42,160
think we're going to swing back let's go

421
00:17:47,430 --> 00:17:45,280
back to mitzi down at marshall mitzi uh

422
00:17:51,029 --> 00:17:47,440
what are you um

423
00:17:53,350 --> 00:17:51,039
hoping to learn yourself and as you look

424
00:17:55,669 --> 00:17:53,360
at these images from sdo they're they're

425
00:17:58,549 --> 00:17:55,679
they're pretty striking at least to the

426
00:18:01,029 --> 00:17:58,559
untrained observer like myself

427
00:18:03,350 --> 00:18:01,039
it's they're just they're cool the wow

428
00:18:08,150 --> 00:18:03,360
factor is there how about for you what

429
00:18:12,789 --> 00:18:10,150
i i agree with you the wow factor is

430
00:18:15,350 --> 00:18:12,799
definitely there

431
00:18:16,470 --> 00:18:15,360
i i'm actually doing research with sdo

432
00:18:17,990 --> 00:18:16,480
data

433
00:18:20,630 --> 00:18:18,000
and

434
00:18:21,909 --> 00:18:20,640
every day when i look at the images i'm

435
00:18:24,310 --> 00:18:21,919
just

436
00:18:26,549 --> 00:18:24,320
truly amazed at what we've been able to

437
00:18:30,390 --> 00:18:26,559
do here

438
00:18:32,789 --> 00:18:30,400

in terms of the transit itself

439
00:18:35,110 --> 00:18:32,799
i personally won't be doing any research

440
00:18:36,630 --> 00:18:35,120
with with these data

441
00:18:39,830 --> 00:18:36,640
but um

442
00:18:42,710 --> 00:18:39,840
i i think that scientists will be able

443
00:18:45,029 --> 00:18:42,720
to use the data to fine-tune some of the

444
00:18:47,750 --> 00:18:45,039
techniques for looking for planets

445
00:18:50,390 --> 00:18:47,760
outside our solar system

446
00:18:51,669 --> 00:18:50,400
kepler and hubble are both

447
00:18:53,590 --> 00:18:51,679
going to be doing

448
00:18:56,710 --> 00:18:53,600
that sort of study

449
00:18:58,470 --> 00:18:56,720
and the henna day mission

450
00:19:01,909 --> 00:18:58,480
will also be

451
00:19:03,909 --> 00:19:01,919
using the transit of venus to

452
00:19:05,510 --> 00:19:03,919
fine-tune some of the instruments on

453
00:19:08,150 --> 00:19:05,520
board

454
00:19:09,270 --> 00:19:08,160
that spacecraft so

455
00:19:11,270 --> 00:19:09,280
i think there are a lot of good

456
00:19:13,029 --> 00:19:11,280
scientific reasons for

457
00:19:14,710 --> 00:19:13,039
using this opportunity that has

458
00:19:15,510 --> 00:19:14,720
presented itself

459
00:19:16,549 --> 00:19:15,520
to

460
00:19:19,190 --> 00:19:16,559
make

461
00:19:21,190 --> 00:19:19,200
great strides in our science mitzi this

462
00:19:23,350 --> 00:19:21,200
is dwayne well we're going to go we've

463
00:19:24,789 --> 00:19:23,360

been going around the world and al is

464
00:19:25,909 --> 00:19:24,799
going to take us to another country and

465
00:19:27,750 --> 00:19:25,919
i know lincoln is going to be very

466
00:19:29,750 --> 00:19:27,760
familiar with but just a quick question

467
00:19:31,990 --> 00:19:29,760
we've been seeing a lot of excitement in

468
00:19:34,070 --> 00:19:32,000
events all around the nation

469
00:19:36,070 --> 00:19:34,080
and what's happening down in the

470
00:19:40,150 --> 00:19:36,080
huntsville alabama area just sort of

471
00:19:41,750 --> 00:19:40,160
give us uh description of the excitement

472
00:19:45,190 --> 00:19:41,760
there and what's going on in the city

473
00:19:47,510 --> 00:19:45,200
can can you do that for us

474
00:19:49,669 --> 00:19:47,520
i certainly can the

475
00:19:52,549 --> 00:19:49,679
space and rocket center here

476
00:19:55,350 --> 00:19:52,559
is having a viewing opportunity with

477
00:19:57,270 --> 00:19:55,360
telescopes supplied by the von braun

478
00:20:00,150 --> 00:19:57,280
astronomical society

479
00:20:01,430 --> 00:20:00,160
and there are other viewing events going

480
00:20:04,230 --> 00:20:01,440
on in the area

481
00:20:07,270 --> 00:20:04,240
in decatur which is a city to the west

482
00:20:08,710 --> 00:20:07,280
of huntsville there are is an observing

483
00:20:10,149 --> 00:20:08,720
opportunity at one of the local

484
00:20:12,149 --> 00:20:10,159
elementary schools

485
00:20:13,510 --> 00:20:12,159
and actually here on base at marshall

486
00:20:18,950 --> 00:20:13,520
some of our

487
00:20:20,950 --> 00:20:18,960
out looking at the event and speaking of

488
00:20:22,070 --> 00:20:20,960

telescopes out we're gonna go to a shot

489
00:20:26,470 --> 00:20:22,080
right now

490
00:20:29,270 --> 00:20:26,480
from hanle ladakh in india it's the

491
00:20:31,990 --> 00:20:29,280
indian astronomical observatory it's the

492
00:20:35,270 --> 00:20:32,000
world's highest station

493
00:20:38,470 --> 00:20:35,280
webcasting the transit of venus at 14

494
00:20:40,549 --> 00:20:38,480
800 feet and uh

495
00:20:42,950 --> 00:20:40,559
lika you're familiar with this place

496
00:20:45,110 --> 00:20:42,960
well i know it exists i haven't had the

497
00:20:47,669 --> 00:20:45,120
good fortune to visit the place that's

498
00:20:51,990 --> 00:20:47,679
where i'd like to be if i could not

499
00:20:55,909 --> 00:20:52,710
and

500
00:20:58,149 --> 00:20:55,919
uh tell us about some of the um

501
00:21:00,789 --> 00:20:58,159
are you familiar with the uh

502
00:21:03,110 --> 00:21:00,799
capabilities that they have there

503
00:21:07,270 --> 00:21:03,120
not in great details but i know it's a

504
00:21:10,310 --> 00:21:07,280
very advanced telescope and um

505
00:21:13,029 --> 00:21:10,320
very high up so the clarity the

506
00:21:14,950 --> 00:21:13,039
of the sky is exquisite

507
00:21:18,710 --> 00:21:14,960
and i know that they have data

508
00:21:21,190 --> 00:21:18,720
connections um directly to bangalore

509
00:21:23,510 --> 00:21:21,200
so you know scientists in bangalore can

510
00:21:26,470 --> 00:21:23,520
actually use the data you don't have to

511
00:21:28,149 --> 00:21:26,480
be stationed there at the observatory i

512
00:21:29,029 --> 00:21:28,159
guess this is early morning so they're

513
00:21:31,350 --> 00:21:29,039

just

514
00:21:32,710 --> 00:21:31,360
waking up to this this is probably

515
00:21:35,750 --> 00:21:32,720
pretty cool for them

516
00:21:37,750 --> 00:21:35,760
which brings to mind a question

517
00:21:41,909 --> 00:21:37,760
scientists from all over the world are

518
00:21:44,470 --> 00:21:41,919
studying this is there some sort of

519
00:21:47,510 --> 00:21:44,480
one-stop shop for scientists where all

520
00:21:50,470 --> 00:21:47,520
the data gets collected and shared

521
00:21:52,149 --> 00:21:50,480
for something like the venus transit

522
00:21:55,270 --> 00:21:52,159
where scientists

523
00:21:56,710 --> 00:21:55,280
from different nations can can go and

524
00:21:58,789 --> 00:21:56,720
and

525
00:21:59,909 --> 00:21:58,799
find out what

526
00:22:03,110 --> 00:21:59,919
another

527
00:22:05,590 --> 00:22:03,120
has has discovered notes

528
00:22:08,070 --> 00:22:05,600
right scientists will of course do this

529
00:22:10,390 --> 00:22:08,080
you know scientists love to organize

530
00:22:14,070 --> 00:22:10,400
meetings and i am

531
00:22:16,630 --> 00:22:14,080
sure there'll be few 2012 you know

532
00:22:19,830 --> 00:22:16,640
transit of venus conferences that's

533
00:22:21,590 --> 00:22:19,840
where you know such data gets validated

534
00:22:24,230 --> 00:22:21,600
peer-reviewed when you present there'll

535
00:22:26,630 --> 00:22:24,240
be some new findings uh you know every

536
00:22:29,110 --> 00:22:26,640
other transit that we have seen so far

537
00:22:32,310 --> 00:22:29,120
there's always been something new the

538
00:22:33,350 --> 00:22:32,320

last 2004 when we were looking that with

539
00:22:36,789 --> 00:22:33,360
our

540
00:22:39,110 --> 00:22:36,799
new trace um observatory we found this

541
00:22:41,669 --> 00:22:39,120
arc and we didn't know what it was

542
00:22:44,390 --> 00:22:41,679
scientists studied it and figured out

543
00:22:46,710 --> 00:22:44,400
what the arc was all about before that

544
00:22:47,909 --> 00:22:46,720
it was this you know dark

545
00:22:50,310 --> 00:22:47,919
sort of

546
00:22:53,830 --> 00:22:50,320
raindrop shape structure you know which

547
00:22:56,390 --> 00:22:53,840
is a telescope effect so i'm sure this

548
00:22:58,149 --> 00:22:56,400
time around also there'll be new

549
00:23:01,029 --> 00:22:58,159
findings you know i don't even doubt

550
00:23:05,110 --> 00:23:01,039
that mitzi for you down in huntsville do

551
00:23:07,270 --> 00:23:05,120
you have any ideas or any uh suspicions

552
00:23:11,270 --> 00:23:07,280
if you will about what we might learn

553
00:23:17,029 --> 00:23:14,549
any suspicions um perhaps that's not the

554
00:23:18,870 --> 00:23:17,039
best it's always hard to predict

555
00:23:20,310 --> 00:23:18,880
because

556
00:23:23,430 --> 00:23:20,320
there

557
00:23:26,310 --> 00:23:23,440
things happen serendipitously

558
00:23:28,149 --> 00:23:26,320
so i really i really can't say

559
00:23:29,990 --> 00:23:28,159
one of one of the things that we

560
00:23:32,789 --> 00:23:30,000
we hear here at nasa a lot of times

561
00:23:35,830 --> 00:23:32,799
about exploration is that we don't know

562
00:23:39,430 --> 00:23:35,840
what we don't know till we know it and

563
00:23:42,470 --> 00:23:39,440

we'll find out things uh in science as

564
00:23:45,029 --> 00:23:42,480
we do uh uh in any form of uh

565
00:23:47,430 --> 00:23:45,039
exploration uh of space

566
00:23:48,870 --> 00:23:47,440
uh that uh you know we

567
00:23:50,710 --> 00:23:48,880
will learn something we're just not sure

568
00:23:53,990 --> 00:23:50,720
what it'll be at true i mean there are

569
00:23:56,710 --> 00:23:54,000
things uh you know like known unknowns

570
00:23:59,190 --> 00:23:56,720
so in case of sdo we know we want to

571
00:24:01,430 --> 00:23:59,200
know something about our instrument okay

572
00:24:04,630 --> 00:24:01,440
so we are going after that

573
00:24:07,190 --> 00:24:04,640
because venus provides that very dark

574
00:24:09,590 --> 00:24:07,200
space we are going to get a point spread

575
00:24:11,990 --> 00:24:09,600
function you know leakage of light from

576
00:24:14,950 --> 00:24:12,000
one pixel to the next and that's very

577
00:24:19,110 --> 00:24:14,960
important to you know get a good reading

578
00:24:21,909 --> 00:24:19,120
of our data the position of the

579
00:24:25,190 --> 00:24:21,919
transit is actually going to give us a

580
00:24:26,390 --> 00:24:25,200
very good sense of the orientation north

581
00:24:27,269 --> 00:24:26,400
south

582
00:24:29,190 --> 00:24:27,279
of

583
00:24:31,510 --> 00:24:29,200
the actual solar images because when you

584
00:24:33,350 --> 00:24:31,520
launch an instrument in space what

585
00:24:35,830 --> 00:24:33,360
happens is sometimes you know due to

586
00:24:38,390 --> 00:24:35,840
vibration and all that things shift and

587
00:24:40,630 --> 00:24:38,400
so you can't be absolutely sure about

588
00:24:43,350 --> 00:24:40,640

the accuracy of your pointing so these

589
00:24:45,590 --> 00:24:43,360
are opportunities those are the known

590
00:24:47,269 --> 00:24:45,600
unknowns that we are going to fix and

591
00:24:49,669 --> 00:24:47,279
then there are the unknown unknowns you

592
00:24:52,149 --> 00:24:49,679
know which are the new findings i'm

593
00:24:53,430 --> 00:24:52,159
which i as i said do not even doubt will

594
00:24:55,990 --> 00:24:53,440
be coming out but we don't know what

595
00:24:58,950 --> 00:24:56,000
they are as mitzi said well we're gonna

596
00:25:01,269 --> 00:24:58,960
before we go to our social media guru um

597
00:25:03,510 --> 00:25:01,279
we have a lot of young folks watching

598
00:25:04,789 --> 00:25:03,520
this uh broadcast so uh we're gonna go

599
00:25:06,789 --> 00:25:04,799
to social media and then we're gonna

600
00:25:09,750 --> 00:25:06,799
come back but i want you to sort of

601
00:25:11,350 --> 00:25:09,760
you've explained heliophysic um and and

602
00:25:13,750 --> 00:25:11,360
the scientist

603
00:25:16,390 --> 00:25:13,760
your role model i've seen you inspire

604
00:25:19,269 --> 00:25:16,400
you know young women young folks so

605
00:25:20,870 --> 00:25:19,279
maybe uh take a few moments to just tell

606
00:25:22,710 --> 00:25:20,880
the folks if they're interested in

607
00:25:23,750 --> 00:25:22,720
studying the sun and going to feel some

608
00:25:25,510 --> 00:25:23,760
some

609
00:25:27,750 --> 00:25:25,520
guidance and recommendations so think

610
00:25:30,710 --> 00:25:27,760
about that but we're gonna we're gonna

611
00:25:33,110 --> 00:25:30,720
visit uh jason townsend there's a lot of

612
00:25:34,789 --> 00:25:33,120
activity on the social media site jason

613
00:25:36,950 --> 00:25:34,799

uh give us an update what's going on

614
00:25:38,710 --> 00:25:36,960
over there sure so we're we're trending

615
00:25:40,230 --> 00:25:38,720
out there uh if you're following along

616
00:25:41,590 --> 00:25:40,240
and joining us in the conversation make

617
00:25:43,750 --> 00:25:41,600
sure to be using

618
00:25:45,590 --> 00:25:43,760
pound venus transit you can use that on

619
00:25:47,190 --> 00:25:45,600
google plus you can use that on twitter

620
00:25:49,830 --> 00:25:47,200
we're also on facebook you can look for

621
00:25:51,190 --> 00:25:49,840
nasa and follow along

622
00:25:53,029 --> 00:25:51,200
we've been putting up some good images

623
00:25:54,070 --> 00:25:53,039
that are out there we are making sure

624
00:25:55,830 --> 00:25:54,080
that we're getting the latest and

625
00:25:57,510 --> 00:25:55,840
greatest from things like the solar

626
00:25:59,029 --> 00:25:57,520
dynamics observatory so if you're

627
00:26:00,950 --> 00:25:59,039
following along make sure to follow at

628
00:26:02,789 --> 00:26:00,960
nasa on twitter and if you're taking

629
00:26:05,830 --> 00:26:02,799
photos of yourself of your

630
00:26:07,190 --> 00:26:05,840
your own viewing out there uh all over

631
00:26:09,669 --> 00:26:07,200
the globe make sure to upload your

632
00:26:11,110 --> 00:26:09,679
photos to flickr if you go onto flickr

633
00:26:12,630 --> 00:26:11,120
make sure to search for the group venus

634
00:26:14,789 --> 00:26:12,640
transit and add them to the community

635
00:26:16,549 --> 00:26:14,799
pool that's out there so thanks a lot

636
00:26:17,909 --> 00:26:16,559
for following along on social media and

637
00:26:19,590 --> 00:26:17,919
keep watching we've got several more

638
00:26:23,510 --> 00:26:19,600

hours of this so

639
00:26:25,430 --> 00:26:23,520
thanks thanks jason okay so lika

640
00:26:26,950 --> 00:26:25,440
go ahead and inspire the folks that you

641
00:26:28,310 --> 00:26:26,960
do every day these young folks who are

642
00:26:30,470 --> 00:26:28,320
watching this

643
00:26:32,710 --> 00:26:30,480
i don't need to inspire them venus

644
00:26:34,870 --> 00:26:32,720
transit is inspiring people all over the

645
00:26:38,630 --> 00:26:34,880
world anyway that's correct you know we

646
00:26:41,350 --> 00:26:38,640
are fascinated by anything heavenly i

647
00:26:43,909 --> 00:26:41,360
mean yes we get a little tired of the

648
00:26:45,430 --> 00:26:43,919
sun because we see this yellow ball day

649
00:26:47,669 --> 00:26:45,440
in day out

650
00:26:50,070 --> 00:26:47,679
we get a little tired even of the moon

651
00:26:52,390 --> 00:26:50,080
you know beautiful moon but then you

652
00:26:55,029 --> 00:26:52,400
have a planet you know go in front i

653
00:26:57,909 --> 00:26:55,039
mean how often does that happen it is

654
00:27:00,230 --> 00:26:57,919
just mind-boggling that we can predict

655
00:27:02,470 --> 00:27:00,240
it you know these are the things so 200

656
00:27:04,390 --> 00:27:02,480
years ago we could predicted it and

657
00:27:07,830 --> 00:27:04,400
today we are doing it with greater

658
00:27:10,549 --> 00:27:07,840
accuracy today we have spaceborne

659
00:27:14,470 --> 00:27:10,559
observatories that are tracking it and

660
00:27:15,830 --> 00:27:14,480
we are learning more detail about venus

661
00:27:17,830 --> 00:27:15,840
i mean

662
00:27:21,669 --> 00:27:17,840
i don't think i have to inspire them the

663
00:27:22,870 --> 00:27:21,679

story inspires people by itself it's

664
00:27:25,269 --> 00:27:22,880
just

665
00:27:26,710 --> 00:27:25,279
awesome yes and it's but uh let me ask

666
00:27:29,750 --> 00:27:26,720
this thing let me ask this way

667
00:27:31,269 --> 00:27:29,760
heliophysics if you want to go into that

668
00:27:32,310 --> 00:27:31,279
recommendations for the young folks out

669
00:27:34,870 --> 00:27:32,320
there they're saying wow i didn't know

670
00:27:37,750 --> 00:27:34,880
that this this type of field uh

671
00:27:40,549 --> 00:27:37,760
heliophysics is here to stay kids

672
00:27:42,950 --> 00:27:40,559
heliophysics is the science of space

673
00:27:46,549 --> 00:27:42,960
weather and if there is one thing that's

674
00:27:50,070 --> 00:27:46,559
not going to go away is sun's effect on

675
00:27:52,950 --> 00:27:50,080
our technology our technology

676
00:27:55,590 --> 00:27:52,960
any machinery is vulnerable to the

677
00:27:59,029 --> 00:27:55,600
electromagnetic radiation from the sun

678
00:28:01,510 --> 00:27:59,039
and that can cause so many effects that

679
00:28:05,669 --> 00:28:01,520
i don't even want to go into from little

680
00:28:08,630 --> 00:28:05,679
ones to really huge disruption of power

681
00:28:12,149 --> 00:28:08,640
grid to satellite failures so it's a

682
00:28:14,310 --> 00:28:12,159
vast unknown field waiting to be

683
00:28:16,310 --> 00:28:14,320
explored what's what's really

684
00:28:18,870 --> 00:28:16,320
interesting about heliophysics is you

685
00:28:22,230 --> 00:28:18,880
know if we talk about astrophysics it's

686
00:28:25,430 --> 00:28:22,240
really gravity dominated if you talk

687
00:28:28,190 --> 00:28:25,440
about meteorology it's gravity and

688
00:28:31,669 --> 00:28:28,200

pressure and temperature dominated

689
00:28:34,149 --> 00:28:31,679
heliophysics is the science that is

690
00:28:36,870 --> 00:28:34,159
magnetically dominated and magnetism is

691
00:28:38,950 --> 00:28:36,880
something we don't understand very well

692
00:28:42,310 --> 00:28:38,960
magnetic reconnection a fundamental

693
00:28:45,350 --> 00:28:42,320
universal process that ignites all kinds

694
00:28:48,149 --> 00:28:45,360
of energy that you know has

695
00:28:51,510 --> 00:28:48,159
manifestation in so many ways so i find

696
00:28:52,870 --> 00:28:51,520
that to be a very exciting field

697
00:28:55,510 --> 00:28:52,880
lika we're going to go down to mitzi

698
00:28:57,430 --> 00:28:55,520
again for one last question mitzi uh

699
00:28:59,190 --> 00:28:57,440
this the next

700
00:29:03,750 --> 00:28:59,200
venus transit is not going to happen for

701
00:29:06,310 --> 00:29:03,760
another 105 years we've looked we know

702
00:29:09,110 --> 00:29:06,320
looking back how people have waxed

703
00:29:11,110 --> 00:29:09,120
poetic in the past historically and they

704
00:29:12,950 --> 00:29:11,120
look ahead and they conjecture about

705
00:29:14,789 --> 00:29:12,960
what it would be like when the next one

706
00:29:18,630 --> 00:29:14,799
comes do you have any thoughts about

707
00:29:24,830 --> 00:29:18,640
what what the folks in 105 years here on

708
00:29:28,149 --> 00:29:26,389
home

709
00:29:30,870 --> 00:29:28,159
in 2117

710
00:29:33,190 --> 00:29:30,880
what to what to expect

711
00:29:37,830 --> 00:29:34,710
i don't know if if i

712
00:29:41,830 --> 00:29:37,840
you know if we think back to um

713
00:29:44,710 --> 00:29:41,840

to the last venus transit and

714
00:29:46,950 --> 00:29:44,720
the number the numbers of people who

715
00:29:48,230 --> 00:29:46,960
were able to observe it and the way they

716
00:29:51,029 --> 00:29:48,240
observed it

717
00:29:54,310 --> 00:29:51,039
it's very different from the way that we

718
00:29:59,510 --> 00:29:54,320
observe it today

719
00:30:02,789 --> 00:29:59,520
and so uh possibly in 20 21 17

720
00:30:04,310 --> 00:30:02,799
folks will be able to observe it from

721
00:30:07,110 --> 00:30:04,320
space

722
00:30:09,830 --> 00:30:07,120
so it it could actually be possible to

723
00:30:11,990 --> 00:30:09,840
make your own venus transit

724
00:30:13,750 --> 00:30:12,000
by positioning

725
00:30:15,350 --> 00:30:13,760
your spacecraft

726
00:30:17,830 --> 00:30:15,360
in such a way

727
00:30:19,669 --> 00:30:17,840
that you could see venus transiting

728
00:30:21,750 --> 00:30:19,679
across the sun

729
00:30:25,269 --> 00:30:21,760
almost at will

730
00:30:28,149 --> 00:30:25,279
that that might be another a a way that

731
00:30:29,990 --> 00:30:28,159
it would be very different

732
00:30:32,389 --> 00:30:30,000
and scientists could study

733
00:30:35,430 --> 00:30:32,399
transits in that way as well

734
00:30:38,230 --> 00:30:35,440
i'm glad you bring that up mitzi in fact

735
00:30:40,710 --> 00:30:38,240
you know when we launched uh stereo we

736
00:30:43,590 --> 00:30:40,720
actually worked on the stereo spacecraft

737
00:30:47,510 --> 00:30:43,600
so that we would have the opportunity to

738
00:30:50,230 --> 00:30:47,520

see transit of moon as seen from the

739
00:30:52,470 --> 00:30:50,240
stereo spacecraft and that looks like an

740
00:30:55,350 --> 00:30:52,480
alien object you know because the moon

741
00:30:57,909 --> 00:30:55,360
is about four times the size of the real

742
00:31:00,470 --> 00:30:57,919
moon so you're seeing this dark ball it

743
00:31:03,269 --> 00:31:00,480
seems like a different solar system but

744
00:31:05,590 --> 00:31:03,279
i i want to comment about you know if if

745
00:31:09,350 --> 00:31:05,600
i could actually dream

746
00:31:10,870 --> 00:31:09,360
105 years 117 years from now

747
00:31:13,750 --> 00:31:10,880
i wouldn't think about

748
00:31:16,830 --> 00:31:13,760
transit of venus what do you think about

749
00:31:19,350 --> 00:31:16,840
transit of earth as seen from

750
00:31:20,950 --> 00:31:19,360
mars ooh like that

751
00:31:22,789 --> 00:31:20,960
nice nice

752
00:31:24,950 --> 00:31:22,799
nicely

753
00:31:26,549 --> 00:31:24,960
thank you so much for being here with us

754
00:31:29,909 --> 00:31:26,559
uh dwayne we're going to be back at 10

755
00:31:32,630 --> 00:31:29,919
o'clock and with the one and only jimmy

756
00:31:34,950 --> 00:31:32,640
will be back then and uh joining us and

757
00:31:37,350 --> 00:31:34,960
uh the head of our planetary division

758
00:31:41,269 --> 00:31:37,360
here at nasa but in the meantime we're

759
00:31:43,190 --> 00:31:41,279
gonna leave you with a shot of uh the uh

760
00:31:44,149 --> 00:31:43,200
uh we're gonna oh thanks to mitzi down

761
00:31:46,149 --> 00:31:44,159
in uh

762
00:31:47,669 --> 00:31:46,159
marshall space thank you mr adam thanks

763
00:31:49,830 --> 00:31:47,679

so much thanks so much we really

764
00:31:51,590 --> 00:31:49,840
appreciate you joining us and enjoy the

765
00:31:54,789 --> 00:31:51,600
rest of the evening down there and now

766
00:31:58,070 --> 00:31:54,799
we're going to go to a live picture from

767
00:32:00,630 --> 00:31:58,080
iao the indian astronomical observatory

768
00:32:03,110 --> 00:32:00,640
in ladakh india and we'll take it we'll

769
00:32:04,710 --> 00:32:03,120
uh then we'll go back to nasa edge and

770
00:32:06,070 --> 00:32:04,720
they'll get us through until 10 o'clock

771
00:32:07,830 --> 00:32:06,080
and we'll see you then

772
00:32:12,230 --> 00:32:07,840
india and thank you again

773
00:32:17,110 --> 00:32:14,870
the faithful moment was now approaching

774
00:32:19,269 --> 00:32:17,120
enthusiasm in some cases rising to