
OBSERVING
OUR
RISING
SEAS

1
00:00:00,000 --> 00:00:28,830
[Music]

2
00:00:28,840 --> 00:00:33,840
so

3
00:02:09,140 --> 00:01:40,540
[Music]

4
00:02:19,560 --> 00:02:09,150
do

5
00:02:49,840 --> 00:02:20,830
[Music]

6
00:03:30,830 --> 00:02:49,850
so

7
00:04:12,830 --> 00:03:30,840
[Music]

8
00:04:12,840 --> 00:04:18,769
done

9
00:05:18,469 --> 00:04:38,910
[Music]

10
00:05:22,390 --> 00:05:21,670
i see pictures of coastal inundation and

11
00:05:24,790 --> 00:05:22,400
flooding

12
00:05:25,990 --> 00:05:24,800
what might happen in the next hundred

13
00:05:29,510 --> 00:05:26,000

years with

14
00:05:31,590 --> 00:05:29,520
the 200 million plus people who live

15
00:05:33,350 --> 00:05:31,600
in those low-lying coastal areas all

16
00:05:36,550 --> 00:05:33,360
across the globe

17
00:05:37,670 --> 00:05:36,560
my name is barack vase and i do anything

18
00:05:40,790 --> 00:05:37,680
and everything

19
00:05:41,670 --> 00:05:40,800
that's needed to make sentinel 6 project

20
00:05:44,550 --> 00:05:41,680
successful

21
00:05:45,270 --> 00:05:44,560
sentinel 6 is all about water so this is

22
00:06:03,430 --> 00:05:45,280
a

23
00:06:05,830 --> 00:06:03,440
behind this

24
00:06:08,870 --> 00:06:05,840
goes back 30 years i've worked on topex

25
00:06:09,670 --> 00:06:08,880
poseidon jason 1 jason 2 jason 3 and now

26
00:06:12,230 --> 00:06:09,680
sentinel 6.

27
00:06:12,950 --> 00:06:12,240
all of them are the same series of

28
00:06:15,830 --> 00:06:12,960
missions

29
00:06:17,029 --> 00:06:15,840
it's a great feeling of satisfaction i

30
00:06:19,909 --> 00:06:17,039
had aspirations

31
00:06:20,790 --> 00:06:19,919
right from childhood that somehow work

32
00:06:23,749 --> 00:06:20,800
in the space

33
00:06:24,629 --> 00:06:23,759
industry i knew that i wanted to work in

34
00:06:27,270 --> 00:06:24,639
something that made

35
00:06:28,950 --> 00:06:27,280
a difference this is the room where we

36
00:06:30,230 --> 00:06:28,960
developed integrated tested the sentinel

37
00:06:32,390 --> 00:06:30,240
6 instruments and then

38
00:06:33,990 --> 00:06:32,400

right here is where we packed it up also

39
00:06:36,870 --> 00:06:34,000
before we shipped it to germany

40
00:06:38,309 --> 00:06:36,880
seeing that come to fruition is a

41
00:06:40,870 --> 00:06:38,319
personal satisfaction

42
00:06:42,950 --> 00:06:40,880
and an emotional satisfaction the

43
00:06:43,830 --> 00:06:42,960
importance of this project and where it

44
00:06:46,830 --> 00:06:43,840
touches

45
00:06:49,470 --> 00:06:46,840
is on all walks of life all across the

46
00:06:54,710 --> 00:06:49,480
world

47
00:06:59,589 --> 00:06:57,749
welcome everyone i'm marina with nasa's

48
00:07:02,469 --> 00:06:59,599
jet propulsion laboratory

49
00:07:04,790 --> 00:07:02,479
in southern california you may know nasa

50
00:07:07,270 --> 00:07:04,800
best for exploring other planets

51
00:07:09,029 --> 00:07:07,280
but we are also keeping a close eye on

52
00:07:11,589 --> 00:07:09,039
our own planet earth

53
00:07:13,990 --> 00:07:11,599
nasa is about to launch the u.s and

54
00:07:14,790 --> 00:07:14,000
european sentinel 6 michael freilix

55
00:07:17,830 --> 00:07:14,800
satellite

56
00:07:20,790 --> 00:07:17,840
accurate data

57
00:07:21,430 --> 00:07:20,800
yet on sea level and how it changes over

58
00:07:23,830 --> 00:07:21,440
time

59
00:07:25,749 --> 00:07:23,840
jpl manages the sentinel 6 michael

60
00:07:28,629 --> 00:07:25,759
freilick mission for nasa

61
00:07:30,390 --> 00:07:28,639
program manager perroc vase is not only

62
00:07:33,350 --> 00:07:30,400
in charge of the sentinel 6

63
00:07:35,029 --> 00:07:33,360

satellite operations here at nasa jpl he

64
00:07:37,749 --> 00:07:35,039
has spent his entire

65
00:07:38,870 --> 00:07:37,759
30-year career studying the earth's

66
00:07:40,790 --> 00:07:38,880
rising ocean

67
00:07:42,629 --> 00:07:40,800
and is excited for this satellite to

68
00:07:45,110 --> 00:07:42,639
continue that legacy

69
00:07:46,309 --> 00:07:45,120
he joins us live today to answer some of

70
00:07:47,830 --> 00:07:46,319
your questions

71
00:07:49,670 --> 00:07:47,840
if you have any questions you'd like to

72
00:07:50,309 --> 00:07:49,680
ask you can leave them right here in the

73
00:07:52,309 --> 00:07:50,319
comments

74
00:07:54,550 --> 00:07:52,319
or post them to social media with the

75
00:07:58,469 --> 00:07:54,560
hashtag seeingthesees

76
00:08:01,350 --> 00:07:58,479
thanks so much for joining us today frog

77
00:08:02,390 --> 00:08:01,360
thank you i'm really happy to be here

78
00:08:06,390 --> 00:08:02,400
and um

79
00:08:08,550 --> 00:08:06,400
would love to to talk with everybody and

80
00:08:10,230 --> 00:08:08,560
give some feedback on on what it's been

81
00:08:12,710 --> 00:08:10,240
like to to work on these missions and

82
00:08:14,710 --> 00:08:12,720
especially looking forward to the launch

83
00:08:17,189 --> 00:08:14,720
of sentinel 6.

84
00:08:18,390 --> 00:08:17,199
we all are can't wait until november

85
00:08:19,749 --> 00:08:18,400
10th now perrag

86
00:08:22,070 --> 00:08:19,759
i know you've been involved with the

87
00:08:22,629 --> 00:08:22,080
mission studying sea level for 30 years

88
00:08:24,550 --> 00:08:22,639

now

89
00:08:27,110 --> 00:08:24,560
why is it so important to have this

90
00:08:29,749 --> 00:08:27,120
consistent and continuous record of sea

91
00:08:32,389 --> 00:08:29,759
level changes

92
00:08:34,070 --> 00:08:32,399
yeah it's really really important to

93
00:08:36,949 --> 00:08:34,080
know what's happening

94
00:08:37,589 --> 00:08:36,959
uh you know all the time because even

95
00:08:39,589 --> 00:08:37,599
though

96
00:08:41,829 --> 00:08:39,599
we know the oceans are changing they're

97
00:08:43,430 --> 00:08:41,839
changing slowly but they are changing

98
00:08:45,430 --> 00:08:43,440
and rising but

99
00:08:47,910 --> 00:08:45,440
things are going up and down and those

100
00:08:49,829 --> 00:08:47,920
ups and downs as it's rising

101
00:08:50,949 --> 00:08:49,839
is very very important because it tells

102
00:08:53,030 --> 00:08:50,959
us what's

103
00:08:56,790 --> 00:08:53,040
also happening in other parts of the

104
00:08:59,750 --> 00:08:56,800
world including what's happening across

105
00:09:00,630 --> 00:08:59,760
ice sheets or other terrestrial surfaces

106
00:09:02,870 --> 00:09:00,640
so

107
00:09:03,829 --> 00:09:02,880
really understanding and monitoring

108
00:09:06,829 --> 00:09:03,839
closely

109
00:09:08,630 --> 00:09:06,839
that trend continuously is very

110
00:09:11,430 --> 00:09:08,640
important

111
00:09:11,910 --> 00:09:11,440
and what's great is sentinel 6 it will

112
00:09:13,590 --> 00:09:11,920
be

113
00:09:15,990 --> 00:09:13,600

offering us another 10 years of

114
00:09:17,430 --> 00:09:16,000
observations so that's incredible

115
00:09:18,790 --> 00:09:17,440
tell me a little bit about what you

116
00:09:21,430 --> 00:09:18,800
think the neatest thing about this

117
00:09:23,829 --> 00:09:21,440
spacecraft is

118
00:09:24,630 --> 00:09:23,839
yeah so i think um first of all it's

119
00:09:26,870 --> 00:09:24,640
it's uh

120
00:09:28,949 --> 00:09:26,880
sort of the genesis of of the of the

121
00:09:29,829 --> 00:09:28,959
spacecraft itself it's really the story

122
00:09:32,550 --> 00:09:29,839
behind

123
00:09:34,630 --> 00:09:32,560
uh the building of it and um building

124
00:09:37,269 --> 00:09:34,640
first that partnership um

125
00:09:38,550 --> 00:09:37,279
with with isa and the european space

126
00:09:41,190 --> 00:09:38,560
agency you met said

127
00:09:42,389 --> 00:09:41,200
others uh to build this uh this

128
00:09:45,350 --> 00:09:42,399
continuity mission

129
00:09:45,670 --> 00:09:45,360
um is a challenge itself but uh you know

130
00:09:48,310 --> 00:09:45,680
the

131
00:09:49,430 --> 00:09:48,320
engineering that's gone behind uh

132
00:09:51,590 --> 00:09:49,440
building this

133
00:09:53,590 --> 00:09:51,600
and really looking at what's happening

134
00:09:54,389 --> 00:09:53,600
uh to to maintain these precise

135
00:09:56,150 --> 00:09:54,399
measurements

136
00:09:57,990 --> 00:09:56,160
and to do it better uh you know on

137
00:10:00,630 --> 00:09:58,000
sentinel six we want to continue it

138
00:10:02,470 --> 00:10:00,640

and do it better get get uh better uh

139
00:10:04,790 --> 00:10:02,480
resolution better accuracies

140
00:10:06,470 --> 00:10:04,800
and and much more uh close uh

141
00:10:07,430 --> 00:10:06,480
observations of what's happening on the

142
00:10:09,269 --> 00:10:07,440
coast so

143
00:10:10,550 --> 00:10:09,279
really understanding um you know what it

144
00:10:12,630 --> 00:10:10,560
takes to build

145
00:10:13,750 --> 00:10:12,640
such a system and really make it

146
00:10:16,389 --> 00:10:13,760
operational

147
00:10:17,509 --> 00:10:16,399
uh so that we can have data out there is

148
00:10:19,590 --> 00:10:17,519
is extremely

149
00:10:22,150 --> 00:10:19,600
challenging and extremely exciting and

150
00:10:24,150 --> 00:10:22,160
fulfilling

151
00:10:26,310 --> 00:10:24,160
what has it meant for you personally to

152
00:10:29,269 --> 00:10:26,320
have been on this journey now for

153
00:10:30,949 --> 00:10:29,279
30 years with this legacy of satellites

154
00:10:34,550 --> 00:10:30,959
basically your entire career

155
00:10:36,870 --> 00:10:34,560
did you think this is where you would be

156
00:10:38,470 --> 00:10:36,880
yeah i did not think uh this is where i

157
00:10:41,590 --> 00:10:38,480
would be i knew that um

158
00:10:43,990 --> 00:10:41,600
i was excited to work at

159
00:10:45,030 --> 00:10:44,000
the original contractor uh fairchild

160
00:10:48,069 --> 00:10:45,040
space which which

161
00:10:49,670 --> 00:10:48,079
uh built topex poseidon but

162
00:10:51,350 --> 00:10:49,680
you know as i was working on it i really

163
00:10:53,750 --> 00:10:51,360

didn't understand uh

164
00:10:54,790 --> 00:10:53,760
you know how uh how this was going to

165
00:10:56,310 --> 00:10:54,800
make a difference and

166
00:10:59,030 --> 00:10:56,320
as i continued working on it and

167
00:10:59,670 --> 00:10:59,040
particularly as i came to jpl to support

168
00:11:01,829 --> 00:10:59,680
that

169
00:11:03,030 --> 00:11:01,839
i i think i got a much better picture of

170
00:11:05,430 --> 00:11:03,040
the whole picture

171
00:11:06,389 --> 00:11:05,440
and got to work with uh you know all of

172
00:11:09,030 --> 00:11:06,399
the people

173
00:11:09,670 --> 00:11:09,040
that it takes to make this whole

174
00:11:11,990 --> 00:11:09,680
measurement

175
00:11:13,030 --> 00:11:12,000
um fulfilling including the end users

176
00:11:15,350 --> 00:11:13,040
scientists

177
00:11:16,230 --> 00:11:15,360
and and and understanding that really

178
00:11:19,350 --> 00:11:16,240
made it

179
00:11:20,550 --> 00:11:19,360
um a passion of mine to not only build

180
00:11:23,269 --> 00:11:20,560
these kinds of uh

181
00:11:24,230 --> 00:11:23,279
of missions uh but really be able to see

182
00:11:27,350 --> 00:11:24,240
them succeed

183
00:11:29,910 --> 00:11:27,360
and deliver and um you know uh

184
00:11:31,269 --> 00:11:29,920
help uh what's going to be happening uh

185
00:11:33,990 --> 00:11:31,279
in in understanding

186
00:11:35,190 --> 00:11:34,000
uh the future of our planet so it's that

187
00:11:37,110 --> 00:11:35,200
really has uh

188
00:11:38,870 --> 00:11:37,120

been my passion in bringing these

189
00:11:42,069 --> 00:11:38,880
missions and continuing them

190
00:11:43,670 --> 00:11:42,079
uh for the future

191
00:11:45,269 --> 00:11:43,680
that's so wonderful prague and i know

192
00:11:47,030 --> 00:11:45,279
when we've had our conversations before

193
00:11:47,910 --> 00:11:47,040
you told me that there's this global

194
00:11:50,310 --> 00:11:47,920
community

195
00:11:54,069 --> 00:11:50,320
that uses the data from this satellite

196
00:11:56,230 --> 00:11:54,079
and it impacts each and every one of us

197
00:11:58,550 --> 00:11:56,240
yeah we've been um we've been fortunate

198
00:12:00,550 --> 00:11:58,560
to to be able to to work uh particularly

199
00:12:03,750 --> 00:12:00,560
as i've i've done for the last uh

200
00:12:05,509 --> 00:12:03,760
uh 20 to 30 years that uh you know as i

201
00:12:06,550 --> 00:12:05,519
not only meet the scientists i actually

202
00:12:09,509 --> 00:12:06,560
meet people

203
00:12:10,150 --> 00:12:09,519
who are using uh the data or i meet

204
00:12:13,269 --> 00:12:10,160
people

205
00:12:15,110 --> 00:12:13,279
at different agencies who are are using

206
00:12:17,590 --> 00:12:15,120
the data in ways that i never

207
00:12:18,389 --> 00:12:17,600
imagined we always talk about sea level

208
00:12:20,629 --> 00:12:18,399
but

209
00:12:23,509 --> 00:12:20,639
you know people come up to me as we're

210
00:12:26,790 --> 00:12:23,519
doing open houses or as we're

211
00:12:27,509 --> 00:12:26,800
talking to other agencies and they say

212
00:12:29,430 --> 00:12:27,519
hey

213
00:12:30,550 --> 00:12:29,440

i'm using the data that you're you're

214
00:12:33,590 --> 00:12:30,560
supplying

215
00:12:36,710 --> 00:12:33,600
and i'm using it you know as i'm

216
00:12:38,069 --> 00:12:36,720
planning my my fishing trips or

217
00:12:40,150 --> 00:12:38,079
companies tell us you know they're

218
00:12:41,590 --> 00:12:40,160
they're using it uh to plan

219
00:12:43,110 --> 00:12:41,600
um you know how they're gonna be

220
00:12:43,750 --> 00:12:43,120
managing their fisheries and other

221
00:12:48,150 --> 00:12:43,760
things

222
00:12:51,110 --> 00:12:48,160
um so it's it's amazing the kinds of

223
00:12:51,990 --> 00:12:51,120
applications and the applications

224
00:12:54,629 --> 00:12:52,000
throughout the world

225
00:12:55,910 --> 00:12:54,639
i i haven't i've seen every corner of

226
00:12:59,269 --> 00:12:55,920
the world

227
00:13:01,110 --> 00:12:59,279
right from australia vietnam you know

228
00:13:01,990 --> 00:13:01,120
rich countries poor countries it doesn't

229
00:13:04,310 --> 00:13:02,000
matter

230
00:13:06,069 --> 00:13:04,320
people are interested in using this data

231
00:13:10,310 --> 00:13:06,079
especially since our goal is to make

232
00:13:12,949 --> 00:13:10,320
it uh free and accessible to everybody

233
00:13:14,710 --> 00:13:12,959
that's so amazing and it's so impactful

234
00:13:16,389 --> 00:13:14,720
to each and every one of us well let's

235
00:13:17,670 --> 00:13:16,399
get over to the social media questions

236
00:13:20,710 --> 00:13:17,680
now parag

237
00:13:23,829 --> 00:13:20,720
nerdless on twitter asks it seems to me

238
00:13:26,949 --> 00:13:23,839

that the accuracy of a few centimeters

239
00:13:28,069 --> 00:13:26,959
that sentinel-6 is capable of will not

240
00:13:30,310 --> 00:13:28,079
be able to detect

241
00:13:32,710 --> 00:13:30,320
millimeter changes over its five-year

242
00:13:38,790 --> 00:13:36,230
yeah so um it you know we're not taking

243
00:13:39,670 --> 00:13:38,800
one direct measurement um i mean a lot

244
00:13:41,829 --> 00:13:39,680
of this

245
00:13:43,750 --> 00:13:41,839
uh these measurements that we're doing

246
00:13:46,150 --> 00:13:43,760
are are taken continuously

247
00:13:47,670 --> 00:13:46,160
and uh you know scientists are really

248
00:13:51,189 --> 00:13:47,680
looking at

249
00:13:53,590 --> 00:13:51,199
trends so

250
00:13:54,550 --> 00:13:53,600
those sorts of trends with those sorts

251
00:13:58,230 --> 00:13:54,560
of algorithms and

252
00:14:00,150 --> 00:13:58,240
averaging and analysis sometimes we even

253
00:14:02,310 --> 00:14:00,160
improve the algorithms that we are

254
00:14:03,350 --> 00:14:02,320
applying as we're learning um you know

255
00:14:04,790 --> 00:14:03,360
the behavior

256
00:14:06,389 --> 00:14:04,800
of our of our instruments and

257
00:14:08,629 --> 00:14:06,399
measurements and we come back and

258
00:14:09,509 --> 00:14:08,639
reprocess that data so as we look at the

259
00:14:12,230 --> 00:14:09,519
data

260
00:14:12,550 --> 00:14:12,240
uh you know not on a snapshot of what we

261
00:14:15,269 --> 00:14:12,560
took

262
00:14:16,069 --> 00:14:15,279
but uh you know months if sometimes even

263
00:14:18,790 --> 00:14:16,079

years of

264
00:14:20,069 --> 00:14:18,800
of data we are able to really look at

265
00:14:22,629 --> 00:14:20,079
millimeter types

266
00:14:24,310 --> 00:14:22,639
you know sort of uh trends which is

267
00:14:26,150 --> 00:14:24,320
really what uh

268
00:14:28,790 --> 00:14:26,160
uh you know drives our ability to

269
00:14:31,590 --> 00:14:28,800
understand uh things like acceleration

270
00:14:33,670 --> 00:14:31,600
uh not only how much it's uh uh it's

271
00:14:35,750 --> 00:14:33,680
grown but how how quickly it's growing

272
00:14:37,910 --> 00:14:35,760
which which can be in in millimeter type

273
00:14:39,829 --> 00:14:37,920
scales

274
00:14:42,230 --> 00:14:39,839
and then letting us know how we need to

275
00:14:45,110 --> 00:14:42,240
react brandon on twitter asks

276
00:14:48,310 --> 00:14:45,120
what will it be seeing when orbiting

277
00:14:52,629 --> 00:14:50,629
yeah so um you know we are uh we're

278
00:14:56,230 --> 00:14:52,639
running the instrument in the satellite

279
00:14:58,150 --> 00:14:56,240
all the time including over land um

280
00:14:59,990 --> 00:14:58,160
but uh you know one of the things we

281
00:15:01,430 --> 00:15:00,000
have been improving over time of course

282
00:15:02,710 --> 00:15:01,440
we want to measure what's happening in

283
00:15:04,870 --> 00:15:02,720
our open oceans

284
00:15:06,310 --> 00:15:04,880
but uh this same kind of technique also

285
00:15:10,069 --> 00:15:06,320
gives us data

286
00:15:10,629 --> 00:15:10,079
as we fly over uh other uh water bodies

287
00:15:12,629 --> 00:15:10,639
you know

288
00:15:13,670 --> 00:15:12,639

particularly large rivers lakes

289
00:15:16,790 --> 00:15:13,680
reservoirs

290
00:15:18,629 --> 00:15:16,800
uh and as time has gone on uh you know

291
00:15:20,710 --> 00:15:18,639
our teams have put together

292
00:15:22,790 --> 00:15:20,720
uh algorithms to really be able to

293
00:15:25,590 --> 00:15:22,800
understand those returns

294
00:15:27,110 --> 00:15:25,600
uh and also be able to to provide some

295
00:15:30,629 --> 00:15:27,120
measurements of what's happening

296
00:15:33,870 --> 00:15:33,269
and bonita on facebook asks do you have

297
00:15:36,949 --> 00:15:33,880
certain

298
00:15:37,590 --> 00:15:36,959
expectations from ground research which

299
00:15:39,829 --> 00:15:37,600
you hope

300
00:15:42,550 --> 00:15:39,839
to be confirmed with data from the

301
00:15:47,030 --> 00:15:45,749
yeah so i think um you know uh getting

302
00:15:48,550 --> 00:15:47,040
these kinds of measurements somebody

303
00:15:50,710 --> 00:15:48,560
else was asking you know how do we

304
00:15:52,470 --> 00:15:50,720
look at uh centimetric or even

305
00:15:55,670 --> 00:15:52,480
millimeter types of

306
00:15:56,389 --> 00:15:55,680
scales and and part of that of course is

307
00:15:59,030 --> 00:15:56,399
um

308
00:16:00,230 --> 00:15:59,040
uh is what we're doing on the ground on

309
00:16:03,350 --> 00:16:00,240
on being able to

310
00:16:05,269 --> 00:16:03,360
to calibrate and validate it uh the data

311
00:16:08,310 --> 00:16:05,279
there's a calibration function

312
00:16:09,590 --> 00:16:08,320
uh where we might have specific features

313
00:16:13,030 --> 00:16:09,600

or targets that we

314
00:16:15,110 --> 00:16:13,040
we set up to be able to uh understand

315
00:16:17,430 --> 00:16:15,120
and calibrate exactly how

316
00:16:18,710 --> 00:16:17,440
good and and correctly we're making

317
00:16:19,910 --> 00:16:18,720
these measurements and then we have

318
00:16:22,150 --> 00:16:19,920
other campaigns

319
00:16:23,110 --> 00:16:22,160
where we're looking at validating that

320
00:16:25,590 --> 00:16:23,120
data we're using

321
00:16:27,749 --> 00:16:25,600
all kinds of uh you know ground-based or

322
00:16:31,350 --> 00:16:27,759
in-situ techniques right from

323
00:16:34,470 --> 00:16:31,360
ships to underwater gliders

324
00:16:35,749 --> 00:16:34,480
to moorings to all sorts of

325
00:16:37,350 --> 00:16:35,759
measurements and we're also taking

326
00:16:39,110 --> 00:16:37,360
measurements and looking at uh

327
00:16:41,030 --> 00:16:39,120
measurements from other satellites

328
00:16:43,350 --> 00:16:41,040
and combining all of these together we

329
00:16:46,870 --> 00:16:43,360
have a large science team who

330
00:16:50,230 --> 00:16:46,880
really helps uh to look at all this data

331
00:16:51,269 --> 00:16:50,240
combine it analyze it and and ultimately

332
00:16:53,030 --> 00:16:51,279
validate it

333
00:16:55,749 --> 00:16:53,040
so that we're uh we're able to really

334
00:16:57,430 --> 00:16:55,759
rely and and trust this uh

335
00:17:00,150 --> 00:16:57,440
this measurement and and the products

336
00:17:02,870 --> 00:17:00,160
that we're putting out

337
00:17:04,549 --> 00:17:02,880
and i think it's really fascinating how

338
00:17:07,350 --> 00:17:04,559

the altimeter works

339
00:17:07,909 --> 00:17:07,360
and stella c who's a fourth grader hey

340
00:17:10,710 --> 00:17:07,919
stella

341
00:17:11,270 --> 00:17:10,720
wants to know on youtube how can you

342
00:17:15,029 --> 00:17:11,280
measure

343
00:17:20,789 --> 00:17:18,069
yeah so um so stella is really great uh

344
00:17:21,189 --> 00:17:20,799
to hear you ask that question because um

345
00:17:27,270 --> 00:17:21,199
it's

346
00:17:28,390 --> 00:17:27,280
simple technique in in in principle

347
00:17:30,870 --> 00:17:28,400
because um

348
00:17:32,070 --> 00:17:30,880
really what we're doing um just like uh

349
00:17:34,070 --> 00:17:32,080
if you had your

350
00:17:36,070 --> 00:17:34,080
your cell phone or anything else that's

351
00:17:39,110 --> 00:17:36,080
uh really working wirelessly

352
00:17:40,230 --> 00:17:39,120
we're transmitting a basically a radio

353
00:17:43,510 --> 00:17:40,240
signal

354
00:17:45,750 --> 00:17:43,520
from space and just like you you might

355
00:17:47,750 --> 00:17:45,760
receive a signal back again on your

356
00:17:48,789 --> 00:17:47,760
radio and maybe now on on the internet

357
00:17:51,350 --> 00:17:48,799
or other ways

358
00:17:53,669 --> 00:17:51,360
um we're really trying to measure uh

359
00:17:56,870 --> 00:17:53,679
once that signal bounces off

360
00:17:57,270 --> 00:17:56,880
a surface like the ocean uh how long it

361
00:18:00,470 --> 00:17:57,280
takes

362
00:18:02,310 --> 00:18:00,480
to to receive that now you can do that

363
00:18:04,150 --> 00:18:02,320

very very simply and get a crude

364
00:18:07,510 --> 00:18:04,160
measurement but we are trying to do it

365
00:18:08,230 --> 00:18:07,520
very very precisely uh so we're we're

366
00:18:10,950 --> 00:18:08,240
trying to

367
00:18:12,070 --> 00:18:10,960
to basically use that same technique and

368
00:18:15,430 --> 00:18:12,080
really analyze

369
00:18:17,270 --> 00:18:15,440
closely how that signal is being

370
00:18:20,789 --> 00:18:17,280
reflected how long it takes

371
00:18:23,270 --> 00:18:20,799
and what it looks like and and with that

372
00:18:23,830 --> 00:18:23,280
basic principle we're able to make this

373
00:18:25,830 --> 00:18:23,840
measurement

374
00:18:26,870 --> 00:18:25,840
and and of course we've improved that

375
00:18:28,950 --> 00:18:26,880
over time

376
00:18:30,070 --> 00:18:28,960
not just in the last 30 years but things

377
00:18:33,990 --> 00:18:30,080
have been

378
00:18:37,510 --> 00:18:35,990
and going back to what you touched on

379
00:18:40,070 --> 00:18:37,520
just a little bit ago prague

380
00:18:42,070 --> 00:18:40,080
when it comes to this global community

381
00:18:42,390 --> 00:18:42,080
that you'd like to offer this data up

382
00:18:45,830 --> 00:18:42,400
for

383
00:18:48,150 --> 00:18:45,840
peter on youtube remarks what are some

384
00:18:50,870 --> 00:18:48,160
of the future applications you hope for

385
00:18:54,230 --> 00:18:50,880
with this data

386
00:18:56,310 --> 00:18:54,240
yeah so um let me uh before i answer

387
00:18:58,150 --> 00:18:56,320
exactly that question

388
00:18:59,830 --> 00:18:58,160

somebody asked me a while back you know

389
00:19:02,710 --> 00:18:59,840
what was the most

390
00:19:03,510 --> 00:19:02,720
unique and unexpected application of of

391
00:19:06,070 --> 00:19:03,520
this data

392
00:19:07,110 --> 00:19:06,080
and a few years ago i think everybody

393
00:19:11,110 --> 00:19:07,120
knows

394
00:19:12,950 --> 00:19:11,120
about the mh370 um disappearance of of

395
00:19:16,549 --> 00:19:12,960
the malaysian airlines uh

396
00:19:18,470 --> 00:19:16,559
uh jet and i was amazed to see

397
00:19:20,310 --> 00:19:18,480
how much um you know the australian

398
00:19:23,350 --> 00:19:20,320
agencies uh which we

399
00:19:25,909 --> 00:19:23,360
work with as one of our users

400
00:19:27,990 --> 00:19:25,919
uh had used this data to really map out

401
00:19:30,070 --> 00:19:28,000
what's happening with the ocean

402
00:19:31,190 --> 00:19:30,080
and applying it to even that mystery i

403
00:19:33,669 --> 00:19:31,200
hope one day

404
00:19:34,390 --> 00:19:33,679
they totally solved that mystery but uh

405
00:19:38,070 --> 00:19:34,400
you know there's

406
00:19:40,470 --> 00:19:38,080
applications i was talking to another uh

407
00:19:41,510 --> 00:19:40,480
representative of an ngo who was telling

408
00:19:44,630 --> 00:19:41,520
me hey

409
00:19:45,669 --> 00:19:44,640
um waterborne disease is is a big thing

410
00:19:49,990 --> 00:19:45,679
that they're working on

411
00:19:52,789 --> 00:19:50,000
and they love to help the the world uh

412
00:19:55,110 --> 00:19:52,799
community on that and understanding how

413
00:19:57,350 --> 00:19:55,120

water moves how it changes

414
00:19:58,630 --> 00:19:57,360
i never imagined that that's one of the

415
00:20:01,510 --> 00:19:58,640
things that

416
00:20:03,270 --> 00:20:01,520
could be helpful to that community to

417
00:20:06,710 --> 00:20:03,280
understand for example how

418
00:20:07,990 --> 00:20:06,720
waterborne disease spreads changes and

419
00:20:09,510 --> 00:20:08,000
changes over time

420
00:20:11,029 --> 00:20:09,520
and maybe again it's something that

421
00:20:13,990 --> 00:20:11,039
could be used to

422
00:20:17,510 --> 00:20:14,000
improve even in those areas which i

423
00:20:22,029 --> 00:20:20,549
yes now shea on facebook asks could you

424
00:20:23,750 --> 00:20:22,039
talk a little bit about your

425
00:20:26,149 --> 00:20:23,760
pre-industry life

426
00:20:28,470 --> 00:20:26,159
for example how did you end up with such

427
00:20:32,390 --> 00:20:28,480
an exciting job

428
00:20:33,190 --> 00:20:32,400
yeah so um i i would say my personal

429
00:20:35,350 --> 00:20:33,200
experience is

430
00:20:36,310 --> 00:20:35,360
um you know the small small events you

431
00:20:39,669 --> 00:20:36,320
know make uh

432
00:20:41,510 --> 00:20:39,679
make big changes um i uh i did have a

433
00:20:44,149 --> 00:20:41,520
fascination with uh

434
00:20:45,270 --> 00:20:44,159
working in this uh in this area but i

435
00:20:47,270 --> 00:20:45,280
didn't have uh

436
00:20:48,789 --> 00:20:47,280
you know a 20-year plan that i had

437
00:20:51,909 --> 00:20:48,799
planned right from uh

438
00:20:53,750 --> 00:20:51,919

from uh university but uh i i knew

439
00:20:56,950 --> 00:20:53,760
people who worked in this industry

440
00:20:58,149 --> 00:20:56,960
and particularly um at that time i was

441
00:20:59,110 --> 00:20:58,159
fascinated with

442
00:21:01,510 --> 00:20:59,120
satellite and satellite

443
00:21:02,710 --> 00:21:01,520
telecommunications so i actually first

444
00:21:05,750 --> 00:21:02,720
started working

445
00:21:08,230 --> 00:21:05,760
uh very very briefly uh in in the

446
00:21:10,549 --> 00:21:08,240
satellite telecommunications industry

447
00:21:11,990 --> 00:21:10,559
and and learned a bit more about how uh

448
00:21:14,710 --> 00:21:12,000
things work

449
00:21:16,310 --> 00:21:14,720
but then i was fortunate uh maybe

450
00:21:19,029 --> 00:21:16,320
through a life circumstance because

451
00:21:20,149 --> 00:21:19,039
actually our company uh was was bought

452
00:21:21,750 --> 00:21:20,159
out and merged

453
00:21:24,149 --> 00:21:21,760
and and i was looking for better

454
00:21:26,710 --> 00:21:24,159
opportunities and i was really lucky to

455
00:21:28,870 --> 00:21:26,720
be able to find one um at fairchild

456
00:21:30,149 --> 00:21:28,880
uh but the second part is really again

457
00:21:34,549 --> 00:21:30,159
in

458
00:21:36,630 --> 00:21:34,559
be able to work with people who

459
00:21:37,750 --> 00:21:36,640
really mentored me and and guided me

460
00:21:40,950 --> 00:21:37,760
along the way

461
00:21:43,270 --> 00:21:40,960
uh so i think uh that effort and

462
00:21:47,350 --> 00:21:43,280
perseverance and persistence

463
00:21:49,669 --> 00:21:47,360

does pay off in one form or another

464
00:21:51,430 --> 00:21:49,679
and speaking of that guidance parag you

465
00:21:53,590 --> 00:21:51,440
were friends with the late dr michael

466
00:21:56,710 --> 00:21:53,600
freilich whom this satellite is

467
00:21:58,230 --> 00:21:56,720
named for that was a really incredible

468
00:22:01,270 --> 00:21:58,240
day then we all found out that it was

469
00:22:03,190 --> 00:22:01,280
going to be named after him

470
00:22:04,950 --> 00:22:03,200
yeah it's um it was definitely an

471
00:22:06,710 --> 00:22:04,960
incredible day and um

472
00:22:08,789 --> 00:22:06,720
you know one of the most deserving

473
00:22:12,070 --> 00:22:08,799
people that i would thank for this honor

474
00:22:14,230 --> 00:22:12,080
um he was i certainly worked with

475
00:22:16,950 --> 00:22:14,240
him over the course of many years um he

476
00:22:19,190 --> 00:22:16,960
has some history even at jpl even before

477
00:22:21,350 --> 00:22:19,200
uh some of the the altimetry projects

478
00:22:25,430 --> 00:22:21,360
but uh you know mike had

479
00:22:26,390 --> 00:22:25,440
um he led by example uh so i i think you

480
00:22:30,310 --> 00:22:26,400
know my

481
00:22:30,630 --> 00:22:30,320
most um uh memories in terms of getting

482
00:22:33,830 --> 00:22:30,640
uh

483
00:22:34,870 --> 00:22:33,840
personal advice um was really by by

484
00:22:37,909 --> 00:22:34,880
example

485
00:22:40,710 --> 00:22:37,919
and uh and guidance as we went through

486
00:22:42,470 --> 00:22:40,720
working um you know on these missions

487
00:22:44,950 --> 00:22:42,480
things don't always go

488
00:22:46,549 --> 00:22:44,960

uh smoothly and and things don't always

489
00:22:50,470 --> 00:22:46,559
go exactly to plan

490
00:22:53,510 --> 00:22:50,480
uh you know he was always um very um

491
00:22:56,230 --> 00:22:53,520
uh you know systematic at looking at

492
00:22:57,990 --> 00:22:56,240
whatever our challenge might be and um

493
00:23:00,630 --> 00:22:58,000
and and being part of the team

494
00:23:02,230 --> 00:23:00,640
to help us solve it um and and really

495
00:23:05,430 --> 00:23:02,240
that was an inspiration

496
00:23:07,029 --> 00:23:05,440
uh not only uh in terms of building and

497
00:23:07,990 --> 00:23:07,039
and promoting these programs for the

498
00:23:10,950 --> 00:23:08,000
future but

499
00:23:11,990 --> 00:23:10,960
really motivating the the uh the teams

500
00:23:15,190 --> 00:23:12,000
that are behind it

501
00:23:18,870 --> 00:23:15,200
um by by example mike was definitely a

502
00:23:22,230 --> 00:23:18,880
a a very um great spirit

503
00:23:25,909 --> 00:23:22,240
in terms of conveying that

504
00:23:28,070 --> 00:23:25,919
samiksha on facebook asks what are major

505
00:23:28,549 --> 00:23:28,080
observations that you would like to

506
00:23:31,029 --> 00:23:28,559
share

507
00:23:31,990 --> 00:23:31,039
when you started working on satellites

508
00:23:35,190 --> 00:23:32,000
then

509
00:23:40,549 --> 00:23:38,230
yeah i i think um you know uh

510
00:23:42,310 --> 00:23:40,559
the the satellite industry and the and

511
00:23:44,470 --> 00:23:42,320
satellite technology existed

512
00:23:45,510 --> 00:23:44,480
of course 30 years back um so that that

513
00:23:48,870 --> 00:23:45,520

wasn't very

514
00:23:50,470 --> 00:23:48,880
new um but uh some of the technology

515
00:23:52,630 --> 00:23:50,480
definitely is is things that have

516
00:23:56,230 --> 00:23:52,640
changed well over time

517
00:23:57,750 --> 00:23:56,240
um i think uh uh you know when i when i

518
00:23:58,390 --> 00:23:57,760
started working on topex one of the

519
00:24:00,549 --> 00:23:58,400
things i

520
00:24:03,350 --> 00:24:00,559
i worked on was the actual flight

521
00:24:06,470 --> 00:24:03,360
software uh on the topex satellite

522
00:24:08,870 --> 00:24:06,480
and um we did that all in in in the

523
00:24:10,630 --> 00:24:08,880
lowest form of computer programming that

524
00:24:12,149 --> 00:24:10,640
uh you know one could think of probably

525
00:24:14,230 --> 00:24:12,159
at that time in assembly language

526
00:24:18,070 --> 00:24:14,240
literally zeros and ones almost

527
00:24:22,549 --> 00:24:18,080
um and uh so that was a very unique but

528
00:24:24,870 --> 00:24:22,559
a very um uh much uh

529
00:24:26,070 --> 00:24:24,880
unstructured way of of doing things

530
00:24:27,590 --> 00:24:26,080
where we basically

531
00:24:30,470 --> 00:24:27,600
engineered things found the right

532
00:24:32,789 --> 00:24:30,480
solution but but didn't necessarily have

533
00:24:34,230 --> 00:24:32,799
let's say tried and true processes now

534
00:24:36,230 --> 00:24:34,240
as time has gone on

535
00:24:38,230 --> 00:24:36,240
uh you know the tools technology has

536
00:24:41,510 --> 00:24:38,240
grown but also the processes

537
00:24:43,909 --> 00:24:41,520
have grown and the processes being

538
00:24:44,789 --> 00:24:43,919

more standardized even with our

539
00:24:47,830 --> 00:24:44,799
international

540
00:24:50,950 --> 00:24:47,840
partners is something that really didn't

541
00:24:52,470 --> 00:24:50,960
exist at least that i remember but has

542
00:24:53,909 --> 00:24:52,480
really come a long way

543
00:24:56,149 --> 00:24:53,919
so that's one of the things that

544
00:24:57,510 --> 00:24:56,159
actually enables us to work with

545
00:24:59,590 --> 00:24:57,520
industrial partners but also

546
00:24:59,990 --> 00:24:59,600
international partners because we we

547
00:25:03,190 --> 00:25:00,000
apply

548
00:25:07,029 --> 00:25:03,200
a lot of standards um that we've all

549
00:25:10,149 --> 00:25:07,039
learned and prague this is the first

550
00:25:13,750 --> 00:25:10,159
nasa european space agency earth

551
00:25:15,350 --> 00:25:13,760
mission that's joint am i correct

552
00:25:17,110 --> 00:25:15,360
um you know of course nasa's been

553
00:25:18,549 --> 00:25:17,120
working with the european space agency

554
00:25:21,669 --> 00:25:18,559
in many many years but

555
00:25:23,190 --> 00:25:21,679
um this is the first with uh in earth

556
00:25:25,669 --> 00:25:23,200
science and in particular

557
00:25:27,190 --> 00:25:25,679
uh as part of their uh copernicus

558
00:25:30,549 --> 00:25:27,200
program which is a

559
00:25:32,549 --> 00:25:30,559
significant earth observation program um

560
00:25:34,230 --> 00:25:32,559
it has been um a tremendous

561
00:25:36,950 --> 00:25:34,240
collaboration i have to say

562
00:25:38,549 --> 00:25:36,960
uh right from all levels uh whether it's

563
00:25:40,950 --> 00:25:38,559

the agency management

564
00:25:41,990 --> 00:25:40,960
um but really at the project team and

565
00:25:43,830 --> 00:25:42,000
and also

566
00:25:45,830 --> 00:25:43,840
with um you know their industrial

567
00:25:48,950 --> 00:25:45,840
partner which is airbus

568
00:25:50,070 --> 00:25:48,960
we really um committed ourselves at the

569
00:25:53,430 --> 00:25:50,080
beginning of the project

570
00:25:55,750 --> 00:25:53,440
to work very very closely in a in a

571
00:25:57,909 --> 00:25:55,760
transparent collaborative manner

572
00:25:58,870 --> 00:25:57,919
and and i you know there's numerous

573
00:26:00,789 --> 00:25:58,880
instances

574
00:26:01,909 --> 00:26:00,799
as we've gone through the last few years

575
00:26:03,990 --> 00:26:01,919
where uh

576
00:26:04,950 --> 00:26:04,000
we've had challenges on one side or the

577
00:26:07,350 --> 00:26:04,960
other and

578
00:26:08,470 --> 00:26:07,360
and people have really stepped up as as

579
00:26:11,190 --> 00:26:08,480
true partners

580
00:26:13,190 --> 00:26:11,200
uh to help us solve that problem and and

581
00:26:15,029 --> 00:26:13,200
do it in a good way and and

582
00:26:16,310 --> 00:26:15,039
keep us on track which has been part of

583
00:26:21,190 --> 00:26:16,320
our

584
00:26:25,510 --> 00:26:23,269
and speaking of success we have a lot of

585
00:26:28,549 --> 00:26:25,520
questions coming in about basically how

586
00:26:30,549 --> 00:26:28,559
the satellite works six silverstones on

587
00:26:33,909 --> 00:26:30,559
twitter asks which orbit is this

588
00:26:38,110 --> 00:26:36,870

yeah so it's it's going into an orbit

589
00:26:41,269 --> 00:26:38,120
that's um

590
00:26:44,230 --> 00:26:41,279
1336 kilometers high um

591
00:26:45,269 --> 00:26:44,240
uh and it's it's an orbit um that's also

592
00:26:49,430 --> 00:26:45,279
inclined

593
00:26:51,990 --> 00:26:49,440
uh you know at uh it's at 66 degrees so

594
00:26:52,549 --> 00:26:52,000
um you know it's uh it's a particular

595
00:26:55,430 --> 00:26:52,559
orbit

596
00:26:56,310 --> 00:26:55,440
that was chosen in the days of topex

597
00:26:59,029 --> 00:26:56,320
poseidon

598
00:26:59,750 --> 00:26:59,039
um to have um to be able to cover the

599
00:27:02,470 --> 00:26:59,760
earth

600
00:27:02,789 --> 00:27:02,480
and in these tracks within 10 days uh

601
00:27:05,909 --> 00:27:02,799
but

602
00:27:07,909 --> 00:27:05,919
also to uh you know have um

603
00:27:09,430 --> 00:27:07,919
be able to use these measurements and

604
00:27:11,590 --> 00:27:09,440
correct for other

605
00:27:13,029 --> 00:27:11,600
features like tides and so forth when i

606
00:27:15,350 --> 00:27:13,039
when i described how we

607
00:27:16,789 --> 00:27:15,360
we literally take uh the sea surface

608
00:27:18,630 --> 00:27:16,799
height measurement that's true but

609
00:27:21,669 --> 00:27:18,640
there's a lot of factors

610
00:27:23,750 --> 00:27:21,679
uh that really um affect that

611
00:27:24,710 --> 00:27:23,760
the quality of that measurement and and

612
00:27:26,789 --> 00:27:24,720
accuracy

613
00:27:28,230 --> 00:27:26,799

and things like tides for example are

614
00:27:31,029 --> 00:27:28,240
are one of the factors

615
00:27:33,029 --> 00:27:31,039
which can be um corrected uh in this

616
00:27:33,990 --> 00:27:33,039
particular orbit so this this orbit was

617
00:27:37,029 --> 00:27:34,000
chosen

618
00:27:39,110 --> 00:27:37,039
very specifically for this particular

619
00:27:41,590 --> 00:27:39,120
uh type of measurement and then as a

620
00:27:42,389 --> 00:27:41,600
continuity we've kept that exact same

621
00:27:44,310 --> 00:27:42,399
orbit

622
00:27:48,149 --> 00:27:44,320
uh you know for all of the series of

623
00:27:51,110 --> 00:27:48,159
missions that we've been doing

624
00:27:53,590 --> 00:27:51,120
and myriarch on youtube asks what's the

625
00:27:57,029 --> 00:27:53,600
kind of scale of the data you look at

626
00:28:01,350 --> 00:27:59,909
yeah i mean um if if the scale means um

627
00:28:02,549 --> 00:28:01,360
something like you know what what sort

628
00:28:05,750 --> 00:28:02,559
of volumes of

629
00:28:09,190 --> 00:28:05,760
of data that we're we're looking at um

630
00:28:11,909 --> 00:28:09,200
but you know the the data that we're

631
00:28:13,590 --> 00:28:11,919
first measuring is is literally uh you

632
00:28:15,269 --> 00:28:13,600
know what we call level zero data it's

633
00:28:18,149 --> 00:28:15,279
literally the raw data

634
00:28:18,789 --> 00:28:18,159
as as the instruments are putting out

635
00:28:20,549 --> 00:28:18,799
and

636
00:28:22,549 --> 00:28:20,559
um the first challenge is collecting all

637
00:28:23,110 --> 00:28:22,559
of that data and transmitting it to the

638
00:28:26,630 --> 00:28:23,120

ground

639
00:28:27,669 --> 00:28:26,640
so uh you know over the course of a day

640
00:28:29,430 --> 00:28:27,679
of an orbit

641
00:28:31,110 --> 00:28:29,440
we're trying to downlink you know as

642
00:28:33,990 --> 00:28:31,120
much data as we can

643
00:28:35,830 --> 00:28:34,000
uh you know somewhere uh close to where

644
00:28:37,510 --> 00:28:35,840
we're we're trying to downlink um you

645
00:28:39,510 --> 00:28:37,520
know several hundred megabits

646
00:28:41,830 --> 00:28:39,520
per second which you know on your

647
00:28:43,909 --> 00:28:41,840
computer on google might not sound

648
00:28:46,549 --> 00:28:43,919
a lot if you know some of the the the

649
00:28:49,510 --> 00:28:46,559
specifications but doing it from space

650
00:28:51,269 --> 00:28:49,520
uh and we and and doing it you know in a

651
00:28:53,029 --> 00:28:51,279
timely manner in a robust manner where

652
00:28:55,430 --> 00:28:53,039
we also don't lose that data

653
00:28:57,909 --> 00:28:55,440
in the in the transmission uh is is

654
00:28:59,269 --> 00:28:57,919
quite a challenge and on sentinel 6

655
00:29:01,830 --> 00:28:59,279
because we've enhanced some of this

656
00:29:03,909 --> 00:29:01,840
capability uh you know that that data

657
00:29:05,750 --> 00:29:03,919
rate has grown significantly

658
00:29:07,190 --> 00:29:05,760
uh more than more than doubled or

659
00:29:09,110 --> 00:29:07,200
tripled what we've had

660
00:29:10,310 --> 00:29:09,120
in the in the past missions but our

661
00:29:12,230 --> 00:29:10,320
technologies have also

662
00:29:14,549 --> 00:29:12,240
improved so that we can process that

663
00:29:15,909 --> 00:29:14,559

data and also produce the products and

664
00:29:17,590 --> 00:29:15,919
transfer them

665
00:29:20,070 --> 00:29:17,600
you know really within within three

666
00:29:23,190 --> 00:29:21,590
that's really exciting what a great

667
00:29:26,389 --> 00:29:23,200
turnaround stitchin

668
00:29:27,190 --> 00:29:26,399
on youtube asks will sentinel 6 be able

669
00:29:30,789 --> 00:29:27,200
to measure

670
00:29:35,029 --> 00:29:33,350
yeah so this is not something sentinel 6

671
00:29:36,470 --> 00:29:35,039
can do

672
00:29:38,310 --> 00:29:36,480
in terms of being able to measure

673
00:29:40,950 --> 00:29:38,320
underneath sea ice but

674
00:29:42,470 --> 00:29:40,960
you know the study of sea ice um uh is

675
00:29:43,830 --> 00:29:42,480
being conducted by by a lot of

676
00:29:46,710 --> 00:29:43,840
scientists and

677
00:29:47,830 --> 00:29:46,720
uh they are all using measurements

678
00:29:49,669 --> 00:29:47,840
including they will be using

679
00:29:52,630 --> 00:29:49,679
measurements from sentinel six

680
00:29:55,510 --> 00:29:52,640
to really understand um what's happening

681
00:29:57,909 --> 00:29:55,520
at the at the very top layers of

682
00:29:59,830 --> 00:29:57,919
of the sea ice but also what's happening

683
00:30:01,590 --> 00:29:59,840
at the edges of of a lot of these sea

684
00:30:04,389 --> 00:30:01,600
ice because there's a lot of

685
00:30:04,789 --> 00:30:04,399
ocean interaction with with the sea ice

686
00:30:08,070 --> 00:30:04,799
and

687
00:30:10,789 --> 00:30:08,080
to

688
00:30:12,149 --> 00:30:10,799

help understand uh what that interaction

689
00:30:14,389 --> 00:30:12,159
is some of that

690
00:30:15,190 --> 00:30:14,399
you know is being looked at um in terms

691
00:30:18,389 --> 00:30:15,200
of

692
00:30:20,870 --> 00:30:18,399
how they're changing

693
00:30:22,310 --> 00:30:20,880
uh and and sometimes how they're

694
00:30:25,669 --> 00:30:22,320
diminishing

695
00:30:27,750 --> 00:30:25,679
so all of this data is very important

696
00:30:29,029 --> 00:30:27,760
and is is being utilized and is being

697
00:30:31,990 --> 00:30:29,039
planned to be utilized

698
00:30:35,430 --> 00:30:32,000
even further uh for for even study of of

699
00:30:37,990 --> 00:30:35,440
sea ice glaciers et cetera

700
00:30:41,510 --> 00:30:38,000
navid on youtube asks can we measure

701
00:30:43,990 --> 00:30:41,520
rivers using sentinel 6.

702
00:30:46,070 --> 00:30:44,000
yeah so uh i was mentioning earlier you

703
00:30:47,990 --> 00:30:46,080
know this is one of the things um

704
00:30:49,110 --> 00:30:48,000
that's not part of our our normal

705
00:30:51,110 --> 00:30:49,120
mission uh

706
00:30:52,389 --> 00:30:51,120
objective we're really focusing on the

707
00:30:54,789 --> 00:30:52,399
on the oceans and

708
00:30:55,750 --> 00:30:54,799
uh and so forth but we are taking data

709
00:30:58,149 --> 00:30:55,760
over um

710
00:30:59,190 --> 00:30:58,159
surface waters rivers being one of them

711
00:31:01,269 --> 00:30:59,200
um now

712
00:31:02,230 --> 00:31:01,279
our satellite and the instruments aren't

713
00:31:04,149 --> 00:31:02,240

tuned to

714
00:31:05,430 --> 00:31:04,159
to measure you know every water body

715
00:31:07,669 --> 00:31:05,440
that's there so

716
00:31:09,669 --> 00:31:07,679
uh we are able to take uh measurements

717
00:31:12,870 --> 00:31:09,679
on rivers particularly if they're

718
00:31:14,630 --> 00:31:12,880
uh very large rivers uh and and be able

719
00:31:16,870 --> 00:31:14,640
to use those and those measurements are

720
00:31:18,710 --> 00:31:16,880
being taken and and being used

721
00:31:20,310 --> 00:31:18,720
uh you know there will be future

722
00:31:23,269 --> 00:31:20,320
technologies uh one of the

723
00:31:24,950 --> 00:31:23,279
the projects i'm also excited about is

724
00:31:28,710 --> 00:31:24,960
called swat in the future

725
00:31:30,870 --> 00:31:28,720
uh which will really look at much more

726
00:31:32,950 --> 00:31:30,880
precise measurements uh you know

727
00:31:36,549 --> 00:31:32,960
particularly on surface waters but this

728
00:31:38,470 --> 00:31:36,559
data from sentinel 6 will be a very big

729
00:31:39,669 --> 00:31:38,480
pathfinder towards being able to to

730
00:31:43,430 --> 00:31:39,679
fully uh

731
00:31:46,630 --> 00:31:45,750
now 2020 has given a lot of us many

732
00:31:48,870 --> 00:31:46,640
curveballs

733
00:31:50,310 --> 00:31:48,880
russ on facebook asks what is the

734
00:31:53,990 --> 00:31:50,320
biggest surprise

735
00:31:55,110 --> 00:31:54,000
2020 has given your team

736
00:31:58,149 --> 00:31:55,120
right well i think it's the biggest

737
00:32:01,509 --> 00:31:58,159
surprise uh the world has experienced

738
00:32:04,549 --> 00:32:01,519

of course with uh with the pandemic and

739
00:32:06,710 --> 00:32:04,559
um uh you know it was also another

740
00:32:07,669 --> 00:32:06,720
spirit of of cooperation when that

741
00:32:11,190 --> 00:32:07,679
happened because

742
00:32:14,230 --> 00:32:11,200
um i think uh the first reaction

743
00:32:15,509 --> 00:32:14,240
from um uh from our our partners and our

744
00:32:18,230 --> 00:32:15,519
project team

745
00:32:19,430 --> 00:32:18,240
wasn't um you know how how do we throw

746
00:32:21,590 --> 00:32:19,440
up our hands and give up

747
00:32:23,909 --> 00:32:21,600
it was actually exactly the opposite is

748
00:32:24,789 --> 00:32:23,919
yes we we want to be safe we want to

749
00:32:27,509 --> 00:32:24,799
keep everybody

750
00:32:28,389 --> 00:32:27,519
safe but are there ways that we can work

751
00:32:31,190 --> 00:32:28,399
together

752
00:32:33,029 --> 00:32:31,200
to to continue our progress so i think

753
00:32:35,830 --> 00:32:33,039
right from i remember about march

754
00:32:37,269 --> 00:32:35,840
22nd i remember it very well in terms of

755
00:32:40,389 --> 00:32:37,279
the exact date

756
00:32:43,269 --> 00:32:40,399
we worked very closely with our partners

757
00:32:43,669 --> 00:32:43,279
to figure out ways and and i have to say

758
00:32:45,750 --> 00:32:43,679
uh

759
00:32:47,110 --> 00:32:45,760
you know in the past when under normal

760
00:32:50,149 --> 00:32:47,120
circumstances

761
00:32:52,470 --> 00:32:50,159
uh when i might talk to um a person

762
00:32:55,110 --> 00:32:52,480
whether it's because of i.t

763
00:32:56,389 --> 00:32:55,120

issues challenges the answer would be no

764
00:32:58,310 --> 00:32:56,399
and now the answer

765
00:32:59,830 --> 00:32:58,320
you know pretty much from everybody is

766
00:33:02,310 --> 00:32:59,840
you know how can i help

767
00:33:03,190 --> 00:33:02,320
uh and that was really the spirit um

768
00:33:06,149 --> 00:33:03,200
that helped us

769
00:33:06,950 --> 00:33:06,159
continue uh you know it it uh it did

770
00:33:10,149 --> 00:33:06,960
take effort

771
00:33:11,190 --> 00:33:10,159
sacrifice uh long hours of things that

772
00:33:13,830 --> 00:33:11,200
had to be done

773
00:33:15,669 --> 00:33:13,840
maybe more slowly but really the

774
00:33:17,430 --> 00:33:15,679
objective was always you know how can we

775
00:33:18,789 --> 00:33:17,440
help to keep things moving forward which

776
00:33:21,990 --> 00:33:18,799
was amazing

777
00:33:24,630 --> 00:33:22,000
um because this was really a

778
00:33:26,950 --> 00:33:24,640
another demonstration of our partnership

779
00:33:28,710 --> 00:33:26,960
spirit

780
00:33:30,710 --> 00:33:28,720
and especially since you had so many

781
00:33:32,470 --> 00:33:30,720
different time zones to work throughout

782
00:33:35,830 --> 00:33:32,480
so you guys did an amazing

783
00:33:37,509 --> 00:33:35,840
job now gerard on youtube asks how many

784
00:33:39,990 --> 00:33:37,519
total years of data

785
00:33:42,149 --> 00:33:40,000
do you have and parag maybe you can also

786
00:33:44,230 --> 00:33:42,159
go into the future now that there are

787
00:33:46,310 --> 00:33:44,240
two satellites that sentinel is a part

788
00:33:52,149 --> 00:33:46,320

of

789
00:33:53,750 --> 00:33:52,159
the data record as it stands today you

790
00:33:55,590 --> 00:33:53,760
know started back with uh

791
00:33:57,909 --> 00:33:55,600
topex poseidon and as we've been saying

792
00:34:00,549 --> 00:33:57,919
we've got almost 30 years of data

793
00:34:02,310 --> 00:34:00,559
um you know our plan for sentinel 6 is

794
00:34:04,630 --> 00:34:02,320
is to have two satellites built

795
00:34:06,310 --> 00:34:04,640
one launched now and and then the other

796
00:34:07,190 --> 00:34:06,320
put in storage and launched five years

797
00:34:10,470 --> 00:34:07,200
from now

798
00:34:11,829 --> 00:34:10,480
uh so uh the primary mission life of of

799
00:34:13,750 --> 00:34:11,839
each of these satellites

800
00:34:14,950 --> 00:34:13,760
is is at least five and a half years

801
00:34:16,230 --> 00:34:14,960
although um

802
00:34:18,230 --> 00:34:16,240
i think every single one of our

803
00:34:18,550 --> 00:34:18,240
satellites that we built uh thankfully

804
00:34:23,669 --> 00:34:18,560
has

805
00:34:27,109 --> 00:34:23,679
plan is is basically to

806
00:34:30,149 --> 00:34:27,119
operate um and and get at least um

807
00:34:32,710 --> 00:34:30,159
11 years of of total mission um

808
00:34:34,389 --> 00:34:32,720
life and continuity out of it we're

809
00:34:36,710 --> 00:34:34,399
expecting that um

810
00:34:38,550 --> 00:34:36,720
sentinel six uh mike freilich is is

811
00:34:39,349 --> 00:34:38,560
gonna not only last the five and a half

812
00:34:41,270 --> 00:34:39,359
years but

813
00:34:43,430 --> 00:34:41,280

actually go beyond that um we're

814
00:34:45,270 --> 00:34:43,440
expecting uh probably for another two

815
00:34:47,829 --> 00:34:45,280
year extension as a goal

816
00:34:48,310 --> 00:34:47,839
uh for each of these so in all total you

817
00:34:52,389 --> 00:34:48,320
know

818
00:34:54,389 --> 00:34:52,399
if uh if we're somewhat

819
00:34:55,990 --> 00:34:54,399
have done a great job on the engineering

820
00:34:58,390 --> 00:34:56,000
side and somewhat lucky

821
00:34:59,750 --> 00:34:58,400
uh you know we're really expecting uh

822
00:35:01,589 --> 00:34:59,760
things to go out

823
00:35:03,030 --> 00:35:01,599
maybe up to 15 years but that doesn't

824
00:35:05,750 --> 00:35:03,040
mean that

825
00:35:06,870 --> 00:35:05,760
we want to rely on that and and that

826
00:35:09,190 --> 00:35:06,880
only

827
00:35:10,550 --> 00:35:09,200
because we really like to have this

828
00:35:12,710 --> 00:35:10,560
overlap between

829
00:35:13,829 --> 00:35:12,720
an existing uh satellite and a new

830
00:35:15,510 --> 00:35:13,839
satellite so

831
00:35:17,270 --> 00:35:15,520
part of that you know anywhere between

832
00:35:19,990 --> 00:35:17,280
11 and 15 years is

833
00:35:21,030 --> 00:35:20,000
is making sure that we are have a have a

834
00:35:24,390 --> 00:35:21,040
good overlap

835
00:35:27,430 --> 00:35:24,400
and that we can um ensure continuity and

836
00:35:29,589 --> 00:35:27,440
continuity of how precise and accurate

837
00:35:31,270 --> 00:35:29,599
the measurement is

838
00:35:33,430 --> 00:35:31,280

yes as we've said over and over a

839
00:35:36,150 --> 00:35:33,440
continuity consistency

840
00:35:37,670 --> 00:35:36,160
that's what makes it move forward when

841
00:35:39,349 --> 00:35:37,680
it comes to understanding

842
00:35:41,430 --> 00:35:39,359
sea level rise we've got a great

843
00:35:44,710 --> 00:35:41,440
question from reese on facebook

844
00:35:45,349 --> 00:35:44,720
hi parag rhys from orbital here will

845
00:35:48,150 --> 00:35:45,359
there be

846
00:35:51,990 --> 00:35:48,160
coincident science between sentinel 6

847
00:35:56,710 --> 00:35:55,030
um you know i i think uh i i don't know

848
00:35:59,990 --> 00:35:56,720
the exact answer to that so

849
00:36:02,150 --> 00:36:00,000
i'll be uh direct but what i do know

850
00:36:03,750 --> 00:36:02,160
is and and what we are trying to do

851
00:36:06,069 --> 00:36:03,760
across all of these um

852
00:36:07,270 --> 00:36:06,079
these systems is we're of course trying

853
00:36:09,910 --> 00:36:07,280
to gather data

854
00:36:11,670 --> 00:36:09,920
uh about um continuity of the of the

855
00:36:14,230 --> 00:36:11,680
oceans and sea surface height

856
00:36:14,950 --> 00:36:14,240
but really um you know what i've seen as

857
00:36:20,790 --> 00:36:14,960
a change

858
00:36:21,270 --> 00:36:20,800
emphasis particularly in the last five

859
00:36:25,670 --> 00:36:21,280
ten

860
00:36:28,630 --> 00:36:25,680
scientific community

861
00:36:31,030 --> 00:36:28,640
is really the combination of uh of

862
00:36:34,390 --> 00:36:31,040
measurements from various platforms

863
00:36:34,950 --> 00:36:34,400

not just satellites uh like oco2 but but

864
00:36:37,109 --> 00:36:34,960
the the

865
00:36:39,030 --> 00:36:37,119
the answer is is that people ultimately

866
00:36:40,550 --> 00:36:39,040
sort of the holy grail thereafter

867
00:36:42,150 --> 00:36:40,560
is really trying to understand how the

868
00:36:45,510 --> 00:36:42,160
earth works and that means

869
00:36:48,150 --> 00:36:45,520
uh it's the atmosphere it's it's the uh

870
00:36:48,870 --> 00:36:48,160
it's the ocean and understanding that

871
00:36:51,910 --> 00:36:48,880
connection and

872
00:36:54,550 --> 00:36:51,920
relation is something i definitely know

873
00:36:55,910 --> 00:36:54,560
will be utilized by by by the science

874
00:36:58,230 --> 00:36:55,920
community

875
00:36:59,109 --> 00:36:58,240
by the way nice to hear from somebody at

876
00:37:02,390 --> 00:36:59,119
orbital which

877
00:37:04,150 --> 00:37:02,400
uh was uh was somebody an organization i

878
00:37:07,109 --> 00:37:04,160
worked with as part of

879
00:37:09,030 --> 00:37:07,119
of topex poseidon so nice to hear from

880
00:37:10,790 --> 00:37:09,040
you

881
00:37:12,710 --> 00:37:10,800
and our last question's from barbara on

882
00:37:14,950 --> 00:37:12,720
facebook she wants to know will this

883
00:37:16,790 --> 00:37:14,960
data be shared with zooniverse

884
00:37:20,710 --> 00:37:16,800
to give citizen scientists the

885
00:37:24,310 --> 00:37:22,870
yeah so i'm i'm not very familiar with

886
00:37:27,990 --> 00:37:24,320
uh with that particular

887
00:37:31,829 --> 00:37:28,000
um outlet but um what i what i would say

888
00:37:34,310 --> 00:37:31,839

is that um you know our objective is to

889
00:37:34,950 --> 00:37:34,320
make this data uh fully and freely

890
00:37:38,069 --> 00:37:34,960
available

891
00:37:40,870 --> 00:37:38,079
so you know we're really trying to

892
00:37:42,470 --> 00:37:40,880
not only promote and advertise where

893
00:37:46,630 --> 00:37:42,480
this data is available

894
00:37:49,349 --> 00:37:46,640
but also that you know this data can be

895
00:37:49,990 --> 00:37:49,359
downloaded hosted in in many different

896
00:37:53,030 --> 00:37:50,000
areas and

897
00:37:55,910 --> 00:37:53,040
platforms uh by many different um

898
00:37:57,589 --> 00:37:55,920
organizations so uh you know if we are

899
00:38:00,069 --> 00:37:57,599
not making that connection

900
00:38:02,069 --> 00:38:00,079
uh please reach out to us because we're

901
00:38:03,910 --> 00:38:02,079
very excited to make a connection

902
00:38:05,190 --> 00:38:03,920
with anybody and everybody and

903
00:38:08,630 --> 00:38:05,200
facilitate that

904
00:38:12,710 --> 00:38:10,310
well thank you so much for all of you

905
00:38:14,710 --> 00:38:12,720
folks who reached out on social media

906
00:38:17,190 --> 00:38:14,720
and joined us today and thank you so

907
00:38:19,589 --> 00:38:17,200
much for joining us prague

908
00:38:21,510 --> 00:38:19,599
you're welcome it was a pleasure uh it

909
00:38:22,310 --> 00:38:21,520
was really great to talk about this

910
00:38:25,589 --> 00:38:22,320
project and

911
00:38:26,950 --> 00:38:25,599
uh look forward to the launch we are all

912
00:38:28,630 --> 00:38:26,960
looking forward to the launch

913
00:38:30,550 --> 00:38:28,640

the sentinel 6 michael freilick

914
00:38:32,390 --> 00:38:30,560
satellite is a true international

915
00:38:33,030 --> 00:38:32,400
collaboration as you heard parag

916
00:38:34,790 --> 00:38:33,040
mentioned

917
00:38:36,710 --> 00:38:34,800
it is being jointly developed by the

918
00:38:39,430 --> 00:38:36,720
european space agency

919
00:38:42,150 --> 00:38:39,440
nasa the european organization for the

920
00:38:44,470 --> 00:38:42,160
exploration of meteorological satellites

921
00:38:46,630 --> 00:38:44,480
and the national oceanic and atmospheric

922
00:38:48,390 --> 00:38:46,640
administration with funding support

923
00:38:50,390 --> 00:38:48,400
from the european commission and

924
00:38:53,190 --> 00:38:50,400
technical support from the french

925
00:38:54,950 --> 00:38:53,200
space agency canes the sentinel 6

926
00:38:56,470 --> 00:38:54,960
michael freilix satellite is scheduled

927
00:38:58,550 --> 00:38:56,480
to launch on november

928
00:39:00,870 --> 00:38:58,560
10th for the latest on the mission

929
00:39:03,589 --> 00:39:00,880
follow at nasa earth on twitter

930
00:39:05,349 --> 00:39:03,599
facebook and instagram you can watch all

931
00:39:07,750 --> 00:39:05,359
of the behind the spacecraft video

932
00:39:09,829 --> 00:39:07,760
profiles on the nasa 360

933
00:39:11,829 --> 00:39:09,839
youtube channel we will be doing q and

934
00:39:13,589 --> 00:39:11,839
a's with sentinel 6 michael freilick

935
00:39:14,310 --> 00:39:13,599
satellite team members on wednesday

936
00:39:16,310 --> 00:39:14,320
afternoons

937
00:39:19,109 --> 00:39:16,320
for the next couple of weeks so please

938
00:39:21,990 --> 00:39:19,119

follow and subscribe for notifications

939
00:39:22,710 --> 00:39:22,000
at nasa earth science your home is our