

Google+



1  
00:00:09,910 --> 00:00:08,230  
hello and welcome i'm john yebrick with

2  
00:00:11,030 --> 00:00:09,920  
nasa public affairs

3  
00:00:13,430 --> 00:00:11,040  
stories and predictions of the

4  
00:00:15,829 --> 00:00:13,440  
underworld in december 2012 have been

5  
00:00:17,430 --> 00:00:15,839  
betrayed in film stadium books and

6  
00:00:18,870 --> 00:00:17,440  
blossomed on the internet

7  
00:00:20,310 --> 00:00:18,880  
a panel of scientists are here with us

8  
00:00:23,349 --> 00:00:20,320  
today to discuss

9  
00:00:24,710 --> 00:00:23,359  
the 2012 2012 rumors propagated across

10  
00:00:26,630 --> 00:00:24,720  
the spectrum

11  
00:00:28,470 --> 00:00:26,640  
we're going to ask some common questions

12  
00:00:30,550 --> 00:00:28,480  
and take some from social media

13  
00:00:33,030 --> 00:00:30,560

if you have a question use the hashtag

14

00:00:35,030 --> 00:00:33,040

poundastnasa on twitter or on the live

15

00:00:36,870 --> 00:00:35,040

streaming page for the event on nasa

16

00:00:39,270 --> 00:00:36,880

television's youtube channel or the

17

00:00:40,310 --> 00:00:39,280

stream on nasa's google plus page

18

00:00:48,069 --> 00:00:40,320

let's start with having our panel

19

00:00:52,389 --> 00:00:49,990

my name is mitzi adams i'm a

20

00:00:53,590 --> 00:00:52,399

heliophysicist for marshall's space

21

00:00:55,590 --> 00:00:53,600

flight center

22

00:00:57,350 --> 00:00:55,600

in huntsville alabama

23

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

and i have a special interest in sunspot

24

00:01:01,430 --> 00:00:59,760

magnetic fields flare prediction and

25

00:01:03,670 --> 00:01:01,440

coronal bright points

26

00:01:05,750 --> 00:01:03,680

i frequently serve as a gas lecturer for

27

00:01:08,070 --> 00:01:05,760

the von braun astronomical society and

28

00:01:10,310 --> 00:01:08,080

for science courses at the university of

29

00:01:12,550 --> 00:01:10,320

alabama in huntsville where i've led

30

00:01:14,950 --> 00:01:12,560

several sessions of theories of the

31

00:01:17,830 --> 00:01:14,960

universe a class that explores how

32

00:01:20,870 --> 00:01:17,840

various cultures perceive the cosmos

33

00:01:22,710 --> 00:01:20,880

including my favorites the maya and inca

34

00:01:23,830 --> 00:01:22,720

civilizations of central and south

35

00:01:26,310 --> 00:01:23,840

america

36

00:01:28,390 --> 00:01:26,320

i enjoy exploring strange new worlds and

37

00:01:31,270 --> 00:01:28,400

have hiked run and been cave diving in

38

00:01:36,789 --> 00:01:31,280

the yucatan of mexico and explored maya

39

00:01:41,990 --> 00:01:39,350

so i'm andrew frack noy

40

00:01:43,830 --> 00:01:42,000

and i'm an astronomer and the chair of

41

00:01:44,870 --> 00:01:43,840

the astronomy department at foothill

42

00:01:47,350 --> 00:01:44,880

college

43

00:01:50,069 --> 00:01:47,360

near san francisco

44

00:01:52,230 --> 00:01:50,079

i have students

45

00:01:55,190 --> 00:01:52,240

every year who are tremendously worried

46

00:01:57,429 --> 00:01:55,200

about such issues so i'm delighted that

47

00:01:58,870 --> 00:01:57,439

we're going to be doing this round table

48

00:02:01,069 --> 00:01:58,880

my specialty

49

00:02:03,990 --> 00:02:01,079

is dealing with astronomical

50

00:02:06,950 --> 00:02:04,000

pseudoscience or fiction science things

51  
00:02:09,749 --> 00:02:06,960  
that are on the fringe of scientific

52  
00:02:11,910 --> 00:02:09,759  
ideas but are not really valid in

53  
00:02:14,390 --> 00:02:11,920  
examining them and helping the public to

54  
00:02:17,190 --> 00:02:14,400  
understand them i'm also the only

55  
00:02:19,589 --> 00:02:17,200  
non-nasa person on the panel i'm the

56  
00:02:21,030 --> 00:02:19,599  
outside commentator so that you can't

57  
00:02:25,589 --> 00:02:21,040  
imagine that this is some kind of

58  
00:02:31,110 --> 00:02:29,350  
hi i'm lika goha takurta i'm at nasa

59  
00:02:32,550 --> 00:02:31,120  
headquarters in the heliophysics

60  
00:02:35,509 --> 00:02:32,560  
division

61  
00:02:38,070 --> 00:02:35,519  
my profession is as a heliophysicist and

62  
00:02:40,790 --> 00:02:38,080  
i manage a program called living with a

63  
00:02:42,790 --> 00:02:40,800

star and that star is our sun

64

00:02:45,670 --> 00:02:42,800

and the goal of this program is really

65

00:02:48,390 --> 00:02:45,680

to understand the sun and the earth as a

66

00:02:50,470 --> 00:02:48,400

connected system and sun's influence not

67

00:02:53,270 --> 00:02:50,480

only on our planet earth but every other

68

00:02:56,309 --> 00:02:53,280

planet the interplanetary medium

69

00:02:58,630 --> 00:02:56,319

this area of heliophysics has given rise

70

00:03:00,550 --> 00:02:58,640

to what we know as space weather

71

00:03:04,229 --> 00:03:00,560

geophysics is the science of space

72

00:03:06,070 --> 00:03:04,239

weather and i know that space weather is

73

00:03:07,910 --> 00:03:06,080

an ill-understood

74

00:03:09,110 --> 00:03:07,920

subject today because it's still in its

75

00:03:12,229 --> 00:03:09,120

infancy

76

00:03:14,390 --> 00:03:12,239

and so i hope in today's discussion

77

00:03:17,270 --> 00:03:14,400

we'll be able to discuss some of the

78

00:03:18,869 --> 00:03:17,280

ideas behind space weather and some of

79

00:03:21,110 --> 00:03:18,879

the ideas of solar storms that are

80

00:03:23,589 --> 00:03:21,120

floating around that are not correct

81

00:03:27,509 --> 00:03:25,509

my name is paul hertz i'm the director

82

00:03:29,110 --> 00:03:27,519

of astrophysics at nasa headquarters in

83

00:03:31,110 --> 00:03:29,120

washington dc

84

00:03:33,110 --> 00:03:31,120

my training is as an astronomer i've

85

00:03:35,350 --> 00:03:33,120

used telescopes all over the world as

86

00:03:37,509 --> 00:03:35,360

well as many telescopes orbiting in

87

00:03:39,830 --> 00:03:37,519

space to study interesting phenomena

88

00:03:41,589 --> 00:03:39,840

throughout the universe my specialty has

89

00:03:44,149 --> 00:03:41,599

been studying black holes and neutron

90

00:03:46,470 --> 00:03:44,159

stars and other objects which which emit

91

00:03:47,670 --> 00:03:46,480

large numbers of x-rays but i'm

92

00:03:51,430 --> 00:03:47,680

interested in just about anything that

93

00:03:53,990 --> 00:03:51,440

takes place uh beyond our planet

94

00:03:57,030 --> 00:03:54,000

i'm david morrison i'm a space scientist

95

00:03:59,190 --> 00:03:57,040

at nasa's ames research center uh began

96

00:04:01,670 --> 00:03:59,200

career as an astronomer and planetary

97

00:04:04,149 --> 00:04:01,680

scientist and then became one of the

98

00:04:06,949 --> 00:04:04,159

founders of the interdisciplinary study

99

00:04:09,589 --> 00:04:06,959

of astrobiology the study of life in the

100

00:04:11,589 --> 00:04:09,599

universe currently i also have a joint

101

00:04:13,350 --> 00:04:11,599

appointment as director of the carl

102

00:04:15,910 --> 00:04:13,360

sagan center for the study of life in

103

00:04:17,670 --> 00:04:15,920

the universe at the seti institute

104

00:04:19,430 --> 00:04:17,680

for almost a decade i have been

105

00:04:22,629 --> 00:04:19,440

answering the questions that the public

106

00:04:25,830 --> 00:04:22,639

send in about science to nasa's ask an

107

00:04:27,990 --> 00:04:25,840

astrobiology webpage and that's a lot of

108

00:04:30,950 --> 00:04:28,000

fun but in the last few years the real

109

00:04:34,070 --> 00:04:30,960

science questions have been overwhelmed

110

00:04:38,070 --> 00:04:34,080

by questions about a 2012 doomsday so

111

00:04:42,550 --> 00:04:40,870

hi i'm don yeomans i'm manager of nasa's

112

00:04:44,310 --> 00:04:42,560

near near-earth object program office at

113

00:04:46,469 --> 00:04:44,320

the jet propulsion laboratory in

114

00:04:48,310 --> 00:04:46,479

pasadena california

115

00:04:50,550 --> 00:04:48,320

and i'm supervisor of the solar system

116

00:04:51,830 --> 00:04:50,560

dynamics group here at jpl and it's our

117

00:04:53,830 --> 00:04:51,840

job

118

00:04:55,749 --> 00:04:53,840

to keep track of the planets

119

00:04:57,830 --> 00:04:55,759

their past positions and their future

120

00:04:59,909 --> 00:04:57,840

positions to keep track of the natural

121

00:05:02,469 --> 00:04:59,919

satellites and also the hundreds of

122

00:05:04,629 --> 00:05:02,479

thousands of asteroids and comets

123

00:05:07,189 --> 00:05:04,639

that can from time to time get close to

124

00:05:09,830 --> 00:05:07,199

earth and if we do find one or two that

125

00:05:11,909 --> 00:05:09,840

do get close it's our job to compute

126

00:05:15,189 --> 00:05:11,919

impact probabilities

127

00:05:16,390 --> 00:05:15,199

and if there's a problem uh we notify

128

00:05:19,270 --> 00:05:16,400

observers

129

00:05:21,350 --> 00:05:19,280

to provide additional data in hopes that

130

00:05:25,830 --> 00:05:21,360

these impact probabilities will go to

131

00:05:27,590 --> 00:05:25,840

zero which they almost always do

132

00:05:30,550 --> 00:05:27,600

thank you let's start with a question

133

00:05:32,710 --> 00:05:30,560

from google plus cal singh man asks why

134

00:05:34,390 --> 00:05:32,720

is nasa even wasting their time doing a

135

00:05:37,510 --> 00:05:34,400

hangout on google plus if we have

136

00:05:41,350 --> 00:05:39,670

well that's an interesting question many

137

00:05:44,629 --> 00:05:41,360

of us have asked the same question to

138

00:05:47,430 --> 00:05:44,639

ourselves because there is no true issue

139

00:05:50,310 --> 00:05:47,440

here this is just a a manufactured

140

00:05:51,990 --> 00:05:50,320

fantasy but the fact is that many people

141

00:05:54,790 --> 00:05:52,000

are worried about it and many of those

142

00:05:56,629 --> 00:05:54,800

people do write to nasa and ask for nasa

143

00:05:58,950 --> 00:05:56,639

to to respond

144

00:06:01,350 --> 00:05:58,960

in particular i'm concerned about the

145

00:06:03,510 --> 00:06:01,360

young people who write to me and say

146

00:06:05,110 --> 00:06:03,520

they are terribly afraid that they can't

147

00:06:06,629 --> 00:06:05,120

sleep they can't eat

148

00:06:08,870 --> 00:06:06,639

some of them have said they're

149

00:06:10,950 --> 00:06:08,880

contemplating suicide

150

00:06:13,270 --> 00:06:10,960

there was one case of a teacher in in

151  
00:06:14,870 --> 00:06:13,280  
stockton who had the parents of two of

152  
00:06:16,710 --> 00:06:14,880  
her students come and say they were

153  
00:06:19,990 --> 00:06:16,720  
planning to kill their children

154  
00:06:22,550 --> 00:06:20,000  
themselves to escape this apocalypse so

155  
00:06:25,270 --> 00:06:22,560  
while it's a joke to many people and a

156  
00:06:27,029 --> 00:06:25,280  
mystery to others there is a core of

157  
00:06:29,270 --> 00:06:27,039  
people who are truly concerned and i

158  
00:06:30,790 --> 00:06:29,280  
think it's appropriate that nasa should

159  
00:06:36,230 --> 00:06:30,800  
answer these questions that are being

160  
00:06:39,430 --> 00:06:37,670  
thanks what is the origin of the

161  
00:06:47,270 --> 00:06:39,440  
prediction that the rural land in 2012

162  
00:06:52,550 --> 00:06:49,590  
andy are you going to answer that i i am

163  
00:06:54,309 --> 00:06:52,560

my microphone was muted excuse me so uh

164

00:06:56,870 --> 00:06:54,319

can everyone hear me now

165

00:06:58,629 --> 00:06:56,880

yeah good so i think this is important

166

00:07:01,350 --> 00:06:58,639

to remember that this is not the first

167

00:07:02,550 --> 00:07:01,360

time we've heard predictions of doomsday

168

00:07:04,950 --> 00:07:02,560

in apocalypse

169

00:07:06,950 --> 00:07:04,960

uh those who were around the year 2000

170

00:07:09,189 --> 00:07:06,960

remember that there was a lot of

171

00:07:11,510 --> 00:07:09,199

calendar scare there too just like we're

172

00:07:13,670 --> 00:07:11,520

hearing now that the mayan calendar is

173

00:07:15,189 --> 00:07:13,680

going to reset in those days we thought

174

00:07:17,909 --> 00:07:15,199

the world was going to end because our

175

00:07:19,749 --> 00:07:17,919

computer calendars were going to reset

176

00:07:23,189 --> 00:07:19,759

and i have a little chart which maybe we

177

00:07:24,469 --> 00:07:23,199

can put up that shows some of the uh

178

00:07:27,029 --> 00:07:24,479

very uh

179

00:07:28,230 --> 00:07:27,039

recent predictions of doomsday there

180

00:07:31,990 --> 00:07:28,240

have been predictions like this

181

00:07:33,589 --> 00:07:32,000

throughout history but uh in 1982 for

182

00:07:35,589 --> 00:07:33,599

example there was a thought that the

183

00:07:37,749 --> 00:07:35,599

planets would align and a great

184

00:07:40,070 --> 00:07:37,759

earthquake would send california into

185

00:07:43,589 --> 00:07:40,080

the ocean and much to the chagrin of

186

00:07:47,510 --> 00:07:43,599

some california still around

187

00:07:49,189 --> 00:07:47,520

in uh 1999 charles berlitz predicted

188

00:07:51,270 --> 00:07:49,199

that there would be an end of the world

189

00:07:54,869 --> 00:07:51,280

and wrote a best-selling book about it

190

00:07:57,670 --> 00:07:54,879

um so we've had a number of these uh and

191

00:07:59,670 --> 00:07:57,680

in each case nothing much has happened

192

00:08:01,749 --> 00:07:59,680

and here we come again i think there

193

00:08:03,830 --> 00:08:01,759

have been a lot of different people who

194

00:08:07,430 --> 00:08:03,840

have jumped on board

195

00:08:09,909 --> 00:08:07,440

once the 2012 rumors started going and

196

00:08:13,029 --> 00:08:09,919

brought their own particular flavor of

197

00:08:17,670 --> 00:08:13,039

catastrophe to bear on this particular

198

00:08:20,629 --> 00:08:17,680

date of the winter solstice of 2012.

199

00:08:23,110 --> 00:08:20,639

and i would would add to that only that

200

00:08:25,189 --> 00:08:23,120

that there are these different threads

201

00:08:27,670 --> 00:08:25,199

as you said there's neither

202

00:08:29,670 --> 00:08:27,680

creation to earth there's whole shifts

203

00:08:31,909 --> 00:08:29,680

there's all sorts of other things and

204

00:08:34,550 --> 00:08:31,919

they're really quite unconnected it's

205

00:08:37,589 --> 00:08:34,560

just that they focus on this one date

206

00:08:40,790 --> 00:08:37,599

and it's become a a snowballing process

207

00:08:42,389 --> 00:08:40,800

it's gone viral there's nothing

208

00:08:44,310 --> 00:08:42,399

logical of why these different

209

00:08:46,949 --> 00:08:44,320

calamities should be associated with

210

00:08:48,389 --> 00:08:46,959

december 21st but that's the situation

211

00:08:51,310 --> 00:08:48,399

we're in

212

00:08:53,910 --> 00:08:51,320

and david tell the story about the movie

213

00:08:55,910 --> 00:08:53,920

2012 and how they made the website

214

00:08:58,230 --> 00:08:55,920

because i think that's a great story

215

00:09:01,670 --> 00:08:58,240

well it was interesting i expect many of

216

00:09:04,230 --> 00:09:01,680

you have seen the movie 2012 it was a

217

00:09:05,190 --> 00:09:04,240

spectacular disaster flick

218

00:09:08,470 --> 00:09:05,200

the

219

00:09:11,110 --> 00:09:08,480

not know

220

00:09:13,269 --> 00:09:11,120

about 2012 when they started it had a

221

00:09:15,509 --> 00:09:13,279

different title it was just going to be

222

00:09:16,949 --> 00:09:15,519

an end of the world disaster click and

223

00:09:19,190 --> 00:09:16,959

at one point when they were starting

224

00:09:20,790 --> 00:09:19,200

production someone walked in and say i

225

00:09:22,630 --> 00:09:20,800

just was on the internet and heard that

226

00:09:24,870 --> 00:09:22,640

there are people really scared

227

00:09:27,030 --> 00:09:24,880

about 2012 so let's

228

00:09:30,710 --> 00:09:27,040

tack our movie onto that and give that

229

00:09:35,670 --> 00:09:30,720

title uh it the movie wasn't about 2012

230

00:09:39,030 --> 00:09:35,680

but it is contributed to this this broad

231

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

concern that is propagated primarily on

232

00:09:43,190 --> 00:09:41,120

the internet there are thousands of

233

00:09:45,829 --> 00:09:43,200

websites there are thousands of youtube

234

00:09:48,550 --> 00:09:45,839

videos that are all saying that there

235

00:09:49,750 --> 00:09:48,560

will be some disaster happening in three

236

00:09:51,829 --> 00:09:49,760

weeks

237

00:09:53,990 --> 00:09:51,839

it's uh interesting to point out that uh

238

00:09:55,910 --> 00:09:54,000

on the internet uh there are no referees

239

00:09:58,150 --> 00:09:55,920

there are no filters there are no

240

00:10:00,070 --> 00:09:58,160

reality checks so it's a wild west out

241

00:10:02,389 --> 00:10:00,080

there and folks who

242

00:10:04,150 --> 00:10:02,399

hear about extraordinary claims have to

243

00:10:07,110 --> 00:10:04,160

look for the extraordinary evidence

244

00:10:09,430 --> 00:10:07,120

that's required to support those claims

245

00:10:11,829 --> 00:10:09,440

and and sadly it's not just the web

246

00:10:14,710 --> 00:10:11,839

that's like this now more and more sort

247

00:10:17,430 --> 00:10:14,720

of cable television channels are taking

248

00:10:19,990 --> 00:10:17,440

a tabloid approach where anything goes

249

00:10:22,389 --> 00:10:20,000

so it's especially important for

250

00:10:23,829 --> 00:10:22,399

scientists to speak up and say look even

251  
00:10:25,990 --> 00:10:23,839  
if you've heard it on the history

252  
00:10:28,230 --> 00:10:26,000  
channel it doesn't mean it has to be

253  
00:10:29,670 --> 00:10:28,240  
true

254  
00:10:32,389 --> 00:10:29,680  
we have another question from google

255  
00:10:34,069 --> 00:10:32,399  
plus it's robin venerman is asking was

256  
00:10:36,310 --> 00:10:34,079  
wondering how the mayans picked a date

257  
00:10:38,389 --> 00:10:36,320  
to start their calendar why exactly or

258  
00:10:43,269 --> 00:10:38,399  
most likely on that day thousands of

259  
00:10:50,550 --> 00:10:47,030  
well the maya i believe in cycles

260  
00:10:53,670 --> 00:10:50,560  
and the current calendar is actually one

261  
00:10:55,910 --> 00:10:53,680  
of several cycles that lasts for

262  
00:10:57,509 --> 00:10:55,920  
thousands of years the current calendar

263  
00:11:00,710 --> 00:10:57,519

probably began in

264

00:11:02,470 --> 00:11:00,720  
somewhere around 3114

265

00:11:04,230 --> 00:11:02,480  
before the current era

266

00:11:09,110 --> 00:11:04,240  
and

267

00:11:09,990 --> 00:11:09,120  
of the cycles have been passed down

268

00:11:12,550 --> 00:11:10,000  
through

269

00:11:13,430 --> 00:11:12,560  
some of the mythology of the maya

270

00:11:15,350 --> 00:11:13,440  
and

271

00:11:20,710 --> 00:11:15,360  
this current one

272

00:11:23,590 --> 00:11:20,720  
simply ends on um december 21st or 23rd

273

00:11:25,430 --> 00:11:23,600  
depending on who's doing the translation

274

00:11:27,190 --> 00:11:25,440  
of this year

275

00:11:29,110 --> 00:11:27,200  
the um

276

00:11:31,670 --> 00:11:29,120

the reason there is no other maya

277

00:11:33,910 --> 00:11:31,680

calendar is because the spanish arrived

278

00:11:36,310 --> 00:11:33,920

and the maya civilization was um

279

00:11:37,670 --> 00:11:36,320

essentially destroyed um they would have

280

00:11:40,790 --> 00:11:37,680

done essentially the same thing that we

281

00:11:48,310 --> 00:11:40,800

do and and just create a new calendar

282

00:11:54,949 --> 00:11:49,910

okay thank you i have another question

283

00:11:58,150 --> 00:11:56,790

it's a baby gva

284

00:12:01,430 --> 00:11:58,160

asks can you also talk about the

285

00:12:06,470 --> 00:12:04,710

sure i'll talk about that um so uh as

286

00:12:07,670 --> 00:12:06,480

you know as the earth goes around the

287

00:12:09,829 --> 00:12:07,680

sun

288

00:12:12,870 --> 00:12:09,839

and then different stars are up in the

289

00:12:14,790 --> 00:12:12,880

night sky uh every night uh we get up we

290

00:12:17,509 --> 00:12:14,800

get a sweep through the whole sky

291

00:12:19,430 --> 00:12:17,519

um and once a year the uh direction to

292

00:12:23,430 --> 00:12:19,440

the center of the milky way galaxy will

293

00:12:25,990 --> 00:12:23,440

be right overhead um and uh or right

294

00:12:29,030 --> 00:12:26,000

behind the sun and in fact uh in late

295

00:12:31,829 --> 00:12:29,040

december is the time that every year the

296

00:12:34,310 --> 00:12:31,839

center of the milky way galaxy is behind

297

00:12:37,350 --> 00:12:34,320

the sun and so the earth and the sun and

298

00:12:40,310 --> 00:12:37,360

the sun and the milky way galaxy kinda

299

00:12:43,190 --> 00:12:40,320

of line up in late december every year

300

00:12:46,389 --> 00:12:43,200

it's not december 21st and it's not an

301  
00:12:49,590 --> 00:12:46,399  
exact alignment the uh the sun will be

302  
00:12:52,389 --> 00:12:49,600  
about 10 of its own widths away from the

303  
00:12:54,069 --> 00:12:52,399  
exact direction to the galactic center

304  
00:12:56,150 --> 00:12:54,079  
when they get as close as they're going

305  
00:12:58,790 --> 00:12:56,160  
to get this year and this year is no

306  
00:13:01,190 --> 00:12:58,800  
different than any other year

307  
00:13:03,430 --> 00:13:01,200  
and i guess it's important to point out

308  
00:13:06,069 --> 00:13:03,440  
to those of our listeners who are not

309  
00:13:08,870 --> 00:13:06,079  
astronomy buffs that the distance

310  
00:13:13,030 --> 00:13:08,880  
between us and the center of the galaxy

311  
00:13:16,230 --> 00:13:13,040  
is absolutely mind-boggling so that it's

312  
00:13:19,990 --> 00:13:16,240  
something like 26 000 light years where

313  
00:13:21,750 --> 00:13:20,000

each light year is 6 000 billion miles

314

00:13:23,990 --> 00:13:21,760

so the notion that something at the

315

00:13:26,310 --> 00:13:24,000

center of the galaxy could cause

316

00:13:28,389 --> 00:13:26,320

doomsday on earth is a complete

317

00:13:31,590 --> 00:13:28,399

misunderstanding of how truly

318

00:13:34,629 --> 00:13:31,600

astronomical the distances are between

319

00:13:38,389 --> 00:13:34,639

us and the center of the milky way and

320

00:13:39,829 --> 00:13:38,399

andy as an example um uh even though the

321

00:13:42,790 --> 00:13:39,839

uh black hole at the center of the

322

00:13:45,590 --> 00:13:42,800

galaxy weighs a million times as much as

323

00:13:48,389 --> 00:13:45,600

the sun it's so far away that its

324

00:13:50,310 --> 00:13:48,399

gravity is less than one millionth

325

00:13:52,150 --> 00:13:50,320

the gravity that the sun the ground on

326

00:13:53,509 --> 00:13:52,160

the earth the gravity effect of this

327

00:13:55,509 --> 00:13:53,519

black hole this here in the galaxy is

328

00:13:58,629 --> 00:13:55,519

less than one millionth the gravity

329

00:14:00,710 --> 00:13:58,639

effect that the sun has on the earth

330

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

there's a strange variant on this that

331

00:14:04,949 --> 00:14:03,120

uh that said that um

332

00:14:07,269 --> 00:14:04,959

go ahead go ahead don well i was just

333

00:14:09,269 --> 00:14:07,279

going to point out uh reinforce what

334

00:14:09,990 --> 00:14:09,279

pulse said that

335

00:14:13,110 --> 00:14:10,000

the

336

00:14:15,189 --> 00:14:13,120

so-called galactic alignment takes place

337

00:14:17,750 --> 00:14:15,199

every year without consequence and has

338

00:14:21,750 --> 00:14:17,760

done so for millions of years so

339

00:14:24,470 --> 00:14:22,790

go ahead

340

00:14:26,150 --> 00:14:24,480

i'm just going to say it's it's a it's a

341

00:14:27,829 --> 00:14:26,160

silly variant but i've heard it many

342

00:14:29,750 --> 00:14:27,839

times there are some people who

343

00:14:31,990 --> 00:14:29,760

interpret this as saying the earth is

344

00:14:34,069 --> 00:14:32,000

going to be in the center of the galaxy

345

00:14:36,069 --> 00:14:34,079

that somehow it's going to travel 30 000

346

00:14:37,350 --> 00:14:36,079

light years and collide with that black

347

00:14:38,949 --> 00:14:37,360

hole

348

00:14:40,870 --> 00:14:38,959

goodness knows where these things get

349

00:14:43,110 --> 00:14:40,880

going but they are propagated on the

350

00:14:46,389 --> 00:14:43,120

internet and as has been pointed out

351  
00:14:48,710 --> 00:14:46,399  
there's nobody there to uh to moderate

352  
00:14:49,509 --> 00:14:48,720  
to say what's right and what's wrong

353  
00:14:51,350 --> 00:14:49,519  
it's

354  
00:14:53,670 --> 00:14:51,360  
been described that the internet is the

355  
00:14:56,230 --> 00:14:53,680  
world's greatest library without the

356  
00:14:58,470 --> 00:14:56,240  
benefit of librarians

357  
00:15:00,389 --> 00:14:58,480  
could plan is it possible is it could

358  
00:15:01,990 --> 00:15:00,399  
planets align in a way

359  
00:15:04,230 --> 00:15:02,000  
that could have some sort of impact on

360  
00:15:07,430 --> 00:15:04,240  
earth is that even feasible

361  
00:15:09,750 --> 00:15:07,440  
well planets align all the time uh

362  
00:15:11,269 --> 00:15:09,760  
but the only objects that have a

363  
00:15:13,269 --> 00:15:11,279

noticeable effect on the earth tidal

364

00:15:14,949 --> 00:15:13,279

effects are the moon which is very close

365

00:15:17,030 --> 00:15:14,959

and massive and the sun which is

366

00:15:19,990 --> 00:15:17,040

extraordinarily massive

367

00:15:22,389 --> 00:15:20,000

even if the sun earth and jupiter were

368

00:15:24,470 --> 00:15:22,399

aligned and they do align from time to

369

00:15:27,030 --> 00:15:24,480

time the effect of jupiter on the earth

370

00:15:29,910 --> 00:15:27,040

is much less than one percent of the

371

00:15:31,110 --> 00:15:29,920

daily effect that our moon has on us so

372

00:15:33,990 --> 00:15:31,120

alignments

373

00:15:35,910 --> 00:15:34,000

occur uh they're interesting uh from a

374

00:15:38,470 --> 00:15:35,920

pictorial point of view but uh they

375

00:15:40,870 --> 00:15:38,480

really have no bearing uh an effect upon

376

00:15:42,629 --> 00:15:40,880

the earth

377

00:15:45,350 --> 00:15:42,639

okay thank god

378

00:15:47,590 --> 00:15:45,360

isn't it also true that uh that in this

379

00:15:48,870 --> 00:15:47,600

case when you look at where the planets

380

00:15:51,509 --> 00:15:48,880

are in the sky they're pretty much

381

00:15:53,269 --> 00:15:51,519

scattered all over on december 21st it's

382

00:15:55,110 --> 00:15:53,279

about as far from an alignment of

383

00:15:57,350 --> 00:15:55,120

planets as you could get

384

00:16:01,509 --> 00:15:57,360

that's true but even if even if they

385

00:16:04,150 --> 00:16:03,269

here's a question that we get asked a

386

00:16:06,310 --> 00:16:04,160

lot

387

00:16:08,629 --> 00:16:06,320

just on social media and comments

388

00:16:10,389 --> 00:16:08,639

sections on the web uh is nasa uh

389

00:16:14,790 --> 00:16:10,399

predicting a total blackout of earth on

390

00:16:17,670 --> 00:16:16,550

what

391

00:16:21,269 --> 00:16:17,680

i don't know where it came from but

392

00:16:27,269 --> 00:16:25,110

it's it's very uh complicated where some

393

00:16:31,269 --> 00:16:27,279

of these rumors emerge apparently there

394

00:16:34,310 --> 00:16:31,279

is a a uh note some kind of email going

395

00:16:36,949 --> 00:16:34,320

around uh sometimes some religious uh

396

00:16:38,949 --> 00:16:36,959

traditions get confused with the ideas

397

00:16:41,670 --> 00:16:38,959

that the winter solstice is the shortest

398

00:16:45,350 --> 00:16:41,680

day of the year so uh it's it's

399

00:16:47,749 --> 00:16:45,360

completely without scientific basis

400

00:16:49,509 --> 00:16:47,759

again folks have to uh understand that

401  
00:16:52,389 --> 00:16:49,519  
if they see something on the internet

402  
00:16:54,389 --> 00:16:52,399  
and it's an extraordinary claim as carl

403  
00:16:56,310 --> 00:16:54,399  
sagan pointed out time and time again

404  
00:16:58,870 --> 00:16:56,320  
you need extraordinary evidence to back

405  
00:17:00,790 --> 00:16:58,880  
it up and there is no evidence for this

406  
00:17:03,670 --> 00:17:00,800  
this three-day blackout or any of these

407  
00:17:05,829 --> 00:17:03,680  
other phenomena that we're discussing

408  
00:17:08,309 --> 00:17:05,839  
this is not the first time that the the

409  
00:17:11,669 --> 00:17:08,319  
blackout came along by the way there was

410  
00:17:14,069 --> 00:17:11,679  
a similar kind of interest and concern

411  
00:17:17,350 --> 00:17:14,079  
about comet elenin the little comet that

412  
00:17:19,510 --> 00:17:17,360  
came along in in 2011 and disintegrated

413  
00:17:21,590 --> 00:17:19,520

and there were firm predictions on the

414

00:17:23,510 --> 00:17:21,600

web then that that comet was going to

415

00:17:25,750 --> 00:17:23,520

come between the earth and the sun and

416

00:17:27,750 --> 00:17:25,760

cause a three-day blackout at the end of

417

00:17:29,669 --> 00:17:27,760

september of last year

418

00:17:32,390 --> 00:17:29,679

by then the comet had disintegrated but

419

00:17:34,789 --> 00:17:32,400

it was a crazy idea then too

420

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

uh it's really fascinating i think you

421

00:17:38,710 --> 00:17:36,240

know some of the questions that we are

422

00:17:42,310 --> 00:17:38,720

getting i'm wondering are these sort of

423

00:17:44,549 --> 00:17:42,320

uh fear generated in the people only in

424

00:17:46,390 --> 00:17:44,559

the northern hemisphere because if there

425

00:17:48,310 --> 00:17:46,400

is a winter solstice somewhere there is

426  
00:17:51,830 --> 00:17:48,320  
a summer solstice going on somewhere

427  
00:17:54,230 --> 00:17:51,840  
else and uh so obviously the inter

428  
00:17:57,350 --> 00:17:54,240  
planet is not affected so it's kind of

429  
00:18:01,510 --> 00:17:59,909  
and for a three-day blackout to occur

430  
00:18:03,669 --> 00:18:01,520  
something weird would have to happen

431  
00:18:05,909 --> 00:18:03,679  
with the sun and there's nothing we know

432  
00:18:08,150 --> 00:18:05,919  
of physically that would allow the sun

433  
00:18:08,710 --> 00:18:08,160  
to turn off for three days and then turn

434  
00:18:11,110 --> 00:18:08,720  
back on

435  
00:18:12,470 --> 00:18:11,120  
[Music]

436  
00:18:14,310 --> 00:18:12,480  
well thank you for shedding light on

437  
00:18:16,070 --> 00:18:14,320  
that question um hopefully people are

438  
00:18:17,909 --> 00:18:16,080

tuning in they've been asking it

439

00:18:20,070 --> 00:18:17,919

we have one from twitter it's uh at

440

00:18:23,029 --> 00:18:20,080

ipod7223s

441

00:18:24,630 --> 00:18:23,039

been hearing a lot about uh nibiru

442

00:18:26,549 --> 00:18:24,640

the planet the fictional planet and how

443

00:18:29,909 --> 00:18:26,559

it spells certain doom for a little blue

444

00:18:31,990 --> 00:18:29,919

planet care to shed some light on this

445

00:18:34,230 --> 00:18:32,000

probably i have had more questions from

446

00:18:36,789 --> 00:18:34,240

the public about about this nibiru or

447

00:18:39,350 --> 00:18:36,799

planet x as they often call it and it's

448

00:18:42,390 --> 00:18:39,360

one of the associations also with nasa

449

00:18:44,310 --> 00:18:42,400

because some people go back to the 1983

450

00:18:46,230 --> 00:18:44,320

irs the first

451  
00:18:48,630 --> 00:18:46,240  
astronomical infrared satellite that

452  
00:18:50,470 --> 00:18:48,640  
carried out a survey and of course found

453  
00:18:52,710 --> 00:18:50,480  
many new objects that no one had seen

454  
00:18:54,789 --> 00:18:52,720  
before at the time there was a

455  
00:18:57,510 --> 00:18:54,799  
speculation that one or more of them

456  
00:18:59,750 --> 00:18:57,520  
might be a a new planet the outer edge

457  
00:19:01,909 --> 00:18:59,760  
of the solar system um

458  
00:19:03,990 --> 00:19:01,919  
that wasn't true it was uh

459  
00:19:06,789 --> 00:19:04,000  
the truth was found they were all extra

460  
00:19:08,789 --> 00:19:06,799  
galactic objects uh millions of light

461  
00:19:10,789 --> 00:19:08,799  
years away but there are people who

462  
00:19:13,909 --> 00:19:10,799  
think that somehow nasa has been doing a

463  
00:19:16,549 --> 00:19:13,919

cover-up ever since a cover-up of a

464

00:19:18,230 --> 00:19:16,559

planet called nibiru are named by the

465

00:19:19,029 --> 00:19:18,240

ancient sumerians

466

00:19:22,789 --> 00:19:19,039

that

467

00:19:25,669 --> 00:19:22,799

in the normal description has a 36

468

00:19:29,110 --> 00:19:25,679

3600 year orbit so it comes back into

469

00:19:31,430 --> 00:19:29,120

the inner solar system every 3 600 years

470

00:19:33,669 --> 00:19:31,440

and each time it comes in

471

00:19:35,830 --> 00:19:33,679

it either hits the earth or almost hits

472

00:19:38,870 --> 00:19:35,840

the earth this time it's supposed to hit

473

00:19:41,990 --> 00:19:38,880

the earth and destroy us um

474

00:19:42,870 --> 00:19:42,000

and this is such a pervasive idea

475

00:19:45,669 --> 00:19:42,880

that

476  
00:19:47,110 --> 00:19:45,679  
makes no sense because if it were there

477  
00:19:49,350 --> 00:19:47,120  
we could see it

478  
00:19:50,950 --> 00:19:49,360  
if there were an object a planet as big

479  
00:19:53,510 --> 00:19:50,960  
as the earth or bigger that was headed

480  
00:19:55,909 --> 00:19:53,520  
into the inner solar system astronomers

481  
00:19:57,669 --> 00:19:55,919  
like don yeomans and the people he works

482  
00:20:00,390 --> 00:19:57,679  
with would have been tracking it for a

483  
00:20:02,549 --> 00:20:00,400  
decade at least and by now it would be

484  
00:20:04,070 --> 00:20:02,559  
the brightest object in the sky after

485  
00:20:06,390 --> 00:20:04,080  
the sun and moon

486  
00:20:09,669 --> 00:20:06,400  
anybody could go out and see it you can

487  
00:20:11,270 --> 00:20:09,679  
dispel this rumor yourself you don't

488  
00:20:13,510 --> 00:20:11,280

have to ask the government or ask

489

00:20:17,029 --> 00:20:13,520

scientists just go out and look at the

490

00:20:19,110 --> 00:20:17,039

sky and you will find no new bright

491

00:20:22,070 --> 00:20:19,120

object headed for the earth

492

00:20:25,270 --> 00:20:22,080

similarly if there were such a planet its

493

00:20:27,350 --> 00:20:25,280

gravity would be messing with the orbits

494

00:20:29,669 --> 00:20:27,360

of the planets and again

495

00:20:32,310 --> 00:20:29,679

if you go look

496

00:20:34,870 --> 00:20:32,320

at what the scientists are studying

497

00:20:36,390 --> 00:20:34,880

there is no way that a change in the

498

00:20:40,390 --> 00:20:36,400

orbits of the planets would happen

499

00:20:44,310 --> 00:20:43,270

i think it's interesting to note as dave

500

00:20:46,310 --> 00:20:44,320

has pointed out

501  
00:20:48,870 --> 00:20:46,320  
many times that the the most recent

502  
00:20:51,590 --> 00:20:48,880  
prediction of nibiru coming close to the

503  
00:20:52,549 --> 00:20:51,600  
earth was provided by a lady

504  
00:20:54,789 --> 00:20:52,559  
nancy

505  
00:20:55,750 --> 00:20:54,799  
what's her name leader

506  
00:20:58,310 --> 00:20:55,760  
who

507  
00:21:00,310 --> 00:20:58,320  
claims to be channeling aliens around

508  
00:21:01,270 --> 00:21:00,320  
the star system zeta reticulite well

509  
00:21:07,110 --> 00:21:01,280  
that should

510  
00:21:11,110 --> 00:21:08,549  
changing subjects a little bit what is

511  
00:21:14,149 --> 00:21:11,120  
this polar shift theory that the earth

512  
00:21:17,190 --> 00:21:14,159  
uh cross does a 180 degree rotation two

513  
00:21:21,430 --> 00:21:17,200

kinds of poles we have the pull of

514

00:21:22,870 --> 00:21:21,440

rotation the kind of imaginary stick or

515

00:21:24,549 --> 00:21:22,880

axis

516

00:21:27,029 --> 00:21:24,559

which is which goes through the earth

517

00:21:29,510 --> 00:21:27,039

and around which we spin is called our

518

00:21:32,870 --> 00:21:29,520

rotation pole and then we have another

519

00:21:35,029 --> 00:21:32,880

set of poles called the magnetic poles

520

00:21:38,070 --> 00:21:35,039

where the earth acts like a magnet and

521

00:21:41,430 --> 00:21:38,080

the magnetic influence has a north and

522

00:21:44,950 --> 00:21:41,440

south pole to it and over long

523

00:21:47,190 --> 00:21:44,960

geological periods the magnetic poles of

524

00:21:49,350 --> 00:21:47,200

the earth drift a little bit because of

525

00:21:52,470 --> 00:21:49,360

the complexity of the electrical

526

00:21:54,549 --> 00:21:52,480

currents inside our planet and also from

527

00:21:56,549 --> 00:21:54,559

time to time over time scales of

528

00:21:59,350 --> 00:21:56,559

millions of years or hundreds of

529

00:22:01,350 --> 00:21:59,360

thousands of years we can have a flip

530

00:22:03,669 --> 00:22:01,360

where the north pole becomes the south

531

00:22:06,549 --> 00:22:03,679

pole magnetically and the magnetic south

532

00:22:09,510 --> 00:22:06,559

becomes north somehow people have gotten

533

00:22:10,870 --> 00:22:09,520

that mixed up with the rotational pole

534

00:22:14,470 --> 00:22:10,880

so they say

535

00:22:16,470 --> 00:22:14,480

my goodness on december 21st in one day

536

00:22:18,630 --> 00:22:16,480

there's going to be a flip of the

537

00:22:20,470 --> 00:22:18,640

earth's rotation so that we're going to

538

00:22:22,789 --> 00:22:20,480

either rotate the other way or the whole

539

00:22:25,110 --> 00:22:22,799

planet is going to turn upside down this

540

00:22:27,590 --> 00:22:25,120

is absolutely ridiculous the force

541

00:22:29,909 --> 00:22:27,600

required to do that to change the way

542

00:22:32,710 --> 00:22:29,919

our planet rotates would require an

543

00:22:34,390 --> 00:22:32,720

enormous other body to come here and

544

00:22:36,630 --> 00:22:34,400

affect us and we've just heard that such

545

00:22:38,710 --> 00:22:36,640

a body would be immediately visible to

546

00:22:41,430 --> 00:22:38,720

all of us and without that there's no

547

00:22:43,590 --> 00:22:41,440

way to change the rotation of a huge

548

00:22:46,230 --> 00:22:43,600

planet like the earth so people get

549

00:22:49,190 --> 00:22:46,240

mixed up between the long geological

550

00:22:52,070 --> 00:22:49,200

trend of changes in our magnetic field

551  
00:22:54,470 --> 00:22:52,080  
and our rotation and as a result of this

552  
00:22:56,390 --> 00:22:54,480  
comes as doomsday rumor

553  
00:22:58,710 --> 00:22:56,400  
that on the winter solstice we're going

554  
00:22:59,750 --> 00:22:58,720  
to be rotating raw there's just nothing

555  
00:23:01,590 --> 00:22:59,760  
to that

556  
00:23:03,830 --> 00:23:01,600  
andy if that does uh if when the

557  
00:23:05,430 --> 00:23:03,840  
magnetic shift does happen could that

558  
00:23:08,310 --> 00:23:05,440  
impact life on earth

559  
00:23:11,510 --> 00:23:08,320  
well we we have never during historic

560  
00:23:14,070 --> 00:23:11,520  
times experience such a magnetic change

561  
00:23:16,070 --> 00:23:14,080  
but we do know that it's a very gradual

562  
00:23:18,310 --> 00:23:16,080  
process it would happen over a long

563  
00:23:20,470 --> 00:23:18,320

period of time perhaps thousands of

564

00:23:22,870 --> 00:23:20,480

years and we know that it's happened we

565

00:23:25,110 --> 00:23:22,880

have geological evidence from the rocks

566

00:23:27,510 --> 00:23:25,120

where the magnetism is recorded that

567

00:23:30,710 --> 00:23:27,520

it's happened many times and yet life on

568

00:23:32,789 --> 00:23:30,720

earth has continued to thrive and evolve

569

00:23:34,789 --> 00:23:32,799

so there may well be a little bit more

570

00:23:37,029 --> 00:23:34,799

radiation there may be more particles

571

00:23:39,590 --> 00:23:37,039

coming from space when the magnetic

572

00:23:41,590 --> 00:23:39,600

field of the earth changes but certainly

573

00:23:43,990 --> 00:23:41,600

we know that life has survived and we're

574

00:23:45,669 --> 00:23:44,000

all still here

575

00:23:48,390 --> 00:23:45,679

thank you and here's a question that we

576

00:23:50,789 --> 00:23:48,400

know is a real danger to earth and

577

00:23:52,789 --> 00:23:50,799

that's being hit by a meteor uh is there

578

00:23:54,630 --> 00:23:52,799

any danger or possibility this could

579

00:23:56,950 --> 00:23:54,640

happen in the year 2012 sometime in

580

00:23:59,430 --> 00:23:56,960

december

581

00:24:01,430 --> 00:23:59,440

no the the earth is actually hit by

582

00:24:03,430 --> 00:24:01,440

meteors on a daily basis i mean

583

00:24:06,230 --> 00:24:03,440

basketball-sized objects come in a

584

00:24:07,830 --> 00:24:06,240

couple times a day they don't do any

585

00:24:08,950 --> 00:24:07,840

damage because they burn up the earth's

586

00:24:11,190 --> 00:24:08,960

atmosphere

587

00:24:13,669 --> 00:24:11,200

volkswagen size objects come in every

588

00:24:14,950 --> 00:24:13,679

couple of weeks again they're too small

589

00:24:16,710 --> 00:24:14,960

to make it all the way through the

590

00:24:19,350 --> 00:24:16,720

earth's atmosphere but they are recorded

591

00:24:20,390 --> 00:24:19,360

by downloading defense department

592

00:24:24,230 --> 00:24:20,400

sensors

593

00:24:25,909 --> 00:24:24,240

so the earth is plummeted with

594

00:24:27,990 --> 00:24:25,919

hundreds of

595

00:24:28,789 --> 00:24:28,000

tons of material every day

596

00:24:31,269 --> 00:24:28,799

but

597

00:24:32,789 --> 00:24:31,279

in order for an object to come through

598

00:24:35,590 --> 00:24:32,799

the earth's atmosphere and cause ground

599

00:24:38,470 --> 00:24:35,600

damage it has to be about 40 meters in

600

00:24:39,590 --> 00:24:38,480

diameter or larger and those types of

601  
00:24:42,230 --> 00:24:39,600  
objects

602  
00:24:43,990 --> 00:24:42,240  
don't occur but every 500 years and we

603  
00:24:45,510 --> 00:24:44,000  
know of no objects that are really of a

604  
00:24:46,710 --> 00:24:45,520  
concern

605  
00:24:48,549 --> 00:24:46,720  
to earth

606  
00:24:51,110 --> 00:24:48,559  
either this december or for the next

607  
00:24:53,190 --> 00:24:51,120  
several years

608  
00:24:54,470 --> 00:24:53,200  
thanks

609  
00:24:57,029 --> 00:24:54,480  
go ahead

610  
00:24:59,269 --> 00:24:57,039  
should you perhaps add that

611  
00:25:02,549 --> 00:24:59,279  
that we know these things because of the

612  
00:25:05,510 --> 00:25:02,559  
nasa space guard survey that there is a

613  
00:25:07,510 --> 00:25:05,520

real long-term concern about possible

614

00:25:11,029 --> 00:25:07,520

impacts and that's why for the last

615

00:25:12,870 --> 00:25:11,039

almost 20 years uh we have been scanning

616

00:25:15,590 --> 00:25:12,880

the sky specifically looking for

617

00:25:17,990 --> 00:25:15,600

asteroids near earth asteroids and have

618

00:25:20,950 --> 00:25:18,000

a catalog of about 10 000 of them now

619

00:25:22,950 --> 00:25:20,960

with determined orbits and i always

620

00:25:25,269 --> 00:25:22,960

mention to people that one result of

621

00:25:27,510 --> 00:25:25,279

that is there has not been a single

622

00:25:29,510 --> 00:25:27,520

object found that's on a collision

623

00:25:31,830 --> 00:25:29,520

course with earth

624

00:25:33,669 --> 00:25:31,840

that's true i should mention the nasa

625

00:25:35,669 --> 00:25:33,679

program near earth object program that

626  
00:25:37,830 --> 00:25:35,679  
is actively searching the skies on a

627  
00:25:40,149 --> 00:25:37,840  
nightly basis and finding more and more

628  
00:25:42,230 --> 00:25:40,159  
of these objects so that we can

629  
00:25:44,230 --> 00:25:42,240  
take the observations they provide and

630  
00:25:46,070 --> 00:25:44,240  
make predictions of where these objects

631  
00:25:48,070 --> 00:25:46,080  
will be in the future and if they do get

632  
00:25:49,510 --> 00:25:48,080  
close which they do from time to time in

633  
00:25:52,549 --> 00:25:49,520  
fact we had one hit

634  
00:25:54,470 --> 00:25:52,559  
in 2008 uh a small one over northern

635  
00:25:55,750 --> 00:25:54,480  
sudan and we predicted that one

636  
00:25:58,470 --> 00:25:55,760  
correctly so

637  
00:26:00,950 --> 00:25:58,480  
whereas 30 years ago or

638  
00:26:03,029 --> 00:26:00,960

there was very little effort by anyone

639

00:26:05,110 --> 00:26:03,039

to observe and track these objects that

640

00:26:08,390 --> 00:26:05,120

is not the case any longer nasa is uh

641

00:26:11,350 --> 00:26:08,400

very aware of this issue and is

642

00:26:13,510 --> 00:26:11,360

making great strides to predict any

643

00:26:15,510 --> 00:26:13,520

large objects that are incoming and i

644

00:26:16,710 --> 00:26:15,520

would add to that as i'm sure you would

645

00:26:19,110 --> 00:26:16,720

but the uh

646

00:26:21,909 --> 00:26:19,120

that the information is all made public

647

00:26:24,870 --> 00:26:21,919

that you have a beautiful website uh

648

00:26:26,789 --> 00:26:24,880

updated every day there's no sort of

649

00:26:29,110 --> 00:26:26,799

secrecy governing these objects and

650

00:26:30,950 --> 00:26:29,120

people can go look for themselves

651  
00:26:32,310 --> 00:26:30,960  
for all the known objects and the newly

652  
00:26:33,510 --> 00:26:32,320  
discovered ones and see what their

653  
00:26:34,549 --> 00:26:33,520  
orbits are

654  
00:26:36,230 --> 00:26:34,559  
that's true

655  
00:26:38,630 --> 00:26:36,240  
in fact we even have a widget that's

656  
00:26:41,110 --> 00:26:38,640  
available giving the next five close

657  
00:26:44,310 --> 00:26:41,120  
earth approaches and we have a twitter

658  
00:26:45,430 --> 00:26:44,320  
feed that has something like 950 000

659  
00:26:48,230 --> 00:26:45,440  
uh

660  
00:26:49,830 --> 00:26:48,240  
people taking part so there's full

661  
00:26:51,350 --> 00:26:49,840  
transparency

662  
00:26:52,390 --> 00:26:51,360  
everything is put out there immediately

663  
00:26:53,909 --> 00:26:52,400

on our website

664

00:26:55,590 --> 00:26:53,919

we couldn't

665

00:26:57,590 --> 00:26:55,600

keep a secret even if we wanted to so

666

00:26:59,430 --> 00:26:57,600

it's it's all out there

667

00:27:01,909 --> 00:26:59,440

almost immediately

668

00:27:04,390 --> 00:27:01,919

i i think i'd like to add to it it is

669

00:27:06,630 --> 00:27:04,400

not a concern just for nasa or for

670

00:27:10,070 --> 00:27:06,640

united states it's an international

671

00:27:12,950 --> 00:27:10,080

concern and there is actually an active

672

00:27:15,110 --> 00:27:12,960

agenda within united nations committee

673

00:27:16,149 --> 00:27:15,120

on peaceful use of outer space that

674

00:27:19,029 --> 00:27:16,159

actually

675

00:27:21,830 --> 00:27:19,039

looks at near our asteroid and it's not

676

00:27:23,909 --> 00:27:21,840

nasa but many other countries join in

677

00:27:25,830 --> 00:27:23,919

with their telescopes to really track

678

00:27:28,310 --> 00:27:25,840

these objects so

679

00:27:30,070 --> 00:27:28,320

i i think um as an international

680

00:27:33,029 --> 00:27:30,080

community we are

681

00:27:35,029 --> 00:27:33,039

we are very aware of the consequences of

682

00:27:37,909 --> 00:27:35,039

such an object and we are keeping eyes

683

00:27:40,630 --> 00:27:37,919

on this so this this is this is an

684

00:27:42,149 --> 00:27:40,640

important topic and it is on everyone's

685

00:27:44,470 --> 00:27:42,159

radar screen

686

00:27:46,230 --> 00:27:44,480

i think it's very good to point that out

687

00:27:49,590 --> 00:27:46,240

because many of the people who write to

688

00:27:51,590 --> 00:27:49,600

me just don't understand how astronomy

689

00:27:53,909 --> 00:27:51,600

and nasa work they think that somehow

690

00:27:55,909 --> 00:27:53,919

nasa controls all the telescopes in the

691

00:27:58,149 --> 00:27:55,919

world and paul i know you control a lot

692

00:27:59,909 --> 00:27:58,159

of them but not all of them

693

00:28:02,950 --> 00:27:59,919

that the astronomers of the world all

694

00:28:05,510 --> 00:28:02,960

work for nasa and so nasa has a a

695

00:28:07,590 --> 00:28:05,520

control on information when in fact

696

00:28:09,190 --> 00:28:07,600

there is a wide international

697

00:28:11,510 --> 00:28:09,200

astronomical

698

00:28:13,669 --> 00:28:11,520

community in the case of something like

699

00:28:15,750 --> 00:28:13,679

nibiru there are at least a hundred

700

00:28:18,310 --> 00:28:15,760

thousand astronomers amateur and

701  
00:28:20,230 --> 00:28:18,320  
professional in 100 different countries

702  
00:28:23,430 --> 00:28:20,240  
that could have been looking so so

703  
00:28:25,590 --> 00:28:23,440  
there's no possibility of hiding

704  
00:28:27,269 --> 00:28:25,600  
something that's in the sky

705  
00:28:30,149 --> 00:28:27,279  
and let me just add

706  
00:28:33,110 --> 00:28:30,159  
don pointed out that all of our uh data

707  
00:28:35,029 --> 00:28:33,120  
on the asteroids that we're tracking is

708  
00:28:37,430 --> 00:28:35,039  
put on the web for everybody take

709  
00:28:40,070 --> 00:28:37,440  
advantage of that's in fact true of all

710  
00:28:43,269 --> 00:28:40,080  
nasa as data whether it's astronomical

711  
00:28:45,430 --> 00:28:43,279  
data planetary data solar data or earth

712  
00:28:47,590 --> 00:28:45,440  
science data you can go to the web and

713  
00:28:49,510 --> 00:28:47,600

get access to all the data that nasa's

714

00:28:51,190 --> 00:28:49,520

satellites are collecting we make it

715

00:28:52,549 --> 00:28:51,200

available so that all scientists around

716

00:28:54,149 --> 00:28:52,559

the world can use it and we make it

717

00:28:55,669 --> 00:28:54,159

available so that all interested

718

00:28:59,190 --> 00:28:55,679

citizens can learn from it and take

719

00:29:01,110 --> 00:28:59,200

advantage of it

720

00:29:02,230 --> 00:29:01,120

thanks everyone that's a really thorough

721

00:29:03,590 --> 00:29:02,240

explanation

722

00:29:07,430 --> 00:29:03,600

we have i think we've touched on this

723

00:29:09,110 --> 00:29:07,440

before but on twitter sophie emma asked

724

00:29:11,029 --> 00:29:09,120

could the black hole found the center of

725

00:29:13,190 --> 00:29:11,039

the milky way have an effect on earth is

726

00:29:15,990 --> 00:29:13,200

that a possibility at all

727

00:29:17,909 --> 00:29:16,000

i'll take that one and the answer is no

728

00:29:21,029 --> 00:29:17,919

as as we've already pointed out that

729

00:29:23,590 --> 00:29:21,039

black hole is 28 000 light years away

730

00:29:25,269 --> 00:29:23,600

which is uh tremendously distant

731

00:29:27,830 --> 00:29:25,279

not only that but of course the reason

732

00:29:30,630 --> 00:29:27,840

why we call black holes black holes is

733

00:29:32,470 --> 00:29:30,640

because they don't emit any radiation

734

00:29:34,389 --> 00:29:32,480

that they only have gravitational

735

00:29:36,789 --> 00:29:34,399

attraction um the gravitational

736

00:29:38,870 --> 00:29:36,799

attraction is as i mentioned before less

737

00:29:41,110 --> 00:29:38,880

than one millionth that from the earth

738

00:29:43,029 --> 00:29:41,120

we can't even see the black hole at the

739

00:29:44,630 --> 00:29:43,039

center of the galaxy the only reason we

740

00:29:47,110 --> 00:29:44,640

know it's there is because we can see

741

00:29:48,549 --> 00:29:47,120

stars orbiting it and that's how we can

742

00:29:49,590 --> 00:29:48,559

detect it and we can measure its

743

00:29:50,950 --> 00:29:49,600

brightness

744

00:29:53,510 --> 00:29:50,960

we can also see

745

00:29:55,430 --> 00:29:53,520

x-rays from dust that falls into the

746

00:29:58,310 --> 00:29:55,440

black hole at the center of the galaxy

747

00:30:01,269 --> 00:29:58,320

but those x-rays are so far away that

748

00:30:05,350 --> 00:30:01,279

they have no impact even on stars in

749

00:30:09,909 --> 00:30:06,710

thank you have another question from

750

00:30:11,830 --> 00:30:09,919

twitter it's ramon underscore 305 asks

751  
00:30:13,430 --> 00:30:11,840  
do you have any news on solar activity

752  
00:30:16,310 --> 00:30:13,440  
what are the chances of a major solar

753  
00:30:17,990 --> 00:30:16,320  
flare hitting earth's atmosphere

754  
00:30:20,549 --> 00:30:18,000  
i'll take that one first and which

755  
00:30:23,029 --> 00:30:20,559  
probably will join me um

756  
00:30:26,310 --> 00:30:23,039  
i i think we have lots of news on solar

757  
00:30:28,710 --> 00:30:26,320  
activity for one uh in this case it

758  
00:30:31,029 --> 00:30:28,720  
happens to be nasa nasa spacecraft has

759  
00:30:33,350 --> 00:30:31,039  
literally surrounded the sun we have

760  
00:30:36,470 --> 00:30:33,360  
many spacecraft that is looking at the

761  
00:30:38,630 --> 00:30:36,480  
sun from different vantage point and so

762  
00:30:41,750 --> 00:30:38,640  
there is nothing that happens on the

763  
00:30:44,070 --> 00:30:41,760

surface of the sun that goes unnoticed

764

00:30:46,950 --> 00:30:44,080

by the spacecraft so we are able to

765

00:30:49,350 --> 00:30:46,960

track the progression of solar activity

766

00:30:52,070 --> 00:30:49,360

now we all know that the sun goes

767

00:30:54,549 --> 00:30:52,080

through an activity cycle every 11 years

768

00:30:57,190 --> 00:30:54,559

what you find are that the magnetic

769

00:30:59,669 --> 00:30:57,200

field on the sun increases and then

770

00:31:02,149 --> 00:30:59,679

decreases and what happens as a

771

00:31:04,630 --> 00:31:02,159

phenomenon on the photosphere of the sun

772

00:31:06,789 --> 00:31:04,640

are the sunspot numbers increases and

773

00:31:09,029 --> 00:31:06,799

then sun sunspot number decreases

774

00:31:12,230 --> 00:31:09,039

sometimes it just completely vanishes

775

00:31:14,710 --> 00:31:12,240

from the uh you know photosphere or the

776

00:31:17,269 --> 00:31:14,720

uh lit up side of the sun and that's

777

00:31:18,389 --> 00:31:17,279

what we call a solar cycle maximum to

778

00:31:20,549 --> 00:31:18,399

minimum

779

00:31:23,110 --> 00:31:20,559

in the space age that we have been

780

00:31:26,549 --> 00:31:23,120

tracking the sun let's say like

781

00:31:28,950 --> 00:31:26,559

some 50 years what we have seen in solar

782

00:31:30,630 --> 00:31:28,960

activity is that the solar activity had

783

00:31:34,230 --> 00:31:30,640

been on the rise

784

00:31:37,909 --> 00:31:34,240

up until this last solar minimum the

785

00:31:38,950 --> 00:31:37,919

solar minimum of the last cycle 23 was

786

00:31:42,310 --> 00:31:38,960

rather

787

00:31:44,549 --> 00:31:42,320

long and protruded uh solar minimum you

788

00:31:46,470 --> 00:31:44,559

know they were almost um almost two

789

00:31:50,230 --> 00:31:46,480

years when we had uh

790

00:31:53,269 --> 00:31:50,240

very few sunspot or no sunspots at all

791

00:31:55,990 --> 00:31:53,279

and as we came out of that

792

00:31:59,269 --> 00:31:56,000

solar cycle solar minimum and started

793

00:32:01,909 --> 00:31:59,279

rising into solar cycle 24 you know noah

794

00:32:02,950 --> 00:32:01,919

does the prediction for um

795

00:32:08,950 --> 00:32:02,960

solar

796

00:32:10,710 --> 00:32:08,960

earth and what what they determine is

797

00:32:12,710 --> 00:32:10,720

that there is a scale you know it's not

798

00:32:15,750 --> 00:32:12,720

a very real thing and i'll show you a

799

00:32:18,549 --> 00:32:15,760

graph from the outside that told us you

800

00:32:21,029 --> 00:32:18,559

know what would this cycle look like and

801  
00:32:23,350 --> 00:32:21,039  
every solar cycle scientists kind of

802  
00:32:25,430 --> 00:32:23,360  
come together and bat around and you

803  
00:32:27,350 --> 00:32:25,440  
know come to some kind of understanding

804  
00:32:30,070 --> 00:32:27,360  
what is our expectation based on the

805  
00:32:32,870 --> 00:32:30,080  
latest understanding of physics

806  
00:32:36,549 --> 00:32:32,880  
and so what we are finding in this solar

807  
00:32:38,950 --> 00:32:36,559  
cycle in this solar cycle is sort of the

808  
00:32:43,190 --> 00:32:38,960  
wimpiest solar cycle in the space age it

809  
00:32:44,710 --> 00:32:43,200  
is lower than what we had even expected

810  
00:32:46,789 --> 00:32:44,720  
um so

811  
00:32:49,190 --> 00:32:46,799  
now why is that important

812  
00:32:50,389 --> 00:32:49,200  
storms happen all the time on the sun

813  
00:32:53,430 --> 00:32:50,399

okay

814

00:32:55,750 --> 00:32:53,440

if you have a strong solar cycle the

815

00:32:58,230 --> 00:32:55,760

frequency of the storms increases but

816

00:33:00,310 --> 00:32:58,240

their intensity has nothing to do with

817

00:33:02,230 --> 00:33:00,320

the frequency so you can have a weak

818

00:33:04,710 --> 00:33:02,240

solar cycle and you can still have a

819

00:33:07,590 --> 00:33:04,720

really strong solar storm but the

820

00:33:09,830 --> 00:33:07,600

frequency is the one that gives us sort

821

00:33:12,710 --> 00:33:09,840

of a probabilistic sense right so the

822

00:33:15,509 --> 00:33:12,720

question is is there going to be a solar

823

00:33:17,909 --> 00:33:15,519

storm you know sufficiently large that

824

00:33:20,470 --> 00:33:17,919

can hit us right and that it's a

825

00:33:23,269 --> 00:33:20,480

probabilistic question these questions

826

00:33:26,070 --> 00:33:23,279

are like uh the questions we ask of you

827

00:33:29,029 --> 00:33:26,080

know hundred year flood hundred year

828

00:33:31,350 --> 00:33:29,039

super volcano something like that can it

829

00:33:33,750 --> 00:33:31,360

happen you know we can't say it won't

830

00:33:35,509 --> 00:33:33,760

happen but we have enough understanding

831

00:33:37,990 --> 00:33:35,519

to say that it doesn't look like

832

00:33:42,149 --> 00:33:38,000

something like that is going to happen

833

00:33:45,269 --> 00:33:42,159

but even if we were to get a really

834

00:33:48,230 --> 00:33:45,279

large uh solar storm the interesting

835

00:33:50,950 --> 00:33:48,240

thing is that now we because we can see

836

00:33:53,029 --> 00:33:50,960

and track the sun from all sides we can

837

00:33:55,509 --> 00:33:53,039

actually predict that there is an active

838

00:33:57,990 --> 00:33:55,519

region emerging that the active region

839

00:34:00,870 --> 00:33:58,000

has the potential to create a really

840

00:34:03,110 --> 00:34:00,880

large storm so we can start warning

841

00:34:06,389 --> 00:34:03,120

people we meaning noah in this case we

842

00:34:08,310 --> 00:34:06,399

work closely with noah uh and and what

843

00:34:10,629 --> 00:34:08,320

we can do is we

844

00:34:13,669 --> 00:34:10,639

we can turn off our sensitive

845

00:34:16,629 --> 00:34:13,679

electronics our power grid anything that

846

00:34:19,510 --> 00:34:16,639

is sort of electromagnetic in nature has

847

00:34:20,550 --> 00:34:19,520

the potential to be impacted by solar

848

00:34:26,629 --> 00:34:20,560

storms

849

00:34:29,430 --> 00:34:26,639

effect on human beings in terms of a

850

00:34:32,069 --> 00:34:29,440

huge radiation or there is no fire

851

00:34:34,950 --> 00:34:32,079

created none of those but

852

00:34:38,069 --> 00:34:34,960

electronics can be severely damaged and

853

00:34:40,710 --> 00:34:38,079

as we know uh our societies are becoming

854

00:34:42,869 --> 00:34:40,720

more and more uh technologically

855

00:34:46,149 --> 00:34:42,879

dependent so if you were to ask me are

856

00:34:49,030 --> 00:34:46,159

we going to get a major solar flare on

857

00:34:50,950 --> 00:34:49,040

december 21st i could tell you something

858

00:34:54,550 --> 00:34:50,960

because we are actually looking at the

859

00:34:56,950 --> 00:34:54,560

sun and it takes about al almost a month

860

00:35:00,950 --> 00:34:56,960

let's say from the far side of the sun

861

00:35:03,270 --> 00:35:00,960

to come in front of us and today is 28

862

00:35:05,030 --> 00:35:03,280

so i can say you know what we can

863

00:35:08,310 --> 00:35:05,040

already because we have spacecraft

864

00:35:10,550 --> 00:35:08,320

stereo stereo b soho solar dynamics

865

00:35:12,630 --> 00:35:10,560

observatory we know all the sunspots

866

00:35:15,589 --> 00:35:12,640

that's out there that's coming towards

867

00:35:18,230 --> 00:35:15,599

uh we can actually penetrate beneath the

868

00:35:21,430 --> 00:35:18,240

sun also with our telescopes and say

869

00:35:23,829 --> 00:35:21,440

what is emerging so we will have a

870

00:35:27,430 --> 00:35:23,839

pretty good idea if something is forming

871

00:35:29,829 --> 00:35:27,440

rapidly and coming at us so i i think um

872

00:35:32,390 --> 00:35:29,839

i think we'll be able to warn you guide

873

00:35:34,630 --> 00:35:32,400

you uh it is very unlikely that we are

874

00:35:36,550 --> 00:35:34,640

going to get something huge

875

00:35:38,230 --> 00:35:36,560

would you like to respond to the

876

00:35:40,870 --> 00:35:38,240

question that i've received several

877

00:35:43,109 --> 00:35:40,880

times the people say ah it's not just

878

00:35:45,589 --> 00:35:43,119

the sun but there is a tear in our

879

00:35:47,670 --> 00:35:45,599

magnetosphere that the magnetosphere is

880

00:35:50,150 --> 00:35:47,680

collapsing that our natural protection

881

00:35:53,589 --> 00:35:50,160

is going away uh how do you answer that

882

00:35:55,750 --> 00:35:53,599

question uh then yes

883

00:35:57,589 --> 00:35:55,760

it is going to be a little bit difficult

884

00:35:59,270 --> 00:35:57,599

in terms of because it's a technical

885

00:36:02,630 --> 00:35:59,280

jargon but let's talk about the

886

00:36:05,349 --> 00:36:02,640

magnetosphere how are we protected uh

887

00:36:06,790 --> 00:36:05,359

from these solar particles that come and

888

00:36:09,190 --> 00:36:06,800

impinge on us you know there were

889

00:36:12,710 --> 00:36:09,200

questions before you know about polar

890

00:36:15,670 --> 00:36:12,720

shift and all that now earth is uh

891

00:36:18,069 --> 00:36:15,680

tremendously blessed and lucky that it

892

00:36:21,109 --> 00:36:18,079

has a magnetosphere in fact i might even

893

00:36:23,589 --> 00:36:21,119

venture as far out to say that perhaps

894

00:36:25,829 --> 00:36:23,599

this magnetosphere which kind of shields

895

00:36:30,390 --> 00:36:25,839

us like a cocoon from these harmful

896

00:36:32,630 --> 00:36:30,400

radiations of the sun has enabled life

897

00:36:35,109 --> 00:36:32,640

to have been generated

898

00:36:37,109 --> 00:36:35,119

on this planet now what happens when

899

00:36:39,349 --> 00:36:37,119

these particles come and impinge on the

900

00:36:41,750 --> 00:36:39,359

magnetosphere these are all magnetic

901  
00:36:44,790 --> 00:36:41,760  
field lines connecting with each other

902  
00:36:46,710 --> 00:36:44,800  
there is reconnection happening and when

903  
00:36:50,950 --> 00:36:46,720  
this reconnection happens these

904  
00:36:53,270 --> 00:36:50,960  
particles can actually propagate into

905  
00:36:55,030 --> 00:36:53,280  
our planet and then this is when we

906  
00:36:57,430 --> 00:36:55,040  
begin to see

907  
00:37:00,870 --> 00:36:57,440  
if we are seeing an aurora the northern

908  
00:37:03,670 --> 00:37:00,880  
and southern lights that tells us that a

909  
00:37:06,630 --> 00:37:03,680  
solar storm has actually

910  
00:37:09,670 --> 00:37:06,640  
generated a geomagnetic storm which is a

911  
00:37:12,470 --> 00:37:09,680  
storm in our own planet and then these

912  
00:37:15,270 --> 00:37:12,480  
particles can actually propagate down

913  
00:37:16,790 --> 00:37:15,280

create electromagnetic fluctuation uh

914

00:37:20,390 --> 00:37:16,800

which creates you know different

915

00:37:23,349 --> 00:37:20,400

conditions in the ionosphere that um

916

00:37:26,230 --> 00:37:23,359

controls our a lot of our satellites for

917

00:37:29,349 --> 00:37:26,240

communication navigation etc furthermore

918

00:37:31,990 --> 00:37:29,359

this these fluctuations have the ability

919

00:37:34,390 --> 00:37:32,000

to really produce huge amount of voltage

920

00:37:36,710 --> 00:37:34,400

fluctuation on power grid which can get

921

00:37:38,790 --> 00:37:36,720

tripped and which can actually go out

922

00:37:42,790 --> 00:37:38,800

and these things have happened like in

923

00:37:45,510 --> 00:37:42,800

1989 hydroquebec failure that's how you

924

00:37:48,230 --> 00:37:45,520

can be in darkness because your power

925

00:37:51,109 --> 00:37:48,240

system failed so yes

926

00:37:54,310 --> 00:37:51,119

these particles can penetrate through

927

00:37:57,430 --> 00:37:54,320

our magnetosphere but even that we are

928

00:38:00,230 --> 00:37:57,440

able to kind of guide people through

929

00:38:03,349 --> 00:38:00,240

whether a particular storm has the kind

930

00:38:05,990 --> 00:38:03,359

of magnetic field orientation that will

931

00:38:08,390 --> 00:38:06,000

allow it to connect up with our own

932

00:38:10,790 --> 00:38:08,400

magnetosphere but but the question the

933

00:38:12,550 --> 00:38:10,800

question that i get is that somehow

934

00:38:15,510 --> 00:38:12,560

something recently has happened that the

935

00:38:17,670 --> 00:38:15,520

magnetosphere is going away and uh and i

936

00:38:19,670 --> 00:38:17,680

think you're saying it's that's not true

937

00:38:22,710 --> 00:38:19,680

that it's uh it's still there and it's

938

00:38:24,630 --> 00:38:22,720

still protecting us it's very much there

939

00:38:27,109 --> 00:38:24,640

and in fact we just launched another

940

00:38:30,630 --> 00:38:27,119

pair of satellites uh called ben allen

941

00:38:33,910 --> 00:38:30,640

probes uh some of those results will be

942

00:38:36,790 --> 00:38:33,920

uh during this upcoming meeting that uh

943

00:38:39,750 --> 00:38:36,800

clearly shows that our magnetosphere not

944

00:38:41,910 --> 00:38:39,760

only exists sometimes it creates kind of

945

00:38:45,270 --> 00:38:41,920

new radiation belts because of its

946

00:38:47,670 --> 00:38:45,280

interaction uh with the solar energetic

947

00:38:49,750 --> 00:38:47,680

particles

948

00:38:51,829 --> 00:38:49,760

you know and actually that aside from

949

00:38:53,750 --> 00:38:51,839

solar flares what

950

00:38:55,349 --> 00:38:53,760

what kind of solar activity eventually

951  
00:38:57,109 --> 00:38:55,359  
whether it's thousand million years from

952  
00:38:59,270 --> 00:38:57,119  
now could eventually impact life here on

953  
00:39:01,349 --> 00:38:59,280  
earth uh i mean i'm assuming that

954  
00:39:04,150 --> 00:39:01,359  
eventually something with the sun

955  
00:39:05,750 --> 00:39:04,160  
expansion or uh will eventually could

956  
00:39:07,190 --> 00:39:05,760  
could have an impact what what is that

957  
00:39:08,710 --> 00:39:07,200  
and when would that estimate it be where

958  
00:39:11,270 --> 00:39:08,720  
we could look at something that could

959  
00:39:13,510 --> 00:39:11,280  
have a major impact that we know are you

960  
00:39:17,109 --> 00:39:13,520  
talking of the sun as an astrophysical

961  
00:39:19,750 --> 00:39:17,119  
object yes morphs into you know sun is

962  
00:39:22,950 --> 00:39:19,760  
kind of a very ordinary star so it's not

963  
00:39:26,870 --> 00:39:22,960

going to produce a supernova and i think

964

00:39:29,510 --> 00:39:26,880

all it will do is become a red giant you

965

00:39:32,710 --> 00:39:29,520

know and then it it's going to expand

966

00:39:36,470 --> 00:39:32,720

tremendously and at some point uh i

967

00:39:39,829 --> 00:39:36,480

think it's going to envelop our um

968

00:39:42,230 --> 00:39:39,839

planet earth and go all the way to mars

969

00:39:44,470 --> 00:39:42,240

but that that that's billions of years

970

00:39:54,230 --> 00:39:44,480

away and i will ask

971

00:39:59,030 --> 00:39:56,630

paul you with us

972

00:40:01,510 --> 00:39:59,040

sorry i was muted um

973

00:40:03,910 --> 00:40:01,520

the sun is a fairly ordinary star uh

974

00:40:05,990 --> 00:40:03,920

we've observed many stars similar to the

975

00:40:08,870 --> 00:40:06,000

sun throughout the galaxy at different

976

00:40:11,190 --> 00:40:08,880

stages of their evolution um our best

977

00:40:12,950 --> 00:40:11,200

understanding of the future of the sun

978

00:40:15,109 --> 00:40:12,960

which we can only get from looking at

979

00:40:17,190 --> 00:40:15,119

other stars that are older in the sun

980

00:40:19,670 --> 00:40:17,200

and therefore have gone through later

981

00:40:22,390 --> 00:40:19,680

stages of their life than the sun has is

982

00:40:23,990 --> 00:40:22,400

that the sun will indeed uh

983

00:40:26,790 --> 00:40:24,000

use up the hydrogen at the center of its

984

00:40:29,910 --> 00:40:26,800

core that will cause it to expand into a

985

00:40:32,310 --> 00:40:29,920

red giant um it will eventually get as

986

00:40:34,230 --> 00:40:32,320

certainly as big as the orbit of venus

987

00:40:36,630 --> 00:40:34,240

we don't know if it will get out to the

988

00:40:38,470 --> 00:40:36,640

orbit of the earth but it will certainly

989

00:40:41,030 --> 00:40:38,480

change the weather on the earth in the

990

00:40:43,190 --> 00:40:41,040

climate quite substantially

991

00:40:45,510 --> 00:40:43,200

but in case anybody is getting concerned

992

00:40:48,390 --> 00:40:45,520

about this happening in december that's

993

00:40:50,390 --> 00:40:48,400

not the case this will happen in about 5

994

00:40:52,470 --> 00:40:50,400

billion years

995

00:40:55,430 --> 00:40:52,480

and so we have plenty of time to

996

00:40:57,430 --> 00:40:55,440

contemplate what we might do uh in five

997

00:40:59,829 --> 00:40:57,440

billion years when the sun

998

00:41:01,990 --> 00:40:59,839

reaches later parts of its lifetime

999

00:41:07,750 --> 00:41:02,000

so i'm not taking out red giant

1000

00:41:11,589 --> 00:41:09,349

uh this is a this is just a general

1001  
00:41:13,349 --> 00:41:11,599  
question for everybody i suppose are

1002  
00:41:16,230 --> 00:41:13,359  
there in your field are there any

1003  
00:41:18,150 --> 00:41:16,240  
threats to earth in 2012 or any time the

1004  
00:41:20,150 --> 00:41:18,160  
near future that we should be concerned

1005  
00:41:21,030 --> 00:41:20,160  
about

1006  
00:41:22,950 --> 00:41:21,040  
yes

1007  
00:41:25,750 --> 00:41:22,960  
i think there's any credible threats uh

1008  
00:41:27,349 --> 00:41:25,760  
that we know about in the near future of

1009  
00:41:29,510 --> 00:41:27,359  
there's an interesting close earth

1010  
00:41:31,750 --> 00:41:29,520  
approach by an asteroid called

1011  
00:41:34,309 --> 00:41:31,760  
2012 da14

1012  
00:41:35,190 --> 00:41:34,319  
uh next february 15th it's going to pass

1013  
00:41:37,829 --> 00:41:35,200

within

1014

00:41:39,990 --> 00:41:37,839

four and a half earth radii

1015

00:41:43,030 --> 00:41:40,000

of the earth's surface which is within

1016

00:41:44,470 --> 00:41:43,040

the geosynchronous satellite belts so

1017

00:41:46,470 --> 00:41:44,480

you've got this object that's coming

1018

00:41:49,349 --> 00:41:46,480

closer to the earth

1019

00:41:51,670 --> 00:41:49,359

and you've got satellites further away

1020

00:41:53,750 --> 00:41:51,680

there will be announcing its arrival

1021

00:41:56,069 --> 00:41:53,760

it's uh it's an object that's whose

1022

00:41:59,349 --> 00:41:56,079

orbit is well known uh it cannot get any

1023

00:42:01,030 --> 00:41:59,359

closer than uh four and a half uh earth

1024

00:42:03,270 --> 00:42:01,040

radii so it's going to be an interesting

1025

00:42:06,870 --> 00:42:03,280

target for astronomers especially radar

1026  
00:42:09,510 --> 00:42:06,880  
astronomers but it's it's not a threat

1027  
00:42:11,349 --> 00:42:09,520  
from an astronomical point of view 2012

1028  
00:42:13,109 --> 00:42:11,359  
is like any other year

1029  
00:42:14,630 --> 00:42:13,119  
the earth goes around the sun the earth

1030  
00:42:16,390 --> 00:42:14,640  
rotates the sun is moving through

1031  
00:42:18,710 --> 00:42:16,400  
interstellar space all the planets are

1032  
00:42:21,430 --> 00:42:18,720  
in their orbits and there's nothing

1033  
00:42:23,670 --> 00:42:21,440  
happening this year that's special

1034  
00:42:25,750 --> 00:42:23,680  
so if i can give you a slightly

1035  
00:42:28,150 --> 00:42:25,760  
whimsical answer but i think a

1036  
00:42:31,430 --> 00:42:28,160  
relatively important one i think one of

1037  
00:42:33,670 --> 00:42:31,440  
the greatest threats to earth in 2012

1038  
00:42:35,990 --> 00:42:33,680

is the low level of science education

1039

00:42:37,910 --> 00:42:36,000

and public knowledge and i think this

1040

00:42:40,470 --> 00:42:37,920

entire discussion and the fears that

1041

00:42:41,430 --> 00:42:40,480

have been generated illustrates how much

1042

00:42:44,309 --> 00:42:41,440

more

1043

00:42:47,030 --> 00:42:44,319

nasa the scientific community and those

1044

00:42:49,910 --> 00:42:47,040

of us in science education still need to

1045

00:42:52,390 --> 00:42:49,920

do it's really sad that so many people

1046

00:42:54,470 --> 00:42:52,400

are worried in writing to david morrison

1047

00:42:57,349 --> 00:42:54,480

it's really sad that our schools have

1048

00:42:59,910 --> 00:42:57,359

not taught skeptical thinking have not

1049

00:43:02,790 --> 00:42:59,920

helped students to distinguish between

1050

00:43:05,750 --> 00:43:02,800

the reality and the fantasy of what's

1051

00:43:08,550 --> 00:43:05,760

going on in these areas so i think if

1052

00:43:11,030 --> 00:43:08,560

people are concerned about cosmic

1053

00:43:13,510 --> 00:43:11,040

threats part of that is a threat to to

1054

00:43:15,829 --> 00:43:13,520

our understanding of science that comes

1055

00:43:17,670 --> 00:43:15,839

from insufficient science education and

1056

00:43:19,910 --> 00:43:17,680

i hope we can all

1057

00:43:21,910 --> 00:43:19,920

redouble our efforts to help students

1058

00:43:24,710 --> 00:43:21,920

understand the world better

1059

00:43:27,349 --> 00:43:24,720

i'm also worried about that in fact i

1060

00:43:29,430 --> 00:43:27,359

think the great threat is really in this

1061

00:43:32,230 --> 00:43:29,440

month because there are literally

1062

00:43:34,470 --> 00:43:32,240

millions of people who are afraid who

1063

00:43:36,550 --> 00:43:34,480

think the world will end and in

1064

00:43:38,870 --> 00:43:36,560

particular children the children who are

1065

00:43:41,030 --> 00:43:38,880

contemplating suicide the children that

1066

00:43:42,069 --> 00:43:41,040

are worried that christmas won't come

1067

00:43:44,710 --> 00:43:42,079

this year

1068

00:43:47,109 --> 00:43:44,720

and i think it's evil

1069

00:43:49,430 --> 00:43:47,119

for people to propagate rumors on the

1070

00:43:51,990 --> 00:43:49,440

internet to frighten children and i

1071

00:43:54,390 --> 00:43:52,000

think all these frightened children

1072

00:43:57,430 --> 00:43:54,400

are a real problem and i hope it'll go

1073

00:43:59,990 --> 00:43:57,440

away soon but we need to to protect

1074

00:44:03,670 --> 00:44:00,000

ourselves and our children uh from this

1075

00:44:05,829 --> 00:44:03,680

sort of of crazy ideas as andy says the

1076

00:44:08,230 --> 00:44:05,839

best way to protect ourselves is to

1077

00:44:12,150 --> 00:44:08,240

learn enough science to recognize just

1078

00:44:14,550 --> 00:44:12,160

how silly these threats supposedly are

1079

00:44:15,750 --> 00:44:14,560

and i'd like to add to that i i think

1080

00:44:17,510 --> 00:44:15,760

this is

1081

00:44:21,589 --> 00:44:17,520

absolutely true

1082

00:44:24,390 --> 00:44:21,599

science education and outreach is uh

1083

00:44:26,470 --> 00:44:24,400

very very important in this regard as a

1084

00:44:29,589 --> 00:44:26,480

matter of fact the fact that we are all

1085

00:44:33,349 --> 00:44:29,599

here spending an hour doing this it is

1086

00:44:35,829 --> 00:44:33,359

an outreach activity to really educate

1087

00:44:38,630 --> 00:44:35,839

people the best we can on this short

1088

00:44:41,349 --> 00:44:38,640

period of our time i wanted to share

1089

00:44:45,030 --> 00:44:41,359

actually one item with you and that is

1090

00:44:47,670 --> 00:44:45,040

if anyone is uh interested in tracking

1091

00:44:48,790 --> 00:44:47,680

the sun we have something called a 3d

1092

00:44:51,829 --> 00:44:48,800

sun

1093

00:44:54,790 --> 00:44:51,839

app both on iphone and android and of

1094

00:44:56,550 --> 00:44:54,800

course it's on the website and and so

1095

00:44:58,390 --> 00:44:56,560

you can actually this is what i was

1096

00:45:01,589 --> 00:44:58,400

saying i wasn't kidding

1097

00:45:03,750 --> 00:45:01,599

uh we get this sort of 24 7. we have

1098

00:45:06,230 --> 00:45:03,760

data that is transmitted to us by

1099

00:45:09,430 --> 00:45:06,240

several satellite nasa satellite with

1100

00:45:11,510 --> 00:45:09,440

which we are actually seeing the sun

1101

00:45:14,950 --> 00:45:11,520

both the far side at the front front

1102

00:45:17,270 --> 00:45:14,960

side um almost instantaneously but on

1103

00:45:20,150 --> 00:45:17,280

this site you can actually get

1104

00:45:22,550 --> 00:45:20,160

information if there is a solar flare uh

1105

00:45:24,630 --> 00:45:22,560

happening if there is an active region

1106

00:45:27,109 --> 00:45:24,640

emerging so you can be educated there

1107

00:45:29,910 --> 00:45:27,119

are other uh little tidbits in there

1108

00:45:33,750 --> 00:45:29,920

that is informative for our listeners on

1109

00:45:37,510 --> 00:45:35,750

i would agree with everybody about

1110

00:45:41,030 --> 00:45:37,520

science literacy i think that's really

1111

00:45:44,069 --> 00:45:41,040

important i think the greatest threat to

1112

00:45:45,670 --> 00:45:44,079

earth in 2012 at the end of this year

1113

00:45:48,950 --> 00:45:45,680

and in the future it's just from the

1114

00:45:53,349 --> 00:45:50,710

yeah i think it's really important for

1115

00:45:55,109 --> 00:45:53,359

us to uh without getting

1116

00:45:57,829 --> 00:45:55,119

derailed into a long discussion of

1117

00:45:59,270 --> 00:45:57,839

global warming is to emphasize that and

1118

00:46:02,470 --> 00:45:59,280

i said in fact

1119

00:46:04,630 --> 00:46:02,480

we our own actions may represent a far

1120

00:46:06,710 --> 00:46:04,640

greater threat to the planet than

1121

00:46:09,670 --> 00:46:06,720

anything that the cosmos is throwing at

1122

00:46:13,430 --> 00:46:11,510

and this uh this question actually ties

1123

00:46:16,470 --> 00:46:13,440

in well to one that was asked to us on

1124

00:46:18,870 --> 00:46:16,480

youtube from charles phil king he asked

1125

00:46:21,990 --> 00:46:18,880

given all the myths 2012 moon landing

1126

00:46:23,750 --> 00:46:22,000

etc what methods can a lay person who is

1127

00:46:25,990 --> 00:46:23,760

questioning these things

1128

00:46:28,470 --> 00:46:26,000

due to research and verify the research

1129

00:46:30,630 --> 00:46:28,480

they do to help rest their fears slash

1130

00:46:32,790 --> 00:46:30,640

concerns

1131

00:46:35,190 --> 00:46:32,800

that's an excellent question and and i

1132

00:46:37,109 --> 00:46:35,200

get it often um

1133

00:46:39,430 --> 00:46:37,119

obviously these are complicated

1134

00:46:41,270 --> 00:46:39,440

scientific issues and not everybody is

1135

00:46:43,589 --> 00:46:41,280

going to know all the science

1136

00:46:47,030 --> 00:46:43,599

what i tell people first

1137

00:46:50,069 --> 00:46:47,040

is look it up in wikipedia that is such

1138

00:46:54,230 --> 00:46:52,550

resource on the internet of course it's

1139

00:46:55,910 --> 00:46:54,240

not perfect of course some things that

1140

00:46:58,470 --> 00:46:55,920

are wrong but they tend to be corrected

1141

00:47:01,589 --> 00:46:58,480

very quickly for instance just uh last

1142

00:47:03,829 --> 00:47:01,599

week someone put up a silly thing about

1143

00:47:06,230 --> 00:47:03,839

and meteor ten times the size of the

1144

00:47:08,630 --> 00:47:06,240

earth headed for the earth and it was up

1145

00:47:09,750 --> 00:47:08,640

for just under two hours before someone

1146

00:47:11,829 --> 00:47:09,760

took it down

1147

00:47:14,230 --> 00:47:11,839

so you know people can write to ask an

1148

00:47:16,390 --> 00:47:14,240

astrobiologist and other ask a scientist

1149

00:47:17,750 --> 00:47:16,400

things they can learn science that's

1150

00:47:19,910 --> 00:47:17,760

great but when you're faced with an

1151  
00:47:22,309 --> 00:47:19,920  
immediate issue when you see something

1152  
00:47:23,030 --> 00:47:22,319  
that just doesn't quite make sense for

1153  
00:47:25,990 --> 00:47:23,040  
you

1154  
00:47:28,550 --> 00:47:26,000  
i suggest looking it up on wikipedia

1155  
00:47:30,230 --> 00:47:28,560  
and another really good resource that we

1156  
00:47:34,069 --> 00:47:30,240  
can perhaps mention is that there's an

1157  
00:47:37,589 --> 00:47:34,079  
organization of scientists educators

1158  
00:47:40,309 --> 00:47:37,599  
magicians and others who are good at

1159  
00:47:42,870 --> 00:47:40,319  
figuring out tricks of irrational

1160  
00:47:45,270 --> 00:47:42,880  
thinking it's called the committee for

1161  
00:47:52,710 --> 00:47:45,280  
skeptical inquiry

1162  
00:47:57,670 --> 00:47:54,790  
and this organization publishes a

1163  
00:47:59,750 --> 00:47:57,680

newsletter called the skeptical inquirer

1164

00:48:02,150 --> 00:47:59,760

uh david has been very active in writing

1165

00:48:04,790 --> 00:48:02,160

for them i think this is an excellent

1166

00:48:10,470 --> 00:48:04,800

source of sort of rational or skeptical

1167

00:48:14,710 --> 00:48:12,309

thank you and i'd be revisified and add

1168

00:48:16,710 --> 00:48:14,720

nasa.gov has a webpage

1169

00:48:19,829 --> 00:48:16,720

that addresses a lot of these questions

1170

00:48:21,829 --> 00:48:19,839

you can visit at nasa.gov 2012.

1171

00:48:23,990 --> 00:48:21,839

i have one final question for the group

1172

00:48:25,510 --> 00:48:24,000

and if you have any closing remarks when

1173

00:48:27,589 --> 00:48:25,520

answering this question uh this would be

1174

00:48:29,349 --> 00:48:27,599

a good time it'd be nice if everybody uh

1175

00:48:31,190 --> 00:48:29,359

may be in order that we started off when

1176

00:48:33,589 --> 00:48:31,200

uh just kind of gives a question and

1177

00:48:36,069 --> 00:48:33,599

answer this um on twitter at esther

1178

00:48:42,150 --> 00:48:36,079

vanguardner asks um have you guys made

1179

00:48:45,670 --> 00:48:44,870

i've made a few plans for december 21st

1180

00:48:47,510 --> 00:48:45,680

um

1181

00:48:48,470 --> 00:48:47,520

i'm actually going to be going to

1182

00:48:49,910 --> 00:48:48,480

atlanta

1183

00:48:52,950 --> 00:48:49,920

for christmas

1184

00:48:55,190 --> 00:48:52,960

and on december 22nd i'm running a 5k

1185

00:48:56,870 --> 00:48:55,200

so december 21st i'll probably be

1186

00:49:00,870 --> 00:48:56,880

resting a little bit

1187

00:49:05,109 --> 00:49:03,430

well i i guess the more important

1188

00:49:09,190 --> 00:49:05,119

question is whether we have plans for

1189

00:49:12,470 --> 00:49:09,200

december 22nd and thereafter um i david

1190

00:49:14,950 --> 00:49:12,480

and i participated this summer in a uh

1191

00:49:16,790 --> 00:49:14,960

colloquium for our symposium for the

1192

00:49:19,109 --> 00:49:16,800

astronomical society of the pacific

1193

00:49:21,670 --> 00:49:19,119

where a lot of science educators were

1194

00:49:25,030 --> 00:49:21,680

there and we've been encouraging science

1195

00:49:28,150 --> 00:49:25,040

museums schools and other institutions

1196

00:49:30,230 --> 00:49:28,160

to stay open if possible through that

1197

00:49:32,790 --> 00:49:30,240

evening of december 21st and have a

1198

00:49:35,750 --> 00:49:32,800

little party the first hour of december

1199

00:49:38,470 --> 00:49:35,760

22nd i i certainly will be celebrating

1200

00:49:40,950 --> 00:49:38,480

when december 22nd rolls around but i

1201  
00:49:42,390 --> 00:49:40,960  
think more importantly what i think we

1202  
00:49:45,030 --> 00:49:42,400  
all ought to be

1203  
00:49:47,109 --> 00:49:45,040  
encouraging science teachers and other

1204  
00:49:50,150 --> 00:49:47,119  
educators to do

1205  
00:49:52,870 --> 00:49:50,160  
is to be on the lookout for the next

1206  
00:49:55,190 --> 00:49:52,880  
doomsday because for sure when this

1207  
00:49:57,270 --> 00:49:55,200  
doomsday is over someone's going to come

1208  
00:49:59,270 --> 00:49:57,280  
up with another date when the world is

1209  
00:50:01,349 --> 00:49:59,280  
going to end and perhaps some of the

1210  
00:50:03,990 --> 00:50:01,359  
tools that we've learned to use for this

1211  
00:50:07,030 --> 00:50:04,000  
particular doomsday will be helpful in

1212  
00:50:10,549 --> 00:50:07,040  
preventing fear about future doomsdays

1213  
00:50:17,349 --> 00:50:13,910

i think i'm going to start my um first

1214

00:50:19,589 --> 00:50:17,359

day of holiday vacation on 21st with uh

1215

00:50:21,829 --> 00:50:19,599

children home from college it's soul's

1216

00:50:25,270 --> 00:50:21,839

day so obviously if it's not snowing

1217

00:50:27,750 --> 00:50:25,280

outside we'll have a bonfire be happy

1218

00:50:30,230 --> 00:50:27,760

eat drink and be merry and i would

1219

00:50:32,549 --> 00:50:30,240

suggest people who are celebrating

1220

00:50:34,710 --> 00:50:32,559

winter solstice and the special holiday

1221

00:50:38,870 --> 00:50:34,720

in whichever hemisphere you are

1222

00:50:40,950 --> 00:50:38,880

uh i think just celebrate it

1223

00:50:43,430 --> 00:50:40,960

well i'm very jealous of lika and mitzi

1224

00:50:45,030 --> 00:50:43,440

for their plans uh i'm having a very

1225

00:50:47,670 --> 00:50:45,040

important review here at nasa

1226

00:50:49,510 --> 00:50:47,680

headquarters on december 21st

1227

00:50:52,069 --> 00:50:49,520

for for a project with the european

1228

00:50:54,309 --> 00:50:52,079

space agency to build a telescope put it

1229

00:50:56,309 --> 00:50:54,319

in space to study dark energy and the

1230

00:50:57,910 --> 00:50:56,319

whole team will be here to uh to have

1231

00:50:59,589 --> 00:50:57,920

the review and get approval for the next

1232

00:51:01,270 --> 00:50:59,599

stage of that project it's like

1233

00:51:03,510 --> 00:51:01,280

superstorm sandy

1234

00:51:06,549 --> 00:51:03,520

the droughts the floods all of these

1235

00:51:09,910 --> 00:51:06,559

things are happening and that is a real

1236

00:51:14,309 --> 00:51:09,920

threat to the earth not a fantasy like

1237

00:51:17,670 --> 00:51:15,589

yeah i'd like to follow up with

1238

00:51:19,829 --> 00:51:17,680

something david just said there's a plot

1239

00:51:22,549 --> 00:51:19,839

on the bulletin board outside at my

1240

00:51:25,430 --> 00:51:22,559

office of the the

1241

00:51:28,390 --> 00:51:25,440

monthly rise in sea level as the ice

1242

00:51:30,950 --> 00:51:28,400

caps in greenland uh disappeared so

1243

00:51:32,790 --> 00:51:30,960

uh global warming is a real issue and

1244

00:51:36,390 --> 00:51:32,800

colleagues make sure that they don't uh

1245

00:51:38,870 --> 00:51:36,400

dismiss this type of disaster prediction

1246

00:51:40,230 --> 00:51:38,880

as something silly and well outside

1247

00:51:42,950 --> 00:51:40,240

their

1248

00:51:44,630 --> 00:51:42,960

area of expertise and something they

1249

00:51:46,390 --> 00:51:44,640

don't have to concern themselves with we

1250

00:51:48,710 --> 00:51:46,400

all have to concern ourselves with what

1251  
00:51:51,510 --> 00:51:48,720  
the public thinks these folks are paying

1252  
00:51:52,950 --> 00:51:51,520  
our salaries they need to know the truth

1253  
00:51:54,150 --> 00:51:52,960  
they need to know where to go for the

1254  
00:51:57,349 --> 00:51:54,160  
absolute

1255  
00:51:59,030 --> 00:51:57,359  
best information be it a nasa site or an

1256  
00:52:00,630 --> 00:51:59,040  
academic site

1257  
00:52:02,630 --> 00:52:00,640  
so we need to

1258  
00:52:05,349 --> 00:52:02,640  
shake our colleagues into action and

1259  
00:52:07,589 --> 00:52:05,359  
make them talk to the public make them

1260  
00:52:09,349 --> 00:52:07,599  
respond the way we have and i'd like to

1261  
00:52:10,870 --> 00:52:09,359  
thank headquarters for putting this on i

1262  
00:52:14,630 --> 00:52:10,880  
think it's a great start

1263  
00:52:16,230 --> 00:52:14,640

and for uh december 21st and 2nd

1264

00:52:17,990 --> 00:52:16,240

if history is any guide i think i'll

1265

00:52:19,109 --> 00:52:18,000

probably be doing last minute shopping

1266

00:52:22,710 --> 00:52:19,119

again and

1267

00:52:24,630 --> 00:52:22,720

running out to get the christmas tree

1268

00:52:26,950 --> 00:52:24,640

great i want to thank our panelists for

1269

00:52:28,630 --> 00:52:26,960

joining us this has been a fantastic and

1270

00:52:30,549 --> 00:52:28,640

lively conversation

1271

00:52:31,670 --> 00:52:30,559

that concludes our 2012 google plus

1272

00:52:32,950 --> 00:52:31,680

hangout

1273

00:52:34,870 --> 00:52:32,960

if your question wasn't answered here

1274

00:52:37,109 --> 00:52:34,880

today uh please visit us on the web or

1275

00:52:39,270 --> 00:52:37,119

on social media and ask away our twitter

1276

00:52:41,470 --> 00:52:39,280

and google plus or on google

1277

00:52:43,589 --> 00:52:41,480

google plus or twitter use the hashtag

1278

00:52:44,710 --> 00:52:43,599

poundasknasa and we'll try to answer

1279

00:52:46,309 --> 00:52:44,720

your question get back to you as soon as

1280

00:52:48,230 --> 00:52:46,319

possible and thanks to everyone for