

NASA LIVE



SENTINEL-6
MICHAEL FREILICH
SATELLITE LAUNCH

#SEEINGTHESEAS

1
00:00:07,110 --> 00:00:05,749
and in just about half an hour this

2
00:00:09,110 --> 00:00:07,120
spacex rocket

3
00:00:10,549 --> 00:00:09,120
will launch the sentinel 6 michael

4
00:00:12,870 --> 00:00:10,559
freilick satellite

5
00:00:16,070 --> 00:00:12,880
into space to continue the important

6
00:00:19,109 --> 00:00:16,080
work of monitoring changes in our oceans

7
00:00:21,269 --> 00:00:19,119
around the world and so it seems fitting

8
00:00:22,870 --> 00:00:21,279
this satellite will begin its flight

9
00:00:26,150 --> 00:00:22,880
over top of the largest

10
00:00:28,390 --> 00:00:26,160
ocean in the world the pacific

11
00:00:30,470 --> 00:00:28,400
welcome everyone watching on nasa and

12
00:00:31,750 --> 00:00:30,480
spacex's platforms

13
00:00:33,830 --> 00:00:31,760

thank you for joining us here at

14

00:00:35,590 --> 00:00:33,840

vandenberg air force base on the coast

15

00:00:38,150 --> 00:00:35,600

of central california

16

00:00:39,590 --> 00:00:38,160

i'm your host daryl nail and with me is

17

00:00:42,310 --> 00:00:39,600

marina jericho with

18

00:00:43,910 --> 00:00:42,320

nasa's jet propulsion laboratory so good

19

00:00:46,229 --> 00:00:43,920

to have you here oh thank you so much

20

00:00:47,670 --> 00:00:46,239

daryl i'm so honored and excited to be

21

00:00:50,470 --> 00:00:47,680

here the launch pad

22

00:00:51,270 --> 00:00:50,480

right behind us sentinel 6 getting ready

23

00:00:53,990 --> 00:00:51,280

to launch

24

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

and giving us another decade of c-level

25

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

observations the science return

26

00:00:59,990 --> 00:00:58,000

is so critical and i'm so excited to be

27

00:01:01,990 --> 00:01:00,000

here now you're a meteorologist

28

00:01:03,430 --> 00:01:02,000

as well so you know the value of the

29

00:01:04,149 --> 00:01:03,440

data that's going to be coming from the

30

00:01:06,310 --> 00:01:04,159

satellite

31

00:01:08,149 --> 00:01:06,320

once it gets into space and starts uh

32

00:01:10,789 --> 00:01:08,159

working but now comes the hard part

33

00:01:12,149 --> 00:01:10,799

which is launching it into space i know

34

00:01:14,950 --> 00:01:12,159

and i'm feeling so excited

35

00:01:15,510 --> 00:01:14,960

to get this sea scout launched and into

36

00:01:17,670 --> 00:01:15,520

action

37

00:01:19,830 --> 00:01:17,680

i'm so invested in the incredible data

38

00:01:22,630 --> 00:01:19,840

that's going to come from this satellite

39

00:01:22,950 --> 00:01:22,640

the legacy that it follows and continues

40

00:01:25,190 --> 00:01:22,960

and

41

00:01:27,270 --> 00:01:25,200

we all live on this earth here together

42

00:01:27,910 --> 00:01:27,280

so we need to make it a better place for

43

00:01:30,550 --> 00:01:27,920

everyone

44

00:01:31,749 --> 00:01:30,560

well said and right now as far as the

45

00:01:34,310 --> 00:01:31,759

rockets concerned

46

00:01:36,069 --> 00:01:34,320

we are go for launch we'll get an update

47

00:01:37,590 --> 00:01:36,079

from launch control in a minute

48

00:01:40,310 --> 00:01:37,600

we'll take a look at the pad though the

49

00:01:43,670 --> 00:01:40,320

rocket looking beautiful out there on

50

00:01:44,550 --> 00:01:43,680

space launch complex four now coming up

51
00:01:47,030 --> 00:01:44,560
in the show

52
00:01:49,109 --> 00:01:47,040
we'll learn more about michael frylick

53
00:01:50,950 --> 00:01:49,119
and why this satellite was renamed after

54
00:01:53,350 --> 00:01:50,960
him before he passed away

55
00:01:54,230 --> 00:01:53,360
we'll also talk live with his son and

56
00:01:56,630 --> 00:01:54,240
his daughter

57
00:01:59,670 --> 00:01:56,640
after the launch the satellite he's

58
00:02:01,670 --> 00:01:59,680
named for can do some incredible science

59
00:02:03,670 --> 00:02:01,680
we'll show you how it detects sea level

60
00:02:06,149 --> 00:02:03,680
changes down to a single

61
00:02:07,429 --> 00:02:06,159
centimeter and how it helps forecasters

62
00:02:09,430 --> 00:02:07,439
make better predictions

63
00:02:10,869 --> 00:02:09,440

about the strength and the path of

64

00:02:13,510 --> 00:02:10,879

life-threatening storms

65

00:02:15,430 --> 00:02:13,520

like hurricanes and just before launch

66

00:02:16,070 --> 00:02:15,440

we'll talk about the cool secondary

67

00:02:18,390 --> 00:02:16,080

mission

68

00:02:20,229 --> 00:02:18,400

of the landing of spacex's first stage

69

00:02:21,910 --> 00:02:20,239

booster right back here on land

70

00:02:23,910 --> 00:02:21,920

just a few hundred feet away from the

71

00:02:25,990 --> 00:02:23,920

launch pad then after the launch

72

00:02:27,030 --> 00:02:26,000

join us for a live transatlantic

73

00:02:29,830 --> 00:02:27,040

conversation

74

00:02:30,790 --> 00:02:29,840

about climate with scientists from nasa

75

00:02:33,430 --> 00:02:30,800

and esa

76

00:02:34,630 --> 00:02:33,440

european space agency but first let's

77

00:02:36,309 --> 00:02:34,640

introduce you to the team of

78

00:02:37,350 --> 00:02:36,319

commentators who will be calling the

79

00:02:39,750 --> 00:02:37,360

launch today

80

00:02:41,270 --> 00:02:39,760

nasa's joshua santora and launch

81

00:02:44,229 --> 00:02:41,280

trajectory analyst

82

00:02:45,830 --> 00:02:44,239

philip hargrove gentlemen daryl marina

83

00:02:47,190 --> 00:02:45,840

it's a pleasure to be here just i really

84

00:02:48,550 --> 00:02:47,200

an honor like marina said

85

00:02:50,309 --> 00:02:48,560

i am joshua santorum with nasa

86

00:02:51,910 --> 00:02:50,319

communications and joining me phillip

87

00:02:53,030 --> 00:02:51,920

hargrove from nasa's launch services

88

00:02:54,550 --> 00:02:53,040

program or lsp

89

00:02:56,070 --> 00:02:54,560

philip it's a pleasure to have you with

90

00:02:57,190 --> 00:02:56,080

me it's a pleasure to be here thank you

91

00:02:58,949 --> 00:02:57,200

so much for having me

92

00:03:00,710 --> 00:02:58,959

yeah so we are super excited feeling the

93

00:03:01,830 --> 00:03:00,720

energy even from the east coast where we

94

00:03:03,830 --> 00:03:01,840

are located currently

95

00:03:05,030 --> 00:03:03,840

uh the launch team um due to code

96

00:03:06,309 --> 00:03:05,040

coveted environment so we're split

97

00:03:07,750 --> 00:03:06,319

across the country right now

98

00:03:09,509 --> 00:03:07,760

trying to very literally distance

99

00:03:11,830 --> 00:03:09,519

ourselves uh but part of the

100

00:03:13,110 --> 00:03:11,840

the launch services programs their

101
00:03:15,270 --> 00:03:13,120
services provided

102
00:03:16,869 --> 00:03:15,280
is to keep everybody around the world

103
00:03:17,430 --> 00:03:16,879
that needs to be in the loop on what's

104
00:03:19,110 --> 00:03:17,440
going on

105
00:03:20,630 --> 00:03:19,120
actively in the loop and that's true for

106
00:03:21,830 --> 00:03:20,640
us here today uh we are actively

107
00:03:22,869 --> 00:03:21,840
listening into everything happening

108
00:03:23,990 --> 00:03:22,879
behind the scenes in the entire

109
00:03:25,910 --> 00:03:24,000
countdown procedures

110
00:03:27,270 --> 00:03:25,920
so philip how are things going in the

111
00:03:28,949 --> 00:03:27,280
countdown procedures

112
00:03:30,630 --> 00:03:28,959
yeah things are going really great it's

113
00:03:31,990 --> 00:03:30,640

been a big week of preparation and we're

114

00:03:34,789 --> 00:03:32,000

finally in the final stretch

115

00:03:36,309 --> 00:03:34,799

just about 25 minutes or so until launch

116

00:03:38,149 --> 00:03:36,319

it's been a smooth count so far this

117

00:03:40,149 --> 00:03:38,159

morning the teams got on console about

118

00:03:41,509 --> 00:03:40,159

three and a half hours ago around 6 a.m

119

00:03:44,229 --> 00:03:41,519

pacific time

120

00:03:47,430 --> 00:03:44,239

and about 15 minutes ago the nasa chief

121

00:03:49,670 --> 00:03:47,440

engineer akash vengani pulled his team

122

00:03:50,949 --> 00:03:49,680

the nasa engineers the nasa launch

123

00:03:53,509 --> 00:03:50,959

manager tim dunn

124

00:03:54,470 --> 00:03:53,519

pulled his team to ensure that nasa is

125

00:03:56,070 --> 00:03:54,480

ready for launch

126

00:03:58,070 --> 00:03:56,080

and just a few minutes ago the spacex

127

00:04:00,070 --> 00:03:58,080

launch director eric kruskovic pulled

128

00:04:02,869 --> 00:04:00,080

his team to ensure that they were ready

129

00:04:03,270 --> 00:04:02,879

for fueling which just began uh recently

130

00:04:06,229 --> 00:04:03,280

so

131

00:04:08,149 --> 00:04:06,239

the range is is good as well which means

132

00:04:08,869 --> 00:04:08,159

that the path to space is safe for the

133

00:04:12,710 --> 00:04:08,879

rocket

134

00:04:14,309 --> 00:04:12,720

and safe for the public and the falcon 9

135

00:04:14,869 --> 00:04:14,319

is also proceeding nominally towards

136

00:04:16,789 --> 00:04:14,879

launch

137

00:04:18,150 --> 00:04:16,799

yeah all good things obviously lots of

138

00:04:19,349 --> 00:04:18,160

teams they're involved and we'll talk

139

00:04:20,629 --> 00:04:19,359

about that in just a minute

140

00:04:22,150 --> 00:04:20,639

but want to preview for you the fact

141

00:04:23,110 --> 00:04:22,160

that we have an instantaneous launch

142

00:04:24,629 --> 00:04:23,120

window today

143

00:04:26,310 --> 00:04:24,639

meaning that we have a single second to

144

00:04:27,590 --> 00:04:26,320

be able to fly we have a backup

145

00:04:28,230 --> 00:04:27,600

opportunity available tomorrow if it's

146

00:04:31,270 --> 00:04:28,240

needed

147

00:04:32,150 --> 00:04:31,280

but that launch time today is at 9 17 08

148

00:04:33,430 --> 00:04:32,160

pacific time

149

00:04:35,670 --> 00:04:33,440

again a reminder we're launching from

150

00:04:36,790 --> 00:04:35,680

vandenberg air force base space launch

151
00:04:38,230 --> 00:04:36,800
complex 4

152
00:04:40,150 --> 00:04:38,240
there on the west coast so for those of

153
00:04:42,950 --> 00:04:40,160
you here on the east coast that's 12

154
00:04:44,070 --> 00:04:42,960
1708 eastern time so

155
00:04:45,189 --> 00:04:44,080
lots more to come daryl we would

156
00:04:46,790 --> 00:04:45,199
typically provide an update on the

157
00:04:48,950 --> 00:04:46,800
weather as well but since you're there

158
00:04:50,390 --> 00:04:48,960
experiencing the weather and alongside a

159
00:04:54,230 --> 00:04:50,400
professional meteorologist

160
00:04:58,550 --> 00:04:56,469
well we appreciate that joshua indeed we

161
00:05:00,469 --> 00:04:58,560
are um you know she's a certified

162
00:05:01,830 --> 00:05:00,479
meteorologist and the weather today when

163
00:05:03,430 --> 00:05:01,840

we got up i mean it was

164

00:05:04,870 --> 00:05:03,440

picture perfect you know from the window

165

00:05:06,390 --> 00:05:04,880

the hotel clear

166

00:05:09,189 --> 00:05:06,400

beautiful sunshine you can tell how

167

00:05:09,990 --> 00:05:09,199

gorgeous it is didn't have the fog but

168

00:05:12,790 --> 00:05:10,000

you know we do have

169

00:05:14,310 --> 00:05:12,800

these winds it's so unusual daryl i've

170

00:05:15,110 --> 00:05:14,320

been to a dozen launches here at

171

00:05:17,350 --> 00:05:15,120

vandenberg

172

00:05:19,029 --> 00:05:17,360

and i've only seen one of them because

173

00:05:21,270 --> 00:05:19,039

there's always fog

174

00:05:23,590 --> 00:05:21,280

along the central coastline but fog

175

00:05:25,590 --> 00:05:23,600

needs really calm conditions

176

00:05:27,749 --> 00:05:25,600

and so in order for calm conditions to

177

00:05:29,990 --> 00:05:27,759

happen you can't have winds but we've

178

00:05:32,710 --> 00:05:30,000

got a lot of wind out there today

179

00:05:34,629 --> 00:05:32,720

and that is why we have no fog but that

180

00:05:36,070 --> 00:05:34,639

wind might create a problem

181

00:05:38,150 --> 00:05:36,080

and so that's why we need to keep a

182

00:05:40,070 --> 00:05:38,160

close eye on those upper-level winds

183

00:05:42,230 --> 00:05:40,080

for this rocket now you can see behind

184

00:05:43,830 --> 00:05:42,240

me we have a couple of high-level clouds

185

00:05:45,029 --> 00:05:43,840

out there those are just cirrus clouds i

186

00:05:47,430 --> 00:05:45,039

like to call them

187

00:05:48,629 --> 00:05:47,440

horsetails but they are not going to

188

00:05:51,029 --> 00:05:48,639

affect the rocket

189

00:05:53,270 --> 00:05:51,039

in any way it's a beautiful day it's a

190

00:05:53,990 --> 00:05:53,280

clear day but it is a little breezy now

191

00:05:55,670 --> 00:05:54,000

50

192

00:05:57,270 --> 00:05:55,680

of launch scrubs are due to weather and

193

00:06:00,230 --> 00:05:57,280

about 30 percent daryl

194

00:06:02,309 --> 00:06:00,240

are due to upper level wind issues and

195

00:06:04,629 --> 00:06:02,319

so these ones occur basically between 20

196

00:06:05,029 --> 00:06:04,639

to 40 000 feet so pretty high up in the

197

00:06:07,189 --> 00:06:05,039

air

198

00:06:08,950 --> 00:06:07,199

and the rocket it's like hitting a brick

199

00:06:09,350 --> 00:06:08,960

wall when they hit those upper level

200

00:06:13,270 --> 00:06:09,360

winds

201

00:06:14,790 --> 00:06:13,280

direction with height so

202

00:06:16,390 --> 00:06:14,800

it is not good for the rocket but i'm

203

00:06:17,510 --> 00:06:16,400

sure meteorologists are on top of it

204

00:06:18,950 --> 00:06:17,520

this morning at the weather

205

00:06:21,189 --> 00:06:18,960

office and they're going to make that

206

00:06:23,270 --> 00:06:21,199

decision right before launch but taking

207

00:06:26,150 --> 00:06:23,280

a look right now at our radar

208

00:06:28,230 --> 00:06:26,160

we can see that it is crystal clear out

209

00:06:29,029 --> 00:06:28,240

there folks so we have no precipitation

210

00:06:30,710 --> 00:06:29,039

to deal with

211

00:06:33,350 --> 00:06:30,720

like i said these clouds are not going

212

00:06:35,350 --> 00:06:33,360

to be a big issue in any way shape or

213

00:06:37,270 --> 00:06:35,360

form which is good they're just nice

214

00:06:39,510 --> 00:06:37,280

high level cirrus clouds

215

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

and looking at our launch weather

216

00:06:45,430 --> 00:06:41,840

forecast for the day today

217

00:06:45,909 --> 00:06:45,440

we are 80 percent go for probability of

218

00:06:48,550 --> 00:06:45,919

launch

219

00:06:49,510 --> 00:06:48,560

and that 20 percent contingency is

220

00:06:52,629 --> 00:06:49,520

adjust for

221

00:06:54,790 --> 00:06:52,639

the potential of those wins so it's

222

00:06:55,189 --> 00:06:54,800

looking beautiful i'm so excited to be

223

00:06:57,430 --> 00:06:55,199

here

224

00:06:59,029 --> 00:06:57,440

and i'm so excited to actually see it

225

00:07:00,950 --> 00:06:59,039

because like i said i've been here a

226

00:07:03,670 --> 00:07:00,960

dozen times daryl and

227

00:07:05,110 --> 00:07:03,680

every time we just see so much fog in

228

00:07:06,950 --> 00:07:05,120

the area so this is pretty

229

00:07:08,629 --> 00:07:06,960

incredible and we're perfectly situated

230

00:07:09,749 --> 00:07:08,639

for it here on just the mouth of the

231

00:07:12,150 --> 00:07:09,759

santa anas

232

00:07:13,909 --> 00:07:12,160

river spilling into the pacific ocean it

233

00:07:16,390 --> 00:07:13,919

is an incredible view we are

234

00:07:17,350 --> 00:07:16,400

blessed indeed it is so beautiful now

235

00:07:19,510 --> 00:07:17,360

there are teams on

236

00:07:20,390 --> 00:07:19,520

opposite ends of the world working on

237

00:07:22,150 --> 00:07:20,400

this mission

238

00:07:23,430 --> 00:07:22,160

the satellite will be controlled from

239

00:07:26,390 --> 00:07:23,440

the european space

240

00:07:27,270 --> 00:07:26,400

agency's operations center in darmstadt

241

00:07:29,670 --> 00:07:27,280

germany

242

00:07:30,309 --> 00:07:29,680

yeah and here at vanderberg air force

243

00:07:32,469 --> 00:07:30,319

base

244

00:07:34,469 --> 00:07:32,479

spacex's launch team is working the

245

00:07:36,710 --> 00:07:34,479

countdown from their control room

246

00:07:37,909 --> 00:07:36,720

while nasa's launch services program

247

00:07:39,830 --> 00:07:37,919

that you see right there

248

00:07:41,830 --> 00:07:39,840

is at the mission director's center just

249

00:07:43,830 --> 00:07:41,840

a few miles away

250

00:07:45,350 --> 00:07:43,840

now shortly after sentinel 6 michael

251
00:07:47,990 --> 00:07:45,360
frylick is launched it will

252
00:07:50,070 --> 00:07:48,000
start gathering a lot of data about our

253
00:07:52,390 --> 00:07:50,080
oceans around the world

254
00:07:53,189 --> 00:07:52,400
and that data will be collected by

255
00:07:55,670 --> 00:07:53,199
high-tech

256
00:07:57,510 --> 00:07:55,680
instruments on board the satellite

257
00:08:02,070 --> 00:07:57,520
nasa's research scientist

258
00:08:06,390 --> 00:08:04,390
from an early age i saw images of the

259
00:08:08,230 --> 00:08:06,400
earth from above

260
00:08:09,830 --> 00:08:08,240
and you just realize how much is going

261
00:08:11,990 --> 00:08:09,840
on in the ocean the variability that's

262
00:08:12,390 --> 00:08:12,000
there the changes that are occurring it

263
00:08:14,150 --> 00:08:12,400

really

264

00:08:16,230 --> 00:08:14,160

became a passion of mine to understand

265

00:08:17,830 --> 00:08:16,240

what's happening in the ocean

266

00:08:19,589 --> 00:08:17,840

so sea level rise is really interesting

267

00:08:21,029 --> 00:08:19,599

because the impacts are local but it's a

268

00:08:22,550 --> 00:08:21,039

global problem so

269

00:08:24,710 --> 00:08:22,560

i've done a lot of work looking at sea

270

00:08:26,550 --> 00:08:24,720

level rise in particular locations

271

00:08:28,309 --> 00:08:26,560

but on much broader scales and with the

272

00:08:29,990 --> 00:08:28,319

satellites we have this global view

273

00:08:31,189 --> 00:08:30,000

so here we can see the satellites

274

00:08:31,749 --> 00:08:31,199

orbiting the earth and where they are

275

00:08:32,949 --> 00:08:31,759

right now

276

00:08:34,310 --> 00:08:32,959

having overlap between the different

277

00:08:35,190 --> 00:08:34,320

missions allows us to make a direct

278

00:08:36,550 --> 00:08:35,200

comparison

279

00:08:38,070 --> 00:08:36,560

it's really the information we gain from

280

00:08:38,550 --> 00:08:38,080

all of these satellites that tell us

281

00:08:39,909 --> 00:08:38,560

about

282

00:08:41,509 --> 00:08:39,919

sea level change and allow us to get an

283

00:08:42,070 --> 00:08:41,519

understanding of what's happening on the

284

00:08:43,829 --> 00:08:42,080

entire

285

00:08:45,509 --> 00:08:43,839

climate system and that really long

286

00:08:46,870 --> 00:08:45,519

record that'll exceed 30 years with the

287

00:08:48,470 --> 00:08:46,880

sentinel 6 satellite

288

00:08:50,470 --> 00:08:48,480

allows us to have a better understanding

289

00:08:51,829 --> 00:08:50,480

of how the earth's climate is changing

290

00:08:54,070 --> 00:08:51,839

so this is an animation of the sentinel

291

00:08:56,150 --> 00:08:54,080

6 spacecraft and how it collects

292

00:08:57,990 --> 00:08:56,160

information about the the sea surface

293

00:08:59,670 --> 00:08:58,000

you can see the radar pulse that's

294

00:09:01,030 --> 00:08:59,680

bounced off the surface of the ocean

295

00:09:02,790 --> 00:09:01,040

it measures the time it takes for that

296

00:09:03,430 --> 00:09:02,800

pulse to get back and from that we can

297

00:09:05,430 --> 00:09:03,440

pull out

298

00:09:07,110 --> 00:09:05,440

the measurement of sea surface height

299

00:09:08,870 --> 00:09:07,120

it's not just scientific curiosity it

300

00:09:10,230 --> 00:09:08,880

really impacts the daily lives of people

301
00:09:10,949 --> 00:09:10,240
and their ability to plan for their

302
00:09:12,949 --> 00:09:10,959
future

303
00:09:15,030 --> 00:09:12,959
as i started to live in coastal areas

304
00:09:16,870 --> 00:09:15,040
and see flooding that was occurring

305
00:09:18,790 --> 00:09:16,880
i got to see firsthand the effects of

306
00:09:20,389 --> 00:09:18,800
sea level rise and climate change

307
00:09:21,910 --> 00:09:20,399
you start to realize the importance of

308
00:09:22,310 --> 00:09:21,920
understanding what sea level is doing

309
00:09:25,350 --> 00:09:22,320
now

310
00:09:33,590 --> 00:09:25,360
what sea level might be doing in the

311
00:09:36,949 --> 00:09:35,430
and coming up after the launch we'll

312
00:09:38,870 --> 00:09:36,959
talk live with scientist

313
00:09:41,269 --> 00:09:38,880

josh willis who's actually going to

314

00:09:41,750 --> 00:09:41,279

perform a live science demonstration

315

00:09:43,350 --> 00:09:41,760

about

316

00:09:45,430 --> 00:09:43,360

our rising seas it's going to be

317

00:09:47,750 --> 00:09:45,440

something you want to check out

318

00:09:48,949 --> 00:09:47,760

and he is so incredible i'm so glad josh

319

00:09:50,710 --> 00:09:48,959

is with us this morning

320

00:09:52,230 --> 00:09:50,720

you may have noticed this satellite was

321

00:09:54,870 --> 00:09:52,240

named after michael

322

00:09:57,509 --> 00:09:54,880

frilic he led nasa's earth science

323

00:09:59,350 --> 00:09:57,519

division for more than a decade

324

00:10:00,949 --> 00:09:59,360

and he did an outstanding job frilic

325

00:10:02,949 --> 00:10:00,959

though lost his battle with cancer in

326

00:10:03,750 --> 00:10:02,959

august of this year but as you are about

327

00:10:05,110 --> 00:10:03,760

to hear

328

00:10:07,509 --> 00:10:05,120

leaders in the space and science

329

00:10:10,069 --> 00:10:07,519

community around the world explain why

330

00:10:15,190 --> 00:10:10,079

they all agreed to rename this satellite

331

00:10:21,030 --> 00:10:19,350

i was so excited to receive a letter

332

00:10:23,350 --> 00:10:21,040

by the european space agency in the

333

00:10:27,030 --> 00:10:23,360

european commission proposing

334

00:10:27,910 --> 00:10:27,040

that sentinel 6a should be sentinel 6

335

00:10:29,910 --> 00:10:27,920

mike freilich

336

00:10:31,670 --> 00:10:29,920

having a satellite named after you is

337

00:10:32,069 --> 00:10:31,680

pretty remarkable it's not something we

338

00:10:33,990 --> 00:10:32,079

do

339

00:10:35,829 --> 00:10:34,000

in earth science very often it's not

340

00:10:39,110 --> 00:10:35,839

only isa it's europe

341

00:10:40,790 --> 00:10:39,120

who wishes to honor mike freilisch mike

342

00:10:43,990 --> 00:10:40,800

freili

343

00:10:44,630 --> 00:10:44,000

has been instrumental in making sentinel

344

00:10:47,190 --> 00:10:44,640

6

345

00:10:47,910 --> 00:10:47,200

a satellite that measures with very high

346

00:10:50,069 --> 00:10:47,920

precision

347

00:10:52,310 --> 00:10:50,079

sea level rise the sentinel missions are

348

00:10:53,990 --> 00:10:52,320

something that mike was very involved in

349

00:10:55,590 --> 00:10:54,000

it really epitomizes the the role that

350

00:10:57,590 --> 00:10:55,600

mike has played over the years as

351
00:10:59,350 --> 00:10:57,600
championing partnerships championing

352
00:11:00,949 --> 00:10:59,360
collaborative investigation of the earth

353
00:11:03,910 --> 00:11:00,959
names are reserved for the greats

354
00:11:05,509 --> 00:11:03,920
you don't name after a satellite after

355
00:11:07,670 --> 00:11:05,519
somebody who

356
00:11:09,990 --> 00:11:07,680
just does their job it's the second

357
00:11:10,550 --> 00:11:10,000
mission ever named after a person who's

358
00:11:12,550 --> 00:11:10,560
alive

359
00:11:14,069 --> 00:11:12,560
it's a huge honor and i couldn't be more

360
00:11:16,470 --> 00:11:14,079
excited through this

361
00:11:17,509 --> 00:11:16,480
we want to pay tribute to a unique

362
00:11:20,710 --> 00:11:17,519
cooperation

363
00:11:23,670 --> 00:11:20,720

between the u.s and europe and

364

00:11:24,310 --> 00:11:23,680

a unique personality mike freike dr mike

365

00:11:26,710 --> 00:11:24,320

freilich

366

00:11:28,069 --> 00:11:26,720

is a world-renowned ocean scientist who

367

00:11:30,870 --> 00:11:28,079

after a successful career

368

00:11:32,150 --> 00:11:30,880

in academia came to nasa and for a

369

00:11:34,230 --> 00:11:32,160

thousand years

370

00:11:35,509 --> 00:11:34,240

led all of her signs and this really

371

00:11:37,990 --> 00:11:35,519

brought nasa

372

00:11:39,750 --> 00:11:38,000

back on the international stage the

373

00:11:42,310 --> 00:11:39,760

partnerships that we forged

374

00:11:42,870 --> 00:11:42,320

are beyond a business transaction they

375

00:11:45,190 --> 00:11:42,880

are the

376

00:11:46,870 --> 00:11:45,200

about friendship and it might be just

377

00:11:48,630 --> 00:11:46,880

that working with our international

378

00:11:50,710 --> 00:11:48,640

partners working with our interagency

379

00:11:52,550 --> 00:11:50,720

partners and mike brought that community

380

00:11:53,509 --> 00:11:52,560

together in a way that was really

381

00:11:56,710 --> 00:11:53,519

unprecedented

382

00:11:59,190 --> 00:11:56,720

mike freilich's legacy is being able to

383

00:12:00,230 --> 00:11:59,200

build the coalitions that are necessary

384

00:12:02,710 --> 00:12:00,240

for us to get

385

00:12:03,430 --> 00:12:02,720

as much understanding of our planet as

386

00:12:05,110 --> 00:12:03,440

possible

387

00:12:08,829 --> 00:12:05,120

there is not another person more

388

00:12:08,839 --> 00:12:13,190

frylick

389

00:12:16,790 --> 00:12:15,350

michael fry like touched so many people

390

00:12:18,470 --> 00:12:16,800

personally and professionally and

391

00:12:20,949 --> 00:12:18,480

you had a chance to listen to him one

392

00:12:22,870 --> 00:12:20,959

time i did he spoke at an ams conference

393

00:12:24,629 --> 00:12:22,880

and he was just so moving his passion

394

00:12:27,110 --> 00:12:24,639

for earth science missions

395

00:12:27,829 --> 00:12:27,120

was just incredible and it was an honor

396

00:12:29,910 --> 00:12:27,839

to be able to

397

00:12:31,990 --> 00:12:29,920

hear him speak now the sentinel 6

398

00:12:32,949 --> 00:12:32,000

michael freilix satellite has a long

399

00:12:35,829 --> 00:12:32,959

journey ahead

400

00:12:37,829 --> 00:12:35,839

to get into space but before it starts

401
00:12:39,910 --> 00:12:37,839
orbiting the earth the satellite already

402
00:12:42,150 --> 00:12:39,920
traveled halfway around our planet

403
00:12:43,509 --> 00:12:42,160
just to get to the launch pad behind us

404
00:12:49,750 --> 00:12:43,519
nasa's blair allen

405
00:12:54,550 --> 00:12:52,550
on september 24th sentinel 6 completed

406
00:12:55,670 --> 00:12:54,560
its flight from the airbus facility near

407
00:12:57,750 --> 00:12:55,680
munich germany

408
00:12:59,110 --> 00:12:57,760
to vandenbergh air force base and was

409
00:13:01,350 --> 00:12:59,120
transported by truck

410
00:13:07,509 --> 00:13:01,360
to the spacex facility at space launch

411
00:13:09,829 --> 00:13:07,519
complex 4.

412
00:13:11,670 --> 00:13:09,839
upon arrival it was unpacked in the safe

413
00:13:13,670 --> 00:13:11,680

confines of the clean room

414

00:13:15,829 --> 00:13:13,680

a team of scientists engineers and

415

00:13:19,509 --> 00:13:15,839

technicians began the critical process

416

00:13:21,110 --> 00:13:19,519

of preparing the spacecraft for launch

417

00:13:23,110 --> 00:13:21,120

over the last few weeks they have

418

00:13:25,509 --> 00:13:23,120

thoroughly tested and checked out all

419

00:13:28,870 --> 00:13:25,519

aspects of the spacecraft to ensure its

420

00:13:33,110 --> 00:13:31,350

the next critical step the integration

421

00:13:34,310 --> 00:13:33,120

of the spacecraft with the falcon 9

422

00:13:37,110 --> 00:13:34,320

launch vehicle

423

00:13:42,629 --> 00:13:37,120

sentinel 6 was carefully encapsulated

424

00:13:47,030 --> 00:13:44,870

yesterday sentinel 6 and the falcon 9

425

00:13:48,710 --> 00:13:47,040

rolled out of the spacex hangar

426

00:13:51,030 --> 00:13:48,720

covering the last few hundred feet of

427

00:14:04,470 --> 00:13:51,040

its journey on earth to reach the pad at

428

00:14:20,629 --> 00:14:06,870

once vertical the rocket is ready for

429

00:14:25,350 --> 00:14:23,269

separately nasa and the european space

430

00:14:28,230 --> 00:14:25,360

agency have studied the oceans

431

00:14:28,949 --> 00:14:28,240

for decades but now the two have joined

432

00:14:31,269 --> 00:14:28,959

together

433

00:14:33,750 --> 00:14:31,279

for sentinel 6 michael freilich joining

434

00:14:36,389 --> 00:14:33,760

us now is isis guido lovrini the

435

00:14:37,829 --> 00:14:36,399

copernicus space segment program manager

436

00:14:39,750 --> 00:14:37,839

greetings great to have you with us

437

00:14:41,189 --> 00:14:39,760

thanks for having me well we just saw a

438

00:14:42,710 --> 00:14:41,199

video of the rocket rolling out and

439

00:14:43,750 --> 00:14:42,720

going vertical on the pad you can see it

440

00:14:45,829 --> 00:14:43,760

there right behind us

441

00:14:47,350 --> 00:14:45,839

it's ready to go how are you feeling i

442

00:14:49,990 --> 00:14:47,360

it's a it's a big emotion

443

00:14:50,949 --> 00:14:50,000

this project started in isa more than 10

444

00:14:53,350 --> 00:14:50,959

years ago

445

00:14:56,470 --> 00:14:53,360

so it's been a very long journey there

446

00:14:59,750 --> 00:14:56,480

are many memories that stand out but

447

00:15:02,949 --> 00:14:59,760

the most vivid one is a lecture by

448

00:15:04,310 --> 00:15:02,959

michael freilig he was just few months

449

00:15:07,110 --> 00:15:04,320

after his retirement

450

00:15:07,990 --> 00:15:07,120

so he was uh no longer the the nasa

451
00:15:12,629 --> 00:15:08,000
director

452
00:15:15,350 --> 00:15:12,639
for uh her science division but he was a

453
00:15:17,590 --> 00:15:15,360
normal uss citizens and was invited to

454
00:15:18,790 --> 00:15:17,600
make a lecture by our director josef

455
00:15:22,310 --> 00:15:18,800
ashbacher in

456
00:15:25,189 --> 00:15:22,320
milan it was july 19 and he gave us a

457
00:15:28,629 --> 00:15:25,199
lecture on international cooperation

458
00:15:29,829 --> 00:15:28,639
like a gentle caring father it made us

459
00:15:32,949 --> 00:15:29,839
realize that

460
00:15:35,670 --> 00:15:32,959
we don't do enough cooperative mission

461
00:15:36,470 --> 00:15:35,680
in europe on our side and coming here

462
00:15:40,310 --> 00:15:36,480
i've been

463
00:15:42,870 --> 00:15:40,320

thinking about these words quite a lot

464

00:15:45,269 --> 00:15:42,880

and indeed it was right if you think at

465

00:15:48,069 --> 00:15:45,279

a mission like 1706 michael freilich

466

00:15:49,269 --> 00:15:48,079

it's a mission about sea level rise is a

467

00:15:52,389 --> 00:15:49,279

mission about climate

468

00:15:52,790 --> 00:15:52,399

is a mission about safe navigation there

469

00:15:56,069 --> 00:15:52,800

is

470

00:15:57,430 --> 00:15:56,079

no reason why a specific agency or a

471

00:15:59,910 --> 00:15:57,440

specific country

472

00:16:00,710 --> 00:15:59,920

should take action or should care more

473

00:16:03,430 --> 00:16:00,720

than

474

00:16:04,069 --> 00:16:03,440

anybody else in the world and so you

475

00:16:07,509 --> 00:16:04,079

realize

476

00:16:09,749 --> 00:16:07,519

that a mission like that cooperation

477

00:16:11,350 --> 00:16:09,759

is the best way to realize a mission

478

00:16:14,230 --> 00:16:11,360

like that and actually

479

00:16:16,150 --> 00:16:14,240

cooperation is the only appropriate way

480

00:16:17,030 --> 00:16:16,160

the only correct way to realize a

481

00:16:18,389 --> 00:16:17,040

mission like that

482

00:16:20,470 --> 00:16:18,399

you're absolutely right we're all in it

483

00:16:22,069 --> 00:16:20,480

together that's so true guido and you're

484

00:16:24,069 --> 00:16:22,079

right now michael was such an

485

00:16:25,189 --> 00:16:24,079

inspirational speaker and this

486

00:16:27,509 --> 00:16:25,199

collaboration

487

00:16:29,350 --> 00:16:27,519

is so beautiful now we have a question

488

00:16:32,629 --> 00:16:29,360

from social media for you

489

00:16:33,670 --> 00:16:32,639

astro assal on instagram asks what is

490

00:16:37,030 --> 00:16:33,680

the purpose of

491

00:16:40,310 --> 00:16:37,040

choosing this name for this mission

492

00:16:42,150 --> 00:16:40,320

first of all we should all be aware of

493

00:16:45,350 --> 00:16:42,160

the fact that

494

00:16:49,910 --> 00:16:45,360

naming a mission after a

495

00:16:50,629 --> 00:16:49,920

a a person and a a living person at the

496

00:16:53,910 --> 00:16:50,639

time

497

00:16:56,310 --> 00:16:53,920

is a unique uh event

498

00:16:58,069 --> 00:16:56,320

we don't have any other example of this

499

00:17:01,110 --> 00:16:58,079

kind it was a

500

00:17:03,030 --> 00:17:01,120

an honor but we are honored to work for

501
00:17:05,669 --> 00:17:03,040
a mission that carries this name

502
00:17:06,630 --> 00:17:05,679
and the answer to the question is super

503
00:17:09,829 --> 00:17:06,640
simple

504
00:17:12,549 --> 00:17:09,839
without michael freilig this mission

505
00:17:13,510 --> 00:17:12,559
would have not existed we will not be

506
00:17:16,710 --> 00:17:13,520
standing here

507
00:17:18,630 --> 00:17:16,720
today that's

508
00:17:20,150 --> 00:17:18,640
uh and that's a that's quite the honor

509
00:17:22,630 --> 00:17:20,160
you're right they do not just

510
00:17:24,230 --> 00:17:22,640
you know name any old satellite after

511
00:17:24,949 --> 00:17:24,240
you know any person so it's quite an

512
00:17:26,870 --> 00:17:24,959
honor

513
00:17:28,549 --> 00:17:26,880

guido lovrini with the program manager

514

00:17:29,909 --> 00:17:28,559

for the copernicus program thank you so

515

00:17:30,870 --> 00:17:29,919

much for spending your time and sharing

516

00:17:33,909 --> 00:17:30,880

your thoughts with us

517

00:17:36,230 --> 00:17:33,919

thanks for having me thank you guido

518

00:17:37,990 --> 00:17:36,240

guido lavrini with the space agency

519

00:17:39,029 --> 00:17:38,000

thank you we appreciate you being here

520

00:17:40,950 --> 00:17:39,039

the uh

521

00:17:42,710 --> 00:17:40,960

we want to take a brief moment now to

522

00:17:44,070 --> 00:17:42,720

honor our country with the singing of

523

00:17:45,669 --> 00:17:44,080

america the beautiful

524

00:17:47,590 --> 00:17:45,679

and we're thrilled to bring you a

525

00:17:50,789 --> 00:17:47,600

virtual rendition sung by

526
00:17:53,430 --> 00:17:50,799
musica a group of youth ensembles and

527
00:18:01,080 --> 00:17:53,440
youth orchestras from california

528
00:18:09,150 --> 00:18:01,090
florida and the carolinas

529
00:18:16,110 --> 00:18:09,160
[Music]

530
00:18:16,120 --> 00:18:33,190
mountain majesties

531
00:18:57,790 --> 00:18:43,830
his grace

532
00:19:08,830 --> 00:18:57,800
from sea to shining sea

533
00:19:08,840 --> 00:19:33,130
is

534
00:19:33,140 --> 00:19:36,830
[Music]

535
00:19:50,830 --> 00:19:38,220
foreign

536
00:20:03,510 --> 00:19:52,710
shiny

537
00:20:06,549 --> 00:20:03,520
[Music]

538
00:20:07,909 --> 00:20:06,559

oh that was so beautiful and it's so

539

00:20:09,590 --> 00:20:07,919

great to see all the kids

540

00:20:13,190 --> 00:20:09,600

playing and singing oh that was just

541

00:20:16,789 --> 00:20:14,789

that's tough to get everybody in tune

542

00:20:18,470 --> 00:20:16,799

when you're not together all in separate

543

00:20:19,830 --> 00:20:18,480

locations but so many orchestras and

544

00:20:21,590 --> 00:20:19,840

singers across the country are doing

545

00:20:22,149 --> 00:20:21,600

just that to keep the arts going this is

546

00:20:23,909 --> 00:20:22,159

beautiful

547

00:20:25,990 --> 00:20:23,919

all right well we are now t minus 10

548

00:20:27,750 --> 00:20:26,000

minutes until launch and this mission

549

00:20:28,470 --> 00:20:27,760

has a special treat for everyone

550

00:20:31,590 --> 00:20:28,480

watching

551
00:20:33,350 --> 00:20:31,600
spacex is planning to land their booster

552
00:20:35,669 --> 00:20:33,360
just a stone's throw away from the

553
00:20:37,750 --> 00:20:35,679
launch pad spacex has landed their first

554
00:20:39,750 --> 00:20:37,760
stage 65 times but

555
00:20:42,470 --> 00:20:39,760
this is only the third time landing on

556
00:20:43,510 --> 00:20:42,480
land here in california and joining us

557
00:20:45,990 --> 00:20:43,520
live to talk about it

558
00:20:47,270 --> 00:20:46,000
is spacex lead manufacturing engineer

559
00:20:48,630 --> 00:20:47,280
jesse anderson

560
00:20:50,950 --> 00:20:48,640
you might recognize her from such

561
00:20:52,230 --> 00:20:50,960
popular nasa spacex shows as crew one

562
00:20:53,669 --> 00:20:52,240
demo two

563
00:20:55,590 --> 00:20:53,679

thanks for being here it's great having

564

00:20:57,590 --> 00:20:55,600

you thank you for having me i am

565

00:21:00,310 --> 00:20:57,600

so excited i don't think i can even

566

00:21:01,590 --> 00:21:00,320

contain it right now

567

00:21:03,510 --> 00:21:01,600

you see the rocket there on the pad

568

00:21:05,510 --> 00:21:03,520

isn't that something it is a beautiful

569

00:21:06,470 --> 00:21:05,520

view and i'm so excited to see it here

570

00:21:07,990 --> 00:21:06,480

in person

571

00:21:10,549 --> 00:21:08,000

have you ever seen a launch in the

572

00:21:13,830 --> 00:21:10,559

landing so not that i haven't tried

573

00:21:15,830 --> 00:21:13,840

um i tried to come last year um and

574

00:21:17,350 --> 00:21:15,840

you know vandenbergh is known for the

575

00:21:20,630 --> 00:21:17,360

impeccable fog

576

00:21:22,870 --> 00:21:20,640

um so when i came all i saw was fog

577

00:21:24,310 --> 00:21:22,880

um so i heard it but didn't actually get

578

00:21:25,669 --> 00:21:24,320

to see it with my eyes so i'm really

579

00:21:27,669 --> 00:21:25,679

excited that it's a clear

580

00:21:29,350 --> 00:21:27,679

and beautiful day today and hopefully

581

00:21:30,870 --> 00:21:29,360

we'll be able to see both launch and

582

00:21:32,789 --> 00:21:30,880

landing clearly

583

00:21:34,630 --> 00:21:32,799

it's looking good so far now for those

584

00:21:36,549 --> 00:21:34,640

of people who are unfamiliar with the

585

00:21:37,350 --> 00:21:36,559

process how exactly does the booster

586

00:21:40,310 --> 00:21:37,360

landing work

587

00:21:41,430 --> 00:21:40,320

oh yeah this is really cool so after

588

00:21:44,390 --> 00:21:41,440

stage separation

589

00:21:45,190 --> 00:21:44,400

um second stage makes its way on on its

590

00:21:47,029 --> 00:21:45,200

way to orbit

591

00:21:49,029 --> 00:21:47,039

but first stage actually does a flip

592

00:21:49,830 --> 00:21:49,039

maneuver so it continues um to gain

593

00:21:51,110 --> 00:21:49,840

altitude

594

00:21:53,110 --> 00:21:51,120

and actually does kind of like a

595

00:21:54,789 --> 00:21:53,120

backflip um and then we have

596

00:21:56,390 --> 00:21:54,799

three burns that it does so when it's

597

00:21:57,190 --> 00:21:56,400

doing that backflip it does the boost

598

00:21:59,430 --> 00:21:57,200

back burn

599

00:22:00,230 --> 00:21:59,440

which is three of the nine merlin one uh

600

00:22:03,350 --> 00:22:00,240

engines

601
00:22:05,029 --> 00:22:03,360
uh re reigniting um and then following

602
00:22:06,710 --> 00:22:05,039
the boost back burn it will do an entry

603
00:22:08,070 --> 00:22:06,720
burn to help slow it down

604
00:22:10,630 --> 00:22:08,080
as it enters back into the earth's

605
00:22:13,669 --> 00:22:10,640
atmosphere and then it comes back down

606
00:22:15,350 --> 00:22:13,679
and lands with just one single engine

607
00:22:17,190 --> 00:22:15,360
for the final landing burn it is the

608
00:22:17,830 --> 00:22:17,200
neatest thing to see in person and it is

609
00:22:20,149 --> 00:22:17,840
loud there's

610
00:22:21,669 --> 00:22:20,159
a big sonic boom you have to even like

611
00:22:23,270 --> 00:22:21,679
warn the local residents that it's

612
00:22:24,789 --> 00:22:23,280
happening

613
00:22:26,630 --> 00:22:24,799

we want to actually share a special

614

00:22:29,029 --> 00:22:26,640

question with you right now there is a

615

00:22:30,789 --> 00:22:29,039

young man an eight-year-old named parv

616

00:22:32,230 --> 00:22:30,799

he contacted nasa

617

00:22:34,149 --> 00:22:32,240

and shared this picture with it we want

618

00:22:34,870 --> 00:22:34,159

to put it up on the screen he made a

619

00:22:36,630 --> 00:22:34,880

rangoli

620

00:22:39,190 --> 00:22:36,640

this is a traditional decoration for

621

00:22:41,190 --> 00:22:39,200

diwali made of sand rice powder

622

00:22:42,789 --> 00:22:41,200

and or flower petals in the shape of a

623

00:22:44,549 --> 00:22:42,799

rocket you see it there

624

00:22:47,270 --> 00:22:44,559

there's it's so beautiful he's got a

625

00:22:50,870 --> 00:22:49,029

so they're here for the launch they're

626

00:22:53,350 --> 00:22:50,880

watching and his question

627

00:22:55,590 --> 00:22:53,360

to you jessica is how do nasa and spacex

628

00:22:58,390 --> 00:22:55,600

achieve the pinpoint accuracy

629

00:22:59,430 --> 00:22:58,400

they need to launch oh man a lot of hard

630

00:23:01,669 --> 00:22:59,440

work

631

00:23:03,029 --> 00:23:01,679

to sum it up um but there's a number of

632

00:23:04,549 --> 00:23:03,039

things you know we have to calculate you

633

00:23:06,390 --> 00:23:04,559

know the orbital mechanics for how to

634

00:23:09,590 --> 00:23:06,400

get the satellite into space but

635

00:23:10,310 --> 00:23:09,600

there's tons of sensors and a guidance

636

00:23:12,070 --> 00:23:10,320

navigation

637

00:23:14,870 --> 00:23:12,080

control system on the vehicle the

638

00:23:17,110 --> 00:23:14,880

vehicle is uh completely autonomous

639

00:23:19,430 --> 00:23:17,120

so as you know the vehicle is moving so

640

00:23:19,750 --> 00:23:19,440

fast human reaction is not quick enough

641

00:23:28,870 --> 00:23:19,760

to

642

00:23:30,470 --> 00:23:28,880

that's amazing you guys have gotten so

643

00:23:32,149 --> 00:23:30,480

good at it lately so

644

00:23:33,990 --> 00:23:32,159

we're looking forward to that part of it

645

00:23:34,470 --> 00:23:34,000

jessica anderson from spacex thank you

646

00:23:36,549 --> 00:23:34,480

so much

647

00:23:37,830 --> 00:23:36,559

you're going to stick around because for

648

00:23:39,510 --> 00:23:37,840

the landing we're going to have you back

649

00:23:41,909 --> 00:23:39,520

out and we're going to enjoy it together

650

00:23:44,230 --> 00:23:41,919

yes i cannot wait i'm so excited all

651
00:23:45,750 --> 00:23:44,240
right fantastic thank you jessica

652
00:23:47,990 --> 00:23:45,760
and now we're about t minus seven

653
00:23:50,710 --> 00:23:48,000
minutes until liftoff of sentinel 6

654
00:23:51,269 --> 00:23:50,720
michael freylick on a spacex falcon 9

655
00:23:53,350 --> 00:23:51,279
rocket

656
00:23:55,669 --> 00:23:53,360
that's right the moment is upon us we're

657
00:23:57,750 --> 00:23:55,679
going to hand it over to joshua santora

658
00:23:59,909 --> 00:23:57,760
and phillip hargrove for the countdown

659
00:24:01,510 --> 00:23:59,919
to launch guys take it away

660
00:24:03,190 --> 00:24:01,520
hey thanks so much it's been an active

661
00:24:03,990 --> 00:24:03,200
few minutes past few minutes starting to

662
00:24:05,750 --> 00:24:04,000
hear calls of clothes

663
00:24:07,430 --> 00:24:05,760

out and things but before we go too far

664

00:24:09,350 --> 00:24:07,440

i want to philip ask you

665

00:24:10,710 --> 00:24:09,360

uh to introduce us to the teams that are

666

00:24:12,470 --> 00:24:10,720

on console today so

667

00:24:13,990 --> 00:24:12,480

uh there are teams of teams really

668

00:24:15,830 --> 00:24:14,000

working this launch who do we have on

669

00:24:17,590 --> 00:24:15,840

board today you're absolutely right so

670

00:24:19,909 --> 00:24:17,600

we have our international partners from

671

00:24:23,190 --> 00:24:19,919

the european space agency or esa

672

00:24:24,870 --> 00:24:23,200

and the nasa jet propulsion lab or jpl

673

00:24:27,269 --> 00:24:24,880

who have science instruments on board

674

00:24:29,029 --> 00:24:27,279

the spacecraft that was developed by esa

675

00:24:30,710 --> 00:24:29,039

spacex obviously manufactured and

676
00:24:32,630 --> 00:24:30,720
produced the falcon 9 rocket

677
00:24:34,630 --> 00:24:32,640
and the nasa launch services program or

678
00:24:35,029 --> 00:24:34,640
lsp team has been working closely with

679
00:24:36,549 --> 00:24:35,039
them

680
00:24:38,870 --> 00:24:36,559
for the past couple of years to prepare

681
00:24:39,350 --> 00:24:38,880
for today and the united states space

682
00:24:41,350 --> 00:24:39,360
force

683
00:24:42,470 --> 00:24:41,360
range is responsible for public safety

684
00:24:43,990 --> 00:24:42,480
today

685
00:24:45,990 --> 00:24:44,000
yes grateful for everybody's

686
00:24:47,510 --> 00:24:46,000
participation lots of good

687
00:24:49,350 --> 00:24:47,520
comments made this week during briefings

688
00:24:50,950 --> 00:24:49,360

and reviews about just the incredible

689

00:24:52,070 --> 00:24:50,960

partnership and collaboration here so

690

00:24:53,990 --> 00:24:52,080

i want to tell you about what's coming

691

00:24:55,510 --> 00:24:54,000

up uh through the rest of the count as

692

00:24:56,710 --> 00:24:55,520

we proceed towards liftoff here in just

693

00:24:58,149 --> 00:24:56,720

five minutes now

694

00:25:01,029 --> 00:24:58,159

we're gonna here we should hear a call

695

00:25:02,149 --> 00:25:01,039

for rp1 full in just a second

696

00:25:04,230 --> 00:25:02,159

and then we'll be looking for the

697

00:25:05,269 --> 00:25:04,240

strongback retract to take place in just

698

00:25:07,029 --> 00:25:05,279

a few seconds

699

00:25:08,870 --> 00:25:07,039

propellant tanks are pressurizing for

700

00:25:09,990 --> 00:25:08,880

strongback recharge

701
00:25:11,830 --> 00:25:10,000
perfect so what that's going to look

702
00:25:13,430 --> 00:25:11,840
like on your screen is up near the top

703
00:25:15,190 --> 00:25:13,440
of that rocket where the fairing is

704
00:25:16,470 --> 00:25:15,200
just beneath the bottom edge of that

705
00:25:16,950 --> 00:25:16,480
fairing you can see that on screen there

706
00:25:18,390 --> 00:25:16,960
very well

707
00:25:19,750 --> 00:25:18,400
there's a clamp that's wrapped around

708
00:25:20,630 --> 00:25:19,760
the second stage of the falcon that

709
00:25:22,789 --> 00:25:20,640
clamp will

710
00:25:24,390 --> 00:25:22,799
expand and then that tower the

711
00:25:25,990 --> 00:25:24,400
strongback or transporter erector will

712
00:25:27,510 --> 00:25:26,000
tilt back just a couple degrees

713
00:25:30,470 --> 00:25:27,520

in preparation for the final minutes of

714

00:25:31,750 --> 00:25:30,480

countdown it will still be connected

715

00:25:33,590 --> 00:25:31,760

there's that call the retract has

716

00:25:35,750 --> 00:25:33,600

started that that strong back

717

00:25:36,710 --> 00:25:35,760

provides power fluids and communication

718

00:25:38,230 --> 00:25:36,720

for the rocket

719

00:25:39,909 --> 00:25:38,240

up until the time of liftoff when it

720

00:25:40,710 --> 00:25:39,919

will tilt back even further away from

721

00:25:42,390 --> 00:25:40,720

the rocket so

722

00:25:43,990 --> 00:25:42,400

keep your eyes on that uh but philip

723

00:25:46,070 --> 00:25:44,000

wanted to have you tell us about the

724

00:25:47,750 --> 00:25:46,080

the path for today's flight the folks

725

00:25:49,110 --> 00:25:47,760

along the the southern coast of

726

00:25:51,590 --> 00:25:49,120

california might get a treat

727

00:25:52,950 --> 00:25:51,600

if they're outside looking up to the sky

728

00:25:54,549 --> 00:25:52,960

right i'm definitely happy for the

729

00:25:55,750 --> 00:25:54,559

people out there in southern california

730

00:25:57,190 --> 00:25:55,760

because you know we get a million

731

00:25:59,190 --> 00:25:57,200

launches out here but you know

732

00:26:00,470 --> 00:25:59,200

they can finally see some and especially

733

00:26:02,310 --> 00:26:00,480

at jpl because it's

734

00:26:04,390 --> 00:26:02,320

you know they're invested in this launch

735

00:26:05,990 --> 00:26:04,400

so vanderberg is really convenient for

736

00:26:08,789 --> 00:26:06,000

these high inclination launches

737

00:26:10,390 --> 00:26:08,799

so sentinel 6 michael freilick has a 66

738

00:26:12,390 --> 00:26:10,400

degree inclination which means that it's

739

00:26:14,549 --> 00:26:12,400

perfect for the falcon 9 to

740

00:26:16,470 --> 00:26:14,559

launch south southeast and it's really

741

00:26:18,390 --> 00:26:16,480

going to kind of ride along the coast

742

00:26:20,549 --> 00:26:18,400

of central and south america on its way

743

00:26:21,990 --> 00:26:20,559

up to that 1300 kilometer altitude

744

00:26:24,789 --> 00:26:22,000

yeah very good we just heard there tim

745

00:26:26,789 --> 00:26:24,799

dunn coming on on the nets and

746

00:26:28,950 --> 00:26:26,799

giving his official go so nasa is go for

747

00:26:29,830 --> 00:26:28,960

flight here uh the last few minutes here

748

00:26:31,190 --> 00:26:29,840

we're going to see

749

00:26:34,230 --> 00:26:31,200

we're going to hear a number of calls

750

00:26:35,590 --> 00:26:34,240

with closing out liquid oxygen or locks

751
00:26:37,190 --> 00:26:35,600
and then we'll kind of tick down here to

752
00:26:38,789 --> 00:26:37,200
the final minutes where we'll hear uh

753
00:26:40,549 --> 00:26:38,799
we're commanded for

754
00:26:42,149 --> 00:26:40,559
final pre-launch uh we'll have the

755
00:26:43,350 --> 00:26:42,159
automated flight termination system will

756
00:26:44,789 --> 00:26:43,360
be configured for launch

757
00:26:47,990 --> 00:26:44,799
we'll get a final go from the launch

758
00:26:49,510 --> 00:26:48,000
director at around 45 seconds to go

759
00:26:51,430 --> 00:26:49,520
on the way to zero there right on time

760
00:26:55,669 --> 00:26:51,440
for this instantaneous window

761
00:26:57,750 --> 00:26:55,679
at uh 12 1708 eastern time that's 9 17

762
00:26:59,750 --> 00:26:57,760
08 there on the ground

763
00:27:00,870 --> 00:26:59,760

so philip really fast here as we're

764

00:27:02,390 --> 00:27:00,880

waiting for the liftoff

765

00:27:04,230 --> 00:27:02,400

tell us about the rocket here you kind

766

00:27:05,830 --> 00:27:04,240

of told us about the flight path but

767

00:27:07,830 --> 00:27:05,840

what is this rocket capable of there's a

768

00:27:09,110 --> 00:27:07,840

lot going on here right there's a lot

769

00:27:11,350 --> 00:27:09,120

going on and we have some beautiful

770

00:27:13,510 --> 00:27:11,360

views of this falcon 9 so you can see

771

00:27:15,430 --> 00:27:13,520

it's a two-stage rocket the first stage

772

00:27:17,750 --> 00:27:15,440

or the booster goes about two-thirds of

773

00:27:20,149 --> 00:27:17,760

the way up and that actually provides

774

00:27:21,830 --> 00:27:20,159

1.7 million pounds of thrust which is

775

00:27:22,789 --> 00:27:21,840

gonna you know get the the vehicle and

776

00:27:25,669 --> 00:27:22,799

the spacecraft

777

00:27:27,510 --> 00:27:25,679

off of the pad the second stage its

778

00:27:28,549 --> 00:27:27,520

engines or its engine is housed in that

779

00:27:30,230 --> 00:27:28,559

black interstage

780

00:27:31,909 --> 00:27:30,240

region that's just below the five meter

781

00:27:33,830 --> 00:27:31,919

fairing and that's what's going to

782

00:27:34,789 --> 00:27:33,840

finally bring the spacecraft up into its

783

00:27:36,470 --> 00:27:34,799

orbits

784

00:27:37,990 --> 00:27:36,480

and as we've discussed already that

785

00:27:39,830 --> 00:27:38,000

first stage once it separates from the

786

00:27:41,029 --> 00:27:39,840

second stage is going to head on back to

787

00:27:42,870 --> 00:27:41,039

vandenberg

788

00:27:45,430 --> 00:27:42,880

awesome so so much coming up here uh

789

00:27:46,950 --> 00:27:45,440

post liftoff is certainly active as well

790

00:27:49,029 --> 00:27:46,960

about a minute into flight we'll hear

791

00:27:50,389 --> 00:27:49,039

calls for flight through max q or

792

00:27:52,789 --> 00:27:50,399

maximum aerodynamic

793

00:27:53,909 --> 00:27:52,799

pressure and then we'll about two and a

794

00:27:55,430 --> 00:27:53,919

half

795

00:27:57,110 --> 00:27:55,440

strong record track has been completed

796

00:27:58,630 --> 00:27:57,120

there you go you can see a nice

797

00:28:00,149 --> 00:27:58,640

separation there between the rocket and

798

00:28:01,750 --> 00:28:00,159

that transporter erector

799

00:28:03,190 --> 00:28:01,760

about two and a half minutes into flight

800

00:28:04,630 --> 00:28:03,200

we're expecting to see a few things

801
00:28:05,990 --> 00:28:04,640
happen very rapidly we're going to see

802
00:28:08,789 --> 00:28:06,000
that booster separate

803
00:28:09,430 --> 00:28:08,799
uh after that first stage engine cutoff

804
00:28:11,110 --> 00:28:09,440
happens

805
00:28:12,630 --> 00:28:11,120
uh and then after that separation takes

806
00:28:14,630 --> 00:28:12,640
place the second stage

807
00:28:15,990 --> 00:28:14,640
load is complete there's that stage two

808
00:28:17,669 --> 00:28:16,000
liquid oxygen load complete which

809
00:28:19,029 --> 00:28:17,679
is great you kind of see some of the

810
00:28:21,590 --> 00:28:19,039
steam coming off the vehicle

811
00:28:24,310 --> 00:28:21,600
that's dealing with cryogenic fluid

812
00:28:25,269 --> 00:28:24,320
that's on the order of negative 330

813
00:28:27,669 --> 00:28:25,279

degrees fahrenheit

814

00:28:29,350 --> 00:28:27,679

it's densified liquid oxygen mixing with

815

00:28:30,710 --> 00:28:29,360

the uh

816

00:28:32,950 --> 00:28:30,720

the ambient temperature there which

817

00:28:35,750 --> 00:28:32,960

creates that that fog that steam effect

818

00:28:37,510 --> 00:28:35,760

uh so um we'll also see a lot more

819

00:28:40,310 --> 00:28:37,520

happening pose liftoff so stay with us

820

00:28:41,430 --> 00:28:40,320

and we even have a lot very very late

821

00:28:42,950 --> 00:28:41,440

into the show today

822

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

we're roughly an hour and a half of

823

00:28:46,470 --> 00:28:44,880

milestones past liftoff

824

00:28:47,830 --> 00:28:46,480

of getting into the correct orbit and

825

00:28:48,789 --> 00:28:47,840

confirming that we have a good healthy

826

00:28:50,310 --> 00:28:48,799

spacecraft

827

00:28:51,669 --> 00:28:50,320

so please stay with us there's a ton

828

00:28:52,470 --> 00:28:51,679

going on but we'll let you listen in

829

00:28:58,789 --> 00:28:52,480

these last minute

830

00:29:12,470 --> 00:28:58,799

and just enjoy the countdown

831

00:29:24,310 --> 00:29:12,480

falcon 9 is a startup

832

00:29:28,149 --> 00:29:26,230

you may notice some water beginning to

833

00:29:29,669 --> 00:29:28,159

flood the patio that's very intentional

834

00:29:31,350 --> 00:29:29,679

uh that's actually a sound suppression

835

00:29:34,549 --> 00:29:31,360

system that that occurs

836

00:29:35,750 --> 00:29:34,559

to allow uh the the sound

837

00:29:37,110 --> 00:29:35,760

of the vibrate the vibration of the

838

00:29:39,110 --> 00:29:37,120

sound to actually be suppressed and it

839

00:29:42,230 --> 00:29:39,120

also helps with some cooling as well

840

00:29:46,870 --> 00:29:42,240

falcon 9 is configured for flight 2

841

00:29:54,070 --> 00:29:50,230

10 9 9 8

842

00:29:57,190 --> 00:29:54,080

7 6 5 four

843

00:30:01,190 --> 00:29:57,200

three two one

844

00:30:03,669 --> 00:30:01,200

zero and liftoff of sentinel six

845

00:30:05,430 --> 00:30:03,679

michael freilick continuing a legacy of

846

00:30:06,310 --> 00:30:05,440

ocean observation and international

847

00:30:16,870 --> 00:30:06,320

collaboration

848

00:30:16,880 --> 00:30:34,830

and money propulsion is nominal

849

00:30:34,840 --> 00:30:48,830

oh

850

00:30:48,840 --> 00:31:01,190

foreign

851
00:31:01,200 --> 00:31:14,310
vehicle is supersonic

852
00:31:21,430 --> 00:31:15,909
vehicle is experiencing maximum

853
00:31:25,590 --> 00:31:24,070
so there we heard that call for max q we

854
00:31:27,190 --> 00:31:25,600
also heard vehicle supersonic meaning

855
00:31:28,630 --> 00:31:27,200
it's traveling faster than the speed of

856
00:31:30,310 --> 00:31:28,640
sound

857
00:31:31,750 --> 00:31:30,320
a beautiful shot there from the first

858
00:31:34,470 --> 00:31:31,760
stage looking down towards

859
00:31:35,750 --> 00:31:34,480
earth and seeing the plume there created

860
00:32:12,070 --> 00:31:35,760
by those nine

861
00:32:15,430 --> 00:32:13,430
beautiful clear skies there from

862
00:32:16,789 --> 00:32:15,440
vandenbergh on the ground able to track

863
00:32:19,669 --> 00:32:16,799

with that rocket as you see it on screen

864

00:32:22,310 --> 00:32:20,950

just a reminder coming up here very

865

00:32:23,669 --> 00:32:22,320

quickly we're going to hear booster our

866

00:32:25,909 --> 00:32:23,679

first stage engine cut-off page

867

00:32:27,350 --> 00:32:25,919

separation confirmed

868

00:32:32,470 --> 00:32:27,360

booster separation is there visible on

869

00:32:36,230 --> 00:32:34,070

there's the backflip as jesse mentioned

870

00:32:43,509 --> 00:32:36,240

beginning with the falcon booster

871

00:32:45,029 --> 00:32:43,519

stage one booster

872

00:32:46,630 --> 00:32:45,039

and that second engine looks like it has

873

00:32:47,110 --> 00:32:46,640

lit you can start to see the engine bell

874

00:32:51,430 --> 00:32:47,120

there

875

00:32:53,750 --> 00:32:51,440

turning uh an orb nominal trajectory

876
00:32:55,509 --> 00:32:53,760
bearing separation confirmed and there

877
00:32:56,950 --> 00:32:55,519
goes the fairing that's exposed that is

878
00:32:58,789 --> 00:32:56,960
sentinel 6 michael frey look there on

879
00:32:59,990 --> 00:32:58,799
your screen that is the satellite that

880
00:33:00,710 --> 00:33:00,000
has been exposed now because the

881
00:33:02,549 --> 00:33:00,720
fairings have been

882
00:33:03,750 --> 00:33:02,559
jettisoned and separated and you just

883
00:33:04,950 --> 00:33:03,760
saw it there tumbling away some

884
00:33:22,070 --> 00:33:04,960
beautiful shots

885
00:33:22,080 --> 00:33:26,470
and stage one boost back burn shutdown

886
00:33:29,509 --> 00:33:28,630
so we're getting reverse angle views of

887
00:33:31,350 --> 00:33:29,519
that engine

888
00:33:33,509 --> 00:33:31,360

on screen that's what you're seeing uh

889

00:33:36,549 --> 00:33:33,519

this is switching between opposite ends

890

00:33:38,630 --> 00:33:36,559

opposite sides of that second stage

891

00:33:40,310 --> 00:33:38,640

trajectory and that term nominal being

892

00:33:42,230 --> 00:33:40,320

used uh we've heard that a lot during

893

00:33:43,509 --> 00:33:42,240

this call out that's a very good sign

894

00:33:44,870 --> 00:33:43,519

nominal just means that everything is

895

00:33:47,190 --> 00:33:44,880

going according to plan

896

00:33:53,350 --> 00:33:47,200

with within the expectation of operation

897

00:33:55,269 --> 00:33:53,360

for the vehicle

898

00:33:56,789 --> 00:33:55,279

so we are oh they're a great shot from

899

00:33:58,389 --> 00:33:56,799

the first stage you can see the

900

00:34:02,070 --> 00:33:58,399

hypersonic grid fins there

901
00:34:04,149 --> 00:34:02,080
that are expanded those honeycomb shaped

902
00:34:06,070 --> 00:34:04,159
structures as the booster begins to

903
00:34:06,789 --> 00:34:06,080
enter the atmosphere those will be able

904
00:34:09,270 --> 00:34:06,799
to help

905
00:34:10,790 --> 00:34:09,280
guide and stabilize the booster to make

906
00:34:12,389 --> 00:34:10,800
sure that we hit that pinpoint landing

907
00:34:14,470 --> 00:34:12,399
like we heard that question asked

908
00:34:17,750 --> 00:34:14,480
how do we ensure pinpoint landing and

909
00:34:19,190 --> 00:34:17,760
those grid fins play a huge part in that

910
00:34:21,430 --> 00:34:19,200
that second stage is in the middle of

911
00:34:24,230 --> 00:34:21,440
its first burn uh this burn

912
00:34:25,829 --> 00:34:24,240
will last approximately six and a half

913
00:34:27,190 --> 00:34:25,839

minutes

914

00:34:29,349 --> 00:34:27,200

and then there will be a long coast

915

00:34:30,310 --> 00:34:29,359

phase today and then we will have a very

916

00:34:33,349 --> 00:34:30,320

short uh

917

00:34:35,510 --> 00:34:33,359

a relatively short second stage second

918

00:34:36,310 --> 00:34:35,520

burn to put us in the correct orbit to

919

00:34:46,829 --> 00:34:36,320

follow that

920

00:34:51,030 --> 00:34:48,470

earlier

921

00:34:51,510 --> 00:34:51,040

so philip from a trajectory perspective

922

00:34:53,750 --> 00:34:51,520

is this

923

00:34:54,950 --> 00:34:53,760

just kind of a moment where does the

924

00:34:55,990 --> 00:34:54,960

people working this mission do they kind

925

00:34:57,510 --> 00:34:56,000

of just sit and wait

926
00:34:59,270 --> 00:34:57,520
as well here because obviously we're not

927
00:35:00,950 --> 00:34:59,280
controlling this actively it's just the

928
00:35:01,990 --> 00:35:00,960
vehicle in theory just doing what it's

929
00:35:03,349 --> 00:35:02,000
programmed to do

930
00:35:05,030 --> 00:35:03,359
right i mean i will say i didn't

931
00:35:06,710 --> 00:35:05,040
personally work this mission so i'm not

932
00:35:07,670 --> 00:35:06,720
sure what my co-worker who worked it for

933
00:35:09,589 --> 00:35:07,680
a couple of years

934
00:35:11,190 --> 00:35:09,599
thinking but it's beautiful to watch

935
00:35:12,310 --> 00:35:11,200
this trajectory that we've been planning

936
00:35:13,829 --> 00:35:12,320
out for years

937
00:35:15,990 --> 00:35:13,839
we know what the math looks like we know

938
00:35:17,670 --> 00:35:16,000

what the numbers are but actually seeing

939

00:35:19,430 --> 00:35:17,680

these views from the second stage is

940

00:35:21,349 --> 00:35:19,440

just amazing

941

00:35:22,870 --> 00:35:21,359

yeah very good uh and we'll talk more

942

00:35:23,670 --> 00:35:22,880

about kind of your role and what you do

943

00:35:26,230 --> 00:35:23,680

as a

944

00:35:28,230 --> 00:35:26,240

trajectory analyst you are by all

945

00:35:30,710 --> 00:35:28,240

accounts a rocket scientist which is

946

00:35:31,750 --> 00:35:30,720

pretty cool we will come back and chat

947

00:35:33,349 --> 00:35:31,760

more in a bit uh

948

00:35:35,670 --> 00:35:33,359

again we'll revisit you once we get

949

00:35:37,670 --> 00:35:35,680

towards that second stage second bird

950

00:35:39,990 --> 00:35:37,680

but for now i think we're ready to head

951
00:35:42,069 --> 00:35:40,000
back out to to check in with daryl

952
00:35:43,270 --> 00:35:42,079
and jesse to hopefully enjoy nominal

953
00:35:45,750 --> 00:35:43,280
trajectories

954
00:35:46,950 --> 00:35:45,760
what i would expect to be a beautiful

955
00:35:50,230 --> 00:35:46,960
very noisy

956
00:35:57,270 --> 00:35:50,240
uh nominal landing of that booster daryl

957
00:36:00,470 --> 00:35:58,550
all right we're going to hang off

958
00:36:01,030 --> 00:36:00,480
they're not quite ready yet uh i'm sure

959
00:36:02,950 --> 00:36:01,040
they're just

960
00:36:03,990 --> 00:36:02,960
enjoying it they probably got up uh to

961
00:36:05,430 --> 00:36:04,000
watch that launch and they're probably

962
00:36:08,870 --> 00:36:05,440
getting positioned again so

963
00:36:29,750 --> 00:36:08,880

uh i don't blame them me neither

964

00:36:33,750 --> 00:36:33,190

so that uh second stage uh merlin vacuum

965

00:36:36,150 --> 00:36:33,760

engine

966

00:36:37,750 --> 00:36:36,160

uh m vac as we like to call it uh that

967

00:36:39,990 --> 00:36:37,760

produces around 210

968

00:36:41,910 --> 00:36:40,000

000 pounds of thrust once it's on orbit

969

00:36:43,510 --> 00:36:41,920

uh in the vacuum of space

970

00:36:44,710 --> 00:36:43,520

started all right so call for the entry

971

00:36:45,829 --> 00:36:44,720

burn there i think daryl marina are

972

00:36:46,390 --> 00:36:45,839

ready for us they should be there with

973

00:36:48,310 --> 00:36:46,400

jesse

974

00:36:52,230 --> 00:36:48,320

to talk us through the landing uh how

975

00:36:55,349 --> 00:36:54,310

oh my goodness it's incredible it was

976
00:36:57,910 --> 00:36:55,359
incredible

977
00:36:58,790 --> 00:36:57,920
that's why we're awesome we're all

978
00:37:01,109 --> 00:36:58,800
talking at the same time

979
00:37:02,870 --> 00:37:01,119
it's great i think can you tell that

980
00:37:04,630 --> 00:37:02,880
we're excited we were standing there we

981
00:37:05,829 --> 00:37:04,640
saw it it was so clear we could see the

982
00:37:07,750 --> 00:37:05,839
separation

983
00:37:09,349 --> 00:37:07,760
as it was going the entire time jesse i

984
00:37:12,150 --> 00:37:09,359
mean in that

985
00:37:13,589 --> 00:37:12,160
inspiring mind so it's going to be

986
00:37:15,910 --> 00:37:13,599
landing right behind us

987
00:37:17,510 --> 00:37:15,920
and we've got a view now of the actual

988
00:37:19,990 --> 00:37:17,520

booster coming back

989

00:37:20,870 --> 00:37:20,000

um it's got its grid fins out and that's

990

00:37:23,030 --> 00:37:20,880

helpful that's

991

00:37:24,390 --> 00:37:23,040

it has to use those things it has to

992

00:37:27,349 --> 00:37:24,400

help steer it um

993

00:37:29,829 --> 00:37:27,359

as it's making its way back to land so

994

00:37:31,349 --> 00:37:29,839

it's the steering mechanism

995

00:37:33,990 --> 00:37:31,359

it's really interesting that it lands

996

00:37:36,069 --> 00:37:34,000

right next to the launch pad

997

00:37:37,750 --> 00:37:36,079

we have a little tent over top of us so

998

00:37:38,550 --> 00:37:37,760

we're not going to see that first boost

999

00:37:41,430 --> 00:37:38,560

back here

1000

00:37:42,950 --> 00:37:41,440

but we would have a clear shot of uh it

1001

00:37:44,630 --> 00:37:42,960

coming down onto the pad

1002

00:37:46,230 --> 00:37:44,640

the other thing we're wait uh waiting

1003

00:37:50,630 --> 00:37:46,240

for and we're making sure that we

1004

00:37:52,710 --> 00:37:50,640

keep track of is engine cut off of stage

1005

00:37:54,310 --> 00:37:52,720

stage two and we're going to call that

1006

00:37:59,270 --> 00:37:54,320

out here it comes

1007

00:38:01,829 --> 00:37:59,280

there it is oh my goodness

1008

00:38:03,430 --> 00:38:01,839

and just straightening out what do you

1009

00:38:06,069 --> 00:38:03,440

think jesse that's amazing oh my

1010

00:38:08,310 --> 00:38:06,079

goodness i might cry right now

1011

00:38:09,589 --> 00:38:08,320

this is so incredible every time i see

1012

00:38:14,230 --> 00:38:09,599

this it's just

1013

00:38:16,710 --> 00:38:14,240

slowing down so perfectly perfectly

1014

00:38:30,630 --> 00:38:16,720

there's the sonic booms we talked about

1015

00:38:34,950 --> 00:38:33,510

to see it here in person to feel it and

1016

00:38:36,870 --> 00:38:34,960

like jesse said

1017

00:38:38,230 --> 00:38:36,880

no matter if you see it or not you

1018

00:38:41,349 --> 00:38:38,240

always hear it right

1019

00:38:42,230 --> 00:38:41,359

that sonic boom is recognizable wherever

1020

00:38:47,430 --> 00:38:42,240

you are

1021

00:38:50,710 --> 00:38:50,310

i have no words that was incredible like

1022

00:38:54,630 --> 00:38:50,720

as

1023

00:38:56,630 --> 00:38:54,640

in person is a whole different

1024

00:38:58,390 --> 00:38:56,640

experience

1025

00:38:59,670 --> 00:38:58,400

the crowd that's with us you can hear

1026
00:39:00,790 --> 00:38:59,680
them cheering and everything they're

1027
00:39:05,190 --> 00:39:00,800
just totally like

1028
00:39:08,150 --> 00:39:05,200
you know in in awe we're so glad that uh

1029
00:39:08,630 --> 00:39:08,160
we could do this and uh have you join us

1030
00:39:10,470 --> 00:39:08,640
with us

1031
00:39:11,910 --> 00:39:10,480
jesse anderson from spacex lead

1032
00:39:13,270 --> 00:39:11,920
manufacturing engineer

1033
00:39:15,430 --> 00:39:13,280
thanks so much for coming out here what

1034
00:39:17,430 --> 00:39:15,440
a moment so much for having me this has

1035
00:39:20,710 --> 00:39:17,440
been amazing thank you

1036
00:39:23,829 --> 00:39:20,720
thank you all right well the coast phase

1037
00:39:26,390 --> 00:39:23,839
is um about 45 minutes away

1038
00:39:28,790 --> 00:39:26,400

and so we don't expect any activity to

1039

00:39:29,910 --> 00:39:28,800

report at this time but if there is we

1040

00:39:31,670 --> 00:39:29,920

will let you know

1041

00:39:33,670 --> 00:39:31,680

and in the meantime we'd like to tell

1042

00:39:34,950 --> 00:39:33,680

you about the science behind the

1043

00:39:37,510 --> 00:39:34,960

sentinel 6

1044

00:39:39,030 --> 00:39:37,520

uh michael freilich mission and we're

1045

00:39:39,510 --> 00:39:39,040

going to get to that in a moment but you

1046

00:39:41,349 --> 00:39:39,520

know

1047

00:39:43,030 --> 00:39:41,359

um we have a moment here where we're

1048

00:39:45,109 --> 00:39:43,040

going to sync up

1049

00:39:47,109 --> 00:39:45,119

and simulcast with our partners from the

1050

00:39:49,190 --> 00:39:47,119

european space agency

1051
00:39:50,950 --> 00:39:49,200
and when we do that that's going to

1052
00:39:53,589 --> 00:39:50,960
allow both channels both esa

1053
00:39:54,630 --> 00:39:53,599
and nasa to carry the same broadcast at

1054
00:39:56,630 --> 00:39:54,640
the same time

1055
00:39:57,910 --> 00:39:56,640
going to talk a lot about science and

1056
00:39:59,349 --> 00:39:57,920
we're going to get to that in a moment

1057
00:40:00,390 --> 00:39:59,359
but first of all i want to get your

1058
00:40:03,430 --> 00:40:00,400
reaction

1059
00:40:04,230 --> 00:40:03,440
to watching both the launch and the

1060
00:40:06,470 --> 00:40:04,240
landing

1061
00:40:07,670 --> 00:40:06,480
and it's spectacular daryl i mean it's

1062
00:40:10,470 --> 00:40:07,680
just it's so

1063
00:40:11,870 --> 00:40:10,480

beautiful when everything comes and like

1064

00:40:14,470 --> 00:40:11,880

jesse was saying a well

1065

00:40:16,390 --> 00:40:14,480

choreographed valet it's the best

1066

00:40:17,910 --> 00:40:16,400

choreographed ballet in the world

1067

00:40:20,309 --> 00:40:17,920

and it did everything that it was

1068

00:40:22,470 --> 00:40:20,319

supposed to the launch was beautiful i'm

1069

00:40:24,150 --> 00:40:22,480

so glad the winds quieted down when they

1070

00:40:24,790 --> 00:40:24,160

were supposed to so that we could get

1071

00:40:26,870 --> 00:40:24,800

that

1072

00:40:28,309 --> 00:40:26,880

rocket launched because this is

1073

00:40:30,309 --> 00:40:28,319

incredible science that we're going to

1074

00:40:31,190 --> 00:40:30,319

get from sentinel 6 and i just can't

1075

00:40:33,510 --> 00:40:31,200

wait

1076
00:40:34,710 --> 00:40:33,520
well said well said indeed okay now we

1077
00:40:36,950 --> 00:40:34,720
are going to

1078
00:40:38,870 --> 00:40:36,960
turn it over to our friends from esa

1079
00:40:43,670 --> 00:40:38,880
let's join moderator louise

1080
00:40:47,190 --> 00:40:46,470
lately i would like to to thank nasa and

1081
00:40:49,670 --> 00:40:47,200
our friends

1082
00:40:51,030 --> 00:40:49,680
in the us also noah for this

1083
00:40:53,190 --> 00:40:51,040
contribution they have made

1084
00:40:55,990 --> 00:40:53,200
incredible they have been an excellent

1085
00:40:58,150 --> 00:40:56,000
partner uh they have been very

1086
00:41:00,069 --> 00:40:58,160
reliable and they really have delivered

1087
00:41:03,349 --> 00:41:00,079
their part on time

1088
00:41:05,430 --> 00:41:03,359

and very in very significant terms the

1089

00:41:06,550 --> 00:41:05,440

launcher we have just seen but also very

1090

00:41:08,950 --> 00:41:06,560

important instruments

1091

00:41:10,790 --> 00:41:08,960

like the micro radiometer and several

1092

00:41:11,670 --> 00:41:10,800

other components and this is a model

1093

00:41:14,069 --> 00:41:11,680

corporation

1094

00:41:14,870 --> 00:41:14,079

uh i really like with thomas and this

1095

00:41:18,230 --> 00:41:14,880

team

1096

00:41:19,109 --> 00:41:18,240

in the us discuss further cooperation

1097

00:41:20,790 --> 00:41:19,119

opportunities

1098

00:41:22,950 --> 00:41:20,800

because this is just so wonderful what

1099

00:41:24,950 --> 00:41:22,960

uh we have done with center six michael

1100

00:41:26,790 --> 00:41:24,960

friedlis and there is much more to come

1101
00:41:28,150 --> 00:41:26,800
i have quite a few ideas i don't want to

1102
00:41:30,630 --> 00:41:28,160
go into depth right here but

1103
00:41:35,109 --> 00:41:30,640
uh i think this is so successful that i

1104
00:41:36,790 --> 00:41:35,119
would like to expand that

1105
00:41:38,230 --> 00:41:36,800
well thank you so much joseph i think

1106
00:41:40,230 --> 00:41:38,240
you're saying that international

1107
00:41:42,630 --> 00:41:40,240
partnerships are so important

1108
00:41:44,470 --> 00:41:42,640
for these space missions moving forward

1109
00:41:46,470 --> 00:41:44,480
and we've of course been able to

1110
00:41:47,990 --> 00:41:46,480
monitor the oceans from space for nearly

1111
00:41:49,829 --> 00:41:48,000
30 years now

1112
00:41:51,750 --> 00:41:49,839
and before we continue this conversation

1113
00:41:52,309 --> 00:41:51,760

i want to take a look at a video which

1114

00:41:58,710 --> 00:41:52,319

will show

1115

00:42:04,309 --> 00:42:02,550

great sorry this is coming back to me or

1116

00:42:05,750 --> 00:42:04,319

yeah we are what what what would you

1117

00:42:13,670 --> 00:42:05,760

like to ask me

1118

00:42:16,950 --> 00:42:15,510

what difference is speaking to

1119

00:42:26,950 --> 00:42:16,960

revolutionizing um

1120

00:42:26,960 --> 00:42:36,710

after the video you have like six

1121

00:42:36,720 --> 00:42:43,030

she's missing she doesn't have a

1122

00:42:43,040 --> 00:43:29,750

moving feed

1123

00:43:33,750 --> 00:43:32,150

altimeter was actually an experiment on

1124

00:43:36,470 --> 00:43:33,760

board skylab which was

1125

00:43:38,150 --> 00:43:36,480

50 years ago now i mean the way that

1126
00:43:38,710 --> 00:43:38,160
this technology has transformed over

1127
00:43:40,550 --> 00:43:38,720
this last

1128
00:43:42,150 --> 00:43:40,560
half a century it's quite fantastic

1129
00:43:43,670 --> 00:43:42,160
isn't it thomas oh it's amazing i mean

1130
00:43:45,589 --> 00:43:43,680
for me when you just think about it you

1131
00:43:46,069 --> 00:43:45,599
know you have this spacecraft up there

1132
00:43:51,109 --> 00:43:46,079
at

1133
00:43:53,990 --> 00:43:51,119
kilometers per second and you're

1134
00:43:56,470 --> 00:43:54,000
locating it within a centimeter or so

1135
00:43:58,710 --> 00:43:56,480
exactly with all these uh with the

1136
00:44:00,309 --> 00:43:58,720
altimeter but also the gps receivers and

1137
00:44:02,470 --> 00:44:00,319
the supporting instrumentation

1138
00:44:04,630 --> 00:44:02,480

for me it's mind-boggling you know and

1139

00:44:07,030 --> 00:44:04,640

of course it's so important because

1140

00:44:08,870 --> 00:44:07,040

it affects our lives in a direct fashion

1141

00:44:09,270 --> 00:44:08,880

every day even if you don't not notice

1142

00:44:12,069 --> 00:44:09,280

that

1143

00:44:13,430 --> 00:44:12,079

going to come across in the future with

1144

00:44:14,309 --> 00:44:13,440

working with this international

1145

00:44:16,150 --> 00:44:14,319

partnership

1146

00:44:17,910 --> 00:44:16,160

so look i believe that for the first

1147

00:44:19,829 --> 00:44:17,920

couple decades the question really was

1148

00:44:22,870 --> 00:44:19,839

are the ocean levels rising

1149

00:44:24,870 --> 00:44:22,880

the question to that is absolutely yes

1150

00:44:27,270 --> 00:44:24,880

now the question that we're dealing with

1151
00:44:29,829 --> 00:44:27,280
and i as an international community is

1152
00:44:31,349 --> 00:44:29,839
how are we handling these rising oceans

1153
00:44:33,510 --> 00:44:31,359
and how do we make sure

1154
00:44:35,270 --> 00:44:33,520
we don't go to levels that we don't need

1155
00:44:37,750 --> 00:44:35,280
to and so for us

1156
00:44:39,510 --> 00:44:37,760
kind of that the local impacts of those

1157
00:44:41,030 --> 00:44:39,520
around the world whether it's in europe

1158
00:44:42,230 --> 00:44:41,040
whether it's in the united states and

1159
00:44:44,630 --> 00:44:42,240
everywhere else

1160
00:44:45,829 --> 00:44:44,640
are what's going to drive our our

1161
00:44:47,750 --> 00:44:45,839
research and therefore the high

1162
00:44:48,390 --> 00:44:47,760
resolution that this spacecraft provides

1163
00:44:50,390 --> 00:44:48,400

us

1164

00:44:52,150 --> 00:44:50,400

is absolutely critical so that's the

1165

00:44:54,309 --> 00:44:52,160

questions the international community

1166

00:44:55,349 --> 00:44:54,319

has to come together to east to deal

1167

00:44:57,030 --> 00:44:55,359

with these problems

1168

00:44:59,109 --> 00:44:57,040

because each one of those assets you

1169

00:45:00,550 --> 00:44:59,119

know serves all of us

1170

00:45:02,069 --> 00:45:00,560

well we have been hearing more and more

1171

00:45:03,829 --> 00:45:02,079

about how oceanography has been

1172

00:45:05,990 --> 00:45:03,839

revolutionized by

1173

00:45:07,750 --> 00:45:06,000

satellite observation so nadia maybe you

1174

00:45:09,589 --> 00:45:07,760

can tell us a little bit more about why

1175

00:45:10,950 --> 00:45:09,599

sentinel 6 is making such a difference

1176

00:45:14,390 --> 00:45:10,960

in that development

1177

00:45:15,990 --> 00:45:14,400

yes sentinel 6 is indeed building on a

1178

00:45:19,190 --> 00:45:16,000

very rich heritage

1179

00:45:22,630 --> 00:45:19,200

of json class altimeters

1180

00:45:24,390 --> 00:45:22,640

and what we expect to see a new science

1181

00:45:27,430 --> 00:45:24,400

coming out of sentinel 6 that

1182

00:45:29,430 --> 00:45:27,440

it would clear it would open up

1183

00:45:31,270 --> 00:45:29,440

new frequencies and give us a full

1184

00:45:32,870 --> 00:45:31,280

picture of what do we know about the

1185

00:45:36,150 --> 00:45:32,880

oceans and

1186

00:45:38,309 --> 00:45:36,160

ocean altimetry by now it's a mainstream

1187

00:45:39,910 --> 00:45:38,319

tool of modern physical oceanography so

1188

00:45:42,230 --> 00:45:39,920

if you're a border oceanographer

1189

00:45:43,589 --> 00:45:42,240

at one point of your life you're clearly

1190

00:45:45,510 --> 00:45:43,599

looked with this data either you're

1191

00:45:46,710 --> 00:45:45,520

studying tides or sea level ocean

1192

00:45:49,589 --> 00:45:46,720

circulation

1193

00:45:52,069 --> 00:45:49,599

or winds or hurricane prediction you you

1194

00:45:53,990 --> 00:45:52,079

were exposed to this data and we expect

1195

00:45:55,510 --> 00:45:54,000

from sentinel 6 to continue doing this

1196

00:45:58,309 --> 00:45:55,520

discovery on a higher

1197

00:45:59,990 --> 00:45:58,319

resolution and longer time scales well

1198

00:46:01,750 --> 00:46:00,000

if craig can hear us over in

1199

00:46:03,750 --> 00:46:01,760

europa maybe i can come to you as well

1200

00:46:04,870 --> 00:46:03,760

craig and ask you your opinion on how

1201

00:46:12,829 --> 00:46:04,880

this technology

1202

00:46:17,349 --> 00:46:14,870

oceans

1203

00:46:19,190 --> 00:46:17,359

correct precision which is essential

1204

00:46:20,710 --> 00:46:19,200

because the daniel changes is just a few

1205

00:46:23,270 --> 00:46:20,720

millimeters a year

1206

00:46:23,990 --> 00:46:23,280

it's really remarkable but united can do

1207

00:46:25,829 --> 00:46:24,000

a lot more

1208

00:46:27,190 --> 00:46:25,839

and recent work shows that the oceans

1209

00:46:29,109 --> 00:46:27,200

are taking a much more

1210

00:46:30,710 --> 00:46:29,119

carbon dioxide from the atmosphere

1211

00:46:31,670 --> 00:46:30,720

through the ocean atmosphere interface

1212

00:46:33,990 --> 00:46:31,680

where waves

1213

00:46:36,550 --> 00:46:34,000

play an extremely important role now the

1214

00:46:38,550 --> 00:46:36,560

sentinel 6 meteor microphilic radar

1215

00:46:40,390 --> 00:46:38,560

altimeter provides us with excellent

1216

00:46:41,430 --> 00:46:40,400

measurements of the significant wave

1217

00:46:43,670 --> 00:46:41,440

height

1218

00:46:44,790 --> 00:46:43,680

with a 300 meter footprint size on the

1219

00:46:46,710 --> 00:46:44,800

satellite track

1220

00:46:49,030 --> 00:46:46,720

really this will help us to improve our

1221

00:46:50,069 --> 00:46:49,040

understanding of carbon dioxide transfer

1222

00:46:51,990 --> 00:46:50,079

into the ocean

1223

00:46:53,910 --> 00:46:52,000

but it's even more than that wave

1224

00:46:55,589 --> 00:46:53,920

forecasting is part of the copernicus

1225

00:46:57,990 --> 00:46:55,599

marine services

1226
00:47:00,309 --> 00:46:58,000
for serving maritime operations which

1227
00:47:01,430 --> 00:47:00,319
are essential for maritime safety

1228
00:47:03,670 --> 00:47:01,440
and these are managed through the

1229
00:47:05,190 --> 00:47:03,680
european maritime safety agency

1230
00:47:07,109 --> 00:47:05,200
so we'll have topography measurements

1231
00:47:13,109 --> 00:47:07,119
and wave measurements to really provide

1232
00:47:18,550 --> 00:47:15,190
well thank you chris if you wish it is

1233
00:47:22,470 --> 00:47:20,150
and that was craig donlon who's the

1234
00:47:24,470 --> 00:47:22,480
project scientist from isa which is a

1235
00:47:25,349 --> 00:47:24,480
european space agency so thank you so

1236
00:47:27,109 --> 00:47:25,359
much to them

1237
00:47:29,270 --> 00:47:27,119
and the climate science conversation

1238
00:47:31,589 --> 00:47:29,280

continues if you would like to tune in

1239

00:47:34,549 --> 00:47:31,599

just use the sentinel 6 hashtag

1240

00:47:36,549 --> 00:47:34,559

on the european space agency or esa's

1241

00:47:38,470 --> 00:47:36,559

social media platforms

1242

00:47:40,150 --> 00:47:38,480

this satellite was renamed after

1243

00:47:42,309 --> 00:47:40,160

american oceanographer

1244

00:47:43,430 --> 00:47:42,319

michael freilich who led nasa's earth

1245

00:47:45,670 --> 00:47:43,440

science division

1246

00:47:46,790 --> 00:47:45,680

for more than a decade freilick passed

1247

00:47:49,030 --> 00:47:46,800

away in august

1248

00:47:51,270 --> 00:47:49,040

but five months prior nasa held a

1249

00:47:53,349 --> 00:47:51,280

satellite renaming ceremony for him at

1250

00:47:54,309 --> 00:47:53,359

the agency's headquarters in washington

1251
00:47:56,470 --> 00:47:54,319
d.c

1252
00:47:57,829 --> 00:47:56,480
freilich accepted the honor but he

1253
00:47:59,829 --> 00:47:57,839
credited his success

1254
00:48:01,589 --> 00:47:59,839
to the contributions of thousands of

1255
00:48:04,710 --> 00:48:01,599
scientists engineers

1256
00:48:09,829 --> 00:48:04,720
managers and diplomats on both sides of

1257
00:48:13,349 --> 00:48:12,630
it's been a privilege to work with you

1258
00:48:16,630 --> 00:48:13,359
to learn

1259
00:48:20,069 --> 00:48:16,640
from you and to be able to call you

1260
00:48:22,950 --> 00:48:20,079
friends the entire world

1261
00:48:23,670 --> 00:48:22,960
is expecting great things from sentinel

1262
00:48:27,510 --> 00:48:23,680
6

1263
00:48:34,180 --> 00:48:27,520

and i know that you will deliver

1264

00:48:43,829 --> 00:48:34,190

go sentinel 6.

1265

00:48:47,190 --> 00:48:45,750

certainly he would have been thrilled to

1266

00:48:50,390 --> 00:48:47,200

see this launch today

1267

00:48:51,750 --> 00:48:50,400

joining us now is daniel freilich and

1268

00:48:54,390 --> 00:48:51,760

sarah freilich

1269

00:48:56,069 --> 00:48:54,400

michael's children son and daughter

1270

00:48:58,150 --> 00:48:56,079

thank you so much for being here

1271

00:48:59,349 --> 00:48:58,160

thank you so much for having us you're

1272

00:49:01,990 --> 00:48:59,359

very welcome so

1273

00:49:03,829 --> 00:49:02,000

um you know you just saw this launch

1274

00:49:05,109 --> 00:49:03,839

your your father's name is on the

1275

00:49:06,230 --> 00:49:05,119

satellite

1276
00:49:08,470 --> 00:49:06,240
what were your thoughts as you were

1277
00:49:09,910 --> 00:49:08,480
watching that it was gorgeous

1278
00:49:13,349 --> 00:49:09,920
like i haven't seen something that

1279
00:49:15,430 --> 00:49:13,359
beautiful before

1280
00:49:17,430 --> 00:49:15,440
it's my first time seeing a launch from

1281
00:49:19,829 --> 00:49:17,440
out here and to just see that

1282
00:49:20,470 --> 00:49:19,839
was incredible like it means so much to

1283
00:49:22,470 --> 00:49:20,480
see

1284
00:49:24,390 --> 00:49:22,480
and feel it you know like i'd heard him

1285
00:49:27,270 --> 00:49:24,400
talk about feeling it and

1286
00:49:28,549 --> 00:49:27,280
feeling that as it goes is just

1287
00:49:31,750 --> 00:49:28,559
incredible

1288
00:49:33,349 --> 00:49:31,760

amazing and we all talk about him

1289

00:49:34,950 --> 00:49:33,359

in the space community as just being

1290

00:49:37,030 --> 00:49:34,960

such an inspiration i had the honor of

1291

00:49:40,069 --> 00:49:37,040

hearing him speak once as well

1292

00:49:41,990 --> 00:49:40,079

and you guys know the man outside of

1293

00:49:43,510 --> 00:49:42,000

the work so tell us a little bit about

1294

00:49:45,589 --> 00:49:43,520

him so

1295

00:49:47,670 --> 00:49:45,599

our dad was passionate and like whatever

1296

00:49:48,630 --> 00:49:47,680

he chose to do he wanted to like be a

1297

00:49:51,030 --> 00:49:48,640

big part of it

1298

00:49:52,390 --> 00:49:51,040

and like was in all the communities and

1299

00:49:53,910 --> 00:49:52,400

i like to tell people i didn't have

1300

00:49:56,829 --> 00:49:53,920

heartthrobs on my wall

1301

00:49:58,150 --> 00:49:56,839

i had issa and satellite images as the

1302

00:50:00,230 --> 00:49:58,160

posters um

1303

00:50:01,349 --> 00:50:00,240

and so that was just who my dad was he

1304

00:50:04,390 --> 00:50:01,359

shared it with us

1305

00:50:06,790 --> 00:50:04,400

and you know like he was always there

1306

00:50:07,510 --> 00:50:06,800

and i think another thing is you know he

1307

00:50:09,910 --> 00:50:07,520

cared about

1308

00:50:10,950 --> 00:50:09,920

things at all levels so not only did he

1309

00:50:12,790 --> 00:50:10,960

care about

1310

00:50:15,109 --> 00:50:12,800

an individual mission but he cared about

1311

00:50:17,190 --> 00:50:15,119

how it affected the entire world

1312

00:50:18,230 --> 00:50:17,200

and and he did that with everyone he

1313

00:50:19,670 --> 00:50:18,240

worked with you know he

1314

00:50:21,589 --> 00:50:19,680

he talked about the people that he

1315

00:50:22,950 --> 00:50:21,599

worked with he talked about

1316

00:50:24,549 --> 00:50:22,960

all the science that happened when we

1317

00:50:25,589 --> 00:50:24,559

were going through his papers actually

1318

00:50:27,829 --> 00:50:25,599

we found that he

1319

00:50:29,430 --> 00:50:27,839

still had the science papers written

1320

00:50:31,510 --> 00:50:29,440

about the impact on

1321

00:50:32,950 --> 00:50:31,520

the world so he even as he moved on like

1322

00:50:34,710 --> 00:50:32,960

he just cared about every part of the

1323

00:50:36,870 --> 00:50:34,720

process the people the science

1324

00:50:38,549 --> 00:50:36,880

and what it meant for for humanity you

1325

00:50:40,790 --> 00:50:38,559

guys were sharing a nice moment

1326
00:50:42,630 --> 00:50:40,800
with me yesterday when you said that uh

1327
00:50:43,829 --> 00:50:42,640
you know you have talked to the people

1328
00:50:46,069 --> 00:50:43,839
who worked with him

1329
00:50:47,430 --> 00:50:46,079
they talked about you guys and then he

1330
00:50:50,549 --> 00:50:47,440
talked to them about you

1331
00:50:52,309 --> 00:50:50,559
and so just sharing you know uh you know

1332
00:50:52,950 --> 00:50:52,319
the mutual experiences and said that he

1333
00:50:54,950 --> 00:50:52,960
was just

1334
00:50:56,790 --> 00:50:54,960
the real person the real deal he would

1335
00:50:58,950 --> 00:50:56,800
push everyone to be their best

1336
00:51:00,069 --> 00:50:58,960
in order to make everything better and

1337
00:51:02,870 --> 00:51:00,079
we don't want to forget about

1338
00:51:04,870 --> 00:51:02,880

rosie this would be his grandchild right

1339

00:51:09,750 --> 00:51:04,880

his first grandchild that he got to meet

1340

00:51:12,950 --> 00:51:09,760

so that was very special yeah

1341

00:51:13,910 --> 00:51:12,960

look at that you know sarah you're a

1342

00:51:17,109 --> 00:51:13,920

science teacher

1343

00:51:17,990 --> 00:51:17,119

right so so what part of this kind of

1344

00:51:21,349 --> 00:51:18,000

carries through

1345

00:51:24,630 --> 00:51:21,359

to what you do today so i think like i

1346

00:51:27,750 --> 00:51:24,640

we do a big unit on um

1347

00:51:29,829 --> 00:51:27,760

client climate changing um because like

1348

00:51:30,870 --> 00:51:29,839

for me sea level rise and like what we

1349

00:51:33,430 --> 00:51:30,880

can do as a

1350

00:51:35,030 --> 00:51:33,440

as individuals is so important and like

1351

00:51:38,150 --> 00:51:35,040

what my father was saying

1352

00:51:40,710 --> 00:51:38,160

and so as much as i teach science

1353

00:51:42,630 --> 00:51:40,720

and i hope that each student can find

1354

00:51:43,030 --> 00:51:42,640

something that excites them whether or

1355

00:51:45,670 --> 00:51:43,040

not

1356

00:51:46,790 --> 00:51:45,680

it's like physics biology like rising

1357

00:51:48,069 --> 00:51:46,800

sea levels

1358

00:51:49,589 --> 00:51:48,079

but i want to make sure that there's a

1359

00:51:51,109 --> 00:51:49,599

space for everyone to find something

1360

00:51:53,030 --> 00:51:51,119

that interests them

1361

00:51:55,670 --> 00:51:53,040

and michael from the red pen do you have

1362

00:51:59,589 --> 00:51:55,680

a red pen he has a red pen

1363

00:52:03,190 --> 00:52:01,270

and it's so important like you said for

1364

00:52:04,069 --> 00:52:03,200

future generations to be inspired and

1365

00:52:06,549 --> 00:52:04,079

make a difference

1366

00:52:07,829 --> 00:52:06,559

thank you guys that's what he he wanted

1367

00:52:09,750 --> 00:52:07,839

us to understand that this was our

1368

00:52:13,030 --> 00:52:09,760

planet and it needed to be better

1369

00:52:15,190 --> 00:52:13,040

for everyone and so he always said to us

1370

00:52:17,109 --> 00:52:15,200

it's not that there's climate change but

1371

00:52:20,230 --> 00:52:17,119

the climate is changing

1372

00:52:21,990 --> 00:52:20,240

to try to build unity around this topic

1373

00:52:23,430 --> 00:52:22,000

and have everyone understand what

1374

00:52:25,030 --> 00:52:23,440

impacts they can make and

1375

00:52:26,950 --> 00:52:25,040

why it's important to all of us that's

1376

00:52:30,390 --> 00:52:26,960

very well said daniel freilich

1377

00:52:32,150 --> 00:52:30,400

sarah freilich and rosie rosie

1378

00:52:33,990 --> 00:52:32,160

we're so glad that you could be here for

1379

00:52:35,510 --> 00:52:34,000

this moment it's just incredible and

1380

00:52:37,270 --> 00:52:35,520

thank you for sharing your father's

1381

00:52:40,309 --> 00:52:37,280

legacy with us thank you for having us

1382

00:52:43,190 --> 00:52:40,319

thank you so much for having us michael

1383

00:52:46,230 --> 00:52:43,200

fryllick believed strongly in the mission

1384

00:52:48,230 --> 00:52:46,240

documenting sea level rise earth's

1385

00:52:50,230 --> 00:52:48,240

oceans affect us all

1386

00:52:51,910 --> 00:52:50,240

from the air we breathe to how they

1387

00:52:53,990 --> 00:52:51,920

impact our climate

1388

00:52:55,030 --> 00:52:54,000

let's take a look at how sentinel 6

1389

00:52:58,069 --> 00:52:55,040

michael freilich

1390

00:53:00,290 --> 00:52:58,079

will help us continue to explore oceans

1391

00:53:05,510 --> 00:53:00,300

from space

1392

00:53:07,510 --> 00:53:05,520

[Music]

1393

00:53:09,750 --> 00:53:07,520

spend a few minutes on any beach and

1394

00:53:12,390 --> 00:53:09,760

you'll realize just how much the ocean

1395

00:53:14,150 --> 00:53:12,400

can transform the shoreline

1396

00:53:16,150 --> 00:53:14,160

we're here at nasa's jet propulsion

1397

00:53:17,750 --> 00:53:16,160

laboratory and we're really excited

1398

00:53:19,829 --> 00:53:17,760

about this new satellite

1399

00:53:20,870 --> 00:53:19,839

it will extend the record of sea level

1400

00:53:23,829 --> 00:53:20,880

rise another

1401

00:53:24,069 --> 00:53:23,839

decade past the 30 years we already have

1402

00:53:26,150 --> 00:53:24,079

and

1403

00:53:27,270 --> 00:53:26,160

allow us to see how sea level is not

1404

00:53:30,230 --> 00:53:27,280

only rising

1405

00:53:31,910 --> 00:53:30,240

but how it's accelerating this has huge

1406

00:53:33,589 --> 00:53:31,920

consequences for the planet

1407

00:53:35,349 --> 00:53:33,599

because sea level rise is one of the

1408

00:53:38,150 --> 00:53:35,359

most important consequences

1409

00:53:40,549 --> 00:53:38,160

of human-caused global warming sea

1410

00:53:40,950 --> 00:53:40,559

levels are rising at a faster and faster

1411

00:53:43,270 --> 00:53:40,960

rate

1412

00:53:44,870 --> 00:53:43,280

every decade we need these measurements

1413

00:53:47,030 --> 00:53:44,880

to help us predict

1414

00:53:48,630 --> 00:53:47,040

how quickly flooding will increase

1415

00:53:50,549 --> 00:53:48,640

across the planet

1416

00:53:52,390 --> 00:53:50,559

sentinel 6 will also bring us higher

1417

00:53:53,990 --> 00:53:52,400

resolution measurements of sea level

1418

00:53:56,150 --> 00:53:54,000

which is incredibly important near the

1419

00:53:58,230 --> 00:53:56,160

coastline where currents are narrow

1420

00:53:59,589 --> 00:53:58,240

and changes can be difficult to observe

1421

00:54:01,349 --> 00:53:59,599

from space

1422

00:54:03,430 --> 00:54:01,359

currents in the ocean tilt the sea

1423

00:54:03,910 --> 00:54:03,440

surface making sea level high on one

1424

00:54:06,870 --> 00:54:03,920

side

1425

00:54:08,390 --> 00:54:06,880

and low on the other also warm water

1426

00:54:10,150 --> 00:54:08,400

stands taller than cold

1427

00:54:11,589 --> 00:54:10,160

so sea level measurements tell us about

1428

00:54:14,790 --> 00:54:11,599

both ocean currents

1429

00:54:15,829 --> 00:54:14,800

and ocean heat ocean currents affect our

1430

00:54:18,150 --> 00:54:15,839

daily lives

1431

00:54:19,109 --> 00:54:18,160

because the ocean has a strong impact on

1432

00:54:21,589 --> 00:54:19,119

climate

1433

00:54:22,630 --> 00:54:21,599

in the west the pacific ocean strongly

1434

00:54:25,109 --> 00:54:22,640

determines

1435

00:54:26,790 --> 00:54:25,119

droughts and rainfall and in the east

1436

00:54:29,589 --> 00:54:26,800

hurricane forecasting

1437

00:54:30,069 --> 00:54:29,599

uses satellite altimetry to help predict

1438

00:54:33,190 --> 00:54:30,079

how much

1439

00:54:34,309 --> 00:54:33,200

hurricanes will intensify ocean

1440

00:54:36,309 --> 00:54:34,319

conditions can change

1441

00:54:37,510 --> 00:54:36,319

quickly and forecasters need data in

1442

00:54:39,750 --> 00:54:37,520

near real time

1443

00:54:42,470 --> 00:54:39,760

to predict how currents and marine

1444

00:54:43,910 --> 00:54:42,480

weather will change across the globe

1445

00:54:45,990 --> 00:54:43,920

we're excited about the technical

1446

00:54:48,150 --> 00:54:46,000

capabilities of this new satellite

1447

00:54:52,309 --> 00:54:48,160

and the prospect of another 10 years of

1448

00:54:57,910 --> 00:54:52,319

sea level measurements

1449

00:55:01,109 --> 00:54:59,750

and josh willis is here more

1450

00:55:04,150 --> 00:55:01,119

affectionately known as

1451

00:55:04,789 --> 00:55:04,160

climate elvis joined by nasa's blair

1452

00:55:09,190 --> 00:55:04,799

allen

1453

00:55:12,470 --> 00:55:11,829

that's right marina josh is here the uh

1454

00:55:14,470 --> 00:55:12,480

the king

1455

00:55:15,750 --> 00:55:14,480

is in the building with some uh thank

1456

00:55:17,910 --> 00:55:15,760

you thank you very much

1457

00:55:19,829 --> 00:55:17,920

a deep insight into the science of

1458

00:55:21,270 --> 00:55:19,839

sentinel six so let's start there before

1459

00:55:22,950 --> 00:55:21,280

we get to the demonstration

1460

00:55:24,549 --> 00:55:22,960

tell us a little bit about the science

1461

00:55:25,589 --> 00:55:24,559

behind this mission well player first i

1462

00:55:28,630 --> 00:55:25,599

got to say

1463

00:55:29,829 --> 00:55:28,640

that was amazing i just saw the rocket

1464

00:55:32,150 --> 00:55:29,839

went up

1465

00:55:33,670 --> 00:55:32,160

and then it came back down yeah yeah and

1466

00:55:34,950 --> 00:55:33,680

so did the boom it lowered the boom on

1467

00:55:36,950 --> 00:55:34,960

us

1468

00:55:38,470 --> 00:55:36,960

even when you know it's coming yeah uh

1469

00:55:40,710 --> 00:55:38,480

it's still shocking boom

1470

00:55:42,549 --> 00:55:40,720

sonic boom it was cool but it dropped

1471

00:55:44,069 --> 00:55:42,559

the mic honestly it dropped the mic

1472

00:55:45,990 --> 00:55:44,079

as i know you were gonna do at the end

1473

00:55:48,470 --> 00:55:46,000

of this segment

1474

00:55:49,990 --> 00:55:48,480

uh let's hear it so sentinel 6 is going

1475

00:55:52,390 --> 00:55:50,000

to tell us about the sea level

1476

00:55:53,829 --> 00:55:52,400

it measures the height of the ocean from

1477

00:55:55,349 --> 00:55:53,839

about 800 miles up

1478

00:55:57,109 --> 00:55:55,359

and it does this with an accuracy of

1479

00:55:59,589 --> 00:55:57,119

just one inch and

1480

00:56:01,510 --> 00:55:59,599

yeah right yeah pretty cool yeah and so

1481

00:56:03,190 --> 00:56:01,520

it uh it does that everywhere in the

1482

00:56:05,670 --> 00:56:03,200

world once every 10 days

1483

00:56:06,950 --> 00:56:05,680

and from that we can figure out global

1484

00:56:09,030 --> 00:56:06,960

sea level rise how much

1485

00:56:10,950 --> 00:56:09,040

the oceans are rising because of

1486

00:56:13,510 --> 00:56:10,960

human-caused climate change

1487

00:56:14,789 --> 00:56:13,520

so it's pretty neat yeah now one of our

1488

00:56:17,670 --> 00:56:14,799

followers on twitter

1489

00:56:18,710 --> 00:56:17,680

ave wants to know um if they're twin

1490

00:56:20,630 --> 00:56:18,720

satellites

1491

00:56:22,549 --> 00:56:20,640

why are they being launched five years

1492

00:56:24,309 --> 00:56:22,559

apart yeah that's a great question

1493

00:56:25,589 --> 00:56:24,319

they're they're twins but one's the

1494

00:56:27,670 --> 00:56:25,599

younger twins

1495

00:56:29,030 --> 00:56:27,680

okay significantly significantly younger

1496

00:56:31,270 --> 00:56:29,040

twin so yes so

1497

00:56:32,630 --> 00:56:31,280

the idea is that we have to keep

1498

00:56:34,150 --> 00:56:32,640

measuring sea level rise

1499

00:56:36,710 --> 00:56:34,160

sea level rise is not going to stop

1500

00:56:37,430 --> 00:56:36,720

anytime soon and we have to keep our eye

1501
00:56:39,589 --> 00:56:37,440
in the sky

1502
00:56:41,510 --> 00:56:39,599
looking down on it so we're launching we

1503
00:56:44,789 --> 00:56:41,520
just launched the first one today

1504
00:56:46,630 --> 00:56:44,799
in five or six years it'll start to age

1505
00:56:48,950 --> 00:56:46,640
and we'll launch the second one

1506
00:56:50,470 --> 00:56:48,960
and it will continue the record another

1507
00:56:52,470 --> 00:56:50,480
full decade

1508
00:56:54,549 --> 00:56:52,480
and that's a big deal because sea level

1509
00:56:55,910 --> 00:56:54,559
rise is actually accelerating so the

1510
00:56:57,670 --> 00:56:55,920
rate of rise

1511
00:56:59,190 --> 00:56:57,680
uh in the 90s it was about two

1512
00:57:01,270 --> 00:56:59,200
millimeters per year

1513
00:57:02,870 --> 00:57:01,280

in the naughties it was about three

1514

00:57:03,750 --> 00:57:02,880

millimeters the naughties you know the

1515

00:57:06,150 --> 00:57:03,760

decade

1516

00:57:07,109 --> 00:57:06,160

starting in yeah i know let's see the

1517

00:57:09,589 --> 00:57:07,119

demonstration oh

1518

00:57:10,150 --> 00:57:09,599

okay yeah sure so yeah okay so uh all

1519

00:57:12,630 --> 00:57:10,160

right

1520

00:57:14,069 --> 00:57:12,640

what happens when you uh hold the flame

1521

00:57:16,150 --> 00:57:14,079

to a balloon

1522

00:57:17,349 --> 00:57:16,160

i'm gonna say it pops that's right but

1523

00:57:20,150 --> 00:57:17,359

i'm just a layman

1524

00:57:20,950 --> 00:57:20,160

well this layman is right let's find out

1525

00:57:23,190 --> 00:57:20,960

right now

1526

00:57:24,630 --> 00:57:23,200

in order to do this i have to put on my

1527

00:57:26,950 --> 00:57:24,640

uh my

1528

00:57:27,829 --> 00:57:26,960

safety gear so here we go there you go

1529

00:57:31,349 --> 00:57:27,839

now uh

1530

00:57:33,109 --> 00:57:31,359

we're gonna we're gonna do this

1531

00:57:34,710 --> 00:57:33,119

all right yeah and it's gonna pop right

1532

00:57:37,990 --> 00:57:34,720

here we go all right

1533

00:57:42,150 --> 00:57:39,750

wow it was terrifying wasn't it

1534

00:57:44,309 --> 00:57:42,160

frightening frightening right now

1535

00:57:46,710 --> 00:57:44,319

what happens when you do the same thing

1536

00:57:50,470 --> 00:57:46,720

with a balloon filled with water

1537

00:57:54,390 --> 00:57:50,480

i'm assuming it pops as well right

1538

00:57:56,150 --> 00:57:54,400

let's find out here we go

1539

00:57:57,589 --> 00:57:56,160

look at that fascinating look at that

1540

00:57:57,990 --> 00:57:57,599

it's right there it's right there on the

1541

00:58:00,390 --> 00:57:58,000

balloon

1542

00:58:01,270 --> 00:58:00,400

it holds it's not popping why not it's

1543

00:58:04,870 --> 00:58:01,280

not popping

1544

00:58:05,750 --> 00:58:04,880

because water is so good at absorbing

1545

00:58:09,430 --> 00:58:05,760

heat

1546

00:58:11,829 --> 00:58:09,440

from

1547

00:58:13,430 --> 00:58:11,839

the balloon before the flame can melt it

1548

00:58:15,990 --> 00:58:13,440

and that's just like the oceans

1549

00:58:16,950 --> 00:58:16,000

the oceans absorb more than 90 percent

1550

00:58:19,670 --> 00:58:16,960

of the heat

1551
00:58:21,190 --> 00:58:19,680
from climate change so if we think about

1552
00:58:23,829 --> 00:58:21,200
global warming it's really

1553
00:58:24,230 --> 00:58:23,839
ocean warming right wow that's pretty

1554
00:58:25,750 --> 00:58:24,240
cool

1555
00:58:27,349 --> 00:58:25,760
that is amazing i'm really glad it

1556
00:58:28,870 --> 00:58:27,359
didn't pop you know i was afraid

1557
00:58:30,549 --> 00:58:28,880
i was going to have to give up all faith

1558
00:58:31,430 --> 00:58:30,559
in science and join the circus we don't

1559
00:58:33,190 --> 00:58:31,440
want you to do that

1560
00:58:34,470 --> 00:58:33,200
no well thanks so much josh yeah you

1561
00:58:37,510 --> 00:58:34,480
betcha

1562
00:58:39,670 --> 00:58:37,520
yes all right so

1563
00:58:40,549 --> 00:58:39,680

science has also left the building along

1564

00:58:42,549 --> 00:58:40,559

with josh

1565

00:58:44,630 --> 00:58:42,559

back to you guys at the gravel pit i'm

1566

00:58:48,230 --> 00:58:44,640

gonna go join the circus now

1567

00:58:49,349 --> 00:58:48,240

yeah well blair and josh thank you so

1568

00:58:51,270 --> 00:58:49,359

much i guess he's a

1569

00:58:52,549 --> 00:58:51,280

hunk a hunk of burning balloon or

1570

00:58:55,430 --> 00:58:52,559

something

1571

00:58:56,069 --> 00:58:55,440

well anyway we want to recap the launch

1572

00:58:58,309 --> 00:58:56,079

now

1573

00:58:59,349 --> 00:58:58,319

just about a little more than 20 25

1574

00:59:00,789 --> 00:58:59,359

minutes ago

1575

00:59:02,950 --> 00:59:00,799

we launched from right here at the

1576
00:59:05,589 --> 00:59:02,960
vandenberg air force base courtesy of

1577
00:59:09,030 --> 00:59:05,599
the 30th air force space force wing

1578
00:59:11,670 --> 00:59:09,040
there it is the falcon 9 rocket and uh

1579
00:59:12,069 --> 00:59:11,680
michael freilich spacecraft on at around

1580
00:59:15,589 --> 00:59:12,079
9

1581
00:59:19,030 --> 00:59:15,599
17 this morning pacific time

1582
00:59:21,829 --> 00:59:19,040
12 17 eastern time there you see liftoff

1583
00:59:22,710 --> 00:59:21,839
the falcon 9 rocket soaring into a

1584
00:59:25,589 --> 00:59:22,720
beautiful

1585
00:59:26,710 --> 00:59:25,599
blue sky over the central coast of

1586
00:59:29,109 --> 00:59:26,720
california

1587
00:59:30,309 --> 00:59:29,119
the launch was picture perfect look at

1588
00:59:32,630 --> 00:59:30,319

the shot right down

1589

00:59:33,750 --> 00:59:32,640

the center of the rocket as it left the

1590

00:59:36,230 --> 00:59:33,760

coast here

1591

00:59:39,109 --> 00:59:36,240

the mission to launch the sentinel six

1592

00:59:40,789 --> 00:59:39,119

michael freilix satellite into space

1593

00:59:42,870 --> 00:59:40,799

and as it got up off the ground the

1594

00:59:44,950 --> 00:59:42,880

launch it seemed the rocket was

1595

00:59:46,390 --> 00:59:44,960

going taking its time nice and slow it's

1596

00:59:48,870 --> 00:59:46,400

a nice heavy satellite

1597

00:59:49,670 --> 00:59:48,880

up there but once it cleared the tower

1598

00:59:51,190 --> 00:59:49,680

and got up

1599

00:59:54,230 --> 00:59:51,200

uh into the upper parts of the

1600

00:59:56,630 --> 00:59:54,240

atmosphere boy it started to race

1601
00:59:57,910 --> 00:59:56,640
michael frylick's family were on hand to

1602
01:00:00,390 --> 00:59:57,920
watch the launch

1603
01:00:01,349 --> 01:00:00,400
and it was just an incredible sight to

1604
01:00:03,990 --> 01:00:01,359
behold

1605
01:00:04,950 --> 01:00:04,000
a wonderful uh a time had by all we had

1606
01:00:06,470 --> 01:00:04,960
guests and

1607
01:00:08,630 --> 01:00:06,480
and friends and relatives of michael

1608
01:00:10,549 --> 01:00:08,640
freilick out here to watch it and then

1609
01:00:12,309 --> 01:00:10,559
just a few seconds later about eight and

1610
01:00:15,109 --> 01:00:12,319
a half minutes to be exact

1611
01:00:15,670 --> 01:00:15,119
the booster came back down to a nice

1612
01:00:17,589 --> 01:00:15,680
soft

1613
01:00:19,349 --> 01:00:17,599

landing just several hundred feet away

1614

01:00:22,549 --> 01:00:19,359

there came the booster touching

1615

01:00:25,990 --> 01:00:22,559

back down on the landing pad spacex

1616

01:00:28,870 --> 01:00:26,000

now able to reuse that booster

1617

01:00:30,789 --> 01:00:28,880

and now the spacecraft is in flight and

1618

01:00:32,870 --> 01:00:30,799

we are tracking its progress

1619

01:00:33,990 --> 01:00:32,880

joshua santora and philip hargrove are

1620

01:00:36,870 --> 01:00:34,000

keeping an eye

1621

01:00:37,349 --> 01:00:36,880

on the progress of the launch oh that

1622

01:00:40,630 --> 01:00:37,359

was

1623

01:00:42,549 --> 01:00:40,640

inspirational

1624

01:00:43,750 --> 01:00:42,559

it's incredible so beautiful all right

1625

01:00:46,630 --> 01:00:43,760

well there are more than

1626
01:00:48,230 --> 01:00:46,640
half dozen international partners on the

1627
01:00:49,910 --> 01:00:48,240
sentinel 6 mission

1628
01:00:51,589 --> 01:00:49,920
yeah the european commission paid to

1629
01:00:53,829 --> 01:00:51,599
build the satellite earlier

1630
01:00:54,870 --> 01:00:53,839
but we spoke to the europe's ambassador

1631
01:00:57,589 --> 01:00:54,880
to the united states

1632
01:01:01,190 --> 01:00:57,599
stavros lambornidis about its importance

1633
01:01:04,870 --> 01:01:02,870
ambassador lambornidis thank you so much

1634
01:01:07,109 --> 01:01:04,880
for being with us

1635
01:01:09,190 --> 01:01:07,119
thank you for having me i want to ask

1636
01:01:11,109 --> 01:01:09,200
you first of all how important is the

1637
01:01:13,349 --> 01:01:11,119
data that comes off this satellite

1638
01:01:14,950 --> 01:01:13,359

for the continent of europe it's

1639

01:01:16,470 --> 01:01:14,960

supremely important because as we are

1640

01:01:17,990 --> 01:01:16,480

coming out of cobit and we're trying to

1641

01:01:20,470 --> 01:01:18,000

rebuild our economy

1642

01:01:21,190 --> 01:01:20,480

and the health of our people we're doing

1643

01:01:22,950 --> 01:01:21,200

so by

1644

01:01:24,309 --> 01:01:22,960

protecting the climate and protecting

1645

01:01:26,390 --> 01:01:24,319

the environment

1646

01:01:27,829 --> 01:01:26,400

climate change is an existential threat

1647

01:01:30,069 --> 01:01:27,839

for all of us and we need

1648

01:01:31,270 --> 01:01:30,079

all hands on deck to address that

1649

01:01:33,510 --> 01:01:31,280

challenge and

1650

01:01:35,829 --> 01:01:33,520

you know today what we're seeing what we

1651
01:01:37,190 --> 01:01:35,839
saw is an exemplary story of european

1652
01:01:39,109 --> 01:01:37,200
and american friends working together

1653
01:01:41,750 --> 01:01:39,119
for the greater good

1654
01:01:42,710 --> 01:01:41,760
for sentinel 6 we pull together our best

1655
01:01:45,510 --> 01:01:42,720
engineers

1656
01:01:46,069 --> 01:01:45,520
our best scientists our best resources

1657
01:01:48,950 --> 01:01:46,079
we

1658
01:01:49,829 --> 01:01:48,960
mobilize the public and private sectors

1659
01:01:52,390 --> 01:01:49,839
to produce

1660
01:01:53,349 --> 01:01:52,400
the most advanced ocean monitoring data

1661
01:01:55,430 --> 01:01:53,359
in history

1662
01:01:56,470 --> 01:01:55,440
with that thought i want to ask you on a

1663
01:01:59,430 --> 01:01:56,480

personal level

1664

01:02:00,309 --> 01:01:59,440

what is the significance of this launch

1665

01:02:02,230 --> 01:02:00,319

for you

1666

01:02:03,670 --> 01:02:02,240

well i'll tell you as the eu ambassador

1667

01:02:06,069 --> 01:02:03,680

i am proud

1668

01:02:07,029 --> 01:02:06,079

i am deeply hopeful for the future of a

1669

01:02:10,390 --> 01:02:07,039

planet

1670

01:02:12,549 --> 01:02:10,400

and and i am touched i am proud because

1671

01:02:14,069 --> 01:02:12,559

sentinel 6 is at the center of the

1672

01:02:15,670 --> 01:02:14,079

european union's

1673

01:02:17,190 --> 01:02:15,680

earth observation program which is

1674

01:02:18,870 --> 01:02:17,200

called copernicus

1675

01:02:20,789 --> 01:02:18,880

and i'm especially proud that we are

1676

01:02:22,870 --> 01:02:20,799

making this decisive

1677

01:02:24,230 --> 01:02:22,880

scientific move in partnership with our

1678

01:02:26,390 --> 01:02:24,240

american friends

1679

01:02:27,349 --> 01:02:26,400

back to the partnership sentinel 6

1680

01:02:29,670 --> 01:02:27,359

michael frey like

1681

01:02:31,430 --> 01:02:29,680

is actually nasa's first direct

1682

01:02:31,910 --> 01:02:31,440

partnership with the european commission

1683

01:02:33,750 --> 01:02:31,920

so

1684

01:02:35,990 --> 01:02:33,760

take me back to the beginning how did

1685

01:02:37,990 --> 01:02:36,000

this all come about

1686

01:02:39,270 --> 01:02:38,000

well it all came about from a remarkable

1687

01:02:42,470 --> 01:02:39,280

success story of uh

1688

01:02:44,470 --> 01:02:42,480

1688 european uh cooperation first of all uh

1689

01:02:45,829 --> 01:02:44,480

so copernicus came from a cooperation

1690

01:02:47,670 --> 01:02:45,839

between eu

1691

01:02:49,029 --> 01:02:47,680

institutions and intergovernmental

1692

01:02:51,430 --> 01:02:49,039

agencies such as

1693

01:02:53,190 --> 01:02:51,440

the european space agency the european

1694

01:02:54,470 --> 01:02:53,200

organization for the exploitation of

1695

01:02:57,829 --> 01:02:54,480

meteorological uh

1696

01:02:59,990 --> 01:02:57,839

satellites uh down to national space

1697

01:03:02,230 --> 01:03:00,000

agencies in the industry so this was

1698

01:03:04,630 --> 01:03:02,240

first and foremost a european success

1699

01:03:07,109 --> 01:03:04,640

story and now that satellite has been

1700

01:03:08,710 --> 01:03:07,119

launched into space and we look forward

1701

01:03:10,789 --> 01:03:08,720

to getting all of that data

1702

01:03:13,109 --> 01:03:10,799

for the better of the entire world

1703

01:03:16,230 --> 01:03:13,119

really ambassador lam bernidis thank you

1704

01:03:24,230 --> 01:03:16,240

so much for joining us today thank you

1705

01:03:27,990 --> 01:03:26,630

meteorologists understand the critical

1706

01:03:30,789 --> 01:03:28,000

importance of advance

1707

01:03:31,670 --> 01:03:30,799

warnings of severe storms across our

1708

01:03:34,230 --> 01:03:31,680

nation

1709

01:03:35,910 --> 01:03:34,240

one of the instruments aboard sentinel-6

1710

01:03:38,990 --> 01:03:35,920

the global navigation

1711

01:03:40,150 --> 01:03:39,000

satellite system radio occultation or

1712

01:03:42,870 --> 01:03:40,160

g-n-s-s-r-o

1713

01:03:49,670 --> 01:03:42,880

will be the next tool for more accurate

1714

01:03:53,270 --> 01:03:51,829

sentinel 6 michael frylick will provide

1715

01:03:56,069 --> 01:03:53,280

important information

1716

01:03:57,589 --> 01:03:56,079

in producing our daily weather forecast

1717

01:04:00,549 --> 01:03:57,599

so how does this work

1718

01:04:01,589 --> 01:04:00,559

the data from the gnsro that stands for

1719

01:04:03,990 --> 01:04:01,599

global navigation

1720

01:04:06,150 --> 01:04:04,000

satellite system and radio occultation a

1721

01:04:07,829 --> 01:04:06,160

new instrument on board is ingested into

1722

01:04:09,829 --> 01:04:07,839

the weather models that can help

1723

01:04:11,990 --> 01:04:09,839

us with our weather forecasting and our

1724

01:04:13,670 --> 01:04:12,000

warnings to help protect the public

1725

01:04:15,430 --> 01:04:13,680

this mission will use a special

1726

01:04:18,230 --> 01:04:15,440

technique called radio quotation

1727

01:04:20,309 --> 01:04:18,240

which measures tiny changes in the radio

1728

01:04:22,230 --> 01:04:20,319

signals broadcast by gps and other

1729

01:04:24,470 --> 01:04:22,240

navigation satellites

1730

01:04:26,390 --> 01:04:24,480

the gnss instrument essentially

1731

01:04:28,069 --> 01:04:26,400

measures the time delay

1732

01:04:30,150 --> 01:04:28,079

of the radio signals as they go through

1733

01:04:32,549 --> 01:04:30,160

different layers of the atmosphere

1734

01:04:34,470 --> 01:04:32,559

so this allows us to unravel the

1735

01:04:36,549 --> 01:04:34,480

temperature and moisture content of the

1736

01:04:38,309 --> 01:04:36,559

atmosphere layer by layer

1737

01:04:40,549 --> 01:04:38,319

most of the weather that we experience

1738

01:04:42,549 --> 01:04:40,559

comes from our west over the ocean

1739

01:04:44,390 --> 01:04:42,559

that lacks conventional observations

1740

01:04:46,710 --> 01:04:44,400

like what we have over land

1741

01:04:47,430 --> 01:04:46,720

the gnssro will help address these

1742

01:04:49,109 --> 01:04:47,440

challenges

1743

01:04:50,950 --> 01:04:49,119

by providing us very important

1744

01:04:51,589 --> 01:04:50,960

temperature moisture information over

1745

01:04:53,270 --> 01:04:51,599

the ocean

1746

01:04:55,109 --> 01:04:53,280

that will help our forecast here on the

1747

01:04:57,270 --> 01:04:55,119

west coast

1748

01:04:58,950 --> 01:04:57,280

studying the entire atmosphere from the

1749

01:04:59,910 --> 01:04:58,960

surface all the way up to the

1750

01:05:02,549 --> 01:04:59,920

stratosphere

1751

01:05:04,069 --> 01:05:02,559

is important for us to improve our

1752

01:05:06,390 --> 01:05:04,079

understanding of our weather

1753

01:05:08,870 --> 01:05:06,400

and climate change we're very excited

1754

01:05:10,470 --> 01:05:08,880

with the data that the gnssro

1755

01:05:12,710 --> 01:05:10,480

will provide for these weather models

1756

01:05:13,430 --> 01:05:12,720

that will ultimately help improve our

1757

01:05:21,109 --> 01:05:13,440

forecasts

1758

01:05:26,390 --> 01:05:23,910

eric luliet is the noah the national

1759

01:05:26,950 --> 01:05:26,400

oceanic atmospheric administration's

1760

01:05:29,910 --> 01:05:26,960

program

1761

01:05:32,230 --> 01:05:29,920

scientist for sentinel 6. noah is one of

1762

01:05:32,870 --> 01:05:32,240

the sentinel 6 partners and will use the

1763

01:05:35,589 --> 01:05:32,880

data

1764

01:05:39,990 --> 01:05:35,599

from this satellite on a daily basis

1765

01:05:45,589 --> 01:05:41,589

thank you it's a really exciting day to

1766

01:05:48,950 --> 01:05:47,670

oh it was so spectacular how will

1767

01:05:52,150 --> 01:05:48,960

sentinel 6

1768

01:05:54,950 --> 01:05:52,160

help meteorologists at noaa and across

1769

01:05:56,470 --> 01:05:54,960

the nation the gnsro instrument will

1770

01:05:58,390 --> 01:05:56,480

provide a temperature

1771

01:06:02,069 --> 01:05:58,400

and humidity profile throughout the

1772

01:06:04,309 --> 01:06:02,079

atmosphere which is pretty awesome

1773

01:06:05,589 --> 01:06:04,319

yeah indeed we're very excited that noah

1774

01:06:07,510 --> 01:06:05,599

to be using

1775

01:06:09,190 --> 01:06:07,520

data from all the instruments we'll be

1776

01:06:10,789 --> 01:06:09,200

using from the radar

1777

01:06:12,549 --> 01:06:10,799

measurements of winds and waves that

1778

01:06:14,470 --> 01:06:12,559

will go right onto forecaster screens

1779

01:06:17,109 --> 01:06:14,480

we'll be using the sea levels to improve

1780

01:06:18,630 --> 01:06:17,119

ocean current forecasting which will

1781

01:06:20,470 --> 01:06:18,640

help for navigation

1782

01:06:22,069 --> 01:06:20,480

we'll also be using those sea levels to

1783

01:06:24,390 --> 01:06:22,079

measure heat content which is really

1784

01:06:25,910 --> 01:06:24,400

important for sustainable fisheries

1785

01:06:27,950 --> 01:06:25,920

but as you also see from we saw from

1786

01:06:29,750 --> 01:06:27,960

that last video how we'll be using the

1787

01:06:32,470 --> 01:06:29,760

gnssro

1788

01:06:33,750 --> 01:06:32,480

instrument to profile the atmosphere uh

1789

01:06:34,789 --> 01:06:33,760

measuring humidity and temperature in

1790

01:06:36,309 --> 01:06:34,799

the layers

1791

01:06:38,069 --> 01:06:36,319

and that'll help us do all sorts of

1792

01:06:41,029 --> 01:06:38,079

improvements to forecasts

1793

01:06:42,150 --> 01:06:41,039

including using that the atmospheric

1794

01:06:44,789 --> 01:06:42,160

measurements to

1795

01:06:45,430 --> 01:06:44,799

monitor hurricanes from their formation

1796

01:06:51,990 --> 01:06:45,440

all the way

1797

01:06:56,549 --> 01:06:54,309

and eric we have seen great improvements

1798

01:06:58,309 --> 01:06:56,559

in forecasting hurricane tracks over the

1799

01:07:00,470 --> 01:06:58,319

years especially with the launch

1800

01:07:02,630 --> 01:07:00,480

of goes east and west but how will

1801
01:07:06,390 --> 01:07:02,640
sentinel-6 help with forecasting the

1802
01:07:10,309 --> 01:07:07,990
yeah one of the reasons that hurricanes

1803
01:07:11,750 --> 01:07:10,319
can become intense is because they feed

1804
01:07:13,270 --> 01:07:11,760
off the energy that's stored in the

1805
01:07:15,589 --> 01:07:13,280
upper layer of the ocean

1806
01:07:16,950 --> 01:07:15,599
as you saw from josh's demonstration

1807
01:07:18,710 --> 01:07:16,960
with the balloons the

1808
01:07:20,549 --> 01:07:18,720
water in the upper layer can store a lot

1809
01:07:23,349 --> 01:07:20,559
of heat

1810
01:07:24,630 --> 01:07:23,359
so what we can do with sentinel-6 is by

1811
01:07:26,390 --> 01:07:24,640
measuring sea level

1812
01:07:28,950 --> 01:07:26,400
we can measure how much the sea level

1813
01:07:30,710 --> 01:07:28,960

has expanded that's approximate for how

1814

01:07:32,630 --> 01:07:30,720

much heat there is stored there

1815

01:07:34,390 --> 01:07:32,640

so we can figure out how much heat and

1816

01:07:36,630 --> 01:07:34,400

where it is and map it and send those

1817

01:07:39,349 --> 01:07:36,640

maps to forecasters

1818

01:07:40,870 --> 01:07:39,359

this year alone we've seen 10 tropical

1819

01:07:43,910 --> 01:07:40,880

storms

1820

01:07:45,910 --> 01:07:43,920

increase in intensity rapidly

1821

01:07:48,069 --> 01:07:45,920

so it's more important forever that we

1822

01:07:48,870 --> 01:07:48,079

have than ever that we have several six

1823

01:07:51,349 --> 01:07:48,880

there

1824

01:07:56,549 --> 01:07:51,359

to for the next decade to monitor uh and

1825

01:07:58,549 --> 01:07:56,559

improve hurricane forecasts

1826

01:08:00,390 --> 01:07:58,559

yes ocean heat content so important i

1827

01:08:01,750 --> 01:08:00,400

always like to think about it as a car

1828

01:08:04,390 --> 01:08:01,760

that needs gasoline

1829

01:08:04,870 --> 01:08:04,400

a hurricane needs that warm water to

1830

01:08:07,349 --> 01:08:04,880

fuel

1831

01:08:08,950 --> 01:08:07,359

that engine that's for sure now what

1832

01:08:11,270 --> 01:08:08,960

impacts to society

1833

01:08:13,349 --> 01:08:11,280

do sea level changes have and how will

1834

01:08:16,789 --> 01:08:13,359

sentinel 6 help us better plan and

1835

01:08:20,390 --> 01:08:18,229

sure you know for the last 30 years

1836

01:08:22,149 --> 01:08:20,400

we've been seeing sea levels rise

1837

01:08:24,550 --> 01:08:22,159

using the satellites that are the

1838

01:08:25,910 --> 01:08:24,560

predecessors to sentinel-6

1839

01:08:27,590 --> 01:08:25,920

and one of the things we've learned is

1840

01:08:27,990 --> 01:08:27,600

that sea level doesn't rise at the same

1841

01:08:29,910 --> 01:08:28,000

rate

1842

01:08:31,189 --> 01:08:29,920

everywhere so it's vital that we use

1843

01:08:33,990 --> 01:08:31,199

sentinel 6

1844

01:08:36,070 --> 01:08:34,000

to map where the sea levels are rising

1845

01:08:38,229 --> 01:08:36,080

we've already started seeing flooding

1846

01:08:40,550 --> 01:08:38,239

both in clear weather from places all

1847

01:08:42,470 --> 01:08:40,560

the way from hawaii the florida keys to

1848

01:08:44,229 --> 01:08:42,480

norfolk virginia

1849

01:08:46,149 --> 01:08:44,239

so we're going to need sentinel 6 and

1850

01:08:48,470 --> 01:08:46,159

working with our nasa partners

1851
01:08:49,910 --> 01:08:48,480
to help make better models to figure out

1852
01:08:52,550 --> 01:08:49,920
where we should expect

1853
01:08:58,870 --> 01:08:52,560
increased flooding and storm surges as

1854
01:09:03,430 --> 01:09:01,189
thank you so much eric for joining us

1855
01:09:06,870 --> 01:09:03,440
today

1856
01:09:10,229 --> 01:09:06,880
thank you another fantastic

1857
01:09:13,829 --> 01:09:10,239
tool on board is

1858
01:09:16,630 --> 01:09:13,839
sentinel 6 is the advanced

1859
01:09:18,070 --> 01:09:16,640
microwave radiometer for climate or the

1860
01:09:20,390 --> 01:09:18,080
amrc

1861
01:09:21,269 --> 01:09:20,400
and the person who led the testing and

1862
01:09:25,910 --> 01:09:21,279
integration

1863
01:09:29,189 --> 01:09:28,709

in order to be good custodians of our

1864

01:09:30,630 --> 01:09:29,199

planet

1865

01:09:32,229 --> 01:09:30,640

we really need to understand how it's

1866

01:09:34,950 --> 01:09:32,239

changing how is it evolving

1867

01:09:36,390 --> 01:09:34,960

and here we are at high bay 2 this is

1868

01:09:38,470 --> 01:09:36,400

actually a clean room

1869

01:09:40,870 --> 01:09:38,480

and each component gets tested on its

1870

01:09:42,950 --> 01:09:40,880

own and then we assemble it together

1871

01:09:45,510 --> 01:09:42,960

so my team was responsible for

1872

01:09:47,910 --> 01:09:45,520

assembling testing and delivering

1873

01:09:48,870 --> 01:09:47,920

amrc for the sentinel 6 mission and this

1874

01:09:50,789 --> 01:09:48,880

is where we built it

1875

01:09:52,149 --> 01:09:50,799

amrc is the advanced microwave

1876

01:09:54,229 --> 01:09:52,159

radiometer one

1877

01:09:56,310 --> 01:09:54,239

of a suite of instruments that work

1878

01:09:58,870 --> 01:09:56,320

together on sentinel-6 and then give us

1879

01:09:59,510 --> 01:09:58,880

a very high resolution heights of the

1880

01:10:02,950 --> 01:09:59,520

oceans

1881

01:10:05,750 --> 01:10:02,960

so we are in the antenna range at jpl

1882

01:10:06,229 --> 01:10:05,760

and this is where we tested amrc we need

1883

01:10:08,390 --> 01:10:06,239

to know

1884

01:10:09,270 --> 01:10:08,400

that what we send into space is going to

1885

01:10:11,669 --> 01:10:09,280

survive

1886

01:10:13,189 --> 01:10:11,679

i've always had an affinity for art

1887

01:10:14,630 --> 01:10:13,199

singing and dancing and so one of the

1888

01:10:18,070 --> 01:10:14,640

things i've been doing more recently

1889

01:10:20,310 --> 01:10:18,080

is sewing and my dress i actually showed

1890

01:10:22,070 --> 01:10:20,320

you cannot do this job without being

1891

01:10:24,950 --> 01:10:22,080

creative every mission

1892

01:10:26,229 --> 01:10:24,960

is unique we are answering those really

1893

01:10:28,229 --> 01:10:26,239

interesting and hard

1894

01:10:35,750 --> 01:10:28,239

questions that we all have about our

1895

01:10:39,270 --> 01:10:38,229

shannon statum joins us live now on this

1896

01:10:42,470 --> 01:10:39,280

exciting

1897

01:10:44,709 --> 01:10:42,480

day boy what a textbook launch welcome

1898

01:10:47,189 --> 01:10:44,719

shannon thank you so much for having me

1899

01:10:49,430 --> 01:10:47,199

yeah you worked on the advanced

1900

01:10:50,310 --> 01:10:49,440

microwave radiometer for climate

1901

01:10:53,510 --> 01:10:50,320

instrument now

1902

01:10:56,229 --> 01:10:53,520

what is the exact role of the amrc

1903

01:10:58,310 --> 01:10:56,239

yes so amrc works in conjunction with

1904

01:10:59,110 --> 01:10:58,320

the poseidon radar to get those very

1905

01:11:01,110 --> 01:10:59,120

precise

1906

01:11:02,709 --> 01:11:01,120

measurements of our sea level heights

1907

01:11:04,870 --> 01:11:02,719

and effectively amr

1908

01:11:05,830 --> 01:11:04,880

is looking at water vapor in the

1909

01:11:08,950 --> 01:11:05,840

atmosphere so

1910

01:11:11,590 --> 01:11:08,960

clouds and rain and snow and that

1911

01:11:11,990 --> 01:11:11,600

affects the radar measurement because it

1912

01:11:14,310 --> 01:11:12,000

basically

1913

01:11:16,310 --> 01:11:14,320

causes a delay in the signal returning

1914

01:11:18,149 --> 01:11:16,320

back to the radar so ocean heights might

1915

01:11:18,790 --> 01:11:18,159

look a little closer a little further

1916

01:11:21,590 --> 01:11:18,800

away

1917

01:11:22,790 --> 01:11:21,600

due to those effects so amrc we take the

1918

01:11:25,750 --> 01:11:22,800

data from amrc

1919

01:11:27,590 --> 01:11:25,760

and we're able to resolve those effects

1920

01:11:29,110 --> 01:11:27,600

out of the data and then get those very

1921

01:11:30,630 --> 01:11:29,120

precise measurements

1922

01:11:32,229 --> 01:11:30,640

we're in the super science part of our

1923

01:11:33,750 --> 01:11:32,239

show by the way you know we're really

1924

01:11:35,830 --> 01:11:33,760

hitting it hard this is great

1925

01:11:37,750 --> 01:11:35,840

um i want to ask you you know you uh

1926

01:11:39,910 --> 01:11:37,760

also do testing right because this thing

1927

01:11:41,430 --> 01:11:39,920

helps with accuracy but you've got to

1928

01:11:42,390 --> 01:11:41,440

test it to make sure that it will be

1929

01:11:44,149 --> 01:11:42,400

accurate how do you

1930

01:11:45,430 --> 01:11:44,159

how do you test for mission and launch

1931

01:11:48,070 --> 01:11:45,440

environments yes

1932

01:11:48,870 --> 01:11:48,080

so at jpl we have a number of facilities

1933

01:11:50,870 --> 01:11:48,880

that simulate

1934

01:11:51,910 --> 01:11:50,880

launch and the extreme temperatures and

1935

01:11:53,830 --> 01:11:51,920

vacuum of space

1936

01:11:55,669 --> 01:11:53,840

and so everything that we build is going

1937

01:11:57,430 --> 01:11:55,679

to go through this test campaign

1938

01:11:59,350 --> 01:11:57,440

where we certify it for launch and we

1939

01:12:01,669 --> 01:11:59,360

certify it for its space environment

1940

01:12:03,270 --> 01:12:01,679

and not only ensure that it will survive

1941

01:12:05,510 --> 01:12:03,280

but that it will perform the way that we

1942

01:12:07,750 --> 01:12:05,520

need it to throughout the mission

1943

01:12:10,070 --> 01:12:07,760

and the amrc instrument shannon i know

1944

01:12:13,430 --> 01:12:10,080

we've talked about this before it is

1945

01:12:15,270 --> 01:12:13,440

much more difficult and complex than its

1946

01:12:15,910 --> 01:12:15,280

predecessors and so you didn't really

1947

01:12:17,910 --> 01:12:15,920

have a

1948

01:12:19,030 --> 01:12:17,920

blueprint on this one how is it

1949

01:12:21,030 --> 01:12:19,040

different

1950

01:12:22,950 --> 01:12:21,040

yes it um well for every mission we're

1951

01:12:24,550 --> 01:12:22,960

going to you know push that envelope try

1952

01:12:27,270 --> 01:12:24,560

to use the latest technologies

1953

01:12:29,430 --> 01:12:27,280

and amrc is no exception so we have two

1954

01:12:30,470 --> 01:12:29,440

new components on amrc compared to the

1955

01:12:32,709 --> 01:12:30,480

predecessors

1956

01:12:34,229 --> 01:12:32,719

and that is a high frequency component

1957

01:12:36,310 --> 01:12:34,239

that enables us to get

1958

01:12:38,229 --> 01:12:36,320

more precise measurements near coastal

1959

01:12:40,229 --> 01:12:38,239

lines in past missions

1960

01:12:41,990 --> 01:12:40,239

as we're over the oceans we see really

1961

01:12:42,390 --> 01:12:42,000

precise heights but as we got to the

1962

01:12:44,149 --> 01:12:42,400

coast

1963

01:12:45,830 --> 01:12:44,159

things were a little blurry so now we're

1964

01:12:47,750 --> 01:12:45,840

going to be able to get those better

1965

01:12:48,950 --> 01:12:47,760

measurements near the beach which people

1966

01:12:50,310 --> 01:12:48,960

care a lot about because that's where

1967

01:12:51,270 --> 01:12:50,320

they live and that's where they have

1968

01:12:53,430 --> 01:12:51,280

businesses

1969

01:12:55,350 --> 01:12:53,440

and we also have an onboard calibration

1970

01:12:57,030 --> 01:12:55,360

system and that includes a rotating

1971

01:12:58,070 --> 01:12:57,040

mirror so of course just adding to that

1972

01:13:00,149 --> 01:12:58,080

complexity

1973

01:13:02,229 --> 01:13:00,159

and and that was because of some new

1974

01:13:03,990 --> 01:13:02,239

science requirements on sentinel 6

1975

01:13:05,910 --> 01:13:04,000

to get us even better data throughout

1976

01:13:07,110 --> 01:13:05,920

the mission and folks in florida

1977

01:13:08,149 --> 01:13:07,120

certainly care about that because there

1978

01:13:10,870 --> 01:13:08,159

are more

1979

01:13:12,229 --> 01:13:10,880

or more miles of populated coastline in

1980

01:13:14,790 --> 01:13:12,239

my home state of florida

1981

01:13:15,430 --> 01:13:14,800

than in any other state got a question

1982

01:13:18,229 --> 01:13:15,440

from

1983

01:13:19,030 --> 01:13:18,239

social media for you hank reached us

1984

01:13:20,709 --> 01:13:19,040

from facebook

1985

01:13:22,790 --> 01:13:20,719

and he wants to know how accurate is the

1986

01:13:25,270 --> 01:13:22,800

satellite what is the smallest area of

1987

01:13:27,350 --> 01:13:25,280

ocean it can measure the altitude of

1988

01:13:29,430 --> 01:13:27,360

and might it have any applications for

1989

01:13:31,830 --> 01:13:29,440

detecting seismic activity

1990

01:13:33,350 --> 01:13:31,840

oh a very interesting question yes so

1991

01:13:35,990 --> 01:13:33,360

for a single measurement

1992

01:13:36,950 --> 01:13:36,000

we can get down to three centimeter

1993

01:13:39,430 --> 01:13:36,960

accuracy

1994

01:13:41,270 --> 01:13:39,440

um but as we continue to take those

1995

01:13:42,390 --> 01:13:41,280

measurements we get global coverage over

1996

01:13:44,149 --> 01:13:42,400

10 day period

1997

01:13:46,870 --> 01:13:44,159

and then we continue we continue to get

1998

01:13:47,990 --> 01:13:46,880

the map of the full of our full planet

1999

01:13:49,990 --> 01:13:48,000

and all the oceans

2000

01:13:51,910 --> 01:13:50,000

and so over the span of a year we get

2001

01:13:53,590 --> 01:13:51,920

down to millimeter resolution

2002

01:13:55,030 --> 01:13:53,600

so that's an order of magnitude better

2003

01:13:55,990 --> 01:13:55,040

than a single measurement and how we're

2004

01:13:57,750 --> 01:13:56,000

able to get

2005

01:14:00,070 --> 01:13:57,760

those global averages of three

2006

01:14:02,070 --> 01:14:00,080

millimeter height increase per year

2007

01:14:03,510 --> 01:14:02,080

um which is really you know if you think

2008

01:14:04,229 --> 01:14:03,520

about over the span of a decade that's a

2009

01:14:06,390 --> 01:14:04,239

centimeter

2010

01:14:08,149 --> 01:14:06,400

and over the span of a millennia or a

2011

01:14:10,310 --> 01:14:08,159

century excuse me that's going to be

2012

01:14:11,270 --> 01:14:10,320

uh 10 10 centimeters so we're definitely

2013

01:14:13,590 --> 01:14:11,280

seeing the rise

2014

01:14:14,630 --> 01:14:13,600

and definitely seeing the sea level

2015

01:14:17,830 --> 01:14:14,640

impacts

2016

01:14:20,070 --> 01:14:17,840

the seismic activity yes so although

2017

01:14:22,229 --> 01:14:20,080

central six is not going to be trying to

2018

01:14:23,110 --> 01:14:22,239

detect seismic activity or tsunamis

2019

01:14:25,350 --> 01:14:23,120

which often

2020

01:14:27,510 --> 01:14:25,360

come as a result of that over the oceans

2021

01:14:29,030 --> 01:14:27,520

but we have been able to detect them in

2022

01:14:30,310 --> 01:14:29,040

the past previous emissions previous

2023

01:14:31,750 --> 01:14:30,320

missions have been able to

2024

01:14:33,750 --> 01:14:31,760

but really what we're going to see is

2025

01:14:34,310 --> 01:14:33,760

any changes in the sea levels as a

2026

01:14:35,830 --> 01:14:34,320

result

2027

01:14:37,669 --> 01:14:35,840

of that seismic activity and any

2028

01:14:39,750 --> 01:14:37,679

tsunamis very helpful

2029

01:14:41,110 --> 01:14:39,760

that's all data that is very important

2030

01:14:43,350 --> 01:14:41,120

to our world

2031

01:14:44,709 --> 01:14:43,360

stadium thank you so much for joining us

2032

01:14:48,470 --> 01:14:44,719

thank you so much for having me

2033

01:14:50,950 --> 01:14:48,480

thank you shannon all right all of these

2034

01:14:52,870 --> 01:14:50,960

highly accurate earth observing

2035

01:14:54,870 --> 01:14:52,880

instruments were installed onto one

2036

01:14:56,310 --> 01:14:54,880

satellite that will orbit our earth for

2037

01:14:58,630 --> 01:14:56,320

about five years

2038

01:15:00,709 --> 01:14:58,640

nasa's blair allen asked sentinel six

2039

01:15:05,030 --> 01:15:00,719

project manager parag vasay

2040

01:15:10,229 --> 01:15:08,070

joining us now is paraguay he's the nasa

2041

01:15:11,910 --> 01:15:10,239

project manager for sentinel 6

2042

01:15:13,669 --> 01:15:11,920

and he's going to talk about a few

2043

01:15:15,669 --> 01:15:13,679

particulars on the spacecraft

2044

01:15:17,189 --> 01:15:15,679

but prague before you do i was wondering

2045

01:15:17,830 --> 01:15:17,199

if you wouldn't mind talking a little

2046

01:15:21,110 --> 01:15:17,840

bit about

2047

01:15:24,149 --> 01:15:21,120

the science behind this altimetry

2048

01:15:27,669 --> 01:15:24,159

yeah altimetry is a science

2049

01:15:28,630 --> 01:15:27,679

uh it's basically using uh microwave

2050

01:15:31,189 --> 01:15:28,640

instruments

2051
01:15:31,990 --> 01:15:31,199
using them from space so that we can

2052
01:15:34,310 --> 01:15:32,000
cover

2053
01:15:35,430 --> 01:15:34,320
uh the vast oceans that we have across

2054
01:15:37,350 --> 01:15:35,440
the whole world

2055
01:15:39,110 --> 01:15:37,360
and the whole objective with altimetry

2056
01:15:41,030 --> 01:15:39,120
and ocean altimetry is to be able to

2057
01:15:42,709 --> 01:15:41,040
measure those oceans

2058
01:15:44,870 --> 01:15:42,719
across the world measure them very

2059
01:15:46,550 --> 01:15:44,880
precisely and doing that with a

2060
01:15:50,149 --> 01:15:46,560
satellite from space

2061
01:15:51,430 --> 01:15:50,159
allows us to do it completely and most

2062
01:15:53,510 --> 01:15:51,440
accurately that we can

2063
01:15:55,030 --> 01:15:53,520

all across the whole world so let's look

2064

01:15:56,390 --> 01:15:55,040

at the instruments can you tell me about

2065

01:15:58,870 --> 01:15:56,400

the primary instrument

2066

01:15:59,510 --> 01:15:58,880

for sentinel 6 yeah the primary

2067

01:16:03,110 --> 01:15:59,520

instrument

2068

01:16:06,149 --> 01:16:03,120

is the poseidon radar altimeter

2069

01:16:09,430 --> 01:16:06,159

it's built on a simple concept which is

2070

01:16:11,590 --> 01:16:09,440

uh like any other radar where basically

2071

01:16:12,310 --> 01:16:11,600

we are producing a radio signal from the

2072

01:16:14,149 --> 01:16:12,320

instrument

2073

01:16:16,390 --> 01:16:14,159

it's being transmitted down to the earth

2074

01:16:19,189 --> 01:16:16,400

from space and we're waiting

2075

01:16:20,790 --> 01:16:19,199

to actually get the reflected signal off

2076

01:16:23,669 --> 01:16:20,800

the ocean surface

2077

01:16:24,709 --> 01:16:23,679

back up to the antenna and receiving

2078

01:16:27,430 --> 01:16:24,719

that signal

2079

01:16:28,709 --> 01:16:27,440

we want to understand how long it took

2080

01:16:31,350 --> 01:16:28,719

for that signal to get us

2081

01:16:33,270 --> 01:16:31,360

get it back here and then with that

2082

01:16:35,590 --> 01:16:33,280

we're able to understand

2083

01:16:36,310 --> 01:16:35,600

what and measure what the height of the

2084

01:16:37,990 --> 01:16:36,320

ocean is

2085

01:16:40,070 --> 01:16:38,000

and there's another important instrument

2086

01:16:42,310 --> 01:16:40,080

on board the amrc

2087

01:16:43,669 --> 01:16:42,320

can you talk about that and its purpose

2088

01:16:45,350 --> 01:16:43,679

yes you're right

2089

01:16:46,790 --> 01:16:45,360

this is the advanced microwave

2090

01:16:50,470 --> 01:16:46,800

radiometer

2091

01:16:52,630 --> 01:16:50,480

very important instrument for doing this

2092

01:16:54,070 --> 01:16:52,640

measurement because the poseidon

2093

01:16:57,189 --> 01:16:54,080

altimeter measures

2094

01:17:00,229 --> 01:16:57,199

the height but it really

2095

01:17:02,870 --> 01:17:00,239

matters how well that is measured

2096

01:17:03,910 --> 01:17:02,880

as that signal passes through the

2097

01:17:06,229 --> 01:17:03,920

atmosphere

2098

01:17:07,510 --> 01:17:06,239

and we need the microwave radiometer to

2099

01:17:10,630 --> 01:17:07,520

be able to measure

2100

01:17:12,149 --> 01:17:10,640

uh differences in that signal as it

2101
01:17:14,310 --> 01:17:12,159
passes through the atmosphere this

2102
01:17:16,470 --> 01:17:14,320
instrument provides us that correction

2103
01:17:18,470 --> 01:17:16,480
so that together we're able to make a

2104
01:17:21,189 --> 01:17:18,480
very precise height measurement

2105
01:17:22,709 --> 01:17:21,199
uh of the ocean surface what are some

2106
01:17:24,390 --> 01:17:22,719
other important features

2107
01:17:25,750 --> 01:17:24,400
our instruments that are flying on

2108
01:17:27,830 --> 01:17:25,760
sentinel six

2109
01:17:29,110 --> 01:17:27,840
yeah we're lucky uh because on sentinel

2110
01:17:31,750 --> 01:17:29,120
six we do have an

2111
01:17:33,910 --> 01:17:31,760
additional instrument which is called

2112
01:17:35,750 --> 01:17:33,920
the radio occultation

2113
01:17:37,430 --> 01:17:35,760

receiver that's right here with the

2114

01:17:40,149 --> 01:17:37,440

antennas that you see here

2115

01:17:40,709 --> 01:17:40,159

it's a totally different concept but

2116

01:17:42,390 --> 01:17:40,719

similar

2117

01:17:44,070 --> 01:17:42,400

in some sense where we're actually

2118

01:17:46,870 --> 01:17:44,080

trying to measure how

2119

01:17:47,830 --> 01:17:46,880

radio signals bend through the earth's

2120

01:17:49,590 --> 01:17:47,840

atmosphere

2121

01:17:50,950 --> 01:17:49,600

that we get actually from other

2122

01:17:53,189 --> 01:17:50,960

satellites so

2123

01:17:54,229 --> 01:17:53,199

we use signals from the gps

2124

01:17:56,470 --> 01:17:54,239

constellation

2125

01:17:57,990 --> 01:17:56,480

which is transmitting a signal and these

2126
01:17:58,950 --> 01:17:58,000
antennas will receive it through the

2127
01:18:01,350 --> 01:17:58,960
atmosphere

2128
01:18:02,870 --> 01:18:01,360
help us understand what the the

2129
01:18:04,310 --> 01:18:02,880
atmosphere is like in terms of

2130
01:18:05,750 --> 01:18:04,320
temperature and humidity

2131
01:18:07,750 --> 01:18:05,760
well we're very excited about the

2132
01:18:09,189 --> 01:18:07,760
spacecraft and obviously the data we're

2133
01:18:10,830 --> 01:18:09,199
going to get with sentinel 6

2134
01:18:15,750 --> 01:18:10,840
thanks so much prague for being on the

2135
01:18:19,189 --> 01:18:17,669
thanks blair as we have mentioned

2136
01:18:21,189 --> 01:18:19,199
sentinel 6 is a true

2137
01:18:23,510 --> 01:18:21,199
international collaboration among

2138
01:18:25,669 --> 01:18:23,520

several agencies around the world

2139

01:18:27,189 --> 01:18:25,679

it was built upon a legacy of earth

2140

01:18:29,189 --> 01:18:27,199

observation missions

2141

01:18:31,430 --> 01:18:29,199

let's break down how this partnership

2142

01:18:33,350 --> 01:18:31,440

came together

2143

01:18:35,669 --> 01:18:33,360

the sentinel 6 michael freilick

2144

01:18:37,189 --> 01:18:35,679

satellite is the culmination of decades

2145

01:18:37,910 --> 01:18:37,199

of international research and

2146

01:18:40,070 --> 01:18:37,920

development

2147

01:18:41,990 --> 01:18:40,080

of satellite altimetry designed to

2148

01:18:44,149 --> 01:18:42,000

measure sea surface height

2149

01:18:45,350 --> 01:18:44,159

in the early 90s nasa and the french

2150

01:18:48,070 --> 01:18:45,360

space agency

2151
01:18:48,790 --> 01:18:48,080
launched topex poseidon the first in a

2152
01:18:51,510 --> 01:18:48,800
series of

2153
01:18:54,390 --> 01:18:51,520
next generation altimetry missions that

2154
01:18:56,630 --> 01:18:54,400
includes the Jason satellites meanwhile

2155
01:18:58,870 --> 01:18:56,640
the European Space Agency created their

2156
01:19:00,149 --> 01:18:58,880
own successful Earth observation program

2157
01:19:02,630 --> 01:19:00,159
called Copernicus

2158
01:19:04,630 --> 01:19:02,640
which includes the Sentinel series in an

2159
01:19:07,270 --> 01:19:04,640
effort to maximize the technology

2160
01:19:08,070 --> 01:19:07,280
and resources on both sides of the pond

2161
01:19:11,030 --> 01:19:08,080
NASA

2162
01:19:11,590 --> 01:19:11,040
NOAA, ESA, EUMETSAT and the European

2163
01:19:13,430 --> 01:19:11,600

commission

2164

01:19:15,270 --> 01:19:13,440

all joined forces to create this

2165

01:19:17,669 --> 01:19:15,280

satellite sentinel 6

2166

01:19:19,590 --> 01:19:17,679

michael freilick the name itself is

2167

01:19:21,350 --> 01:19:19,600

emblematic of a mission greater than the

2168

01:19:24,070 --> 01:19:21,360

sum of all its parts

2169

01:19:26,470 --> 01:19:24,080

the first part of the name sentinel 6 is

2170

01:19:27,270 --> 01:19:26,480

derived from issa's series of sentinel

2171

01:19:28,870 --> 01:19:27,280

satellites

2172

01:19:31,030 --> 01:19:28,880

and the michael freillett part of the

2173

01:19:32,950 --> 01:19:31,040

name honors dr michael freilich

2174

01:19:34,070 --> 01:19:32,960

the former director of nasa's earth

2175

01:19:36,550 --> 01:19:34,080

science division

2176
01:19:38,229 --> 01:19:36,560
and a tireless advocate for advancing

2177
01:19:39,750 --> 01:19:38,239
measurements of the ocean in an effort

2178
01:19:41,460 --> 01:19:39,760
to better understand

2179
01:19:46,149 --> 01:19:41,470
the planet we all live on

2180
01:19:50,229 --> 01:19:48,950
as you just saw umetsat or european

2181
01:19:52,070 --> 01:19:50,239
organization for the

2182
01:19:53,830 --> 01:19:52,080
exploitation of meteorological

2183
01:19:55,430 --> 01:19:53,840
satellites has been operating the

2184
01:19:56,470 --> 01:19:55,440
sentinel series of satellites from the

2185
01:19:58,390 --> 01:19:56,480
very beginning

2186
01:20:00,790 --> 01:19:58,400
earlier i spoke with the agency's

2187
01:20:07,990 --> 01:20:00,800
director general

2188
01:20:12,470 --> 01:20:10,070

yumeza has been involved in these

2189

01:20:13,510 --> 01:20:12,480

high-precision altimetry missions for a

2190

01:20:14,950 --> 01:20:13,520

long time

2191

01:20:17,270 --> 01:20:14,960

can you tell us a little bit more about

2192

01:20:20,709 --> 01:20:17,280

umetsat's role over the years and

2193

01:20:22,149 --> 01:20:20,719

how that's developed yes we we became

2194

01:20:24,550 --> 01:20:22,159

involved with json2

2195

01:20:26,550 --> 01:20:24,560

which was launched in 2006 and then we

2196

01:20:28,709 --> 01:20:26,560

continued to json3

2197

01:20:30,950 --> 01:20:28,719

and uh this was in cooperation with

2198

01:20:33,990 --> 01:20:30,960

kness nasa and noaa

2199

01:20:35,270 --> 01:20:34,000

and it's reflected the interest of the

2200

01:20:37,270 --> 01:20:35,280

operational agency

2201
01:20:38,550 --> 01:20:37,280
to contribute to these missions but we

2202
01:20:41,189 --> 01:20:38,560
had a

2203
01:20:43,350 --> 01:20:41,199
minor role technically we were just

2204
01:20:45,830 --> 01:20:43,360
processing real-time data

2205
01:20:48,149 --> 01:20:45,840
and with sentinel 6 we have a much more

2206
01:20:50,950 --> 01:20:48,159
important role because we develop

2207
01:20:52,709 --> 01:20:50,960
most of the ground segments and we will

2208
01:20:54,149 --> 01:20:52,719
perform flight operations and deliver

2209
01:20:56,149 --> 01:20:54,159
the data

2210
01:20:58,149 --> 01:20:56,159
so when will you mess that take control

2211
01:20:58,550 --> 01:20:58,159
of the spacecraft and how long will you

2212
01:21:01,830 --> 01:20:58,560
be

2213
01:21:04,950 --> 01:21:01,840

operating it so we will take uh

2214

01:21:08,310 --> 01:21:04,960

control of flight operations three

2215

01:21:11,510 --> 01:21:08,320

days after the launch after the uh

2216

01:21:13,510 --> 01:21:11,520

the what we call the early operations

2217

01:21:15,669 --> 01:21:13,520

phase which will be performed by either

2218

01:21:18,470 --> 01:21:15,679

and we will operate the spacecraft and

2219

01:21:21,030 --> 01:21:18,480

the system all along its lifetime

2220

01:21:23,510 --> 01:21:21,040

very good and since oceanography is a

2221

01:21:25,430 --> 01:21:23,520

field that's dear to your heart i know

2222

01:21:27,510 --> 01:21:25,440

can you explain to us what the the

2223

01:21:28,950 --> 01:21:27,520

difference this new satellite will make

2224

01:21:33,110 --> 01:21:28,960

in our understanding

2225

01:21:35,510 --> 01:21:33,120

of our oceans yeah first of all

2226

01:21:37,990 --> 01:21:35,520

this satellite will preserve the

2227

01:21:40,149 --> 01:21:38,000

integrity of a unique record of mean sea

2228

01:21:41,510 --> 01:21:40,159

level started with topex poseidon in

2229

01:21:44,470 --> 01:21:41,520

1992

2230

01:21:45,430 --> 01:21:44,480

but it will also improve the qrc further

2231

01:21:48,149 --> 01:21:45,440

so we were

2232

01:21:49,910 --> 01:21:48,159

3.5 centimeters topics we were two

2233

01:21:50,950 --> 01:21:49,920

centimeters with json will be one

2234

01:21:54,149 --> 01:21:50,960

centimeter

2235

01:21:54,950 --> 01:21:54,159

for for this spacecraft and we will also

2236

01:21:57,030 --> 01:21:54,960

have

2237

01:21:58,790 --> 01:21:57,040

better spatial resolution along the

2238

01:22:00,790 --> 01:21:58,800

track 300 meters

2239

01:22:02,229 --> 01:22:00,800

instead of seven kilometers so it's a

2240

01:22:04,709 --> 01:22:02,239

major improvement

2241

01:22:06,950 --> 01:22:04,719

will come closer to the cost and it will

2242

01:22:09,430 --> 01:22:06,960

be very important not only for climate

2243

01:22:11,590 --> 01:22:09,440

monitoring but for forecasting

2244

01:22:12,870 --> 01:22:11,600

peak waves in europe for instance

2245

01:22:16,470 --> 01:22:12,880

cyclones

2246

01:22:19,510 --> 01:22:16,480

and also whether the next summer will be

2247

01:22:21,110 --> 01:22:19,520

unusually unusually hot

2248

01:22:23,030 --> 01:22:21,120

so that's what we expect from this

2249

01:22:25,590 --> 01:22:23,040

mission

2250

01:22:27,590 --> 01:22:25,600

and we've talked a lot about cooperation

2251
01:22:30,790 --> 01:22:27,600
director general so how important

2252
01:22:32,870 --> 01:22:30,800
is that to umetsat in this endeavor so

2253
01:22:34,229 --> 01:22:32,880
to make it short one of the aspects of

2254
01:22:37,270 --> 01:22:34,239
cooperation

2255
01:22:38,149 --> 01:22:37,280
is science but i would like to close

2256
01:22:40,310 --> 01:22:38,159
saying that

2257
01:22:41,590 --> 01:22:40,320
at this meeting the ambassador of the

2258
01:22:44,390 --> 01:22:41,600
united states

2259
01:22:45,830 --> 01:22:44,400
in japan caroline kelly was asked was

2260
01:22:48,709 --> 01:22:45,840
given the flaw and she said

2261
01:22:49,669 --> 01:22:48,719
i am a fan of michael feilik and so

2262
01:22:52,310 --> 01:22:49,679
tonight

2263
01:22:54,470 --> 01:22:52,320

the us and europe are fans of michael

2264

01:22:55,910 --> 01:22:54,480

friday

2265

01:22:57,990 --> 01:22:55,920

well thank you for sharing those

2266

01:23:00,550 --> 01:22:58,000

thoughts on michael freilick

2267

01:23:01,110 --> 01:23:00,560

and congratulations on the successful

2268

01:23:02,950 --> 01:23:01,120

launch

2269

01:23:05,270 --> 01:23:02,960

of sentinel 6 michael freilick into

2270

01:23:06,070 --> 01:23:05,280

space director general alain ratier

2271

01:23:12,709 --> 01:23:06,080

thank you so much

2272

01:23:15,830 --> 01:23:14,709

it's time to check in on the progress of

2273

01:23:17,830 --> 01:23:15,840

the launch operations

2274

01:23:19,350 --> 01:23:17,840

that's right joshua and phillip they are

2275

01:23:20,070 --> 01:23:19,360

about to light that engine for the

2276

01:23:21,910 --> 01:23:20,080

second stage

2277

01:23:23,590 --> 01:23:21,920

but it's not expected to last very long

2278

01:23:25,110 --> 01:23:23,600

right yeah that's correct

2279

01:23:26,070 --> 01:23:25,120

i'm just checking my my columns here

2280

01:23:27,270 --> 01:23:26,080

make sure we're here and everything

2281

01:23:28,790 --> 01:23:27,280

we're expecting to hear that

2282

01:23:30,709 --> 01:23:28,800

call for the second stage second burn

2283

01:23:31,750 --> 01:23:30,719

any second now so uh we're kind of in a

2284

01:23:33,350 --> 01:23:31,760

holding pattern here

2285

01:23:35,750 --> 01:23:33,360

uh just kind of cycling back on the day

2286

01:23:39,830 --> 01:23:35,760

we had successful on time liftoff

2287

01:23:41,110 --> 01:23:39,840

at 9 17 08 pacific time um there you see

2288

01:23:43,830 --> 01:23:41,120

on screen that's a track

2289

01:23:44,390 --> 01:23:43,840

payload insertion orbit that's a great

2290

01:23:45,910 --> 01:23:44,400

call

2291

01:23:47,590 --> 01:23:45,920

i believe philip help me i believe

2292

01:23:49,110 --> 01:23:47,600

that's a call for like we've completed

2293

01:23:52,070 --> 01:23:49,120

the second stage burn

2294

01:23:52,629 --> 01:23:52,080

uh a nominal insertion orbit that's

2295

01:23:56,629 --> 01:23:52,639

where we

2296

01:23:57,830 --> 01:23:56,639

exactly yes the the first stage did most

2297

01:23:59,590 --> 01:23:57,840

of the work of getting out of that

2298

01:24:01,510 --> 01:23:59,600

gravity well to get away from earth into

2299

01:24:03,669 --> 01:24:01,520

orbit and then that second stage

2300

01:24:05,270 --> 01:24:03,679

uh second burn was really just tweaking

2301

01:24:07,910 --> 01:24:05,280

to to get into that final

2302

01:24:09,510 --> 01:24:07,920

circular orbit yeah fantastic uh on and

2303

01:24:11,750 --> 01:24:09,520

we're seeing now some great shots

2304

01:24:13,430 --> 01:24:11,760

from that second stage um and we saw the

2305

01:24:15,270 --> 01:24:13,440

spacecraft there a second ago so that

2306

01:24:16,709 --> 01:24:15,280

that track that the rocket has flown

2307

01:24:17,990 --> 01:24:16,719

it's tough to see because this is

2308

01:24:18,790 --> 01:24:18,000

simulating this image on screen and

2309

01:24:20,629 --> 01:24:18,800

simulating

2310

01:24:22,470 --> 01:24:20,639

the in being in the shadowy part of the

2311

01:24:23,350 --> 01:24:22,480

earth right now so if you look really

2312

01:24:25,510 --> 01:24:23,360

closely you can see

2313

01:24:27,830 --> 01:24:25,520

we're kind of uh approaching if not in

2314

01:24:28,790 --> 01:24:27,840

the indian ocean now or to the east of

2315

01:24:30,229 --> 01:24:28,800

africa

2316

01:24:32,229 --> 01:24:30,239

the track as philip mentioned earlier

2317

01:24:34,390 --> 01:24:32,239

that 66 degree inclination

2318

01:24:36,390 --> 01:24:34,400

kind of put us around the tip of south

2319

01:24:39,270 --> 01:24:36,400

america and then around the tip

2320

01:24:39,590 --> 01:24:39,280

of africa without actually dipping down

2321

01:24:42,950 --> 01:24:39,600

to

2322

01:24:44,149 --> 01:24:42,960

take

2323

01:24:46,310 --> 01:24:44,159

we're expecting to have signal

2324

01:24:49,430 --> 01:24:46,320

acquisition of the spacecraft over

2325

01:24:50,709 --> 01:24:49,440

around alaska so lots to come ahead uh

2326

01:24:51,910 --> 01:24:50,719

but philip i want to ask you about your

2327

01:24:53,830 --> 01:24:51,920

work because this is

2328

01:24:55,030 --> 01:24:53,840

kind of the bread and butter of your job

2329

01:24:57,270 --> 01:24:55,040

as a flight analyst

2330

01:24:59,030 --> 01:24:57,280

you definitely pride yourself on getting

2331

01:25:00,310 --> 01:24:59,040

to this point and beyond um so tell us

2332

01:25:01,510 --> 01:25:00,320

about what you do

2333

01:25:02,709 --> 01:25:01,520

right i mean you know be careful with

2334

01:25:03,990 --> 01:25:02,719

that question because we've been talking

2335

01:25:05,750 --> 01:25:04,000

orbits all day so you know

2336

01:25:07,430 --> 01:25:05,760

don't get me started on it but but you

2337

01:25:09,030 --> 01:25:07,440

know when you talk about trajectories

2338

01:25:10,470 --> 01:25:09,040

and the launch sense there's really two

2339

01:25:12,070 --> 01:25:10,480

pieces there's what you happen

2340

01:25:13,830 --> 01:25:12,080

what happens when you are in orbit when

2341

01:25:14,550 --> 01:25:13,840

you're already in space and then there's

2342

01:25:16,550 --> 01:25:14,560

the unique

2343

01:25:18,310 --> 01:25:16,560

question of how do you get from the

2344

01:25:20,870 --> 01:25:18,320

launch pad into orbit

2345

01:25:21,669 --> 01:25:20,880

so at lsp at the launch services program

2346

01:25:23,910 --> 01:25:21,679

we really

2347

01:25:25,510 --> 01:25:23,920

speak both languages so we want to be

2348

01:25:26,310 --> 01:25:25,520

able to take the work that the

2349

01:25:28,709 --> 01:25:26,320

spacecraft

2350

01:25:30,310 --> 01:25:28,719

team does to determine what all of their

2351

01:25:32,149 --> 01:25:30,320

needs are in terms of where they need to

2352

01:25:33,990 --> 01:25:32,159

be and when they need to be there

2353

01:25:35,430 --> 01:25:34,000

and we help translate that efficiently

2354

01:25:36,229 --> 01:25:35,440

to the launch vehicle who has their own

2355

01:25:37,990 --> 01:25:36,239

process of

2356

01:25:39,590 --> 01:25:38,000

designing the actual trajectory to get

2357

01:25:41,110 --> 01:25:39,600

from the launch pad into orbit

2358

01:25:42,950 --> 01:25:41,120

so we support that process however we

2359

01:25:44,229 --> 01:25:42,960

can yeah and that's as you kind of

2360

01:25:46,390 --> 01:25:44,239

alluded there that's really

2361

01:25:47,430 --> 01:25:46,400

the bread and butter of the broader lsp

2362

01:25:50,229 --> 01:25:47,440

picture

2363

01:25:51,590 --> 01:25:50,239

working with a spacecraft customer uh to

2364

01:25:52,790 --> 01:25:51,600

acquire the vehicle

2365

01:25:54,870 --> 01:25:52,800

we heard tim dunn speak about that

2366

01:25:56,149 --> 01:25:54,880

yesterday just the acquisition

2367

01:25:57,910 --> 01:25:56,159

of the vehicle and the service to get

2368

01:25:59,430 --> 01:25:57,920

into orbit as you need to be um so

2369

01:26:01,510 --> 01:25:59,440

what's kind of that picture like for lsp

2370

01:26:02,550 --> 01:26:01,520

what's the process at large right so we

2371

01:26:05,669 --> 01:26:02,560

really just want to

2372

01:26:07,430 --> 01:26:05,679

support those spacecraft and

2373

01:26:08,870 --> 01:26:07,440

do whatever do whatever needs to be done

2374

01:26:11,270 --> 01:26:08,880

to make sure that they are

2375

01:26:12,470 --> 01:26:11,280

going to be placed into the the specific

2376

01:26:14,709 --> 01:26:12,480

orbit safely

2377

01:26:15,510 --> 01:26:14,719

so there's a lot of things that lsp does

2378

01:26:18,390 --> 01:26:15,520

to

2379

01:26:19,510 --> 01:26:18,400

just keep a grasp on the evolving launch

2380

01:26:21,270 --> 01:26:19,520

vehicle markets

2381

01:26:23,030 --> 01:26:21,280

um you know being able to to know

2382

01:26:24,310 --> 01:26:23,040

exactly what the spacecraft is or what

2383

01:26:26,870 --> 01:26:24,320

the launch vehicle is going to do

2384

01:26:28,390 --> 01:26:26,880

before it's actually purchased so we can

2385

01:26:29,910 --> 01:26:28,400

advise them so they can do their

2386

01:26:32,229 --> 01:26:29,920

planning years in advance

2387

01:26:33,910 --> 01:26:32,239

before they're even uh purchasing their

2388

01:26:35,990 --> 01:26:33,920

vehicle so we really just want to sort

2389

01:26:37,910 --> 01:26:36,000

of be that interface for nasa

2390

01:26:39,270 --> 01:26:37,920

yeah and i want to check in for a second

2391

01:26:42,629 --> 01:26:39,280

to say we just heard a call

2392

01:26:44,229 --> 01:26:42,639

of acquisition for diego uh diego garcia

2393

01:26:46,070 --> 01:26:44,239

that's not the spacecraft acquisition

2394

01:26:47,510 --> 01:26:46,080

that's a stage two acquisition

2395

01:26:50,229 --> 01:26:47,520

um so we'll be looking for this

2396

01:26:51,189 --> 01:26:50,239

spacecraft acquisition over alaska as we

2397

01:26:54,149 --> 01:26:51,199

get to

2398

01:26:54,790 --> 01:26:54,159

the alaska general geography and we're

2399

01:26:56,709 --> 01:26:54,800

hoping to

2400

01:26:58,550 --> 01:26:56,719

ahead in our show bring you the

2401

01:27:00,790 --> 01:26:58,560

spacecraft separation video live

2402

01:27:02,470 --> 01:27:00,800

or close to live it'll be a few seconds

2403

01:27:04,070 --> 01:27:02,480

delayed it takes a few seconds

2404

01:27:05,990 --> 01:27:04,080

to get that signal back from the other

2405

01:27:08,149 --> 01:27:06,000

side of the earth where we already are

2406

01:27:09,430 --> 01:27:08,159

i do want to go ahead and bring in now

2407

01:27:11,350 --> 01:27:09,440

another flight analyst

2408

01:27:12,470 --> 01:27:11,360

uh cali burke who's also with launch

2409

01:27:15,350 --> 01:27:12,480

services program

2410

01:27:16,629 --> 01:27:15,360

uh cali thanks for joining us today yeah

2411

01:27:18,149 --> 01:27:16,639

i'm here in uh

2412

01:27:19,910 --> 01:27:18,159

my own little booth and mission director

2413

01:27:21,270 --> 01:27:19,920

center yeah i appreciate you you're kind

2414

01:27:23,910 --> 01:27:21,280

of isolated there um

2415

01:27:25,350 --> 01:27:23,920

in our booth over there um glad to have

2416

01:27:26,470 --> 01:27:25,360

you and i know you wanted to talk a

2417

01:27:28,310 --> 01:27:26,480

little bit about today about

2418

01:27:30,149 --> 01:27:28,320

kind of the the choosing of the orbit

2419

01:27:32,470 --> 01:27:30,159

we're in obviously we had a good call

2420

01:27:33,910 --> 01:27:32,480

out for nominal insertion burn um so

2421

01:27:35,270 --> 01:27:33,920

where are we and why did we choose this

2422

01:27:37,270 --> 01:27:35,280

specific orbit

2423

01:27:38,790 --> 01:27:37,280

so um so as a launch sources program we

2424

01:27:39,669 --> 01:27:38,800

go where the spacecraft asks us and so

2425

01:27:40,950 --> 01:27:39,679

we're going to

2426

01:27:43,270 --> 01:27:40,960

um you know if this was the equator at

2427

01:27:44,870 --> 01:27:43,280

zero degrees we're going to a 66 degree

2428

01:27:46,870 --> 01:27:44,880

inclination so it's a high inclination

2429

01:27:48,950 --> 01:27:46,880

orbit and um so it's

2430

01:27:51,030 --> 01:27:48,960

generally the same one that jason 3 is

2431

01:27:53,189 --> 01:27:51,040

in decades of continuous data

2432

01:27:54,709 --> 01:27:53,199

and so that going up that high means we

2433

01:27:56,470 --> 01:27:54,719

go up you know as high as alaska and

2434

01:27:57,510 --> 01:27:56,480

sweden but then sweep down below south

2435

01:27:59,510 --> 01:27:57,520

america

2436

01:28:00,950 --> 01:27:59,520

and so it's a nearly circular orbit and

2437

01:28:02,950 --> 01:28:00,960

so it's around you know around the earth

2438

01:28:05,669 --> 01:28:02,960

it's about 800 miles above the earth

2439

01:28:07,510 --> 01:28:05,679

which is about 1 300 kilometers

2440

01:28:08,709 --> 01:28:07,520

and why such a long coast phase i know

2441

01:28:09,990 --> 01:28:08,719

that uh

2442

01:28:12,709 --> 01:28:10,000

for those that are familiar with

2443

01:28:14,709 --> 01:28:12,719

rocketry they kind of are accustomed to

2444

01:28:16,790 --> 01:28:14,719

science missions and robotic explorers

2445

01:28:19,430 --> 01:28:16,800

having a coast phase that can be

2446

01:28:21,189 --> 01:28:19,440

fairly lengthy but why this 45 minute

2447

01:28:22,709 --> 01:28:21,199

coast before the second burn

2448

01:28:24,310 --> 01:28:22,719

so with the rocket we bring all the gas

2449

01:28:25,830 --> 01:28:24,320

with us there's not gas stations in the

2450

01:28:26,470 --> 01:28:25,840

way so we want to try and use as little

2451

01:28:28,870 --> 01:28:26,480

as possible

2452

01:28:30,629 --> 01:28:28,880

and so just the way that it works is

2453

01:28:34,229 --> 01:28:30,639

that um you know we start in

2454

01:28:35,430 --> 01:28:34,239

um we're looking at the spacecraft

2455

01:28:36,790 --> 01:28:35,440

separation right now

2456

01:28:37,990 --> 01:28:36,800

i want to let you finish but we're

2457

01:28:39,430 --> 01:28:38,000

getting that live and i wanted to call

2458

01:28:40,070 --> 01:28:39,440

that out for you so there goes sentinel

2459

01:28:42,709 --> 01:28:40,080

6.

2460

01:28:44,550 --> 01:28:42,719

uh that is a beautiful sight uh watching

2461

01:28:46,950 --> 01:28:44,560

it drift off there again we are kind of

2462

01:28:48,470 --> 01:28:46,960

shaded by the earth um so we're not in

2463

01:28:51,030 --> 01:28:48,480

direct sunlight at this time

2464

01:28:51,750 --> 01:28:51,040

um so that's why it's as dark as it is

2465

01:28:52,790 --> 01:28:51,760

uh if

2466

01:28:53,990 --> 01:28:52,800

the sun were on this side of the earth

2467

01:28:55,430 --> 01:28:54,000

we'd see a little bit more of that but

2468

01:28:56,629 --> 01:28:55,440

that's gonna kind of just drift off

2469

01:28:58,629 --> 01:28:56,639

and that's completely normal and

2470

01:28:59,910 --> 01:28:58,639

expected so

2471

01:29:02,950 --> 01:28:59,920

kelly i do want to let you finish sorry

2472

01:29:05,830 --> 01:29:02,960

for jumping in there no yeah that's the

2473

01:29:07,189 --> 01:29:05,840

exciting part um uh when we have the

2474

01:29:10,149 --> 01:29:07,199

rocket's done its job

2475

01:29:11,430 --> 01:29:10,159

um so what what we did was we got to a

2476

01:29:13,270 --> 01:29:11,440

park orbit coast with

2477

01:29:15,189 --> 01:29:13,280

the boost and the first burn and so with

2478

01:29:16,629 --> 01:29:15,199

that we still had a perigee so the point

2479

01:29:19,030 --> 01:29:16,639

where closest to the earth just above

2480

01:29:20,790 --> 01:29:19,040

160 miles and so we're near that

2481

01:29:22,310 --> 01:29:20,800

and then we just we coast and just let

2482

01:29:23,350 --> 01:29:22,320

physics do its job where we go out to

2483

01:29:25,750 --> 01:29:23,360

the furthest part

2484

01:29:27,189 --> 01:29:25,760

800 miles and then at that point we just

2485

01:29:28,550 --> 01:29:27,199

have to do a short burn you know just

2486

01:29:30,629 --> 01:29:28,560

over 10 seconds

2487

01:29:32,149 --> 01:29:30,639

um a little bit more and then you know

2488

01:29:33,590 --> 01:29:32,159

we circulate the orbit so we just then

2489

01:29:35,350 --> 01:29:33,600

are just using a little bit of fuel at

2490

01:29:36,870 --> 01:29:35,360

that point so

2491

01:29:38,550 --> 01:29:36,880

awesome hey last question for you really

2492

01:29:40,310 --> 01:29:38,560

quickly i wanted to ask about the

2493

01:29:41,270 --> 01:29:40,320

question of how far would we be behind

2494

01:29:42,310 --> 01:29:41,280

jason 3

2495

01:29:44,149 --> 01:29:42,320

because obviously we're trying to be in

2496

01:29:46,390 --> 01:29:44,159

that exact same orbit like you mentioned

2497

01:29:48,629 --> 01:29:46,400

but how far away are we

2498

01:29:49,910 --> 01:29:48,639

so um what we're doing so we have our

2499

01:29:52,149 --> 01:29:49,920

launch time so that we're in

2500

01:29:53,350 --> 01:29:52,159

our the same orbit plane as jason three

2501
01:29:54,310 --> 01:29:53,360
that's why we had just that one second

2502
01:29:55,830 --> 01:29:54,320
to launch

2503
01:29:57,590 --> 01:29:55,840
and then we're going to be just minutes

2504
01:30:00,629 --> 01:29:57,600
behind and um

2505
01:30:01,590 --> 01:30:00,639
they're zooming around at 3.5 miles per

2506
01:30:03,110 --> 01:30:01,600
second

2507
01:30:05,030 --> 01:30:03,120
um and so if they get you know if

2508
01:30:06,709 --> 01:30:05,040
sentinel 3 gets as close as just 30

2509
01:30:09,350 --> 01:30:06,719
seconds behind jason iii that's still

2510
01:30:10,790 --> 01:30:09,360
135 miles behind it in the orbit

2511
01:30:12,950 --> 01:30:10,800
yeah i think i think i just heard you

2512
01:30:13,750 --> 01:30:12,960
say 3.5 but i know we talked this that

2513
01:30:16,709 --> 01:30:13,760

numbers

2514

01:30:17,430 --> 01:30:16,719

wanted to make sure it was at 3.5 or

2515

01:30:19,350 --> 01:30:17,440

four points

2516

01:30:20,950 --> 01:30:19,360

four point five okay correct no worries

2517

01:30:23,270 --> 01:30:20,960

again we deal with lots of numbers

2518

01:30:24,950 --> 01:30:23,280

um cali i appreciate you being here with

2519

01:30:26,390 --> 01:30:24,960

us thanks so much and appreciate your

2520

01:30:27,750 --> 01:30:26,400

hard work for lsp and

2521

01:30:30,149 --> 01:30:27,760

and getting our spacecraft customers

2522

01:30:32,390 --> 01:30:30,159

where they need to be yeah go sentinel

2523

01:30:34,790 --> 01:30:32,400

six michael freely yes awesome thank you

2524

01:30:35,750 --> 01:30:34,800

so much uh yeah that speed of 4.5 meters

2525

01:30:39,430 --> 01:30:35,760

per second

2526

01:30:41,669 --> 01:30:39,440

actually

2527

01:30:42,950 --> 01:30:41,679

means that we're traveling at a speed

2528

01:30:45,110 --> 01:30:42,960

that would put you from

2529

01:30:46,550 --> 01:30:45,120

esa's headquarters in paris france to

2530

01:30:47,590 --> 01:30:46,560

the launch site at vandenberg in about

2531

01:30:49,510 --> 01:30:47,600

20 minutes

2532

01:30:50,790 --> 01:30:49,520

so uh pretty speedy there there are

2533

01:30:51,910 --> 01:30:50,800

still a few milestones ahead we hope

2534

01:30:53,270 --> 01:30:51,920

you'll stay with us

2535

01:30:54,790 --> 01:30:53,280

but we're gonna send it back over to

2536

01:30:56,550 --> 01:30:54,800

daryl but uh just preview for you

2537

01:30:57,830 --> 01:30:56,560

quickly solar array deploy is ahead

2538

01:31:02,229 --> 01:30:57,840

and then that signal acquisition we

2539

01:31:03,990 --> 01:31:02,239

mentioned daryl back to you all right

2540

01:31:05,350 --> 01:31:04,000

thank you joshua and philip and i want

2541

01:31:07,830 --> 01:31:05,360

to fly that fast

2542

01:31:08,470 --> 01:31:07,840

yes get you from point a to point b and

2543

01:31:11,590 --> 01:31:08,480

uh

2544

01:31:14,629 --> 01:31:11,600

lickety-slip now while we await

2545

01:31:15,030 --> 01:31:14,639

the deployment uh we uh have a special

2546

01:31:17,590 --> 01:31:15,040

guest

2547

01:31:19,669 --> 01:31:17,600

who is responsible for nasa's physical

2548

01:31:22,470 --> 01:31:19,679

oceanography program

2549

01:31:23,350 --> 01:31:22,480

she's also nasa's program scientist for

2550

01:31:26,070 --> 01:31:23,360

this mission

2551
01:31:26,629 --> 01:31:26,080
nadia vinogradova schiffer joins us live

2552
01:31:29,430 --> 01:31:26,639
now

2553
01:31:31,270 --> 01:31:29,440
nadia what a textbook launch that was so

2554
01:31:34,870 --> 01:31:31,280
beautiful

2555
01:31:38,070 --> 01:31:34,880
absolutely incredible a very rewarding

2556
01:31:38,629 --> 01:31:38,080
um experience for all of us uh it's been

2557
01:31:40,550 --> 01:31:38,639
like

2558
01:31:42,310 --> 01:31:40,560
a turbulent year for the for the whole

2559
01:31:45,110 --> 01:31:42,320
planet the way emits of our

2560
01:31:46,070 --> 01:31:45,120
health crisis political crisis cultural

2561
01:31:49,430 --> 01:31:46,080
crisis so

2562
01:31:51,350 --> 01:31:49,440
it's nice to see that science perseveres

2563
01:31:53,590 --> 01:31:51,360

and they will continue marching forward

2564

01:31:55,270 --> 01:31:53,600

it was it was very rewarding something

2565

01:31:57,510 --> 01:31:55,280

like this connects us all doesn't it

2566

01:31:57,990 --> 01:31:57,520

nadia it just brings us all together and

2567

01:32:01,510 --> 01:31:58,000

it reminds

2568

01:32:03,990 --> 01:32:01,520

us what's most important in life i agree

2569

01:32:06,310 --> 01:32:04,000

well now nasa has an extremely diverse

2570

01:32:08,950 --> 01:32:06,320

portfolio of earth science missions

2571

01:32:10,709 --> 01:32:08,960

what sets sentinel 6 apart from all the

2572

01:32:13,110 --> 01:32:10,719

rest of them

2573

01:32:14,149 --> 01:32:13,120

sea level measurements that sentinel-6

2574

01:32:17,590 --> 01:32:14,159

provide is our

2575

01:32:18,470 --> 01:32:17,600

only ocean surface measurements that we

2576

01:32:20,470 --> 01:32:18,480

can connect

2577

01:32:22,390 --> 01:32:20,480

uh to the physics of the whole water

2578

01:32:23,669 --> 01:32:22,400

column so not just what happens at the

2579

01:32:26,709 --> 01:32:23,679

very surface

2580

01:32:28,790 --> 01:32:26,719

but what happens from top to bottom and

2581

01:32:30,870 --> 01:32:28,800

uh and and that's that's an incredible

2582

01:32:33,430 --> 01:32:30,880

and very rich data sets that

2583

01:32:35,270 --> 01:32:33,440

can tell us a wealth of information what

2584

01:32:37,590 --> 01:32:35,280

happens with the oceans

2585

01:32:40,229 --> 01:32:37,600

uh and how oceans that connect with the

2586

01:32:40,709 --> 01:32:40,239

rest of the earth system we have a

2587

01:32:43,110 --> 01:32:40,719

question

2588

01:32:43,750 --> 01:32:43,120

coming from social media so can you take

2589

01:32:45,830 --> 01:32:43,760

that for us

2590

01:32:47,350 --> 01:32:45,840

absolutely oh very good shane on

2591

01:32:49,189 --> 01:32:47,360

facebook asks

2592

01:32:51,030 --> 01:32:49,199

will there be a way for individuals to

2593

01:32:52,310 --> 01:32:51,040

see the research data that comes from

2594

01:32:55,830 --> 01:32:52,320

the satellite

2595

01:32:56,870 --> 01:32:55,840

yes absolutely nasa has an open data

2596

01:32:59,430 --> 01:32:56,880

policy

2597

01:33:00,790 --> 01:32:59,440

so when the when we receive the data

2598

01:33:03,350 --> 01:33:00,800

from the satellites

2599

01:33:05,110 --> 01:33:03,360

nasa science team uh carefully looks at

2600

01:33:07,189 --> 01:33:05,120

the data that everything makes sense and

2601
01:33:07,990 --> 01:33:07,199
then makes it available to the to the

2602
01:33:11,030 --> 01:33:08,000
public

2603
01:33:12,390 --> 01:33:11,040
uh freely and openly that's excellent

2604
01:33:14,470 --> 01:33:12,400
that's great and that's what's awesome

2605
01:33:15,030 --> 01:33:14,480
is that it's data that everyone can use

2606
01:33:17,750 --> 01:33:15,040
from

2607
01:33:18,470 --> 01:33:17,760
fishermen to meteorologists to so many

2608
01:33:20,229 --> 01:33:18,480
different people

2609
01:33:22,470 --> 01:33:20,239
all across the world absolutely marina

2610
01:33:24,790 --> 01:33:22,480
and that's the foundation of the

2611
01:33:25,510 --> 01:33:24,800
to keep the integrity of science very

2612
01:33:27,990 --> 01:33:25,520
high that

2613
01:33:29,189 --> 01:33:28,000

if you come up with a discovery anybody

2614

01:33:31,430 --> 01:33:29,199

in the world can

2615

01:33:32,310 --> 01:33:31,440

back up and repeat your experiment and

2616

01:33:34,310 --> 01:33:32,320

confirm

2617

01:33:36,790 --> 01:33:34,320

your findings or find something that

2618

01:33:38,629 --> 01:33:36,800

looks different and nadia what does the

2619

01:33:40,229 --> 01:33:38,639

mission hope to accomplish in the next

2620

01:33:41,750 --> 01:33:40,239

10 years with all this data that is

2621

01:33:42,390 --> 01:33:41,760

going to come in from sentinel a and

2622

01:33:44,070 --> 01:33:42,400

sentinel b

2623

01:33:46,070 --> 01:33:44,080

because it's two spacecrafts that'll

2624

01:33:48,709 --> 01:33:46,080

launch between five years of each other

2625

01:33:49,430 --> 01:33:48,719

um by the time we're done with sentinel

2626

01:33:51,830 --> 01:33:49,440

a and

2627

01:33:52,870 --> 01:33:51,840

mike fryer can be we would have almost

2628

01:33:55,830 --> 01:33:52,880

four decades

2629

01:33:57,590 --> 01:33:55,840

of sea level data that's uh that's

2630

01:34:01,110 --> 01:33:57,600

enough to look at the

2631

01:34:02,229 --> 01:34:01,120

at the spread of frequencies of how our

2632

01:34:04,310 --> 01:34:02,239

earth

2633

01:34:05,669 --> 01:34:04,320

climate change is happening and how

2634

01:34:07,990 --> 01:34:05,679

oceans interact with it

2635

01:34:10,070 --> 01:34:08,000

we are sort of on a tipping point what

2636

01:34:12,229 --> 01:34:10,080

we see that sea level is not only rising

2637

01:34:14,310 --> 01:34:12,239

but accelerating when we were

2638

01:34:16,870 --> 01:34:14,320

launching topics poseidon back in the

2639

01:34:18,070 --> 01:34:16,880

day the rise was about two millimeters

2640

01:34:20,790 --> 01:34:18,080

now it's about

2641

01:34:22,310 --> 01:34:20,800

approaching to five so we see that the

2642

01:34:24,310 --> 01:34:22,320

rise of this caesar

2643

01:34:26,310 --> 01:34:24,320

are getting faster and just to give you

2644

01:34:27,669 --> 01:34:26,320

uh just put it in a context those

2645

01:34:29,189 --> 01:34:27,679

millimeters as my

2646

01:34:31,590 --> 01:34:29,199

teenage son asked me why do we care

2647

01:34:32,229 --> 01:34:31,600

about three millimeters i told them well

2648

01:34:34,149 --> 01:34:32,239

andre

2649

01:34:37,350 --> 01:34:34,159

three millimeters per year change in sea

2650

01:34:39,990 --> 01:34:37,360

level means that we're adding about 300

2651
01:34:41,350 --> 01:34:40,000
trillion gallons of water every year

2652
01:34:43,990 --> 01:34:41,360
into the ocean and

2653
01:34:45,510 --> 01:34:44,000
if you line up all these gallons that

2654
01:34:48,390 --> 01:34:45,520
would enough to cover

2655
01:34:50,229 --> 01:34:48,400
distance from sun to pluto and back so

2656
01:34:52,629 --> 01:34:50,239
that's a lot of water

2657
01:34:53,350 --> 01:34:52,639
that's coming into the ocean perspective

2658
01:34:55,590 --> 01:34:53,360
yes

2659
01:34:57,189 --> 01:34:55,600
nadia vinegar radova schiffer thank you

2660
01:34:58,790 --> 01:34:57,199
so much for joining us it was great to

2661
01:35:00,629 --> 01:34:58,800
have this conversation with you here

2662
01:35:02,390 --> 01:35:00,639
just with the pacific ocean behind us

2663
01:35:04,229 --> 01:35:02,400

thank you daryl and marina thank you

2664

01:35:06,709 --> 01:35:04,239

nadia

2665

01:35:09,510 --> 01:35:06,719

well time to go back to kennedy for a

2666

01:35:12,470 --> 01:35:09,520

very big moment in our launch operations

2667

01:35:14,950 --> 01:35:12,480

the unfolding of the satellite solar

2668

01:35:16,870 --> 01:35:14,960

panels joshua

2669

01:35:18,950 --> 01:35:16,880

before we do that we want to recap the

2670

01:35:21,270 --> 01:35:18,960

launch just a quick moment to share with

2671

01:35:22,470 --> 01:35:21,280

everybody and let them know exactly what

2672

01:35:25,350 --> 01:35:22,480

happened about

2673

01:35:25,910 --> 01:35:25,360

45 minutes ago it was a beautiful launch

2674

01:35:27,830 --> 01:35:25,920

here

2675

01:35:29,750 --> 01:35:27,840

on the coast of central california the

2676

01:35:31,830 --> 01:35:29,760

sentinel 6 michael freilix satellite

2677

01:35:34,470 --> 01:35:31,840

which is sitting on top of the rocket

2678

01:35:35,590 --> 01:35:34,480

was ready to go we had clear skies there

2679

01:35:38,950 --> 01:35:35,600

was an ignition

2680

01:35:39,430 --> 01:35:38,960

of the rocket right at 9 17 p.m pacific

2681

01:35:45,830 --> 01:35:39,440

time

2682

01:35:48,390 --> 01:35:45,840

launch

2683

01:35:49,109 --> 01:35:48,400

of the sentinel 6 michael frylick uh

2684

01:35:51,910 --> 01:35:49,119

spacecraft

2685

01:35:53,030 --> 01:35:51,920

satellite going up on the falcon 9

2686

01:35:55,990 --> 01:35:53,040

rocket and it's a

2687

01:35:56,390 --> 01:35:56,000

beautiful sight looking down the barrel

2688

01:35:59,669 --> 01:35:56,400

both

2689

01:36:00,790 --> 01:35:59,679

of the booster as well as the skies

2690

01:36:03,910 --> 01:36:00,800

above

2691

01:36:04,629 --> 01:36:03,920

it just climbed and climbed racing up to

2692

01:36:06,709 --> 01:36:04,639

the middle

2693

01:36:09,510 --> 01:36:06,719

of the blue sky and performed

2694

01:36:12,750 --> 01:36:09,520

beautifully no problems with launch the

2695

01:36:16,310 --> 01:36:12,760

nine merlin d engines belting out their

2696

01:36:18,950 --> 01:36:16,320

1.7 million pounds of thrust

2697

01:36:20,629 --> 01:36:18,960

on their way into space the rocket just

2698

01:36:21,910 --> 01:36:20,639

performed perfectly and there you see a

2699

01:36:24,070 --> 01:36:21,920

shot from up high

2700

01:36:25,350 --> 01:36:24,080

and the coast of california vandenber

2701

01:36:28,550 --> 01:36:25,360

here of course

2702

01:36:29,990 --> 01:36:28,560

uh a launch site that allows for uh a

2703

01:36:31,510 --> 01:36:30,000

certain trajectory that allows our

2704

01:36:32,950 --> 01:36:31,520

science to do a lot of missions here and

2705

01:36:35,189 --> 01:36:32,960

then we had the landing

2706

01:36:36,870 --> 01:36:35,199

which was really neat for all of the

2707

01:36:37,990 --> 01:36:36,880

guests who were here michael freilich's

2708

01:36:40,550 --> 01:36:38,000

family watching as that

2709

01:36:42,310 --> 01:36:40,560

booster touched down just perfectly

2710

01:36:44,390 --> 01:36:42,320

nailing the landing

2711

01:36:46,550 --> 01:36:44,400

it was quite a sight to behold about

2712

01:36:49,189 --> 01:36:46,560

eight and a half minutes after launch

2713

01:36:51,510 --> 01:36:49,199

the first stage booster now available

2714

01:36:53,669 --> 01:36:51,520

for reuse

2715

01:36:54,790 --> 01:36:53,679

so now we want to check in with joshua

2716

01:36:57,830 --> 01:36:54,800

santora and

2717

01:36:59,109 --> 01:36:57,840

phillip hargrove for an update on the

2718

01:37:01,510 --> 01:36:59,119

second stage

2719

01:37:03,189 --> 01:37:01,520

well that's right we are now going to be

2720

01:37:07,109 --> 01:37:03,199

having a very big moment

2721

01:37:09,510 --> 01:37:07,119

as the unfolding of the satellite solar

2722

01:37:11,590 --> 01:37:09,520

panels moves in and joshua

2723

01:37:12,870 --> 01:37:11,600

it is an exciting time everything's

2724

01:37:14,790 --> 01:37:12,880

coming into place

2725

01:37:16,470 --> 01:37:14,800

marina it really is obviously we work

2726
01:37:18,070 --> 01:37:16,480
hard to plan for these moments and we

2727
01:37:19,109 --> 01:37:18,080
expect that we will succeed but it's

2728
01:37:20,470 --> 01:37:19,119
always

2729
01:37:22,790 --> 01:37:20,480
a relief every time you kind of cross

2730
01:37:24,229 --> 01:37:22,800
one of those milestones so we did have

2731
01:37:25,990 --> 01:37:24,239
the spacecraft separation we were able

2732
01:37:27,350 --> 01:37:26,000
to bring you just about live a few

2733
01:37:29,350 --> 01:37:27,360
seconds behind reality

2734
01:37:31,430 --> 01:37:29,360
um not too long ago and now we're

2735
01:37:32,709 --> 01:37:31,440
waiting on solar array deploy which in

2736
01:37:34,550 --> 01:37:32,719
theory should be happening in the next

2737
01:37:36,310 --> 01:37:34,560
three and a half minutes i don't know if

2738
01:37:37,590 --> 01:37:36,320

we'll have a visual for that

2739

01:37:39,910 --> 01:37:37,600

i suspect we're just going to hear a

2740

01:37:42,470 --> 01:37:39,920

call out that it's been confirmed so

2741

01:37:43,590 --> 01:37:42,480

in the meantime phillip um launch

2742

01:37:45,830 --> 01:37:43,600

services program

2743

01:37:48,149 --> 01:37:45,840

their official task really kind of ends

2744

01:37:49,430 --> 01:37:48,159

at spacecraft separation so that's a job

2745

01:37:50,790 --> 01:37:49,440

well done for that team i know that they

2746

01:37:52,149 --> 01:37:50,800

still very much care about the success

2747

01:37:54,310 --> 01:37:52,159

of the rest of the mission here

2748

01:37:55,750 --> 01:37:54,320

and they want to just be there with the

2749

01:37:57,590 --> 01:37:55,760

team kind of collectively

2750

01:37:58,870 --> 01:37:57,600

uh but what's is there is there more

2751
01:37:59,990 --> 01:37:58,880
responsibility beyond that i know that

2752
01:38:00,870 --> 01:38:00,000
there's years ahead of time but what

2753
01:38:02,629 --> 01:38:00,880
happens post

2754
01:38:04,310 --> 01:38:02,639
flight for a mission you're right that

2755
01:38:05,669 --> 01:38:04,320
in the big scheme of things our job is

2756
01:38:07,189 --> 01:38:05,679
pretty much done once the spacecraft

2757
01:38:08,149 --> 01:38:07,199
separates from the launch vehicle but

2758
01:38:10,629 --> 01:38:08,159
there is a lot of

2759
01:38:11,750 --> 01:38:10,639
post processing data to make sure that

2760
01:38:12,470 --> 01:38:11,760
everything went the way that it was

2761
01:38:14,310 --> 01:38:12,480
supposed to go

2762
01:38:15,590 --> 01:38:14,320
so you know we recall that you know once

2763
01:38:17,590 --> 01:38:15,600

we lit the candle just

2764

01:38:19,910 --> 01:38:17,600

a little while ago the rocket did

2765

01:38:21,750 --> 01:38:19,920

everything by itself so we have to

2766

01:38:23,189 --> 01:38:21,760

uh take the tracking data that we got

2767

01:38:26,229 --> 01:38:23,199

from some ground stations

2768

01:38:26,709 --> 01:38:26,239

and from space-based stations there's a

2769

01:38:29,030 --> 01:38:26,719

network

2770

01:38:30,629 --> 01:38:29,040

called tdrs for the tracking and data

2771

01:38:33,590 --> 01:38:30,639

relay satellite

2772

01:38:35,109 --> 01:38:33,600

systems tdrs that allows us to have a

2773

01:38:36,310 --> 01:38:35,119

really good understanding of where

2774

01:38:38,629 --> 01:38:36,320

exactly the launch vehicle and

2775

01:38:40,149 --> 01:38:38,639

spacecraft are at all times

2776

01:38:41,669 --> 01:38:40,159

so one of the data products that we get

2777

01:38:43,910 --> 01:38:41,679

from the launch vehicle is called the

2778

01:38:45,750 --> 01:38:43,920

open or the orbital parameters message

2779

01:38:47,990 --> 01:38:45,760

and that gives us a precise

2780

01:38:49,990 --> 01:38:48,000

measurement of the orbit state right

2781

01:38:51,430 --> 01:38:50,000

after separation so we can confirm that

2782

01:38:53,510 --> 01:38:51,440

the rocket did its job

2783

01:38:54,709 --> 01:38:53,520

sure and on a personal level because

2784

01:38:56,550 --> 01:38:54,719

obviously we know that

2785

01:38:57,910 --> 01:38:56,560

lsp like all of these organizations and

2786

01:38:58,790 --> 01:38:57,920

teams it's made up of people of

2787

01:39:00,709 --> 01:38:58,800

individuals

2788

01:39:02,709 --> 01:39:00,719

and obviously you guys individually

2789

01:39:04,070 --> 01:39:02,719

invest and as a team invest years of

2790

01:39:06,310 --> 01:39:04,080

your lives on these missions

2791

01:39:07,590 --> 01:39:06,320

just kind of putting in that energy when

2792

01:39:09,350 --> 01:39:07,600

it flies when you see it

2793

01:39:10,950 --> 01:39:09,360

on its way it's it's in orbit it made it

2794

01:39:11,990 --> 01:39:10,960

where it's supposed to what's that like

2795

01:39:14,470 --> 01:39:12,000

personally for you is

2796

01:39:16,470 --> 01:39:14,480

it is there just kind of a on to the

2797

01:39:17,910 --> 01:39:16,480

next thing or is there some sort of like

2798

01:39:19,990 --> 01:39:17,920

eternal pride that comes with knowing

2799

01:39:21,350 --> 01:39:20,000

that your work is in space somewhere

2800

01:39:23,270 --> 01:39:21,360

right there's definitely a lot of

2801
01:39:24,709 --> 01:39:23,280
emotions on a day like this so right now

2802
01:39:26,229 --> 01:39:24,719
i'm definitely feeling really happy and

2803
01:39:27,590 --> 01:39:26,239
proud for my co-worker who's been

2804
01:39:27,990 --> 01:39:27,600
working on this mission for a couple of

2805
01:39:29,669 --> 01:39:28,000
years

2806
01:39:31,270 --> 01:39:29,679
he actually sits right next to me in the

2807
01:39:32,629 --> 01:39:31,280
office so you know i've i've

2808
01:39:34,790 --> 01:39:32,639
seen and heard a lot about this mission

2809
01:39:35,910 --> 01:39:34,800
sure and uh just in general when it is

2810
01:39:37,430 --> 01:39:35,920
one that i work on

2811
01:39:39,109 --> 01:39:37,440
you just get a lot of perspective on the

2812
01:39:39,990 --> 01:39:39,119
fact that you know i worked on this for

2813
01:39:41,669 --> 01:39:40,000

a couple of years but

2814

01:39:43,109 --> 01:39:41,679

other people have you know potentially

2815

01:39:44,310 --> 01:39:43,119

put their whole career

2816

01:39:46,709 --> 01:39:44,320

especially for someone like michael

2817

01:39:48,709 --> 01:39:46,719

freilick who who's been so dedicated

2818

01:39:49,750 --> 01:39:48,719

or who was so dedicated uh to this type

2819

01:39:51,270 --> 01:39:49,760

of work so

2820

01:39:53,030 --> 01:39:51,280

it's really an honor to be a part of

2821

01:39:53,990 --> 01:39:53,040

that and then it's exciting to look

2822

01:39:55,830 --> 01:39:54,000

forward to the future

2823

01:39:57,750 --> 01:39:55,840

and uh look forward to getting the

2824

01:39:59,830 --> 01:39:57,760

science data back and see how the up

2825

01:40:01,590 --> 01:39:59,840

the actual spacecraft operates awesome

2826

01:40:02,870 --> 01:40:01,600

and just kind of spitballing how many

2827

01:40:04,149 --> 01:40:02,880

missions do you work at the same time

2828

01:40:04,790 --> 01:40:04,159

because that's one of the other factors

2829

01:40:06,870 --> 01:40:04,800

is that

2830

01:40:08,870 --> 01:40:06,880

no person i don't think anybody on your

2831

01:40:11,030 --> 01:40:08,880

team is is working one mission

2832

01:40:11,990 --> 01:40:11,040

exclusively at a time you're kind of

2833

01:40:13,750 --> 01:40:12,000

rolling that work

2834

01:40:15,030 --> 01:40:13,760

what's that i know it's a flexible

2835

01:40:15,430 --> 01:40:15,040

number what what is that like for you

2836

01:40:16,870 --> 01:40:15,440

guys

2837

01:40:18,790 --> 01:40:16,880

yeah rolling is a really good way to

2838

01:40:20,149 --> 01:40:18,800

describe it we i want to make sure that

2839

01:40:22,070 --> 01:40:20,159

nobody is you know working

2840

01:40:23,189 --> 01:40:22,080

two missions that are launching like

2841

01:40:25,109 --> 01:40:23,199

right along

2842

01:40:26,629 --> 01:40:25,119

right around the same time but so a lot

2843

01:40:28,390 --> 01:40:26,639

of us will maybe have one mission that's

2844

01:40:29,590 --> 01:40:28,400

a few years in advance and then one that

2845

01:40:30,950 --> 01:40:29,600

just launched so that's definitely the

2846

01:40:32,149 --> 01:40:30,960

case for me i have one that

2847

01:40:33,669 --> 01:40:32,159

launched this year and then my next

2848

01:40:35,109 --> 01:40:33,679

mission launches in a couple of years

2849

01:40:35,990 --> 01:40:35,119

yeah i think we just got a call for a

2850

01:40:37,910 --> 01:40:36,000

loss of signal i believe

2851
01:40:39,510 --> 01:40:37,920
that's actually for the second stage uh

2852
01:40:41,350 --> 01:40:39,520
that's as we've been hearing those calls

2853
01:40:41,830 --> 01:40:41,360
for second stage as we travel around the

2854
01:40:44,550 --> 01:40:41,840
earth

2855
01:40:46,149 --> 01:40:44,560
uh we're hearing pickups for the the new

2856
01:40:48,070 --> 01:40:46,159
tracking station ground station

2857
01:40:49,990 --> 01:40:48,080
as well as when that loss of signal

2858
01:40:50,709 --> 01:40:50,000
happens uh that's a nominal part of the

2859
01:40:52,870 --> 01:40:50,719
operation so

2860
01:40:54,310 --> 01:40:52,880
no surprises there nothing unexpected

2861
01:40:57,270 --> 01:40:54,320
that's just kind of

2862
01:40:58,390 --> 01:40:57,280
working rocket science and tell me about

2863
01:41:00,470 --> 01:40:58,400

uh

2864

01:41:02,229 --> 01:41:00,480

the the orbit that we're taking today i

2865

01:41:03,189 --> 01:41:02,239

know that we generally end up taking a

2866

01:41:05,750 --> 01:41:03,199

lot of

2867

01:41:06,950 --> 01:41:05,760

flights out of vanderberg for sci for

2868

01:41:09,189 --> 01:41:06,960

earth science missions

2869

01:41:10,870 --> 01:41:09,199

what's really the cause behind that why

2870

01:41:12,870 --> 01:41:10,880

why vanderberg so much for those

2871

01:41:14,470 --> 01:41:12,880

right so really connecting to what cali

2872

01:41:14,870 --> 01:41:14,480

was talking about earlier when you want

2873

01:41:16,950 --> 01:41:14,880

to do

2874

01:41:17,990 --> 01:41:16,960

earth science you also you don't want to

2875

01:41:19,510 --> 01:41:18,000

just look at one portion

2876

01:41:21,030 --> 01:41:19,520

of the earth you often want to look at

2877

01:41:22,629 --> 01:41:21,040

all of it you want to get

2878

01:41:23,910 --> 01:41:22,639

a lot of the surface of earth you want

2879

01:41:24,790 --> 01:41:23,920

to be able to cover that so if you're

2880

01:41:26,550 --> 01:41:24,800

able to

2881

01:41:28,229 --> 01:41:26,560

launch into a polar orbit where you're

2882

01:41:30,470 --> 01:41:28,239

literally hitting every

2883

01:41:32,470 --> 01:41:30,480

latitude you're in a really good place

2884

01:41:33,590 --> 01:41:32,480

so vanderberg obviously on that central

2885

01:41:35,430 --> 01:41:33,600

california coast

2886

01:41:36,790 --> 01:41:35,440

allows you to launch with one of those

2887

01:41:39,109 --> 01:41:36,800

southern azimuths

2888

01:41:41,189 --> 01:41:39,119

so we often use the use vanderberg for

2889

01:41:44,149 --> 01:41:41,199

polar launches and sun synchronous

2890

01:41:44,870 --> 01:41:44,159

uh orbits which are sort of a unique

2891

01:41:46,470 --> 01:41:44,880

case of that

2892

01:41:47,830 --> 01:41:46,480

great yeah just a reminder we are

2893

01:41:49,510 --> 01:41:47,840

listening in here now we should be

2894

01:41:51,270 --> 01:41:49,520

expecting a call out for solar array

2895

01:41:53,109 --> 01:41:51,280

deploy any moment now

2896

01:41:55,750 --> 01:41:53,119

we're just waiting to hear that i'm

2897

01:41:59,189 --> 01:41:55,760

excited for that moment

2898

01:42:00,709 --> 01:41:59,199

and as we mentioned

2899

01:42:02,470 --> 01:42:00,719

uh obviously we flew out of vanderberg

2900

01:42:06,310 --> 01:42:02,480

today right on time 12

2901

01:42:08,470 --> 01:42:06,320

or excuse me uh 9 17 08 pacific time

2902

01:42:09,590 --> 01:42:08,480

that's 12 17 08 eastern time and we are

2903

01:42:11,270 --> 01:42:09,600

waiting at solar deploy

2904

01:42:13,430 --> 01:42:11,280

post solar array deploy really that last

2905

01:42:14,870 --> 01:42:13,440

milestone there's kind of a larger gap

2906

01:42:16,390 --> 01:42:14,880

as we travel around the earth i don't

2907

01:42:17,270 --> 01:42:16,400

know if we can pull up that stk that

2908

01:42:18,870 --> 01:42:17,280

animation again

2909

01:42:20,950 --> 01:42:18,880

to kind of check and see where we're at

2910

01:42:23,189 --> 01:42:20,960

i'm not sure what status is

2911

01:42:24,470 --> 01:42:23,199

so this actually is going to demonstrate

2912

01:42:25,990 --> 01:42:24,480

a little bit about where we are

2913

01:42:27,270 --> 01:42:26,000

not exactly the location of the

2914

01:42:29,189 --> 01:42:27,280

spacecraft i think that's tracking

2915

01:42:30,709 --> 01:42:29,199

specifically second stage right now

2916

01:42:32,310 --> 01:42:30,719

so we are definitely in a little bit of

2917

01:42:34,629 --> 01:42:32,320

a holding pattern here hoping to hear

2918

01:42:36,470 --> 01:42:34,639

that call out for solar array deploy

2919

01:42:38,229 --> 01:42:36,480

which we wouldn't hear that call until

2920

01:42:39,590 --> 01:42:38,239

it's complete so we wouldn't necessarily

2921

01:42:40,870 --> 01:42:39,600

it could have begun already

2922

01:42:42,950 --> 01:42:40,880

and we just are waiting for that call

2923

01:42:44,950 --> 01:42:42,960

that it's been completed depending upon

2924

01:42:46,390 --> 01:42:44,960

the complexity and timeline for that as

2925

01:42:49,430 --> 01:42:46,400

well as any kind of communication

2926

01:42:50,629 --> 01:42:49,440

that's necessary right and it's

2927

01:42:51,830 --> 01:42:50,639

definitely you know important to note

2928

01:42:52,870 --> 01:42:51,840

that there are a lot of complicated

2929

01:42:54,149 --> 01:42:52,880

things that need to happen

2930

01:42:56,390 --> 01:42:54,159

right at this moment you know the

2931

01:42:57,510 --> 01:42:56,400

spacecraft just you know got into space

2932

01:42:59,270 --> 01:42:57,520

so it has to

2933

01:43:01,189 --> 01:42:59,280

uh you know it has to fit into that into

2934

01:43:02,709 --> 01:43:01,199

that payload fairing so there's often

2935

01:43:03,510 --> 01:43:02,719

times where you need to deploy a big

2936

01:43:05,990 --> 01:43:03,520

boom

2937

01:43:07,590 --> 01:43:06,000

deploy your your solar arrays will be

2938

01:43:09,189 --> 01:43:07,600

deploying antennas so it's able to

2939

01:43:10,229 --> 01:43:09,199

communicate with the ground

2940

01:43:11,910 --> 01:43:10,239

so all those things are going to be

2941

01:43:12,870 --> 01:43:11,920

happening you know in this in this near

2942

01:43:19,910 --> 01:43:12,880

term period

2943

01:43:23,590 --> 01:43:21,669

can you talk any more about the tracking

2944

01:43:24,790 --> 01:43:23,600

system i know that i know you kind of

2945

01:43:25,750 --> 01:43:24,800

spoke about that a little bit uh but

2946

01:43:27,510 --> 01:43:25,760

with tdrs

2947

01:43:28,629 --> 01:43:27,520

uh we have kind of an on-orbit system

2948

01:43:30,149 --> 01:43:28,639

we've heard these call-outs for these

2949

01:43:32,149 --> 01:43:30,159

ground station tracking systems

2950

01:43:33,990 --> 01:43:32,159

uh what's the thought process there

2951

01:43:35,669 --> 01:43:34,000

right i guess not thought process but

2952

01:43:37,590 --> 01:43:35,679

like how does that work

2953

01:43:38,950 --> 01:43:37,600

right so um so like i said there's

2954

01:43:41,990 --> 01:43:38,960

there's ground stations

2955

01:43:44,310 --> 01:43:42,000

um i believe on this trajectory we uh

2956

01:43:45,910 --> 01:43:44,320

you know received telemetry on its way

2957

01:43:46,470 --> 01:43:45,920

uh there was a station that's in south

2958

01:43:48,149 --> 01:43:46,480

america

2959

01:43:50,070 --> 01:43:48,159

one that's in uh you know southern

2960

01:43:51,990 --> 01:43:50,080

africa and things that are allowing us

2961

01:43:54,070 --> 01:43:52,000

to really know what's going on

2962

01:43:55,590 --> 01:43:54,080

because you don't want to just let it go

2963

01:43:56,149 --> 01:43:55,600

and then just wait until the very end

2964

01:43:59,910 --> 01:43:56,159

you want to

2965

01:44:00,629 --> 01:43:59,920

we're receiving that data really in real

2966

01:44:03,270 --> 01:44:00,639

time

2967

01:44:04,470 --> 01:44:03,280

and when it comes to tdrs that is a

2968

01:44:06,950 --> 01:44:04,480

geosynchronous

2969

01:44:08,870 --> 01:44:06,960

satellite system and the idea there is

2970

01:44:10,470 --> 01:44:08,880

to have satellites that are basically

2971

01:44:12,629 --> 01:44:10,480

parked above a particular

2972

01:44:14,229 --> 01:44:12,639

location on earth at all times and the

2973

01:44:16,470 --> 01:44:14,239

way that that works is that the orbit

2974

01:44:18,470 --> 01:44:16,480

period the time it takes the spacecraft

2975

01:44:19,990 --> 01:44:18,480

to travel around the earth is the exact

2976

01:44:21,669 --> 01:44:20,000

same amount of time that it takes the

2977

01:44:22,790 --> 01:44:21,679

earth to spin around its own axis

2978

01:44:24,709 --> 01:44:22,800

so that means that you can park

2979

01:44:28,070 --> 01:44:24,719

something right above the u.s or

2980

01:44:29,669 --> 01:44:28,080

whatever other longitude you want and uh

2981

01:44:31,590 --> 01:44:29,679

and when you are launching things from

2982

01:44:32,470 --> 01:44:31,600

the surface of the earth you can know oh

2983

01:44:34,950 --> 01:44:32,480

it's going to pass over

2984

01:44:35,590 --> 01:44:34,960

tdrs east they're numbered in a certain

2985

01:44:38,310 --> 01:44:35,600

way

2986

01:44:39,990 --> 01:44:38,320

and you can easily plan out your your

2987

01:44:41,270 --> 01:44:40,000

communications

2988

01:44:42,629 --> 01:44:41,280

very good thanks for that phillip uh

2989

01:44:44,229 --> 01:44:42,639

we're going to actually move along here

2990

01:44:45,830 --> 01:44:44,239

uh we're listening in

2991

01:44:47,030 --> 01:44:45,840

nothing to be alarmed about as philip

2992

01:44:48,550 --> 01:44:47,040

mentioned there's a lot of things at

2993

01:44:50,550 --> 01:44:48,560

play here and it's not

2994

01:44:52,390 --> 01:44:50,560

uncommon to have these kinds of calls

2995

01:44:53,750 --> 01:44:52,400

delayed we may even not hear that

2996

01:44:55,669 --> 01:44:53,760

officially confirmed until we get back

2997

01:44:57,669 --> 01:44:55,679

to that alaska tracking station

2998

01:44:58,950 --> 01:44:57,679

uh so we're gonna run back out to daryl

2999

01:45:02,310 --> 01:44:58,960

i know daryl has some more for us on

3000

01:45:04,229 --> 01:45:02,320

this mission

3001
01:45:05,350 --> 01:45:04,239
all right thank you very much joshua and

3002
01:45:07,830 --> 01:45:05,360
while we await

3003
01:45:09,109 --> 01:45:07,840
for that solar ray deploy we want to

3004
01:45:12,070 --> 01:45:09,119
chat with nasa's

3005
01:45:12,629 --> 01:45:12,080
launch services provider omar baez a

3006
01:45:14,629 --> 01:45:12,639
launch

3007
01:45:15,990 --> 01:45:14,639
manager himself thanks for coming out

3008
01:45:17,910 --> 01:45:16,000
here and joining us

3009
01:45:19,910 --> 01:45:17,920
we're awaiting of course solar ray

3010
01:45:21,030 --> 01:45:19,920
deploy but you you mentioned something

3011
01:45:23,270 --> 01:45:21,040
interesting about the

3012
01:45:24,870 --> 01:45:23,280
the deployment of these solar arrays

3013
01:45:26,390 --> 01:45:24,880

there's not a mechanical or electrical

3014

01:45:29,189 --> 01:45:26,400

trigger for this

3015

01:45:29,990 --> 01:45:29,199

no usually it's uh it's just a little

3016

01:45:33,189 --> 01:45:30,000

bit of paraffin

3017

01:45:35,189 --> 01:45:33,199

holding them in wax and you wait for it

3018

01:45:37,350 --> 01:45:35,199

to to be in the proper attitude to get

3019

01:45:39,750 --> 01:45:37,360

the sun and have it melt at a certain

3020

01:45:40,950 --> 01:45:39,760

temperature and the solar rays will

3021

01:45:43,270 --> 01:45:40,960

spring out and

3022

01:45:44,629 --> 01:45:43,280

be in their position then the solar rays

3023

01:45:46,550 --> 01:45:44,639

just pop right out

3024

01:45:48,790 --> 01:45:46,560

there there's other mechanisms at times

3025

01:45:51,270 --> 01:45:48,800

where where you do an electrical

3026

01:45:53,350 --> 01:45:51,280

uh deployment but uh this is very simple

3027

01:45:55,430 --> 01:45:53,360

the the simpler you keep it the better

3028

01:45:56,550 --> 01:45:55,440

well simple to study the ocean so we

3029

01:45:58,870 --> 01:45:56,560

like it um yes

3030

01:45:59,750 --> 01:45:58,880

the launch from our perspective viewing

3031

01:46:02,629 --> 01:45:59,760

it it just

3032

01:46:03,990 --> 01:46:02,639

looked magnificent from out here and uh

3033

01:46:06,310 --> 01:46:04,000

omar can't help but notice that the

3034

01:46:08,229 --> 01:46:06,320

boosters back there too

3035

01:46:09,430 --> 01:46:08,239

nice sight to come over the hill and see

3036

01:46:10,950 --> 01:46:09,440

the uh

3037

01:46:13,270 --> 01:46:10,960

the booster sitting there without the

3038

01:46:16,629 --> 01:46:13,280

second stage and the payload fairing

3039

01:46:18,870 --> 01:46:16,639

and what a sight

3040

01:46:19,750 --> 01:46:18,880

this is very unusual for vanderberg to

3041

01:46:22,790 --> 01:46:19,760

have this

3042

01:46:25,910 --> 01:46:22,800

beautiful non-marine layer

3043

01:46:27,430 --> 01:46:25,920

type of launch and it was a pleasure to

3044

01:46:28,950 --> 01:46:27,440

watch from the control room

3045

01:46:30,470 --> 01:46:28,960

we actually had a window where we could

3046

01:46:32,229 --> 01:46:30,480

see it um

3047

01:46:33,990 --> 01:46:32,239

launch and and we actually saw the

3048

01:46:35,830 --> 01:46:34,000

landing from it too so

3049

01:46:37,590 --> 01:46:35,840

usually as a launch director i get to

3050

01:46:39,750 --> 01:46:37,600

see it on a tv monitor

3051

01:46:40,629 --> 01:46:39,760

this time i i had both i had the tv

3052

01:46:42,149 --> 01:46:40,639

monitor

3053

01:46:44,470 --> 01:46:42,159

i could look out the window and and

3054

01:46:47,030 --> 01:46:44,480

watch it so it was a pretty cool

3055

01:46:48,470 --> 01:46:47,040

thing to watch your colleague tim dunn

3056

01:46:49,270 --> 01:46:48,480

of course is the launch manager for this

3057

01:46:50,550 --> 01:46:49,280

mission and

3058

01:46:52,390 --> 01:46:50,560

he's back there working it so we

3059

01:46:53,510 --> 01:46:52,400

appreciate you popping out and

3060

01:46:55,669 --> 01:46:53,520

and then of course you talk about the

3061

01:46:57,189 --> 01:46:55,679

the clear skies we were looking at it

3062

01:46:59,830 --> 01:46:57,199

we could see the separation of the first

3063

01:47:01,590 --> 01:46:59,840

stage um from the second stage

3064

01:47:03,109 --> 01:47:01,600

i mean it seemed like for like three or

3065

01:47:05,030 --> 01:47:03,119

four minutes it was amazing

3066

01:47:06,709 --> 01:47:05,040

just how clear the sky was crystal clear

3067

01:47:08,070 --> 01:47:06,719

blue skies and like you said i've had a

3068

01:47:09,669 --> 01:47:08,080

dozen launches here before

3069

01:47:11,510 --> 01:47:09,679

and it's just that marine layer gets

3070

01:47:13,189 --> 01:47:11,520

sucked into this valley here

3071

01:47:15,430 --> 01:47:13,199

and usually we can't see a thing i

3072

01:47:17,669 --> 01:47:15,440

remember insight very well we heard it

3073

01:47:19,510 --> 01:47:17,679

but we didn't see it now the last launch

3074

01:47:22,310 --> 01:47:19,520

here was icesat-2

3075

01:47:23,430 --> 01:47:22,320

from vanderberg in 2018 so how does it

3076

01:47:25,430 --> 01:47:23,440

feel to be back

3077

01:47:26,470 --> 01:47:25,440

to launch another earth science mission

3078

01:47:29,590 --> 01:47:26,480

today so

3079

01:47:33,189 --> 01:47:29,600

um icesat was launch services program's

3080

01:47:36,550 --> 01:47:33,199

last nasa mission out of here

3081

01:47:39,590 --> 01:47:36,560

another of dr freilich's missions

3082

01:47:42,070 --> 01:47:39,600

and that was on the last

3083

01:47:45,030 --> 01:47:42,080

mission of the delta ii vehicle it's

3084

01:47:47,830 --> 01:47:45,040

great to be out here

3085

01:47:49,430 --> 01:47:47,840

it you know those long periods of time

3086

01:47:53,030 --> 01:47:49,440

even for spacex

3087

01:47:55,189 --> 01:47:53,040

their pad's been down for for roughly

3088

01:47:56,149 --> 01:47:55,199

almost a year and a half from their last

3089

01:47:59,910 --> 01:47:56,159

launch there

3090

01:48:02,550 --> 01:47:59,920

so to get the tempo going again

3091

01:48:05,669 --> 01:48:02,560

we've got missions coming up next year

3092

01:48:09,430 --> 01:48:05,679

out of here starting with dart

3093

01:48:12,390 --> 01:48:09,440

which is the double asteroid redirect

3094

01:48:14,470 --> 01:48:12,400

test that is going to be so cool because

3095

01:48:17,750 --> 01:48:14,480

this is one where

3096

01:48:20,470 --> 01:48:17,760

we're going to be catching up to the

3097

01:48:22,390 --> 01:48:20,480

asteroid dynamos and going after one of

3098

01:48:25,109 --> 01:48:22,400

its moonlits

3099

01:48:26,149 --> 01:48:25,119

that's about 160 meters across we're

3100

01:48:30,390 --> 01:48:26,159

going to impact

3101

01:48:33,510 --> 01:48:30,400

that moonlit and and try to impart

3102

01:48:35,590 --> 01:48:33,520

energy to to redirect it so

3103

01:48:36,629 --> 01:48:35,600

pretty cool planetary defense type

3104

01:48:39,189 --> 01:48:36,639

mission

3105

01:48:40,310 --> 01:48:39,199

and uh that'll be in uh coming out of

3106

01:48:42,950 --> 01:48:40,320

here in july

3107

01:48:43,510 --> 01:48:42,960

on a falcon 9 rocket yeah and then uh of

3108

01:48:45,830 --> 01:48:43,520

course

3109

01:48:46,709 --> 01:48:45,840

five years from now we'll have another

3110

01:48:49,990 --> 01:48:46,719

um

3111

01:48:51,109 --> 01:48:50,000

sentinel 6 b will then go up to follow

3112

01:48:55,510 --> 01:48:51,119

on with this mission

3113

01:48:58,149 --> 01:48:55,520

that's right and and shortly after

3114

01:48:58,709 --> 01:48:58,159

this summer in the fall september 16th

3115

01:49:01,109 --> 01:48:58,719

we've

3116

01:49:02,629 --> 01:49:01,119

scheduled landsat for out of here so

3117

01:49:05,109 --> 01:49:02,639

that continues

3118

01:49:05,990 --> 01:49:05,119

with our partners at the geological

3119

01:49:09,830 --> 01:49:06,000

survey the

3120

01:49:11,910 --> 01:49:09,840

the mapping of the land surfaces and

3121

01:49:13,990 --> 01:49:11,920

water surfaces

3122

01:49:16,149 --> 01:49:14,000

for for almost 50 years now so it's a

3123

01:49:19,830 --> 01:49:16,159

continuous

3124

01:49:22,870 --> 01:49:19,840

measurement of real scientific data that

3125

01:49:24,229 --> 01:49:22,880

is available to all to look at and to

3126

01:49:26,550 --> 01:49:24,239

analyze and to

3127

01:49:28,070 --> 01:49:26,560

speak the truth earth science mission so

3128

01:49:30,310 --> 01:49:28,080

exciting over the next couple of years

3129

01:49:32,709 --> 01:49:30,320

then after landsat we've got uh

3130

01:49:33,430 --> 01:49:32,719

nysar and swat launching as well so it's

3131

01:49:35,189 --> 01:49:33,440

going to be great

3132

01:49:36,870 --> 01:49:35,199

great for earth science that's right

3133

01:49:38,950 --> 01:49:36,880

omar bias launch

3134

01:49:39,990 --> 01:49:38,960

services program launch manager

3135

01:49:40,790 --> 01:49:40,000

appreciate you coming out here and

3136

01:49:44,149 --> 01:49:40,800

joining us

3137

01:49:47,270 --> 01:49:44,159

congratulations thank you congrats omar

3138

01:49:49,669 --> 01:49:47,280

well there's one last milestone left as

3139

01:49:52,070 --> 01:49:49,679

we are awaiting both the solar

3140

01:49:53,510 --> 01:49:52,080

deploy of the solar panels and the

3141

01:49:55,350 --> 01:49:53,520

acquisition of

3142

01:49:57,750 --> 01:49:55,360

signal and that's actually going to let

3143

01:49:59,830 --> 01:49:57,760

us tell us that the satellite is very

3144

01:50:01,830 --> 01:49:59,840

healthy and it's in the right orbit

3145

01:50:03,030 --> 01:50:01,840

and we're expecting that hopefully here

3146

01:50:05,270 --> 01:50:03,040

daryl

3147

01:50:07,270 --> 01:50:05,280

give or take about 15-20 minutes yep and

3148

01:50:09,589 --> 01:50:07,280

so in the meantime we are going to pause

3149

01:50:11,510 --> 01:50:09,599

our broadcast and come back with an

3150

01:50:13,910 --> 01:50:11,520

update about the aos

3151

01:50:15,669 --> 01:50:13,920

but before we do we want to pay one last

3152

01:50:17,669 --> 01:50:15,679

tribute to michael freilich

3153

01:50:25,669 --> 01:50:17,679

and his tireless determination to better

3154

01:50:29,430 --> 01:50:25,679

understand our rising sea levels

3155

01:50:33,030 --> 01:50:29,440

is likely quite atypical

3156

01:50:35,109 --> 01:50:33,040

i knew in 10th grade

3157

01:50:36,390 --> 01:50:35,119

that i wanted to be a near-shore

3158

01:50:40,310 --> 01:50:36,400

oceanographer

3159

01:50:43,990 --> 01:50:40,320

what has driven me is understanding

3160

01:50:47,750 --> 01:50:44,000

how nature works and that's why

3161

01:50:51,830 --> 01:50:47,760

humanity not one agency

3162

01:50:53,350 --> 01:50:51,840

not one country not one continent but

3163

01:50:55,510 --> 01:50:53,360

why humanity

3164

01:50:56,550 --> 01:50:55,520

has been monitoring global sea level

3165

01:50:59,669 --> 01:50:56,560

from space

3166

01:51:02,070 --> 01:50:59,679

with exquisite accuracy

3167

01:51:03,990 --> 01:51:02,080

for more than 28 years it's a

3168

01:51:05,750 --> 01:51:04,000

world-renowned ocean scientist

3169

01:51:07,990 --> 01:51:05,760

who after a successful career in

3170

01:51:10,070 --> 01:51:08,000

academia came to nasa

3171

01:51:11,189 --> 01:51:10,080

and for a thousand years dr mike

3172

01:51:13,589 --> 01:51:11,199

freilich led

3173

01:51:14,470 --> 01:51:13,599

all of her signs and this really brought

3174

01:51:17,109 --> 01:51:14,480

nasa

3175

01:51:17,750 --> 01:51:17,119

back on the international stage and this

3176
01:51:20,390 --> 01:51:17,760
is not all

3177
01:51:21,270 --> 01:51:20,400
you also changed the discipline of earth

3178
01:51:25,350 --> 01:51:21,280
science

3179
01:51:27,910 --> 01:51:25,360
technology to understand

3180
01:51:28,950 --> 01:51:27,920
our beautiful planet mike freilich's

3181
01:51:31,350 --> 01:51:28,960
legacy

3182
01:51:32,709 --> 01:51:31,360
is being able to build the coalitions

3183
01:51:35,430 --> 01:51:32,719
that are necessary

3184
01:51:36,950 --> 01:51:35,440
for us to get as much understanding of

3185
01:51:38,629 --> 01:51:36,960
our planet as possible

3186
01:51:40,149 --> 01:51:38,639
there is not another person more

3187
01:51:42,470 --> 01:51:40,159
deserving of this honor than mike

3188
01:51:45,430 --> 01:51:42,480

freilich i'm very pleased to rename

3189

01:51:46,470 --> 01:51:45,440

central 6a in the future to be called

3190

01:51:48,400 --> 01:51:46,480

sentinel 6

3191

01:51:52,550 --> 01:51:48,410

michael friday

3192

01:51:54,709 --> 01:51:52,560

[Applause]

3193

01:51:58,229 --> 01:51:54,719

you know when i when i first found out

3194

01:52:02,629 --> 01:51:59,830

when i first found out that mike had

3195

01:52:04,310 --> 01:52:02,639

cancer i want him to know that

3196

01:52:06,709 --> 01:52:04,320

all the work he's done is extremely

3197

01:52:09,109 --> 01:52:06,719

meaningful i am much better

3198

01:52:10,550 --> 01:52:09,119

because of what i learned from him and

3199

01:52:11,270 --> 01:52:10,560

because i had the opportunity to work

3200

01:52:14,390 --> 01:52:11,280

with him

3201

01:52:15,589 --> 01:52:14,400

mike is a leader to all of us and a

3202

01:52:17,750 --> 01:52:15,599

mentor

3203

01:52:18,629 --> 01:52:17,760

and a person who was really advanced

3204

01:52:21,109 --> 01:52:18,639

earth science

3205

01:52:21,910 --> 01:52:21,119

for the entire world he was absolutely

3206

01:52:24,870 --> 01:52:21,920

committed

3207

01:52:25,430 --> 01:52:24,880

to dispassionately following the science

3208

01:52:28,629 --> 01:52:25,440

he had

3209

01:52:29,430 --> 01:52:28,639

high standards for himself and everyone

3210

01:52:32,229 --> 01:52:29,440

around him

3211

01:52:33,990 --> 01:52:32,239

earth system science is bigger than any

3212

01:52:37,270 --> 01:52:34,000

particular agency

3213

01:52:40,149 --> 01:52:37,280

it's bigger than any single nation

3214

01:52:40,550 --> 01:52:40,159

it's bigger than any single continent

3215

01:52:43,430 --> 01:52:40,560

and

3216

01:52:44,310 --> 01:52:43,440

i surely hope because humanity requires

3217

01:52:46,950 --> 01:52:44,320

it

3218

01:52:48,709 --> 01:52:46,960

that we make some significant progress

3219

01:52:51,589 --> 01:52:48,719

in understanding

3220

01:52:59,750 --> 01:52:51,599

you did good dr feilik for all of us and

3221

01:53:02,709 --> 01:52:59,760

for that we're all very grateful

3222

01:53:10,830 --> 01:53:02,719

ignition liftoff of the falcon 9

3223

01:53:10,840 --> 01:53:19,770

freywick

3224

01:55:31,750 --> 01:54:01,510

[Music]

3225

01:55:31,760 --> 01:55:35,190

foreign

3226
01:58:18,830 --> 01:56:22,420
[Music]

3227
01:58:18,840 --> 01:58:46,930
so

3228
01:59:14,830 --> 01:59:01,650
[Music]

3229
01:59:14,840 --> 01:59:18,380
hey

3230
02:02:46,520 --> 01:59:48,880
[Music]

3231
02:03:15,330 --> 02:02:46,530
easy

3232
02:03:15,340 --> 02:03:37,669
[Music]

3233
02:03:37,679 --> 02:03:45,370
is all about water

3234
02:03:45,380 --> 02:04:08,629
[Music]

3235
02:04:12,950 --> 02:04:10,470
welcome back to vanderberg air force

3236
02:04:14,390 --> 02:04:12,960
base in central california my name is

3237
02:04:16,950 --> 02:04:14,400
daryl nail i'm joined with

3238
02:04:18,790 --> 02:04:16,960

marina jericho from jpl thanks for

3239

02:04:19,910 --> 02:04:18,800

joining us we have an update for you

3240

02:04:21,589 --> 02:04:19,920

some good news

3241

02:04:23,510 --> 02:04:21,599

we managed to get an acquisition of

3242

02:04:25,990 --> 02:04:23,520

signal from the sentinel 6

3243

02:04:27,830 --> 02:04:26,000

michael freilix satellite and as well as

3244

02:04:29,830 --> 02:04:27,840

confirm the uh deploy

3245

02:04:31,830 --> 02:04:29,840

the deployment of the solar ray that's

3246

02:04:33,669 --> 02:04:31,840

right so the solar rays the solar panels

3247

02:04:34,390 --> 02:04:33,679

have now been deployed and what's

3248

02:04:36,709 --> 02:04:34,400

incredible

3249

02:04:38,149 --> 02:04:36,719

is we got the signal of acquisition in

3250

02:04:39,750 --> 02:04:38,159

layman's terms it basically just means

3251

02:04:41,189 --> 02:04:39,760

that the satellite is healthy

3252

02:04:43,189 --> 02:04:41,199

it's in the right orbit that it's

3253

02:04:44,629 --> 02:04:43,199

supposed to be in and we are ready to

3254

02:04:45,189 --> 02:04:44,639

rock and roll to get that science

3255

02:04:47,430 --> 02:04:45,199

getting

3256

02:04:48,470 --> 02:04:47,440

to us as soon as possible and that's an

3257

02:04:51,030 --> 02:04:48,480

exciting moment for

3258

02:04:53,350 --> 02:04:51,040

us here at nasa as well as esa and our

3259

02:04:56,470 --> 02:04:53,360

european partners it all started

3260

02:04:58,390 --> 02:04:56,480

at 9 17 in the morning pacific time

3261

02:04:59,830 --> 02:04:58,400

from right here at the vanderberg air

3262

02:05:03,109 --> 02:04:59,840

force base launch

3263

02:05:04,390 --> 02:05:03,119

complex 4. spacex launched their falcon

3264

02:05:07,990 --> 02:05:04,400

9 rocket

3265

02:05:10,790 --> 02:05:08,000

from that launch complex around 12 17

3266

02:05:11,830 --> 02:05:10,800

p.m eastern time and it was an

3267

02:05:14,629 --> 02:05:11,840

incredibly

3268

02:05:15,669 --> 02:05:14,639

beautiful launch rare conditions here

3269

02:05:17,430 --> 02:05:15,679

for a launch

3270

02:05:19,189 --> 02:05:17,440

a lot of the folks around here say we

3271

02:05:22,229 --> 02:05:19,199

had clear skies

3272

02:05:24,069 --> 02:05:22,239

beautiful as this rocket lifted the

3273

02:05:24,550 --> 02:05:24,079

satellite off the launch pad marina oh

3274

02:05:29,189 --> 02:05:24,560

it was

3275

02:05:30,470 --> 02:05:29,199

usually we have fog all across this area

3276

02:05:32,950 --> 02:05:30,480

a really thick marine layer

3277

02:05:33,510 --> 02:05:32,960

but it was crystal clear blue skies and

3278

02:05:36,790 --> 02:05:33,520

then

3279

02:05:38,870 --> 02:05:36,800

we saw the booster land back

3280

02:05:41,510 --> 02:05:38,880

nexus that was just unbelievable we

3281

02:05:44,390 --> 02:05:41,520

heard that sonic boom it was so powerful

3282

02:05:44,870 --> 02:05:44,400

and uh in fact it came down right in eye

3283

02:05:46,069 --> 02:05:44,880

level

3284

02:05:47,990 --> 02:05:46,079

right back at the place where it

3285

02:05:50,709 --> 02:05:48,000

launched off the pad

3286

02:05:52,709 --> 02:05:50,719

and so uh it was just fascinating and a

3287

02:05:54,709 --> 02:05:52,719

wonderful thing to watch but the mission

3288

02:05:56,550 --> 02:05:54,719

then later continued and you can see

3289

02:05:58,790 --> 02:05:56,560

there the separation

3290

02:05:59,750 --> 02:05:58,800

of the satellite from the second stage

3291

02:06:02,229 --> 02:05:59,760

booster

3292

02:06:04,550 --> 02:06:02,239

that confirmed beautiful video there

3293

02:06:07,589 --> 02:06:04,560

from an onboard camera

3294

02:06:09,669 --> 02:06:07,599

on board spacex's second stage

3295

02:06:10,790 --> 02:06:09,679

watching that sentinel six michael

3296

02:06:12,790 --> 02:06:10,800

frylick satellite

3297

02:06:14,149 --> 02:06:12,800

go off in space and michael freilich's

3298

02:06:15,669 --> 02:06:14,159

family here to enjoy it

3299

02:06:17,430 --> 02:06:15,679

we want to toss it now back to the

3300

02:06:19,589 --> 02:06:17,440

kennedy space center where

3301
02:06:20,470 --> 02:06:19,599
joshua santora and philip hargrove are

3302
02:06:23,109 --> 02:06:20,480
there and

3303
02:06:24,950 --> 02:06:23,119
documented and heard the acquisition of

3304
02:06:26,629 --> 02:06:24,960
signal gentlemen

3305
02:06:28,229 --> 02:06:26,639
yeah thanks daryl obviously all smiles

3306
02:06:30,790 --> 02:06:28,239
here uh that's what we want to hear

3307
02:06:31,350 --> 02:06:30,800
uh we got a great set of calls there uh

3308
02:06:33,589 --> 02:06:31,360
and

3309
02:06:35,109 --> 02:06:33,599
we heard a number of times uh calls come

3310
02:06:37,189 --> 02:06:35,119
out repeatedly saying hey we

3311
02:06:38,629 --> 02:06:37,199
we can confirm we definitely got the

3312
02:06:40,310 --> 02:06:38,639
solar array deploy which was something i

3313
02:06:42,310 --> 02:06:40,320

know that we had left you last time

3314

02:06:43,589 --> 02:06:42,320

not sure of so glad that happened right

3315

02:06:43,990 --> 02:06:43,599

and it was really great to hear the

3316

02:06:45,669 --> 02:06:44,000

excitement

3317

02:06:46,870 --> 02:06:45,679

from the spacecraft team over the nets

3318

02:06:48,629 --> 02:06:46,880

so they're they're happy that they can

3319

02:06:50,390 --> 02:06:48,639

talk to their satellite and uh

3320

02:06:52,629 --> 02:06:50,400

yeah signal six michael freilick is on

3321

02:06:53,669 --> 02:06:52,639

its way yeah it's funny typically during

3322

02:06:55,830 --> 02:06:53,679

a launch countdown

3323

02:06:58,069 --> 02:06:55,840

and even post liftoff it's very quiet in

3324

02:06:59,109 --> 02:06:58,079

control rooms it's very focused

3325

02:07:00,709 --> 02:06:59,119

you want to make sure everybody can hear

3326

02:07:02,629 --> 02:07:00,719

what they need to hear but we heard

3327

02:07:04,310 --> 02:07:02,639

calls coming in and just people just

3328

02:07:06,229 --> 02:07:04,320

explosively cheering in the background

3329

02:07:07,750 --> 02:07:06,239

so excited for those teams a huge

3330

02:07:09,430 --> 02:07:07,760

congratulations to all the teams

3331

02:07:12,470 --> 02:07:09,440

involved today obviously

3332

02:07:15,750 --> 02:07:12,480

isa jpl lsp

3333

02:07:17,990 --> 02:07:15,760

uh the space force and spacex

3334

02:07:19,109 --> 02:07:18,000

spacex um so philip it has been a

3335

02:07:20,229 --> 02:07:19,119

pleasure to have you alongside me

3336

02:07:22,870 --> 02:07:20,239

appreciate your insight and

3337

02:07:23,990 --> 02:07:22,880

expertise on the topic of rocketry thank

3338

02:07:25,430 --> 02:07:24,000

you so much this was an awesome

3339

02:07:26,069 --> 02:07:25,440

experience so i'm glad i got to share it

3340

02:07:27,830 --> 02:07:26,079

with you

3341

02:07:29,750 --> 02:07:27,840

fantastic and from here at the kennedy

3342

02:07:31,189 --> 02:07:29,760

space center doing commentary

3343

02:07:32,790 --> 02:07:31,199

we there's a lot of missions between now

3344

02:07:33,910 --> 02:07:32,800

and then but we hope you'll be back in

3345

02:07:35,750 --> 02:07:33,920

about five years

3346

02:07:37,669 --> 02:07:35,760

when we get to see the sister of

3347

02:07:39,830 --> 02:07:37,679

sentinel 6 michael freilich fly sentinel

3348

02:07:41,589 --> 02:07:39,840

6

3349

02:07:43,030 --> 02:07:41,599

the twin sister that will fly in five

3350

02:07:44,709 --> 02:07:43,040

years to continue that service

3351
02:07:49,030 --> 02:07:44,719
of ocean observation that's gonna do it

3352
02:07:52,310 --> 02:07:50,709
all right joshua phillip great job guys

3353
02:07:53,750 --> 02:07:52,320
we appreciate it and uh

3354
02:07:55,589 --> 02:07:53,760
like he said in five years we'll have

3355
02:07:56,310 --> 02:07:55,599
that second satellite that really helps

3356
02:07:58,550 --> 02:07:56,320
to that

3357
02:08:00,310 --> 02:07:58,560
uh continuity of data that's right the

3358
02:08:00,950 --> 02:08:00,320
consistency and the continuity adding

3359
02:08:02,629 --> 02:08:00,960
that full

3360
02:08:04,629 --> 02:08:02,639
tenure block and that's what makes it

3361
02:08:06,870 --> 02:08:04,639
unusual to other earth science missions

3362
02:08:07,990 --> 02:08:06,880
is that the satellite is already built

3363
02:08:09,990 --> 02:08:08,000

and it's stored and it's

3364

02:08:11,510 --> 02:08:10,000

ready to rock and in five years we'll

3365

02:08:14,790 --> 02:08:11,520

get that one up and it'll be

3366

02:08:16,709 --> 02:08:14,800

10 years a full decade of this critical

3367

02:08:18,069 --> 02:08:16,719

information because we know sea level

3368

02:08:18,870 --> 02:08:18,079

rise is happening we know it's

3369

02:08:20,149 --> 02:08:18,880

accelerating

3370

02:08:23,109 --> 02:08:20,159

and this is just going to give us

3371

02:08:25,189 --> 02:08:23,119

another 10 years which will be 40 years

3372

02:08:26,390 --> 02:08:25,199

of consistency and continuity in this

3373

02:08:28,470 --> 02:08:26,400

data and what a

3374

02:08:29,589 --> 02:08:28,480

what a place to watch all this right we

3375

02:08:30,790 --> 02:08:29,599

had beautiful weather

3376

02:08:33,589 --> 02:08:30,800

we're here on the central coast of

3377

02:08:36,470 --> 02:08:33,599

california many thanks to the 30th uh

3378

02:08:38,149 --> 02:08:36,480

space wing for helping us out and making

3379

02:08:38,629 --> 02:08:38,159

this possible they really did a great

3380

02:08:40,229 --> 02:08:38,639

job

3381

02:08:42,310 --> 02:08:40,239

it was it was so beautiful i've been

3382

02:08:43,990 --> 02:08:42,320

here so many times this whole valley is

3383

02:08:46,390 --> 02:08:44,000

usually covered in fog we were here

3384

02:08:48,069 --> 02:08:46,400

just a couple of days ago and everything

3385

02:08:49,830 --> 02:08:48,079

was foggy because we get this marine

3386

02:08:51,189 --> 02:08:49,840

layer that just pushes right into the

3387

02:08:53,990 --> 02:08:51,199

valley but today

3388

02:08:55,990 --> 02:08:54,000

everyone was in place the weather was in

3389

02:08:57,510 --> 02:08:56,000

place for us the rocket was in place the

3390

02:08:59,270 --> 02:08:57,520

booster was in place and now

3391

02:09:00,550 --> 02:08:59,280

the science is in place it's wonderful

3392

02:09:02,629 --> 02:09:00,560

and how'd you like that landing

3393

02:09:03,750 --> 02:09:02,639

oh that was incredible i've only seen it

3394

02:09:05,030 --> 02:09:03,760

one other time

3395

02:09:06,629 --> 02:09:05,040

and that was the double landing which

3396

02:09:08,310 --> 02:09:06,639

was pretty amazing but this was just as

3397

02:09:10,790 --> 02:09:08,320

amazing in my home state

3398

02:09:12,390 --> 02:09:10,800

in my hometown with my family watching

3399

02:09:15,430 --> 02:09:12,400

and most importantly michael

3400

02:09:17,030 --> 02:09:15,440

frylick's family watching what a moving

3401
02:09:19,189 --> 02:09:17,040
moment when we got to speak to his

3402
02:09:21,189 --> 02:09:19,199
children he was an incredible

3403
02:09:23,510 --> 02:09:21,199
incredible advocate for earth science

3404
02:09:24,950 --> 02:09:23,520
missions and especially for altimetry

3405
02:09:27,669 --> 02:09:24,960
data and sea level rise

3406
02:09:28,709 --> 02:09:27,679
and it was so heartwarming to see them

3407
02:09:30,550 --> 02:09:28,719
here it was just

3408
02:09:32,950 --> 02:09:30,560
wonderful there's another star in the

3409
02:09:34,149 --> 02:09:32,960
sky it's got michael frylick's name on

3410
02:09:36,069 --> 02:09:34,159
it you've got it daryl

3411
02:09:37,910 --> 02:09:36,079
all right well we thank you for joining

3412
02:09:39,669 --> 02:09:37,920
us that's our coverage of sentinel 6

3413
02:09:42,069 --> 02:09:39,679

michael fry like the launch

3414

02:09:43,990 --> 02:09:42,079

of that satellite on a falcon 9 rocket

3415

02:09:45,350 --> 02:09:44,000

by spacex we appreciate you being here

3416

02:09:47,350 --> 02:09:45,360

for everyone here

3417

02:10:03,060 --> 02:09:47,360

at nasa thank you for watching and

3418

02:10:03,070 --> 02:10:33,430

[Music]

3419

02:10:44,230 --> 02:10:37,189

six five four three

3420

02:10:44,240 --> 02:10:54,830

[Music]

3421

02:10:54,840 --> 02:10:58,069

fire

3422

02:11:01,350 --> 02:10:59,990

the flight opportunities program

3423

02:11:03,589 --> 02:11:01,360

facilitates the

3424

02:11:04,870 --> 02:11:03,599

demonstration of technologies that will

3425

02:11:08,069 --> 02:11:04,880

be used in space

3426

02:11:10,470 --> 02:11:08,079

commerce as well as in space exploration

3427

02:11:12,470 --> 02:11:10,480

and we do that through utilizing

3428

02:11:14,550 --> 02:11:12,480

suborbital flight providers

3429

02:11:15,990 --> 02:11:14,560

that can test these technologies in