1
00:01:07,340 --> 00:01:28,230
[Music]

2
00:01:32,710 --> 00:01:30,710
an uninterrupted series of satellites

3
00:01:36,149 --> 00:01:32,720
has collected sea level measurements for

4
00:01:38,469 --> 00:01:36,159
nearly 30 years and now a joint u.s

5
00:01:41,270 --> 00:01:38,479
european effort will launch the next

6
00:01:43,830 --> 00:01:41,280
spacecraft to carry on this legacy of

7
00:01:46,069 --> 00:01:43,840
monitoring sea surface height we are

8
00:01:48,789 --> 00:01:46,079
here today to count down the launch of

9
00:01:50,870 --> 00:01:48,799
the sentinel 6 michael frylick satellite

10
00:01:52,630 --> 00:01:50,880
that is less than a month away and

11
00:01:54,469 --> 00:01:52,640
answer your questions later in the

12
00:01:57,109 --> 00:01:54,479
briefing this has been a true

13
00:01:59,429 --> 00:01:57,119

collaboration among several agencies

14
00:02:01,830 --> 00:01:59,439
which you will see represented today in

15
00:02:04,950 --> 00:02:01,840
a first joint earth mission involving

16
00:02:07,270 --> 00:02:04,960
nasa and the european space agency this

17
00:02:10,150 --> 00:02:07,280
c-level scout will collect the most

18
00:02:12,550 --> 00:02:10,160
accurate data yet on sea level and how

19
00:02:14,630 --> 00:02:12,560
it changes over time

20
00:02:16,390 --> 00:02:14,640
this is this big complex machine that

21
00:02:18,070 --> 00:02:16,400
we're trying to understand we really

22
00:02:20,229 --> 00:02:18,080
need to understand how it's changing how

23
00:02:22,630 --> 00:02:20,239
is it evolving wherever you live on this

24
00:02:24,790 --> 00:02:22,640
globe the oceans will influence you in

25
00:02:26,949 --> 00:02:24,800
some form or the other we are answering

26
00:02:29,030 --> 00:02:26,959
those really interesting and hard

27
00:02:31,030 --> 00:02:29,040
questions that we all have about our

28
00:02:33,589 --> 00:02:31,040
universe and our planet my name is

29
00:02:35,750 --> 00:02:33,599
severin fonie and i'm observing our

30
00:02:38,550 --> 00:02:35,760
changing oceans from space i'm shannon

31
00:02:40,470 --> 00:02:38,560
sadam and here at nasa jpl i help

32
00:02:42,630 --> 00:02:40,480
prepare sentinel 6 for its journey to

33
00:02:45,110 --> 00:02:42,640
space my name is shaylen desai my name

34
00:02:46,470 --> 00:02:45,120
is barack vase my name is ben hamilton

35
00:02:48,550 --> 00:02:46,480
and i'm studying sea level rise from

36
00:02:50,869 --> 00:02:48,560
space we're looking at a one-third

37
00:02:52,790 --> 00:02:50,879
replica of the channel six microfarad

38
00:02:55,030 --> 00:02:52,800

electric satellite sentinel six is all

39
00:02:57,670 --> 00:02:55,040
about water this sort of top half of the

40
00:02:59,110 --> 00:02:57,680
satellite houses the main instruments we

41
00:03:00,790 --> 00:02:59,120
have the altimeter we have the

42
00:03:03,589 --> 00:03:00,800
radiometer sentinel six is a

43
00:03:05,910 --> 00:03:03,599
collaboration with nasa noaa the

44
00:03:08,470 --> 00:03:05,920
european space agency and and also

45
00:03:10,149 --> 00:03:08,480
umitzat in europe to measure sea level

46
00:03:12,390 --> 00:03:10,159
and it's specifically capturing the

47
00:03:14,470 --> 00:03:12,400
heights of the ocean the satellite is

48
00:03:16,149 --> 00:03:14,480
actually emitting a signal and that

49
00:03:17,509 --> 00:03:16,159
signal is bouncing back it measures the

50
00:03:19,030 --> 00:03:17,519
time it takes for that pulse to get back

51
00:03:21,110 --> 00:03:19,040
so we've been measuring the height of

52
00:03:23,350 --> 00:03:21,120
the ocean since the beginning of the 90s

53
00:03:26,070 --> 00:03:23,360
i've worked on topex poseidon jason 1

54
00:03:28,789 --> 00:03:26,080
jason 2 jason 3. we really need that

55
00:03:30,789 --> 00:03:28,799
long duration observation and sentinel 6

56
00:03:33,110 --> 00:03:30,799
is going to allow us to continue that

57
00:03:34,710 --> 00:03:33,120
record so we can better predict what is

58
00:03:36,550 --> 00:03:34,720
the rate of change what is it going to

59
00:03:38,149 --> 00:03:36,560
look like in a year five years ten years

60
00:03:40,070 --> 00:03:38,159
from now and so forth it's not just

61
00:03:41,430 --> 00:03:40,080
scientific curiosity it really impacts

62
00:03:43,509 --> 00:03:41,440
the daily lives of people and their

63
00:03:46,229 --> 00:03:43,519

ability to plan for their future i see

64
00:03:47,990 --> 00:03:46,239
pictures of coastal inundation and

65
00:03:49,350 --> 00:03:48,000
flooding you start to realize the

66
00:03:51,190 --> 00:03:49,360
importance of understanding what sea

67
00:03:52,869 --> 00:03:51,200
level is doing now we can use that

68
00:03:54,869 --> 00:03:52,879
understanding to know what sea level

69
00:03:57,670 --> 00:03:54,879
might be doing in the future seeing that

70
00:03:59,670 --> 00:03:57,680
come to fruition is a personal

71
00:04:02,390 --> 00:03:59,680
satisfaction and an emotional

72
00:04:05,830 --> 00:04:02,400
satisfaction scientists around the world

73
00:04:07,910 --> 00:04:05,840
are using this data to help people the

74
00:04:11,030 --> 00:04:07,920
importance of this project and where it

75
00:04:13,589 --> 00:04:11,040
touches is on all walks of life all

76
00:04:19,509 --> 00:04:13,599
across the world from space it's just

77
00:04:24,310 --> 00:04:22,069
welcome i am marina jureka from nasa's

78
00:04:26,950 --> 00:04:24,320
jet propulsion laboratory in southern

79
00:04:28,950 --> 00:04:26,960
california i am your host today as we

80
00:04:31,189 --> 00:04:28,960
bring you a closer look at this

81
00:04:33,830 --> 00:04:31,199
incredible mission that will continue to

82
00:04:36,310 --> 00:04:33,840
help us understand how our oceans are

83
00:04:38,390 --> 00:04:36,320
changing as we are social distancing i

84
00:04:40,870 --> 00:04:38,400
will introduce you virtually to some of

85
00:04:43,430 --> 00:04:40,880
the people behind the sentinel 6 michael

86
00:04:45,510 --> 00:04:43,440
freilix satellite we are experiencing a

87
00:04:48,790 --> 00:04:45,520
bit of an audio delay with our european

88
00:04:51,830 --> 00:04:48,800

partners so please be patient with us on

89
00:04:53,670 --> 00:04:51,840
our panel today we have nasa's associate

90
00:04:56,230 --> 00:04:53,680
administrator for the science mission

91
00:04:58,629 --> 00:04:56,240
directorate thomas zurbukin who will

92
00:05:01,110 --> 00:04:58,639
talk about nasa's dedication to earth

93
00:05:03,350 --> 00:05:01,120
observations and the legacy of michael

94
00:05:05,990 --> 00:05:03,360
freilich whom the satellite was named

95
00:05:08,950 --> 00:05:06,000
after the european commission's deputy

96
00:05:10,710 --> 00:05:08,960
director general for space pierre delso

97
00:05:12,629 --> 00:05:10,720
who will speak about the legacy and

98
00:05:13,990 --> 00:05:12,639
commitment to earth science missions

99
00:05:16,390 --> 00:05:14,000
through the years

100
00:05:19,189 --> 00:05:16,400
european space agency's director of

101
00:05:21,430 --> 00:05:19,199
earth observation joseph oshbacher will

102
00:05:23,749 --> 00:05:21,440
tell us about the agency's copernicus

103
00:05:26,390 --> 00:05:23,759
program the european union's earth

104
00:05:28,310 --> 00:05:26,400
observation program which monitors our

105
00:05:31,189 --> 00:05:28,320
planet and its environment for the

106
00:05:33,350 --> 00:05:31,199
ultimate benefit of its people nasa's

107
00:05:35,430 --> 00:05:33,360
earth science division director karen st

108
00:05:37,990 --> 00:05:35,440
germain will discuss the benefit to

109
00:05:40,070 --> 00:05:38,000
humanity in understanding and studying

110
00:05:43,029 --> 00:05:40,080
the earth and the importance of what

111
00:05:45,510 --> 00:05:43,039
sentinel 6 michael freilich will show us

112
00:05:47,350 --> 00:05:45,520
director general alan rattier of the

113
00:05:50,070 --> 00:05:47,360

european organization for the

114
00:05:52,870 --> 00:05:50,080
exploration of meteorological satellites

115
00:05:55,430 --> 00:05:52,880
or umetsat who can talk about how this

116
00:05:58,150 --> 00:05:55,440
organization will carry on day-to-day

117
00:06:00,390 --> 00:05:58,160
operations of science gathering for the

118
00:06:02,710 --> 00:06:00,400
satellite project manager for this

119
00:06:04,790 --> 00:06:02,720
mission paraguay of nasa's jet

120
00:06:06,950 --> 00:06:04,800
propulsion laboratory will talk about

121
00:06:09,590 --> 00:06:06,960
the legacy of these earth observing

122
00:06:12,950 --> 00:06:09,600
satellites starting with topex poseidon

123
00:06:15,189 --> 00:06:12,960
almost 30 years ago nasa's program

124
00:06:17,510 --> 00:06:15,199
scientist for this mission is nadia

125
00:06:19,510 --> 00:06:17,520
vinogradova schiffer who will break down

126
00:06:22,309 --> 00:06:19,520
the science goals and what the mission

127
00:06:24,790 --> 00:06:22,319
hopes to accomplish moving forward and

128
00:06:27,189 --> 00:06:24,800
finally tim dunn the nasa launch

129
00:06:29,029 --> 00:06:27,199
director for sentinel 6 michael freilich

130
00:06:32,550 --> 00:06:29,039
who will give us an update on launch

131
00:06:34,230 --> 00:06:32,560
status as we count down to november 10th

132
00:06:36,629 --> 00:06:34,240
for anyone watching who would like to

133
00:06:38,870 --> 00:06:36,639
submit a question you can do so by using

134
00:06:40,710 --> 00:06:38,880
the seeing the seas

135
00:06:43,270 --> 00:06:40,720
our phone lines are now open to the

136
00:06:46,629 --> 00:06:43,280
media you can ask a question by pressing

137
00:06:48,469 --> 00:06:46,639
star one to be put into the queue

138
00:06:51,189 --> 00:06:48,479

we will begin with nasa's associate

139
00:06:54,710 --> 00:06:51,199
administrator thomas zurbukin at nasa

140
00:06:57,029 --> 00:06:54,720
headquarters in washington d.c dr z

141
00:06:59,589 --> 00:06:57,039
welcome this project has been such an

142
00:07:01,510 --> 00:06:59,599
incredible international collaboration

143
00:07:06,390 --> 00:07:01,520
which is appropriate since all the

144
00:07:11,189 --> 00:07:09,029
thank you marina indeed

145
00:07:12,150 --> 00:07:11,199
we live on a blue marble flying through

146
00:07:14,550 --> 00:07:12,160
space

147
00:07:16,629 --> 00:07:14,560
and it's blue because of the 70 percent

148
00:07:18,870 --> 00:07:16,639
of the surfer that's covered by oceans

149
00:07:21,589 --> 00:07:18,880
and of course primarily because of the

150
00:07:22,870 --> 00:07:21,599
pacific atlantic arctic and indian

151
00:07:25,110 --> 00:07:22,880
oceans

152
00:07:27,990 --> 00:07:25,120
what we tend to forget though and the

153
00:07:30,790 --> 00:07:28,000
movie reminded us that nearly 80 percent

154
00:07:32,790 --> 00:07:30,800
of the earth's population lives near

155
00:07:37,830 --> 00:07:32,800
oceans

156
00:07:40,790 --> 00:07:37,840
and 90 of all commerce internationally

157
00:07:43,270 --> 00:07:40,800
crosses the seas so the oceans are part

158
00:07:44,550 --> 00:07:43,280
of every one of our lives

159
00:07:46,550 --> 00:07:44,560
and frankly

160
00:07:49,909 --> 00:07:46,560
this focus on the oceans is very

161
00:07:53,589 --> 00:07:49,919
appropriate it's the last great frontier

162
00:07:54,550 --> 00:07:53,599
i would believe of discoveries on earth

163
00:07:57,749 --> 00:07:54,560

and

164
00:08:00,469 --> 00:07:57,759
very exciting to learn new things for us

165
00:08:02,469 --> 00:08:00,479
from that investigation which is a first

166
00:08:05,189 --> 00:08:02,479
european partnership of this type for

167
00:08:06,790 --> 00:08:05,199
nasa with esa and we couldn't be more

168
00:08:10,150 --> 00:08:06,800
excited

169
00:08:12,550 --> 00:08:10,160
so i'm so glad that this new satellite

170
00:08:14,230 --> 00:08:12,560
the sentinel 6 michael freileck will go

171
00:08:16,790 --> 00:08:14,240
into space and

172
00:08:19,830 --> 00:08:16,800
really teach us about this

173
00:08:22,869 --> 00:08:19,840
you know blue marble our home the most

174
00:08:25,029 --> 00:08:22,879
beautiful planet we know about it can

175
00:08:27,510 --> 00:08:25,039
teach us about climate change about

176
00:08:30,629 --> 00:08:27,520
weather and continued that 30-year

177
00:08:33,990 --> 00:08:30,639
record that was accomplished by a

178
00:08:36,630 --> 00:08:34,000
national community just how the oceans

179
00:08:38,310 --> 00:08:36,640
are global so is the community that

180
00:08:41,670 --> 00:08:38,320
needs to study it

181
00:08:43,909 --> 00:08:41,680
and so with this spacecraft and with

182
00:08:46,790 --> 00:08:43,919
sentinel 6b that will be launched in

183
00:08:49,670 --> 00:08:46,800
five years we will add another 10 years

184
00:08:52,070 --> 00:08:49,680
to this amazing record of international

185
00:08:53,670 --> 00:08:52,080
collaboration and impact

186
00:08:57,030 --> 00:08:53,680
we work together

187
00:08:59,990 --> 00:08:57,040
as a international community and we do

188
00:09:02,630 --> 00:09:00,000

so because together we learn best we

189
00:09:04,550 --> 00:09:02,640
have one science community on earth our

190
00:09:07,030 --> 00:09:04,560
international community and also

191
00:09:10,310 --> 00:09:07,040
together we can provide best the

192
00:09:12,710 --> 00:09:10,320
information to all decision makers about

193
00:09:14,949 --> 00:09:12,720
critical decisions they need to make in

194
00:09:16,389 --> 00:09:14,959
the future

195
00:09:18,070 --> 00:09:16,399
i want to tell you

196
00:09:21,110 --> 00:09:18,080
i'm so honored

197
00:09:24,150 --> 00:09:21,120
uh to be uh to be i have been part of a

198
00:09:25,750 --> 00:09:24,160
ceremony earlier this year to name this

199
00:09:28,230 --> 00:09:25,760
satellite after

200
00:09:29,430 --> 00:09:28,240
dr michael freilich

201
00:09:31,509 --> 00:09:29,440
frankly

202
00:09:34,150 --> 00:09:31,519
you know mike is no longer with us

203
00:09:36,630 --> 00:09:34,160
unfortunately but we will never forget

204
00:09:39,509 --> 00:09:36,640
his deep knowledge

205
00:09:42,389 --> 00:09:39,519
how forthright he was how strong and

206
00:09:45,190 --> 00:09:42,399
focused on always doing the right thing

207
00:09:47,829 --> 00:09:45,200
and then once that's decided

208
00:09:50,070 --> 00:09:47,839
is on doing things absolutely the right

209
00:09:52,870 --> 00:09:50,080
way

210
00:09:54,389 --> 00:09:52,880
mike taught all of us i consider myself

211
00:09:56,790 --> 00:09:54,399
a friend of his

212
00:10:00,070 --> 00:09:56,800
and i'm just so glad

213
00:10:02,790 --> 00:10:00,080

to know that this trust that we have and

214
00:10:05,990 --> 00:10:02,800
had in mike's work was also a trust that

215
00:10:07,750 --> 00:10:06,000
was shared all around the community

216
00:10:10,310 --> 00:10:07,760
that trust

217
00:10:12,150 --> 00:10:10,320
and his understanding of the importance

218
00:10:14,790 --> 00:10:12,160
of that international partnership at the

219
00:10:17,030 --> 00:10:14,800
basis of sentinel 6 michael frank led to

220
00:10:19,030 --> 00:10:17,040
this unprecedented honor

221
00:10:21,430 --> 00:10:19,040
of his name being on the spacecraft

222
00:10:23,110 --> 00:10:21,440
today and up there on the launch uh

223
00:10:25,110 --> 00:10:23,120
vehicle you saw the fairing with his

224
00:10:27,509 --> 00:10:25,120
name on it and i just want to tell you

225
00:10:29,910 --> 00:10:27,519
i'm still a move just uh thinking how i

226
00:10:32,389 --> 00:10:29,920
felt when i received that email from our

227
00:10:34,949 --> 00:10:32,399
friend jose fashbacher

228
00:10:36,630 --> 00:10:34,959
co-signed with multiple from

229
00:10:39,350 --> 00:10:36,640
multiple colleagues from

230
00:10:42,389 --> 00:10:39,360
europe now on the on this call that

231
00:10:45,190 --> 00:10:42,399
proposed uh renaming uh this and mike's

232
00:10:48,069 --> 00:10:45,200
honor and i'm just so glad to be here

233
00:10:50,150 --> 00:10:48,079
with our european colleagues all of them

234
00:10:52,710 --> 00:10:50,160
and i'm glad to turn it over to mr

235
00:11:03,750 --> 00:10:52,720
pierre lasso the deputy director general

236
00:11:08,470 --> 00:11:06,630
thank you very much thomas

237
00:11:10,710 --> 00:11:08,480
you know we all live in a difficult time

238
00:11:12,710 --> 00:11:10,720

because of the the kobe 19 situation

239
00:11:14,710 --> 00:11:12,720
which affects the u.s like europe and

240
00:11:18,069 --> 00:11:14,720
the rest of the world

241
00:11:20,389 --> 00:11:18,079
and so in this difficult context

242
00:11:22,870 --> 00:11:20,399
it's a pleasure and an honor to see

243
00:11:25,269 --> 00:11:22,880
actually that we are able to have a good

244
00:11:27,829 --> 00:11:25,279
cooperation between us and to develop

245
00:11:29,910 --> 00:11:27,839
projects like the sentinel 6 that we are

246
00:11:31,269 --> 00:11:29,920
going to launch very soon

247
00:11:33,110 --> 00:11:31,279
and that's important because we have

248
00:11:35,430 --> 00:11:33,120
been able to achieve this between

249
00:11:37,509 --> 00:11:35,440
partners across the atlantic with nasa

250
00:11:40,230 --> 00:11:37,519
noaa but also on this side of the

251
00:11:42,470 --> 00:11:40,240
atlantic with isa um and of course let's

252
00:11:46,069 --> 00:11:42,480
not forget the industry this is a

253
00:11:48,150 --> 00:11:46,079
perfect example of cooperation between

254
00:11:50,629 --> 00:11:48,160
european and between americans to

255
00:11:52,790 --> 00:11:50,639
achieve a very important goal

256
00:11:55,269 --> 00:11:52,800
now as time as i say i would like maybe

257
00:11:57,430 --> 00:11:55,279
to focus a bit on the name that we have

258
00:11:59,910 --> 00:11:57,440
we are going to give to this uh sentinel

259
00:12:02,550 --> 00:11:59,920
6 michael freit freylig

260
00:12:04,389 --> 00:12:02,560
as he said mike was a great man

261
00:12:07,030 --> 00:12:04,399
and i believe it's important for us to

262
00:12:09,030 --> 00:12:07,040
have named this satellite uh with the

263
00:12:11,509 --> 00:12:09,040

name of mike frelich

264
00:12:13,750 --> 00:12:11,519
because it's a sign it's a sign not only

265
00:12:15,670 --> 00:12:13,760
of the fact that mike was a great man

266
00:12:18,310 --> 00:12:15,680
but also he's a gesture towards the

267
00:12:20,949 --> 00:12:18,320
cooperation which exists between the u.s

268
00:12:22,550 --> 00:12:20,959
and europe in the field of space and i

269
00:12:24,230 --> 00:12:22,560
believe that's important that you know

270
00:12:25,509 --> 00:12:24,240
for a very long time the satellites will

271
00:12:27,509 --> 00:12:25,519
move around the

272
00:12:30,629 --> 00:12:27,519
earth with such a name which represents

273
00:12:33,590 --> 00:12:30,639
uh so well this uh this achievement

274
00:12:35,750 --> 00:12:33,600
now as you say this is sentinel-6 will

275
00:12:38,710 --> 00:12:35,760
be part of copernicus

276
00:12:39,750 --> 00:12:38,720
copernicus is a european european union

277
00:12:43,829 --> 00:12:39,760
program

278
00:12:45,430 --> 00:12:43,839
which of course observed on a worldwide

279
00:12:46,870 --> 00:12:45,440
basis

280
00:12:49,750 --> 00:12:46,880
you know i'm very proud to say that

281
00:12:51,350 --> 00:12:49,760
copenhagen is a real european success

282
00:12:52,389 --> 00:12:51,360
it has been built under the leadership

283
00:12:54,389 --> 00:12:52,399
of the commission

284
00:12:57,030 --> 00:12:54,399
but of course with a real partnership

285
00:12:58,870 --> 00:12:57,040
from isa and umitza and of course the

286
00:13:00,389 --> 00:12:58,880
european industry

287
00:13:01,829 --> 00:13:00,399
sometimes you know europe is being

288
00:13:03,750 --> 00:13:01,839

criticized for not

289
00:13:06,069 --> 00:13:03,760
being able to work together but

290
00:13:08,870 --> 00:13:06,079
copernicus is an excellent example of

291
00:13:11,269 --> 00:13:08,880
cooperation and work between everybody

292
00:13:13,590 --> 00:13:11,279
in europe to achieve a system which is

293
00:13:15,509 --> 00:13:13,600
excellent and provide a lot of

294
00:13:17,110 --> 00:13:15,519
information

295
00:13:18,470 --> 00:13:17,120
the second message i would like to give

296
00:13:21,350 --> 00:13:18,480
about copernicus is the fact that

297
00:13:23,910 --> 00:13:21,360
copenhagen is a global program of course

298
00:13:26,310 --> 00:13:23,920
it's run by your parents but the purpose

299
00:13:28,710 --> 00:13:26,320
of copernicus is to serve the whole

300
00:13:30,710 --> 00:13:28,720
world the whole planet and we really

301
00:13:33,110 --> 00:13:30,720
want that data which are available which

302
00:13:35,990 --> 00:13:33,120
are given by copernicus are available

303
00:13:37,990 --> 00:13:36,000
for everybody across the world and we

304
00:13:39,590 --> 00:13:38,000
don't hesitate when it's needed actually

305
00:13:41,269 --> 00:13:39,600
to provide it even to the u.s for

306
00:13:43,670 --> 00:13:41,279
instance we have done it during the

307
00:13:45,750 --> 00:13:43,680
hurricane season because again we

308
00:13:47,430 --> 00:13:45,760
believe that it's a powerful tool and

309
00:13:49,430 --> 00:13:47,440
everybody should be able to benefit from

310
00:13:51,110 --> 00:13:49,440
this powerful tool

311
00:13:53,670 --> 00:13:51,120
third element i would like to say about

312
00:13:55,990 --> 00:13:53,680
copernicus is the fact that for us

313
00:13:57,910 --> 00:13:56,000

copernicus is a very important element

314
00:13:59,990 --> 00:13:57,920
in monitoring the situation of the earth

315
00:14:02,629 --> 00:14:00,000
and more precisely to achieve what we

316
00:14:04,710 --> 00:14:02,639
call in europe the green deal we cannot

317
00:14:06,949 --> 00:14:04,720
ignore that our planet is changing you

318
00:14:08,710 --> 00:14:06,959
know i live in brussels i can tell you

319
00:14:10,629 --> 00:14:08,720
the weather in brussels is no longer the

320
00:14:12,629 --> 00:14:10,639
same that it was so 10 years ago 15

321
00:14:14,389 --> 00:14:12,639
years ago it's completely different we

322
00:14:18,069 --> 00:14:14,399
have almost hurricanes during the day

323
00:14:20,389 --> 00:14:18,079
you know we have a hot summer so climate

324
00:14:21,990 --> 00:14:20,399
is changing nobody can deny it and from

325
00:14:24,150 --> 00:14:22,000
their point of view we need to

326
00:14:25,910 --> 00:14:24,160
understand why the climate is changing

327
00:14:28,069 --> 00:14:25,920
what are the factors and we need also to

328
00:14:29,670 --> 00:14:28,079
monitor this situation and i would say

329
00:14:30,790 --> 00:14:29,680
that copenhagen is one of the key role

330
00:14:33,189 --> 00:14:30,800
of companies

331
00:14:35,350 --> 00:14:33,199
is to be able to do such a thing to help

332
00:14:37,269 --> 00:14:35,360
us to understand better the challenges

333
00:14:39,910 --> 00:14:37,279
in front of us to better monitor the

334
00:14:41,350 --> 00:14:39,920
situation of our planet and to see what

335
00:14:42,870 --> 00:14:41,360
we need of course and that would lead to

336
00:14:45,269 --> 00:14:42,880
what we need to do to avoid

337
00:14:47,590 --> 00:14:45,279
environmental degradation so copernicus

338
00:14:49,990 --> 00:14:47,600

is a powerful tool i'm very proud to be

339
00:14:52,069 --> 00:14:50,000
in charge of this tool again with the

340
00:14:54,710 --> 00:14:52,079
cooperation of my colleagues from iza

341
00:14:56,629 --> 00:14:54,720
and meza and

342
00:14:58,470 --> 00:14:56,639
we really want this tool to continue and

343
00:15:00,550 --> 00:14:58,480
to be a basis for the corporation again

344
00:15:03,509 --> 00:15:00,560
in the future with nasa with noaa and of

345
00:15:05,590 --> 00:15:03,519
course with a u.s geological survey

346
00:15:08,470 --> 00:15:05,600
again as i say this is not a tool for

347
00:15:10,310 --> 00:15:08,480
europe this is a tool for all of us

348
00:15:12,150 --> 00:15:10,320
because at the end of the day our planet

349
00:15:14,069 --> 00:15:12,160
is not only a european planet it's a

350
00:15:15,430 --> 00:15:14,079
global planet for everybody and we need

351
00:15:16,949 --> 00:15:15,440
to preserve it

352
00:15:18,949 --> 00:15:16,959
now i would like maybe to say a few

353
00:15:20,389 --> 00:15:18,959
words about sentinel 6 not too much

354
00:15:21,829 --> 00:15:20,399
because you already have explained a bit

355
00:15:24,470 --> 00:15:21,839
what uh you know what it's supposed to

356
00:15:25,829 --> 00:15:24,480
be achieved with starting r6

357
00:15:28,150 --> 00:15:25,839
it's very important element in the

358
00:15:29,829 --> 00:15:28,160
copenhagen systems and josef who will

359
00:15:32,790 --> 00:15:29,839
talk after me we'll we'll go into the

360
00:15:34,710 --> 00:15:32,800
details clearly sentinel 6 is designed

361
00:15:37,110 --> 00:15:34,720
to act for the next decade as a

362
00:15:39,189 --> 00:15:37,120
reference mission in altimetry as you

363
00:15:43,030 --> 00:15:39,199

say monitoring the situation of the

364
00:15:45,110 --> 00:15:43,040
earth or ocean is fundamental is a key

365
00:15:47,430 --> 00:15:45,120
element for everybody because as you say

366
00:15:49,350 --> 00:15:47,440
thomas we are surrounded by water

367
00:15:50,629 --> 00:15:49,360
everywhere so it's important that we

368
00:15:52,629 --> 00:15:50,639
have a powerful instrument which will be

369
00:15:55,430 --> 00:15:52,639
able to monitor this dimension of our

370
00:15:57,829 --> 00:15:55,440
planet and again

371
00:16:00,550 --> 00:15:57,839
we believe that this instrument sentinel

372
00:16:02,629 --> 00:16:00,560
thinks will be able to provide us

373
00:16:05,110 --> 00:16:02,639
data useful data which could be

374
00:16:06,790 --> 00:16:05,120
incorporated in models and combining

375
00:16:09,110 --> 00:16:06,800
earth and atmospheric observation will

376
00:16:11,269 --> 00:16:09,120
be able also to use it for

377
00:16:12,550 --> 00:16:11,279
regional weather forecasting

378
00:16:13,990 --> 00:16:12,560
and we believe this is extremely

379
00:16:15,670 --> 00:16:14,000
important because of the different

380
00:16:17,910 --> 00:16:15,680
elements i've already mentioned but

381
00:16:19,670 --> 00:16:17,920
again my colleagues from isa nasa and

382
00:16:21,430 --> 00:16:19,680
the msat will talk much better as i

383
00:16:23,269 --> 00:16:21,440
could know about this but again the

384
00:16:25,749 --> 00:16:23,279
message is clear we believe that

385
00:16:27,269 --> 00:16:25,759
sentinel 6 will be a powerful tool in

386
00:16:29,749 --> 00:16:27,279
helping us to better understand the

387
00:16:31,990 --> 00:16:29,759
situation of us of our planet

388
00:16:34,310 --> 00:16:32,000

now as a conclusion again i would like

389
00:16:36,550 --> 00:16:34,320
to thank all partners to to be able to

390
00:16:38,230 --> 00:16:36,560
be able to achieve such a great program

391
00:16:40,710 --> 00:16:38,240
to make sure that the launch will be on

392
00:16:42,389 --> 00:16:40,720
time and honestly as i said coming back

393
00:16:44,550 --> 00:16:42,399
to my first point it was not certainly

394
00:16:46,150 --> 00:16:44,560
not obvious in the context of the copy

395
00:16:48,790 --> 00:16:46,160
19 situation which has affected

396
00:16:50,470 --> 00:16:48,800
everybody so again i would like to thank

397
00:16:53,590 --> 00:16:50,480
everybody all the efforts which have

398
00:16:55,829 --> 00:16:53,600
been done to achieve this and again we

399
00:16:57,670 --> 00:16:55,839
by working together we give a strong

400
00:16:59,590 --> 00:16:57,680
signal to the rest of the world and now

401
00:17:02,389 --> 00:16:59,600
i would like to give the floor to joseph

402
00:17:12,069 --> 00:17:02,399
ashbacher from isa our strong partner in

403
00:17:17,029 --> 00:17:14,789
so thank you pierre and

404
00:17:19,270 --> 00:17:17,039
welcome also from my side so thank you

405
00:17:20,309 --> 00:17:19,280
for this introduction and also the the

406
00:17:22,470 --> 00:17:20,319
words of

407
00:17:23,990 --> 00:17:22,480
explaining how the copernicus

408
00:17:25,590 --> 00:17:24,000
corporation is working across the

409
00:17:28,470 --> 00:17:25,600
atlantic and i really would like to say

410
00:17:30,549 --> 00:17:28,480
that uh for many would claim that

411
00:17:32,310 --> 00:17:30,559
copernicus is an excellent cooperation

412
00:17:34,630 --> 00:17:32,320
where europe works extremely well

413
00:17:37,350 --> 00:17:34,640

together in space yes that is absolutely

414
00:17:39,110 --> 00:17:37,360
true but in this case it is also a

415
00:17:40,950 --> 00:17:39,120
symbol for the excellent cooperation

416
00:17:42,870 --> 00:17:40,960
between europe and the united states of

417
00:17:44,470 --> 00:17:42,880
america and i think this is really

418
00:17:46,630 --> 00:17:44,480
showing and as it was mentioned as

419
00:17:49,909 --> 00:17:46,640
before how powerful and how wonderful

420
00:17:52,630 --> 00:17:49,919
this satellite is to up to uh to prove

421
00:17:54,710 --> 00:17:52,640
this uh this cooperation so what you see

422
00:17:56,950 --> 00:17:54,720
here in this slide is um

423
00:17:59,430 --> 00:17:56,960
taking the pulse of our planet which is

424
00:18:01,350 --> 00:17:59,440
really the slogan which we are using in

425
00:18:03,270 --> 00:18:01,360
earth observation in ether where

426
00:18:05,430 --> 00:18:03,280
different uh satellite sensors are

427
00:18:08,310 --> 00:18:05,440
measuring different parameters of our

428
00:18:10,549 --> 00:18:08,320
planet of the atmosphere of the oceans

429
00:18:12,470 --> 00:18:10,559
of the land surface of the cryosphere

430
00:18:14,470 --> 00:18:12,480
but in particular to understand how

431
00:18:16,870 --> 00:18:14,480
these elements work together how they

432
00:18:19,270 --> 00:18:16,880
are interconnected and certainly in

433
00:18:22,150 --> 00:18:19,280
order to better understand our planet as

434
00:18:23,990 --> 00:18:22,160
a planet but also the life on our planet

435
00:18:25,350 --> 00:18:24,000
and how we can protect it in the best

436
00:18:26,710 --> 00:18:25,360
possible way

437
00:18:30,549 --> 00:18:26,720
if we go to the

438
00:18:32,150 --> 00:18:30,559

next slide it shows the portfolio of

439
00:18:34,870 --> 00:18:32,160
earth observation satellites which we

440
00:18:36,950 --> 00:18:34,880
are currently developing in europe

441
00:18:40,310 --> 00:18:36,960
through the european space agency

442
00:18:41,990 --> 00:18:40,320
uh copernicus you see here on this

443
00:18:45,110 --> 00:18:42,000
picture in the middle which is the orbit

444
00:18:47,750 --> 00:18:45,120
with the most crowded uh space of our

445
00:18:49,430 --> 00:18:47,760
satellites uh michael freilig central

446
00:18:51,510 --> 00:18:49,440
sixth is somewhere in the middle

447
00:18:53,830 --> 00:18:51,520
cobalicus is led by the european

448
00:18:55,669 --> 00:18:53,840
commission as pierre was just uh

449
00:18:58,310 --> 00:18:55,679
explaining and the european commission

450
00:19:01,110 --> 00:18:58,320
really defines the policy priorities uh

451
00:19:02,870 --> 00:19:01,120
the user requirements but also uh gives

452
00:19:05,029 --> 00:19:02,880
the majority of the funding and the

453
00:19:06,870 --> 00:19:05,039
leadership overall of kubernetes and i'm

454
00:19:09,270 --> 00:19:06,880
very happy to see a very strong

455
00:19:11,510 --> 00:19:09,280
leadership of cobalt nicosta european

456
00:19:14,070 --> 00:19:11,520
commission which is really essential to

457
00:19:16,150 --> 00:19:14,080
have the program uh in place

458
00:19:19,270 --> 00:19:16,160
then you see on the right hand side our

459
00:19:21,430 --> 00:19:19,280
uh partner um uh with umitzat we have a

460
00:19:23,909 --> 00:19:21,440
long-standing several decade-long

461
00:19:25,830 --> 00:19:23,919
cooperation on meteorological satellites

462
00:19:28,470 --> 00:19:25,840
uh geostationary and polar orbiting

463
00:19:30,710 --> 00:19:28,480

satellites and uh alertier the director

464
00:19:33,270 --> 00:19:30,720
general of humidity uh for sure will

465
00:19:35,190 --> 00:19:33,280
later on explain the context of central

466
00:19:37,830 --> 00:19:35,200
sixth anti-meteorological meteorological

467
00:19:39,909 --> 00:19:37,840
measurements but here just to say that

468
00:19:42,230 --> 00:19:39,919
also on our side with these i'm very

469
00:19:44,310 --> 00:19:42,240
happy uh to see and very happy to state

470
00:19:46,630 --> 00:19:44,320
that the cooperation with human studies

471
00:19:48,070 --> 00:19:46,640
is actually in one word excellent

472
00:19:50,870 --> 00:19:48,080
then on the left-hand side we see

473
00:19:53,830 --> 00:19:50,880
science science missions are the uh

474
00:19:55,750 --> 00:19:53,840
satellites that uh answer to burning

475
00:19:59,190 --> 00:19:55,760
questions of science but with the latest

476
00:20:01,510 --> 00:19:59,200
technology uh and really uh novelties in

477
00:20:04,390 --> 00:20:01,520
terms of satellites that are being

478
00:20:06,390 --> 00:20:04,400
developed to address uh questions that

479
00:20:08,149 --> 00:20:06,400
are leading to a better understanding of

480
00:20:10,630 --> 00:20:08,159
our planet we call them earth explorer

481
00:20:13,270 --> 00:20:10,640
missions and there are several in orbit

482
00:20:15,190 --> 00:20:13,280
already and others are being developed

483
00:20:16,549 --> 00:20:15,200
and being ready made ready for launch in

484
00:20:19,909 --> 00:20:16,559
the near future

485
00:20:23,270 --> 00:20:19,919
all together today we have a portfolio

486
00:20:25,909 --> 00:20:23,280
of 40 satellites under development 15 in

487
00:20:27,909 --> 00:20:25,919
operation and another 13 in preparation

488
00:20:29,669 --> 00:20:27,919

and this is by far the biggest portfolio

489
00:20:31,590 --> 00:20:29,679
which in europe we ever had on top of

490
00:20:33,350 --> 00:20:31,600
this we also have

491
00:20:35,029 --> 00:20:33,360
satellites emissions from our member

492
00:20:37,110 --> 00:20:35,039
states which complement the european

493
00:20:39,190 --> 00:20:37,120
portfolio and i think this is important

494
00:20:41,029 --> 00:20:39,200
that this is a contribution that europe

495
00:20:43,270 --> 00:20:41,039
collectively provides to a better

496
00:20:44,470 --> 00:20:43,280
understanding of our planet and the next

497
00:20:47,830 --> 00:20:44,480
slide

498
00:20:49,430 --> 00:20:47,840
uh shows a bit uh the sentinel uh series

499
00:20:51,669 --> 00:20:49,440
of satellites you see on the right hand

500
00:20:53,510 --> 00:20:51,679
side different uh numbers sentinel one

501
00:20:55,750 --> 00:20:53,520
center two uh all the way down to

502
00:20:58,230 --> 00:20:55,760
sentinel six and they're having having

503
00:21:01,590 --> 00:20:58,240
different instruments on board a radar

504
00:21:03,350 --> 00:21:01,600
instrument uh multispectral immature on

505
00:21:05,430 --> 00:21:03,360
altimeter atmosphere chemistry

506
00:21:07,909 --> 00:21:05,440
instruments and as you see here at the

507
00:21:10,789 --> 00:21:07,919
bottom center six with a very precise

508
00:21:12,070 --> 00:21:10,799
altimeter to measure sea level across

509
00:21:13,669 --> 00:21:12,080
the oceans

510
00:21:15,830 --> 00:21:13,679
and these satellites today there are

511
00:21:18,789 --> 00:21:15,840
seven of those in orbit they are

512
00:21:20,950 --> 00:21:18,799
producing at the moment 250 terabytes of

513
00:21:23,750 --> 00:21:20,960

data which we are disseminating uh to

514
00:21:25,430 --> 00:21:23,760
the world uh to all the partners who

515
00:21:27,909 --> 00:21:25,440
want to retrieve this data and i should

516
00:21:30,549 --> 00:21:27,919
say that these 250 terabytes of data

517
00:21:32,470 --> 00:21:30,559
which are coming out of our servers here

518
00:21:34,470 --> 00:21:32,480
in frascati is only the deep of the

519
00:21:36,630 --> 00:21:34,480
iceberg because thanks to a free and

520
00:21:38,470 --> 00:21:36,640
open data policy anyone can

521
00:21:41,029 --> 00:21:38,480
re-disseminate this data and there are

522
00:21:41,750 --> 00:21:41,039
many mirror sites across the globe which

523
00:21:43,830 --> 00:21:41,760
are

524
00:21:45,909 --> 00:21:43,840
replicating and redisseminating these

525
00:21:47,750 --> 00:21:45,919
data so these data are really entering

526
00:21:49,270 --> 00:21:47,760
all levels of society at the

527
00:21:51,909 --> 00:21:49,280
institutional level at the commercial

528
00:21:53,990 --> 00:21:51,919
level uh they're really finding a very

529
00:21:56,549 --> 00:21:54,000
deep way into the various segments of a

530
00:21:59,029 --> 00:21:56,559
better understanding of our planet

531
00:22:01,190 --> 00:21:59,039
the next uh slide shows uh one of these

532
00:22:02,870 --> 00:22:01,200
exit of one of these examples where this

533
00:22:04,549 --> 00:22:02,880
data are being used

534
00:22:06,549 --> 00:22:04,559
obviously today we talk about central

535
00:22:09,270 --> 00:22:06,559
six michael feili uh that means

536
00:22:10,230 --> 00:22:09,280
ultimately you see here the measurements

537
00:22:13,430 --> 00:22:10,240
of

538
00:22:17,029 --> 00:22:13,440

a global mean sea level uh across uh the

539
00:22:18,870 --> 00:22:17,039
uh uh across the oceans from 1993

540
00:22:21,350 --> 00:22:18,880
onwards in fact the first measurements

541
00:22:24,310 --> 00:22:21,360
uh date back to 1991 with topics

542
00:22:26,149 --> 00:22:24,320
crusader and the rs1 uh both uh

543
00:22:28,950 --> 00:22:26,159
satellites that have been put together

544
00:22:30,950 --> 00:22:28,960
by europe and the us and all the way

545
00:22:33,029 --> 00:22:30,960
over these decades different satellites

546
00:22:34,870 --> 00:22:33,039
have provided a piece of this curve for

547
00:22:36,710 --> 00:22:34,880
these measurements in order to be sure

548
00:22:39,029 --> 00:22:36,720
that we do well understand the sea level

549
00:22:40,950 --> 00:22:39,039
rise globally but also

550
00:22:43,510 --> 00:22:40,960
the variations on different places in

551
00:22:45,430 --> 00:22:43,520
our planet what you see here uh of

552
00:22:48,310 --> 00:22:45,440
course is also alarming on the left hand

553
00:22:51,590 --> 00:22:48,320
side of this curve to in the 90s the sea

554
00:22:53,590 --> 00:22:51,600
level rise is 3.1 millimeters per year

555
00:22:57,669 --> 00:22:53,600
and towards the right hand side in the

556
00:23:00,310 --> 00:22:57,679
2000 2010 uh years you see an increase

557
00:23:02,070 --> 00:23:00,320
of 4.8 millimeters per year and this is

558
00:23:03,909 --> 00:23:02,080
not a linear increase but

559
00:23:05,110 --> 00:23:03,919
an asymptotic increase and this of

560
00:23:07,270 --> 00:23:05,120
course is very

561
00:23:10,230 --> 00:23:07,280
alarming because this means that the sea

562
00:23:11,990 --> 00:23:10,240
level rise is accelerating over time

563
00:23:14,230 --> 00:23:12,000

scientists are expecting that by the end

564
00:23:17,590 --> 00:23:14,240
of this century the sea level will have

565
00:23:18,630 --> 00:23:17,600
risen by about 1.3 1.5 meters depending

566
00:23:21,029 --> 00:23:18,640
a bit on

567
00:23:22,710 --> 00:23:21,039
the models and the different assumptions

568
00:23:24,390 --> 00:23:22,720
but in other words we do need these

569
00:23:26,549 --> 00:23:24,400
satellites to make these precise

570
00:23:28,390 --> 00:23:26,559
measurements and to well understand what

571
00:23:30,950 --> 00:23:28,400
is the impact on our planet

572
00:23:32,549 --> 00:23:30,960
if we go to the next slide you see

573
00:23:34,710 --> 00:23:32,559
a picture of

574
00:23:37,190 --> 00:23:34,720
copernicus sentinel 6 microphilic

575
00:23:40,070 --> 00:23:37,200
satellite and this is really a small

576
00:23:42,390 --> 00:23:40,080
miracle and a fantastic satellite uh

577
00:23:45,029 --> 00:23:42,400
which we have built together and

578
00:23:47,830 --> 00:23:45,039
together means really the united states

579
00:23:49,590 --> 00:23:47,840
and i should really acknowledge the

580
00:23:51,909 --> 00:23:49,600
enormous effort the united states were

581
00:23:53,909 --> 00:23:51,919
making both on the side of nasa but also

582
00:23:55,830 --> 00:23:53,919
on the side of noah in order to make the

583
00:23:57,350 --> 00:23:55,840
satellite of reality and of course on

584
00:23:59,669 --> 00:23:57,360
the european side with the european

585
00:24:02,230 --> 00:23:59,679
commission leading kubernetes overall

586
00:24:04,710 --> 00:24:02,240
with your midshot with kness and also

587
00:24:07,190 --> 00:24:04,720
with our own organization european space

588
00:24:09,990 --> 00:24:07,200

agency who has been essential in putting

589
00:24:12,149 --> 00:24:10,000
this satellite into place

590
00:24:14,149 --> 00:24:12,159
as you know the satellite will launch

591
00:24:17,350 --> 00:24:14,159
in less than a month's time in fact

592
00:24:19,110 --> 00:24:17,360
today's event is called l minus 30

593
00:24:21,029 --> 00:24:19,120
indicating that it's one month before

594
00:24:23,590 --> 00:24:21,039
the launch date and as you will notice

595
00:24:25,029 --> 00:24:23,600
today is not uh is the 16th of october

596
00:24:26,310 --> 00:24:25,039
but the launch is planned for the 10th

597
00:24:28,230 --> 00:24:26,320
of november

598
00:24:30,149 --> 00:24:28,240
meaning that we have actually

599
00:24:32,470 --> 00:24:30,159
put a launch earlier than originally

600
00:24:34,870 --> 00:24:32,480
planned a year ago we had a plan for the

601
00:24:36,789 --> 00:24:34,880
launch around 1506 in november so this

602
00:24:38,310 --> 00:24:36,799
also shows that the satellite has been

603
00:24:44,230 --> 00:24:38,320
on time

604
00:24:47,830 --> 00:24:44,240
since a few years we have been indicated

605
00:24:49,909 --> 00:24:47,840
in november 2020 launch date a few years

606
00:24:51,830 --> 00:24:49,919
ago already and we have kept this launch

607
00:24:53,590 --> 00:24:51,840
day to the day in fact we have advanced

608
00:24:56,310 --> 00:24:53,600
the launch date by five days and i think

609
00:24:58,310 --> 00:24:56,320
this is also proof of the engineering

610
00:25:00,149 --> 00:24:58,320
capability but also the excellence of

611
00:25:02,549 --> 00:25:00,159
industry and project management who have

612
00:25:05,430 --> 00:25:02,559
all worked together to make this happen

613
00:25:08,870 --> 00:25:05,440

the satellite itself weighs about 1 400

614
00:25:12,310 --> 00:25:08,880
kilos as a nominal lifetime of 5.5 years

615
00:25:15,510 --> 00:25:12,320
flies at an orbiter for 1 366 kilometers

616
00:25:18,070 --> 00:25:15,520
with an inclination of 66 degrees and

617
00:25:20,230 --> 00:25:18,080
has a as a main instrument procedure for

618
00:25:24,149 --> 00:25:20,240
the natal altimeter which is a very very

619
00:25:27,029 --> 00:25:24,159
precise altimeter in space plus the amc

620
00:25:29,590 --> 00:25:27,039
radiometer provided by nasa the gnss pod

621
00:25:31,430 --> 00:25:29,600
provided by nasa and the doris provided

622
00:25:33,029 --> 00:25:31,440
by class

623
00:25:34,230 --> 00:25:33,039
the next slide

624
00:25:37,830 --> 00:25:34,240
will

625
00:25:39,669 --> 00:25:37,840
go a step further and show a bit the u.s

626
00:25:42,149 --> 00:25:39,679
european cooperation which we have since

627
00:25:43,990 --> 00:25:42,159
many many years and this really is

628
00:25:46,789 --> 00:25:44,000
showing just a few acronyms and they may

629
00:25:47,669 --> 00:25:46,799
not be easily understandable in b stands

630
00:25:49,750 --> 00:25:47,679
for

631
00:25:51,590 --> 00:25:49,760
mass balance experiment which we carried

632
00:25:53,909 --> 00:25:51,600
out together with u.s and european

633
00:25:55,110 --> 00:25:53,919
scientists to really study the mass

634
00:25:57,430 --> 00:25:55,120
balance of

635
00:25:59,029 --> 00:25:57,440
greenland and of antarctica

636
00:26:01,350 --> 00:25:59,039
with all the sensors and all the

637
00:26:04,149 --> 00:26:01,360
measurements we could take to determine

638
00:26:06,549 --> 00:26:04,159

the truth of how much is melting or how

639
00:26:08,149 --> 00:26:06,559
much is accumulating on certain areas

640
00:26:09,830 --> 00:26:08,159
and this was a fantastic work over a

641
00:26:12,230 --> 00:26:09,840
couple of years where the best

642
00:26:14,710 --> 00:26:12,240
scientists on both sides of the atlantic

643
00:26:16,549 --> 00:26:14,720
have been putting together data models

644
00:26:19,510 --> 00:26:16,559
to have a better understanding but you

645
00:26:21,830 --> 00:26:19,520
also see jppg which is a joint program

646
00:26:23,830 --> 00:26:21,840
planning group between nasa and esa

647
00:26:26,390 --> 00:26:23,840
where we work on different domains and

648
00:26:27,990 --> 00:26:26,400
in fact in in one word this cooperation

649
00:26:30,549 --> 00:26:28,000
which we have built up through uh

650
00:26:32,070 --> 00:26:30,559
sentinel six michael frei lee is such a

651
00:26:34,789 --> 00:26:32,080
wonderful cooperation and i really would

652
00:26:36,549 --> 00:26:34,799
like to thank my partners in in nasa who

653
00:26:38,390 --> 00:26:36,559
have been so committed to make this

654
00:26:40,070 --> 00:26:38,400
happen that we have decided that we want

655
00:26:42,230 --> 00:26:40,080
to further explore this cooperation on

656
00:26:44,070 --> 00:26:42,240
new missions and you see a few acronyms

657
00:26:46,950 --> 00:26:44,080
here on few candidates which we are

658
00:26:49,510 --> 00:26:46,960
studying right now where esa nasa but

659
00:26:50,870 --> 00:26:49,520
europe and the u.s in general can work

660
00:26:52,870 --> 00:26:50,880
closer together and i think this is

661
00:26:55,269 --> 00:26:52,880
really a testimony of the strong

662
00:26:57,029 --> 00:26:55,279
cooperation which we have and the strong

663
00:26:59,430 --> 00:26:57,039

partnership which we have developed over

664
00:27:01,830 --> 00:26:59,440
time and the next slide really shows the

665
00:27:04,950 --> 00:27:01,840
man who has to be honored today michael

666
00:27:07,830 --> 00:27:04,960
feiley michael feine also as thomas was

667
00:27:10,789 --> 00:27:07,840
already saying has been an incredibly

668
00:27:13,110 --> 00:27:10,799
strong scientist a very strong believer

669
00:27:14,870 --> 00:27:13,120
in the truth he has always told what he

670
00:27:16,789 --> 00:27:14,880
thinks but he has been a brilliant

671
00:27:19,269 --> 00:27:16,799
scientist and really

672
00:27:21,830 --> 00:27:19,279
a good friend and a good partner in many

673
00:27:23,909 --> 00:27:21,840
aspects you see here we have

674
00:27:25,750 --> 00:27:23,919
handed over the certificate to name the

675
00:27:27,590 --> 00:27:25,760
satellite after him very very

676
00:27:30,070 --> 00:27:27,600
unfortunate that he cannot push the

677
00:27:32,549 --> 00:27:30,080
button at the launch but

678
00:27:34,870 --> 00:27:32,559
next month to see the settle flying into

679
00:27:36,470 --> 00:27:34,880
space so it makes me really feel

680
00:27:38,149 --> 00:27:36,480
sentimental when i think of it but

681
00:27:41,190 --> 00:27:38,159
michael file he was a friend was a

682
00:27:42,630 --> 00:27:41,200
partner but he also left a big legacy of

683
00:27:45,350 --> 00:27:42,640
international cooperation and i really

684
00:27:47,029 --> 00:27:45,360
would like to thank the us uh for having

685
00:27:48,950 --> 00:27:47,039
allowed this cooperation to materialize

686
00:27:50,710 --> 00:27:48,960
which mike was putting in place

687
00:27:52,070 --> 00:27:50,720
and let me show the next slide

688
00:27:54,389 --> 00:27:52,080

which is uh

689
00:27:56,630 --> 00:27:54,399
just a slide to thank all the partners

690
00:27:58,389 --> 00:27:56,640
involved in this corporation in the us

691
00:28:00,149 --> 00:27:58,399
in europe this has been a unique

692
00:28:02,070 --> 00:28:00,159
experience and i'm so grateful to

693
00:28:04,389 --> 00:28:02,080
everyone for their contribution and i

694
00:28:06,630 --> 00:28:04,399
would like to thank you for my side and

695
00:28:09,669 --> 00:28:06,640
hand over to my dear friend and

696
00:28:11,990 --> 00:28:09,679
colleague in nasa karen sanchez the

697
00:28:22,870 --> 00:28:12,000
director of nasa's earth science

698
00:28:27,190 --> 00:28:24,870
thank you so much joseph it's a thrill

699
00:28:29,830 --> 00:28:27,200
for me to be here today still new in my

700
00:28:31,750 --> 00:28:29,840
role as the nasa earth science director

701
00:28:33,830 --> 00:28:31,760
and sitting a month out from the launch

702
00:28:35,269 --> 00:28:33,840
of the sentinel 6 micro freilich

703
00:28:38,230 --> 00:28:35,279
satellite

704
00:28:40,950 --> 00:28:38,240
the earth is a is a global system of

705
00:28:42,830 --> 00:28:40,960
intricate and dynamic interactions

706
00:28:46,070 --> 00:28:42,840
between ocean

707
00:28:47,909 --> 00:28:46,080
land ice and the atmosphere and also

708
00:28:50,710 --> 00:28:47,919
human communities

709
00:28:53,750 --> 00:28:50,720
and that global system is changing

710
00:28:55,830 --> 00:28:53,760
and increasingly decision makers

711
00:28:57,350 --> 00:28:55,840
in the public in the public sector and

712
00:28:59,990 --> 00:28:57,360
the private sector

713
00:29:02,389 --> 00:29:00,000

at at all levels are turning to the

714
00:29:05,430 --> 00:29:02,399
earth science community to understand

715
00:29:07,909 --> 00:29:05,440
those changes to inform frankly both the

716
00:29:12,070 --> 00:29:07,919
risks and the opportunities about which

717
00:29:14,070 --> 00:29:12,080
they have to make critical decisions

718
00:29:17,350 --> 00:29:14,080
we we in the earth science community

719
00:29:20,310 --> 00:29:17,360
seek to advance our understanding and

720
00:29:21,269 --> 00:29:20,320
ability to model and predict that earth

721
00:29:23,190 --> 00:29:21,279
system

722
00:29:25,350 --> 00:29:23,200
and it's the observations and in

723
00:29:27,830 --> 00:29:25,360
particular from satellites that underpin

724
00:29:29,909 --> 00:29:27,840
our ability to do that

725
00:29:33,269 --> 00:29:29,919
nasa has a fleet of

726
00:29:35,110 --> 00:29:33,279
of satellites that observe all aspects

727
00:29:38,389 --> 00:29:35,120
on different time scales and different

728
00:29:40,310 --> 00:29:38,399
spatial resolutions of the earth system

729
00:29:44,230 --> 00:29:40,320
and sentinel 6 michael frylick will be

730
00:29:47,430 --> 00:29:44,240
the newest addition to that fleet

731
00:29:50,310 --> 00:29:47,440
uh as you've as as joseph explained this

732
00:29:53,029 --> 00:29:50,320
satellite will continue the decades-long

733
00:29:56,310 --> 00:29:53,039
record of observations of sea surface

734
00:29:58,310 --> 00:29:56,320
height but it's it's when we use the

735
00:29:59,750 --> 00:29:58,320
observations from the altimeters in

736
00:30:02,470 --> 00:29:59,760
combination

737
00:30:05,350 --> 00:30:02,480
with our other satellites that we really

738
00:30:07,669 --> 00:30:05,360

unleash the power of these observations

739
00:30:10,230 --> 00:30:07,679
for example when we combine the

740
00:30:13,350 --> 00:30:10,240
altimeter observations with gravity

741
00:30:15,510 --> 00:30:13,360
measurements we can actually sort out

742
00:30:18,149 --> 00:30:15,520
where the where the

743
00:30:21,269 --> 00:30:18,159
increase in the sea level is coming from

744
00:30:23,510 --> 00:30:21,279
how much of it is attributable to melt

745
00:30:26,310 --> 00:30:23,520
of ice sheets and glaciers and how much

746
00:30:29,750 --> 00:30:26,320
of it is attributable to the expansion

747
00:30:31,590 --> 00:30:29,760
of the ocean itself as it warms up

748
00:30:35,110 --> 00:30:31,600
when we combine out when we combine

749
00:30:37,909 --> 00:30:35,120
altimetry with synthetic aperture radar

750
00:30:41,350 --> 00:30:37,919
we can make better uh

751
00:30:43,830 --> 00:30:41,360
we have a better understanding of

752
00:30:46,070 --> 00:30:43,840
the relative sea level rise in our

753
00:30:48,870 --> 00:30:46,080
coastal communities because we can take

754
00:30:50,549 --> 00:30:48,880
account of what the land surface itself

755
00:30:53,990 --> 00:30:50,559
is doing

756
00:30:55,510 --> 00:30:54,000
and when we combine altimetry with the

757
00:30:57,110 --> 00:30:55,520
observations we get from weather

758
00:30:59,669 --> 00:30:57,120
satellites

759
00:31:02,549 --> 00:30:59,679
we can do things like better predict

760
00:31:06,870 --> 00:31:02,559
rapid intensification of hurricanes

761
00:31:08,870 --> 00:31:06,880
when a column of of sea water warms it

762
00:31:10,310 --> 00:31:08,880
expands and that creates a bulge on the

763
00:31:13,110 --> 00:31:10,320

surface that we can see with the

764
00:31:15,509 --> 00:31:13,120
altimeters and when hurricanes

765
00:31:17,430 --> 00:31:15,519
pass over these warm bulges

766
00:31:19,909 --> 00:31:17,440
that's when we we get rapid

767
00:31:22,389 --> 00:31:19,919
intensification events like we saw with

768
00:31:23,990 --> 00:31:22,399
hurricane michael in 2018 and we are

769
00:31:26,070 --> 00:31:24,000
seeing them play out again in the

770
00:31:27,590 --> 00:31:26,080
hurricane season that's still ongoing

771
00:31:30,149 --> 00:31:27,600
this year

772
00:31:32,549 --> 00:31:30,159
and we do all of this as you've heard

773
00:31:34,389 --> 00:31:32,559
through international partnerships not

774
00:31:36,470 --> 00:31:34,399
just to to

775
00:31:39,190 --> 00:31:36,480
maintain the continuity of observations

776
00:31:41,110 --> 00:31:39,200
but also to advance them

777
00:31:43,190 --> 00:31:41,120
and you'll hear more about all of that

778
00:31:45,430 --> 00:31:43,200
when our program scientist nadia speaks

779
00:31:47,110 --> 00:31:45,440
in just a few moments

780
00:31:48,549 --> 00:31:47,120
this mission

781
00:31:51,029 --> 00:31:48,559
sentinel six michael freilich is

782
00:31:52,310 --> 00:31:51,039
especially meaningful to me for two

783
00:31:53,430 --> 00:31:52,320
reasons

784
00:31:57,430 --> 00:31:53,440
one

785
00:31:59,350 --> 00:31:57,440
it was back in 1992 that as a graduate

786
00:32:01,509 --> 00:31:59,360
student i got to make a small

787
00:32:04,230 --> 00:32:01,519
contribution to the calibration and

788
00:32:07,269 --> 00:32:04,240

validation of the very first the the

789
00:32:09,110 --> 00:32:07,279
topex poseidon altimeter

790
00:32:10,470 --> 00:32:09,120
but more importantly

791
00:32:11,190 --> 00:32:10,480
this mission

792
00:32:13,110 --> 00:32:11,200
is

793
00:32:14,870 --> 00:32:13,120
bears the name of my friend colleague

794
00:32:16,549 --> 00:32:14,880
mentor and my predecessor is the

795
00:32:18,070 --> 00:32:16,559
director of earth science michael

796
00:32:21,269 --> 00:32:18,080
freilick

797
00:32:23,350 --> 00:32:21,279
michael was a driving force in

798
00:32:25,430 --> 00:32:23,360
establishing and maintaining the

799
00:32:28,630 --> 00:32:25,440
partnerships that enable all of the

800
00:32:31,110 --> 00:32:28,640
earth science work we do today

801
00:32:33,190 --> 00:32:31,120
so with that i'm looking forward to the

802
00:32:36,070 --> 00:32:33,200
launch in a month and i will turn it

803
00:32:48,149 --> 00:32:36,080
over to my friend the director general

804
00:32:48,159 --> 00:32:53,590
thank you very much karen

805
00:32:57,750 --> 00:32:55,430
yes so

806
00:33:00,149 --> 00:32:57,760
you met seth and noah have been involved

807
00:33:03,430 --> 00:33:00,159
in the jason success story since 12

808
00:33:04,789 --> 00:33:03,440
years now starting with jason ii

809
00:33:06,549 --> 00:33:04,799
and

810
00:33:07,909 --> 00:33:06,559
the involvement of both operational

811
00:33:10,310 --> 00:33:07,919
agencies

812
00:33:11,990 --> 00:33:10,320
acknowledges the operational maturity of

813
00:33:13,990 --> 00:33:12,000

ocean altimetry

814
00:33:15,190 --> 00:33:14,000
and its unique value for ocean

815
00:33:18,149 --> 00:33:15,200
prediction

816
00:33:21,669 --> 00:33:18,159
and monitoring of mean sea level

817
00:33:24,470 --> 00:33:21,679
ocean prediction is essential as touch

818
00:33:26,630 --> 00:33:24,480
for our blue economy but it's also

819
00:33:28,310 --> 00:33:26,640
a key component of coupled ocean

820
00:33:31,990 --> 00:33:28,320
atmosphere prediction

821
00:33:33,269 --> 00:33:32,000
and thanks to this data so this coupled

822
00:33:34,870 --> 00:33:33,279
model

823
00:33:37,029 --> 00:33:34,880
we can

824
00:33:40,389 --> 00:33:37,039
predict that the current hurricane

825
00:33:41,909 --> 00:33:40,399
season is exceptional in the atlantic

826
00:33:44,230 --> 00:33:41,919
so uh

827
00:33:46,789 --> 00:33:44,240
with certain sixth michael fralich will

828
00:33:49,430 --> 00:33:46,799
continue a unique climate record and

829
00:33:53,029 --> 00:33:49,440
then disputed climate record repeating

830
00:33:55,590 --> 00:33:53,039
exactly the same orbit as topex poseidon

831
00:33:58,310 --> 00:33:55,600
and the previous json mission

832
00:34:00,950 --> 00:33:58,320
we will also deliver the most accurate

833
00:34:03,430 --> 00:34:00,960
measurements of c support height against

834
00:34:04,870 --> 00:34:03,440
which other altimeter mission will cross

835
00:34:08,069 --> 00:34:04,880
calibrate

836
00:34:10,550 --> 00:34:08,079
on this slide uh you see that sentinel 6

837
00:34:13,109 --> 00:34:10,560
is part of the broader constellation

838
00:34:15,030 --> 00:34:13,119

including also two sentient copernicus

839
00:34:17,510 --> 00:34:15,040
sentinel-3 satellites flying on

840
00:34:20,470 --> 00:34:17,520
different complementary orbits

841
00:34:24,230 --> 00:34:20,480
on this picture you can see in white

842
00:34:26,389 --> 00:34:24,240
the altimeter ground rack of sentinel 6

843
00:34:29,190 --> 00:34:26,399
and in blue

844
00:34:32,310 --> 00:34:29,200
the ground track of one sentinel-3 uh

845
00:34:36,069 --> 00:34:32,320
satellite and what you can see

846
00:34:37,909 --> 00:34:36,079
in fact the uh ground track of 7 have a

847
00:34:39,829 --> 00:34:37,919
broader separation

848
00:34:41,270 --> 00:34:39,839
but they repeat much more frequently

849
00:34:43,510 --> 00:34:41,280
every 10 days

850
00:34:45,909 --> 00:34:43,520
and this is optimum for monitoring the

851
00:34:46,869 --> 00:34:45,919
tropical ocean

852
00:34:48,389 --> 00:34:46,879
where

853
00:34:51,190 --> 00:34:48,399
changes are

854
00:34:55,909 --> 00:34:51,200
faster at larger scale in direct

855
00:35:00,550 --> 00:34:58,710
and this is where el nino starts so i

856
00:35:03,430 --> 00:35:00,560
know as you know one of the major

857
00:35:04,550 --> 00:35:03,440
climate feature having impact on our

858
00:35:07,030 --> 00:35:04,560
planet

859
00:35:08,470 --> 00:35:07,040
next slide please

860
00:35:11,030 --> 00:35:08,480
so the role of human set has

861
00:35:13,990 --> 00:35:11,040
significantly expanded from json to

862
00:35:17,190 --> 00:35:15,030
we

863
00:35:20,310 --> 00:35:17,200

coordinate the system activities across

864
00:35:22,950 --> 00:35:20,320
the partners and we also develop the

865
00:35:24,390 --> 00:35:22,960
core ground segments under our own

866
00:35:26,470 --> 00:35:24,400
program

867
00:35:27,589 --> 00:35:26,480
and on this picture you can see

868
00:35:28,829 --> 00:35:27,599
our staff

869
00:35:32,150 --> 00:35:28,839
in darf

870
00:35:33,750 --> 00:35:32,160
during uh satellite validation tests so

871
00:35:35,510 --> 00:35:33,760
where our ground segment talks with the

872
00:35:37,270 --> 00:35:35,520
satellites and

873
00:35:39,829 --> 00:35:37,280
you see two pictures because in the

874
00:35:43,270 --> 00:35:39,839
kovid 19 times we had to split the team

875
00:35:45,270 --> 00:35:43,280
into for social distancing but as

876
00:35:47,430 --> 00:35:45,280
previous speakers said that we all made

877
00:35:49,270 --> 00:35:47,440
the required effort to keep ready for

878
00:35:52,230 --> 00:35:49,280
the launch

879
00:35:58,310 --> 00:35:55,109
we also preparing ourselves to take over

880
00:36:00,870 --> 00:35:58,320
flight operations from the sentinel 6

881
00:36:04,230 --> 00:36:00,880
michael freire satellite three year

882
00:36:06,390 --> 00:36:04,240
three days after the launch from isa

883
00:36:09,190 --> 00:36:06,400
and we will then operate the full system

884
00:36:11,349 --> 00:36:09,200
in cooperation with our european

885
00:36:13,510 --> 00:36:11,359
and u.s partners

886
00:36:15,990 --> 00:36:13,520
and what you can see here is our new

887
00:36:17,829 --> 00:36:16,000
mission control center the scorpionicus

888
00:36:20,790 --> 00:36:17,839

mission control center from which we

889
00:36:22,870 --> 00:36:20,800
will operate both santilla 3

890
00:36:25,750 --> 00:36:22,880
and sentinel 6.

891
00:36:27,670 --> 00:36:25,760
so i wish to thank all our partners from

892
00:36:29,430 --> 00:36:27,680
europe from the us

893
00:36:31,670 --> 00:36:29,440
for their trust and also for the

894
00:36:34,550 --> 00:36:31,680
excellent cooperation

895
00:36:36,230 --> 00:36:34,560
and as michael frielek said go

896
00:36:39,510 --> 00:36:36,240
sentinel-6

897
00:36:42,390 --> 00:36:39,520
and i'm now very pleased to pass over to

898
00:36:44,390 --> 00:36:42,400
my friend dr

899
00:36:46,470 --> 00:36:44,400
who i think like me has been involved in

900
00:36:48,390 --> 00:36:46,480
stoppage poseidon in the full series of

901
00:36:50,310 --> 00:36:48,400
missions and i certainly a lot of things

902
00:36:53,190 --> 00:36:50,320
to tell you

903
00:36:55,430 --> 00:36:53,200
alrighty of the show thank you

904
00:36:58,470 --> 00:36:55,440
so my name is barack vase and i'm really

905
00:37:01,349 --> 00:36:58,480
honored and privileged to be able to

906
00:37:03,109 --> 00:37:01,359
work on this incredible mission

907
00:37:05,829 --> 00:37:03,119
called sentinel 6.

908
00:37:06,870 --> 00:37:05,839
it's a global partnership as you've

909
00:37:07,750 --> 00:37:06,880
heard

910
00:37:09,670 --> 00:37:07,760
and

911
00:37:10,950 --> 00:37:09,680
we are working very very closely

912
00:37:14,710 --> 00:37:10,960
together

913
00:37:17,430 --> 00:37:14,720

to make this mission a reality

914
00:37:19,589 --> 00:37:17,440
measuring the world's vast oceans

915
00:37:22,550 --> 00:37:19,599
is a difficult problem

916
00:37:25,190 --> 00:37:22,560
we have to cover a vast amount of space

917
00:37:26,950 --> 00:37:25,200
and to do it very very quickly and

918
00:37:28,230 --> 00:37:26,960
measure the world's oceans very

919
00:37:31,190 --> 00:37:28,240
accurately

920
00:37:33,990 --> 00:37:31,200
so naturally satellite technology is a

921
00:37:36,550 --> 00:37:34,000
very good solution for this problem

922
00:37:39,829 --> 00:37:36,560
but as i think about it having a

923
00:37:42,310 --> 00:37:39,839
satellite that's orbiting 800 miles up

924
00:37:43,990 --> 00:37:42,320
spinning around the earth at five miles

925
00:37:46,550 --> 00:37:44,000
every second

926
00:37:48,790 --> 00:37:46,560
and now being able to do a

927
00:37:52,390 --> 00:37:48,800
very accurate measurement of the sea

928
00:37:54,470 --> 00:37:52,400
surface height to within just two inches

929
00:37:57,990 --> 00:37:54,480
is an incredible feat

930
00:38:00,230 --> 00:37:58,000
and one that if you'd asked me years ago

931
00:38:02,550 --> 00:38:00,240
i would have said people are crazy

932
00:38:04,470 --> 00:38:02,560
but this is exactly what

933
00:38:06,310 --> 00:38:04,480
all of our teams have been doing for the

934
00:38:08,470 --> 00:38:06,320
past 28 years

935
00:38:11,270 --> 00:38:08,480
with the start of the topex poseidon

936
00:38:13,750 --> 00:38:11,280
satellite and subsequent subsequent json

937
00:38:15,190 --> 00:38:13,760
series of missions and now with the

938
00:38:17,430 --> 00:38:15,200

sentinel 6

939
00:38:19,829 --> 00:38:17,440
project we're planning on continuing

940
00:38:22,069 --> 00:38:19,839
that for the next decade

941
00:38:24,470 --> 00:38:22,079
and in some respects even doing it

942
00:38:28,230 --> 00:38:24,480
better so let me show you an animation

943
00:38:29,990 --> 00:38:28,240
that describes a bit about the satellite

944
00:38:33,109 --> 00:38:30,000
the satellite is provided

945
00:38:35,190 --> 00:38:33,119
by isa with contributions from nasa and

946
00:38:36,390 --> 00:38:35,200
is built by airbus and friedrichshafe in

947
00:38:38,310 --> 00:38:36,400
germany

948
00:38:39,910 --> 00:38:38,320
the sentinel 6 michael freilax satellite

949
00:38:41,109 --> 00:38:39,920
is built to operate for at least five

950
00:38:46,390 --> 00:38:41,119
years

951
00:38:48,550 --> 00:38:46,400
that's expected to launch in 2025 to

952
00:38:49,990 --> 00:38:48,560
really be able to extend this for the

953
00:38:52,069 --> 00:38:50,000
next decade

954
00:38:54,069 --> 00:38:52,079
the altimeter that's provided by isa

955
00:38:55,910 --> 00:38:54,079
measures the sea surface height

956
00:38:58,710 --> 00:38:55,920
by sending microwave pulses down to the

957
00:39:00,470 --> 00:38:58,720
ocean and measuring how long it takes to

958
00:39:02,550 --> 00:39:00,480
reflect that pulse you can see that in

959
00:39:04,870 --> 00:39:02,560
this animation with the red signal

960
00:39:06,550 --> 00:39:04,880
that's bouncing off the ocean

961
00:39:08,550 --> 00:39:06,560
however as the signal travels through

962
00:39:10,950 --> 00:39:08,560
the atmosphere it slows

963
00:39:13,030 --> 00:39:10,960

so we have a nasa provided microwave

964
00:39:15,910 --> 00:39:13,040
radiometer instrument shown with the

965
00:39:18,870 --> 00:39:15,920
blue beam that measures the delay to

966
00:39:20,790 --> 00:39:18,880
improve the height accuracy

967
00:39:22,310 --> 00:39:20,800
we also need to know precisely where the

968
00:39:24,870 --> 00:39:22,320
satellite is

969
00:39:27,990 --> 00:39:24,880
so we have instruments from isa and nasa

970
00:39:30,550 --> 00:39:28,000
that use gps and other tracking systems

971
00:39:33,190 --> 00:39:30,560
to know precisely where the satellite is

972
00:39:35,510 --> 00:39:33,200
located the satellite is running 24

973
00:39:37,430 --> 00:39:35,520
hours a day seven days a week doing

974
00:39:39,990 --> 00:39:37,440
ground track measurements of about 30

975
00:39:41,109 --> 00:39:40,000
kilometers each but over the span of 10

976
00:39:43,109 --> 00:39:41,119
days

977
00:39:44,390 --> 00:39:43,119
we're able to build a map of the

978
00:39:46,470 --> 00:39:44,400
complete

979
00:39:49,910 --> 00:39:46,480
world's oceans

980
00:39:52,710 --> 00:39:49,920
so we can go to the next animation

981
00:39:55,829 --> 00:39:52,720
but as a bonus on this satellite

982
00:39:58,150 --> 00:39:55,839
nasa is providing a radio occultation

983
00:40:00,150 --> 00:39:58,160
measurement instrument that provides

984
00:40:01,510 --> 00:40:00,160
measurements of the earth's atmospheric

985
00:40:03,829 --> 00:40:01,520
temperature

986
00:40:06,150 --> 00:40:03,839
and humidity profiles

987
00:40:08,230 --> 00:40:06,160
this is a very important measurement for

988
00:40:11,589 --> 00:40:08,240

the world's weather agencies

989
00:40:13,030 --> 00:40:11,599
and is done by measuring how signals

990
00:40:15,589 --> 00:40:13,040
from existing

991
00:40:17,589 --> 00:40:15,599
satellites like gps satellites are

992
00:40:19,510 --> 00:40:17,599
bending as they cross across the earth's

993
00:40:21,990 --> 00:40:19,520
atmosphere

994
00:40:25,349 --> 00:40:22,000
now for sentinel 6

995
00:40:27,670 --> 00:40:25,359
we have a few additional features that

996
00:40:30,550 --> 00:40:27,680
we are enhancing

997
00:40:32,390 --> 00:40:30,560
sea level as said before is rising but

998
00:40:35,030 --> 00:40:32,400
it is also accelerating and

999
00:40:37,510 --> 00:40:35,040
understanding this acceleration is even

1000
00:40:40,069 --> 00:40:37,520
more important for the future and having

1001
00:40:41,190 --> 00:40:40,079
very precise and stable measurements

1002
00:40:43,510 --> 00:40:41,200
is key

1003
00:40:44,630 --> 00:40:43,520
so the new nasa radiometers and esa

1004
00:40:46,710 --> 00:40:44,640
altimeter

1005
00:40:50,790 --> 00:40:46,720
have enhancements that improve that

1006
00:40:53,109 --> 00:40:50,800
stability accuracy and resolution

1007
00:40:55,349 --> 00:40:53,119
if you can go to the next slide

1008
00:40:56,870 --> 00:40:55,359
the altimeters and radiometers feature

1009
00:40:59,430 --> 00:40:56,880
higher resolution

1010
00:41:01,750 --> 00:40:59,440
to get much closer to the coast

1011
00:41:04,069 --> 00:41:01,760
as illustrated by these red hash marks

1012
00:41:06,470 --> 00:41:04,079
which we haven't been able to see before

1013
00:41:08,470 --> 00:41:06,480

with these types of measurements from

1014
00:41:10,150 --> 00:41:08,480
our existing satellites

1015
00:41:12,630 --> 00:41:10,160
as you know

1016
00:41:15,589 --> 00:41:12,640
a vast majority hundreds of millions of

1017
00:41:18,550 --> 00:41:15,599
people across the world live on these

1018
00:41:20,390 --> 00:41:18,560
very very close coastal regions and who

1019
00:41:23,829 --> 00:41:20,400
are directly affected

1020
00:41:27,190 --> 00:41:25,510
so doing so

1021
00:41:29,990 --> 00:41:27,200
this is a global

1022
00:41:32,470 --> 00:41:30,000
problem and a global challenge and we're

1023
00:41:34,790 --> 00:41:32,480
bringing together a global solution as

1024
00:41:36,790 --> 00:41:34,800
you've heard we're bringing together

1025
00:41:39,349 --> 00:41:36,800
engineers scientists

1026
00:41:42,470 --> 00:41:39,359
and agencies from across the world to

1027
00:41:45,589 --> 00:41:42,480
collaborate on this important mission

1028
00:41:46,550 --> 00:41:45,599
and we're doing this very actively

1029
00:41:48,790 --> 00:41:46,560
and

1030
00:41:50,710 --> 00:41:48,800
in a very successful manner

1031
00:41:53,190 --> 00:41:50,720
we are really uh

1032
00:41:54,309 --> 00:41:53,200
indebted to michael freilick dr michael

1033
00:41:56,950 --> 00:41:54,319
freilich

1034
00:41:59,190 --> 00:41:56,960
this was a important theme that he has

1035
00:42:00,630 --> 00:41:59,200
stressed on all of the people that he

1036
00:42:02,950 --> 00:42:00,640
has been working with for many

1037
00:42:04,950 --> 00:42:02,960
generations i being one of them to have

1038
00:42:06,790 --> 00:42:04,960

been lucky enough to have worked with

1039
00:42:08,309 --> 00:42:06,800
him for many years over these past

1040
00:42:10,390 --> 00:42:08,319
missions

1041
00:42:13,030 --> 00:42:10,400
uh dr frey like we're building this

1042
00:42:15,910 --> 00:42:13,040
satellite in your honor and implementing

1043
00:42:17,829 --> 00:42:15,920
it in that spirit of collaboration and

1044
00:42:20,470 --> 00:42:17,839
we're planning on doing this of course

1045
00:42:23,589 --> 00:42:20,480
on this mission but continuing that for

1046
00:42:25,510 --> 00:42:23,599
future generations of teams working and

1047
00:42:28,069 --> 00:42:25,520
collaborations hopefully

1048
00:42:30,550 --> 00:42:28,079
continuing well into the future

1049
00:42:32,710 --> 00:42:30,560
the satellite mission systems ground

1050
00:42:34,870 --> 00:42:32,720
systems and importantly all of the teams

1051
00:42:37,030 --> 00:42:34,880
across the world are ready we've

1052
00:42:38,230 --> 00:42:37,040
prepared for this launch

1053
00:42:41,750 --> 00:42:38,240
and we're

1054
00:42:43,910 --> 00:42:41,760
anticipating a fantastic launch and

1055
00:42:45,750 --> 00:42:43,920
commissioning of the satellite and start

1056
00:42:48,069 --> 00:42:45,760
of this important mission

1057
00:42:49,990 --> 00:42:48,079
for the next decade

1058
00:42:51,030 --> 00:42:50,000
so now i'll turn this over to my

1059
00:42:53,750 --> 00:42:51,040
colleague

1060
00:43:03,190 --> 00:42:53,760
dr nadja vinogradova schiffer will tell

1061
00:43:08,550 --> 00:43:05,670
thank you barack and i agree with you uh

1062
00:43:11,030 --> 00:43:08,560
what seemed like a technological wonder

1063
00:43:14,150 --> 00:43:11,040

some time ago and now is a

1064
00:43:16,790 --> 00:43:14,160
mainstream instrument in modern physical

1065
00:43:19,270 --> 00:43:16,800
oceanography and climate science

1066
00:43:21,510 --> 00:43:19,280
it enabled hundreds of discoveries and

1067
00:43:23,270 --> 00:43:21,520
i'd just like to touch base on a few of

1068
00:43:25,109 --> 00:43:23,280
them

1069
00:43:27,109 --> 00:43:25,119
we talked a little bit about global mean

1070
00:43:29,190 --> 00:43:27,119
sea level rise and

1071
00:43:30,790 --> 00:43:29,200
when my kids ask me is three millimeter

1072
00:43:31,750 --> 00:43:30,800
a year is a lot

1073
00:43:34,230 --> 00:43:31,760
um

1074
00:43:38,550 --> 00:43:34,240
i told them that that equivalent to

1075
00:43:42,309 --> 00:43:38,560
adding extra 300 trillion gallons of

1076
00:43:44,870 --> 00:43:42,319
water every year and if you put this uh

1077
00:43:48,230 --> 00:43:44,880
water in milk jars that would cover the

1078
00:43:50,790 --> 00:43:48,240
distance from sun to pluto and back

1079
00:43:53,430 --> 00:43:50,800
several times so that's uh that's a lot

1080
00:43:56,470 --> 00:43:53,440
of water that that expanding and

1081
00:43:59,510 --> 00:43:56,480
creeping to our to our land and if you

1082
00:44:02,630 --> 00:43:59,520
can see from uh from my first animation

1083
00:44:05,990 --> 00:44:02,640
altimeters can tell us uh by how much

1084
00:44:07,270 --> 00:44:06,000
and where exactly this rate of sea level

1085
00:44:10,069 --> 00:44:07,280
uh rise

1086
00:44:12,950 --> 00:44:10,079
ears and if you can see that the the red

1087
00:44:16,150 --> 00:44:12,960
spot excuse me shows us the this hot

1088
00:44:18,710 --> 00:44:16,160

spots uh on the globe that is uh

1089
00:44:20,470 --> 00:44:18,720
indicative of where sea level is rising

1090
00:44:23,430 --> 00:44:20,480
faster such as the

1091
00:44:25,829 --> 00:44:23,440
the east coast of the united states

1092
00:44:28,950 --> 00:44:25,839
so what does nasa do with uh with this

1093
00:44:32,870 --> 00:44:28,960
information besides monitoring we have a

1094
00:44:34,390 --> 00:44:32,880
dedicated uh science teams that um

1095
00:44:36,950 --> 00:44:34,400
untangling

1096
00:44:40,230 --> 00:44:36,960
complex physics of sea level sort of

1097
00:44:41,910 --> 00:44:40,240
tease out um physical processes behind

1098
00:44:45,270 --> 00:44:41,920
those rise and then

1099
00:44:48,309 --> 00:44:45,280
use this collective knowledge to improve

1100
00:44:51,190 --> 00:44:48,319
projections over future changes in sea

1101
00:44:53,750 --> 00:44:51,200
level projections that are data-driven

1102
00:44:56,150 --> 00:44:53,760
physics-based

1103
00:44:57,990 --> 00:44:56,160
so what can we do with altimeters

1104
00:45:01,270 --> 00:44:58,000
beyond sea level

1105
00:45:04,309 --> 00:45:01,280
well turns out quite a lot the shape of

1106
00:45:07,510 --> 00:45:04,319
ocean topography is related to and

1107
00:45:09,589 --> 00:45:07,520
impacted by a lot of physical processes

1108
00:45:13,109 --> 00:45:09,599
so we could tell a lot of

1109
00:45:14,870 --> 00:45:13,119
physics behind it uh one of the example

1110
00:45:17,030 --> 00:45:14,880
is of course that was already mentioned

1111
00:45:20,069 --> 00:45:17,040
ocean circulation

1112
00:45:20,870 --> 00:45:20,079
and on my next animation you can see

1113
00:45:24,230 --> 00:45:20,880

that

1114
00:45:25,190 --> 00:45:24,240
uh ocean is a constantly moving feature

1115
00:45:27,589 --> 00:45:25,200
and

1116
00:45:30,470 --> 00:45:27,599
a satellite altimetry record could be

1117
00:45:32,550 --> 00:45:30,480
directly related to the

1118
00:45:33,270 --> 00:45:32,560
velocity of the

1119
00:45:38,550 --> 00:45:33,280
of

1120
00:45:41,349 --> 00:45:38,560
moving water as you can see uh

1121
00:45:43,109 --> 00:45:41,359
transports enormous amount of properties

1122
00:45:45,430 --> 00:45:43,119
such as heat

1123
00:45:46,710 --> 00:45:45,440
momentum salt

1124
00:45:51,750 --> 00:45:46,720
carbon

1125
00:45:57,510 --> 00:45:54,630
altimeter data is our key informational

1126
00:45:59,190 --> 00:45:57,520
constraint in climate models and ocean

1127
00:46:00,630 --> 00:45:59,200
state estimates

1128
00:46:03,750 --> 00:46:00,640
as well as

1129
00:46:08,630 --> 00:46:03,760
operational forecasts including weather

1130
00:46:14,390 --> 00:46:10,870
in in the next graphic you can see an

1131
00:46:17,109 --> 00:46:14,400
example of what the surface

1132
00:46:19,109 --> 00:46:17,119
sea surface height looks like

1133
00:46:20,790 --> 00:46:19,119
other than than trends and you can

1134
00:46:23,109 --> 00:46:20,800
notice those uh

1135
00:46:25,190 --> 00:46:23,119
hills and valleys or

1136
00:46:27,910 --> 00:46:25,200
higher and lower sea levels that that

1137
00:46:29,990 --> 00:46:27,920
tells you exactly what's happening

1138
00:46:33,190 --> 00:46:30,000

inside the water column in fact

1139
00:46:35,750 --> 00:46:33,200
altimetry is our only ocean surface

1140
00:46:37,990 --> 00:46:35,760
measurements that we make that we can

1141
00:46:41,190 --> 00:46:38,000
connect to the physics of the whole

1142
00:46:43,750 --> 00:46:41,200
water column and which is key in

1143
00:46:45,910 --> 00:46:43,760
predicting hurricane intensity but going

1144
00:46:47,829 --> 00:46:45,920
beyond

1145
00:46:50,630 --> 00:46:47,839
extreme events like hurricane we can

1146
00:46:53,270 --> 00:46:50,640
also looked at uh internal variations

1147
00:46:55,510 --> 00:46:53,280
such as el nino and beyond as we're

1148
00:46:57,990 --> 00:46:55,520
extending our altimetry records into

1149
00:46:59,829 --> 00:46:58,000
their fourth decade we could look at the

1150
00:47:01,990 --> 00:46:59,839
climate mode of variability on a

1151
00:47:04,710 --> 00:47:02,000
spectrum of frequencies

1152
00:47:06,790 --> 00:47:04,720
uh finally my final example that i that

1153
00:47:09,510 --> 00:47:06,800
i'd like to mention today is how

1154
00:47:11,990 --> 00:47:09,520
altimetry completely revolutionized the

1155
00:47:13,670 --> 00:47:12,000
way we looked at tides

1156
00:47:15,750 --> 00:47:13,680
essentially

1157
00:47:18,550 --> 00:47:15,760
altimetry solved our multi-century

1158
00:47:20,630 --> 00:47:18,560
problem of surface barotropic

1159
00:47:23,750 --> 00:47:20,640
fast-moving tides but what was really

1160
00:47:26,230 --> 00:47:23,760
surprising and is the recognition and

1161
00:47:28,950 --> 00:47:26,240
detection of the

1162
00:47:31,430 --> 00:47:28,960
internal tides when the surface tides

1163
00:47:33,109 --> 00:47:31,440

encounter a bottom topography or sloshes

1164
00:47:35,349 --> 00:47:33,119
over a mountain

1165
00:47:37,430 --> 00:47:35,359
it creates the internal fluctuations

1166
00:47:39,990 --> 00:47:37,440
that could be high in range hundreds of

1167
00:47:42,390 --> 00:47:40,000
meters and only few centimeters at the

1168
00:47:44,470 --> 00:47:42,400
surface and as barak said with our

1169
00:47:46,950 --> 00:47:44,480
highly accurate measurements we can

1170
00:47:49,190 --> 00:47:46,960
detect those internal fluctuations from

1171
00:47:50,870 --> 00:47:49,200
the surface and those internal waves

1172
00:47:53,510 --> 00:47:50,880
travel for

1173
00:47:55,829 --> 00:47:53,520
thousands of kilometers and

1174
00:47:57,109 --> 00:47:55,839
transport a large amount of energy they

1175
00:47:59,910 --> 00:47:57,119
connect

1176
00:48:01,670 --> 00:47:59,920
us to a history of lunar orbits but also

1177
00:48:03,990 --> 00:48:01,680
tell us about the earth climate and

1178
00:48:06,309 --> 00:48:04,000
energy dissipation and this is an

1179
00:48:09,270 --> 00:48:06,319
ongoing and active area of research that

1180
00:48:12,870 --> 00:48:09,280
sentinel 6 data would help us to uncover

1181
00:48:15,910 --> 00:48:12,880
more as well as problems to solve with

1182
00:48:17,910 --> 00:48:15,920
the future next generation nasa ultimate

1183
00:48:19,349 --> 00:48:17,920
remission like swot so i'm going to

1184
00:48:22,710 --> 00:48:19,359
leave you with a little teaser here

1185
00:48:29,589 --> 00:48:22,720
today and turn to our next speaker tim

1186
00:48:32,710 --> 00:48:31,270
thank you nadia

1187
00:48:35,750 --> 00:48:32,720
good morning from the kennedy space

1188
00:48:38,630 --> 00:48:35,760

center my name is tim dunn and i am very

1189
00:48:41,270 --> 00:48:38,640
proud to be the launch director for the

1190
00:48:43,670 --> 00:48:41,280
sentinel 6 michael freilick mission

1191
00:48:46,069 --> 00:48:43,680
and i'm even more honored to represent

1192
00:48:47,589 --> 00:48:46,079
the men and women of launch services

1193
00:48:48,710 --> 00:48:47,599
program

1194
00:48:51,829 --> 00:48:48,720
lsp

1195
00:48:54,549 --> 00:48:51,839
is nasa's program that acquires the

1196
00:48:55,349 --> 00:48:54,559
launch services or the rockets

1197
00:48:58,549 --> 00:48:55,359
for

1198
00:49:01,349 --> 00:48:58,559
many of our agencies most critical

1199
00:49:07,030 --> 00:49:04,390
so lsp has a legacy

1200
00:49:09,589 --> 00:49:07,040
with the json series of these ocean

1201
00:49:11,829 --> 00:49:09,599
topographic satellites

1202
00:49:14,470 --> 00:49:11,839
all the way back in 2001

1203
00:49:17,030 --> 00:49:14,480
we were proud to acquire a delta ii to

1204
00:49:19,990 --> 00:49:17,040
launch that spacecraft

1205
00:49:21,670 --> 00:49:20,000
and about seven years later for the ostm

1206
00:49:22,950 --> 00:49:21,680
mission which became the jason ii

1207
00:49:25,750 --> 00:49:22,960
spacecraft

1208
00:49:26,710 --> 00:49:25,760
and then just four and a half years ago

1209
00:49:28,390 --> 00:49:26,720
i was

1210
00:49:31,589 --> 00:49:28,400
really thrilled to get to work with my

1211
00:49:32,309 --> 00:49:31,599
friend parag faze from jpl and launched

1212
00:49:36,150 --> 00:49:32,319
the

1213
00:49:37,670 --> 00:49:36,160

jason-3 spacecraft on a falcon 9 rocket

1214
00:49:39,430 --> 00:49:37,680
all three of those missions launched

1215
00:49:40,390 --> 00:49:39,440
from vandenberg

1216
00:49:42,309 --> 00:49:40,400
and so

1217
00:49:43,990 --> 00:49:42,319
our program

1218
00:49:47,190 --> 00:49:44,000
is based here at kennedy space center

1219
00:49:49,109 --> 00:49:47,200
and we were proud to execute a launch

1220
00:49:51,430 --> 00:49:49,119
campaign just this past summer in the

1221
00:49:54,470 --> 00:49:51,440
midst of this pandemic that we're in

1222
00:49:56,069 --> 00:49:54,480
with the mars 2020 campaign

1223
00:49:59,829 --> 00:49:56,079
had a successful launch at the end of

1224
00:50:02,309 --> 00:49:59,839
july and now we in lsp get to take our

1225
00:50:04,630 --> 00:50:02,319
talents on the road and head west to

1226
00:50:07,030 --> 00:50:04,640
vandenberg air force base

1227
00:50:09,750 --> 00:50:07,040
while still in this socially distanced

1228
00:50:11,990 --> 00:50:09,760
environment of pandemic go launch a

1229
00:50:14,630 --> 00:50:12,000
beautiful rocket with an amazing

1230
00:50:16,309 --> 00:50:14,640
spacecraft from the central california

1231
00:50:20,710 --> 00:50:16,319
coast

1232
00:50:23,109 --> 00:50:20,720
so here we are 25 days from launch

1233
00:50:25,349 --> 00:50:23,119
things are going incredibly well in the

1234
00:50:28,470 --> 00:50:25,359
launch campaign

1235
00:50:30,710 --> 00:50:28,480
all of the launch vehicle hardware

1236
00:50:32,870 --> 00:50:30,720
for the falcon 9 rocket

1237
00:50:35,190 --> 00:50:32,880
is at vandenberg

1238
00:50:38,150 --> 00:50:35,200

it's at slick four

1239
00:50:41,349 --> 00:50:38,160
slick stands for space launch complex

1240
00:50:43,829 --> 00:50:41,359
or the launch pad so we're right there

1241
00:50:45,589 --> 00:50:43,839
on vandenberg air force base

1242
00:50:48,390 --> 00:50:45,599
and all of the hardware is being

1243
00:50:50,150 --> 00:50:48,400
processed in a pre-launch manner by

1244
00:50:55,750 --> 00:50:50,160
spacex

1245
00:50:56,870 --> 00:50:55,760
company they bring together incredible

1246
00:50:58,950 --> 00:50:56,880
talent

1247
00:51:01,910 --> 00:50:58,960
to our industry

1248
00:51:04,549 --> 00:51:01,920
and we are just so fortunate to be able

1249
00:51:06,630 --> 00:51:04,559
to get a ride with them on a falcon 9

1250
00:51:08,470 --> 00:51:06,640
rocket

1251
00:51:11,349 --> 00:51:08,480
so there in the hangar

1252
00:51:13,750 --> 00:51:11,359
at slick 4 at vandenberg

1253
00:51:15,990 --> 00:51:13,760
not only is the

1254
00:51:17,990 --> 00:51:16,000
rocket present and undergoing pre-launch

1255
00:51:20,069 --> 00:51:18,000
processing but on the other end of the

1256
00:51:22,390 --> 00:51:20,079
hangar in the payload processing

1257
00:51:24,950 --> 00:51:22,400
facility the ppf

1258
00:51:27,430 --> 00:51:24,960
is that precious cargo that the falcon 9

1259
00:51:29,910 --> 00:51:27,440
will launch the jason

1260
00:51:31,270 --> 00:51:29,920
the jason-3 spacecraft

1261
00:51:33,109 --> 00:51:31,280
the sentinel

1262
00:51:34,710 --> 00:51:33,119
6.

1263
00:51:36,630 --> 00:51:34,720

so

1264
00:51:40,790 --> 00:51:36,640
all is going really well

1265
00:51:42,630 --> 00:51:40,800
uh our team has begun to deploy the core

1266
00:51:44,790 --> 00:51:42,640
portion of our team is going to deploy

1267
00:51:45,910 --> 00:51:44,800
out to vandenberg within the next two

1268
00:51:48,150 --> 00:51:45,920
weeks

1269
00:51:49,910 --> 00:51:48,160
we're going to all assemble there at

1270
00:51:52,150 --> 00:51:49,920
vandenberg we're going to have a series

1271
00:51:54,790 --> 00:51:52,160
of reviews we're going to practice

1272
00:51:57,109 --> 00:51:54,800
countdown leading up to launch

1273
00:51:58,549 --> 00:51:57,119
and it's going to culminate in an

1274
00:52:01,270 --> 00:51:58,559
incredible

1275
00:52:04,790 --> 00:52:01,280
event on the 10th of november and i want

1276
00:52:06,790 --> 00:52:04,800
to stress that our team remains on track

1277
00:52:09,190 --> 00:52:06,800
all of the hardware processing for both

1278
00:52:11,829 --> 00:52:09,200
the spacecraft and the rocket is on

1279
00:52:15,990 --> 00:52:11,839
track to support that 10 november launch

1280
00:52:17,990 --> 00:52:16,000
date at about 11 30 a.m pacific daylight

1281
00:52:20,470 --> 00:52:18,000
pacific standard time excuse me because

1282
00:52:21,910 --> 00:52:20,480
we're going to transition our times

1283
00:52:25,270 --> 00:52:21,920
we're going to have a beautiful launch

1284
00:52:26,790 --> 00:52:25,280
from the central california coast

1285
00:52:29,589 --> 00:52:26,800
and that's all i have i'd like to turn

1286
00:52:32,069 --> 00:52:29,599
it back to marina

1287
00:52:34,710 --> 00:52:32,079
thank you so much tim we are all in

1288
00:52:37,510 --> 00:52:34,720

eager anticipation as you can see for

1289
00:52:39,829 --> 00:52:37,520
that november 10th launch across the

1290
00:52:41,990 --> 00:52:39,839
globe we are now ready to take media

1291
00:52:44,150 --> 00:52:42,000
questions remember to press star one to

1292
00:52:46,470 --> 00:52:44,160
get put in the queue and please direct

1293
00:52:48,950 --> 00:52:46,480
your questions to one of the panelists

1294
00:52:51,670 --> 00:52:48,960
we're also taking questions through the

1295
00:52:54,150 --> 00:52:51,680
seeing the seas hashtag and remember to

1296
00:52:56,950 --> 00:52:54,160
be patient we do have a little bit of

1297
00:53:00,390 --> 00:52:56,960
delay with our european partners so our

1298
00:53:12,829 --> 00:53:00,400
first question comes from john amos

1299
00:53:18,390 --> 00:53:15,910
john john are you with us john amos from

1300
00:53:19,910 --> 00:53:18,400
bbc yeah i i hope you can uh you can

1301
00:53:22,710 --> 00:53:19,920
hear us here in london

1302
00:53:25,109 --> 00:53:22,720
and my question is for nadia

1303
00:53:27,430 --> 00:53:25,119
um i've heard it said that arsenal 6

1304
00:53:30,309 --> 00:53:27,440
will bring such precision

1305
00:53:32,950 --> 00:53:30,319
to measurement that it will be able to

1306
00:53:35,270 --> 00:53:32,960
see some of the most subtle effects of

1307
00:53:37,510 --> 00:53:35,280
the increase of greenhouse gases

1308
00:53:39,750 --> 00:53:37,520
on the atmosphere i'm thinking the way

1309
00:53:42,309 --> 00:53:39,760
that it affects trade winds and

1310
00:53:50,950 --> 00:53:42,319
obviously that then has an effect on sea

1311
00:53:54,870 --> 00:53:53,270
yes uh thank you for your question uh

1312
00:53:59,109 --> 00:53:54,880
there there was a

1313
00:54:01,910 --> 00:53:59,119

sentinel 6 continues the legacy of

1314
00:54:04,230 --> 00:54:01,920
high precision measurements and in

1315
00:54:06,870 --> 00:54:04,240
addition uh this

1316
00:54:09,430 --> 00:54:06,880
this way around there were additional

1317
00:54:10,870 --> 00:54:09,440
improvement to the accuracy of the sea

1318
00:54:12,069 --> 00:54:10,880
level measurements

1319
00:54:13,510 --> 00:54:12,079
including

1320
00:54:16,390 --> 00:54:13,520
the

1321
00:54:17,190 --> 00:54:16,400
limiting calibration drift

1322
00:54:19,270 --> 00:54:17,200
to

1323
00:54:22,470 --> 00:54:19,280
keep it under one millimeter per year

1324
00:54:24,630 --> 00:54:22,480
level that would truly allow you to

1325
00:54:27,510 --> 00:54:24,640
distinguish even the slightest

1326
00:54:30,790 --> 00:54:27,520
millimeters to sub millimeter signal in

1327
00:54:33,109 --> 00:54:30,800
the data such as sea level trends and uh

1328
00:54:36,309 --> 00:54:33,119
and acceleration emerging acceleration

1329
00:54:39,829 --> 00:54:36,319
that we talked about it today

1330
00:54:43,910 --> 00:54:39,839
thank you nadia next is elizabeth howell

1331
00:54:45,109 --> 00:54:43,920
of space.com good morning elizabeth

1332
00:54:47,589 --> 00:54:45,119
good morning thanks for your time

1333
00:54:48,710 --> 00:54:47,599
everybody um so you've already hinted at

1334
00:54:49,670 --> 00:54:48,720
some of the

1335
00:54:51,750 --> 00:54:49,680
um

1336
00:54:53,670 --> 00:54:51,760
the distinguishing features of sentinel

1337
00:54:55,670 --> 00:54:53,680
6 this is probably more for paragraph

1338
00:54:56,950 --> 00:54:55,680

nadia in terms of the size that it can

1339
00:54:58,789 --> 00:54:56,960
perform you were talking about

1340
00:55:00,789 --> 00:54:58,799
measurements at the coast you were

1341
00:55:02,870 --> 00:55:00,799
talking about looking at

1342
00:55:03,910 --> 00:55:02,880
the underground or underwater sort of

1343
00:55:05,910 --> 00:55:03,920
waves

1344
00:55:07,829 --> 00:55:05,920
what other ways what other kind of new

1345
00:55:09,510 --> 00:55:07,839
signs do you anticipate that sentinel 6

1346
00:55:17,990 --> 00:55:09,520
is going to be bringing

1347
00:55:18,000 --> 00:55:23,270
nadia do you want to take that

1348
00:55:32,230 --> 00:55:24,630
uh

1349
00:55:35,589 --> 00:55:32,240
we are excited to have a longer

1350
00:55:38,789 --> 00:55:35,599
almost years for decades of continuous

1351
00:55:42,710 --> 00:55:38,799
and uninterrupted climate records

1352
00:55:45,910 --> 00:55:42,720
climate is inherently a long

1353
00:55:49,829 --> 00:55:45,920
large scale and long-term processes so

1354
00:55:53,270 --> 00:55:49,839
some events taking a while to unfold

1355
00:55:57,270 --> 00:55:53,280
so having a long and consistent

1356
00:55:59,990 --> 00:55:57,280
climate records is key to our robustness

1357
00:56:02,630 --> 00:56:00,000
of understanding of those processes that

1358
00:56:05,589 --> 00:56:02,640
happen on a longer time scales

1359
00:56:08,710 --> 00:56:05,599
you mentioned improved resolution along

1360
00:56:11,430 --> 00:56:08,720
the coasts and in the open ocean so we

1361
00:56:14,150 --> 00:56:11,440
are excited to see

1362
00:56:17,750 --> 00:56:14,160
how those energetic features such as

1363
00:56:20,549 --> 00:56:17,760

mesoscale 80s that shed of the currents

1364
00:56:22,630 --> 00:56:20,559
evolve and propagate and change our

1365
00:56:24,950 --> 00:56:22,640
circulation and affect our weather and

1366
00:56:27,270 --> 00:56:24,960
climate

1367
00:56:30,710 --> 00:56:27,280
thank you nadia our next question is

1368
00:56:42,230 --> 00:56:30,720
from stephen clark of space flight now

1369
00:56:42,240 --> 00:56:48,230
stephen clark are you with us

1370
00:56:51,910 --> 00:56:49,990
hello can you hear me now yes we can

1371
00:56:53,109 --> 00:56:51,920
hear you

1372
00:56:54,630 --> 00:56:53,119
okay uh

1373
00:56:55,990 --> 00:56:54,640
stephen clark from space flight now my

1374
00:56:59,109 --> 00:56:56,000
question is for

1375
00:57:01,829 --> 00:56:59,119
tim dunn i know nasa is looking at uh a

1376
00:57:04,549 --> 00:57:01,839
gas generator issue on the falcon 9

1377
00:57:06,069 --> 00:57:04,559
as they evaluate uh when the crew 1

1378
00:57:07,430 --> 00:57:06,079
mission can launch a commercial crew

1379
00:57:08,950 --> 00:57:07,440
mission can launch

1380
00:57:11,829 --> 00:57:08,960
your mission is still scheduled for

1381
00:57:13,430 --> 00:57:11,839
sentinel 6 on november 10th right now

1382
00:57:15,109 --> 00:57:13,440
have you studied that issue what have

1383
00:57:18,069 --> 00:57:15,119
you found have you found that it's not

1384
00:57:19,990 --> 00:57:18,079
an issue for this particular vehicle and

1385
00:57:21,910 --> 00:57:20,000
and what can you tell us is sometimes a

1386
00:57:22,950 --> 00:57:21,920
background of what the issue actually is

1387
00:57:27,990 --> 00:57:22,960
that

1388
00:57:30,390 --> 00:57:29,670

thank you stephen

1389
00:57:32,230 --> 00:57:30,400
so

1390
00:57:35,109 --> 00:57:32,240
two weeks ago today

1391
00:57:38,309 --> 00:57:35,119
there was a gps spacecraft on the pad at

1392
00:57:39,589 --> 00:57:38,319
complex 40 here at ksc cape canaveral

1393
00:57:42,309 --> 00:57:39,599
air force station

1394
00:57:44,390 --> 00:57:42,319
and it experienced a launch abort in the

1395
00:57:47,109 --> 00:57:44,400
final seconds prior to launch

1396
00:57:48,950 --> 00:57:47,119
and that was the falcon 9 rocket

1397
00:57:50,870 --> 00:57:48,960
stopping itself from launch when it

1398
00:57:54,069 --> 00:57:50,880
sensed things weren't right during the

1399
00:57:55,430 --> 00:57:54,079
engine startup sequence

1400
00:57:58,309 --> 00:57:55,440
so after

1401
00:58:00,309 --> 00:57:58,319
that anomaly occurred on the pad the gps

1402
00:58:02,870 --> 00:58:00,319
spacecraft is absolutely safe and it

1403
00:58:03,670 --> 00:58:02,880
will launch successfully

1404
00:58:06,150 --> 00:58:03,680
when

1405
00:58:08,789 --> 00:58:06,160
the space force team is ready

1406
00:58:10,390 --> 00:58:08,799
but the joint government community came

1407
00:58:14,630 --> 00:58:10,400
together

1408
00:58:17,750 --> 00:58:14,640
alongside spacex in an investigation

1409
00:58:19,910 --> 00:58:17,760
team to look at that engine

1410
00:58:22,470 --> 00:58:19,920
issue that prevented

1411
00:58:24,390 --> 00:58:22,480
the gps from launching

1412
00:58:27,190 --> 00:58:24,400
two weeks ago

1413
00:58:28,390 --> 00:58:27,200

so that team consists of

1414
00:58:30,309 --> 00:58:28,400
folks from

1415
00:58:32,789 --> 00:58:30,319
the u.s space force

1416
00:58:34,230 --> 00:58:32,799
from our program nasa launch services

1417
00:58:36,950 --> 00:58:34,240
program

1418
00:58:39,190 --> 00:58:36,960
working alongside spacex and their

1419
00:58:42,150 --> 00:58:39,200
engineers from hawthorne and i can tell

1420
00:58:43,430 --> 00:58:42,160
you an incredible amount of data has

1421
00:58:45,270 --> 00:58:43,440
been looked at

1422
00:58:48,549 --> 00:58:45,280
to include

1423
00:58:50,870 --> 00:58:48,559
members from our commercial crew program

1424
00:58:51,910 --> 00:58:50,880
which also has an upcoming falcon 9

1425
00:58:54,470 --> 00:58:51,920
flight

1426
00:58:55,910 --> 00:58:54,480
and so that investigation is ongoing

1427
00:58:57,190 --> 00:58:55,920
there's been a tremendous amount of

1428
00:58:59,190 --> 00:58:57,200
testing

1429
00:59:01,510 --> 00:58:59,200
that has occurred here at the launch

1430
00:59:04,069 --> 00:59:01,520
site on the east coast the engines have

1431
00:59:06,870 --> 00:59:04,079
been taken back to mcgregor texas which

1432
00:59:09,270 --> 00:59:06,880
is where spacex does detailed engine

1433
00:59:11,510 --> 00:59:09,280
testing and reviews those engines have

1434
00:59:14,710 --> 00:59:11,520
been further tested there

1435
00:59:16,789 --> 00:59:14,720
and it's just an amazing team that is

1436
00:59:17,910 --> 00:59:16,799
looking at this issue we've learned a

1437
00:59:19,990 --> 00:59:17,920
lot

1438
00:59:21,829 --> 00:59:20,000

there's going to be some hardware

1439
00:59:23,589 --> 00:59:21,839
implications as we move forward

1440
00:59:26,870 --> 00:59:23,599
depending on

1441
00:59:29,510 --> 00:59:26,880
the engines installed on various rockets

1442
00:59:32,870 --> 00:59:29,520
the gps mission obviously is affected

1443
00:59:35,109 --> 00:59:32,880
the nasa crew one mission is affected

1444
00:59:36,789 --> 00:59:35,119
we on sentinel 6

1445
00:59:39,750 --> 00:59:36,799
we are looking at the engines that are

1446
00:59:41,829 --> 00:59:39,760
on our first stage falcon 9.

1447
00:59:42,950 --> 00:59:41,839
we are going to work through what we

1448
00:59:44,710 --> 00:59:42,960
need to do

1449
00:59:47,589 --> 00:59:44,720
but as of today

1450
00:59:48,390 --> 00:59:47,599
we have a path forward that allows us to

1451
00:59:50,870 --> 00:59:48,400
do

1452
00:59:53,910 --> 00:59:50,880
whatever necessary rework may be

1453
00:59:55,990 --> 00:59:53,920
required and still maintain that 10

1454
00:59:58,309 --> 00:59:56,000
november launch date

1455
01:00:00,549 --> 00:59:58,319
so while it's it's a it's an issue

1456
01:00:03,670 --> 01:00:00,559
that's being addressed by multiple

1457
01:00:06,870 --> 01:00:03,680
agencies multiple customers spacex has

1458
01:00:09,589 --> 01:00:06,880
been incredible in working this anomaly

1459
01:00:12,230 --> 01:00:09,599
and bringing all of us in together

1460
01:00:14,710 --> 01:00:12,240
and so we are looking forward to that

1461
01:00:17,750 --> 01:00:14,720
clear path that gets us to 10 november

1462
01:00:21,589 --> 01:00:19,910
thank you so much for that tim now we're

1463
01:00:24,309 --> 01:00:21,599

going to turn to some social media

1464
01:00:27,589 --> 01:00:24,319
questions using using the hashtag seeing

1465
01:00:30,789 --> 01:00:27,599
the seas frank on facebook asks where

1466
01:00:34,390 --> 01:00:30,799
have the oceans actually risen and by

1467
01:00:34,400 --> 01:00:38,789
nadia would you like to take that

1468
01:00:42,309 --> 01:00:39,990
uh

1469
01:00:44,630 --> 01:00:42,319
yes you've seen on one of my animations

1470
01:00:48,309 --> 01:00:44,640
this rotating globe uh that's showing

1471
01:00:51,030 --> 01:00:48,319
you exactly how much and where uh the

1472
01:00:54,230 --> 01:00:51,040
sea level is rising over the past three

1473
01:00:56,230 --> 01:00:54,240
decades uh the the graphic shows that

1474
01:00:59,190 --> 01:00:56,240
there is a lot of yellow and red regions

1475
01:01:01,670 --> 01:00:59,200
as you remember uh showing you that uh

1476
01:01:04,470 --> 01:01:01,680
the sea level is is rising almost all

1477
01:01:07,349 --> 01:01:04,480
over the global oceans and

1478
01:01:10,390 --> 01:01:07,359
i mentioned the hot spots where

1479
01:01:11,750 --> 01:01:10,400
unfortunately along the u.s u.s eastern

1480
01:01:14,309 --> 01:01:11,760
coast

1481
01:01:16,950 --> 01:01:14,319
where the sea level is rising three to

1482
01:01:19,990 --> 01:01:16,960
four times larger than the global mean

1483
01:01:22,470 --> 01:01:20,000
average uh similar hot spots we see in

1484
01:01:23,910 --> 01:01:22,480
the in the pacific oceans and indian

1485
01:01:25,670 --> 01:01:23,920
oceans

1486
01:01:28,069 --> 01:01:25,680
so that's um

1487
01:01:31,270 --> 01:01:28,079
that's that's the picture today and with

1488
01:01:33,670 --> 01:01:31,280

uh with sentinel 6 we would uh fine-tune

1489
01:01:34,710 --> 01:01:33,680
those numbers and potentially tapping

1490
01:01:37,349 --> 01:01:34,720
into

1491
01:01:39,670 --> 01:01:37,359
emerging acceleration second derivative

1492
01:01:41,109 --> 01:01:39,680
if you will

1493
01:01:44,549 --> 01:01:41,119
thank you nadia

1494
01:01:47,670 --> 01:01:44,559
philippe on twitter comments it's the

1495
01:01:53,270 --> 01:01:47,680
little house in space why is the

1496
01:01:59,349 --> 01:01:55,510
so i i can maybe comment on that a

1497
01:02:02,230 --> 01:01:59,359
little bit so um you know as uh as we've

1498
01:02:04,630 --> 01:02:02,240
been discussing about uh the series of

1499
01:02:06,630 --> 01:02:04,640
missions um we always have a challenge

1500
01:02:08,390 --> 01:02:06,640
to

1501
01:02:10,390 --> 01:02:08,400
continue the measurement and do it very

1502
01:02:12,789 --> 01:02:10,400
very precisely and so we have a

1503
01:02:15,190 --> 01:02:12,799
combination of using

1504
01:02:17,510 --> 01:02:15,200
heritage technologies and things that

1505
01:02:20,309 --> 01:02:17,520
are tried and true and then augmenting

1506
01:02:22,230 --> 01:02:20,319
those with enhancements as we go through

1507
01:02:24,789 --> 01:02:22,240
going forward but uh

1508
01:02:28,390 --> 01:02:24,799
you know the isa program uh really

1509
01:02:31,589 --> 01:02:28,400
selected a a very robust uh satellite

1510
01:02:34,630 --> 01:02:31,599
platform uh built by airbus uh it's a

1511
01:02:36,710 --> 01:02:34,640
tried and true uh architecture with a

1512
01:02:38,390 --> 01:02:36,720
lot of heritage from the prior missions

1513
01:02:40,950 --> 01:02:38,400

like cryosat

1514
01:02:43,510 --> 01:02:40,960
so this particular

1515
01:02:46,230 --> 01:02:43,520
structure and and form factor that you

1516
01:02:49,990 --> 01:02:46,240
see is is built on a lot of heritage uh

1517
01:02:53,750 --> 01:02:50,000
that is an airbus have utilized in prior

1518
01:02:57,510 --> 01:02:53,760
missions um of course very much tuned uh

1519
01:03:00,390 --> 01:02:57,520
for our particular uh mission uh needing

1520
01:03:02,549 --> 01:03:00,400
lots of stability uh accuracy and

1521
01:03:04,630 --> 01:03:02,559
pointing control so you see the

1522
01:03:06,549 --> 01:03:04,640
structure on the outside if you go back

1523
01:03:07,589 --> 01:03:06,559
to other satellites like

1524
01:03:09,829 --> 01:03:07,599
grace

1525
01:03:12,150 --> 01:03:09,839
which was one of the nasa programs or or

1526
01:03:15,349 --> 01:03:12,160
cryosat you'll see a lot of similarity

1527
01:03:17,829 --> 01:03:15,359
but uh really what what you don't see is

1528
01:03:19,430 --> 01:03:17,839
what's really embedded uh in all of the

1529
01:03:22,950 --> 01:03:19,440
the satellite with

1530
01:03:25,270 --> 01:03:22,960
the technology that's specifically for

1531
01:03:27,270 --> 01:03:25,280
this particular application

1532
01:03:29,430 --> 01:03:27,280
but that's where that particular

1533
01:03:31,990 --> 01:03:29,440
architecture comes from and uh we're

1534
01:03:35,829 --> 01:03:32,000
really proud to be able to build on on

1535
01:03:37,270 --> 01:03:35,839
the successes of these prior missions

1536
01:03:39,990 --> 01:03:37,280
thank you prague

1537
01:03:46,230 --> 01:03:40,000
sky phoenix on youtube asks what does it

1538
01:03:50,390 --> 01:03:47,670

dr z would you like to take that

1539
01:03:56,069 --> 01:03:50,400
question for nasa and possibly we could

1540
01:04:01,430 --> 01:03:57,589
that's a great idea i'm happy to talk

1541
01:04:03,670 --> 01:04:01,440
about this uh we have a series of very

1542
01:04:06,470 --> 01:04:03,680
talented individuals that work at nasa

1543
01:04:08,390 --> 01:04:06,480
and very diverse many people from many

1544
01:04:10,950 --> 01:04:08,400
different backgrounds different accents

1545
01:04:13,270 --> 01:04:10,960
different parts and i really what we're

1546
01:04:15,670 --> 01:04:13,280
looking for are people who are just like

1547
01:04:18,549 --> 01:04:15,680
us very committed to

1548
01:04:20,470 --> 01:04:18,559
working on these important projects uh

1549
01:04:22,069 --> 01:04:20,480
frankly this is not for everyone you

1550
01:04:24,309 --> 01:04:22,079
have to really look at yourself in the

1551
01:04:26,710 --> 01:04:24,319
following sense it takes patience and it

1552
01:04:28,230 --> 01:04:26,720
takes a lot of teamwork i don't think

1553
01:04:29,029 --> 01:04:28,240
that's really important to know even

1554
01:04:30,950 --> 01:04:29,039
though

1555
01:04:32,630 --> 01:04:30,960
the amazing engineers and scientists

1556
01:04:34,390 --> 01:04:32,640
that are here on there they we all

1557
01:04:37,270 --> 01:04:34,400
recognize that the only way we can do a

1558
01:04:39,510 --> 01:04:37,280
project like this together is as an

1559
01:04:42,069 --> 01:04:39,520
integrated team that brings together all

1560
01:04:43,109 --> 01:04:42,079
these different perspectives we're

1561
01:04:46,390 --> 01:04:43,119
looking at

1562
01:04:48,470 --> 01:04:46,400
most of our employees at nasa have stem

1563
01:04:50,789 --> 01:04:48,480

degrees as they say you know science

1564
01:04:53,349 --> 01:04:50,799
technology engineering and mathematics

1565
01:04:55,829 --> 01:04:53,359
but make no mistake we have

1566
01:04:57,670 --> 01:04:55,839
individuals with many different uh

1567
01:05:00,309 --> 01:04:57,680
degrees for example some of the artwork

1568
01:05:03,109 --> 01:05:00,319
here was done by artists uh some of the

1569
01:05:05,190 --> 01:05:03,119
writing was done by english majors and

1570
01:05:07,829 --> 01:05:05,200
so forth and so forth so what does it

1571
01:05:10,309 --> 01:05:07,839
take to work on as a real desire to do

1572
01:05:12,549 --> 01:05:10,319
so and the dedication to want to work

1573
01:05:14,390 --> 01:05:12,559
with teams that really do amazing things

1574
01:05:22,789 --> 01:05:14,400
but i'm interested how you would answer

1575
01:05:27,029 --> 01:05:25,190
no thanks uh thomas sir i think you have

1576
01:05:29,910 --> 01:05:27,039
said it all so there's not much to add

1577
01:05:32,150 --> 01:05:29,920
because uh nasa and issa are working in

1578
01:05:34,309 --> 01:05:32,160
a very in a very similar fashion and we

1579
01:05:36,789 --> 01:05:34,319
have very similar talents i think you

1580
01:05:39,270 --> 01:05:36,799
really need uh talented people uh we

1581
01:05:41,589 --> 01:05:39,280
have uh the luxury of having a good

1582
01:05:43,829 --> 01:05:41,599
selection of uh being able to to take

1583
01:05:47,029 --> 01:05:43,839
some of the best engineers which we we

1584
01:05:49,510 --> 01:05:47,039
have in europe uh esa has as you might

1585
01:05:51,829 --> 01:05:49,520
know 22 member states and we are having

1586
01:05:54,470 --> 01:05:51,839
most of our people from these 22 member

1587
01:05:57,349 --> 01:05:54,480
states so you need talent uh you need a

1588
01:05:59,589 --> 01:05:57,359

lot of dedication a bit of craziness uh

1589
01:06:01,349 --> 01:05:59,599
because there are things that

1590
01:06:03,430 --> 01:06:01,359
we are doing are not always in the norm

1591
01:06:06,150 --> 01:06:03,440
but a bit outside the box i think you

1592
01:06:08,150 --> 01:06:06,160
have to be ready to do that and go a bit

1593
01:06:10,390 --> 01:06:08,160
beyond what uh normally you would be

1594
01:06:11,270 --> 01:06:10,400
doing as an engineer

1595
01:06:13,589 --> 01:06:11,280
and

1596
01:06:15,270 --> 01:06:13,599
a bit of luck i should say because

1597
01:06:17,109 --> 01:06:15,280
there's always opportunities coming up

1598
01:06:19,430 --> 01:06:17,119
but they don't come every day and you

1599
01:06:21,910 --> 01:06:19,440
need to be as always on the right place

1600
01:06:23,430 --> 01:06:21,920
at the right time so but uh is nasa in

1601
01:06:25,270 --> 01:06:23,440
this sense we are really like brothers

1602
01:06:27,430 --> 01:06:25,280
and sisters and we have a very similar

1603
01:06:31,349 --> 01:06:27,440
workforce which i think is is quite

1604
01:06:36,230 --> 01:06:33,910
thank you thomas and joseph for that we

1605
01:06:38,069 --> 01:06:36,240
have stephen clark now up from space

1606
01:06:43,990 --> 01:06:38,079
flight now with a follow-up question

1607
01:06:47,349 --> 01:06:45,670
thank you for taking another question i

1608
01:06:49,589 --> 01:06:47,359
was wondering if the

1609
01:06:51,750 --> 01:06:49,599
uh various partners can discuss their

1610
01:06:53,910 --> 01:06:51,760
financial contributions to

1611
01:06:55,349 --> 01:06:53,920
this particular mission uh sentinel 6

1612
01:06:56,390 --> 01:06:55,359
michael freilik

1613
01:06:58,390 --> 01:06:56,400

and

1614
01:07:07,670 --> 01:06:58,400
a total cost for the mission if possible

1615
01:07:12,870 --> 01:07:10,789
or nasa i'm going to start

1616
01:07:14,630 --> 01:07:12,880
it's kind of the investment for both of

1617
01:07:16,309 --> 01:07:14,640
those spacecraft is of the order a half

1618
01:07:18,870 --> 01:07:16,319
a billion dollars

1619
01:07:26,870 --> 01:07:18,880
i'm going to turn it over to uh to esa

1620
01:07:32,390 --> 01:07:29,430
yeah no in fact in the european side

1621
01:07:34,309 --> 01:07:32,400
it's exactly the same size in euros uh

1622
01:07:37,190 --> 01:07:34,319
so we have the same investment on the

1623
01:07:39,510 --> 01:07:37,200
european side in europe we have three

1624
01:07:41,349 --> 01:07:39,520
main funding partners uh the european

1625
01:07:43,349 --> 01:07:41,359
commission the european space agency and

1626
01:07:45,829 --> 01:07:43,359
um in different shares they're not

1627
01:07:47,270 --> 01:07:45,839
exactly the same amounts but these three

1628
01:07:49,829 --> 01:07:47,280
organizations have contributed on the

1629
01:07:51,109 --> 01:07:49,839
european side but i really i'm very

1630
01:07:53,510 --> 01:07:51,119
happy to say that

1631
01:07:55,349 --> 01:07:53,520
the u.s contribution is of the same size

1632
01:07:57,589 --> 01:07:55,359
as the european contribution

1633
01:07:59,829 --> 01:07:57,599
and in fact the naming of the satellite

1634
01:08:01,910 --> 01:07:59,839
is also a good balance and i think that

1635
01:08:03,589 --> 01:08:01,920
shows that we we are well aligned and we

1636
01:08:06,150 --> 01:08:03,599
work well together in a very true

1637
01:08:10,230 --> 01:08:08,069
thank you again to thomas and joseph

1638
01:08:12,069 --> 01:08:10,240

we're going to go back to social media

1639
01:08:15,270 --> 01:08:12,079
questions right now

1640
01:08:17,990 --> 01:08:15,280
emerson on facebook asks what is the

1641
01:08:22,390 --> 01:08:18,000
level of measurement accuracy of the

1642
01:08:28,390 --> 01:08:25,030
so i could start and maybe nadia can can

1643
01:08:29,349 --> 01:08:28,400
compliment uh for that so uh first of

1644
01:08:31,430 --> 01:08:29,359
all um

1645
01:08:33,990 --> 01:08:31,440
you know as i mentioned before uh you

1646
01:08:37,510 --> 01:08:34,000
know we have a job to to do two things

1647
01:08:38,870 --> 01:08:37,520
is one is guarantee continuity uh so our

1648
01:08:41,749 --> 01:08:38,880
overall

1649
01:08:44,309 --> 01:08:41,759
measurement objectives are built upon

1650
01:08:47,030 --> 01:08:44,319
the prior json series missions but

1651
01:08:49,430 --> 01:08:47,040
it's not just to take the same uh

1652
01:08:52,630 --> 01:08:49,440
requirements that we've been building on

1653
01:08:54,630 --> 01:08:52,640
but our existing satellites like jason

1654
01:08:57,510 --> 01:08:54,640
one two and three actually have

1655
01:09:00,470 --> 01:08:57,520
outperformed uh their requirements in

1656
01:09:03,430 --> 01:09:00,480
flight so we're actually uh benefiting

1657
01:09:06,630 --> 01:09:03,440
from their in-flight uh performances and

1658
01:09:09,829 --> 01:09:06,640
so on sentinel six we we've basically uh

1659
01:09:12,070 --> 01:09:09,839
reset the the requirements to be uh more

1660
01:09:14,789 --> 01:09:12,080
in line with what we're actually seeing

1661
01:09:16,950 --> 01:09:14,799
in flight from the prior missions

1662
01:09:18,789 --> 01:09:16,960
the numbers don't change dramatically

1663
01:09:22,309 --> 01:09:18,799

because we're really talking about small

1664
01:09:23,910 --> 01:09:22,319
numbers so if we're talking about uh 3.4

1665
01:09:25,590 --> 01:09:23,920
centimeters we might be going down to

1666
01:09:27,829 --> 01:09:25,600
three centimeters

1667
01:09:30,149 --> 01:09:27,839
but that is critical as as nadia

1668
01:09:32,789 --> 01:09:30,159
mentioned when you're looking at really

1669
01:09:35,269 --> 01:09:32,799
small features in small scales we're

1670
01:09:37,189 --> 01:09:35,279
doing that with the altimeter with

1671
01:09:39,749 --> 01:09:37,199
improved accuracies

1672
01:09:41,349 --> 01:09:39,759
we're doing that with uh

1673
01:09:44,630 --> 01:09:41,359
and extending it

1674
01:09:46,870 --> 01:09:44,640
with higher resolutions in faster data

1675
01:09:49,910 --> 01:09:46,880
turnarounds also this is an operational

1676
01:09:52,709 --> 01:09:49,920
mission as has been said before so

1677
01:09:55,430 --> 01:09:52,719
getting all of that data accurate data

1678
01:09:57,189 --> 01:09:55,440
down to the ground processed and turned

1679
01:09:58,950 --> 01:09:57,199
around to the community within three

1680
01:10:01,910 --> 01:09:58,960
hours and doing that

1681
01:10:03,350 --> 01:10:01,920
basically 99 of the time 24 hours a day

1682
01:10:06,390 --> 01:10:03,360
seven days a week

1683
01:10:08,470 --> 01:10:06,400
is part of that enhancement we're also

1684
01:10:09,669 --> 01:10:08,480
trying it particularly on on the nasa

1685
01:10:12,470 --> 01:10:09,679
instrument

1686
01:10:13,270 --> 01:10:12,480
to improve the stability

1687
01:10:14,950 --> 01:10:13,280
so

1688
01:10:16,870 --> 01:10:14,960

having this

1689
01:10:20,149 --> 01:10:16,880
augmentation where we can guarantee

1690
01:10:22,550 --> 01:10:20,159
continuity on one hand but enhance

1691
01:10:24,070 --> 01:10:22,560
the capability on the other hand for now

1692
01:10:26,470 --> 01:10:24,080
and for the future

1693
01:10:27,750 --> 01:10:26,480
this sort of stability uh measurement

1694
01:10:30,229 --> 01:10:27,760
really took us

1695
01:10:32,229 --> 01:10:30,239
months if not years to look at

1696
01:10:34,790 --> 01:10:32,239
collecting data processing data

1697
01:10:38,070 --> 01:10:34,800
averaging data for a long time and we're

1698
01:10:40,070 --> 01:10:38,080
expecting to shrink that time cycle so

1699
01:10:42,630 --> 01:10:40,080
part of the improvement always isn't in

1700
01:10:44,630 --> 01:10:42,640
the exact accuracy but it's also in the

1701
01:10:46,870 --> 01:10:44,640
time scales that we're talking about and

1702
01:10:49,430 --> 01:10:46,880
being able to turn that data around and

1703
01:10:52,229 --> 01:10:49,440
having it more useful to the scientists

1704
01:10:58,390 --> 01:10:52,239
faster and and reliably maybe nadja

1705
01:11:03,430 --> 01:11:01,110
thank you barack well said uh perhaps i

1706
01:11:04,950 --> 01:11:03,440
would only add that um

1707
01:11:07,110 --> 01:11:04,960
the way we deal

1708
01:11:09,270 --> 01:11:07,120
in in earth signs we take multiple

1709
01:11:12,950 --> 01:11:09,280
repeated measurements we also average

1710
01:11:16,229 --> 01:11:12,960
them over the same time and space

1711
01:11:18,229 --> 01:11:16,239
so over the global mean uh you would get

1712
01:11:20,790 --> 01:11:18,239
those millimeter accuracies because

1713
01:11:24,070 --> 01:11:20,800

you're averaging a larger number of

1714
01:11:28,550 --> 01:11:26,149
and nadia this probably will go to you

1715
01:11:30,630 --> 01:11:28,560
as well because it's a related question

1716
01:11:32,470 --> 01:11:30,640
russell on youtube wants to know will

1717
01:11:38,630 --> 01:11:32,480
the satellite be sensitive enough to

1718
01:11:43,510 --> 01:11:40,550
rogues well they're high enough you

1719
01:11:45,750 --> 01:11:43,520
don't need a lot of accuracy so if you

1720
01:11:48,070 --> 01:11:45,760
are lucky enough to catch them uh

1721
01:11:49,590 --> 01:11:48,080
between the 10 day repeat cycle that

1722
01:11:54,149 --> 01:11:49,600
they passes

1723
01:12:12,950 --> 01:11:57,510
and camellia on facebook asks as a

1724
01:12:16,790 --> 01:12:14,550
i'm going to start but i'm really

1725
01:12:19,030 --> 01:12:16,800
interested in what uh

1726
01:12:20,790 --> 01:12:19,040
karen is going to say about that also

1727
01:12:22,790 --> 01:12:20,800
perhaps others as well you know i have

1728
01:12:25,030 --> 01:12:22,800
to tell you as a teenager

1729
01:12:27,189 --> 01:12:25,040
uh you know i'm a scientist and i'm an

1730
01:12:29,270 --> 01:12:27,199
astrophysicist so i look i tend to look

1731
01:12:31,270 --> 01:12:29,280
away from earth even though i live on

1732
01:12:33,350 --> 01:12:31,280
and i know now on the most beautiful

1733
01:12:36,950 --> 01:12:33,360
planet ever observed we have thousands

1734
01:12:38,470 --> 01:12:36,960
of those now uh from around the galaxy

1735
01:12:40,390 --> 01:12:38,480
and uh you know what we can do as

1736
01:12:43,110 --> 01:12:40,400
teenagers are really two things so first

1737
01:12:45,350 --> 01:12:43,120
of all it's like there's amazing work

1738
01:12:47,910 --> 01:12:45,360

out there nasa is putting out

1739
01:12:50,630 --> 01:12:47,920
lessons they're putting out movies is

1740
01:12:52,470 --> 01:12:50,640
putting out uh books and many of our

1741
01:12:55,430 --> 01:12:52,480
partners you know

1742
01:12:57,350 --> 01:12:55,440
in various locations are really telling

1743
01:12:59,830 --> 01:12:57,360
the story of nature

1744
01:13:02,790 --> 01:12:59,840
go focus on that be interested in that

1745
01:13:04,950 --> 01:13:02,800
every once in a while we have programs

1746
01:13:06,870 --> 01:13:04,960
and there are some that are focused on

1747
01:13:09,590 --> 01:13:06,880
on earth science and actually even on

1748
01:13:12,630 --> 01:13:09,600
the ocean that are what we call citizen

1749
01:13:14,550 --> 01:13:12,640
science programs so it's really science

1750
01:13:17,430 --> 01:13:14,560
projects that you can participate

1751
01:13:20,709 --> 01:13:17,440
perhaps with your friends or parents to

1752
01:13:23,030 --> 01:13:20,719
really engage into one of those elements

1753
01:13:25,910 --> 01:13:23,040
and frankly citizen science is really

1754
01:13:29,030 --> 01:13:25,920
powerful we have discoveries that come

1755
01:13:31,350 --> 01:13:29,040
from citizen science and so so you know

1756
01:13:33,830 --> 01:13:31,360
find out where those opportunities are

1757
01:13:36,550 --> 01:13:33,840
and get involved i have to tell you uh

1758
01:13:38,790 --> 01:13:36,560
there is there's no uh age that's too

1759
01:13:41,270 --> 01:13:38,800
early to get started to do this amazing

1760
01:13:43,750 --> 01:13:41,280
work getting to know our planet and

1761
01:13:45,590 --> 01:13:43,760
really actively participating and doing

1762
01:13:46,709 --> 01:13:45,600
research but karen how would you answer

1763
01:13:51,430 --> 01:13:46,719

it

1764
01:13:54,470 --> 01:13:51,440
on on what you said uh we

1765
01:13:58,550 --> 01:13:54,480
we uh for for decades now nasa has been

1766
01:14:01,669 --> 01:13:58,560
putting uh or making our data available

1767
01:14:03,350 --> 01:14:01,679
just you know to uh to enable of course

1768
01:14:05,430 --> 01:14:03,360
scientific collaboration around the

1769
01:14:08,149 --> 01:14:05,440
world but also

1770
01:14:11,030 --> 01:14:08,159
to make it available for for citizens

1771
01:14:14,310 --> 01:14:11,040
for students to explore themselves so i

1772
01:14:17,669 --> 01:14:14,320
would i would say yes absolutely uh nasa

1773
01:14:19,750 --> 01:14:17,679
has a a lot and and also our european

1774
01:14:22,550 --> 01:14:19,760
partners we have uh we have websites

1775
01:14:26,310 --> 01:14:22,560
that you can explore and uh and and

1776
01:14:29,189 --> 01:14:26,320
learn the science as it as we do

1777
01:14:32,070 --> 01:14:29,199
really we we write the the stories of

1778
01:14:33,350 --> 01:14:32,080
what we learn and post them very quickly

1779
01:14:35,669 --> 01:14:33,360
as we're learning so you can follow

1780
01:14:37,430 --> 01:14:35,679
along with us you can explore the the

1781
01:14:39,830 --> 01:14:37,440
data yourself

1782
01:14:41,830 --> 01:14:39,840
as thomas said we have a variety of

1783
01:14:43,830 --> 01:14:41,840
citizen science

1784
01:14:46,390 --> 01:14:43,840
activities one of them just closed the

1785
01:14:49,270 --> 01:14:46,400
the annual space apps challenge where we

1786
01:14:51,189 --> 01:14:49,280
we throw uh challenges out and and

1787
01:14:53,110 --> 01:14:51,199
people around the globe

1788
01:14:55,830 --> 01:14:53,120

form their own teams and come up with

1789
01:14:59,910 --> 01:14:55,840
their own solutions and then i think the

1790
01:15:03,110 --> 01:14:59,920
last thing i would say is come join us

1791
01:15:05,830 --> 01:15:03,120
you know really focusing on on

1792
01:15:07,590 --> 01:15:05,840
stem and your education will

1793
01:15:09,750 --> 01:15:07,600
but not exclusively as thomas said

1794
01:15:10,870 --> 01:15:09,760
earlier but focusing on your education

1795
01:15:13,590 --> 01:15:10,880
and and

1796
01:15:16,470 --> 01:15:13,600
and coming to join us because there's so

1797
01:15:18,790 --> 01:15:16,480
much more work to do ahead of us uh and

1798
01:15:20,550 --> 01:15:18,800
we're gonna need the talent the

1799
01:15:23,270 --> 01:15:20,560
enthusiasm

1800
01:15:25,350 --> 01:15:23,280
and and the and the perspectives that

1801
01:15:27,590 --> 01:15:25,360
you'll bring to our teams as we move

1802
01:15:29,830 --> 01:15:27,600
forward thanks

1803
01:15:31,910 --> 01:15:29,840
thank you so much thomas and karen and

1804
01:15:33,750 --> 01:15:31,920
it is our future generations so please

1805
01:15:36,149 --> 01:15:33,760
apply i'm sure everyone across the board

1806
01:15:38,950 --> 01:15:36,159
with our european partners also have

1807
01:15:39,669 --> 01:15:38,960
internships so definitely make sure that

1808
01:15:41,590 --> 01:15:39,679
we

1809
01:15:42,950 --> 01:15:41,600
impress that upon our future generations

1810
01:15:45,189 --> 01:15:42,960
so thank you so much for all of your

1811
01:15:48,229 --> 01:15:45,199
questions and thank you to our panelists

1812
01:15:50,390 --> 01:15:48,239
for joining us today if you want a

1813
01:15:52,470 --> 01:15:50,400

replay of all of the graphics that we

1814
01:15:55,270 --> 01:15:52,480
showed in today's program that will be

1815
01:15:58,390 --> 01:15:55,280
replayed right now until the end of the

1816
01:16:00,390 --> 01:15:58,400
hour the u.s european sentinel 6 michael

1817
01:16:02,709 --> 01:16:00,400
freilich satellite will launch from

1818
01:16:05,990 --> 01:16:02,719
vandenberg air force base no earlier

1819
01:16:08,750 --> 01:16:06,000
than november 10 of 2020. for more

1820
01:16:10,310 --> 01:16:08,760
information on this satellite go to

1821
01:16:13,270 --> 01:16:10,320
nasa.gov

1822
01:16:16,070 --> 01:16:13,280
sentinel 6. you can also follow on all

1823
01:16:18,149 --> 01:16:16,080
social media platforms at nasa earth to

1824
01:16:20,630 --> 01:16:18,159
keep up with this mission and all the

1825
01:16:23,030 --> 01:16:20,640
earth missions we are a part of thanks

1826
01:16:26,229 --> 01:16:23,040
so much for joining us today at nasa

1827
01:16:28,310 --> 01:16:26,239
earth science your home is our mission

1828
01:16:30,390 --> 01:16:28,320
thank you for watching

1829
01:16:32,149 --> 01:16:30,400
this is this big complex machine that

1830
01:16:33,830 --> 01:16:32,159
we're trying to understand we really

1831
01:16:35,990 --> 01:16:33,840
need to understand how it's changing how

1832
01:16:38,390 --> 01:16:36,000
is it evolving wherever you live on this

1833
01:16:40,630 --> 01:16:38,400
globe the oceans will influence you in

1834
01:16:42,709 --> 01:16:40,640
some form or the other we are answering

1835
01:16:44,790 --> 01:16:42,719
those really interesting and hard

1836
01:16:46,870 --> 01:16:44,800
questions that we all have about our

1837
01:16:49,350 --> 01:16:46,880
universe and our planet my name is

1838
01:16:51,510 --> 01:16:49,360

severin fognier and i'm observing our

1839
01:16:54,390 --> 01:16:51,520
changing oceans from space i'm shannon

1840
01:16:56,229 --> 01:16:54,400
statum and here at nasa jpl i help

1841
01:16:58,470 --> 01:16:56,239
prepare sentinel 6 for its journey to

1842
01:17:00,870 --> 01:16:58,480
space my name is shaylen desai my name

1843
01:17:02,310 --> 01:17:00,880
is barack vase my name is ben hamilton

1844
01:17:04,310 --> 01:17:02,320
and i'm studying sea level rise from

1845
01:17:06,630 --> 01:17:04,320
space we're looking at a one-third

1846
01:17:08,550 --> 01:17:06,640
replica of the channel six microfarad

1847
01:17:10,790 --> 01:17:08,560
electric satellite sentinel-6 is all

1848
01:17:13,430 --> 01:17:10,800
about water this sort of top half of the

1849
01:17:14,870 --> 01:17:13,440
satellite houses the main instruments we

1850
01:17:17,590 --> 01:17:14,880
have the altimeter we have the

1851
01:17:20,790 --> 01:17:17,600
radiometer sentinel 6 is a collaboration

1852
01:17:23,110 --> 01:17:20,800
with nasa noaa the european space agency

1853
01:17:25,270 --> 01:17:23,120
and and also umitzat in europe to

1854
01:17:27,350 --> 01:17:25,280
measure sea level and it's specifically

1855
01:17:29,990 --> 01:17:27,360
capturing the height of the ocean the

1856
01:17:31,430 --> 01:17:30,000
satellite is actually emitting a signal

1857
01:17:32,630 --> 01:17:31,440
and that signal is bouncing back but it

1858
01:17:33,830 --> 01:17:32,640
measures the time it takes for that

1859
01:17:35,590 --> 01:17:33,840
pulse to get back so we've been

1860
01:17:37,590 --> 01:17:35,600
measuring the height of the ocean since

1861
01:17:40,709 --> 01:17:37,600
the beginning of the 90s i've worked on

1862
01:17:42,630 --> 01:17:40,719
topex poseidon jason 1 jason 2 jason 3.

1863
01:17:45,189 --> 01:17:42,640

we really need that long duration

1864
01:17:47,590 --> 01:17:45,199
observation and sentinel 6 is going to

1865
01:17:49,350 --> 01:17:47,600
allow us to continue that record so we

1866
01:17:50,950 --> 01:17:49,360
can better predict what is the rate of

1867
01:17:53,030 --> 01:17:50,960
change what is it going to look like in

1868
01:17:55,030 --> 01:17:53,040
a year 5 years 10 years from now and so

1869
01:17:56,630 --> 01:17:55,040
forth it's not just scientific curiosity

1870
01:17:58,070 --> 01:17:56,640
it really impacts the daily lives of

1871
01:18:01,189 --> 01:17:58,080
people and their ability to plan for

1872
01:18:03,189 --> 01:18:01,199
their future i see pictures of coastal

1873
01:18:04,870 --> 01:18:03,199
inundation and flooding you start to

1874
01:18:06,709 --> 01:18:04,880
realize the importance of understanding

1875
01:18:08,390 --> 01:18:06,719
what sea level is doing now we can use

1876
01:18:10,070 --> 01:18:08,400
that understanding to know what sea

1877
01:18:12,950 --> 01:18:10,080
level might be doing in the future

1878
01:18:15,510 --> 01:18:12,960
seeing that come to fruition is a

1879
01:18:18,149 --> 01:18:15,520
personal satisfaction and an emotional

1880
01:18:21,669 --> 01:18:18,159
satisfaction scientists around the world

1881
01:18:23,750 --> 01:18:21,679
are using this data to help people the

1882
01:18:26,870 --> 01:18:23,760
importance of this project and where it

1883
01:18:29,350 --> 01:18:26,880
touches is on all walks of life all