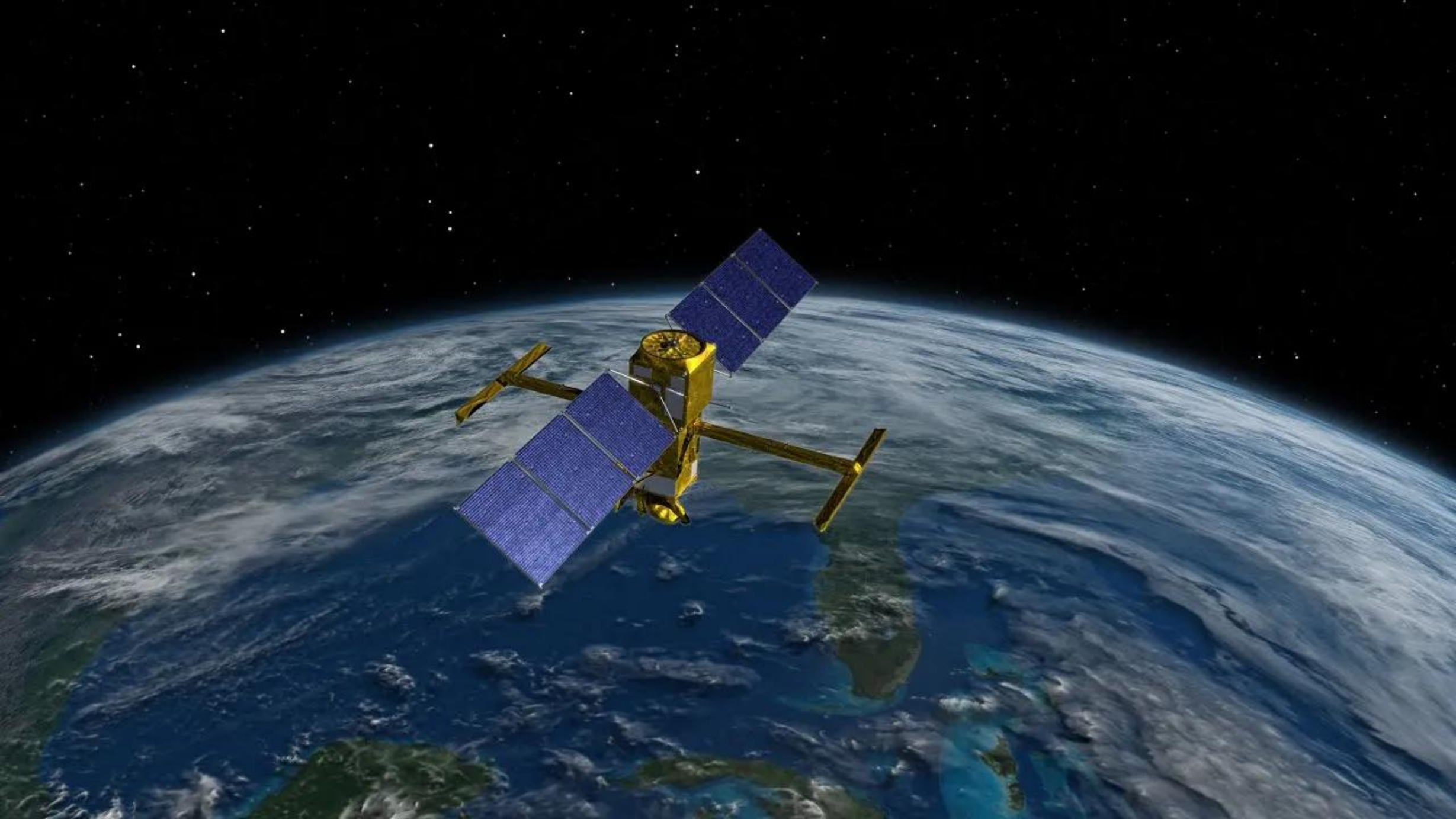

1
00:00:36,709 --> 00:00:33,170
foreign live from the Central Coast of

2
00:00:42,500 --> 00:00:36,719
California this is launch coverage of

3
00:00:42,510 --> 00:01:01,850
[Music]

4
00:01:14,630 --> 00:01:04,559
foreign

5
00:01:20,929 --> 00:01:18,050
you are looking at launch complex 4E at

6
00:01:23,870 --> 00:01:20,939
Vandenberg space Force Base we are just

7
00:01:26,149 --> 00:01:23,880
about 45 minutes away from liftoff of

8
00:01:28,070 --> 00:01:26,159
this Falcon 9 rocket for the

9
00:01:31,550 --> 00:01:28,080
international surface water and ocean

10
00:01:34,010 --> 00:01:31,560
topography Mission also known as SWAT

11
00:01:37,010 --> 00:01:34,020
it's the first satellite mission to

12
00:01:39,590 --> 00:01:37,020
survey nearly all water on the Earth's

13
00:01:42,410 --> 00:01:39,600

surface it will help researchers address

14
00:01:46,370 --> 00:01:42,420
some of the most pressing climate change

15
00:01:50,690 --> 00:01:46,380
questions of our time

16
00:01:53,389 --> 00:01:50,700
hello and welcome I'm Raquel Villanueva

17
00:01:56,270 --> 00:01:53,399
with NASA Communications and I'm joined

18
00:01:59,569 --> 00:01:56,280
by Nadia Vino graduva shiffer welcome

19
00:02:02,030 --> 00:01:59,579
Nadia good morning Raquel now she is the

20
00:02:04,310 --> 00:02:02,040
director of the ocean physics program at

21
00:02:07,429 --> 00:02:04,320
NASA's science mission directorate in

22
00:02:09,469 --> 00:02:07,439
the earth science division Nadia as a

23
00:02:11,869 --> 00:02:09,479
mission scientist what do you feel most

24
00:02:15,530 --> 00:02:11,879
excited about on this very early morning

25
00:02:18,050 --> 00:02:15,540
well Raquel we're launching swats at our

26
00:02:20,270 --> 00:02:18,060
next mission to track water on the

27
00:02:22,550 --> 00:02:20,280
Earth's surface it's been a long journey

28
00:02:24,110 --> 00:02:22,560
20 years said to make us you know to

29
00:02:26,690 --> 00:02:24,120
take us to the lunch with plus one day

30
00:02:29,390 --> 00:02:26,700
so and today our water dreams are coming

31
00:02:32,650 --> 00:02:29,400
true and why is it important to track

32
00:02:35,750 --> 00:02:32,660
all of Earth's water well water is alive

33
00:02:38,750 --> 00:02:35,760
there are eight billion people live on

34
00:02:42,170 --> 00:02:38,760
this planet and we all depend on the

35
00:02:45,770 --> 00:02:42,180
water to survive and prosper we use

36
00:02:48,650 --> 00:02:45,780
water to drink to grow our crops we use

37
00:02:52,250 --> 00:02:48,660
water to produce energy and support our

38
00:02:56,470 --> 00:02:52,260

economy water is what controls our

39
00:02:59,449 --> 00:02:56,480
climate and weather so essentially water

40
00:03:02,750 --> 00:02:59,459
swats will track all of this water for

41
00:03:06,110 --> 00:03:02,760
the same reason as a follows water on

42
00:03:08,630 --> 00:03:06,120
other planets because water is essential

43
00:03:11,089 --> 00:03:08,640
to Life as we know it absolutely

44
00:03:13,970 --> 00:03:11,099
essential I have plenty more questions

45
00:03:15,670 --> 00:03:13,980
for you coming up and we will be taking

46
00:03:18,610 --> 00:03:15,680
your questions throughout the broadcast

47
00:03:21,649 --> 00:03:18,620
send us your questions using the hashtag

48
00:03:23,990 --> 00:03:21,659
tracking World water to learn more about

49
00:03:27,410 --> 00:03:24,000
the swap mission

50
00:03:31,070 --> 00:03:27,420
and NASA is celebrating the completion

51
00:03:32,930 --> 00:03:31,080
of its historic Artemis one fly test the

52
00:03:35,449 --> 00:03:32,940
launch from Kennedy Space Center last

53
00:03:38,449 --> 00:03:35,459
month was viewed by millions around the

54
00:03:41,390 --> 00:03:38,459
world while in orbit around the moon the

55
00:03:43,670 --> 00:03:41,400
uncrewed Orion spacecraft gave us these

56
00:03:45,410 --> 00:03:43,680
breathtaking pictures absolutely

57
00:03:50,770 --> 00:03:45,420
stunning and Nadia take a look at that

58
00:03:56,149 --> 00:03:53,809
Splashdown from Tranquility base to

59
00:03:58,369 --> 00:03:56,159
Taurus litro to the Tranquil Waters of

60
00:04:00,289 --> 00:03:58,379
the Pacific the latest chapter of NASA's

61
00:04:03,110 --> 00:04:00,299
Journey to the moon comes to a close

62
00:04:06,050 --> 00:04:03,120
Orion back on Earth

63
00:04:08,509 --> 00:04:06,060

on Sunday December 11th at 9 40 a.m

64
00:04:12,410 --> 00:04:08,519
Pacific Orion splashed down in the

65
00:04:14,809 --> 00:04:12,420
Pacific Ocean after a 26-day mission the

66
00:04:17,210 --> 00:04:14,819
Artemis program will Explore More Of The

67
00:04:20,750 --> 00:04:17,220
Moon than ever before and eventually

68
00:04:23,150 --> 00:04:20,760
land the first astronauts on Mars very

69
00:04:25,610 --> 00:04:23,160
exciting very exciting in did rikale in

70
00:04:27,710 --> 00:04:25,620
fact Artemis and climate change are two

71
00:04:30,710 --> 00:04:27,720
priorities for the agency and you know

72
00:04:33,110 --> 00:04:30,720
Earth and Moonah directly connected a

73
00:04:35,210 --> 00:04:33,120
celestial bodies well looking how

74
00:04:36,770 --> 00:04:35,220
climate change might impact this Earth

75
00:04:39,230 --> 00:04:36,780
Moon system so there might be more

76
00:04:40,969 --> 00:04:39,240
connection between SWAT and Artemis so

77
00:04:43,610 --> 00:04:40,979
stay tuned well stay tuned for that

78
00:04:45,830 --> 00:04:43,620
connection now let's introduce you to

79
00:04:48,170 --> 00:04:45,840
our team covering today's launch

80
00:04:50,330 --> 00:04:48,180
hundreds of people are gathered right

81
00:04:53,030 --> 00:04:50,340
now at our Hawks Nest viewing area

82
00:04:55,570 --> 00:04:53,040
that's where NASA's NASA's Jasmine

83
00:04:58,730 --> 00:04:55,580
Hopkins will talk with our experts

84
00:05:00,770 --> 00:04:58,740
NASA's Megan Cruz and Denton Gibson will

85
00:05:03,830 --> 00:05:00,780
provide us with commentary from the

86
00:05:06,409 --> 00:05:03,840
mission director Center Megan NASA's

87
00:05:09,170 --> 00:05:06,419
launch Services Program selected SpaceX

88
00:05:10,730 --> 00:05:09,180

to send SWAT into orbit yeah and so for

89
00:05:13,490 --> 00:05:10,740
the last couple of hours we've been

90
00:05:15,590 --> 00:05:13,500
listening to both NASA and SpaceX teams

91
00:05:17,510 --> 00:05:15,600
as they prepare for launch today and

92
00:05:20,390 --> 00:05:17,520
great news both the vehicle and the

93
00:05:22,129 --> 00:05:20,400
spacecraft are healthy uh the range is

94
00:05:25,129 --> 00:05:22,139
green and the weather is looking

95
00:05:26,930 --> 00:05:25,139
excellent 100 go for launch yeah

96
00:05:29,210 --> 00:05:26,940
absolutely and which is which isn't

97
00:05:30,890 --> 00:05:29,220
always the case but we have a great

98
00:05:32,510 --> 00:05:30,900
weather for this yeah I love hearing 100

99
00:05:34,490 --> 00:05:32,520
this is the first time I've actually

100
00:05:36,890 --> 00:05:34,500
heard 100 for for a launch so that's

101
00:05:38,810 --> 00:05:36,900
exciting and commentating with me today

102
00:05:41,450 --> 00:05:38,820
is Denton Gibson

103
00:05:42,890 --> 00:05:41,460
um he is a mission manager with NASA's

104
00:05:44,510 --> 00:05:42,900
launch Services Program and the perfect

105
00:05:46,610 --> 00:05:44,520
person to chat with me today because

106
00:05:48,590 --> 00:05:46,620
before your current role you used to

107
00:05:50,270 --> 00:05:48,600
work with SpaceX really closely yeah for

108
00:05:51,529 --> 00:05:50,280
a long time I was the Falcon 9

109
00:05:53,390 --> 00:05:51,539
engineering team the foot launch

110
00:05:55,850 --> 00:05:53,400
Services Program so and I started

111
00:05:57,830 --> 00:05:55,860
working with the Falcon 9 when they we

112
00:06:00,590 --> 00:05:57,840
during our first mission with

113
00:06:05,210 --> 00:06:00,600

SpaceX so that was many years ago okay

114
00:06:09,409 --> 00:06:07,070
for launch today and start loading

115
00:06:11,689 --> 00:06:09,419
propellant into the

116
00:06:13,850 --> 00:06:11,699
to go the NASA team gave the go for

117
00:06:16,909 --> 00:06:13,860
propellant load but now we have to do a

118
00:06:19,310 --> 00:06:16,919
SpaceX poll right right and with the

119
00:06:20,990 --> 00:06:19,320
NASA poll is they the various groups in

120
00:06:23,029 --> 00:06:21,000
NASA making sure everybody's ready to go

121
00:06:25,070 --> 00:06:23,039
if you just heard that poll everybody's

122
00:06:26,510 --> 00:06:25,080
good to go and now the SpaceX team is

123
00:06:28,309 --> 00:06:26,520
going to confirm with the NASA team that

124
00:06:30,770 --> 00:06:28,319
will be all ready to go okay perfect

125
00:06:32,930 --> 00:06:30,780
here's a live Lookout at a launch pad

126
00:06:35,330 --> 00:06:32,940
for East here at Vandenberg space Force

127
00:06:36,469 --> 00:06:35,340
Base uh we'll monitor the SpaceX poll

128
00:06:38,270 --> 00:06:36,479
that we just told you about and then

129
00:06:41,090 --> 00:06:38,280
we'll check back in once feeling begins

130
00:06:44,090 --> 00:06:41,100
uh back to you Raquel and Nadia thank

131
00:06:46,370 --> 00:06:44,100
you we have a fun way to interact with

132
00:06:49,550 --> 00:06:46,380
our launch broadcast right now you can

133
00:06:51,770 --> 00:06:49,560
print out a SWAT bingo card Nadia is

134
00:06:53,450 --> 00:06:51,780
holding one up here it has different

135
00:06:56,689 --> 00:06:53,460
words on the card you'll hear while

136
00:06:59,689 --> 00:06:56,699
watching the show to print one just scan

137
00:07:01,510 --> 00:06:59,699
this QR code you see on your screen we

138
00:07:05,390 --> 00:07:01,520

also have the website

139
00:07:07,610 --> 00:07:05,400
go.nasa.gov SWAT Dash Bingo when you

140
00:07:10,309 --> 00:07:07,620
hear a word mark it off and when you get

141
00:07:13,249 --> 00:07:10,319
a bingo share your win on social media

142
00:07:15,770 --> 00:07:13,259
with the hashtag tracking World water

143
00:07:17,390 --> 00:07:15,780
it's a good way to stay away yes it's

144
00:07:20,629 --> 00:07:17,400
fun fun to play with kids during

145
00:07:23,689 --> 00:07:20,639
Christmas exactly now let's go over the

146
00:07:27,290 --> 00:07:23,699
specs of the SWAT satellite it weighs

147
00:07:29,950 --> 00:07:27,300
more than 4 800 pounds at launch the

148
00:07:33,110 --> 00:07:29,960
satellite is just over 16 feet in height

149
00:07:35,570 --> 00:07:33,120
its solar panels extend to more than 48

150
00:07:38,210 --> 00:07:35,580
feet in length about the size of a

151
00:07:40,370 --> 00:07:38,220
tennis court it will cover over 90

152
00:07:43,969 --> 00:07:40,380
percent of Earth's surface at least once

153
00:07:46,730 --> 00:07:43,979
every 21 days and SWAT will increase our

154
00:07:48,529 --> 00:07:46,740
tracking of lakes from a few thousand to

155
00:07:50,990 --> 00:07:48,539
over a million

156
00:07:52,670 --> 00:07:51,000
the mission is set to run for the next

157
00:07:55,790 --> 00:07:52,680
three years

158
00:07:59,510 --> 00:07:55,800
SWAT is a joint Mission between NASA and

159
00:08:01,610 --> 00:07:59,520
the French space agency kness JPL shifts

160
00:08:03,290 --> 00:08:01,620
the payload to France in the summer of

161
00:08:05,990 --> 00:08:03,300
2021.

162
00:08:09,110 --> 00:08:06,000
for more than a year Engineers worked at

163
00:08:11,390 --> 00:08:09,120

Talus Elena space to integrate and test

164
00:08:13,670 --> 00:08:11,400
the satellite after a series of

165
00:08:15,409 --> 00:08:13,680
functional and environmental tests it

166
00:08:18,770 --> 00:08:15,419
was ready for the trip from the nice

167
00:08:20,809 --> 00:08:18,780
airport back to the U.S in October the

168
00:08:23,330 --> 00:08:20,819
satellite and its shipping container

169
00:08:26,089 --> 00:08:23,340
arrived at Vandenberg space Force Base

170
00:08:28,249 --> 00:08:26,099
where it was mated with the Falcon 9.

171
00:08:30,650 --> 00:08:28,259
now Nadia this is a complex

172
00:08:32,630 --> 00:08:30,660
International partnership can you talk

173
00:08:35,209 --> 00:08:32,640
about some of the challenges the team

174
00:08:38,630 --> 00:08:35,219
faced well we're actually in jail very

175
00:08:41,209 --> 00:08:38,640
well with all our partners kness Canada

176
00:08:43,510 --> 00:08:41,219
and UK Swiss agency we're currently a

177
00:08:46,190 --> 00:08:43,520
large multinational science team

178
00:08:48,110 --> 00:08:46,200
spreading six continents you know quite

179
00:08:49,130 --> 00:08:48,120
a socrate team just like a just like a

180
00:08:51,590 --> 00:08:49,140
World Cup

181
00:08:54,949 --> 00:08:51,600
exactly and now you're all here today

182
00:08:57,769 --> 00:08:54,959
yes we are well water is fundamental for

183
00:08:59,870 --> 00:08:57,779
Life SWAT will help us understand where

184
00:09:01,970 --> 00:08:59,880
Earth's water is today where it is

185
00:09:05,150 --> 00:09:01,980
coming from and where it will be

186
00:09:09,050 --> 00:09:05,160
tomorrow take a look

187
00:09:11,150 --> 00:09:09,060
so for me SWAT is water

188
00:09:13,550 --> 00:09:11,160

so what is precision

189
00:09:14,990 --> 00:09:13,560
in one word I would describe SWAT as

190
00:09:17,389 --> 00:09:15,000
beautiful

191
00:09:20,570 --> 00:09:17,399
SWAT stands for surface water and ocean

192
00:09:22,730 --> 00:09:20,580
topography SWAT will be observing the

193
00:09:25,490 --> 00:09:22,740
elevation of a water surface in the

194
00:09:28,610 --> 00:09:25,500
ocean on the land the water surface

195
00:09:31,370 --> 00:09:28,620
height will allow us to assess the water

196
00:09:32,449 --> 00:09:31,380
storage in lakes and Stream flow of

197
00:09:34,009 --> 00:09:32,459
rivers

198
00:09:36,949 --> 00:09:34,019
our water is one of our precious

199
00:09:38,930 --> 00:09:36,959
resources saw is unique because it is

200
00:09:41,810 --> 00:09:38,940
the first global view of our

201
00:09:44,090 --> 00:09:41,820
ever-changing water supply on Earth

202
00:09:46,610 --> 00:09:44,100
swat's main instrument is called Karen

203
00:09:48,769 --> 00:09:46,620
which is the cavan Raider interferometer

204
00:09:50,509 --> 00:09:48,779
Karen is what sets apart squat from

205
00:09:53,269 --> 00:09:50,519
other missions it's a unique instrument

206
00:09:55,610 --> 00:09:53,279
that we're flying For the First Time The

207
00:09:57,230 --> 00:09:55,620
Karen instrument uses the two antennas

208
00:09:59,389 --> 00:09:57,240
which are spread out on either side of

209
00:10:01,130 --> 00:09:59,399
the spacecraft in order to bounce

210
00:10:04,009 --> 00:10:01,140
signals off of both of those to get a

211
00:10:05,810 --> 00:10:04,019
much larger view of the surface and

212
00:10:08,750 --> 00:10:05,820
being able to do it in very high

213
00:10:11,150 --> 00:10:08,760

resolution higher accuracy and also a

214
00:10:14,210 --> 00:10:11,160
wide swath so that we're able to measure

215
00:10:16,910 --> 00:10:14,220
large tracks over the Earth in a

216
00:10:20,449 --> 00:10:16,920
relatively small amount of time

217
00:10:23,269 --> 00:10:20,459
SWAT is a Pathfinder Mission using new

218
00:10:25,610 --> 00:10:23,279
technology to address transformative

219
00:10:28,070 --> 00:10:25,620
questions on climate change and its

220
00:10:30,110 --> 00:10:28,080
impact on our environment

221
00:10:32,090 --> 00:10:30,120
we're collaborating with Nest the French

222
00:10:33,829 --> 00:10:32,100
Space Agency for these programs but

223
00:10:36,170 --> 00:10:33,839
we're also helping the global Community

224
00:10:38,389 --> 00:10:36,180
to be able to contribute and collaborate

225
00:10:39,829 --> 00:10:38,399
towards making our home planet a better

226
00:10:42,050 --> 00:10:39,839
place

227
00:10:44,150 --> 00:10:42,060
SWAT will make our models better and our

228
00:10:45,590 --> 00:10:44,160
understanding the water budget helps us

229
00:10:48,650 --> 00:10:45,600
be able to Steward that precious

230
00:10:50,930 --> 00:10:48,660
resource if water is out of balance we

231
00:10:55,329 --> 00:10:50,940
could face droughts and you could also

232
00:11:00,710 --> 00:10:58,190
SWAT is going to be absorbing water in

233
00:11:02,750 --> 00:11:00,720
oceans and ocean science is essential

234
00:11:04,069 --> 00:11:02,760
for understanding sea level rise and

235
00:11:07,790 --> 00:11:04,079
climate change

236
00:11:10,190 --> 00:11:07,800
now we are facing a time that we need to

237
00:11:12,829 --> 00:11:10,200
be very precise therefore we can

238
00:11:16,250 --> 00:11:12,839

accurately predict what will happen in

239
00:11:18,829 --> 00:11:16,260
our coastal cities 50 years from now

240
00:11:22,009 --> 00:11:18,839
understanding that it is a finite source

241
00:11:24,530 --> 00:11:22,019
and we can't rely on that forever is

242
00:11:26,090 --> 00:11:24,540
something that's really important I'm

243
00:11:28,130 --> 00:11:26,100
just so excited and can't wait to see

244
00:11:30,170 --> 00:11:28,140
how it impacts Eliza better

245
00:11:32,509 --> 00:11:30,180
without really understanding the Earth

246
00:11:34,550 --> 00:11:32,519
we cannot protect it because we know

247
00:11:36,650 --> 00:11:34,560
that the missions that we work on are

248
00:11:37,880 --> 00:11:36,660
going to have an impact on our children

249
00:11:42,949 --> 00:11:37,890
and our grandchildren

250
00:11:48,290 --> 00:11:46,069
NASA has a family of satellites in orbit

251
00:11:51,110 --> 00:11:48,300
right now studying how the whole earth

252
00:11:52,850 --> 00:11:51,120
works as a system Karen St Germain is

253
00:11:54,769 --> 00:11:52,860
NASA's director of the earth science

254
00:11:58,310 --> 00:11:54,779
division thank you for joining us today

255
00:12:00,470 --> 00:11:58,320
Karen it's great to be here and what

256
00:12:03,290 --> 00:12:00,480
kind of role will swap play in NASA's

257
00:12:06,650 --> 00:12:03,300
Fleet of Earth observing satellites

258
00:12:09,170 --> 00:12:06,660
well NASA has a fleet of 25 satellites

259
00:12:11,630 --> 00:12:09,180
today missions that are looking down at

260
00:12:14,990 --> 00:12:11,640
Earth at the atmosphere at the land at

261
00:12:17,030 --> 00:12:15,000
the ice and the and the oceans and these

262
00:12:18,470 --> 00:12:17,040
satellites tell us how the earth works

263
00:12:22,130 --> 00:12:18,480

as a system

264
00:12:24,590 --> 00:12:22,140
but SWAT as we know our our planet is

265
00:12:26,750 --> 00:12:24,600
that we're we live on a water planet and

266
00:12:29,810 --> 00:12:26,760
so SWAT will give us the first high

267
00:12:33,470 --> 00:12:29,820
definition view of not just our oceans

268
00:12:35,389 --> 00:12:33,480
but the Inland Waters as well and uh you

269
00:12:38,449 --> 00:12:35,399
know these these Waters play an

270
00:12:41,569 --> 00:12:38,459
important role in climate change and in

271
00:12:44,090 --> 00:12:41,579
everyday lives so I'll be an exciting

272
00:12:46,129 --> 00:12:44,100
addition to the family absolutely now

273
00:12:47,750 --> 00:12:46,139
what can we learn through space-based

274
00:12:49,790 --> 00:12:47,760
tools Like Satellites that we can't

275
00:12:52,910 --> 00:12:49,800
gather here on Earth

276
00:12:55,250 --> 00:12:52,920
well space is is the ultimate High

277
00:12:58,310 --> 00:12:55,260
ground it's a it's a unique vantage

278
00:12:59,269 --> 00:12:58,320
point from which we can see the entire

279
00:13:01,550 --> 00:12:59,279
Earth

280
00:13:04,009 --> 00:13:01,560
and that's especially important when

281
00:13:05,930 --> 00:13:04,019
we're looking at parts of the earth that

282
00:13:07,970 --> 00:13:05,940
are remote difficult for humans to get

283
00:13:10,850 --> 00:13:07,980
to and I'll just give you one example

284
00:13:13,490 --> 00:13:10,860
the southern oceans play an incredibly

285
00:13:17,329 --> 00:13:13,500
important role in our climate they've

286
00:13:19,310 --> 00:13:17,339
absorbed more than uh well the oceans in

287
00:13:21,829 --> 00:13:19,320
total have absorbed about a quarter of

288
00:13:24,050 --> 00:13:21,839

the carbon dioxide the greenhouse gases

289
00:13:25,790 --> 00:13:24,060
that have been emitted in the Industrial

290
00:13:27,949 --> 00:13:25,800
Age the southern oceans because they're

291
00:13:30,590 --> 00:13:27,959
cold play an incredibly important role

292
00:13:32,629 --> 00:13:30,600
so set from the from the unique vantage

293
00:13:35,329 --> 00:13:32,639
point of space we can see these remote

294
00:13:38,090 --> 00:13:35,339
areas and better understand how they

295
00:13:40,970 --> 00:13:38,100
play into the global system

296
00:13:43,790 --> 00:13:40,980
and Karen just going forward how do you

297
00:13:46,069 --> 00:13:43,800
see what being a Trailblazer for the

298
00:13:48,470 --> 00:13:46,079
next earth science Mission over the next

299
00:13:50,090 --> 00:13:48,480
decades it's a great question and you

300
00:13:53,090 --> 00:13:50,100
know we are already hard at work

301
00:13:55,009 --> 00:13:53,100
building the next generation of Earth

302
00:13:57,530 --> 00:13:55,019
observing satellites

303
00:14:00,889 --> 00:13:57,540
and these will also look at all the

304
00:14:02,690 --> 00:14:00,899
aspects of your system but just as

305
00:14:04,670 --> 00:14:02,700
important as what we're doing is how

306
00:14:07,370 --> 00:14:04,680
we're doing it with open science

307
00:14:10,790 --> 00:14:07,380
principles to try to accelerate the pace

308
00:14:12,730 --> 00:14:10,800
of Discovery from these systems and with

309
00:14:16,910 --> 00:14:12,740
Partners around the world

310
00:14:20,629 --> 00:14:16,920
so SWAT is in many ways blazing the

311
00:14:23,269 --> 00:14:20,639
trail for how we will develop that next

312
00:14:26,329 --> 00:14:23,279
generation of capabilities to accelerate

313
00:14:28,370 --> 00:14:26,339

Discovery and the use of the data to

314
00:14:30,530 --> 00:14:28,380
inform decisions around the world

315
00:14:34,490 --> 00:14:30,540
Karen how are you feeling about today's

316
00:14:36,590 --> 00:14:34,500
launch I can could not be more excited

317
00:14:40,189 --> 00:14:36,600
we've been waiting for the SWAT launch

318
00:14:42,530 --> 00:14:40,199
and uh and as the team has gone through

319
00:14:45,110 --> 00:14:42,540
the the challenges that you discussed a

320
00:14:47,509 --> 00:14:45,120
few moments ago and so it's been a long

321
00:14:50,509 --> 00:14:47,519
road to get here and we are so excited

322
00:14:52,550 --> 00:14:50,519
we cannot wait it's very exciting thank

323
00:14:55,250 --> 00:14:52,560
you so much Karen for joining us enjoy

324
00:14:59,090 --> 00:14:55,260
the lunch we all will all right thank

325
00:15:01,009 --> 00:14:59,100
you so much now it is a T minus 32

326
00:15:03,829 --> 00:15:01,019
minutes and counting to today's launch

327
00:15:06,949 --> 00:15:03,839
of the SWAT satellite let's check in on

328
00:15:09,170 --> 00:15:06,959
launch operations Megan is live Megan

329
00:15:12,230 --> 00:15:09,180
preparations for this launch began hours

330
00:15:15,350 --> 00:15:12,240
ago so where do we stand right now yeah

331
00:15:17,329 --> 00:15:15,360
so Falcon 9 fueling is underway spacex's

332
00:15:18,650 --> 00:15:17,339
launch director gave the go for

333
00:15:20,210 --> 00:15:18,660
propellant loading about a couple of

334
00:15:23,389 --> 00:15:20,220
minutes ago so now

335
00:15:25,790 --> 00:15:23,399
um liquid oxygen and rp1 or rocket grade

336
00:15:27,769 --> 00:15:25,800
kerosene both are going in uh to the

337
00:15:29,030 --> 00:15:27,779
Rockets first stage right correctly and

338
00:15:30,949 --> 00:15:29,040

it's it's underway and everything is

339
00:15:33,949 --> 00:15:30,959
going smooth so far no issues to report

340
00:15:37,009 --> 00:15:33,959
perfect so if we take a live look at the

341
00:15:40,090 --> 00:15:37,019
pad here a beautiful shot of the payload

342
00:15:43,610 --> 00:15:40,100
fairing there with SWAT so safely inside

343
00:15:46,189 --> 00:15:43,620
you know Denton we talked about why

344
00:15:48,290 --> 00:15:46,199
SpaceX starts fueling so close to launch

345
00:15:50,329 --> 00:15:48,300
you know why why when other launch

346
00:15:51,470 --> 00:15:50,339
providers start hours earlier yeah and

347
00:15:53,269 --> 00:15:51,480
one of the main reasons they use

348
00:15:55,490 --> 00:15:53,279
intensified repellent so they're very

349
00:15:59,090 --> 00:15:55,500
very cold and that way it allows them to

350
00:16:00,530 --> 00:15:59,100
fit more fuel and oxidizer into a tank

351
00:16:02,629 --> 00:16:00,540
without having to increase the size of

352
00:16:04,129 --> 00:16:02,639
the tank and the reason why it's so

353
00:16:06,170 --> 00:16:04,139
close to launch is that you don't want

354
00:16:08,509 --> 00:16:06,180
those densified repellents to heat up

355
00:16:10,129 --> 00:16:08,519
any and that will cause a lot of cause

356
00:16:11,810 --> 00:16:10,139
you to kind of bleed off some of your

357
00:16:13,850 --> 00:16:11,820
oxide

358
00:16:15,949 --> 00:16:13,860
Etc so and that's why they they do it so

359
00:16:17,930 --> 00:16:15,959
close to launch doesn't give that t that

360
00:16:20,509 --> 00:16:17,940
fuel and those those propellants much

361
00:16:22,430 --> 00:16:20,519
time to heat up and as we look at this

362
00:16:25,430 --> 00:16:22,440
live picture here you can see that

363
00:16:27,170 --> 00:16:25,440

Telltale sign of soot on the booster

364
00:16:29,030 --> 00:16:27,180
there that means it's flown to space

365
00:16:30,710 --> 00:16:29,040
before yes this this thing is Flowing

366
00:16:32,689 --> 00:16:30,720
five times before this and it's a

367
00:16:34,129 --> 00:16:32,699
combination of uh space Force missions

368
00:16:35,810 --> 00:16:34,139
as well as some commercial missions so

369
00:16:37,610 --> 00:16:35,820
we do have some familiarity with the

370
00:16:39,110 --> 00:16:37,620
smooth stand and the stud is just just a

371
00:16:41,090 --> 00:16:39,120
little seasoning on the Boost some

372
00:16:42,829 --> 00:16:41,100
seasoning I love how you say that okay

373
00:16:44,329 --> 00:16:42,839
well perfect so far so good a really

374
00:16:46,610 --> 00:16:44,339
quiet count you know we're hearing the

375
00:16:49,249 --> 00:16:46,620
call-outs we're expecting uh nothing out

376
00:16:50,689 --> 00:16:49,259
of the ordinary so uh again so far so

377
00:16:53,210 --> 00:16:50,699
good so we'll send it back to you guys

378
00:16:55,730 --> 00:16:53,220
for kalanadia

379
00:16:57,710 --> 00:16:55,740
thanks for the update we'll go back to

380
00:16:59,749 --> 00:16:57,720
our commentators as we get closer to

381
00:17:01,790 --> 00:16:59,759
launch in just a few minutes but first

382
00:17:04,610 --> 00:17:01,800
we have some questions to answer about

383
00:17:07,850 --> 00:17:04,620
the swap Mission and water our first

384
00:17:11,569 --> 00:17:07,860
question is from a student here's Meadow

385
00:17:15,169 --> 00:17:11,579
hi my name is Meadow I'm seven years old

386
00:17:19,909 --> 00:17:15,179
and I live in Studio City California I

387
00:17:23,090 --> 00:17:19,919
wonder how much water is on planet Earth

388
00:17:25,970 --> 00:17:23,100

Hi Meadow uh good question there are

389
00:17:28,370 --> 00:17:25,980
more than billion cubic kilometers of

390
00:17:30,710 --> 00:17:28,380
water on Earth a lot of water Raquel

391
00:17:33,049 --> 00:17:30,720
it's a lot of water now thanks for your

392
00:17:34,909 --> 00:17:33,059
question Meadow and we have a social

393
00:17:37,250 --> 00:17:34,919
media question coming up as well let's

394
00:17:39,650 --> 00:17:37,260
see it

395
00:17:42,110 --> 00:17:39,660
um at kawan wants to know what is the

396
00:17:45,710 --> 00:17:42,120
most important thing to know as a NASA

397
00:17:47,810 --> 00:17:45,720
scientist uh to know as a NASA scientist

398
00:17:50,270 --> 00:17:47,820
well a hard work

399
00:17:52,730 --> 00:17:50,280
um some math and physics is a is a good

400
00:17:54,770 --> 00:17:52,740
skill and to have fun while doing it and

401
00:17:57,590 --> 00:17:54,780
you possess those all Daria we have

402
00:17:59,810 --> 00:17:57,600
another question coming up

403
00:18:02,690 --> 00:17:59,820
zeros in math wants to know what's the

404
00:18:04,850 --> 00:18:02,700
accuracy of Swat

405
00:18:07,490 --> 00:18:04,860
we are shooting for centimetric

406
00:18:10,070 --> 00:18:07,500
precision with what it's a very precise

407
00:18:12,650 --> 00:18:10,080
Mission we are improving our accuracy

408
00:18:14,930 --> 00:18:12,660
about 10x compared to our current

409
00:18:17,450 --> 00:18:14,940
observing capability of the ocean water

410
00:18:19,730 --> 00:18:17,460
and and Inland Waters as well

411
00:18:21,049 --> 00:18:19,740
thank you all right we have one more

412
00:18:23,150 --> 00:18:21,059
question coming in

413
00:18:26,210 --> 00:18:23,160

Kevin rainville wants to know will it

414
00:18:28,190 --> 00:18:26,220
give us the rate of sea level rise we

415
00:18:30,409 --> 00:18:28,200
will definitely observe the risings

416
00:18:33,110 --> 00:18:30,419
oceans and rising sea particularly close

417
00:18:35,270 --> 00:18:33,120
to the coast and as we collect more and

418
00:18:36,890 --> 00:18:35,280
more data we can estimate the rate which

419
00:18:38,810 --> 00:18:36,900
is you know the change over a certain

420
00:18:40,850 --> 00:18:38,820
period this is what the rate is yes

421
00:18:42,650 --> 00:18:40,860
excellent question yes it was now

422
00:18:46,010 --> 00:18:42,660
remember you can send your questions

423
00:18:47,450 --> 00:18:46,020
online by using the hashtag tracking

424
00:18:51,110 --> 00:18:47,460
World water

425
00:18:55,190 --> 00:18:51,120
now you are looking live to the launch

426
00:18:57,770 --> 00:18:55,200
pad right now we are T minus 28 minutes

427
00:18:59,570 --> 00:18:57,780
to lift off SWAT data will help

428
00:19:02,330 --> 00:18:59,580
researchers better understand the

429
00:19:04,610 --> 00:19:02,340
ocean's role in climate change let's go

430
00:19:08,330 --> 00:19:04,620
to Jasmine live at the Hawks Nest to

431
00:19:10,909 --> 00:19:08,340
learn more about the mission science

432
00:19:13,010 --> 00:19:10,919
thank you Raquel and welcome to the

433
00:19:15,590 --> 00:19:13,020
Hawks Nest this is the main viewing

434
00:19:17,510 --> 00:19:15,600
location at Vandenberg and there are

435
00:19:19,130 --> 00:19:17,520
over 500 guests scheduled to be in the

436
00:19:21,590 --> 00:19:19,140
surrounding area tonight and right now

437
00:19:23,750 --> 00:19:21,600
I'm thrilled to be joined by Lee luang

438
00:19:26,210 --> 00:19:23,760

Fu the SWAT project scientist who's been

439
00:19:29,450 --> 00:19:26,220
working on water monitoring missions for

440
00:19:31,789 --> 00:19:29,460
over two decades welcome Lee thank you

441
00:19:33,770 --> 00:19:31,799
very much Jasmine of course pleasure to

442
00:19:35,990 --> 00:19:33,780
be here we are so glad to have you it is

443
00:19:39,289 --> 00:19:36,000
very special can you tell me what are

444
00:19:41,029 --> 00:19:39,299
the main science goals of Swat yeah the

445
00:19:44,570 --> 00:19:41,039
main size goes are to better understand

446
00:19:47,990 --> 00:19:44,580
the ocean's role in climate change and

447
00:19:50,810 --> 00:19:48,000
how in a warming climate is affecting

448
00:19:53,330 --> 00:19:50,820
the Earth's rivers lakes and the

449
00:19:54,529 --> 00:19:53,340
reservoirs so more than 90 percent of

450
00:19:56,049 --> 00:19:54,539
the Heat

451
00:19:58,789 --> 00:19:56,059
since the

452
00:20:01,909 --> 00:19:58,799
Industrial Revolution the global warming

453
00:20:04,310 --> 00:20:01,919
has been absorbed and stored in the deep

454
00:20:08,210 --> 00:20:04,320
sea swans will provide a high definition

455
00:20:10,730 --> 00:20:08,220
view of Ocean topography for calculating

456
00:20:14,150 --> 00:20:10,740
ocean currents that transport the heat

457
00:20:16,549 --> 00:20:14,160
from the atmosphere to the deep sea so

458
00:20:19,730 --> 00:20:16,559
the data will help improve Ocean Models

459
00:20:22,730 --> 00:20:19,740
to assess the ocean's capacity in the

460
00:20:25,610 --> 00:20:22,740
future to keep absorbing heat protect

461
00:20:29,210 --> 00:20:25,620
Humanity from global warming and also in

462
00:20:32,029 --> 00:20:29,220
a warming climate the water cycle of

463
00:20:34,010 --> 00:20:32,039

Earth is accelerating making it very

464
00:20:36,590 --> 00:20:34,020
difficult to track and manage water

465
00:20:40,070 --> 00:20:36,600
resources and also difficult to predict

466
00:20:43,070 --> 00:20:40,080
floods and droughts so most of the lakes

467
00:20:45,409 --> 00:20:43,080
rivers are not well sampled but the swan

468
00:20:48,830 --> 00:20:45,419
for the first time will provide a global

469
00:20:51,830 --> 00:20:48,840
survey of the elevation of the lake

470
00:20:55,789 --> 00:20:51,840
storage of water and the flow rates of

471
00:20:57,830 --> 00:20:55,799
river allow us to better model and so so

472
00:20:59,990 --> 00:20:57,840
manage the water resources and the

473
00:21:01,789 --> 00:21:00,000
predict floods and drugs this is in a

474
00:21:03,230 --> 00:21:01,799
nutshell right right the very good

475
00:21:04,909 --> 00:21:03,240
International and I like that you said

476
00:21:07,430 --> 00:21:04,919
that this is the first time we're seeing

477
00:21:09,830 --> 00:21:07,440
something like this so set SWAT apart

478
00:21:12,529 --> 00:21:09,840
from previous uh satellites yeah it's

479
00:21:13,669 --> 00:21:12,539
all about this spatial resolution and

480
00:21:16,370 --> 00:21:13,679
the coverage

481
00:21:19,430 --> 00:21:16,380
for instance the footprint of the radar

482
00:21:22,490 --> 00:21:19,440
on SWAT is a thousand times smaller than

483
00:21:25,310 --> 00:21:22,500
conventional altimeter making this

484
00:21:29,830 --> 00:21:25,320
special resolution of SWAT much much

485
00:21:33,830 --> 00:21:29,840
higher and also it will cover all the

486
00:21:36,950 --> 00:21:33,840
ocean and the surface water without any

487
00:21:39,350 --> 00:21:36,960
gaps between 78 degrees North and the

488
00:21:41,330 --> 00:21:39,360

South wow wow so we're getting something

489
00:21:43,070 --> 00:21:41,340
we've never seen before and Lee you've

490
00:21:45,350 --> 00:21:43,080
been working on SWAT since the beginning

491
00:21:48,289 --> 00:21:45,360
for 20 years what does it feel like to

492
00:21:52,130 --> 00:21:48,299
be here for launch yeah this mission is

493
00:21:55,669 --> 00:21:52,140
20 years in the making and this is the

494
00:21:59,330 --> 00:21:55,679
fourth satellite Mission I serve as a

495
00:22:01,810 --> 00:21:59,340
project scientist so but this mission is

496
00:22:04,250 --> 00:22:01,820
the most complex and challenging

497
00:22:07,450 --> 00:22:04,260
representing the combination of my 40

498
00:22:10,310 --> 00:22:07,460
plus years career at the JPL working on

499
00:22:13,870 --> 00:22:10,320
oceanography from space so my feeling

500
00:22:17,750 --> 00:22:13,880
now is it's a mixture of excitement

501
00:22:19,310 --> 00:22:17,760
fulfillment and also some anxiety right

502
00:22:21,590 --> 00:22:19,320
he has a little bit of anxiety I know

503
00:22:22,789 --> 00:22:21,600
that you and your team will breathe a

504
00:22:25,190 --> 00:22:22,799
sigh of relief when we're done tonight

505
00:22:26,990 --> 00:22:25,200
absolutely fantastically thank you so

506
00:22:29,270 --> 00:22:27,000
much for joining us yeah thank you of

507
00:22:32,029 --> 00:22:29,280
course Raquel back to you

508
00:22:34,010 --> 00:22:32,039
thank you Jasmine and Lee the SWAT

509
00:22:36,710 --> 00:22:34,020
satellite is truly a remarkable

510
00:22:38,630 --> 00:22:36,720
spacecraft earlier I got a chance to

511
00:22:41,510 --> 00:22:38,640
look at it up close with SWAT project

512
00:22:43,909 --> 00:22:41,520
manager parag vase

513
00:22:46,789 --> 00:22:43,919

Prague we're standing here in front of a

514
00:22:49,730 --> 00:22:46,799
one-third scale model of SWAT so can you

515
00:22:51,370 --> 00:22:49,740
tell us a little bit more about the key

516
00:22:55,669 --> 00:22:51,380
scientific instruments on board

517
00:22:58,909 --> 00:22:55,679
absolutely so on this model of course

518
00:23:01,190 --> 00:22:58,919
you see the full spacecraft but the

519
00:23:04,669 --> 00:23:01,200
instrument package is really on this

520
00:23:06,529 --> 00:23:04,679
configuration first featured with our

521
00:23:09,289 --> 00:23:06,539
brand new instrument called the Karen K

522
00:23:11,930 --> 00:23:09,299
Band radar interferometer what makes it

523
00:23:15,470 --> 00:23:11,940
an interferometer is really having a

524
00:23:17,750 --> 00:23:15,480
radar with signals that are transmitted

525
00:23:19,909 --> 00:23:17,760
and received from two separate antennas

526
00:23:22,789 --> 00:23:19,919
that are separated by a large distance

527
00:23:26,149 --> 00:23:22,799
we also need other instruments to make

528
00:23:27,830 --> 00:23:26,159
swap work we have a radar altimeter

529
00:23:30,049 --> 00:23:27,840
which is a more traditional kind of

530
00:23:32,270 --> 00:23:30,059
altimeter gives us precise but very

531
00:23:35,450 --> 00:23:32,280
small strip Maps we have a microwave

532
00:23:37,250 --> 00:23:35,460
radiometer that's used to correct the

533
00:23:39,230 --> 00:23:37,260
altimeter measurement in terms of the

534
00:23:41,149 --> 00:23:39,240
the water vapor as the signal is going

535
00:23:44,690 --> 00:23:41,159
through the Earth's atmosphere and we

536
00:23:46,909 --> 00:23:44,700
also need a set of instrumentation that

537
00:23:49,010 --> 00:23:46,919
that tells us the a very accurate

538
00:23:51,830 --> 00:23:49,020

position of the spacecraft in space

539
00:23:54,289 --> 00:23:51,840
itself we have a GPS receiver that you

540
00:23:57,950 --> 00:23:54,299
don't see here it's inside we have a

541
00:24:00,770 --> 00:23:57,960
Doris system and we have the laser retro

542
00:24:03,649 --> 00:24:00,780
reflector array and can you let us know

543
00:24:06,350 --> 00:24:03,659
how SWAT will communicate

544
00:24:09,110 --> 00:24:06,360
data first of all one type of science

545
00:24:11,930 --> 00:24:09,120
data every day that has to be downlinked

546
00:24:13,909 --> 00:24:11,940
and then processed into products the key

547
00:24:16,970 --> 00:24:13,919
to being able to do that of course is we

548
00:24:19,730 --> 00:24:16,980
have a very large recorder memory

549
00:24:21,710 --> 00:24:19,740
recorder inside the the module here but

550
00:24:23,810 --> 00:24:21,720
then getting it out is is the job of

551
00:24:25,909 --> 00:24:23,820
this antenna system that's the x-band

552
00:24:29,930 --> 00:24:25,919
antenna system that's down linking at

553
00:24:32,750 --> 00:24:29,940
600 megabit per second and we also have

554
00:24:34,570 --> 00:24:32,760
an s-band system that's more for command

555
00:24:38,149 --> 00:24:34,580
and control and basic Mission operations

556
00:24:40,549 --> 00:24:38,159
we obviously can't take a SWAT like this

557
00:24:44,149 --> 00:24:40,559
in space how will it fold and unfold

558
00:24:46,250 --> 00:24:44,159
yeah so uh the whole system is of course

559
00:24:48,470 --> 00:24:46,260
needs to be compact it's folded off to

560
00:24:51,110 --> 00:24:48,480
the side of the payload module that you

561
00:24:53,510 --> 00:24:51,120
see here and it it basically deploys in

562
00:24:55,970 --> 00:24:53,520
three phases one that's first coming up

563
00:24:58,250 --> 00:24:55,980

and then moving out and then the

564
00:25:00,230 --> 00:24:58,260
antennas finally deploying on the side

565
00:25:01,669 --> 00:25:00,240
themselves and then the whole system is

566
00:25:03,409 --> 00:25:01,679
locked in place

567
00:25:05,570 --> 00:25:03,419
it's a very interesting explanation

568
00:25:08,450 --> 00:25:05,580
thank you so much Prague of course happy

569
00:25:13,130 --> 00:25:11,330
time to check in with the launch Team at

570
00:25:15,230 --> 00:25:13,140
the mission director center to see how

571
00:25:17,330 --> 00:25:15,240
the countdown is progressing Megan and

572
00:25:20,510 --> 00:25:17,340
Denton how are we looking

573
00:25:22,610 --> 00:25:20,520
so we are T-minus 21 minutes and 59

574
00:25:24,769 --> 00:25:22,620
seconds and counting until liftoff and

575
00:25:26,330 --> 00:25:24,779
fueling of the SpaceX Falcon 9 uh

576
00:25:28,370 --> 00:25:26,340
continues right something yep it's

577
00:25:30,230 --> 00:25:28,380
continuing it's progressing just fine um

578
00:25:32,690 --> 00:25:30,240
everything is moving along as as it

579
00:25:34,430 --> 00:25:32,700
should great great news so the U.S space

580
00:25:36,230 --> 00:25:34,440
force we know is responsible for the

581
00:25:39,230 --> 00:25:36,240
range you know making sure it's safe to

582
00:25:40,430 --> 00:25:39,240
fly our intended trajectory any concerns

583
00:25:41,510 --> 00:25:40,440
there

584
00:25:42,890 --> 00:25:41,520
um no actually

585
00:25:45,350 --> 00:25:42,900
um the range is green right now

586
00:25:47,450 --> 00:25:45,360
weather's looking good all of the assets

587
00:25:49,190 --> 00:25:47,460
in the correct configuration and so

588
00:25:50,930 --> 00:25:49,200

we're all completely green right now so

589
00:25:53,330 --> 00:25:50,940
talk to me about trajectories you know

590
00:25:55,730 --> 00:25:53,340
that it's not an easy task to design

591
00:25:57,350 --> 00:25:55,740
right that's the way a lot of the real

592
00:25:58,549 --> 00:25:57,360
rocket science is is to design a

593
00:26:00,289 --> 00:25:58,559
trajectory it's basically you're trying

594
00:26:02,450 --> 00:26:00,299
to get from the launch pad to a point in

595
00:26:04,010 --> 00:26:02,460
space and along the way there is some

596
00:26:06,289 --> 00:26:04,020
things you may encounter the other other

597
00:26:07,970 --> 00:26:06,299
orbiting satellites um some debris up

598
00:26:09,710 --> 00:26:07,980
there so you have to make sure you avoid

599
00:26:12,049 --> 00:26:09,720
it and the work that goes into it is

600
00:26:15,409 --> 00:26:12,059
very interesting because the team has a

601
00:26:17,630 --> 00:26:15,419
very detailed uh model of uh analytical

602
00:26:19,430 --> 00:26:17,640
model of how the launch vehicle will

603
00:26:20,930 --> 00:26:19,440
perform and they marry that with

604
00:26:23,149 --> 00:26:20,940
everything that's orbited in Earth and

605
00:26:25,490 --> 00:26:23,159
trying to understand which paths we can

606
00:26:26,870 --> 00:26:25,500
take when we can launch times Etc I mean

607
00:26:28,070 --> 00:26:26,880
there's a lot of work that goes into it

608
00:26:29,630 --> 00:26:28,080
and there's that's where a lot of the

609
00:26:31,130 --> 00:26:29,640
real rocket science is done yeah and

610
00:26:33,350 --> 00:26:31,140
we're talking about years of work right

611
00:26:34,610 --> 00:26:33,360
yes yes in some cases it's you know over

612
00:26:35,930 --> 00:26:34,620
a period of years where you kind of

613
00:26:37,850 --> 00:26:35,940

develop in your trajectory for the

614
00:26:39,230 --> 00:26:37,860
spacecraft and then also develop in the

615
00:26:40,490 --> 00:26:39,240
direction for the launch vehicle so it's

616
00:26:43,549 --> 00:26:40,500
it's a lot of work that goes into it

617
00:26:45,289 --> 00:26:43,559
yeah today's lunch will you know be a

618
00:26:46,970 --> 00:26:45,299
huge moment for a lot of people who have

619
00:26:48,710 --> 00:26:46,980
worked their trajectory who have worked

620
00:26:51,350 --> 00:26:48,720
on this spacecraft who've worked on the

621
00:26:53,930 --> 00:26:51,360
vehicle uh you know it's it's it's many

622
00:26:55,430 --> 00:26:53,940
years of your Hardware yes it's been 20

623
00:26:56,810 --> 00:26:55,440
years since some of the folks who've

624
00:26:58,490 --> 00:26:56,820
worked on the spacecraft has been

625
00:27:00,350 --> 00:26:58,500
working this Mission so I mean it's it's

626
00:27:01,909 --> 00:27:00,360
it's going to be an exciting time for

627
00:27:03,890 --> 00:27:01,919
everybody and now here they can see

628
00:27:05,269 --> 00:27:03,900
again their space spacecraft sitting in

629
00:27:07,070 --> 00:27:05,279
the payload fairing at the top of the

630
00:27:09,110 --> 00:27:07,080
Falcon 9 on on the launch pad here at

631
00:27:11,029 --> 00:27:09,120
Vandenberg uh you know the space force

632
00:27:12,710 --> 00:27:11,039
also monitors the weather for us and

633
00:27:14,210 --> 00:27:12,720
again let's take a look at the weather

634
00:27:17,330 --> 00:27:14,220
graphic we have prepared for you guys

635
00:27:20,990 --> 00:27:17,340
the launch weather officer reporting 100

636
00:27:23,090 --> 00:27:21,000
percent go for launch amazing yes yes

637
00:27:25,730 --> 00:27:23,100
it's very great to see that but we we're

638
00:27:27,830 --> 00:27:25,740

happy to have it absolutely and speaking

639
00:27:29,930 --> 00:27:27,840
of seeing um it seems like we are going

640
00:27:32,330 --> 00:27:29,940
to see the launch today right visibility

641
00:27:34,730 --> 00:27:32,340
is looking amazing you know not not the

642
00:27:37,010 --> 00:27:34,740
typical fog we we usually see here it's

643
00:27:38,390 --> 00:27:37,020
usually foggy here but we're in for a

644
00:27:39,710 --> 00:27:38,400
treat because we actually get some clear

645
00:27:40,789 --> 00:27:39,720
day today so we can actually see the

646
00:27:42,590 --> 00:27:40,799
launch vehicle

647
00:27:44,810 --> 00:27:42,600
yeah and then here we see some of the

648
00:27:46,610 --> 00:27:44,820
venting we were talking about uh you

649
00:27:48,890 --> 00:27:46,620
know we we have to vent right to

650
00:27:50,450 --> 00:27:48,900
maintain the right kind of pressure that

651
00:27:52,130 --> 00:27:50,460
is correct I mean and you just you'll

652
00:27:53,510 --> 00:27:52,140
see this as a normal part of it

653
00:27:54,409 --> 00:27:53,520
um you'll see it kind of cycling on and

654
00:27:55,970 --> 00:27:54,419
off throughout the count just

655
00:27:57,590 --> 00:27:55,980
maintaining um the appropriate pressure

656
00:27:59,390 --> 00:27:57,600
within the tanks and this is venting of

657
00:28:01,490 --> 00:27:59,400
liquid oxygen right that is correct okay

658
00:28:03,529 --> 00:28:01,500
all right so everything is looking good

659
00:28:04,789 --> 00:28:03,539
can't wait to see this launch as we were

660
00:28:07,490 --> 00:28:04,799
talking about so we'll send it back to

661
00:28:10,070 --> 00:28:07,500
you Raquel and Nadia all right thank you

662
00:28:13,190 --> 00:28:10,080
so much Megan and Denton joining us now

663
00:28:15,049 --> 00:28:13,200

on the west coast is Janet Petro the

664
00:28:17,930 --> 00:28:15,059
center director for Kennedy Space Center

665
00:28:19,730 --> 00:28:17,940
on the east coast in Florida thank you

666
00:28:22,730 --> 00:28:19,740
for joining us today Janet thank you

667
00:28:24,649 --> 00:28:22,740
Raquel happy to be here great now most

668
00:28:27,049 --> 00:28:24,659
launches take place at Kennedy but

669
00:28:31,190 --> 00:28:27,059
sometimes like today we launch from

670
00:28:33,049 --> 00:28:31,200
Vandenberg and why is that yeah so the

671
00:28:35,450 --> 00:28:33,059
launch Services Program has multiple

672
00:28:37,310 --> 00:28:35,460
locations where they launch from and so

673
00:28:39,049 --> 00:28:37,320
as you mentioned we're here today on the

674
00:28:42,169 --> 00:28:39,059
California coast and we have several

675
00:28:45,470 --> 00:28:42,179
locations in Florida but also as far

676
00:28:47,330 --> 00:28:45,480
away as Alaska and New Zealand I mean it

677
00:28:49,850 --> 00:28:47,340
generally depends on the science Mission

678
00:28:52,070 --> 00:28:49,860
itself right the science Mission and

679
00:28:55,330 --> 00:28:52,080
ultimately the orbit that it needs to be

680
00:28:58,130 --> 00:28:55,340
in to conduct its science so in general

681
00:29:01,010 --> 00:28:58,140
we launched from the East Coast when we

682
00:29:02,390 --> 00:29:01,020
need an equatorial Mission and then in

683
00:29:04,190 --> 00:29:02,400
the case of today where we're looking

684
00:29:06,769 --> 00:29:04,200
more at the polar missions we generally

685
00:29:08,269 --> 00:29:06,779
launch out of the West Coast here at

686
00:29:11,269 --> 00:29:08,279
Vandenberg

687
00:29:13,490 --> 00:29:11,279
and tell us more about the Kennedy Space

688
00:29:16,010 --> 00:29:13,500

Center involvement in launches here at

689
00:29:18,830 --> 00:29:16,020
Vandenberg so the Kennedy Space Center

690
00:29:21,230 --> 00:29:18,840
we are very very proud to host the

691
00:29:25,789 --> 00:29:21,240
launch Services Program and we've been

692
00:29:27,710 --> 00:29:25,799
doing so since 1998 and that program I'm

693
00:29:30,289 --> 00:29:27,720
very proud of that program I tend to

694
00:29:32,570 --> 00:29:30,299
think of them as the world renowned

695
00:29:35,510 --> 00:29:32,580
experts in launch vehicles and they

696
00:29:37,250 --> 00:29:35,520
really really do understand all of the

697
00:29:40,570 --> 00:29:37,260
launch vehicles and provide a great

698
00:29:43,130 --> 00:29:40,580
service to our age to our agency

699
00:29:45,649 --> 00:29:43,140
they really do the end-to-end services

700
00:29:47,029 --> 00:29:45,659
on on launching a mission you know

701
00:29:50,389 --> 00:29:47,039
they'll work with the spacecraft

702
00:29:52,549 --> 00:29:50,399
providers I work on the the design they

703
00:29:54,590 --> 00:29:52,559
provide data at Telemetry and then like

704
00:29:56,930 --> 00:29:54,600
you know today we're providing the um

705
00:29:59,389 --> 00:29:56,940
the launch Services emission Assurance

706
00:30:01,610 --> 00:29:59,399
for each of the missions and like I said

707
00:30:03,950 --> 00:30:01,620
they've been doing it since 1998 they do

708
00:30:06,230 --> 00:30:03,960
a really really great job wherever

709
00:30:09,230 --> 00:30:06,240
whatever location the mission is going

710
00:30:10,909 --> 00:30:09,240
out of so very very proud of that proud

711
00:30:20,090 --> 00:30:10,919
of that program and we host them out of

712
00:30:26,450 --> 00:30:22,130
so focused on this year you know we just

713
00:30:28,250 --> 00:30:26,460

had the jpss2 and lofted and now the um

714
00:30:30,950 --> 00:30:28,260
and now what we're doing today with SWAT

715
00:30:33,590 --> 00:30:30,960
I'm trying to think next year we have a

716
00:30:36,230 --> 00:30:33,600
little bit of a break until uh April

717
00:30:38,990 --> 00:30:36,240
coming up we did earlier this year

718
00:30:41,510 --> 00:30:39,000
launch the ghost Mission

719
00:30:44,269 --> 00:30:41,520
um yeah I can't and you know of course

720
00:30:46,130 --> 00:30:44,279
the um yeah other missions outside of

721
00:30:47,750 --> 00:30:46,140
the launch Services Program of course we

722
00:30:50,149 --> 00:30:47,760
do the the crew to the International

723
00:30:52,430 --> 00:30:50,159
Space Station we do the cargo to the

724
00:30:54,889 --> 00:30:52,440
International Space Station and you know

725
00:30:57,970 --> 00:30:54,899
we just came from our big mission was

726
00:31:00,049 --> 00:30:57,980
Artemis and very very proud to get that

727
00:31:02,750 --> 00:31:00,059
launched out of our patent you know we

728
00:31:04,750 --> 00:31:02,760
just recovered the vehicle down in San

729
00:31:07,730 --> 00:31:04,760
Diego and that was an incredible

730
00:31:09,769 --> 00:31:07,740
experience the exploration ground

731
00:31:11,930 --> 00:31:09,779
systems program down at Kennedy they're

732
00:31:16,010 --> 00:31:11,940
the ones responsible for the front end

733
00:31:18,289 --> 00:31:16,020
the launch piece of that program and

734
00:31:19,789 --> 00:31:18,299
then the recovery operation here on the

735
00:31:23,149 --> 00:31:19,799
West Coast and they did a really

736
00:31:25,490 --> 00:31:23,159
outstanding job we had a tremendously

737
00:31:27,470 --> 00:31:25,500
busy year at the Kennedy Space Center

738
00:31:29,930 --> 00:31:27,480

and it's our I like to say it's our

739
00:31:33,230 --> 00:31:29,940
diamond anniversary our 60th anniversary

740
00:31:36,289 --> 00:31:33,240
so it was a great way to really cap off

741
00:31:39,649 --> 00:31:36,299
the year with Artemis and now ending

742
00:31:40,430 --> 00:31:39,659
with the uh SWAT program here tonight we

743
00:31:42,769 --> 00:31:40,440
had

744
00:31:44,570 --> 00:31:42,779
um a record number of launches where

745
00:31:47,090 --> 00:31:44,580
some we're at like something like 53

746
00:31:49,789 --> 00:31:47,100
launches that we supported from the east

747
00:31:52,130 --> 00:31:49,799
coast and our Center supports whether

748
00:31:54,110 --> 00:31:52,140
Launches on our property Kennedy Space

749
00:31:56,210 --> 00:31:54,120
Center property or on the space force

750
00:31:58,730 --> 00:31:56,220
property at Cape Canaveral we provide

751
00:32:00,830 --> 00:31:58,740
all kinds of services whether it's our

752
00:32:04,070 --> 00:32:00,840
propellant services or standing up our

753
00:32:07,310 --> 00:32:04,080
EOC and so if you think about that 53

754
00:32:10,630 --> 00:32:07,320
launches that's about fantastic one a

755
00:32:13,430 --> 00:32:10,640
week thank you Janet so much

756
00:32:15,409 --> 00:32:13,440
anniversary now there is a growing

757
00:32:18,350 --> 00:32:15,419
community of scientists eager to use

758
00:32:21,409 --> 00:32:18,360
SWOT data let's go to Jasmine live at

759
00:32:23,570 --> 00:32:21,419
the Hawks Nest to meet one of them

760
00:32:25,370 --> 00:32:23,580
yes Rock Hill that is right I'm here

761
00:32:28,490 --> 00:32:25,380
with somebody who is also eager to get

762
00:32:31,130 --> 00:32:28,500
his hands on that SWAT data Toby Minier

763
00:32:33,889 --> 00:32:31,140

with the series group from CU Boulder in

764
00:32:35,750 --> 00:32:33,899
Colorado welcome Toby thank you glad to

765
00:32:38,210 --> 00:32:35,760
be here we are so glad to have you here

766
00:32:40,070 --> 00:32:38,220
you are a research hydrologist with that

767
00:32:43,070 --> 00:32:40,080
group so can you tell me what are some

768
00:32:44,930 --> 00:32:43,080
of the applications of SWAT well SWAT is

769
00:32:46,909 --> 00:32:44,940
amazing because it has a really unique

770
00:32:49,310 --> 00:32:46,919
capability of measuring water levels

771
00:32:51,470 --> 00:32:49,320
over a big area and so for people that

772
00:32:53,330 --> 00:32:51,480
are water managers in particular there's

773
00:32:54,230 --> 00:32:53,340
a lot of excitement there because we

774
00:32:56,389 --> 00:32:54,240
really don't have this kind of

775
00:32:58,310 --> 00:32:56,399
capability at present we have to do

776
00:32:59,690 --> 00:32:58,320
these things from the field individual

777
00:33:01,389 --> 00:32:59,700
Point measurements and things like that

778
00:33:03,470 --> 00:33:01,399
that are very hard to make in the field

779
00:33:05,810 --> 00:33:03,480
and so we have a lot of interest from

780
00:33:09,649 --> 00:33:05,820
people that are like Municipal Water

781
00:33:12,529 --> 00:33:09,659
agencies state agencies for Dam safety

782
00:33:13,909 --> 00:33:12,539
federal agencies all really interested

783
00:33:15,710 --> 00:33:13,919
in getting their hands on some water

784
00:33:19,190 --> 00:33:15,720
level data in particular and storage

785
00:33:21,110 --> 00:33:19,200
change so be very exciting to see it it

786
00:33:22,850 --> 00:33:21,120
is very exciting and really what I hear

787
00:33:24,409 --> 00:33:22,860
you saying is that SWAT is changing the

788
00:33:26,630 --> 00:33:24,419

game so what are some of those specific

789
00:33:28,310 --> 00:33:26,640
applications maybe agriculture or you

790
00:33:30,649 --> 00:33:28,320
know flood zones how is it changing our

791
00:33:32,509 --> 00:33:30,659
lives in our own backyard yeah well so a

792
00:33:34,549 --> 00:33:32,519
few things that will change are um so

793
00:33:35,930 --> 00:33:34,559
for example flood risk we really don't

794
00:33:38,570 --> 00:33:35,940
have a good sense of where flooding

795
00:33:41,630 --> 00:33:38,580
occurs and when and why um so how much

796
00:33:44,149 --> 00:33:41,640
water requires a flooding to occur

797
00:33:45,830 --> 00:33:44,159
um so for example a good place for that

798
00:33:48,169 --> 00:33:45,840
is on the coast we don't really have

799
00:33:50,990 --> 00:33:48,179
very many gauges along the coast at the

800
00:33:52,850 --> 00:33:51,000
fresh water and saltwater interface and

801
00:33:54,529 --> 00:33:52,860
so uh yeah I think we'll see a lot of

802
00:33:57,950 --> 00:33:54,539
changes there a lot of changes Inland

803
00:33:59,690 --> 00:33:57,960
for lakes and wetlands too wow it's

804
00:34:01,009 --> 00:33:59,700
really exciting and I understand Toby

805
00:34:03,529 --> 00:34:01,019
you're also in this group called The

806
00:34:05,450 --> 00:34:03,539
Early adopters what is that and who's in

807
00:34:08,510 --> 00:34:05,460
that uh yeah so the early adopters group

808
00:34:10,369 --> 00:34:08,520
is about 25 different organizations they

809
00:34:12,050 --> 00:34:10,379
come from all over the world and these

810
00:34:13,129 --> 00:34:12,060
are people that are interested in swat

811
00:34:15,169 --> 00:34:13,139
data they've heard sort of Through the

812
00:34:17,810 --> 00:34:15,179
Grapevine that there's some data coming

813
00:34:19,490 --> 00:34:17,820

out for water level data and these are

814
00:34:20,750 --> 00:34:19,500
agencies that are non-governmental

815
00:34:22,849 --> 00:34:20,760
organizations there are governmental

816
00:34:25,310 --> 00:34:22,859
organizations right ranging from City

817
00:34:27,409 --> 00:34:25,320
level water agencies up to federal

818
00:34:29,389 --> 00:34:27,419
agencies so a lot of excitement there

819
00:34:30,770 --> 00:34:29,399
from the water Community right very

820
00:34:33,589 --> 00:34:30,780
exciting Toby thank you so much for

821
00:34:36,290 --> 00:34:33,599
joining us Raquel back to you

822
00:34:37,970 --> 00:34:36,300
thank you so much this will be the last

823
00:34:39,770 --> 00:34:37,980
launch for NASA's associate

824
00:34:43,129 --> 00:34:39,780
administrator for the science Mission

825
00:34:45,889 --> 00:34:43,139
directorate Thomas zerbukin during

826
00:34:47,750 --> 00:34:45,899
Thomas's six years in the role he has

827
00:34:51,169 --> 00:34:47,760
overseen nearly a hundred science

828
00:34:53,869 --> 00:34:51,179
missions including SWAT Dart the double

829
00:34:57,530 --> 00:34:53,879
asteroid redirection test the Mars 2020

830
00:35:00,170 --> 00:34:57,540
Mission and the James Webb Telescope he

831
00:35:03,470 --> 00:35:00,180
also co-authored and authored more than

832
00:35:05,530 --> 00:35:03,480
200 articles and received many agency

833
00:35:08,089 --> 00:35:05,540
Awards congratulations Thomas

834
00:35:11,470 --> 00:35:08,099
congratulations Thomas yes Thomas will

835
00:35:14,870 --> 00:35:11,480
be missed he is known for his energy

836
00:35:16,550 --> 00:35:14,880
digication and scientific curiosity uh

837
00:35:18,710 --> 00:35:16,560
when I was doing my first lunch with him

838
00:35:20,329 --> 00:35:18,720

Sentinel six Mike Frey it was very

839
00:35:22,970 --> 00:35:20,339
supportive so yeah it's almost will be

840
00:35:26,210 --> 00:35:22,980
missed but congratulations enjoy well

841
00:35:28,790 --> 00:35:26,220
deserved absolutely enjoy that now the

842
00:35:31,430 --> 00:35:28,800
president of France's space agency canes

843
00:35:35,089 --> 00:35:31,440
Philippe Batiste sent us this message

844
00:35:40,790 --> 00:35:38,569
the result of NASA and create historic

845
00:35:43,250 --> 00:35:40,800
partnership in oceanography that all

846
00:35:45,890 --> 00:35:43,260
started more than 30 years ago we

847
00:35:48,770 --> 00:35:45,900
stopped Exposition is really essential

848
00:35:51,470 --> 00:35:48,780
and I am very proud to send you this

849
00:35:53,930 --> 00:35:51,480
message and to be with you at least in

850
00:35:56,450 --> 00:35:53,940
spirit for this Lounge I want to say

851
00:35:58,730 --> 00:35:56,460
once again a few words how proud class

852
00:36:00,650 --> 00:35:58,740
and its team are to be involved in this

853
00:36:04,310 --> 00:36:00,660
ambitious International Adventure

854
00:36:06,109 --> 00:36:04,320
alongside NASA SWOT is the first space

855
00:36:08,750 --> 00:36:06,119
mission to survey the planet's

856
00:36:11,530 --> 00:36:08,760
freshwater resources on a global scale

857
00:36:14,870 --> 00:36:11,540
the water elevation of lakes and water

858
00:36:17,870 --> 00:36:14,880
horses the discharge of rivers and the

859
00:36:20,089 --> 00:36:17,880
fine dynamics of the ocean are all vital

860
00:36:22,550 --> 00:36:20,099
data that are going to help us better

861
00:36:25,310 --> 00:36:22,560
adapt to climate change

862
00:36:27,950 --> 00:36:25,320
in this respects what truly marks a

863
00:36:29,810 --> 00:36:27,960

revolution for space hydrology and we

864
00:36:31,910 --> 00:36:29,820
are proud to be embarking on this

865
00:36:34,430 --> 00:36:31,920
endeavor with the French community of

866
00:36:36,109 --> 00:36:34,440
scientists of users and of course with

867
00:36:39,290 --> 00:36:36,119
our industry

868
00:36:41,410 --> 00:36:39,300
I wish you a successful launch and goes

869
00:36:45,050 --> 00:36:41,420
what go

870
00:36:47,270 --> 00:36:45,060
go SWAT climate change is a topic front

871
00:36:49,910 --> 00:36:47,280
and center for everyone including NASA

872
00:36:51,710 --> 00:36:49,920
joining us now is NASA's Sandra Conley

873
00:36:54,230 --> 00:36:51,720
thank you for joining us Sandra thank

874
00:36:56,089 --> 00:36:54,240
you for having me now as a leader in

875
00:36:58,430 --> 00:36:56,099
science what does it mean to be part of

876
00:36:59,930 --> 00:36:58,440
this Mission oh man this is such an

877
00:37:02,690 --> 00:36:59,940
exciting Mission you know it's

878
00:37:05,089 --> 00:37:02,700
unprecedented in many ways it's going to

879
00:37:07,430 --> 00:37:05,099
be the mission that for the first time

880
00:37:10,250 --> 00:37:07,440
ever we're measuring surface water

881
00:37:13,069 --> 00:37:10,260
around the world fresh water sources

882
00:37:15,290 --> 00:37:13,079
salt water sources how they ebb and flow

883
00:37:17,210 --> 00:37:15,300
and and move in between each other how

884
00:37:19,130 --> 00:37:17,220
the energy is transferred across those

885
00:37:20,990 --> 00:37:19,140
water bodies and also with the

886
00:37:23,329 --> 00:37:21,000
environment is really going to help us

887
00:37:25,370 --> 00:37:23,339
improve our weather forecasting ability

888
00:37:28,190 --> 00:37:25,380

and our climate prediction abilities

889
00:37:30,470 --> 00:37:28,200
real Trailblazer now SWAT is a joint

890
00:37:32,630 --> 00:37:30,480
Mission between NASA and Canes climate

891
00:37:34,370 --> 00:37:32,640
change Knows No Boundaries so why is it

892
00:37:37,609 --> 00:37:34,380
important for a mission to be an

893
00:37:40,069 --> 00:37:37,619
international collaboration so science

894
00:37:41,750 --> 00:37:40,079
Knows No Boundaries right so our

895
00:37:43,970 --> 00:37:41,760
scientists are from all around the world

896
00:37:46,849 --> 00:37:43,980
and this partnership with kness is

897
00:37:49,670 --> 00:37:46,859
tremendously important it spans over 30

898
00:37:50,870 --> 00:37:49,680
years on Ocean ultimatry missions and

899
00:37:52,730 --> 00:37:50,880
that's not even counting other

900
00:37:55,430 --> 00:37:52,740
Partnerships that we have with with

901
00:37:56,930 --> 00:37:55,440
kness to achieve our science so we're

902
00:37:59,329 --> 00:37:56,940
looking forward to many many more

903
00:38:02,329 --> 00:37:59,339
missions together with them

904
00:38:04,310 --> 00:38:02,339
well uh Sandra is he knows what is the

905
00:38:05,990 --> 00:38:04,320
first science team that fully compliance

906
00:38:08,329 --> 00:38:06,000
with open science requirement can you

907
00:38:11,030 --> 00:38:08,339
tell us more about NASA's open sign

908
00:38:13,010 --> 00:38:11,040
Paradigm and how do we kick off the year

909
00:38:15,050 --> 00:38:13,020
of open science with what you know

910
00:38:16,069 --> 00:38:15,060
that's a great question

911
00:38:18,589 --> 00:38:16,079
um

912
00:38:20,750 --> 00:38:18,599
so

913
00:38:22,670 --> 00:38:20,760

our state satellites give us a really

914
00:38:25,910 --> 00:38:22,680
unique vantage point to observe the

915
00:38:30,589 --> 00:38:25,920
Earth right so we're able to look at it

916
00:38:32,510 --> 00:38:30,599
as a global system right and and the um

917
00:38:35,270 --> 00:38:32,520
the data that we've collected through

918
00:38:38,630 --> 00:38:35,280
our satellites over the 50 years allow

919
00:38:41,690 --> 00:38:38,640
us to really look at the the ground the

920
00:38:43,670 --> 00:38:41,700
atmosphere and the oceans and what open

921
00:38:45,410 --> 00:38:43,680
science and open data is going to enable

922
00:38:47,810 --> 00:38:45,420
us to do is to take that to the next

923
00:38:50,390 --> 00:38:47,820
level and give it to the individual user

924
00:38:52,970 --> 00:38:50,400
whether they're decision makers at the

925
00:38:55,010 --> 00:38:52,980
local level at the regional level or

926
00:38:57,589 --> 00:38:55,020
even tribal communities is to give that

927
00:38:59,750 --> 00:38:57,599
information to people so that they can

928
00:39:01,490 --> 00:38:59,760
make informed decisions regardless of

929
00:39:03,109 --> 00:39:01,500
their business you don't need to

930
00:39:05,270 --> 00:39:03,119
actually be a scientist or an engineer

931
00:39:07,190 --> 00:39:05,280
moving forward to be able to leverage

932
00:39:08,990 --> 00:39:07,200
this data and apply it to your

933
00:39:11,210 --> 00:39:09,000
day-to-day business looking forward to

934
00:39:11,990 --> 00:39:11,220
the data thank you so much Sandra thank

935
00:39:16,730 --> 00:39:12,000
you

936
00:39:21,470 --> 00:39:16,740
now let's head over to our commentators

937
00:39:23,450 --> 00:39:21,480
we are T minus seven minutes our launch

938
00:39:25,730 --> 00:39:23,460

of the Falcon 9 rocket from Vandenberg

939
00:39:27,710 --> 00:39:25,740
space Force Base Megan and Denton will

940
00:39:29,990 --> 00:39:27,720
navigate us through that terminal count

941
00:39:31,849 --> 00:39:30,000
yeah just under eight minutes to lift

942
00:39:34,190 --> 00:39:31,859
off and we are looking fantastic for

943
00:39:36,170 --> 00:39:34,200
Launch Weather is a go uh no Collision

944
00:39:39,230 --> 00:39:36,180
concerns on the range for our

945
00:39:43,550 --> 00:39:39,240
instantaneous opportunity to launch at 3

946
00:39:45,349 --> 00:39:43,560
46 and 47 seconds Pacific time we see a

947
00:39:47,270 --> 00:39:45,359
live shot of the Falcon 9 sitting on

948
00:39:50,329 --> 00:39:47,280
launch pad four East here at Vandenberg

949
00:39:53,870 --> 00:39:50,339
space Force Base this reusable two-stage

950
00:39:56,089 --> 00:39:53,880
rocket standing about 230 feet tall the

951
00:39:57,230 --> 00:39:56,099
first stage is the bottom two-thirds of

952
00:40:00,230 --> 00:39:57,240
what you see there that's called the

953
00:40:02,150 --> 00:40:00,240
booster uh and then at the uh right over

954
00:40:04,069 --> 00:40:02,160
that you see this black piece there

955
00:40:06,410 --> 00:40:04,079
that's the interstage adapter which

956
00:40:08,150 --> 00:40:06,420
connects the first and second stage and

957
00:40:11,329 --> 00:40:08,160
then at the very top the payload Fairing

958
00:40:14,150 --> 00:40:11,339
and you see SWAT uh painted on there

959
00:40:16,849 --> 00:40:14,160
SWAT is touch safely inside of it fold

960
00:40:19,310 --> 00:40:16,859
it up to about the size of a midsize car

961
00:40:21,710 --> 00:40:19,320
engine chill

962
00:40:23,569 --> 00:40:21,720
and we just heard the call out first for

963
00:40:25,490 --> 00:40:23,579

a stage one engine shield and and

964
00:40:27,710 --> 00:40:25,500
basically what that is is just the

965
00:40:29,810 --> 00:40:27,720
getting the engine ready for the flow of

966
00:40:31,130 --> 00:40:29,820
the cola temperatures so it's kind of

967
00:40:32,990 --> 00:40:31,140
like if you imagine if you were to jump

968
00:40:34,250 --> 00:40:33,000
in a really cold pool and you you know

969
00:40:36,589 --> 00:40:34,260
your muscles tense up and everything

970
00:40:38,329 --> 00:40:36,599
else and you we don't necessarily want

971
00:40:41,150 --> 00:40:38,339
that with the engine so we slowly start

972
00:40:43,250 --> 00:40:41,160
to bleed in those um liquid oxygen to

973
00:40:44,930 --> 00:40:43,260
kind of bring it down to the temperature

974
00:40:45,950 --> 00:40:44,940
that it'll be seeing during flight so

975
00:40:47,870 --> 00:40:45,960
that's and that's really what that is

976
00:40:50,690 --> 00:40:47,880
it's really preserving

977
00:40:53,270 --> 00:40:50,700
um the stress on the engines and is

978
00:40:55,190 --> 00:40:53,280
getting ready for flight yeah that was a

979
00:40:58,130 --> 00:40:55,200
great analogy so yeah yeah you made me

980
00:41:00,530 --> 00:40:58,140
cold thinking about it so we see some of

981
00:41:02,450 --> 00:41:00,540
that liquid oxygen venting off now both

982
00:41:04,250 --> 00:41:02,460
the first and second stages right yeah

983
00:41:06,230 --> 00:41:04,260
and that and you're seeing that because

984
00:41:08,750 --> 00:41:06,240
the Boost is very very cool because that

985
00:41:10,370 --> 00:41:08,760
liquid oxygen is inside there and um

986
00:41:12,470 --> 00:41:10,380
soon you hear the call out for stage one

987
00:41:15,589 --> 00:41:12,480
RP Road weeks they're wrapping up um

988
00:41:17,030 --> 00:41:15,599

fueling of the stage of the stage one

989
00:41:20,210 --> 00:41:17,040
right now and so we should hit a call

990
00:41:27,710 --> 00:41:22,970
stage one lock load is complete

991
00:41:34,490 --> 00:41:32,089
into both stages and we'll can

992
00:41:36,230 --> 00:41:34,500
we'll continue to top off until about a

993
00:41:38,510 --> 00:41:36,240
minute and a half before launch uh

994
00:41:40,670 --> 00:41:38,520
Falcon 9 uses helium as a precious

995
00:41:43,310 --> 00:41:40,680
meaning it uses helium to maintain

996
00:41:46,670 --> 00:41:43,320
pressure in the tanks as liquid oxygen

997
00:41:49,010 --> 00:41:46,680
and rp1 are consumed by the engines

998
00:41:51,410 --> 00:41:49,020
during ascent

999
00:41:54,290 --> 00:41:51,420
the first stage has nine Merlin engines

1000
00:41:56,990 --> 00:41:54,300
hence the name falcon 9. the second

1001
00:41:59,690 --> 00:41:57,000
stage has a single Merlin vacuum or mvac

1002
00:42:03,230 --> 00:41:59,700
engine so you'll often hear references

1003
00:42:07,609 --> 00:42:05,930
next call out will come in just a couple

1004
00:42:10,310 --> 00:42:07,619
of seconds you'll hear that the

1005
00:42:12,109 --> 00:42:10,320
spacecraft is on internal power and

1006
00:42:13,730 --> 00:42:12,119
configured for a launch that just means

1007
00:42:16,310 --> 00:42:13,740
that the spacecraft is now running on

1008
00:42:19,550 --> 00:42:16,320
batteries versus getting power from the

1009
00:42:22,730 --> 00:42:21,050
tanks are pressing for strong back

1010
00:42:24,890 --> 00:42:22,740
retract

1011
00:42:26,630 --> 00:42:24,900
and the strong back is getting ready to

1012
00:42:28,670 --> 00:42:26,640
retract the strong back is that

1013
00:42:30,589 --> 00:42:28,680

mechanical structure you see

1014
00:42:32,630 --> 00:42:30,599
um just just to the right of the vehicle

1015
00:42:34,010 --> 00:42:32,640
and they're just pressing up the tanks

1016
00:42:36,349 --> 00:42:34,020
and getting ready for that you'll see it

1017
00:42:37,970 --> 00:42:36,359
tilt back slightly initially and then

1018
00:42:40,670 --> 00:42:37,980
when we get close to the launch you will

1019
00:42:42,349 --> 00:42:40,680
see it tilt about 45 degrees back

1020
00:42:44,690 --> 00:42:42,359
um get out of the way so you know the

1021
00:42:47,870 --> 00:42:44,700
clock and I can clear the pad with no

1022
00:42:51,670 --> 00:42:47,880
issues and that tilt starts when you see

1023
00:42:54,470 --> 00:42:51,680
that cradle it's kind of like uh a hug

1024
00:42:56,690 --> 00:42:54,480
around just at the base of the payload

1025
00:42:58,910 --> 00:42:56,700
fairing Veil you'll see those arms start

1026
00:43:01,069 --> 00:42:58,920
to open and that will allow for the

1027
00:43:05,089 --> 00:43:01,079
strong back to start tilting backwards

1028
00:43:09,109 --> 00:43:07,069
and you can see from the video you can

1029
00:43:11,329 --> 00:43:09,119
see that that cradles opening up and

1030
00:43:12,829 --> 00:43:11,339
then you'll see uh a few seconds after

1031
00:43:14,569 --> 00:43:12,839
that's completed you know the strong

1032
00:43:15,950 --> 00:43:14,579
back until back slightly

1033
00:43:19,069 --> 00:43:15,960
and now we're going to pause For an

1034
00:43:31,069 --> 00:43:19,079
upcoming poll here

1035
00:43:31,079 --> 00:43:34,970
MLM copies

1036
00:43:40,849 --> 00:43:37,790
nlm is the launch manager

1037
00:43:44,329 --> 00:43:40,859
for this Mission NASA's launch manager

1038
00:43:48,050 --> 00:43:46,670

again we see that strong back retracting

1039
00:43:51,109 --> 00:43:48,060
and you see those connections between

1040
00:43:53,510 --> 00:43:51,119
the strong back and the rocket those are

1041
00:43:56,690 --> 00:43:53,520
umbilicals and that's what continues to

1042
00:43:59,510 --> 00:43:56,700
feed the rocket with liquid electricity

1043
00:44:02,329 --> 00:43:59,520
gases right up until launch right that

1044
00:44:04,250 --> 00:44:02,339
is correct and um what what we're

1045
00:44:06,050 --> 00:44:04,260
waiting to hear right now is just the

1046
00:44:07,670 --> 00:44:06,060
SpaceX team confirming with the NASA

1047
00:44:10,550 --> 00:44:07,680
launch manager that the team team is

1048
00:44:13,550 --> 00:44:10,560
ready to go and so the nlm count now one

1049
00:44:14,390 --> 00:44:13,560
facility go ahead NASA is go for SWAT

1050
00:44:16,190 --> 00:44:14,400
launch

1051
00:44:19,490 --> 00:44:16,200
but

1052
00:44:21,349 --> 00:44:19,500
there you go perfect news complete

1053
00:44:23,329 --> 00:44:21,359
stage one Pogo

1054
00:44:25,730 --> 00:44:23,339
yep and you heard the team is all good

1055
00:44:27,770 --> 00:44:25,740
good to go and so right now stage one

1056
00:44:29,870 --> 00:44:27,780
lock slow is complete um at this point

1057
00:44:31,250 --> 00:44:29,880
in time the stage one is completely fill

1058
00:44:33,290 --> 00:44:31,260
the fuel we're just waiting for them to

1059
00:44:34,730 --> 00:44:33,300
top off the stage two tank and today

1060
00:44:37,010 --> 00:44:34,740
we're going to be treated to some Sonic

1061
00:44:38,870 --> 00:44:37,020
booms since the booster will land right

1062
00:44:40,849 --> 00:44:38,880
back here at Vandenberg space Force Base

1063
00:44:43,309 --> 00:44:40,859

just about a thousand feet from where

1064
00:44:45,950 --> 00:44:43,319
it's gonna launch yes which is always

1065
00:44:47,710 --> 00:44:45,960
exciting to see I mean it's just so

1066
00:44:50,150 --> 00:44:47,720
fascinating that the Boost is gonna land

1067
00:44:51,290 --> 00:44:50,160
basically RIT doesn't very close to

1068
00:44:53,270 --> 00:44:51,300
where it took off from

1069
00:44:55,309 --> 00:44:53,280
yeah that's gonna be great and as you

1070
00:44:58,010 --> 00:44:55,319
said again because visibility so Grace

1071
00:44:59,329 --> 00:44:58,020
great we won't won't just see the launch

1072
00:45:01,250 --> 00:44:59,339
we're also going to see that booster

1073
00:45:03,170 --> 00:45:01,260
coming back to land yeah it is it's

1074
00:45:05,630 --> 00:45:03,180
taking everything I have to stay inside

1075
00:45:08,450 --> 00:45:05,640
and not go outside and see this no you

1076
00:45:10,370 --> 00:45:08,460
have to sit in here with me and in these

1077
00:45:12,589 --> 00:45:10,380
last few minutes Falcon 9 is performing

1078
00:45:14,750 --> 00:45:12,599
final health checks uh on its primary

1079
00:45:16,970 --> 00:45:14,760
Communications avionics and propulsion

1080
00:45:20,089 --> 00:45:16,980
systems in preparation for flight this

1081
00:45:22,250 --> 00:45:20,099
is the rock range is green

1082
00:45:25,790 --> 00:45:22,260
and we just heard that call out that the

1083
00:45:29,210 --> 00:45:27,589
and we should surely we should be

1084
00:45:31,309 --> 00:45:29,220
hearing the call out for that uh stage

1085
00:45:32,930 --> 00:45:31,319
two locks load is complete and at that

1086
00:45:34,089 --> 00:45:32,940
point all of the propellants will be

1087
00:45:36,349 --> 00:45:34,099
loaded on today

1088
00:45:38,270 --> 00:45:36,359

you just heard that call out so all the

1089
00:45:40,190 --> 00:45:38,280
propellants are done loading and at this

1090
00:45:42,230 --> 00:45:40,200
point in time we're just getting gearing

1091
00:45:44,569 --> 00:45:42,240
up for the Falcon 9 to go into startup

1092
00:45:46,609 --> 00:45:44,579
which is basically the computer taking

1093
00:45:48,470 --> 00:45:46,619
over and going through its last set of

1094
00:45:50,089 --> 00:45:48,480
configurations and checks to make sure

1095
00:45:51,829 --> 00:45:50,099
that we're good for launch

1096
00:45:53,809 --> 00:45:51,839
um leading into t0

1097
00:45:56,329 --> 00:45:53,819
and remember how Dunson was telling us

1098
00:45:58,910 --> 00:45:56,339
earlier you know we see uh the amount of

1099
00:46:01,309 --> 00:45:58,920
liquid oxygen coming off of of the

1100
00:46:03,349 --> 00:46:01,319
rocket fluctuating throughout the counts

1101
00:46:05,150 --> 00:46:03,359
here that's what we're seeing again to

1102
00:46:07,130 --> 00:46:05,160
maintain that pressure the correct

1103
00:46:09,050 --> 00:46:07,140
pressure in both stages yep and what

1104
00:46:11,569 --> 00:46:09,060
you're seeing right now is them venting

1105
00:46:12,650 --> 00:46:11,579
the locks that was in the

1106
00:46:14,510 --> 00:46:12,660
the

1107
00:46:16,010 --> 00:46:14,520
umbilical Tower diet so I was venting

1108
00:46:17,569 --> 00:46:16,020
that out getting it all ready for to go

1109
00:46:19,250 --> 00:46:17,579
for life nine is in startup and

1110
00:46:20,930 --> 00:46:19,260
we just heard that call up Falcon 9s and

1111
00:46:23,150 --> 00:46:20,940
startup which means the flight computer

1112
00:46:25,370 --> 00:46:23,160
is taking over and it's just preparing

1113
00:46:28,910 --> 00:46:25,380

for its initial long sequence and now

1114
00:46:30,530 --> 00:46:28,920
both stages are pressurizing for launch

1115
00:46:35,809 --> 00:46:30,540
next call out in just a couple of

1116
00:46:40,970 --> 00:46:38,630
director go for launch

1117
00:46:53,569 --> 00:46:40,980
SpaceX launch director confirming go for

1118
00:46:57,829 --> 00:46:55,910
this launch will Mark the 100th first

1119
00:47:01,910 --> 00:46:57,839
mission of NASA's launch Services

1120
00:47:05,990 --> 00:47:01,920
Program they set Kennedy Space Center

1121
00:47:10,250 --> 00:47:09,230
nine eight seven

1122
00:47:15,589 --> 00:47:10,260
six

1123
00:47:19,190 --> 00:47:15,599
five four three two one

1124
00:47:22,130 --> 00:47:19,200
engine ignition and the liftoff liftoff

1125
00:47:24,530 --> 00:47:22,140
of SWAT our first Global survey of

1126
00:47:26,870 --> 00:47:24,540
Earth's surface water to study how this

1127
00:47:27,290 --> 00:47:26,880
ever-changing resource affects our

1128
00:47:34,790 --> 00:47:27,300
climate

1129
00:47:39,589 --> 00:47:37,430
and there we get a nice view

1130
00:47:42,170 --> 00:47:39,599
from the ground camera and also we will

1131
00:47:44,390 --> 00:47:42,180
switch to the onboard camera

1132
00:47:45,950 --> 00:47:44,400
now Dunson you didn't go outside to see

1133
00:47:47,390 --> 00:47:45,960
the launch but now we're feeling it

1134
00:47:49,309 --> 00:47:47,400
inside here in the mission director

1135
00:47:51,109 --> 00:47:49,319
Center the rumble all around us

1136
00:47:52,790 --> 00:47:51,119
absolutely

1137
00:47:54,770 --> 00:47:52,800
and now you're getting a good look at

1138
00:47:56,270 --> 00:47:54,780

the onboard camera looking down towards

1139
00:47:57,650 --> 00:47:56,280
the AFT end of the rockets and you can

1140
00:48:00,770 --> 00:47:57,660
see the

1141
00:48:03,230 --> 00:48:00,780
Merlin engines come into life there

1142
00:48:05,750 --> 00:48:03,240
and this room coming to life really

1143
00:48:07,190 --> 00:48:05,760
lots of Rumble going on in here

1144
00:48:09,290 --> 00:48:07,200
and we're soon going to hear that the

1145
00:48:11,990 --> 00:48:09,300
rocket is supersonic meaning it's going

1146
00:48:14,809 --> 00:48:12,000
faster than the speed of sound followed

1147
00:48:17,510 --> 00:48:14,819
by Falcon 9 reaching what's called Max Q

1148
00:48:21,170 --> 00:48:17,520
the moment of peak of mechanic stress on

1149
00:48:28,190 --> 00:48:24,530
look at me getting nice views supersonic

1150
00:48:29,990 --> 00:48:28,200
just heard a call off a supersonic

1151
00:48:33,710 --> 00:48:30,000
getting a good shot of looking at the

1152
00:48:38,089 --> 00:48:36,490
we just stepped through Max Q

1153
00:48:40,550 --> 00:48:38,099
[Music]

1154
00:48:41,990 --> 00:48:40,560
next college

1155
00:48:43,790 --> 00:48:42,000
and back engine Shield which means

1156
00:48:45,589 --> 00:48:43,800
getting the second stage engine ready to

1157
00:48:47,569 --> 00:48:45,599
start and so which means we'll be coming

1158
00:48:50,990 --> 00:48:47,579
up on stage separation shortly and

1159
00:48:53,809 --> 00:48:51,000
followed by stage two ignition

1160
00:48:56,750 --> 00:48:53,819
we see this beautiful shot of all of the

1161
00:48:59,390 --> 00:48:56,760
Merlin engines all nine of them lit up

1162
00:49:01,730 --> 00:48:59,400
that's what 1.7 million pounds of thrust

1163
00:49:03,290 --> 00:49:01,740

look like thrust

1164
00:49:04,730 --> 00:49:03,300
so the next call outs are going to come

1165
00:49:06,410 --> 00:49:04,740
in quick secession so let me walk

1166
00:49:08,390 --> 00:49:06,420
through them really quick so a t plus

1167
00:49:10,550 --> 00:49:08,400
two minutes and 15 seconds we're going

1168
00:49:12,710 --> 00:49:10,560
to have main engine cut off that's Mikko

1169
00:49:14,750 --> 00:49:12,720
meaning the nine Merlin engines on the

1170
00:49:17,750 --> 00:49:14,760
first stage are going to shut down and

1171
00:49:21,230 --> 00:49:17,760
then a few seconds after that stage one

1172
00:49:24,050 --> 00:49:21,240
and two will separate stage one will do

1173
00:49:26,510 --> 00:49:24,060
a flip and do a boost back burn to

1174
00:49:29,089 --> 00:49:26,520
orient itself back towards Earth for

1175
00:49:30,589 --> 00:49:29,099
that Landing here at the space Force

1176
00:49:32,750 --> 00:49:30,599
Base

1177
00:49:35,329 --> 00:49:32,760
and there we get a good shot of looking

1178
00:49:37,069 --> 00:49:35,339
at the Ender stage

1179
00:49:40,250 --> 00:49:37,079
basically the camera's looking up

1180
00:49:43,609 --> 00:49:40,260
towards the same separation confirmed

1181
00:49:45,950 --> 00:49:43,619
and we just and there you go live video

1182
00:49:47,089 --> 00:49:45,960
of stage one and two separate and

1183
00:49:48,470 --> 00:49:47,099
recognition

1184
00:49:51,589 --> 00:49:48,480
and there's a good look at this

1185
00:49:53,750 --> 00:49:51,599
recognition impact engine come into life

1186
00:49:56,270 --> 00:49:53,760
that's great you are seeing the stage

1187
00:49:59,150 --> 00:49:56,280
one booster do its flip

1188
00:50:00,890 --> 00:49:59,160

and now the engine Bell of the mvac

1189
00:50:03,950 --> 00:50:00,900
engine

1190
00:50:13,849 --> 00:50:07,790
this is a camera shot of stage one here

1191
00:50:18,950 --> 00:50:15,650
in just a couple of seconds we're going

1192
00:50:21,470 --> 00:50:18,960
to see the payload fairing jettison

1193
00:50:23,870 --> 00:50:21,480
bearing separation confirmed

1194
00:50:26,150 --> 00:50:23,880
we just heard a call up for saying

1195
00:50:28,849 --> 00:50:26,160
separation and there's a good onboard

1196
00:50:30,170 --> 00:50:28,859
view of the SWAT spacecraft and you can

1197
00:50:31,670 --> 00:50:30,180
see the fairing is gone at this point in

1198
00:50:34,250 --> 00:50:31,680
time

1199
00:50:36,950 --> 00:50:34,260
another camera shot here of the engine

1200
00:50:39,410 --> 00:50:36,960
on the second stage continuing to carry

1201
00:50:43,010 --> 00:50:39,420
SWAT to its intended target

1202
00:50:46,250 --> 00:50:43,020
we have a couple of camera views of this

1203
00:50:49,309 --> 00:50:46,260
engine here so you might see a

1204
00:50:51,230 --> 00:50:49,319
couple page one can I shut down yeah and

1205
00:50:52,730 --> 00:50:51,240
then you'll see it cycling through the

1206
00:50:55,309 --> 00:50:52,740
views of the stage

1207
00:50:57,290 --> 00:50:55,319
um stage two engine and um

1208
00:50:59,569 --> 00:50:57,300
as we get closer to the separation

1209
00:51:01,910 --> 00:50:59,579
they'll go back towards the spacecraft

1210
00:51:04,790 --> 00:51:01,920
and we just heard a call out for the

1211
00:51:07,130 --> 00:51:04,800
Boost back burn ending on stage pages

1212
00:51:08,990 --> 00:51:07,140
are on nominal trajectories and that

1213
00:51:11,150 --> 00:51:09,000

call out was just to say both stage one

1214
00:51:13,250 --> 00:51:11,160
and stage two doing what they were

1215
00:51:15,170 --> 00:51:13,260
expecting them to do and we're hoping to

1216
00:51:16,609 --> 00:51:15,180
get a video of stage one Landing so

1217
00:51:19,670 --> 00:51:16,619
sometimes we don't always get it because

1218
00:51:20,990 --> 00:51:19,680
of it's coming in so fast and sometimes

1219
00:51:22,970 --> 00:51:21,000
it's hard to capture so occasionally in

1220
00:51:24,470 --> 00:51:22,980
case sometimes we don't get it um all

1221
00:51:26,030 --> 00:51:24,480
the way but we're hoping to get a good

1222
00:51:29,569 --> 00:51:26,040
video this time

1223
00:51:31,250 --> 00:51:29,579
t plus 4 minutes and 10 seconds into the

1224
00:51:34,069 --> 00:51:31,260
launch of SWAT and we've had a nominal

1225
00:51:37,609 --> 00:51:34,079
Ascent so far no issues to report again

1226
00:51:39,890 --> 00:51:37,619
this is a video of a live shot of the

1227
00:51:42,470 --> 00:51:39,900
engine on stage two

1228
00:51:44,329 --> 00:51:42,480
SWAT stands for surface water and ocean

1229
00:51:47,210 --> 00:51:44,339
topography and this will be the first

1230
00:51:50,150 --> 00:51:47,220
mission to provide high definition data

1231
00:51:51,650 --> 00:51:50,160
on more than 90 percent of the water on

1232
00:51:53,870 --> 00:51:51,660
our planet's surface

1233
00:51:56,510 --> 00:51:53,880
it's a joint Mission between NASA and

1234
00:51:58,430 --> 00:51:56,520
kness France's space agency with

1235
00:52:00,890 --> 00:51:58,440
contributions from both the Canadian and

1236
00:52:04,250 --> 00:52:00,900
UK space agencies

1237
00:52:06,650 --> 00:52:04,260
SWAT is the fourth NASA LSP science

1238
00:52:09,470 --> 00:52:06,660

mission to launch from Vandenberg space

1239
00:52:11,210 --> 00:52:09,480
force base and the sixth LSP science

1240
00:52:14,089 --> 00:52:11,220
Mission overall it's a launch on a

1241
00:52:15,950 --> 00:52:14,099
falcon 9 dungeon yes and and we got a

1242
00:52:17,270 --> 00:52:15,960
lot more missions coming up on the

1243
00:52:19,309 --> 00:52:17,280
Falcon

1244
00:52:22,190 --> 00:52:19,319
yeah it's a sea uh the partnership

1245
00:52:23,990 --> 00:52:22,200
really grow for you too I mean again you

1246
00:52:25,670 --> 00:52:24,000
you really work from SpaceX from the

1247
00:52:27,589 --> 00:52:25,680
beginning yeah absolutely and seeing

1248
00:52:29,990 --> 00:52:27,599
seeing their evolution over the the

1249
00:52:31,910 --> 00:52:30,000
years has been amazing to watch

1250
00:52:34,250 --> 00:52:31,920
so coming up we're going to see other

1251
00:52:36,290 --> 00:52:34,260
booster begin its entry burn soon and

1252
00:52:39,230 --> 00:52:36,300
again that entry burn is to slow it down

1253
00:52:40,910 --> 00:52:39,240
as it approaches Earth for the landing

1254
00:52:43,549 --> 00:52:40,920
here back at the base

1255
00:52:45,109 --> 00:52:43,559
instead of a drone ship yeah I mean it's

1256
00:52:46,790 --> 00:52:45,119
it's awesome to see it come back to land

1257
00:52:49,430 --> 00:52:46,800
and as I did mentioned before it's seen

1258
00:52:51,770 --> 00:52:49,440
it Landing right very close to the way

1259
00:52:52,970 --> 00:52:51,780
it took off from is awesome so then how

1260
00:52:55,130 --> 00:52:52,980
does this go again we're going to have

1261
00:52:57,109 --> 00:52:55,140
the pre-burn that slows it down and then

1262
00:52:58,430 --> 00:52:57,119
there's a landing burn right yeah so you

1263
00:53:00,349 --> 00:52:58,440

have the Boost back burn it kind of gets

1264
00:53:02,210 --> 00:53:00,359
it back towards the launch pad and then

1265
00:53:03,290 --> 00:53:02,220
the entry burn kind of slows it down as

1266
00:53:04,430 --> 00:53:03,300
they're coming into the atmosphere and

1267
00:53:06,710 --> 00:53:04,440
then you have the landing burn that

1268
00:53:09,530 --> 00:53:06,720
basically puts it down gently on the pad

1269
00:53:12,170 --> 00:53:09,540
yeah SpaceX has become real pros at

1270
00:53:13,730 --> 00:53:12,180
Landing their boosters absolutely and

1271
00:53:15,530 --> 00:53:13,740
it's becoming routine for them at this

1272
00:53:19,609 --> 00:53:15,540
point in time and so this is just a

1273
00:53:25,069 --> 00:53:22,250
again we are looking live at stage two

1274
00:53:28,370 --> 00:53:25,079
stage

1275
00:53:30,109 --> 00:53:28,380
entry burn

1276
00:53:32,150 --> 00:53:30,119
he's just coming back into the Earth's

1277
00:53:33,650 --> 00:53:32,160
atmosphere and we there we go we got a

1278
00:53:36,109 --> 00:53:33,660
good video of it yeah so you can see

1279
00:53:40,030 --> 00:53:36,119
this Hypersonic grid fans uh illuminated

1280
00:53:43,130 --> 00:53:40,040
by the flame from uh from the booster

1281
00:53:44,870 --> 00:53:43,140
FPS is safe

1282
00:53:46,670 --> 00:53:44,880
you see that the screen went black there

1283
00:53:51,530 --> 00:53:46,680
that's because they just shut down the

1284
00:53:55,549 --> 00:53:53,510
but I was talking about this Hypersonic

1285
00:53:57,950 --> 00:53:55,559
grid fins that you see those help guide

1286
00:53:59,569 --> 00:53:57,960
the Falcon 9 booster back down towards

1287
00:54:01,849 --> 00:53:59,579
Earth so now that we're done with the

1288
00:54:04,309 --> 00:54:01,859

entry burn the next burn is the landing

1289
00:54:06,230 --> 00:54:04,319
burn it's just one engine right just

1290
00:54:08,030 --> 00:54:06,240
before it touches down correctly just

1291
00:54:10,370 --> 00:54:08,040
gently setting it set it down on the

1292
00:54:15,349 --> 00:54:12,410
the next milestone for the second stage

1293
00:54:17,870 --> 00:54:15,359
is going to stage

1294
00:54:21,410 --> 00:54:17,880
ceco one

1295
00:54:23,569 --> 00:54:21,420
yeah and Seco one is the first shutdown

1296
00:54:24,470 --> 00:54:23,579
of the second stage engine and where for

1297
00:54:25,569 --> 00:54:24,480
this Mission we're going to have two

1298
00:54:28,490 --> 00:54:25,579
burns

1299
00:54:30,890 --> 00:54:28,500
after stage two shuts down it'll close

1300
00:54:32,030 --> 00:54:30,900
for a while and then we got a good video

1301
00:54:33,890 --> 00:54:32,040
of

1302
00:54:35,990 --> 00:54:33,900
stage one

1303
00:54:38,930 --> 00:54:36,000
it's about to land how exciting how many

1304
00:54:40,970 --> 00:54:38,940
influence uh Landing burn there

1305
00:54:42,530 --> 00:54:40,980
again the grid Fin's moving ever so

1306
00:54:44,329 --> 00:54:42,540
slightly to make sure that it's coming

1307
00:54:46,730 --> 00:54:44,339
down exactly how they want it to come

1308
00:54:49,069 --> 00:54:46,740
down yep and you can see the pad coming

1309
00:54:51,650 --> 00:54:49,079
into view there it is wow

1310
00:54:54,290 --> 00:54:51,660
and then the Sonic booms trademark Sonic

1311
00:54:57,910 --> 00:54:54,300
booms wow and good touchdown of the

1312
00:55:00,829 --> 00:54:57,920
stage one touchdown perfect

1313
00:55:02,329 --> 00:55:00,839

so glad to see that live video again

1314
00:55:05,990 --> 00:55:02,339
sometimes we don't get it that was

1315
00:55:07,910 --> 00:55:06,000
amazing to see and feel really see and

1316
00:55:10,549 --> 00:55:07,920
feel and we get to use this booster

1317
00:55:12,770 --> 00:55:10,559
again yeah yeah again six this would

1318
00:55:16,910 --> 00:55:12,780
this is the sixth flight of this booster

1319
00:55:19,790 --> 00:55:16,920
is this right okay so we are still

1320
00:55:26,089 --> 00:55:19,800
awaiting again that shutdown of who FTS

1321
00:55:27,950 --> 00:55:26,099
is safe of the second uh uh uh yes

1322
00:55:29,990 --> 00:55:27,960
and when it does shut down it's going to

1323
00:55:31,790 --> 00:55:30,000
be over the Pacific Ocean just west of

1324
00:55:33,670 --> 00:55:31,800
the southern tip of Baja California

1325
00:55:36,530 --> 00:55:33,680
again exactly where we want it to be

1326
00:55:38,569 --> 00:55:36,540
following that well thought out plan

1327
00:55:40,670 --> 00:55:38,579
trajectory yep and the team is reporting

1328
00:55:42,650 --> 00:55:40,680
back everything's looking nominal stage

1329
00:55:44,990 --> 00:55:42,660
two it's right where it's supposed to be

1330
00:55:47,329 --> 00:55:45,000
and looking good

1331
00:55:50,210 --> 00:55:47,339
mvac shutdown

1332
00:55:52,370 --> 00:55:50,220
and we should see M back shutdown come

1333
00:55:56,329 --> 00:55:52,380
up here shortly

1334
00:56:01,730 --> 00:55:59,390
yep Seco one nominal parking orbit

1335
00:56:03,349 --> 00:56:01,740
confirmed

1336
00:56:05,390 --> 00:56:03,359
that's the trajectory you're seeing it's

1337
00:56:07,790 --> 00:56:05,400
flying south from where it just launched

1338
00:56:11,870 --> 00:56:07,800

and it'll continue to fly south down

1339
00:56:15,530 --> 00:56:13,549
and so again everything going as

1340
00:56:17,210 --> 00:56:15,540
expected so far

1341
00:56:19,730 --> 00:56:17,220
the second stage is now going to Coast

1342
00:56:21,950 --> 00:56:19,740
for about 30 minutes you can see that it

1343
00:56:24,410 --> 00:56:21,960
is shut down there from that view

1344
00:56:26,569 --> 00:56:24,420
and this is a view of the spacecraft

1345
00:56:29,270 --> 00:56:26,579
again because the payload fairing has

1346
00:56:31,849 --> 00:56:29,280
been jettisoned you see SWAT right there

1347
00:56:34,490 --> 00:56:31,859
on your screen

1348
00:56:36,710 --> 00:56:34,500
expose now that we don't need the

1349
00:56:38,990 --> 00:56:36,720
payload fairing to safely get it out of

1350
00:56:40,430 --> 00:56:39,000
the atmosphere correct and yeah once the

1351
00:56:42,349 --> 00:56:40,440
I mean the whole purpose of the fraying

1352
00:56:44,270 --> 00:56:42,359
is protected while the vehicle is flying

1353
00:56:46,309 --> 00:56:44,280
through the atmosphere at supersonic

1354
00:56:47,930 --> 00:56:46,319
speeds and then once you get up out of

1355
00:56:50,030 --> 00:56:47,940
the atmosphere there's nothing to to

1356
00:56:52,309 --> 00:56:50,040
harm the spacecraft so you can jettison

1357
00:56:53,569 --> 00:56:52,319
that extra weight and give your vehicle

1358
00:56:56,870 --> 00:56:53,579
a lot more performance once you get rid

1359
00:56:59,450 --> 00:56:56,880
of that extra weight okay

1360
00:57:01,190 --> 00:56:59,460
the engine not glowing orange as it had

1361
00:57:03,230 --> 00:57:01,200
before because again it is shut off so

1362
00:57:05,510 --> 00:57:03,240
it will Coast for about 30 minutes with

1363
00:57:07,549 --> 00:57:05,520

SWOT attached to it before some

1364
00:57:09,170 --> 00:57:07,559
Maneuvers are needed to keep it on the

1365
00:57:11,390 --> 00:57:09,180
right trajectory again to get it in the

1366
00:57:13,309 --> 00:57:11,400
orbit that we want it in so Denton and I

1367
00:57:14,809 --> 00:57:13,319
are going to be back then with you to

1368
00:57:16,549 --> 00:57:14,819
walk you through those operations but

1369
00:57:18,589 --> 00:57:16,559
for now we're going to send it back to

1370
00:57:20,510 --> 00:57:18,599
Raquel and Nadia who I'm sure are very

1371
00:57:22,549 --> 00:57:20,520
excited to talk about how the experience

1372
00:57:25,069 --> 00:57:22,559
launched today

1373
00:57:27,349 --> 00:57:25,079
is Right Megan and Denton just 10

1374
00:57:29,930 --> 00:57:27,359
minutes ago we watched a spectacular

1375
00:57:32,510 --> 00:57:29,940
launch from Vandenberg here in

1376
00:57:34,849 --> 00:57:32,520
California Nadia describe what was going

1377
00:57:37,250 --> 00:57:34,859
through your mind at that time what a

1378
00:57:40,790 --> 00:57:37,260
spectacular truly spectacular launch it

1379
00:57:43,010 --> 00:57:40,800
was a a very bright uh Splash on this

1380
00:57:47,150 --> 00:57:43,020
kind of very loud one too what an

1381
00:57:49,910 --> 00:57:47,160
entrance uh welcome to the era of of

1382
00:57:53,030 --> 00:57:49,920
SWAT very excited I've had some cheering

1383
00:57:55,370 --> 00:57:53,040
going on here yeah and the car went off

1384
00:57:57,549 --> 00:57:55,380
yes yeah we had car alarms going off it

1385
00:58:00,589 --> 00:57:57,559
was really exciting here for our view

1386
00:58:03,410 --> 00:58:00,599
now soon the SWAT satellite on board

1387
00:58:06,770 --> 00:58:03,420
will separate from the spacecraft

1388
00:58:09,230 --> 00:58:06,780

SWAT stands for surface water and ocean

1389
00:58:11,510 --> 00:58:09,240
topography the satellite will survey

1390
00:58:14,930 --> 00:58:11,520
nearly all the water on Earth's surface

1391
00:58:16,549 --> 00:58:14,940
in unprecedented detail SWAT will

1392
00:58:19,490 --> 00:58:16,559
provide insights into how the ocean

1393
00:58:22,130 --> 00:58:19,500
influences climate change how a warming

1394
00:58:23,809 --> 00:58:22,140
World affects lakes and rivers and how

1395
00:58:26,329 --> 00:58:23,819
communities can better prepare for

1396
00:58:28,549 --> 00:58:26,339
disasters like floods and we are

1397
00:58:31,069 --> 00:58:28,559
covering every angle of the SWAT Mission

1398
00:58:33,710 --> 00:58:31,079
from the new data the satellite will

1399
00:58:37,849 --> 00:58:33,720
provide to how it is Paving the way for

1400
00:58:40,190 --> 00:58:37,859
future NASA Earth missions now SWAT is a

1401
00:58:42,650 --> 00:58:40,200
culmination of work by a global team of

1402
00:58:45,109 --> 00:58:42,660
Engineers scientists and technicians

1403
00:58:47,690 --> 00:58:45,119
committed to improving our understanding

1404
00:58:51,789 --> 00:58:47,700
of Earth let's get to know some of the

1405
00:58:57,230 --> 00:58:55,010
planning for future Generations requires

1406
00:59:00,049 --> 00:58:57,240
us understanding how much water we have

1407
00:59:02,450 --> 00:59:00,059
and we need to understand the water

1408
00:59:04,670 --> 00:59:02,460
cycle in a lot of detail and swap will

1409
00:59:06,710 --> 00:59:04,680
provide that for us my name is teheny

1410
00:59:08,390 --> 00:59:06,720
ammer I'm Cedric David Mark Simard

1411
00:59:10,730 --> 00:59:08,400
Christine Jabara and I'm an integration

1412
00:59:12,349 --> 00:59:10,740
test engineer at JPL I study the world's

1413
00:59:14,329 --> 00:59:12,359

Rivers I'm one of the principal

1414
00:59:16,430 --> 00:59:14,339
investigators for SWAT

1415
00:59:17,750 --> 00:59:16,440
SWAT is an Earth orbiting satellite it

1416
00:59:20,450 --> 00:59:17,760
stands for surface water ocean

1417
00:59:22,250 --> 00:59:20,460
topography swap will for the first time

1418
00:59:25,490 --> 00:59:22,260
make measurement of water surface

1419
00:59:27,829 --> 00:59:25,500
elevation not only on the ocean but also

1420
00:59:30,170 --> 00:59:27,839
on the lakes and rivers of the entire

1421
00:59:32,410 --> 00:59:30,180
Globe this in itself will be a

1422
00:59:35,270 --> 00:59:32,420
scientific revolution

1423
00:59:37,970 --> 00:59:35,280
collaborations and relationship build

1424
00:59:39,670 --> 00:59:37,980
Bridges and SWAT will be the bridge

1425
00:59:43,430 --> 00:59:39,680
across the world

1426
00:59:45,530 --> 00:59:43,440
is being designed jointly by NASA and

1427
00:59:47,990 --> 00:59:45,540
the French space agency with help from

1428
00:59:50,569 --> 00:59:48,000
Canada and the UK I was born in France

1429
00:59:52,789 --> 00:59:50,579
so SWA is a match made in heaven for me

1430
00:59:54,170 --> 00:59:52,799
coming to work every day it's always

1431
00:59:56,890 --> 00:59:54,180
to know that

1432
01:00:00,589 --> 00:59:56,900
the system that we're building will

1433
01:00:03,230 --> 01:00:00,599
I think finally I found a meaning to all

1434
01:00:05,030 --> 01:00:03,240
of my research I believe SWAT will

1435
01:00:07,730 --> 01:00:05,040
create a lot of Peace because we all

1436
01:00:09,230 --> 01:00:07,740
need water now more than ever it's

1437
01:00:11,569 --> 01:00:09,240
important to recognize that water

1438
01:00:13,850 --> 01:00:11,579

connects us all and it might be the one

1439
01:00:16,190 --> 01:00:13,860
thing that unites us all

1440
01:00:18,650 --> 01:00:16,200
[Music]

1441
01:00:20,750 --> 01:00:18,660
really see how hard your team has worked

1442
01:00:22,549 --> 01:00:20,760
there yeah we have a great team you know

1443
01:00:25,849 --> 01:00:22,559
we Gel really well together we

1444
01:00:27,950 --> 01:00:25,859
scientists we dream and engineers make

1445
01:00:30,829 --> 01:00:27,960
our science fiction dreams come true and

1446
01:00:34,069 --> 01:00:30,839
then collectively we make this NASA

1447
01:00:35,450 --> 01:00:34,079
magic that enables discoveries and uh

1448
01:00:37,069 --> 01:00:35,460
for the you know for the good of

1449
01:00:39,589 --> 01:00:37,079
humanity and science there's magic

1450
01:00:41,569 --> 01:00:39,599
indeed we want to show you how some of

1451
01:00:44,030 --> 01:00:41,579
Swatch technology works but to do that

1452
01:00:48,770 --> 01:00:44,040
Nadia and I had to go tap into our

1453
01:00:52,849 --> 01:00:50,870
all right Nadia in order to learn more

1454
01:00:55,069 --> 01:00:52,859
about SWAT we have to play a little

1455
01:00:57,170 --> 01:00:55,079
basketball that's right Raquel we're

1456
01:00:59,630 --> 01:00:57,180
trying to explain how the heart of the

1457
01:01:02,569 --> 01:00:59,640
SWAT Mission Works which is a new

1458
01:01:06,289 --> 01:01:02,579
instrument a radar interferometer which

1459
01:01:09,530 --> 01:01:06,299
we lovingly call Karen so Karen has two

1460
01:01:12,289 --> 01:01:09,540
antennas separated by a 10 meter boom

1461
01:01:14,870 --> 01:01:12,299
one of the antenna transmits a signal

1462
01:01:17,270 --> 01:01:14,880
that is bounces back from the Earth's

1463
01:01:19,910 --> 01:01:17,280

surface and received by two antennas

1464
01:01:22,970 --> 01:01:19,920
with a little bit delay and out of sync

1465
01:01:24,710 --> 01:01:22,980
now Kieran uses his information to

1466
01:01:26,690 --> 01:01:24,720
compute the distance between the

1467
01:01:28,730 --> 01:01:26,700
satellite and the Earth's surface and

1468
01:01:30,289 --> 01:01:28,740
the calculate the water height so let's

1469
01:01:31,849 --> 01:01:30,299
see how we can we explain it with the

1470
01:01:33,710 --> 01:01:31,859
basketball if you don't mind sending

1471
01:01:35,210 --> 01:01:33,720
them feet away from me all right is

1472
01:01:38,270 --> 01:01:35,220
right here pretty good this is perfect

1473
01:01:41,870 --> 01:01:38,280
okay and we will bounce the ball just

1474
01:01:46,789 --> 01:01:41,880
like SWAT uh satellite bounces right

1475
01:01:52,370 --> 01:01:49,609
so what are we seeing here right now

1476
01:01:55,010 --> 01:01:52,380
we're seeing how the bowl which is our

1477
01:01:57,890 --> 01:01:55,020
Raider beam bounces over the Earth's

1478
01:01:59,930 --> 01:01:57,900
surface and by knowing the range the

1479
01:02:01,910 --> 01:01:59,940
distance and we compute the height of

1480
01:02:05,030 --> 01:02:01,920
the water surface

1481
01:02:07,250 --> 01:02:05,040
so the ocean isn't a flat surface

1482
01:02:09,770 --> 01:02:07,260
there's waves like how do you calculate

1483
01:02:14,210 --> 01:02:09,780
that that's right let's uh let's bring a

1484
01:02:19,190 --> 01:02:16,609
so did you notice when the water is a

1485
01:02:21,430 --> 01:02:19,200
little bit higher that the Bulls returns

1486
01:02:24,470 --> 01:02:21,440
to the antenna to us a little bit faster

1487
01:02:26,329 --> 01:02:24,480
that's how we know that we're retrieving

1488
01:02:29,690 --> 01:02:26,339

topography just like in the name of the

1489
01:02:33,049 --> 01:02:29,700
mission a satellite is doing thousands

1490
01:02:35,329 --> 01:02:33,059
of bounces per second to capture the

1491
01:02:38,270 --> 01:02:35,339
data on both sides from both antennas

1492
01:02:41,510 --> 01:02:38,280
over a wide strip on the ground about 30

1493
01:02:43,430 --> 01:02:41,520
miles 50 kilometers wide and then once

1494
01:02:49,430 --> 01:02:43,440
we do enough of the stripes we'll

1495
01:02:53,690 --> 01:02:51,049
Nadia I could really hear your

1496
01:02:55,670 --> 01:02:53,700
excitement and passion first of all in

1497
01:02:58,309 --> 01:02:55,680
that package why are you so excited for

1498
01:03:00,109 --> 01:02:58,319
this new technology yeah it's a really

1499
01:03:03,650 --> 01:03:00,119
um pivotal moment I think for our space

1500
01:03:05,870 --> 01:03:03,660
science Industry as we uh testing

1501
01:03:08,270 --> 01:03:05,880
um new technology with SWAT this is our

1502
01:03:11,089 --> 01:03:08,280
first in-fly demonstration for the SR

1503
01:03:14,750 --> 01:03:11,099
interferometry and this is opens a new

1504
01:03:16,609 --> 01:03:14,760
way of of observing earth water Heights

1505
01:03:19,549 --> 01:03:16,619
so yes it is a pivotal moment and I'm

1506
01:03:21,589 --> 01:03:19,559
very excited about it yes and like you

1507
01:03:24,470 --> 01:03:21,599
mentioned before the Scientific heart of

1508
01:03:27,170 --> 01:03:24,480
SWAT satellite is the KA band radar

1509
01:03:29,630 --> 01:03:27,180
interferometer or Karen and it measures

1510
01:03:31,250 --> 01:03:29,640
the height of water on Earth Jasmine is

1511
01:03:34,670 --> 01:03:31,260
live at the hawksiness to learn more

1512
01:03:37,010 --> 01:03:34,680
about how the technology was built

1513
01:03:39,829 --> 01:03:37,020

that is right Raquel we're back at the

1514
01:03:41,809 --> 01:03:39,839
Hawks Nest now joined by Ava peral the

1515
01:03:45,289 --> 01:03:41,819
lead systems engineer for the Karen

1516
01:03:47,030 --> 01:03:45,299
instrument on SWAT welcome Ava hi we are

1517
01:03:48,710 --> 01:03:47,040
so glad to have you here that launch

1518
01:03:51,530 --> 01:03:48,720
just lit up the sky what did you think

1519
01:03:54,049 --> 01:03:51,540
it was impressive really impressive it

1520
01:03:55,430 --> 01:03:54,059
really was it's beautiful so you work on

1521
01:03:56,750 --> 01:03:55,440
the Karen instrument can you tell me

1522
01:03:59,569 --> 01:03:56,760
what sets that apart from other

1523
01:04:02,569 --> 01:03:59,579
instruments yeah so Karen is a writer

1524
01:04:05,870 --> 01:04:02,579
and NASA has launched Raiders before to

1525
01:04:07,970 --> 01:04:05,880
study the ocean from space but Karen is

1526
01:04:10,730 --> 01:04:07,980
a very special type of raider it's a

1527
01:04:13,730 --> 01:04:10,740
Raider interferometer that means that

1528
01:04:16,809 --> 01:04:13,740
the signal that bounces off the Earth is

1529
01:04:19,670 --> 01:04:16,819
received simultaneously by two antennas

1530
01:04:22,910 --> 01:04:19,680
these two antennas are separated by a

1531
01:04:25,549 --> 01:04:22,920
long distance about half the size of a

1532
01:04:28,190 --> 01:04:25,559
tennis court and they have to be

1533
01:04:29,750 --> 01:04:28,200
positioned very precisely to levels that

1534
01:04:32,329 --> 01:04:29,760
are like micrometers so we're talking

1535
01:04:34,309 --> 01:04:32,339
about the width of a hair so you can

1536
01:04:37,010 --> 01:04:34,319
imagine that that's a lot of complexity

1537
01:04:40,190 --> 01:04:37,020
to this so our mission but it is that

1538
01:04:43,010 --> 01:04:40,200

technology that enables the resolution

1539
01:04:45,589 --> 01:04:43,020
and the accuracy that we're expected to

1540
01:04:47,809 --> 01:04:45,599
achieve we saw of the Earth's water

1541
01:04:49,250 --> 01:04:47,819
right so we're seeing things in a

1542
01:04:51,589 --> 01:04:49,260
Precision that we've never had before

1543
01:04:53,210 --> 01:04:51,599
which is very exciting and complex so

1544
01:04:55,789 --> 01:04:53,220
were there any challenges that your team

1545
01:04:58,250 --> 01:04:55,799
faced while creating Karen yes yes Karen

1546
01:05:00,410 --> 01:04:58,260
has been pushing the envelope in many

1547
01:05:02,809 --> 01:05:00,420
many different fronts I can give you

1548
01:05:05,390 --> 01:05:02,819
many examples one I just told you before

1549
01:05:07,609 --> 01:05:05,400
about the mechanical Precision that we

1550
01:05:11,329 --> 01:05:07,619
need to have position in these two

1551
01:05:12,770 --> 01:05:11,339
antennas we also have a very high power

1552
01:05:15,530 --> 01:05:12,780
amplifier

1553
01:05:18,289 --> 01:05:15,540
we need an enormous amount of power

1554
01:05:20,990 --> 01:05:18,299
to be able to get that signal back to

1555
01:05:24,890 --> 01:05:21,000
the satellite from the earth at a level

1556
01:05:28,130 --> 01:05:24,900
that is detectable by the radar and that

1557
01:05:30,950 --> 01:05:28,140
level of power at our frequency front

1558
01:05:32,030 --> 01:05:30,960
space is by itself a technological

1559
01:05:35,690 --> 01:05:32,040
achievement

1560
01:05:38,990 --> 01:05:35,700
we also have a the radar produces a

1561
01:05:41,930 --> 01:05:39,000
massive amount of data in fact over 60

1562
01:05:43,490 --> 01:05:41,940
terabytes of data every single day and

1563
01:05:46,430 --> 01:05:43,500

that's a lot of hard drives as you can

1564
01:05:49,730 --> 01:05:46,440
imagine so we really need to reduce that

1565
01:05:51,829 --> 01:05:49,740
data volume so that is manageable and we

1566
01:05:54,230 --> 01:05:51,839
can then link it to the ground and for

1567
01:05:57,410 --> 01:05:54,240
that we're doing some fairly unique

1568
01:06:01,309 --> 01:05:57,420
signal processing in the radar in space

1569
01:06:03,770 --> 01:06:01,319
so all of those are really neat

1570
01:06:06,950 --> 01:06:03,780
achievements Karen is a unique

1571
01:06:08,450 --> 01:06:06,960
instrument and one of a kind right it

1572
01:06:10,910 --> 01:06:08,460
really is you and your team to be very

1573
01:06:12,710 --> 01:06:10,920
happy with this achievement and Ava you

1574
01:06:14,569 --> 01:06:12,720
yourself have been working on this for a

1575
01:06:16,069 --> 01:06:14,579
decade how does it feel you know I know

1576
01:06:17,870 --> 01:06:16,079
those last few weeks can be like a race

1577
01:06:20,270 --> 01:06:17,880
to the Finish Line what is it like that

1578
01:06:22,730 --> 01:06:20,280
you just saw this launch well for me

1579
01:06:26,329 --> 01:06:22,740
it's been my project since I started at

1580
01:06:28,910 --> 01:06:26,339
jpo it's been actually over 13 years so

1581
01:06:32,390 --> 01:06:28,920
this is really very exciting moment for

1582
01:06:35,450 --> 01:06:32,400
me and myself and my team have actually

1583
01:06:37,849 --> 01:06:35,460
working very hard on what's coming ahead

1584
01:06:41,390 --> 01:06:37,859
of us now that we're going to be getting

1585
01:06:43,970 --> 01:06:41,400
the data from space we need to make sure

1586
01:06:46,370 --> 01:06:43,980
that the data is valid it has the

1587
01:06:49,069 --> 01:06:46,380
accuracy that we're expecting and that's

1588
01:06:51,349 --> 01:06:49,079

going to be a very difficult and

1589
01:06:52,849 --> 01:06:51,359
critical task for itself right but this

1590
01:06:55,010 --> 01:06:52,859
is just the beginning Ava thank you so

1591
01:06:55,970 --> 01:06:55,020
much for joining thank you Raquel back

1592
01:06:58,309 --> 01:06:55,980
to you

1593
01:07:01,130 --> 01:06:58,319
thank you Jasmine and Ava let's get to

1594
01:07:04,609 --> 01:07:01,140
some questions for you Nadia our first

1595
01:07:10,150 --> 01:07:04,619
question is from a young space fan Mark

1596
01:07:17,750 --> 01:07:14,930
how we can see water from space

1597
01:07:20,870 --> 01:07:17,760
well hi Mark uh NASA can see different

1598
01:07:22,789 --> 01:07:20,880
aspects of water from space we could see

1599
01:07:24,950 --> 01:07:22,799
how hot is the water how the temperature

1600
01:07:28,250 --> 01:07:24,960
the surface temperature of the water is

1601
01:07:31,789 --> 01:07:28,260
how salty is our water salinity of ocean

1602
01:07:35,510 --> 01:07:31,799
salinity we can see how heavy the mass

1603
01:07:37,849 --> 01:07:35,520
of water is gravity we could all we can

1604
01:07:40,370 --> 01:07:37,859
see the volume or the height of water

1605
01:07:42,770 --> 01:07:40,380
with satellites like SWOT for example we

1606
01:07:45,289 --> 01:07:42,780
could see liquid water frozen water like

1607
01:07:47,150 --> 01:07:45,299
sea ice we can even see some content of

1608
01:07:48,950 --> 01:07:47,160
water in the atmosphere so yeah so we

1609
01:07:50,930 --> 01:07:48,960
can see different aspects of water from

1610
01:07:53,089 --> 01:07:50,940
space good question so many different

1611
01:07:55,849 --> 01:07:53,099
ways to see water and we also have some

1612
01:07:58,849 --> 01:07:55,859
social media questions coming in

1613
01:08:00,589 --> 01:07:58,859

we have uh how many times per day will

1614
01:08:04,190 --> 01:08:00,599
SWAT orbit the Earth

1615
01:08:06,650 --> 01:08:04,200
so on average what's nominal orbit is 21

1616
01:08:08,510 --> 01:08:06,660
a day repeat orbits

1617
01:08:10,370 --> 01:08:08,520
and we have another one coming in for

1618
01:08:12,589 --> 01:08:10,380
you now

1619
01:08:14,329 --> 01:08:12,599
see how accurate is the equipment when

1620
01:08:16,789 --> 01:08:14,339
measuring the current sea level from

1621
01:08:20,769 --> 01:08:16,799
space meters centimeters millimeters

1622
01:08:23,510 --> 01:08:20,779
nanometers really getting into that that

1623
01:08:26,809 --> 01:08:23,520
we're we're targeting centimetric

1624
01:08:28,910 --> 01:08:26,819
accuracy of sea level measurements from

1625
01:08:31,189 --> 01:08:28,920
space which is which is a truly

1626
01:08:33,890 --> 01:08:31,199
breakthrough it's a 10x Improvement of

1627
01:08:35,269 --> 01:08:33,900
what we are currently doing yes now

1628
01:08:36,650 --> 01:08:35,279
you're doing such a good job answering

1629
01:08:38,110 --> 01:08:36,660
these questions we have another one

1630
01:08:41,150 --> 01:08:38,120
coming in for you

1631
01:08:43,910 --> 01:08:41,160
what is ocean topography and how does it

1632
01:08:46,550 --> 01:08:43,920
work with SWOT well think of it ocean

1633
01:08:49,010 --> 01:08:46,560
topography just like mountains and

1634
01:08:51,890 --> 01:08:49,020
Valley like I was driving here from LAX

1635
01:08:54,470 --> 01:08:51,900
to to lampog just like mountains and

1636
01:08:56,749 --> 01:08:54,480
valleys on the ground you see Hills and

1637
01:08:58,130 --> 01:08:56,759
dips on the ocean surface so think of it

1638
01:09:00,050 --> 01:08:58,140

as well

1639
01:09:02,870 --> 01:09:00,060
great explanation we have another

1640
01:09:04,849 --> 01:09:02,880
question for you too let's get to this

1641
01:09:06,890 --> 01:09:04,859
one is will you be able to tell how

1642
01:09:09,490 --> 01:09:06,900
clean the water is

1643
01:09:12,229 --> 01:09:09,500
so we will be able to make some

1644
01:09:15,110 --> 01:09:12,239
interpretation of water quality and this

1645
01:09:17,209 --> 01:09:15,120
chemical composition uh but but we're

1646
01:09:19,910 --> 01:09:17,219
mostly focusing on the volume storage

1647
01:09:21,769 --> 01:09:19,920
and uh and the height of the water we

1648
01:09:23,689 --> 01:09:21,779
SWAT okay let's see if we have another

1649
01:09:26,450 --> 01:09:23,699
one for you

1650
01:09:28,249 --> 01:09:26,460
will SWAT data help in predicting flash

1651
01:09:29,809 --> 01:09:28,259
flooding more effectively than current

1652
01:09:33,289 --> 01:09:29,819
technology

1653
01:09:35,870 --> 01:09:33,299
we are so with the with the rising sea

1654
01:09:38,329 --> 01:09:35,880
levels we do uh see a more frequent

1655
01:09:40,550 --> 01:09:38,339
inundations including those related to

1656
01:09:43,309 --> 01:09:40,560
uh flash flooding or or sunny days

1657
01:09:46,249 --> 01:09:43,319
flooding so and so what will continue uh

1658
01:09:49,309 --> 01:09:46,259
the legacy of of prediction of flood

1659
01:09:51,650 --> 01:09:49,319
events uh related to the rising oceans

1660
01:09:54,410 --> 01:09:51,660
we have one more social question for you

1661
01:09:56,870 --> 01:09:54,420
to get to will this technology also help

1662
01:09:58,550 --> 01:09:56,880
determine how much drinkable water is

1663
01:10:02,209 --> 01:09:58,560

currently available

1664
01:10:05,689 --> 01:10:02,219
yes we are targeting uh fresh water and

1665
01:10:07,370 --> 01:10:05,699
our reservoirs in Lakes uh and uh and

1666
01:10:10,550 --> 01:10:07,380
and and and and other reservoirs there's

1667
01:10:13,370 --> 01:10:10,560
storage the change in their volume and

1668
01:10:15,950 --> 01:10:13,380
the extent yes drinking uh unavailable

1669
01:10:17,930 --> 01:10:15,960
water for usage uh you just offered some

1670
01:10:21,530 --> 01:10:17,940
great insight to swat thank you Nadia

1671
01:10:23,390 --> 01:10:21,540
now before SWAT data researchers could

1672
01:10:25,550 --> 01:10:23,400
only collect information on a few

1673
01:10:28,250 --> 01:10:25,560
thousand rivers and lakes but with SWAT

1674
01:10:30,530 --> 01:10:28,260
it will be more than a million here is a

1675
01:10:36,490 --> 01:10:30,540
look at how that kind of data can have a

1676
01:10:40,430 --> 01:10:38,810
SWAT is the surface water and ocean

1677
01:10:41,870 --> 01:10:40,440
topography satellite it's an

1678
01:10:43,130 --> 01:10:41,880
International satellite that's going to

1679
01:10:44,810 --> 01:10:43,140
give us this complete view of the

1680
01:10:46,790 --> 01:10:44,820
surface water here on Earth what's

1681
01:10:48,950 --> 01:10:46,800
happening the Lakes reservoirs rivers

1682
01:10:50,870 --> 01:10:48,960
and also in the ocean it'll tell us

1683
01:10:53,030 --> 01:10:50,880
about how sea level is rising along

1684
01:10:54,470 --> 01:10:53,040
coastlines and in the open ocean and

1685
01:10:56,209 --> 01:10:54,480
really give us a good understanding of

1686
01:10:57,460 --> 01:10:56,219
how surface water is is moving about the

1687
01:11:02,890 --> 01:10:57,470
Earth

1688
01:11:08,990 --> 01:11:06,830

our goal is to provide data forecasts

1689
01:11:11,270 --> 01:11:09,000
watches and warnings that's some key

1690
01:11:13,910 --> 01:11:11,280
locations like the Willamette River in

1691
01:11:15,950 --> 01:11:13,920
Portland which is a major U.S city that

1692
01:11:17,030 --> 01:11:15,960
historically has seen some catastrophic

1693
01:11:20,270 --> 01:11:17,040
floods

1694
01:11:23,390 --> 01:11:20,280
the better quality of the data that we

1695
01:11:25,430 --> 01:11:23,400
have that feeds into our models the

1696
01:11:26,990 --> 01:11:25,440
better the forecasts are going to be the

1697
01:11:28,610 --> 01:11:27,000
more time that people will have to

1698
01:11:31,250 --> 01:11:28,620
protect themselves and their property

1699
01:11:33,590 --> 01:11:31,260
and ultimately our communities a tool

1700
01:11:34,990 --> 01:11:33,600
like SWAT is going to help us with

1701
01:11:37,070 --> 01:11:35,000
making these really difficult

1702
01:11:37,810 --> 01:11:37,080
projections and predictions for the

1703
01:11:42,290 --> 01:11:37,820
future

1704
01:11:47,149 --> 01:11:45,110
in the Willamette Valley in Oregon it is

1705
01:11:48,590 --> 01:11:47,159
a human-made lake it is a reservoir

1706
01:11:51,229 --> 01:11:48,600
operated by the Army Corps of Engineers

1707
01:11:52,729 --> 01:11:51,239
the water managers here they use you

1708
01:11:54,950 --> 01:11:52,739
know weather prediction they use

1709
01:11:56,450 --> 01:11:54,960
hydrologic models and the hope is that

1710
01:11:58,250 --> 01:11:56,460
data like SWAT might be incorporated

1711
01:12:00,050 --> 01:11:58,260
into those predictions to help them

1712
01:12:01,189 --> 01:12:00,060
better understand this water body's

1713
01:12:02,810 --> 01:12:01,199

filling and we don't want to over top

1714
01:12:04,610 --> 01:12:02,820
the dams you might want to start letting

1715
01:12:07,250 --> 01:12:04,620
water out really quickly they have to

1716
01:12:09,229 --> 01:12:07,260
make a lot of complicated decisions

1717
01:12:10,910 --> 01:12:09,239
when you've got a big storm event we

1718
01:12:12,770 --> 01:12:10,920
want to keep the community safe in the

1719
01:12:15,410 --> 01:12:12,780
best way that we can so how do we best

1720
01:12:17,270 --> 01:12:15,420
manage operation of these reservoirs in

1721
01:12:19,550 --> 01:12:17,280
terms of putting water out Downstream to

1722
01:12:21,470 --> 01:12:19,560
prevent flooding at a larger scale

1723
01:12:23,689 --> 01:12:21,480
in lots of states there are you know

1724
01:12:25,490 --> 01:12:23,699
hundreds thousands of reservoirs and

1725
01:12:27,709 --> 01:12:25,500
many of those reservoirs don't have

1726
01:12:29,510 --> 01:12:27,719
automated gauging available and so these

1727
01:12:30,649 --> 01:12:29,520
agencies have to kind of estimate how

1728
01:12:32,870 --> 01:12:30,659
much water is in them and how that's

1729
01:12:37,610 --> 01:12:32,880
changing and with SWAT they can just

1730
01:12:43,610 --> 01:12:40,610
for us in Alaska we have many many

1731
01:12:51,310 --> 01:12:43,620
rivers and only a few of them are

1732
01:12:56,149 --> 01:12:54,350
if we have data on when flooding is

1733
01:12:57,830 --> 01:12:56,159
occurring or might occur we can get

1734
01:12:59,149 --> 01:12:57,840
crews out there to look at the bridge to

1735
01:13:01,669 --> 01:12:59,159
make sure that the bridge and the

1736
01:13:04,250 --> 01:13:01,679
associated roadway are still safe if we

1737
01:13:06,470 --> 01:13:04,260
can start collecting data on All Rivers

1738
01:13:08,930 --> 01:13:06,480

above a certain size remotely for

1739
01:13:10,689 --> 01:13:08,940
satellites it really opens up the amount

1740
01:13:13,430 --> 01:13:10,699
of rivers that we can help understand

1741
01:13:16,430 --> 01:13:13,440
what happens when they flood or how they

1742
01:13:18,830 --> 01:13:16,440
flood and that really improves our

1743
01:13:21,709 --> 01:13:18,840
ability to manage our infrastructure and

1744
01:13:23,149 --> 01:13:21,719
to design new infrastructure that is

1745
01:13:24,649 --> 01:13:23,159
where SWAT will really make a big

1746
01:13:26,270 --> 01:13:24,659
difference

1747
01:13:27,649 --> 01:13:26,280
one of the partners we're working with

1748
01:13:29,510 --> 01:13:27,659
is the Department of Defense and they're

1749
01:13:30,860 --> 01:13:29,520
trying to fill gaps in the data that

1750
01:13:35,050 --> 01:13:30,870
they have along the coastlines

1751
01:13:37,370 --> 01:13:35,060
[Music]

1752
01:13:38,870 --> 01:13:37,380
our military is obviously very concerned

1753
01:13:40,250 --> 01:13:38,880
about what's happening on global scales

1754
01:13:42,530 --> 01:13:40,260
and they have installations across the

1755
01:13:44,090 --> 01:13:42,540
globe so SWAT will potentially provide

1756
01:13:45,950 --> 01:13:44,100
an opportunity to fill in some of those

1757
01:13:47,630 --> 01:13:45,960
gaps allow them to make the impact

1758
01:13:49,310 --> 01:13:47,640
assessments that they need for sea level

1759
01:13:50,750 --> 01:13:49,320
rise in their facilities so trying to

1760
01:13:52,490 --> 01:13:50,760
understand and give them the information

1761
01:13:53,990 --> 01:13:52,500
they need to plan for and then

1762
01:13:56,770 --> 01:13:54,000
potentially adapt to these changes is

1763
01:13:58,910 --> 01:13:56,780

really critically important

1764
01:14:01,250 --> 01:13:58,920
coastal wetlands like the Mississippi

1765
01:14:03,709 --> 01:14:01,260
River delta are extremely important

1766
01:14:11,570 --> 01:14:03,719
because it acts as a buffer between us

1767
01:14:16,070 --> 01:14:13,850
with swords because of its high spatial

1768
01:14:18,649 --> 01:14:16,080
resolution will be able to resolve water

1769
01:14:21,050 --> 01:14:18,659
surface elevation right at the coast

1770
01:14:23,330 --> 01:14:21,060
so this is quite important because as

1771
01:14:26,030 --> 01:14:23,340
sea level rises the ocean will migrate

1772
01:14:27,649 --> 01:14:26,040
into the land bringing more salt into

1773
01:14:29,689 --> 01:14:27,659
the land so it threatens the

1774
01:14:32,090 --> 01:14:29,699
infrastructure the biodiversity in the

1775
01:14:34,189 --> 01:14:32,100
wetlands along the coast hopefully the

1776
01:14:36,350 --> 01:14:34,199
types of models that we're producing can

1777
01:14:38,930 --> 01:14:36,360
support or they decide to manage the

1778
01:14:41,750 --> 01:14:38,940
River delta and SWOT on its own will

1779
01:14:45,110 --> 01:14:41,760
allow us to upscale these types of

1780
01:14:47,030 --> 01:14:45,120
studies to the world I'm really excited

1781
01:14:48,649 --> 01:14:47,040
about the new information we'll get from

1782
01:14:50,270 --> 01:14:48,659
SWAT and how we can start to couple it

1783
01:14:52,189 --> 01:14:50,280
to some of the the needs that we see

1784
01:14:53,750 --> 01:14:52,199
both at the coastal interface and also

1785
01:14:55,370 --> 01:14:53,760
on land I think we can potentially see

1786
01:15:02,950 --> 01:14:55,380
some immediate impact once what's

1787
01:15:08,149 --> 01:15:05,750
thank you

1788
01:15:10,669 --> 01:15:08,159

SWAT is an international collaborative

1789
01:15:12,950 --> 01:15:10,679
effort not only between NASA and Canes

1790
01:15:15,770 --> 01:15:12,960
but with contributions from the Canadian

1791
01:15:18,530 --> 01:15:15,780
space agency and the UK space agency

1792
01:15:20,750 --> 01:15:18,540
we'll hear from the UK space agency in a

1793
01:15:23,270 --> 01:15:20,760
moment but joining us now is Taryn

1794
01:15:25,250 --> 01:15:23,280
Tomlinson with the Canadian space agency

1795
01:15:27,590 --> 01:15:25,260
thank you for joining us today thanks

1796
01:15:29,510 --> 01:15:27,600
for having me good morning now why did

1797
01:15:32,030 --> 01:15:29,520
your agency choose to be involved with

1798
01:15:34,550 --> 01:15:32,040
the swap Mission while contributing to

1799
01:15:37,250 --> 01:15:34,560
the first ever satellite to survey most

1800
01:15:39,890 --> 01:15:37,260
of the water on the planet is truly an

1801
01:15:42,169 --> 01:15:39,900
exceptional opportunity for us water

1802
01:15:43,790 --> 01:15:42,179
such an important resource and it is so

1803
01:15:45,950 --> 01:15:43,800
in so many ways linked with climate

1804
01:15:47,870 --> 01:15:45,960
change and we're so happy to work with

1805
01:15:50,990 --> 01:15:47,880
our International Partners again on

1806
01:15:53,450 --> 01:15:51,000
solving issues that matter to all of us

1807
01:15:56,689 --> 01:15:53,460
SWAT is particularly important to Canada

1808
01:15:59,630 --> 01:15:56,699
we have the longest shoreline on the

1809
01:16:01,970 --> 01:15:59,640
planet and we have over a million lakes

1810
01:16:04,390 --> 01:16:01,980
and it's so important to monitor the

1811
01:16:06,530 --> 01:16:04,400
change of those Lakes over time

1812
01:16:08,709 --> 01:16:06,540
SWAT is really going to benefit

1813
01:16:12,410 --> 01:16:08,719

Canadians for strategic water management

1814
01:16:14,510 --> 01:16:12,420
but it will support Humanity in the face

1815
01:16:16,850 --> 01:16:14,520
of climate change it really is an

1816
01:16:18,770 --> 01:16:16,860
international effort as we say can you

1817
01:16:20,990 --> 01:16:18,780
talk a little bit more about csa's

1818
01:16:23,810 --> 01:16:21,000
contributions to the mission I'd love to

1819
01:16:25,689 --> 01:16:23,820
uh CSA will be contributing a key

1820
01:16:28,689 --> 01:16:25,699
component to the Karen instrument

1821
01:16:33,169 --> 01:16:28,699
they're called the extended interaction

1822
01:16:35,149 --> 01:16:33,179
klystronz built by CPI Canada it's the

1823
01:16:38,270 --> 01:16:35,159
high-powered amplifier that will help

1824
01:16:41,090 --> 01:16:38,280
those Ka bands Precision measurements

1825
01:16:43,729 --> 01:16:41,100
for measuring the surface water and so

1826
01:16:46,010 --> 01:16:43,739
in addition to the device that we are

1827
01:16:47,510 --> 01:16:46,020
contributing we have science researchers

1828
01:16:49,490 --> 01:16:47,520
who've been involved with the SWAT

1829
01:16:51,770 --> 01:16:49,500
science team and they've been developing

1830
01:16:53,930 --> 01:16:51,780
the objectives and they are also working

1831
01:16:56,149 --> 01:16:53,940
to deploy instruments to key sites

1832
01:16:58,729 --> 01:16:56,159
across Canada

1833
01:17:00,610 --> 01:16:58,739
yesterday we enjoy working uh with

1834
01:17:04,550 --> 01:17:00,620
Canadian sciences and speaking of that

1835
01:17:06,709 --> 01:17:04,560
what is the Canadian scientist's users

1836
01:17:08,750 --> 01:17:06,719
are most exciting to use for data for

1837
01:17:10,970 --> 01:17:08,760
for the data so

1838
01:17:13,130 --> 01:17:10,980

um we have some Services key services in

1839
01:17:15,530 --> 01:17:13,140
Canada that we'd really like to improve

1840
01:17:18,110 --> 01:17:15,540
and so as I was mentioning that

1841
01:17:20,030 --> 01:17:18,120
Shoreline navigation services to

1842
01:17:23,149 --> 01:17:20,040
Canadians is going to be very important

1843
01:17:24,790 --> 01:17:23,159
weather forecasting is going to be very

1844
01:17:27,470 --> 01:17:24,800
important as well

1845
01:17:29,450 --> 01:17:27,480
as well as just to monitors as I

1846
01:17:32,810 --> 01:17:29,460
mentioned the lakes and make sure that

1847
01:17:35,030 --> 01:17:32,820
we that we keep our eye on on the lake

1848
01:17:37,010 --> 01:17:35,040
measurements our researchers are looking

1849
01:17:39,590 --> 01:17:37,020
towards the North in helping Northern

1850
01:17:42,050 --> 01:17:39,600
Communities as well and so we're talking

1851
01:17:45,010 --> 01:17:42,060
about clean water supply we're talking

1852
01:17:48,649 --> 01:17:45,020
about water management for

1853
01:17:52,130 --> 01:17:48,659
the coastlines for tides and for

1854
01:17:54,050 --> 01:17:52,140
estuaries and also hydroelectricity and

1855
01:17:55,669 --> 01:17:54,060
I do want to mention I'm so excited to

1856
01:17:59,330 --> 01:17:55,679
see what Canadians will do with open

1857
01:18:01,550 --> 01:17:59,340
science and open data excellent yes the

1858
01:18:04,610 --> 01:18:01,560
data ahead and I want to know what was

1859
01:18:06,950 --> 01:18:04,620
launched like for you today well it was

1860
01:18:08,930 --> 01:18:06,960
exhilarating and we had cheers and

1861
01:18:11,330 --> 01:18:08,940
excitement outside we were all Outdoors

1862
01:18:13,189 --> 01:18:11,340
but what was it specifically exciting

1863
01:18:16,070 --> 01:18:13,199

for me was to see The Return of the

1864
01:18:18,350 --> 01:18:16,080
booster and that double sonic boom and

1865
01:18:20,390 --> 01:18:18,360
everybody jumped out of their skin it

1866
01:18:22,430 --> 01:18:20,400
was exhilarating what a morning thank

1867
01:18:24,470 --> 01:18:22,440
you so much we're grateful to be here

1868
01:18:25,850 --> 01:18:24,480
absolutely thank you for sharing us

1869
01:18:28,669 --> 01:18:25,860
today

1870
01:18:31,189 --> 01:18:28,679
good morning now Beth greenaway with the

1871
01:18:36,669 --> 01:18:31,199
UK agency wasn't able to be on set with

1872
01:18:41,930 --> 01:18:39,709
the UK space agency has contributed to

1873
01:18:43,669 --> 01:18:41,940
swap by enabling both our industry and

1874
01:18:46,130 --> 01:18:43,679
our scientists to be part of the mission

1875
01:18:47,570 --> 01:18:46,140
we were approached by the French space

1876
01:18:49,430 --> 01:18:47,580
agency connect who are building the

1877
01:18:51,770 --> 01:18:49,440
instrument for the mission they needed a

1878
01:18:54,350 --> 01:18:51,780
very complex bit of Kit built in the UK

1879
01:18:56,750 --> 01:18:54,360
which essentially signals or moves the

1880
01:18:58,729 --> 01:18:56,760
radar pulses around the instrument and

1881
01:19:00,590 --> 01:18:58,739
it was Honeywell in the UK that built

1882
01:19:01,669 --> 01:19:00,600
this in the UK we're really fortunate to

1883
01:19:03,850 --> 01:19:01,679
have some of the world leading

1884
01:19:06,830 --> 01:19:03,860
scientists who understand both the

1885
01:19:09,050 --> 01:19:06,840
oceanography how the ocean moves and how

1886
01:19:11,090 --> 01:19:09,060
satellites can be used to measure that

1887
01:19:13,250 --> 01:19:11,100
it's really exciting to be part of such

1888
01:19:15,830 --> 01:19:13,260

a big exciting Mission it takes a long

1889
01:19:19,130 --> 01:19:15,840
long time to come through to a launch in

1890
01:19:21,709 --> 01:19:19,140
2022 to be part of that Journey on the

1891
01:19:23,450 --> 01:19:21,719
policy side enabling people to really do

1892
01:19:25,070 --> 01:19:23,460
The Best of the Best of British

1893
01:19:27,830 --> 01:19:25,080
engineering and The Best of British

1894
01:19:29,510 --> 01:19:27,840
Science to be part of such a huge Global

1895
01:19:31,430 --> 01:19:29,520
Water Survey that's so important for

1896
01:19:33,110 --> 01:19:31,440
climate change and it's really going to

1897
01:19:34,910 --> 01:19:33,120
make a difference to what we understand

1898
01:19:39,370 --> 01:19:34,920
about our world

1899
01:19:44,810 --> 01:19:42,649
will measure the Earth's water on a

1900
01:19:46,910 --> 01:19:44,820
global weather it will take into account

1901
01:19:49,610 --> 01:19:46,920
how much fresh water flows in and out of

1902
01:19:51,410 --> 01:19:49,620
lakes rivers and back into the ocean it

1903
01:19:53,930 --> 01:19:51,420
will also look at shifts in sea level

1904
01:19:55,610 --> 01:19:53,940
Nadia you have a demonstration that

1905
01:19:57,890 --> 01:19:55,620
illustrates the importance of our water

1906
01:19:59,570 --> 01:19:57,900
that involves a gallon of water right

1907
01:20:01,790 --> 01:19:59,580
here right if we wanted to look a little

1908
01:20:05,330 --> 01:20:01,800
bit of the water storage what a budget

1909
01:20:08,570 --> 01:20:05,340
what a what a cycle and we imagine that

1910
01:20:12,250 --> 01:20:08,580
all the water on Earth represented in

1911
01:20:15,770 --> 01:20:12,260
this gallon of of clean water

1912
01:20:18,530 --> 01:20:15,780
and how the water moves the ocean is the

1913
01:20:20,750 --> 01:20:18,540

ultimate source of all our water land

1914
01:20:23,330 --> 01:20:20,760
does not produce its own water all the

1915
01:20:25,610 --> 01:20:23,340
water and moisture on land comes either

1916
01:20:29,510 --> 01:20:25,620
directly from the ocean or it

1917
01:20:30,729 --> 01:20:29,520
subsequently recycled from it and so

1918
01:20:38,930 --> 01:20:30,739
some of it

1919
01:20:42,350 --> 01:20:38,940
stored in the atmosphere so if a if you

1920
01:20:44,810 --> 01:20:42,360
just do a half a drop of your magic

1921
01:20:46,970 --> 01:20:44,820
liquid that would be representative of

1922
01:20:50,090 --> 01:20:46,980
how much water is contained in the in

1923
01:20:53,990 --> 01:20:50,100
our atmosphere so not too much right

1924
01:20:56,870 --> 01:20:54,000
right so yes and then about a tablespoon

1925
01:20:59,750 --> 01:20:56,880
of that magic liquid and I'll let you do

1926
01:21:02,390 --> 01:20:59,760
the math in terms of how many uh that

1927
01:21:06,350 --> 01:21:02,400
much would be representative of how much

1928
01:21:09,169 --> 01:21:06,360
available uh fresh water we have on land

1929
01:21:11,870 --> 01:21:09,179
so about a half a percent uh only so

1930
01:21:14,810 --> 01:21:11,880
also not that much you know most of it

1931
01:21:17,590 --> 01:21:14,820
is contained in our salty ocean so so we

1932
01:21:21,169 --> 01:21:17,600
humans and ecosystem we depend on this

1933
01:21:23,750 --> 01:21:21,179
steady supply of water and moisture from

1934
01:21:27,110 --> 01:21:23,760
Ocean to land and if the ocean supplies

1935
01:21:28,669 --> 01:21:27,120
interrupted we have droughts or even

1936
01:21:31,370 --> 01:21:28,679
fires like you guys have in California

1937
01:21:34,390 --> 01:21:31,380
that you experience perhaps yourself or

1938
01:21:37,910 --> 01:21:34,400

if the ocean supply of water is too much

1939
01:21:40,070 --> 01:21:37,920
we get floods and inundation just like

1940
01:21:42,229 --> 01:21:40,080
people like us on the East Coast so so

1941
01:21:45,950 --> 01:21:42,239
this this movements and the supply

1942
01:21:48,709 --> 01:21:45,960
demand chain uh in in this completeness

1943
01:21:51,950 --> 01:21:48,719
would be seen by SWAT just like you and

1944
01:21:54,470 --> 01:21:51,960
I seeing it in this gallon yeah and what

1945
01:21:55,850 --> 01:21:54,480
if too much water comes back into the

1946
01:21:58,610 --> 01:21:55,860
ocean as you were kind of describing

1947
01:22:01,550 --> 01:21:58,620
yeah well then the ocean becomes higher

1948
01:22:03,709 --> 01:22:01,560
the volume of the ocean Rises yeah and

1949
01:22:06,470 --> 01:22:03,719
how much would it rise well currently

1950
01:22:09,050 --> 01:22:06,480
we're observing about three millimeter

1951
01:22:11,510 --> 01:22:09,060
3.4 millimeter of global means sea level

1952
01:22:15,189 --> 01:22:11,520
rise I don't know if if that makes sense

1953
01:22:18,470 --> 01:22:15,199
so in in gallons that would be about

1954
01:22:20,750 --> 01:22:18,480
300 trillion of gallons a year that's

1955
01:22:24,229 --> 01:22:20,760
how much water we add every year into

1956
01:22:27,050 --> 01:22:24,239
the ocean okay I that is a giant number

1957
01:22:30,050 --> 01:22:27,060
how how can you help put that to scale

1958
01:22:33,649 --> 01:22:30,060
as well I mean I guess if you uh line up

1959
01:22:37,370 --> 01:22:33,659
all these jars you would cover the

1960
01:22:40,010 --> 01:22:37,380
distance from a Sun to Pluto and back so

1961
01:22:43,149 --> 01:22:40,020
yeah it's a lot of water the Sun Pluto

1962
01:22:46,490 --> 01:22:43,159
and back yes

1963
01:22:50,209 --> 01:22:46,500

well thank you so much Nadia for this

1964
01:22:51,830 --> 01:22:50,219
now a SWAT technology tracks changes in

1965
01:22:53,510 --> 01:22:51,840
water volume over time like you

1966
01:22:55,370 --> 01:22:53,520
mentioned and we'll get a better

1967
01:22:57,649 --> 01:22:55,380
understanding of Earth's water cycle

1968
01:23:00,410 --> 01:22:57,659
that data can be used to help prepare

1969
01:23:02,930 --> 01:23:00,420
communities for Rising seas and changing

1970
01:23:05,870 --> 01:23:02,940
coastlines let's learn more about

1971
01:23:10,430 --> 01:23:09,470
Earth has about 370 quintillion gallons

1972
01:23:12,830 --> 01:23:10,440
of water

1973
01:23:16,910 --> 01:23:12,840
if all that water was inside a single

1974
01:23:18,290 --> 01:23:16,920
drop it'd be 860 miles wide of course

1975
01:23:20,630 --> 01:23:18,300
it's not

1976
01:23:21,410 --> 01:23:20,640
Earth's water can be found all over the

1977
01:23:23,870 --> 01:23:21,420
planet

1978
01:23:26,810 --> 01:23:23,880
Earth's water budget tells us where that

1979
01:23:29,450 --> 01:23:26,820
water is and what form it takes

1980
01:23:31,310 --> 01:23:29,460
NASA has a fleet of satellites studying

1981
01:23:33,290 --> 01:23:31,320
the location and movement of Earth's

1982
01:23:35,630 --> 01:23:33,300
water each designed to measure certain

1983
01:23:37,669 --> 01:23:35,640
types of water some measure the movement

1984
01:23:40,310 --> 01:23:37,679
of groundwater or ocean currents while

1985
01:23:42,229 --> 01:23:40,320
New Missions like SWAT and nysar will

1986
01:23:44,149 --> 01:23:42,239
also fill gaps in our knowledge by

1987
01:23:46,550 --> 01:23:44,159
measuring fresh water and possible

1988
01:23:48,770 --> 01:23:46,560

hassles together these missions help

1989
01:23:50,090 --> 01:23:48,780
bring NASA's water budget and cycle into

1990
01:23:52,430 --> 01:23:50,100
Focus

1991
01:23:54,709 --> 01:23:52,440
so next time you feel a drop of rain on

1992
01:23:56,270 --> 01:23:54,719
your face imagine all the places that

1993
01:23:58,850 --> 01:23:56,280
water might have been during the last

1994
01:24:03,010 --> 01:23:58,860
few billion years and where it might be

1995
01:24:07,790 --> 01:24:05,689
you know that video really shows off

1996
01:24:11,090 --> 01:24:07,800
NASA's family Fleet doesn't it that's

1997
01:24:13,790 --> 01:24:11,100
right yes yes and let's jump back into

1998
01:24:16,310 --> 01:24:13,800
questions from kids and social media Ed

1999
01:24:18,410 --> 01:24:16,320
you know speaking of family looks like

2000
01:24:20,510 --> 01:24:18,420
we have a special surprise for you Nadia

2001
01:24:23,810 --> 01:24:20,520
okay

2002
01:24:27,229 --> 01:24:23,820
hi NASA my name is Kira I'm 80 years old

2003
01:24:29,570 --> 01:24:27,239
I'm in Washington DC I heard that kilos

2004
01:24:32,810 --> 01:24:29,580
are rising what I want to know is if me

2005
01:24:35,689 --> 01:24:32,820
and all puppies are safe Kira out

2006
01:24:38,330 --> 01:24:35,699
who did we just see there Nadia well hi

2007
01:24:40,910 --> 01:24:38,340
Kira yeah this is this is this is Kira

2008
01:24:43,250 --> 01:24:40,920
my daughter so I hope that you parents

2009
01:24:46,070 --> 01:24:43,260
will keep you safe and your puppies as

2010
01:24:48,950 --> 01:24:46,080
well but uh when you grow up uh by you

2011
01:24:50,570 --> 01:24:48,960
know 2050 I think uh sea level I believe

2012
01:24:53,630 --> 01:24:50,580
would be about half a meter high in

2013
01:24:56,270 --> 01:24:53,640

Washington DC which is about uh 20

2014
01:24:58,790 --> 01:24:56,280
inches of extra water where you live and

2015
01:25:01,970 --> 01:24:58,800
so that would be your job uh to to keep

2016
01:25:05,270 --> 01:25:01,980
your puppies safe and actually uh Raquel

2017
01:25:09,110 --> 01:25:05,280
uh NASA has a very uh useful tool where

2018
01:25:13,130 --> 01:25:09,120
we could uh demonstrate uh the um and

2019
01:25:16,070 --> 01:25:13,140
predict sea level rise 10 20 50 even 100

2020
01:25:19,189 --> 01:25:16,080
years from now not just for here in

2021
01:25:21,290 --> 01:25:19,199
Washington DC but uh all uh all our

2022
01:25:24,410 --> 01:25:21,300
major coastal city all over the globe

2023
01:25:27,110 --> 01:25:24,420
and I see that we have uh yes uh well

2024
01:25:29,530 --> 01:25:27,120
done NASA sea level.nasa.gov very very

2025
01:25:31,669 --> 01:25:29,540
effective yeah we have a link sea

2026
01:25:33,350 --> 01:25:31,679
level.nasa.gov and we have some social

2027
01:25:36,410 --> 01:25:33,360
questions coming in for you as well

2028
01:25:38,750 --> 01:25:36,420
let's see the first one coming up here

2029
01:25:41,870 --> 01:25:38,760
oh actually we have a photo this one is

2030
01:25:44,410 --> 01:25:41,880
a picture we have a space fan let's take

2031
01:25:47,570 --> 01:25:44,420
a look at Watson um

2032
01:25:50,990 --> 01:25:47,580
his mom Lucy says he has been a fan

2033
01:25:53,149 --> 01:25:51,000
since birth well it's just not far far

2034
01:25:55,430 --> 01:25:53,159
along right

2035
01:25:57,410 --> 01:25:55,440
great that was a very cute picture now

2036
01:25:59,390 --> 01:25:57,420
we have a social question to get to for

2037
01:26:00,530 --> 01:25:59,400
you okay

2038
01:26:02,930 --> 01:26:00,540

see

2039
01:26:04,370 --> 01:26:02,940
the first one coming up is can you

2040
01:26:07,370 --> 01:26:04,380
shortly describe the collaboration

2041
01:26:10,669 --> 01:26:07,380
between canes and NASA on the SWAT

2042
01:26:12,530 --> 01:26:10,679
mission who does what who does what uh

2043
01:26:15,729 --> 01:26:12,540
yeah so so NASA Inc has been

2044
01:26:19,129 --> 01:26:15,739
long-sending Partners working with kness

2045
01:26:21,830 --> 01:26:19,139
for more than 30 years especially for

2046
01:26:23,570 --> 01:26:21,840
for sale at altimetry this has been the

2047
01:26:25,669 --> 01:26:23,580
relationship that we've been doing very

2048
01:26:27,350 --> 01:26:25,679
strongly going on into fourth decade

2049
01:26:28,850 --> 01:26:27,360
it's in in when we talk about

2050
01:26:31,550 --> 01:26:28,860
collaboration it was a truly

2051
01:26:34,370 --> 01:26:31,560
collaborative effort when we were doing

2052
01:26:36,770 --> 01:26:34,380
both uh testing and engineering and

2053
01:26:40,490 --> 01:26:36,780
ping-poning our sweat observative back

2054
01:26:43,490 --> 01:26:40,500
between JPL and talus in France multiple

2055
01:26:44,810 --> 01:26:43,500
times so both agency contributes uh

2056
01:26:47,270 --> 01:26:44,820
contributed major Hardware

2057
01:26:49,430 --> 01:26:47,280
instrumentation for the observatory and

2058
01:26:51,050 --> 01:26:49,440
the questions just keep coming in we

2059
01:26:52,910 --> 01:26:51,060
have another social question for you to

2060
01:26:55,550 --> 01:26:52,920
answer

2061
01:26:58,430 --> 01:26:55,560
take a look this one is how long will

2062
01:27:02,209 --> 01:26:58,440
SWAT be in space a good question so the

2063
01:27:04,250 --> 01:27:02,219

nominal uh Mission timeline is three

2064
01:27:06,649 --> 01:27:04,260
years so we give our Engineers a

2065
01:27:09,590 --> 01:27:06,659
reasonable uh timeline to fulfill

2066
01:27:13,189 --> 01:27:09,600
engineering objectives but longer than

2067
01:27:15,709 --> 01:27:13,199
that would be a very welcome bonus for

2068
01:27:17,810 --> 01:27:15,719
our scientists to use what data Beyond

2069
01:27:20,930 --> 01:27:17,820
those three years that's a great bonus

2070
01:27:23,209 --> 01:27:20,940
let's get to the next social question

2071
01:27:25,550 --> 01:27:23,219
how is the data shared which

2072
01:27:27,950 --> 01:27:25,560
institutions are the intermediaries and

2073
01:27:29,450 --> 01:27:27,960
which are the end users I will soon be

2074
01:27:31,669 --> 01:27:29,460
working with the French government to

2075
01:27:34,310 --> 01:27:31,679
study link between water management and

2076
01:27:35,330 --> 01:27:34,320
spatial infrastructure it's an exciting

2077
01:27:38,030 --> 01:27:35,340
subject

2078
01:27:41,030 --> 01:27:38,040
well thank you we we think so too so

2079
01:27:43,850 --> 01:27:41,040
this is a free-fall wall all data would

2080
01:27:47,870 --> 01:27:43,860
be available to the public uh through

2081
01:27:49,729 --> 01:27:47,880
NASA and techness of data providers uh

2082
01:27:53,510 --> 01:27:49,739
and and not just that we're actually

2083
01:27:57,050 --> 01:27:53,520
welcoming a community to help NASA and

2084
01:27:59,510 --> 01:27:57,060
kness validate the data prior to the

2085
01:28:01,070 --> 01:27:59,520
delivery of a fully validated data set

2086
01:28:03,050 --> 01:28:01,080
this is the experiment that Sandra

2087
01:28:05,570 --> 01:28:03,060
mentioned that we're going through at

2088
01:28:07,790 --> 01:28:05,580

Nasa it's called open signs and we are

2089
01:28:10,010 --> 01:28:07,800
delivering and sharing pre-validated

2090
01:28:11,990 --> 01:28:10,020
data sets with the science community so

2091
01:28:14,629 --> 01:28:12,000
all hands on deck if you want to be a

2092
01:28:17,470 --> 01:28:14,639
hydrologist or work with infrastructure

2093
01:28:20,870 --> 01:28:17,480
as this person who asked this question

2094
01:28:23,149 --> 01:28:20,880
welcome yes data for all thank you so

2095
01:28:25,970 --> 01:28:23,159
much Nadia we still have time to get

2096
01:28:27,709 --> 01:28:25,980
your questions answered simply post your

2097
01:28:31,310 --> 01:28:27,719
question online with the hashtag

2098
01:28:34,070 --> 01:28:31,320
tracking World water now we are just

2099
01:28:36,290 --> 01:28:34,080
over 41 minutes since launch

2100
01:28:39,169 --> 01:28:36,300
commentators Megan Cruz and Denton

2101
01:28:42,050 --> 01:28:39,179
Gibson are tracking the next Milestones

2102
01:28:45,530 --> 01:28:44,090
yeah hello again guys from inside the

2103
01:28:47,209 --> 01:28:45,540
mission director Center here at

2104
01:28:49,189 --> 01:28:47,219
Vandenberg space force base in central

2105
01:28:50,930 --> 01:28:49,199
California we're actually sitting right

2106
01:28:52,370 --> 01:28:50,940
next to where Nadia and Raquel are

2107
01:28:54,830 --> 01:28:52,380
because this is where we can listen in

2108
01:28:57,590 --> 01:28:54,840
to the teams who are still working the

2109
01:28:59,930 --> 01:28:57,600
launch so uh it's been about 41 minutes

2110
01:29:01,790 --> 01:28:59,940
uh since liftoff from Vandenberg space

2111
01:29:04,850 --> 01:29:01,800
Force Base we had a nominal ascent and

2112
01:29:06,470 --> 01:29:04,860
now we are looking at live video of uh

2113
01:29:08,750 --> 01:29:06,480

the second stage and and the engine

2114
01:29:10,610 --> 01:29:08,760
there not burning red hot anymore

2115
01:29:12,410 --> 01:29:10,620
because it's been coasting now right for

2116
01:29:14,030 --> 01:29:12,420
about 30 minutes Denton yeah and what's

2117
01:29:15,530 --> 01:29:14,040
happening right now is they're chilling

2118
01:29:17,629 --> 01:29:15,540
down the engine as we we talked about

2119
01:29:19,669 --> 01:29:17,639
earlier they're just cooling down the

2120
01:29:22,250 --> 01:29:19,679
engine getting it ready to take on those

2121
01:29:23,570 --> 01:29:22,260
uh you know those densified propellants

2122
01:29:25,010 --> 01:29:23,580
with those which is down in the

2123
01:29:26,330 --> 01:29:25,020
neighborhood of Minister into degrees so

2124
01:29:28,550 --> 01:29:26,340
you see what's happening right now it's

2125
01:29:29,629 --> 01:29:28,560
just chilling engine down and getting

2126
01:29:31,430 --> 01:29:29,639
ready for

2127
01:29:33,110 --> 01:29:31,440
second engine start which is basically

2128
01:29:35,510 --> 01:29:33,120
is going to be a very short burn that's

2129
01:29:37,610 --> 01:29:35,520
coming up and this burn is essentially

2130
01:29:39,470 --> 01:29:37,620
just kind of doing a final orbit

2131
01:29:41,030 --> 01:29:39,480
adjustment before getting into

2132
01:29:43,010 --> 01:29:41,040
spacecraft separation so that's what's

2133
01:29:45,610 --> 01:29:43,020
what's happening right now and we should

2134
01:29:49,310 --> 01:29:45,620
hear the stage

2135
01:29:53,870 --> 01:29:49,320
two engine restart coming up here in

2136
01:29:55,430 --> 01:29:53,880
about a minute or so and so where we

2137
01:29:57,649 --> 01:29:55,440
just saw a map there that's a trajectory

2138
01:29:59,990 --> 01:29:57,659

it's showing where stage two is and

2139
01:30:02,870 --> 01:30:00,000
right now it is just south of South

2140
01:30:05,030 --> 01:30:02,880
Africa along the coast of Antarctica so

2141
01:30:07,189 --> 01:30:05,040
it traveled pretty far in just those 30

2142
01:30:09,649 --> 01:30:07,199
minutes

2143
01:30:11,570 --> 01:30:09,659
and as soon as we get in range

2144
01:30:14,270 --> 01:30:11,580
um of that that externalization the

2145
01:30:17,570 --> 01:30:14,280
engine will start up again and then

2146
01:30:18,950 --> 01:30:17,580
um shortly after that uh States I'm

2147
01:30:20,330 --> 01:30:18,960
excusing spacecraft separation will

2148
01:30:22,250 --> 01:30:20,340
occur

2149
01:30:25,129 --> 01:30:22,260
and what ground station are we trying to

2150
01:30:26,990 --> 01:30:25,139
hit so the ground station that um that

2151
01:30:30,050 --> 01:30:27,000
we're kind of targeting right now is

2152
01:30:32,209 --> 01:30:30,060
hard to be stuck which is on the south

2153
01:30:34,010 --> 01:30:32,219
end of of the African continent in South

2154
01:30:35,810 --> 01:30:34,020
Africa so that's the ground station you

2155
01:30:38,209 --> 01:30:35,820
want to get in range we want to kind of

2156
01:30:40,370 --> 01:30:38,219
capture that that uh stage excuse me

2157
01:30:44,830 --> 01:30:40,380
that spacecraft separation and so again

2158
01:30:47,990 --> 01:30:44,840
we are we need this burn to get it to

2159
01:30:50,450 --> 01:30:48,000
yep all right and we see the engine

2160
01:30:53,870 --> 01:30:50,460
lighting now again the second burn of

2161
01:30:56,870 --> 01:30:53,880
the second stage of Falcon 9

2162
01:30:59,810 --> 01:30:56,880
still carrying SWAT and be a very short

2163
01:31:05,750 --> 01:31:02,510

and we already have a nominal deploy

2164
01:31:08,209 --> 01:31:05,760
orbit engine shut down and we just heard

2165
01:31:10,850 --> 01:31:08,219
a call out that we are in the nominal

2166
01:31:14,149 --> 01:31:10,860
orbit so which means we kind of on the

2167
01:31:16,370 --> 01:31:14,159
correct path to go to State and skinny

2168
01:31:18,110 --> 01:31:16,380
spacecraft separation I

2169
01:31:20,209 --> 01:31:18,120
I do just love that we see all this live

2170
01:31:22,010 --> 01:31:20,219
video and we are gonna we expect to get

2171
01:31:25,070 --> 01:31:22,020
some live video of spacecraft separation

2172
01:31:26,870 --> 01:31:25,080
again in just less than 10 minutes uh so

2173
01:31:27,890 --> 01:31:26,880
uh you want to stick around for that but

2174
01:31:31,030 --> 01:31:27,900
for now we're going to send it back to

2175
01:31:36,290 --> 01:31:34,310
thank you Megan and Denton NASA's jet

2176
01:31:38,169 --> 01:31:36,300
propulsion laboratory led the U.S

2177
01:31:41,090 --> 01:31:38,179
portion of this International Mission

2178
01:31:44,750 --> 01:31:41,100
jpl's director Lori leshen joins us now

2179
01:31:46,910 --> 01:31:44,760
welcome Lori thank you thank you both uh

2180
01:31:48,830 --> 01:31:46,920
what a fabulous job you're doing thank

2181
01:31:51,709 --> 01:31:48,840
you well this is your first launch as

2182
01:31:54,169 --> 01:31:51,719
the director for JPL yes how excited are

2183
01:31:55,729 --> 01:31:54,179
you for this Mission oh I'm thrilled I

2184
01:31:58,189 --> 01:31:55,739
mean first of all it's just been an

2185
01:31:59,990 --> 01:31:58,199
extraordinary day here getting to be on

2186
01:32:01,790 --> 01:32:00,000
console and then run outside and

2187
01:32:04,010 --> 01:32:01,800
actually watch the launch which was

2188
01:32:05,930 --> 01:32:04,020

great and hear those Sonic booms when

2189
01:32:07,790 --> 01:32:05,940
the booster came back our launch teams

2190
01:32:09,290 --> 01:32:07,800
have been incredible but I'm just so

2191
01:32:10,850 --> 01:32:09,300
thrilled for the SWAT team who's been

2192
01:32:12,649 --> 01:32:10,860
you know I've only been at JPL for six

2193
01:32:15,590 --> 01:32:12,659
months the SWAT team's been working on

2194
01:32:16,910 --> 01:32:15,600
this for so so many years and thrilled

2195
01:32:18,649 --> 01:32:16,920
for an exciting mission to come of

2196
01:32:20,270 --> 01:32:18,659
course we still need that acquisition of

2197
01:32:23,209 --> 01:32:20,280
signal we're not getting ahead of

2198
01:32:24,830 --> 01:32:23,219
ourselves but so happy that my first

2199
01:32:26,390 --> 01:32:24,840
launch is in our science launch because

2200
01:32:28,330 --> 01:32:26,400
this is the planet we care the most

2201
01:32:31,250 --> 01:32:28,340
about

2202
01:32:33,950 --> 01:32:31,260
well JPL is known for operating deep

2203
01:32:36,410 --> 01:32:33,960
space missions how much of jpl's work is

2204
01:32:38,209 --> 01:32:36,420
devoted to studying Earth you know it's

2205
01:32:40,430 --> 01:32:38,219
more than people think right people know

2206
01:32:43,430 --> 01:32:40,440
us for cool Mars rovers and helicopters

2207
01:32:44,930 --> 01:32:43,440
and for orbiting Jupiter and these uh

2208
01:32:46,669 --> 01:32:44,940
and wonderful telescopes that look into

2209
01:32:48,649 --> 01:32:46,679
deep space and of course we do all of

2210
01:32:51,350 --> 01:32:48,659
that but in fact with the launch of SWAT

2211
01:32:53,689 --> 01:32:51,360
we now have 15 earth science missions

2212
01:32:56,629 --> 01:32:53,699
currently operating either dedicated

2213
01:32:58,790 --> 01:32:56,639

missions or big instruments on on other

2214
01:33:01,370 --> 01:32:58,800
missions so we've got a lot of eyes on

2215
01:33:03,770 --> 01:33:01,380
Earth at JPL and the thing about them is

2216
01:33:06,410 --> 01:33:03,780
whenever we do something at JPL we want

2217
01:33:08,030 --> 01:33:06,420
it to be technologically advanced so

2218
01:33:09,709 --> 01:33:08,040
we're always the ones trying to really

2219
01:33:11,629 --> 01:33:09,719
push the boundaries of what's possible

2220
01:33:13,669 --> 01:33:11,639
and what's that's really what swat's

2221
01:33:15,950 --> 01:33:13,679
going to do it's a whole new way of

2222
01:33:17,510 --> 01:33:15,960
measuring Earth's water and and we

2223
01:33:19,490 --> 01:33:17,520
always want to be pushing the boundaries

2224
01:33:21,890 --> 01:33:19,500
of innovation with all those 15 missions

2225
01:33:24,050 --> 01:33:21,900
now we've got about seven more that

2226
01:33:26,750 --> 01:33:24,060
we're working on that we'll be launching

2227
01:33:28,910 --> 01:33:26,760
in the next few years so a lot more

2228
01:33:30,709 --> 01:33:28,920
earth science work ahead of us so what

2229
01:33:32,030 --> 01:33:30,719
are those the next seven missions that

2230
01:33:34,070 --> 01:33:32,040
you mentioned Lori what's in the

2231
01:33:35,330 --> 01:33:34,080
pipeline yeah so there's you know four

2232
01:33:37,430 --> 01:33:35,340
of them are going to launch in the next

2233
01:33:40,310 --> 01:33:37,440
couple of years so the the first three

2234
01:33:42,110 --> 01:33:40,320
are are are fairly small actually small

2235
01:33:43,729 --> 01:33:42,120
missions that are have kind of focused

2236
01:33:46,550 --> 01:33:43,739
objectives but really important things

2237
01:33:48,709 --> 01:33:46,560
like looking at at aerosols particles in

2238
01:33:50,870 --> 01:33:48,719

the air working with actually local

2239
01:33:53,629 --> 01:33:50,880
medical professionals in cities to try

2240
01:33:55,850 --> 01:33:53,639
and understand the impact of aerosols on

2241
01:33:57,709 --> 01:33:55,860
health what a really interesting idea

2242
01:34:00,649 --> 01:33:57,719
right where we have a mission that's

2243
01:34:02,930 --> 01:34:00,659
going to be looking at the um at the

2244
01:34:04,729 --> 01:34:02,940
heat at the poles of the earth to try

2245
01:34:07,729 --> 01:34:04,739
and understand better sort of the

2246
01:34:10,250 --> 01:34:07,739
thermal environment there so that as we

2247
01:34:11,930 --> 01:34:10,260
you know the polls really help Drive the

2248
01:34:14,209 --> 01:34:11,940
circulation and climate change and so

2249
01:34:15,950 --> 01:34:14,219
understanding that that environment is

2250
01:34:18,590 --> 01:34:15,960
really really important and the third

2251
01:34:20,990 --> 01:34:18,600
one is actually going to work on methane

2252
01:34:23,030 --> 01:34:21,000
super emitters one of the most powerful

2253
01:34:24,649 --> 01:34:23,040
greenhouse gases we're going to be

2254
01:34:26,870 --> 01:34:24,659
detecting it with with greater

2255
01:34:29,510 --> 01:34:26,880
sensitivity than ever from space so that

2256
01:34:31,430 --> 01:34:29,520
we can actually mitigate methane

2257
01:34:33,350 --> 01:34:31,440
emissions which is super exciting so

2258
01:34:35,270 --> 01:34:33,360
those are all three kind of small ones

2259
01:34:37,010 --> 01:34:35,280
but the next really big earth science

2260
01:34:39,649 --> 01:34:37,020
missions are sort of on the scale of

2261
01:34:41,750 --> 01:34:39,659
SWAT is a mission called nysar which is

2262
01:34:44,149 --> 01:34:41,760
a collaboration NASA's first major

2263
01:34:48,050 --> 01:34:44,159

collaboration with the Indian space

2264
01:34:50,750 --> 01:34:48,060
agency so so exciting and if SWAT is

2265
01:34:52,970 --> 01:34:50,760
focused on water nysar is focused on

2266
01:34:55,310 --> 01:34:52,980
land it's really going to be a mission

2267
01:34:57,649 --> 01:34:55,320
that's going to teach us about help us

2268
01:34:58,850 --> 01:34:57,659
sense and detect changes in land that

2269
01:35:01,310 --> 01:34:58,860
are affiliated with things like

2270
01:35:03,050 --> 01:35:01,320
earthquakes and volcanoes oh I so wish

2271
01:35:04,910 --> 01:35:03,060
it was up there right now as monologue

2272
01:35:06,649 --> 01:35:04,920
is erupting but it's going to help us

2273
01:35:08,750 --> 01:35:06,659
see those things better from space it's

2274
01:35:11,510 --> 01:35:08,760
going to help us understand vegetation

2275
01:35:13,129 --> 01:35:11,520
all across the land and many many other

2276
01:35:15,050 --> 01:35:13,139
applications that are going to be so

2277
01:35:16,610 --> 01:35:15,060
valuable to folks so we've got the water

2278
01:35:19,129 --> 01:35:16,620
covered with SWAT and we'll have the

2279
01:35:21,110 --> 01:35:19,139
land covered that sounds like so many

2280
01:35:24,530 --> 01:35:21,120
great missions ahead thank you so much

2281
01:35:26,270 --> 01:35:24,540
for joining us today when LSP selects a

2282
01:35:28,490 --> 01:35:26,280
rocket for a mission they have to take

2283
01:35:30,830 --> 01:35:28,500
into account just how hot it gets

2284
01:35:35,149 --> 01:35:30,840
Jasmine spoke with a thermal engineer

2285
01:35:39,590 --> 01:35:37,970
joining us now is Dave pirick he is the

2286
01:35:41,570 --> 01:35:39,600
lead thermal engineer from launch

2287
01:35:43,070 --> 01:35:41,580
Services Program for the SWAT Mission

2288
01:35:44,750 --> 01:35:43,080

thank you so much for being here Dave

2289
01:35:46,129 --> 01:35:44,760
well thank you for having me it's a

2290
01:35:47,450 --> 01:35:46,139
pleasure being here and talking a little

2291
01:35:48,590 --> 01:35:47,460
bit about what we've been doing it's

2292
01:35:50,689 --> 01:35:48,600
been swapped from the thermal

2293
01:35:53,390 --> 01:35:50,699
perspective awesome very exciting so you

2294
01:35:55,189 --> 01:35:53,400
focus on integrated thermal analysis a

2295
01:35:57,890 --> 01:35:55,199
big term can you break that down for us

2296
01:35:59,629 --> 01:35:57,900
absolutely so an integrated thermal

2297
01:36:01,490 --> 01:35:59,639
analysis is just like it sounds you're

2298
01:36:03,590 --> 01:36:01,500
integrating different entities and in

2299
01:36:06,830 --> 01:36:03,600
this case uh we're integrating a second

2300
01:36:08,990 --> 01:36:06,840
stage launch vehicle model and a unique

2301
01:36:10,550 --> 01:36:09,000
spacecraft along with the interface that

2302
01:36:12,830 --> 01:36:10,560
connects the two like your payload

2303
01:36:14,390 --> 01:36:12,840
adapters and your isolation systems and

2304
01:36:16,070 --> 01:36:14,400
seeing how they interact with each other

2305
01:36:17,930 --> 01:36:16,080
and making sure that one doesn't

2306
01:36:19,370 --> 01:36:17,940
adversely affect the other

2307
01:36:21,050 --> 01:36:19,380
right so you're really kind of

2308
01:36:23,510 --> 01:36:21,060
protecting the the spacecraft from the

2309
01:36:25,010 --> 01:36:23,520
rocket and vice versa absolutely and so

2310
01:36:27,050 --> 01:36:25,020
as part of an integrated thermal

2311
01:36:29,450 --> 01:36:27,060
analysis we're really running

2312
01:36:31,669 --> 01:36:29,460
mathematical models to make temperature

2313
01:36:34,250 --> 01:36:31,679

predictions on launch vehicles and

2314
01:36:36,470 --> 01:36:34,260
spacecrafts and so what that entails is

2315
01:36:38,510 --> 01:36:36,480
as a thermal engineer you're really

2316
01:36:41,510 --> 01:36:38,520
worried about three different modes of

2317
01:36:43,910 --> 01:36:41,520
heat transfer radiation conduction and

2318
01:36:45,290 --> 01:36:43,920
convection so convection is think of

2319
01:36:48,590 --> 01:36:45,300
when you're outside and the wind is

2320
01:36:50,810 --> 01:36:48,600
blowing that's convection so radiation

2321
01:36:53,930 --> 01:36:50,820
it's it's like the sun beating down on

2322
01:36:56,629 --> 01:36:53,940
you solar radiation and then uh and then

2323
01:36:58,669 --> 01:36:56,639
conduction is kind of like taking a coat

2324
01:37:00,890 --> 01:36:58,679
hanger unraveling it holding a lighter

2325
01:37:02,870 --> 01:37:00,900
up to one end and then the heat will

2326
01:37:04,490 --> 01:37:02,880
transverse down through that uh little

2327
01:37:06,830 --> 01:37:04,500
coat hanger and that's that's conduction

2328
01:37:09,050 --> 01:37:06,840
through materials right a really good X

2329
01:37:10,970 --> 01:37:09,060
explanation of something complex there I

2330
01:37:12,410 --> 01:37:10,980
understand there's different challenges

2331
01:37:13,729 --> 01:37:12,420
that can happen along the way too can

2332
01:37:15,350 --> 01:37:13,739
you tell us what was unique or

2333
01:37:17,689 --> 01:37:15,360
challenging about working on the swap

2334
01:37:19,669 --> 01:37:17,699
Mission yeah so

2335
01:37:20,990 --> 01:37:19,679
um it when when we're doing any of these

2336
01:37:22,669 --> 01:37:21,000
assessments

2337
01:37:24,649 --> 01:37:22,679
um the three main modes of heat transfer

2338
01:37:26,450 --> 01:37:24,659

that I just mentioned well when you're

2339
01:37:28,070 --> 01:37:26,460
once you're in the vacuum of space one

2340
01:37:29,450 --> 01:37:28,080
of them goes away because you no longer

2341
01:37:32,590 --> 01:37:29,460
have convection you're in you're in

2342
01:37:36,290 --> 01:37:32,600
vacuum and so for SWOT in particularly

2343
01:37:38,629 --> 01:37:36,300
uh we had to face some modeling

2344
01:37:40,850 --> 01:37:38,639
conversion challenges we are working

2345
01:37:43,189 --> 01:37:40,860
with our European counterparts and and

2346
01:37:45,709 --> 01:37:43,199
kness and Dallas and they threw a secure

2347
01:37:47,209 --> 01:37:45,719
ball pretty early on and we didn't

2348
01:37:49,850 --> 01:37:47,219
necessarily know what one of their

2349
01:37:51,110 --> 01:37:49,860
software packages were so we used a lot

2350
01:37:53,510 --> 01:37:51,120
of really good teamwork and

2351
01:37:55,490 --> 01:37:53,520
collaboration throughout the the agency

2352
01:37:57,950 --> 01:37:55,500
and not just Kennedy Space Center and

2353
01:38:00,050 --> 01:37:57,960
JPL but we leveraged our resources up at

2354
01:38:02,090 --> 01:38:00,060
Goddard space flight center who has done

2355
01:38:03,590 --> 01:38:02,100
some of these conversions before and

2356
01:38:06,290 --> 01:38:03,600
it's just the type of community and

2357
01:38:11,750 --> 01:38:06,300
teamwork that our Niche little area of

2358
01:38:16,729 --> 01:38:13,129
well thank you for having me I

2359
01:38:20,330 --> 01:38:18,290
absolutely we are neary's spacecraft

2360
01:38:23,209 --> 01:38:20,340
separation let's go back to our

2361
01:38:26,270 --> 01:38:23,219
commentators Megan and Denton yeah we're

2362
01:38:28,729 --> 01:38:26,280
about 51 minutes after launch and now we

2363
01:38:31,370 --> 01:38:28,739

are awaiting spacecraft separation so

2364
01:38:33,950 --> 01:38:31,380
SWAT the spacecraft separating from

2365
01:38:35,689 --> 01:38:33,960
Falcon 9's second stage yes and and

2366
01:38:37,070 --> 01:38:35,699
that'll occur as we get closer to the

2367
01:38:39,890 --> 01:38:37,080
heart of Vegas top ground station and

2368
01:38:41,629 --> 01:38:39,900
now we see a good video there of the

2369
01:38:43,129 --> 01:38:41,639
SWAT spacecraft looking up and then

2370
01:38:46,370 --> 01:38:43,139
there's another cycling through of the

2371
01:38:48,290 --> 01:38:46,380
mvac engine so yeah once we get to the

2372
01:38:50,090 --> 01:38:48,300
point where we separation occur

2373
01:38:52,370 --> 01:38:50,100
hopefully we'll get a good video of that

2374
01:38:55,010 --> 01:38:52,380
and now there's a slight chance we may

2375
01:38:56,510 --> 01:38:55,020
get acquisition to signal

2376
01:38:58,310 --> 01:38:56,520
from the spacecraft at that point in

2377
01:39:00,649 --> 01:38:58,320
time but that's not the primary

2378
01:39:02,750 --> 01:39:00,659
opportunity to get it sure so you see

2379
01:39:06,470 --> 01:39:02,760
the Telemetry data right there stage two

2380
01:39:08,510 --> 01:39:06,480
just at the tip of uh South Africa you

2381
01:39:10,669 --> 01:39:08,520
were mentioning a ground station there

2382
01:39:13,370 --> 01:39:10,679
it's because when

2383
01:39:15,709 --> 01:39:13,380
um when the spacecraft separates from

2384
01:39:17,750 --> 01:39:15,719
the Falcon 9 second stage we want to

2385
01:39:19,490 --> 01:39:17,760
make sure we know where it is and we do

2386
01:39:21,229 --> 01:39:19,500
that by using the ground station correct

2387
01:39:22,729 --> 01:39:21,239
yeah and the ground station is what is

2388
01:39:24,530 --> 01:39:22,739

capturing the video that you're seeing

2389
01:39:26,750 --> 01:39:24,540
here as well as the Telemetry coming

2390
01:39:28,910 --> 01:39:26,760
from the vehicle so that's how the the

2391
01:39:31,250 --> 01:39:28,920
team down on the ground is able to see

2392
01:39:33,649 --> 01:39:31,260
everything that's happening in the data

2393
01:39:35,570 --> 01:39:33,659
and actually get the video as well so

2394
01:39:37,490 --> 01:39:35,580
you see the SWAT spacecraft there SWAT

2395
01:39:40,129 --> 01:39:37,500
stands for surface water and ocean

2396
01:39:43,370 --> 01:39:40,139
topography and as a joint Mission by

2397
01:39:45,229 --> 01:39:43,380
NASA and Canes Francis space agency they

2398
01:39:47,629 --> 01:39:45,239
had contributions from both the Canadian

2399
01:39:50,689 --> 01:39:47,639
and UK space agencies

2400
01:39:53,510 --> 01:39:50,699
yeah but once separation across payload

2401
01:39:55,790 --> 01:39:53,520
separation confirmed and we got good

2402
01:39:57,890 --> 01:39:55,800
video and we're hearing some cheering

2403
01:40:00,229 --> 01:39:57,900
here at the mission director Center at

2404
01:40:03,530 --> 01:40:00,239
Vandenberg space Force Base I'm sure the

2405
01:40:06,350 --> 01:40:03,540
spacecraft team uh for kness is also

2406
01:40:08,090 --> 01:40:06,360
cheering in their mission control center

2407
01:40:11,149 --> 01:40:08,100
you see the spacecraft floating away

2408
01:40:13,550 --> 01:40:11,159
right now from the second stage

2409
01:40:15,830 --> 01:40:13,560
and at this point the launch vehicles uh

2410
01:40:18,290 --> 01:40:15,840
job is done so the second stage will

2411
01:40:20,570 --> 01:40:18,300
just basically kind of back off move

2412
01:40:23,030 --> 01:40:20,580
away from the the spacecraft and kind of

2413
01:40:24,649 --> 01:40:23,040

take itself out of orbit just so we

2414
01:40:27,530 --> 01:40:24,659
don't have junk any junk floating around

2415
01:40:29,270 --> 01:40:27,540
after it's completed this mission

2416
01:40:31,370 --> 01:40:29,280
now

2417
01:40:33,530 --> 01:40:31,380
it's just so great to see all this live

2418
01:40:36,590 --> 01:40:33,540
video I'm still just watching it amazed

2419
01:40:38,750 --> 01:40:36,600
uh you know just to see it and this is a

2420
01:40:41,090 --> 01:40:38,760
moment that so many people have been

2421
01:40:42,470 --> 01:40:41,100
waiting for right absolutely as we

2422
01:40:44,990 --> 01:40:42,480
mentioned before a lot of all these

2423
01:40:46,850 --> 01:40:45,000
people have been working this Mission

2424
01:40:49,010 --> 01:40:46,860
um for 20 years right

2425
01:40:51,470 --> 01:40:49,020
and you know nice we getting a good view

2426
01:40:53,570 --> 01:40:51,480
of you can kind of see the the sun there

2427
01:40:55,610 --> 01:40:53,580
um from the view of the second stage

2428
01:40:57,050 --> 01:40:55,620
looking at SWAT floating away and you

2429
01:40:59,689 --> 01:40:57,060
kind of see the sun coming into view

2430
01:41:01,310 --> 01:40:59,699
there it's an awesome sight to see now

2431
01:41:03,890 --> 01:41:01,320
as a member of NASA's launch Services

2432
01:41:06,110 --> 01:41:03,900
Program Danza how does it feel uh to be

2433
01:41:08,330 --> 01:41:06,120
part of a program that facilitates so

2434
01:41:09,890 --> 01:41:08,340
much great science like SWAT I mean it's

2435
01:41:12,290 --> 01:41:09,900
always exciting to see that you know we

2436
01:41:13,370 --> 01:41:12,300
kind of play a role in helping enable a

2437
01:41:15,590 --> 01:41:13,380
lot of the science that these

2438
01:41:18,470 --> 01:41:15,600

spacecrafts provide for us and that you

2439
01:41:20,090 --> 01:41:18,480
know help us in our daily lives and it's

2440
01:41:21,470 --> 01:41:20,100
it's kind of it's sitting here at

2441
01:41:23,810 --> 01:41:21,480
consoles it's kind of you know it's

2442
01:41:25,490 --> 01:41:23,820
exciting and nervous nervousness at the

2443
01:41:26,810 --> 01:41:25,500
same time you're excited that you know

2444
01:41:29,030 --> 01:41:26,820
you get into this point in the mission

2445
01:41:30,770 --> 01:41:29,040
and you actually get to see this launch

2446
01:41:32,390 --> 01:41:30,780
and to see the spacecraft going on his

2447
01:41:33,530 --> 01:41:32,400
journey and it's nervous at the same

2448
01:41:35,330 --> 01:41:33,540
time so you want to make sure everything

2449
01:41:36,770 --> 01:41:35,340
goes right in the team and the

2450
01:41:38,990 --> 01:41:36,780
engineering team has done a tremendous

2451
01:41:40,729 --> 01:41:39,000
job of making sure that this Mission has

2452
01:41:43,669 --> 01:41:40,739
been successful and so we were saying

2453
01:41:46,070 --> 01:41:43,679
again uh the next step right is the team

2454
01:41:49,370 --> 01:41:46,080
confirming a signal with the spacecraft

2455
01:41:51,830 --> 01:41:49,380
oh here yes this is a shot of the canes

2456
01:41:54,109 --> 01:41:51,840
team again this is a joint Mission

2457
01:41:57,169 --> 01:41:54,119
between NASA and Canes Francis space

2458
01:41:59,390 --> 01:41:57,179
agency so I'm sure everyone there was

2459
01:42:01,270 --> 01:41:59,400
cheering the same that they were here at

2460
01:42:04,430 --> 01:42:01,280
the mission director Center once we saw

2461
01:42:07,370 --> 01:42:04,440
uh the spacecraft float away yeah and

2462
01:42:10,129 --> 01:42:07,380
hopefully we'll hear from the team in

2463
01:42:12,709 --> 01:42:10,139

France that they've acquired

2464
01:42:14,270 --> 01:42:12,719
signal from the spacecraft and we'll be

2465
01:42:17,290 --> 01:42:14,280
looking to hear that coming up soon

2466
01:42:22,310 --> 01:42:17,300
hopefully soon yeah the First full pass

2467
01:42:25,550 --> 01:42:22,320
for signal is slated for t plus one hour

2468
01:42:27,890 --> 01:42:25,560
and 18 minutes you did mention that we

2469
01:42:31,250 --> 01:42:27,900
might get some initial data around this

2470
01:42:34,129 --> 01:42:31,260
time but really what the team is uh

2471
01:42:35,750 --> 01:42:34,139
marching towards is that one hour 18

2472
01:42:37,310 --> 01:42:35,760
minutes that's when we really want to

2473
01:42:38,870 --> 01:42:37,320
confirm signal meaning that the

2474
01:42:40,129 --> 01:42:38,880
spacecraft is healthy and it's where we

2475
01:42:41,689 --> 01:42:40,139
want it to be yeah and that's an

2476
01:42:43,729 --> 01:42:41,699
important step in this whole process is

2477
01:42:45,350 --> 01:42:43,739
the you know after the the ride it's

2478
01:42:46,729 --> 01:42:45,360
kind of you know like you ride on a

2479
01:42:48,229 --> 01:42:46,739
roller coaster and you know you want to

2480
01:42:49,430 --> 01:42:48,239
make sure after you get off you get all

2481
01:42:51,410 --> 01:42:49,440
your belongings everything's looking

2482
01:42:53,629 --> 01:42:51,420
good and that's essentially what it is

2483
01:42:56,149 --> 01:42:53,639
we're waiting to kind of hear

2484
01:42:57,709 --> 01:42:56,159
um confirmation that the team in France

2485
01:42:59,750 --> 01:42:57,719
is able to communicate to the satellite

2486
01:43:01,430 --> 01:42:59,760
make sure everything's good and

2487
01:43:02,930 --> 01:43:01,440
everything went well with the ride okay

2488
01:43:05,810 --> 01:43:02,940

so we got a couple of minutes to wait

2489
01:43:07,430 --> 01:43:05,820
for that acquisition of signal so until

2490
01:43:08,930 --> 01:43:07,440
then we'll send it back to Raquel and

2491
01:43:11,090 --> 01:43:08,940
Nadia

2492
01:43:13,250 --> 01:43:11,100
thank you Megan and Denton we have some

2493
01:43:15,770 --> 01:43:13,260
more questions to get to the first is

2494
01:43:19,850 --> 01:43:15,780
from a student who has a question and

2495
01:43:26,510 --> 01:43:23,270
hello my name is mikhaila and I have two

2496
01:43:29,450 --> 01:43:26,520
questions for you today one is

2497
01:43:33,530 --> 01:43:29,460
how long will this Mission take and

2498
01:43:36,830 --> 01:43:33,540
number two is what is the range of

2499
01:43:39,590 --> 01:43:36,840
accuracy with this technology thank you

2500
01:43:41,810 --> 01:43:39,600
some great questions there yes Michaela

2501
01:43:44,510 --> 01:43:41,820
looks like a future engineer with a very

2502
01:43:47,649 --> 01:43:44,520
smart question so Michaela we are the

2503
01:43:51,770 --> 01:43:47,659
Prime mission timeline is three years

2504
01:43:54,830 --> 01:43:51,780
and our targeted accuracy for Ocean

2505
01:43:57,350 --> 01:43:54,840
Heights is about a centimeter accuracy

2506
01:43:59,330 --> 01:43:57,360
for smaller features you know less than

2507
01:44:01,129 --> 01:43:59,340
thousand kilometers and for larger

2508
01:44:03,109 --> 01:44:01,139
features which we're gonna use our other

2509
01:44:06,229 --> 01:44:03,119
non-care and altimeter we're shooting

2510
01:44:08,990 --> 01:44:06,239
about three centimeter accuracy in about

2511
01:44:11,330 --> 01:44:09,000
10 centimeters for Inland Waters so

2512
01:44:14,209 --> 01:44:11,340
great questions Michaela said

2513
01:44:15,590 --> 01:44:14,219

engineering career in her future we also

2514
01:44:16,910 --> 01:44:15,600
have some more social media questions to

2515
01:44:18,229 --> 01:44:16,920
get to let's take a look at the first

2516
01:44:22,070 --> 01:44:18,239
one

2517
01:44:25,790 --> 01:44:22,080
when will SWAT data be publicly released

2518
01:44:30,109 --> 01:44:25,800
we we would have us first uh look at the

2519
01:44:32,570 --> 01:44:30,119
data about full nominally full 2023 this

2520
01:44:36,169 --> 01:44:32,580
is where we are inviting our science

2521
01:44:38,930 --> 01:44:36,179
Community Raquel to help NASA to to

2522
01:44:40,970 --> 01:44:38,940
validate and take a first look at the

2523
01:44:43,129 --> 01:44:40,980
data we call it a pre-validated data

2524
01:44:46,850 --> 01:44:43,139
sets so don't write your nature papers

2525
01:44:49,669 --> 01:44:46,860
yet okay but uh but fully validated

2526
01:44:53,270 --> 01:44:49,679
um data I expected to be around the

2527
01:44:54,709 --> 01:44:53,280
spring time frame 2024 okay and we have

2528
01:44:56,689 --> 01:44:54,719
another question coming in here on

2529
01:44:59,270 --> 01:44:56,699
social media

2530
01:45:01,310 --> 01:44:59,280
Alessandra asks what will be the probe's

2531
01:45:03,590 --> 01:45:01,320
data processing centers

2532
01:45:05,169 --> 01:45:03,600
so the major processing data would be

2533
01:45:07,609 --> 01:45:05,179
our French

2534
01:45:10,430 --> 01:45:07,619
partners and then data would be

2535
01:45:12,890 --> 01:45:10,440
downlinked to GPL and back so this is

2536
01:45:14,990 --> 01:45:12,900
again a team effort yeah showing off

2537
01:45:18,169 --> 01:45:15,000
that International collaboration let's

2538
01:45:20,810 --> 01:45:18,179

get to our next social media question

2539
01:45:22,609 --> 01:45:20,820
will it measure ocean depths at what

2540
01:45:25,370 --> 01:45:22,619
resolution

2541
01:45:27,290 --> 01:45:25,380
oceans that were actually I have a few

2542
01:45:29,390 --> 01:45:27,300
scientists on the science simple are

2543
01:45:33,290 --> 01:45:29,400
looking at the seamounts and the

2544
01:45:35,770 --> 01:45:33,300
Symmetry using SWOT and they are also

2545
01:45:39,109 --> 01:45:35,780
excited to see some and discover

2546
01:45:41,209 --> 01:45:39,119
thousands of new amounts on the bottom

2547
01:45:44,870 --> 01:45:41,219
of our oceans so yes

2548
01:45:49,129 --> 01:45:47,149
is there more water in the atmosphere of

2549
01:45:51,709 --> 01:45:49,139
Earth than there is on all the surface

2550
01:45:54,290 --> 01:45:51,719
of oceans on Earth what amount if

2551
01:45:55,790 --> 01:45:54,300
Subterranean water is unknown currently

2552
01:45:58,070 --> 01:45:55,800
they're really asking you the tough

2553
01:46:00,109 --> 01:45:58,080
questions yes and I think maybe they

2554
01:46:02,689 --> 01:46:00,119
just was excited without a demonstration

2555
01:46:05,330 --> 01:46:02,699
so most of the water is of course

2556
01:46:08,870 --> 01:46:05,340
located in the ocean we just saw it in

2557
01:46:12,109 --> 01:46:08,880
this hour gallon and the only tiny uh

2558
01:46:13,790 --> 01:46:12,119
portion of the earth Global Water Cycle

2559
01:46:16,129 --> 01:46:13,800
is contained by the atmosphere so

2560
01:46:19,189 --> 01:46:16,139
atmospheric in it hold a lot of moisture

2561
01:46:22,850 --> 01:46:19,199
and but it's very effective at

2562
01:46:25,189 --> 01:46:22,860
transporting water between the ocean and

2563
01:46:26,810 --> 01:46:25,199

land that's great thank you Nadia now if

2564
01:46:28,510 --> 01:46:26,820
you have a question to ask post your

2565
01:46:31,790 --> 01:46:28,520
question online with the hashtag

2566
01:46:34,850 --> 01:46:31,800
tracking World water you did a great job

2567
01:46:37,189 --> 01:46:34,860
answering those schwa will create the

2568
01:46:39,950 --> 01:46:37,199
first comprehensive Global survey of

2569
01:46:42,950 --> 01:46:39,960
freshwater lakes rivers and reservoirs

2570
01:46:44,810 --> 01:46:42,960
from space let's go to Jasmine live at

2571
01:46:47,629 --> 01:46:44,820
the Hawks Nest who is with a scientist

2572
01:46:49,910 --> 01:46:47,639
eager to use the new data

2573
01:46:51,950 --> 01:46:49,920
thanks Raquel yes joining me now is

2574
01:46:54,649 --> 01:46:51,960
Tamlin pavelski the SWAT hydrology

2575
01:46:56,930 --> 01:46:54,659
science lead thank you for being here oh

2576
01:46:58,669 --> 01:46:56,940
my pleasure we are so excited especially

2577
01:47:00,950 --> 01:46:58,679
after seeing that spectacular launch

2578
01:47:02,510 --> 01:47:00,960
Tamlin and right now scientists really

2579
01:47:04,370 --> 01:47:02,520
have to Trek into the field to

2580
01:47:06,350 --> 01:47:04,380
understand the data from rivers and

2581
01:47:08,149 --> 01:47:06,360
lakes tell me how is SWAT going to

2582
01:47:12,050 --> 01:47:08,159
change that oh my gosh it's going to

2583
01:47:14,270 --> 01:47:12,060
change it so much so uh you know right

2584
01:47:15,770 --> 01:47:14,280
now if I go into the fields uh for a

2585
01:47:18,950 --> 01:47:15,780
field campaign I might be able to go and

2586
01:47:21,229 --> 01:47:18,960
measure a couple of rivers a few dozen

2587
01:47:23,030 --> 01:47:21,239
Lakes SWAT is going to be able to see

2588
01:47:24,830 --> 01:47:23,040

Lakes all over the world in places I

2589
01:47:27,169 --> 01:47:24,840
can't even get to where it's just

2590
01:47:28,850 --> 01:47:27,179
impossible and so the kind of science

2591
01:47:32,030 --> 01:47:28,860
that that we're going to be able to do

2592
01:47:34,609 --> 01:47:32,040
with SWAT is just orders of magnitude

2593
01:47:36,109 --> 01:47:34,619
above what we can do with uh just data

2594
01:47:38,330 --> 01:47:36,119
on the ground that said even more

2595
01:47:39,709 --> 01:47:38,340
powerful is going to be combining the

2596
01:47:40,970 --> 01:47:39,719
kinds of measurements we can make on the

2597
01:47:42,290 --> 01:47:40,980
ground with the groundbreaking

2598
01:47:43,970 --> 01:47:42,300
measurements we'll make with swap

2599
01:47:45,350 --> 01:47:43,980
exactly so we're combining kind of the

2600
01:47:47,330 --> 01:47:45,360
methods that we've already used with

2601
01:47:49,490 --> 01:47:47,340
some new things exactly that is so

2602
01:47:50,750 --> 01:47:49,500
exciting writing and what are you most

2603
01:47:52,790 --> 01:47:50,760
excited what measurements are you most

2604
01:47:54,109 --> 01:47:52,800
looking forward to from SWAT so I think

2605
01:47:56,570 --> 01:47:54,119
I might be most looking forward to

2606
01:47:58,030 --> 01:47:56,580
swat's measurements of lakes

2607
01:48:00,350 --> 01:47:58,040
so we're going to be able to measure

2608
01:48:02,450 --> 01:48:00,360
simultaneously the water level in lakes

2609
01:48:04,970 --> 01:48:02,460
and the area of lakes we'll be able to

2610
01:48:06,530 --> 01:48:04,980
see changes in volume and we're not just

2611
01:48:09,109 --> 01:48:06,540
going to be able to see that in a few

2612
01:48:10,790 --> 01:48:09,119
Lakes right right now maybe we can see a

2613
01:48:12,950 --> 01:48:10,800

few tens of thousands of lakes using on

2614
01:48:15,709 --> 01:48:12,960
the ground data with SWAT we're going to

2615
01:48:17,629 --> 01:48:15,719
see Millions so it's like going to a

2616
01:48:19,910 --> 01:48:17,639
more powerful telescope where suddenly

2617
01:48:21,350 --> 01:48:19,920
all these new stars appear right when

2618
01:48:22,970 --> 01:48:21,360
you say that figure Millions I mean

2619
01:48:25,370 --> 01:48:22,980
that's so hard to even picture but it's

2620
01:48:26,810 --> 01:48:25,380
really really exciting and how is SWAT

2621
01:48:28,910 --> 01:48:26,820
going to help us understand how water

2622
01:48:31,609 --> 01:48:28,920
moves worldwide I mean this is a global

2623
01:48:33,169 --> 01:48:31,619
view yeah so I think a lot of us start

2624
01:48:34,850 --> 01:48:33,179
learning about the water cycle really

2625
01:48:38,450 --> 01:48:34,860
early on you know in elementary school

2626
01:48:39,770 --> 01:48:38,460
or middle school maybe and uh you know

2627
01:48:41,990 --> 01:48:39,780
that's because it's so fundamental to

2628
01:48:44,390 --> 01:48:42,000
how our planet works and water is a

2629
01:48:45,590 --> 01:48:44,400
precious resource for us and SWAT is

2630
01:48:47,870 --> 01:48:45,600
going to tell us about one of the most

2631
01:48:49,310 --> 01:48:47,880
critical parts of the water cycle which

2632
01:48:51,290 --> 01:48:49,320
is surface water right so we have

2633
01:48:52,609 --> 01:48:51,300
evaporation right off of the ocean and

2634
01:48:54,830 --> 01:48:52,619
off the land we have precipitation

2635
01:48:57,590 --> 01:48:54,840
coming down SWAT is going to help us put

2636
01:48:59,510 --> 01:48:57,600
real numbers on how the amount of water

2637
01:49:01,490 --> 01:48:59,520
flowing through Rivers is changing over

2638
01:49:03,950 --> 01:49:01,500

time and how climate change is affecting

2639
01:49:05,149 --> 01:49:03,960
that right that that is so exciting to

2640
01:49:06,890 --> 01:49:05,159
see how this is all working together

2641
01:49:09,830 --> 01:49:06,900
Tamlin thank you so much for being here

2642
01:49:10,550 --> 01:49:09,840
oh my pleasure awesome Raquel back to

2643
01:49:15,410 --> 01:49:10,560
you

2644
01:49:17,870 --> 01:49:15,420
much water is on Earth but also how it

2645
01:49:19,370 --> 01:49:17,880
moves we actually don't know the extent

2646
01:49:21,950 --> 01:49:19,380
of some of the science that this is

2647
01:49:24,229 --> 01:49:21,960
going to produce and I'd like to

2648
01:49:26,810 --> 01:49:24,239
introduce you to Christine Gabara she's

2649
01:49:30,189 --> 01:49:26,820
a mechanical engineer inspiring future

2650
01:49:34,609 --> 01:49:32,390
coming to work every day it's always

2651
01:49:36,290 --> 01:49:34,619
really nice to know that the system that

2652
01:49:38,810 --> 01:49:36,300
we're building will collect science data

2653
01:49:41,270 --> 01:49:38,820
that will be spread publicly that the

2654
01:49:42,950 --> 01:49:41,280
data will help people hi my name is

2655
01:49:46,230 --> 01:49:42,960
Christine Jabara and I'm an integration

2656
01:50:00,950 --> 01:49:58,450
[Music]

2657
01:50:02,270 --> 01:50:00,960
SWAT is an Earth orbiting satellite it

2658
01:50:04,609 --> 01:50:02,280
stands for surface water ocean

2659
01:50:07,490 --> 01:50:04,619
topography and it'll give us more

2660
01:50:08,810 --> 01:50:07,500
accurate data on how the water levels

2661
01:50:11,410 --> 01:50:08,820
the fresh water and the salt water

2662
01:50:14,030 --> 01:50:11,420
levels are changing with time

2663
01:50:15,470 --> 01:50:14,040

the day-to-day varies a lot we're

2664
01:50:17,330 --> 01:50:15,480
usually either setting up for a test

2665
01:50:19,010 --> 01:50:17,340
testing breaking down from a test or

2666
01:50:20,330 --> 01:50:19,020
moving the spacecraft the coolest parts

2667
01:50:21,649 --> 01:50:20,340
of SWAT to me are the like the

2668
01:50:23,629 --> 01:50:21,659
engineering bits that are slightly

2669
01:50:25,370 --> 01:50:23,639
extreme so I've really enjoyed working

2670
01:50:27,649 --> 01:50:25,380
on the Deployable antennas it's

2671
01:50:29,270 --> 01:50:27,659
nerve-wracking but it's a well rehearsed

2672
01:50:30,709 --> 01:50:29,280
dance and when the antenna is actually

2673
01:50:32,810 --> 01:50:30,719
deployed they're really beautiful

2674
01:50:34,020 --> 01:50:32,820
they're moving slowly and intentionally

2675
01:50:36,830 --> 01:50:34,030
it's like a butterfly

2676
01:50:39,410 --> 01:50:36,840
[Music]

2677
01:50:40,970 --> 01:50:39,420
I grew up in Houston Texas I was very

2678
01:50:43,070 --> 01:50:40,980
lucky to be part of the Girl Scout

2679
01:50:44,810 --> 01:50:43,080
sailing program where they taught us not

2680
01:50:46,729 --> 01:50:44,820
only how to sail but they taught us the

2681
01:50:48,890 --> 01:50:46,739
very basics of aerodynamics and how the

2682
01:50:51,290 --> 01:50:48,900
sailboat worked I became an aerospace

2683
01:50:53,570 --> 01:50:51,300
engineer because of that program the

2684
01:50:56,149 --> 01:50:53,580
ability to say oh I know how this works

2685
01:50:58,790 --> 01:50:56,159
and then going to implement it in like a

2686
01:51:01,010 --> 01:50:58,800
way that was fun and exciting was really

2687
01:51:03,350 --> 01:51:01,020
rewarding if I were to tell a little

2688
01:51:04,850 --> 01:51:03,360

girl how to get into engineering I would

2689
01:51:07,669 --> 01:51:04,860
tell her just to get started in whatever

2690
01:51:09,229 --> 01:51:07,679
way feels exciting and natural it gets a

2691
01:51:11,330 --> 01:51:09,239
lot easier once you just get started and

2692
01:51:13,870 --> 01:51:11,340
start tinkering with things and building

2693
01:51:16,850 --> 01:51:13,880
whatever excites you

2694
01:51:18,550 --> 01:51:16,860
it's not lost on me at all that I grew

2695
01:51:21,109 --> 01:51:18,560
up sailing and I still love the water

2696
01:51:23,149 --> 01:51:21,119
and the the spacecraft that we're

2697
01:51:25,129 --> 01:51:23,159
building will help us track our oceans

2698
01:51:26,930 --> 01:51:25,139
and our lakes and our Rivers

2699
01:51:29,490 --> 01:51:26,940
hopefully we'll be able to sail for much

2700
01:51:35,450 --> 01:51:29,500
much longer in Beautiful Blue Waters

2701
01:51:40,010 --> 01:51:38,209
watch is a joint Mission between NASA

2702
01:51:42,830 --> 01:51:40,020
and kness with contributions from the

2703
01:51:44,870 --> 01:51:42,840
Canadian and UK space agencies joining

2704
01:51:47,390 --> 01:51:44,880
us now is Caroline Laurent the director

2705
01:51:50,149 --> 01:51:47,400
of orbital systems and applications at

2706
01:51:53,750 --> 01:51:50,159
kness thank you for joining us today hi

2707
01:51:56,330 --> 01:51:53,760
hi Caroline what does it mean to finally

2708
01:51:59,810 --> 01:51:56,340
see the satellite in space well it's

2709
01:52:02,149 --> 01:51:59,820
it's so great it's such an experience

2710
01:52:05,090 --> 01:52:02,159
what I'd like to say is I'm so proud of

2711
01:52:07,629 --> 01:52:05,100
everybody I'm proud of proud of the

2712
01:52:10,430 --> 01:52:07,639
French teams of course of my teams from

2713
01:52:13,310 --> 01:52:10,440

kinespace but I'm also so proud of our

2714
01:52:16,430 --> 01:52:13,320
collaboration and of course this success

2715
01:52:19,189 --> 01:52:16,440
is due to our common teams and to NASA

2716
01:52:21,950 --> 01:52:19,199
GPL and SpaceX I want to congratulate

2717
01:52:24,470 --> 01:52:21,960
everybody for this incredible launch and

2718
01:52:26,750 --> 01:52:24,480
I I'd like to say I'm really proud to

2719
01:52:29,330 --> 01:52:26,760
see what international cooperation can

2720
01:52:32,390 --> 01:52:29,340
achieve together for the common goods so

2721
01:52:34,070 --> 01:52:32,400
it's a great day yes and there's lots of

2722
01:52:36,950 --> 01:52:34,080
activities still happening here at

2723
01:52:38,930 --> 01:52:36,960
Vandenberg space Force Base uh what is

2724
01:52:41,149 --> 01:52:38,940
happening over at kness in the main

2725
01:52:43,070 --> 01:52:41,159
control center at France right at this

2726
01:52:44,990 --> 01:52:43,080
moment okay so uh in Toulouse we have

2727
01:52:47,450 --> 01:52:45,000
the main Control Center and we have

2728
01:52:50,030 --> 01:52:47,460
ground stations all of the over the

2729
01:52:53,390 --> 01:52:50,040
world so first the satellite has an

2730
01:52:55,370 --> 01:52:53,400
autonomous maneuver for an hour and a

2731
01:52:57,229 --> 01:52:55,380
half and we'll have the solar panels

2732
01:53:00,530 --> 01:52:57,239
which is the main important thing

2733
01:53:03,830 --> 01:53:00,540
happening which will be deployed but

2734
01:53:06,050 --> 01:53:03,840
then the they will take fully control of

2735
01:53:09,649 --> 01:53:06,060
the satellite but in one hour and a half

2736
01:53:11,930 --> 01:53:09,659
probably from Sweden or South Africa

2737
01:53:13,430 --> 01:53:11,940
and during that hour and a half of

2738
01:53:15,410 --> 01:53:13,440

although the satellite is on an

2739
01:53:18,770 --> 01:53:15,420
automatic Mission it will send

2740
01:53:21,709 --> 01:53:18,780
information to so the people can start

2741
01:53:25,010 --> 01:53:21,719
having them and so there are people that

2742
01:53:27,890 --> 01:53:25,020
will be uh 24 hours a day working

2743
01:53:29,750 --> 01:53:27,900
starting from now through Christmas and

2744
01:53:31,490 --> 01:53:29,760
everybody I want to congratulate them of

2745
01:53:33,770 --> 01:53:31,500
course and then they will start

2746
01:53:36,950 --> 01:53:33,780
receiving they will start deploying the

2747
01:53:39,530 --> 01:53:36,960
antennas in a few days and once it's

2748
01:53:42,050 --> 01:53:39,540
fully in orbit they will start put

2749
01:53:43,550 --> 01:53:42,060
switching on the payload and start

2750
01:53:46,310 --> 01:53:43,560
receiving then there will the

2751
01:53:48,590 --> 01:53:46,320
calibration and validation will start

2752
01:53:50,930 --> 01:53:48,600
and then they will start receiving all

2753
01:53:53,450 --> 01:53:50,940
the data and they will in the end get

2754
01:53:56,629 --> 01:53:53,460
eight terabits of data everywhere that

2755
01:53:59,390 --> 01:53:56,639
every day that will be a flow that will

2756
01:54:01,850 --> 01:53:59,400
flow down through all all the over all

2757
01:54:04,550 --> 01:54:01,860
over the world stations

2758
01:54:06,350 --> 01:54:04,560
and and um that's it but right right now

2759
01:54:08,629 --> 01:54:06,360
they're all ready to get the first

2760
01:54:10,669 --> 01:54:08,639
things of the satellite and send the

2761
01:54:12,709 --> 01:54:10,679
first orders within an hour

2762
01:54:15,410 --> 01:54:12,719
thanks Carolina as we start a new

2763
01:54:18,229 --> 01:54:15,420

altimetry era with SWAT uh when you

2764
01:54:20,570 --> 01:54:18,239
reflect back what do you think of Sword

2765
01:54:22,609 --> 01:54:20,580
is building on a legacy of NASA and

2766
01:54:24,410 --> 01:54:22,619
NASA's altimetry friendship can you

2767
01:54:27,350 --> 01:54:24,420
comment on that yes it's been an

2768
01:54:31,250 --> 01:54:27,360
incredible journey starting more than 40

2769
01:54:33,350 --> 01:54:31,260
years ago and I'd say the main event was

2770
01:54:35,810 --> 01:54:33,360
the launch of topics for zaidon in the

2771
01:54:37,910 --> 01:54:35,820
summer of 1992 which was the first

2772
01:54:41,750 --> 01:54:37,920
altimetric mission then there were all

2773
01:54:43,910 --> 01:54:41,760
the Jason's missions and of course what

2774
01:54:47,209 --> 01:54:43,920
is the new is a breakthrough because now

2775
01:54:49,970 --> 01:54:47,219
we're going to monitor water and uh

2776
01:54:52,310 --> 01:54:49,980
before that we were only surveying the

2777
01:54:55,189 --> 01:54:52,320
oceans so that's a major breakthrough

2778
01:54:57,410 --> 01:54:55,199
and that tomorrow to monitor globally

2779
01:54:59,930 --> 01:54:57,420
all over the world the water

2780
01:55:01,850 --> 01:54:59,940
is really important for our world for

2781
01:55:03,950 --> 01:55:01,860
the next decades

2782
01:55:05,570 --> 01:55:03,960
and as I said at the beginning I mean

2783
01:55:08,090 --> 01:55:05,580
it's an incredible collab of

2784
01:55:10,609 --> 01:55:08,100
collaboration we have also Canadian and

2785
01:55:12,169 --> 01:55:10,619
uh and British friends working with us

2786
01:55:14,510 --> 01:55:12,179
together

2787
01:55:18,169 --> 01:55:14,520
and it's good to see what we can achieve

2788
01:55:21,530 --> 01:55:18,179

together and uh it's such an incredible

2789
01:55:25,250 --> 01:55:21,540
collaboration so right now I'm expecting

2790
01:55:27,470 --> 01:55:25,260
us to exploit a swords and to uh to have

2791
01:55:30,290 --> 01:55:27,480
a lot of years of tremendous data with

2792
01:55:32,030 --> 01:55:30,300
sport what but I'd like to think already

2793
01:55:34,070 --> 01:55:32,040
your future missions that we could build

2794
01:55:36,350 --> 01:55:34,080
together because it's been a great

2795
01:55:38,330 --> 01:55:36,360
collaboration Thank You Caroline thank

2796
01:55:40,790 --> 01:55:38,340
you thank you for joining us

2797
01:55:43,669 --> 01:55:40,800
well the SWAT satellite can see rivers

2798
01:55:45,169 --> 01:55:43,679
that are wider than 330 feet and that's

2799
01:55:48,109 --> 01:55:45,179
about the length of a soccer field

2800
01:55:50,209 --> 01:55:48,119
Cedric David a hydrologist who studies

2801
01:55:54,430 --> 01:55:50,219
the world's Rivers shared his unique

2802
01:55:58,970 --> 01:55:56,990
there is something about the environment

2803
01:56:01,370 --> 01:55:58,980
that's just incredibly cool

2804
01:56:03,770 --> 01:56:01,380
a lot of what we do as scientists is

2805
01:56:05,990 --> 01:56:03,780
we're just curious and so anybody who's

2806
01:56:08,149 --> 01:56:06,000
a curious person ought to be a scientist

2807
01:56:10,070 --> 01:56:08,159
in my opinion you can think of the

2808
01:56:12,470 --> 01:56:10,080
awards Rivers as Earth's arteries

2809
01:56:14,270 --> 01:56:12,480
because they're essential to life I'm

2810
01:56:16,180 --> 01:56:14,280
Cedric David and I study the world's

2811
01:56:19,070 --> 01:56:16,190
Rivers

2812
01:56:20,880 --> 01:56:19,080
[Music]

2813
01:56:29,229 --> 01:56:20,890

foreign

2814
01:56:34,970 --> 01:56:32,149
is a mission that is specifically

2815
01:56:37,729 --> 01:56:34,980
designed in part to observe rivers and

2816
01:56:40,189 --> 01:56:37,739
it's also being designed jointly by NASA

2817
01:56:42,050 --> 01:56:40,199
and the French space agency I was born

2818
01:56:45,350 --> 01:56:42,060
in France but I've lived in the U.S for

2819
01:56:46,850 --> 01:56:45,360
18 years now and I study Rivers so SWAT

2820
01:56:49,310 --> 01:56:46,860
is a little bit of a match made in

2821
01:56:50,689 --> 01:56:49,320
heaven for me the kind of science that

2822
01:56:53,149 --> 01:56:50,699
I'm interested in is trying to

2823
01:56:54,950 --> 01:56:53,159
understand how how much water flows down

2824
01:56:57,050 --> 01:56:54,960
the rivers of the world and SWAT will be

2825
01:56:59,390 --> 01:56:57,060
able to make one such measurement for

2826
01:57:02,470 --> 01:56:59,400
all the largest rivers of the world so

2827
01:57:05,149 --> 01:57:02,480
we'll be able to get a global unified

2828
01:57:07,490 --> 01:57:05,159
picture of surface waters from space

2829
01:57:09,649 --> 01:57:07,500
this in itself will be a scientific

2830
01:57:12,649 --> 01:57:09,659
revolution I think that's going to have

2831
01:57:14,649 --> 01:57:12,659
a big impact on Water Management

2832
01:57:17,149 --> 01:57:14,659
I like to say that water is my friend

2833
01:57:19,790 --> 01:57:17,159
water is my happy place

2834
01:57:22,970 --> 01:57:19,800
I was born with a physical disability

2835
01:57:25,490 --> 01:57:22,980
that affected both of my legs

2836
01:57:29,089 --> 01:57:25,500
being able to walk now was not a darn

2837
01:57:31,310 --> 01:57:29,099
deal at Birth and it still involves a

2838
01:57:33,589 --> 01:57:31,320

significant amount of discomfort and is

2839
01:57:34,870 --> 01:57:33,599
a constant reminder of having been born

2840
01:57:38,030 --> 01:57:34,880
differently

2841
01:57:39,709 --> 01:57:38,040
for as long as I can remember water has

2842
01:57:41,870 --> 01:57:39,719
been the only place where I felt

2843
01:57:43,250 --> 01:57:41,880
comfortable where I felt normal where I

2844
01:57:45,830 --> 01:57:43,260
felt like I couldn't do things like

2845
01:57:47,570 --> 01:57:45,840
everybody else when I get in the water

2846
01:57:48,890 --> 01:57:47,580
is just like I mean you're floating when

2847
01:57:50,089 --> 01:57:48,900
you're floating it's just like all the

2848
01:57:51,770 --> 01:57:50,099
pain goes away

2849
01:57:53,390 --> 01:57:51,780
as a kid my parents would take my

2850
01:57:55,189 --> 01:57:53,400
brother and I all the time to jump in

2851
01:57:58,850 --> 01:57:55,199
the Mediterranean but to this day we

2852
01:58:01,729 --> 01:57:58,860
still do it on New Year's Day every year

2853
01:58:04,790 --> 01:58:01,739
thankful future Generations requires us

2854
01:58:06,589 --> 01:58:04,800
understanding how much water we have and

2855
01:58:09,410 --> 01:58:06,599
a SWAT will be able to provide that

2856
01:58:11,390 --> 01:58:09,420
global view of the world's fresh waters

2857
01:58:13,850 --> 01:58:11,400
and in my opinion it might very well

2858
01:58:16,129 --> 01:58:13,860
become the key that unlocks surface

2859
01:58:18,709 --> 01:58:16,139
water observations around the world and

2860
01:58:20,330 --> 01:58:18,719
unleashes surface water management so it

2861
01:58:23,209 --> 01:58:20,340
might help us make sure that everybody

2862
01:58:25,250 --> 01:58:23,219
gets access to fresh water now more than

2863
01:58:27,410 --> 01:58:25,260

ever it's important to recognize that

2864
01:58:30,460 --> 01:58:27,420
water connects us all and it might be

2865
01:58:34,070 --> 01:58:30,470
the one thing that unites us all

2866
01:58:37,910 --> 01:58:36,050
we have some more questions to answer

2867
01:58:42,830 --> 01:58:37,920
and before we get to the social media

2868
01:58:51,649 --> 01:58:46,750
hello my name is

2869
01:58:53,030 --> 01:58:51,659
I'm six years old and I'm from Twain and

2870
01:58:58,010 --> 01:58:53,040
the year

2871
01:59:05,030 --> 01:58:58,020
and I have a question for you

2872
01:59:10,970 --> 01:59:08,209
that's a good question Easton well um

2873
01:59:13,970 --> 01:59:10,980
sword is relatively small compared to

2874
01:59:16,270 --> 01:59:13,980
other celestial bodies and it's not as

2875
01:59:19,310 --> 01:59:16,280
bright as a moon

2876
01:59:21,970 --> 01:59:19,320
it's about 500 miles above the Earth's

2877
01:59:25,490 --> 01:59:21,980
surface but maybe with a perfect

2878
01:59:28,970 --> 01:59:25,500
binoculars uh far away from major cities

2879
01:59:32,089 --> 01:59:28,980
on a particularly night sky you can spot

2880
01:59:34,250 --> 01:59:32,099
SWAT from uh from Indiana where you live

2881
01:59:36,050 --> 01:59:34,260
some binoculars there we also have

2882
01:59:39,050 --> 01:59:36,060
social media questions coming in so

2883
01:59:43,850 --> 01:59:41,330
let's see Elaine will SWAT measure ice

2884
01:59:45,229 --> 01:59:43,860
Fields glaciers and snowpack or just

2885
01:59:48,350 --> 01:59:45,239
liquid water

2886
01:59:53,030 --> 01:59:48,360
so the the primary focus was what is is

2887
01:59:54,830 --> 01:59:53,040
uh ice free water but we do have a

2888
01:59:58,250 --> 01:59:54,840

couple of scientists who are interested

2889
02:00:00,229 --> 01:59:58,260
to use the SWOT measurements uh for for

2890
02:00:05,149 --> 02:00:00,239
the height of sea ice as well good

2891
02:00:09,169 --> 02:00:07,310
what will happen to the probe after the

2892
02:00:12,430 --> 02:00:09,179
mission

2893
02:00:15,530 --> 02:00:12,440
so I presume it's a the care instrument

2894
02:00:18,010 --> 02:00:15,540
uh it will stay on the satellite and do

2895
02:00:21,950 --> 02:00:18,020
its job until until

2896
02:00:24,229 --> 02:00:21,960
we're done we'll keep going all right we

2897
02:00:28,070 --> 02:00:24,239
have another question coming up

2898
02:00:30,410 --> 02:00:28,080
hi everyone at Nasa SWAT our bodies are

2899
02:00:31,910 --> 02:00:30,420
70 water and then we cremate the

2900
02:00:33,410 --> 02:00:31,920
deceased does that water go into the

2901
02:00:34,970 --> 02:00:33,420
atmosphere and then the land and the Sea

2902
02:00:37,729 --> 02:00:34,980
they're really getting into details or

2903
02:00:39,589 --> 02:00:37,739
get rained back onto land also is the

2904
02:00:42,950 --> 02:00:39,599
swap Mission measuring the depth of

2905
02:00:46,129 --> 02:00:42,960
water to calculate the volume

2906
02:00:48,410 --> 02:00:46,139
so we could calculate the volume by

2907
02:00:51,830 --> 02:00:48,420
knowing the slope of the water and its

2908
02:00:53,270 --> 02:00:51,840
height so that's uh that that's one of

2909
02:00:56,570 --> 02:00:53,280
the measurements that we're targeting

2910
02:00:57,709 --> 02:00:56,580
and knowing the volume and and height is

2911
02:01:00,229 --> 02:00:57,719
really

2912
02:01:03,410 --> 02:01:00,239
um a very Dynamic variable Raquel it can

2913
02:01:05,689 --> 02:01:03,420

also tell us uh how the water moves and

2914
02:01:08,089 --> 02:01:05,699
how it moves different quantities with

2915
02:01:11,450 --> 02:01:08,099
that you know qualities like heat so

2916
02:01:13,490 --> 02:01:11,460
energy or plastic or pollution so it's a

2917
02:01:17,870 --> 02:01:13,500
very Dynamic and Rich quantity to deal

2918
02:01:20,330 --> 02:01:17,880
with lots of variables next question

2919
02:01:23,390 --> 02:01:20,340
how will SWAT satellite help in our

2920
02:01:26,510 --> 02:01:23,400
fight against climate change

2921
02:01:29,330 --> 02:01:26,520
in many ways uh let me start with the

2922
02:01:31,910 --> 02:01:29,340
oceans uh you know ocean is known to

2923
02:01:33,890 --> 02:01:31,920
absorb most of the global warming that

2924
02:01:36,890 --> 02:01:33,900
we've accumulated over the past few

2925
02:01:38,770 --> 02:01:36,900
years and as we expect ocean continue

2926
02:01:40,970 --> 02:01:38,780
taking it for the team

2927
02:01:43,790 --> 02:01:40,980
excuse me team Earth

2928
02:01:46,430 --> 02:01:43,800
what's really interesting question uh

2929
02:01:48,649 --> 02:01:46,440
Raquel is would it continue to absorb

2930
02:01:51,830 --> 02:01:48,659
heat or will reach the steeping point

2931
02:01:54,530 --> 02:01:51,840
when the efficiency of the of the Earth

2932
02:01:56,990 --> 02:01:54,540
oceans is decreasing and all of this

2933
02:02:00,470 --> 02:01:57,000
heat will be kicked back so by observing

2934
02:02:03,050 --> 02:02:00,480
a range of energetics Resort like on a

2935
02:02:04,850 --> 02:02:03,060
range of frequencies will really answer

2936
02:02:07,970 --> 02:02:04,860
this one of the most critical questions

2937
02:02:11,209 --> 02:02:07,980
of our time of what happens with our

2938
02:02:13,189 --> 02:02:11,219

planet as we as as it warms as well as

2939
02:02:15,649 --> 02:02:13,199
with our water resources that are

2940
02:02:18,169 --> 02:02:15,659
impacted by the climate change questions

2941
02:02:21,830 --> 02:02:18,179
like will population will have enough

2942
02:02:23,930 --> 02:02:21,840
water to survive or maybe it will have

2943
02:02:26,089 --> 02:02:23,940
too much water that will impact its

2944
02:02:28,370 --> 02:02:26,099
livelihood on land so a range of

2945
02:02:30,589 --> 02:02:28,380
questions we are looking to answer with

2946
02:02:33,649 --> 02:02:30,599
SWAT Mission truly critical questions

2947
02:02:35,330 --> 02:02:33,659
this is critical yes thank you Nadia and

2948
02:02:38,149 --> 02:02:35,340
thank you for all your questions today

2949
02:02:40,370 --> 02:02:38,159
we are about one hour after launch

2950
02:02:42,530 --> 02:02:40,380
commentators Megan and Denton are with

2951
02:02:44,450 --> 02:02:42,540
us again

2952
02:02:46,310 --> 02:02:44,460
yeah back here at the mission director

2953
02:02:48,530 --> 02:02:46,320
Center where you can actually see some

2954
02:02:49,550 --> 02:02:48,540
people behind us celebrating

2955
02:02:52,129 --> 02:02:49,560
um because again the spacecraft

2956
02:02:54,290 --> 02:02:52,139
separated a little bit ago and now we

2957
02:02:55,669 --> 02:02:54,300
are awaiting acquisition of signal with

2958
02:02:58,370 --> 02:02:55,679
the spacecraft but I do want to point

2959
02:03:00,589 --> 02:02:58,380
out that a few minutes ago the

2960
02:03:02,570 --> 02:03:00,599
spacecraft team did confirm that they

2961
02:03:05,030 --> 02:03:02,580
did get initial data from the spacecraft

2962
02:03:06,350 --> 02:03:05,040
right right yeah and then the and we as

2963
02:03:08,030 --> 02:03:06,360

you mentioned there was a chance that

2964
02:03:10,550 --> 02:03:08,040
shortly after separation we could get

2965
02:03:12,770 --> 02:03:10,560
some data and they did confirm they did

2966
02:03:14,570 --> 02:03:12,780
receive some Telemetry and it's just a

2967
02:03:16,669 --> 02:03:14,580
subset of the in the full Suite of

2968
02:03:18,770 --> 02:03:16,679
telemetry that we'll we expect to get

2969
02:03:20,570 --> 02:03:18,780
here in a couple of minutes so it's just

2970
02:03:22,189 --> 02:03:20,580
it was just a small subset just in the

2971
02:03:23,689 --> 02:03:22,199
uh just to confirmed they can

2972
02:03:25,609 --> 02:03:23,699
communicate with the spacecraft which is

2973
02:03:27,830 --> 02:03:25,619
great which means the spacecraft is

2974
02:03:31,070 --> 02:03:27,840
doing well okay so yes we're awaiting

2975
02:03:32,570 --> 02:03:31,080
that full uh acquisition of signal in in

2976
02:03:34,729 --> 02:03:32,580
about two minutes

2977
02:03:36,290 --> 02:03:34,739
um so when we get that full acquisition

2978
02:03:38,089 --> 02:03:36,300
signal what kind of data are we talking

2979
02:03:39,589 --> 02:03:38,099
about yeah and so it's the full Suite of

2980
02:03:41,570 --> 02:03:39,599
data it's the the you know the

2981
02:03:43,089 --> 02:03:41,580
spacecraft reporting okay our

2982
02:03:45,830 --> 02:03:43,099
instruments are looking good

2983
02:03:46,910 --> 02:03:45,840
all the subsystems are working correctly

2984
02:03:48,830 --> 02:03:46,920
and that's the type of data we're

2985
02:03:51,530 --> 02:03:48,840
expecting to get from

2986
02:03:53,270 --> 02:03:51,540
um during this initial excuse me I say

2987
02:03:55,010 --> 02:03:53,280
there's primary pass here in a couple of

2988
02:03:56,990 --> 02:03:55,020

minutes and just to make sure that

2989
02:03:59,450 --> 02:03:57,000
everything's working correctly and you

2990
02:04:00,709 --> 02:03:59,460
know they did well during the ride and

2991
02:04:02,030 --> 02:04:00,719
you did mention the instruments

2992
02:04:04,310 --> 02:04:02,040
obviously there's a number of different

2993
02:04:06,470 --> 02:04:04,320
instruments on the SWAT spacecraft so

2994
02:04:08,030 --> 02:04:06,480
you will get data about each of the

2995
02:04:09,709 --> 02:04:08,040
instruments as well yes and they'll be

2996
02:04:11,450 --> 02:04:09,719
able to confirm all that all is working

2997
02:04:13,609 --> 02:04:11,460
well and that's what we expect to see

2998
02:04:16,010 --> 02:04:13,619
and that's the one of the the keys of

2999
02:04:18,169 --> 02:04:16,020
this whole mission is to make sure hey

3000
02:04:20,149 --> 02:04:18,179
everything that's on board of the

3001
02:04:21,770 --> 02:04:20,159
spacecraft is working well because we we

3002
02:04:23,629 --> 02:04:21,780
really wanted to be able to execute

3003
02:04:25,070 --> 02:04:23,639
their mission which as you know we've

3004
02:04:27,530 --> 02:04:25,080
we've heard throughout the night that

3005
02:04:28,430 --> 02:04:27,540
how critical this mission is okay and

3006
02:04:31,430 --> 02:04:28,440
again

3007
02:04:35,510 --> 02:04:31,440
um we are or the team is targeting t

3008
02:04:37,550 --> 02:04:35,520
plus one hour and 18 minutes uh and 20

3009
02:04:39,169 --> 02:04:37,560
seconds so about a minute from now that

3010
02:04:41,270 --> 02:04:39,179
that is what they're targeting for

3011
02:04:43,729 --> 02:04:41,280
acquisition of signal but but really

3012
02:04:45,649 --> 02:04:43,739
that Milestone isn't as hard as other

3013
02:04:47,629 --> 02:04:45,659

Milestones right yeah and it's it's you

3014
02:04:50,209 --> 02:04:47,639
know it's really it's based on you know

3015
02:04:52,669 --> 02:04:50,219
where the spacecraft is you know how the

3016
02:04:54,290 --> 02:04:52,679
the launch was and and also impacted by

3017
02:04:55,850 --> 02:04:54,300
atmospheric conditions because if you

3018
02:04:58,129 --> 02:04:55,860
think about you know like when you shine

3019
02:05:00,649 --> 02:04:58,139
in a a flashlight on something and you

3020
02:05:01,850 --> 02:05:00,659
would have like this cone and basically

3021
02:05:02,930 --> 02:05:01,860
the ground station is essentially

3022
02:05:06,109 --> 02:05:02,940
looking up

3023
02:05:08,030 --> 02:05:06,119
um to the to the sky and and looking at

3024
02:05:09,350 --> 02:05:08,040
where this roundabout where the

3025
02:05:11,510 --> 02:05:09,360
spacecraft is so when it comes when

3026
02:05:12,950 --> 02:05:11,520
spacecraft comes into range that's when

3027
02:05:15,050 --> 02:05:12,960
we'll actually start to get data and be

3028
02:05:17,149 --> 02:05:15,060
able to communicate to it so it's not

3029
02:05:19,129 --> 02:05:17,159
exactly because of again there is a

3030
02:05:20,930 --> 02:05:19,139
target so you know it may be off a few

3031
02:05:22,729 --> 02:05:20,940
seconds here and there but you know

3032
02:05:27,050 --> 02:05:22,739
we're expecting to get good confirmation

3033
02:05:30,589 --> 02:05:28,669
una Sweden right that's the ground

3034
02:05:32,330 --> 02:05:30,599
station we're hoping to make connection

3035
02:05:34,729 --> 02:05:32,340
with yes and that's the ground station

3036
02:05:36,890 --> 02:05:34,739
that the the spacecraft is is on its way

3037
02:05:38,450 --> 02:05:36,900
towards right now and so hopefully here

3038
02:05:41,149 --> 02:05:38,460

in a few seconds we should hear

3039
02:05:42,830 --> 02:05:41,159
confirmation that the team was able to

3040
02:05:43,970 --> 02:05:42,840
get that full

3041
02:05:45,530 --> 02:05:43,980
um Suite of information from the

3042
02:05:46,970 --> 02:05:45,540
spacecraft

3043
02:05:48,410 --> 02:05:46,980
and I do want to talk a little bit about

3044
02:05:50,629 --> 02:05:48,420
the second stage so obviously it's

3045
02:05:53,089 --> 02:05:50,639
separated from the spacecraft the second

3046
02:05:56,750 --> 02:05:53,099
stage is still out there in orbit but

3047
02:05:59,510 --> 02:05:56,760
there's going to be a burn later that is

3048
02:06:01,370 --> 02:05:59,520
correct yes so you know

3049
02:06:03,109 --> 02:06:01,380
there's a lot of junk floating around

3050
02:06:05,390 --> 02:06:03,119
space and that's a big problem that you

3051
02:06:07,250 --> 02:06:05,400
know um that the world is wrestling with

3052
02:06:08,810 --> 02:06:07,260
right now and so we don't want to we

3053
02:06:10,370 --> 02:06:08,820
don't want to play our we want to you

3054
02:06:12,169 --> 02:06:10,380
know be good stewards of space so we

3055
02:06:14,810 --> 02:06:12,179
want to make sure you know our second

3056
02:06:16,729 --> 02:06:14,820
stage is able to deorbit basically come

3057
02:06:18,290 --> 02:06:16,739
down and not continue to float around

3058
02:06:20,870 --> 02:06:18,300
and be another piece of junk to add to

3059
02:06:22,189 --> 02:06:20,880
the issue so it deorbits itself it moves

3060
02:06:24,229 --> 02:06:22,199
away from the space safety moves away

3061
02:06:26,330 --> 02:06:24,239
from the spacecraft makes sure that you

3062
02:06:29,390 --> 02:06:26,340
know there's no issue

3063
02:06:32,089 --> 02:06:29,400

and um Ed BC takes itself down it'll

3064
02:06:37,550 --> 02:06:32,099
splash down just southeast of uh Hawaii

3065
02:06:40,669 --> 02:06:38,810
it's like now for a little bit of

3066
02:06:42,410 --> 02:06:40,679
chatter that we're hearing among the

3067
02:06:44,030 --> 02:06:42,420
spacecraft team

3068
02:06:46,010 --> 02:06:44,040
checking to see if they got that

3069
02:06:50,149 --> 02:06:46,020
acquisition of signal again with the

3070
02:06:54,229 --> 02:06:52,729
yeah and you're getting a good look at

3071
02:06:59,270 --> 02:06:54,239
the

3072
02:07:04,070 --> 02:07:01,970
SWAT a joint Mission between NASA and

3073
02:07:07,310 --> 02:07:04,080
kennes so we're listening into both

3074
02:07:15,589 --> 02:07:07,320
teams our NASA teams and also the canes

3075
02:07:20,149 --> 02:07:17,629
and hopefully we'll we'll see in another

3076
02:07:22,970 --> 02:07:20,159
second round of cheering once they get

3077
02:07:26,689 --> 02:07:22,980
that full Suite of information there

3078
02:07:29,450 --> 02:07:26,699
or at least a huge sigh of relief

3079
02:07:31,370 --> 02:07:29,460
but it is already so reassuring that

3080
02:07:33,950 --> 02:07:31,380
they got that initial yes you know

3081
02:07:35,450 --> 02:07:33,960
absolutely hi I'm here yes and that's

3082
02:07:36,950 --> 02:07:35,460
and that's it's huge because you know

3083
02:07:40,310 --> 02:07:36,960
you know your spacecraft is working well

3084
02:07:43,189 --> 02:07:40,320
after the the ride up to space yeah I

3085
02:07:45,410 --> 02:07:43,199
guess that initial acquisition I guess

3086
02:07:46,910 --> 02:07:45,420
could be said as like hi I'm here and

3087
02:07:49,010 --> 02:07:46,920
then the full one is like okay now I'm

3088
02:07:51,290 --> 02:07:49,020

ready to work right now I'm checking out

3089
02:07:53,030 --> 02:07:51,300
myself I'm checking all my subsystems I

3090
02:07:55,970 --> 02:07:53,040
hey here's all the information you need

3091
02:08:01,189 --> 02:07:55,980
to say okay we're working good and um we

3092
02:08:01,199 --> 02:08:06,410
and one good

3093
02:08:10,010 --> 02:08:08,089
other ground stations that they could

3094
02:08:12,709 --> 02:08:10,020
hit over the next couple of hours this

3095
02:08:14,209 --> 02:08:12,719
is just that first opportunity right and

3096
02:08:17,089 --> 02:08:14,219
yeah there's ground stations literally

3097
02:08:20,149 --> 02:08:17,099
all around the globe and once we're in

3098
02:08:35,990 --> 02:08:20,159
range of any of them we were able to

3099
02:08:47,570 --> 02:08:38,149
so right now we're pausing for some

3100
02:08:59,149 --> 02:08:49,609
so right now we in range of the corona

3101
02:09:04,189 --> 02:09:01,010
and hope we're hoping to get good

3102
02:09:06,470 --> 02:09:04,199
confirmation uh that the spacecraft is

3103
02:09:08,209 --> 02:09:06,480
able to acquire that full Suite of data

3104
02:09:09,589 --> 02:09:08,219
from the

3105
02:09:11,689 --> 02:09:09,599
spacecraft

3106
02:09:14,030 --> 02:09:11,699
a very important Milestone you know you

3107
02:09:14,870 --> 02:09:14,040
launched to get it to where it needs to

3108
02:09:18,169 --> 02:09:14,880
go

3109
02:09:20,810 --> 02:09:18,179
and for it to perform correctly yes so

3110
02:09:24,370 --> 02:09:20,820
this is that step to say hey it's

3111
02:09:31,370 --> 02:09:27,770
for NASA's LSP program acquisition of

3112
02:09:34,609 --> 02:09:31,380
signal is your your point of mission

3113
02:09:36,470 --> 02:09:34,619

success right yes

3114
02:09:38,209 --> 02:09:36,480
yes and that that is the point that we

3115
02:09:40,370 --> 02:09:38,219
know that the spacecraft you know the

3116
02:09:42,169 --> 02:09:40,380
launch vehicle has done its job and we

3117
02:09:43,609 --> 02:09:42,179
just need to get that confirmation that

3118
02:09:45,229 --> 02:09:43,619
the spacecraft is doing well and this is

3119
02:09:47,030 --> 02:09:45,239
the point in time where you know we

3120
02:09:48,609 --> 02:09:47,040
waiting to kind of get a thumbs up from

3121
02:09:50,510 --> 02:09:48,619
the spacecraft say hey we're good

3122
02:09:54,530 --> 02:09:50,520
spacecraft's looking good

3123
02:10:00,770 --> 02:09:57,709
against SWAT stands for surface water

3124
02:10:02,930 --> 02:10:00,780
and ocean topography

3125
02:10:05,270 --> 02:10:02,940
it's the first satellite mission to

3126
02:10:08,149 --> 02:10:05,280
survey nearly all water on the Earth's

3127
02:10:10,490 --> 02:10:08,159
surface with unprecedented detail and

3128
02:10:12,350 --> 02:10:10,500
accuracy

3129
02:10:14,689 --> 02:10:12,360
you know research first researchers want

3130
02:10:16,310 --> 02:10:14,699
to understand how water resources are

3131
02:10:18,709 --> 02:10:16,320
changing you know where the water is

3132
02:10:21,169 --> 02:10:18,719
today where it's coming from and where

3133
02:10:23,149 --> 02:10:21,179
it's going and what impact those changes

3134
02:10:25,850 --> 02:10:23,159
will have on local environments and also

3135
02:10:27,770 --> 02:10:25,860
how the ocean reacts to and influences

3136
02:10:30,050 --> 02:10:27,780
climate change because I I learned from

3137
02:10:32,870 --> 02:10:30,060
doing research on on this mission that

3138
02:10:35,149 --> 02:10:32,880

Earth Seas absorb more than 90 percent

3139
02:10:37,850 --> 02:10:35,159
of the excess heat trapped in the

3140
02:10:41,149 --> 02:10:37,860
atmosphere by human-caused Green

3141
02:10:43,609 --> 02:10:41,159
greenhouse gas emissions yeah and you

3142
02:10:45,950 --> 02:10:43,619
know it's and it's so

3143
02:10:48,530 --> 02:10:45,960
amazing to kind of be a part of nominal

3144
02:10:50,089 --> 02:10:48,540
the orbit that

3145
02:10:52,310 --> 02:10:50,099
is going to accomplish something that'll

3146
02:10:54,649 --> 02:10:52,320
uh in you know affect humanity and help

3147
02:10:57,290 --> 02:10:54,659
Humanity

3148
02:10:59,149 --> 02:10:57,300
and we just wrote a call out a nominal

3149
02:11:00,410 --> 02:10:59,159
deorbit burn right that is correct and

3150
02:11:03,350 --> 02:11:00,420
that's basically as we had mentioned

3151
02:11:05,089 --> 02:11:03,360
before the second stage kind of Taken

3152
02:11:06,890 --> 02:11:05,099
itself out of orbit so it doesn't you

3153
02:11:08,510 --> 02:11:06,900
know remain a piece of junk

3154
02:11:10,490 --> 02:11:08,520
um floating around in space and that was

3155
02:11:12,530 --> 02:11:10,500
basically what we heard the second stage

3156
02:11:13,790 --> 02:11:12,540
essentially took itself out of what we

3157
02:11:17,330 --> 02:11:13,800
did a burn to kind of re-enter the

3158
02:11:19,790 --> 02:11:17,340
Earth's atmosphere and to you know

3159
02:11:21,530 --> 02:11:19,800
impact somewhere southeast of Hawaii

3160
02:11:23,209 --> 02:11:21,540
yeah instead of just floating around

3161
02:11:25,669 --> 02:11:23,219
there like you said space junk is

3162
02:11:27,530 --> 02:11:25,679
obviously an issue especially when you

3163
02:11:29,930 --> 02:11:27,540

know you heard us talking about uh

3164
02:11:32,870 --> 02:11:29,940
earlier uh in in the broadcast before

3165
02:11:36,790 --> 02:11:32,880
launch about collision avoidance you

3166
02:11:39,109 --> 02:11:36,800
know we we have to watch and and and

3167
02:11:41,209 --> 02:11:39,119
determine whether or not it's safe to

3168
02:11:42,950 --> 02:11:41,219
fly considering some of the junk that's

3169
02:11:44,810 --> 02:11:42,960
flying around out there yeah every

3170
02:11:45,950 --> 02:11:44,820
satellite and every piece of junk is

3171
02:11:47,570 --> 02:11:45,960
tracked

3172
02:11:49,250 --> 02:11:47,580
um and you know and that's something we

3173
02:11:51,109 --> 02:11:49,260
have to take into account anytime we

3174
02:11:53,089 --> 02:11:51,119
we're getting ready to launch we have to

3175
02:11:55,010 --> 02:11:53,099
know where all these different pieces of

3176
02:11:57,470 --> 02:11:55,020
junk are so we don't

3177
02:12:03,350 --> 02:11:57,480
you know fly too close or impact any of

3178
02:12:07,129 --> 02:12:05,990
there's a look at the NASA management

3179
02:12:09,589 --> 02:12:07,139
team

3180
02:12:11,830 --> 02:12:09,599
all waiting around hopefully getting to

3181
02:12:14,570 --> 02:12:11,840
get that confirmation from France that

3182
02:12:17,750 --> 02:12:14,580
their full passes went well and they're

3183
02:12:19,669 --> 02:12:17,760
able to acquire all the data required

3184
02:12:21,830 --> 02:12:19,679
from the spacecraft yeah as you said we

3185
02:12:29,450 --> 02:12:21,840
are within range of the ground station

3186
02:12:34,609 --> 02:12:31,310
we now hear

3187
02:12:51,169 --> 02:12:34,619
canes over the audio loops

3188
02:12:57,410 --> 02:12:54,109

all right there you go we are hearing

3189
02:12:59,930 --> 02:12:57,420
the kness team confirming to our NASA

3190
02:13:01,550 --> 02:12:59,940
team that we have acquisition of signal

3191
02:13:03,770 --> 02:13:01,560
with the SWAT spacecraft that's

3192
02:13:05,390 --> 02:13:03,780
fantastic news and the team has done

3193
02:13:07,970 --> 02:13:05,400
their full amounts we're hearing

3194
02:13:09,649 --> 02:13:07,980
cheering now and the spacecraft is doing

3195
02:13:11,810 --> 02:13:09,659
well so all instruments are doing well

3196
02:13:13,910 --> 02:13:11,820
there you go here another round of

3197
02:13:15,589 --> 02:13:13,920
clapping and you can see it be on the

3198
02:13:18,589 --> 02:13:15,599
screen Applause here at the mission

3199
02:13:22,310 --> 02:13:18,599
director Center I'm sure also in France

3200
02:13:24,229 --> 02:13:22,320
and in uh knesses control room again a

3201
02:13:26,209 --> 02:13:24,239
joint Mission between the two agencies

3202
02:13:28,250 --> 02:13:26,219
also contributions from the UK and

3203
02:13:31,310 --> 02:13:28,260
Canadian space agencies a truly

3204
02:13:33,350 --> 02:13:31,320
International mission to see what we can

3205
02:13:34,910 --> 02:13:33,360
do about climate change and and what we

3206
02:13:38,030 --> 02:13:34,920
can do about fresh water management

3207
02:13:39,649 --> 02:13:38,040
around the world and just improving uh

3208
02:13:41,569 --> 02:13:39,659
weather predictions and climate

3209
02:13:43,069 --> 02:13:41,579
predictions into the future yeah

3210
02:13:45,470 --> 02:13:43,079
exciting

3211
02:13:47,750 --> 02:13:45,480
so that so therefore at this point the

3212
02:13:51,050 --> 02:13:47,760
launch has been a success the spacecraft

3213
02:13:52,490 --> 02:13:51,060

has has been healthy and the team's

3214
02:13:54,350 --> 02:13:52,500
excited so you know what that means

3215
02:13:55,270 --> 02:13:54,360
dancing you're off the hook you're done

3216
02:13:57,649 --> 02:13:55,280
now

3217
02:14:00,470 --> 02:13:57,659
thank you so much for joining me today

3218
02:14:02,689 --> 02:14:00,480
and and commentating there there isn't

3219
02:14:05,629 --> 02:14:02,699
uh another person I would have want to

3220
02:14:09,050 --> 02:14:05,639
experience the mix of emotions the The

3221
02:14:11,330 --> 02:14:09,060
Potpourri of emotions uh if you will uh

3222
02:14:13,490 --> 02:14:11,340
that we experienced today first uh you

3223
02:14:16,669 --> 02:14:13,500
know always a little anxious in the

3224
02:14:18,830 --> 02:14:16,679
countdown and then thrilled uh excited

3225
02:14:21,649 --> 02:14:18,840
uh for launch and then to be honest a

3226
02:14:23,270 --> 02:14:21,659
little surprise for the sonic boom no

3227
02:14:25,129 --> 02:14:23,280
but it was honored to be here I'm always

3228
02:14:26,930 --> 02:14:25,139
excited to to work a launch and you know

3229
02:14:28,310 --> 02:14:26,940
it's always an exciting time for the

3230
02:14:30,649 --> 02:14:28,320
team and to see the excitement in the

3231
02:14:31,729 --> 02:14:30,659
room it's been a pleasure yeah thank you

3232
02:14:33,770 --> 02:14:31,739
so much and I hope you do this again

3233
02:14:36,290 --> 02:14:33,780
soon I really appreciate your time thank

3234
02:14:37,910 --> 02:14:36,300
you so much okay so uh we're gonna send

3235
02:14:38,930 --> 02:14:37,920
it back to Raquel and Nadia and then

3236
02:14:41,750 --> 02:14:38,940
you're gonna come back over here because

3237
02:14:44,390 --> 02:14:41,760
I want to introduce you uh to a very

3238
02:14:47,569 --> 02:14:44,400

special person for today today's launch

3239
02:14:50,209 --> 02:14:47,579
and to Echo in her sentiments thank you

3240
02:14:51,470 --> 02:14:50,219
Denton for everything today and Nadia

3241
02:14:52,750 --> 02:14:51,480
there was a round of applause for you

3242
02:14:55,910 --> 02:14:52,760
here too

3243
02:14:58,129 --> 02:14:55,920
thank you and it was just such a nice uh

3244
02:15:01,129 --> 02:14:58,139
thing for what to say hello to all of us

3245
02:15:04,129 --> 02:15:01,139
that he's doing well hello back hello

3246
02:15:07,010 --> 02:15:04,139
absolutely SWAT will help scientists see

3247
02:15:08,870 --> 02:15:07,020
the Earth's water in high def and Nadia

3248
02:15:10,970 --> 02:15:08,880
you have been anxious to put on what you

3249
02:15:13,250 --> 02:15:10,980
have been calling the SWAT goggles

3250
02:15:17,390 --> 02:15:13,260
that's right Raquel let's do it okay

3251
02:15:19,550 --> 02:15:17,400
we're calling it uh a squid goggles and

3252
02:15:23,149 --> 02:15:19,560
there are magic glasses that allow you

3253
02:15:25,310 --> 02:15:23,159
to see uh earth water in a super high

3254
02:15:29,510 --> 02:15:25,320
definition just like when you go from

3255
02:15:32,770 --> 02:15:29,520
your old VHS tape to the plasma TV 4K

3256
02:15:35,149 --> 02:15:32,780
resolution and what it does is that just

3257
02:15:38,149 --> 02:15:35,159
brings a lot of excitement to the

3258
02:15:39,709 --> 02:15:38,159
scientists that we um we're going to see

3259
02:15:42,169 --> 02:15:39,719
earth water like we've never before just

3260
02:15:45,470 --> 02:15:42,179
think of James Webb Telescope and what

3261
02:15:47,629 --> 02:15:45,480
it uh um or looked at the their Universe

3262
02:15:49,189 --> 02:15:47,639
with this Clarity and definition like

3263
02:15:51,950 --> 02:15:49,199

never before so let's just do a little

3264
02:15:54,470 --> 02:15:51,960
bit of a demonstration like imagine this

3265
02:15:56,810 --> 02:15:54,480
is the wave that uh that that this is

3266
02:15:59,689 --> 02:15:56,820
how we see it

3267
02:16:01,970 --> 02:15:59,699
planning for future Generations requires

3268
02:16:04,850 --> 02:16:01,980
us understanding how much water we have

3269
02:16:07,250 --> 02:16:04,860
and we need to understand the water

3270
02:16:10,430 --> 02:16:07,260
cycle in a lot of detail and swap will

3271
02:16:12,589 --> 02:16:10,440
provide that for us my name is Cedric

3272
02:16:14,450 --> 02:16:12,599
David Mark simmer Christine Jabara and

3273
02:16:16,669 --> 02:16:14,460
I'm an integration test engineer at JPL

3274
02:16:19,069 --> 02:16:16,679
I study the world's Rivers I'm one of

3275
02:16:21,229 --> 02:16:19,079
the principal investigators for SWAT

3276
02:16:22,550 --> 02:16:21,239
SWAT is an Earth orbiting satellite it

3277
02:16:25,189 --> 02:16:22,560
stands for surface water ocean

3278
02:16:26,990 --> 02:16:25,199
topography swap will for the first time

3279
02:16:30,229 --> 02:16:27,000
make measurement of water surface

3280
02:16:32,570 --> 02:16:30,239
elevation not only on the ocean but also

3281
02:16:34,849 --> 02:16:32,580
on the lakes and rivers of the entire

3282
02:16:37,030 --> 02:16:34,859
Globe this in itself will be a

3283
02:16:39,950 --> 02:16:37,040
scientific revolution

3284
02:16:42,709 --> 02:16:39,960
collaborations and relationship build

3285
02:16:44,330 --> 02:16:42,719
Bridges and SWAT will be the bridge

3286
02:16:47,810 --> 02:16:44,340
across the world

3287
02:16:50,150 --> 02:16:47,820
what is being designed jointly by NASA

3288
02:16:52,669 --> 02:16:50,160

and the French space agency with help

3289
02:16:54,950 --> 02:16:52,679
from Canada and the UK I was born in

3290
02:16:56,929 --> 02:16:54,960
France so SWA is a match made in heaven

3291
02:16:58,910 --> 02:16:56,939
for me coming to work every day it's

3292
02:17:00,349 --> 02:16:58,920
always really nice to know that the

3293
02:17:02,629 --> 02:17:00,359
system that we're building will collect

3294
02:17:05,389 --> 02:17:02,639
science data that will help people I

3295
02:17:08,030 --> 02:17:05,399
think finally I found a meaning to all

3296
02:17:09,770 --> 02:17:08,040
of my research I believe SWAT will

3297
02:17:12,530 --> 02:17:09,780
create a lot of Peace because we all

3298
02:17:14,030 --> 02:17:12,540
need water now more than ever it's

3299
02:17:16,310 --> 02:17:14,040
important to recognize that water

3300
02:17:18,680 --> 02:17:16,320
connects us all and it might be the one

3301
02:17:23,950 --> 02:17:18,690
thing that unites us all

3302
02:17:28,310 --> 02:17:26,389
there is something about the environment

3303
02:17:30,770 --> 02:17:28,320
that's just incredibly cool

3304
02:17:33,169 --> 02:17:30,780
a lot of what we do as scientists is

3305
02:17:35,330 --> 02:17:33,179
we're just curious and so anybody who's

3306
02:17:37,429 --> 02:17:35,340
a curious person ought to be a scientist

3307
02:17:39,349 --> 02:17:37,439
in my opinion you can think of the

3308
02:17:41,810 --> 02:17:39,359
world's Rivers as Earth's arteries

3309
02:17:43,549 --> 02:17:41,820
because they're essential to life I'm

3310
02:17:44,590 --> 02:17:43,559
Cedric David and I study the world's

3311
02:17:58,030 --> 02:17:44,600
Rivers

3312
02:18:01,490 --> 02:17:58,040
[Music]

3313
02:18:04,370 --> 02:18:01,500

SWAT is a mission that is specifically

3314
02:18:07,190 --> 02:18:04,380
designed in part to observe rivers and

3315
02:18:09,589 --> 02:18:07,200
it's also being designed jointly by NASA

3316
02:18:11,450 --> 02:18:09,599
and the French space agency I was born

3317
02:18:14,750 --> 02:18:11,460
in France but I've lived in the U.S for

3318
02:18:16,250 --> 02:18:14,760
18 years now and I study Rivers so SWA

3319
02:18:18,709 --> 02:18:16,260
is a little bit of a match made in

3320
02:18:20,089 --> 02:18:18,719
heaven for me the kind of science that

3321
02:18:22,549 --> 02:18:20,099
I'm interested in is trying to

3322
02:18:24,410 --> 02:18:22,559
understand how how much water flows down

3323
02:18:26,450 --> 02:18:24,420
the rivers of the world and SWAT will be

3324
02:18:28,129 --> 02:18:26,460
able to make one such measurement for

3325
02:18:31,669 --> 02:18:28,139
all of the largest rivers of the world

3326
02:18:34,490 --> 02:18:31,679
so we'll be able to get a global unified

3327
02:18:36,889 --> 02:18:34,500
a picture of surface waters from space

3328
02:18:38,870 --> 02:18:36,899
this in itself will be a scientific

3329
02:18:41,990 --> 02:18:38,880
revolution and I think that's going to

3330
02:18:43,969 --> 02:18:42,000
have a big impact on Water Management

3331
02:18:46,669 --> 02:18:43,979
I like to say that water is my friend

3332
02:18:49,129 --> 02:18:46,679
water is my happy place

3333
02:18:52,310 --> 02:18:49,139
I was born with a physical disability

3334
02:18:54,830 --> 02:18:52,320
that affected both of my legs

3335
02:18:56,389 --> 02:18:54,840
being able to walk now was not a done

3336
02:18:58,910 --> 02:18:56,399
deal at Birth

3337
02:19:01,070 --> 02:18:58,920
and it still involves a significant

3338
02:19:04,730 --> 02:19:01,080

amount of discomfort and is a constant

3339
02:19:07,370 --> 02:19:04,740
reminder of having been born different

3340
02:19:09,110 --> 02:19:07,380
for as long as I can remember water has

3341
02:19:11,209 --> 02:19:09,120
been the only place where I felt

3342
02:19:12,589 --> 02:19:11,219
comfortable where I felt normal where I

3343
02:19:15,230 --> 02:19:12,599
felt like I couldn't do things like

3344
02:19:16,969 --> 02:19:15,240
everybody else when I get in the water

3345
02:19:18,230 --> 02:19:16,979
is just like I mean you're floating when

3346
02:19:19,490 --> 02:19:18,240
you're floating it's just like all the

3347
02:19:21,169 --> 02:19:19,500
pain goes away

3348
02:19:22,730 --> 02:19:21,179
as a kid my parents would take my

3349
02:19:24,589 --> 02:19:22,740
brother and I all the time to jump in

3350
02:19:28,250 --> 02:19:24,599
the Mediterranean but to this day we

3351
02:19:31,129 --> 02:19:28,260
still do it on New Year's Day every year

3352
02:19:34,190 --> 02:19:31,139
for future Generations requires us

3353
02:19:35,990 --> 02:19:34,200
understanding how much water we have and

3354
02:19:38,810 --> 02:19:36,000
a SWAT will be able to provide that

3355
02:19:40,790 --> 02:19:38,820
global view of the world's fresh waters

3356
02:19:43,190 --> 02:19:40,800
and in my opinion it might very well

3357
02:19:45,469 --> 02:19:43,200
become the key that unlocks surface

3358
02:19:48,110 --> 02:19:45,479
water observations around the world and

3359
02:19:49,730 --> 02:19:48,120
unleashes surface water management so it

3360
02:19:52,610 --> 02:19:49,740
might help us make sure that everybody

3361
02:19:54,590 --> 02:19:52,620
gets access to fresh water now more than

3362
02:19:56,810 --> 02:19:54,600
ever it's important to recognize that

3363
02:19:59,450 --> 02:19:56,820

water connects us all and it might be

3364
02:20:05,470 --> 02:19:59,460
the one thing that unites us all

3365
02:20:12,889 --> 02:20:09,250
[Music]

3366
02:20:15,590 --> 02:20:12,899
keeps me in touch with reality I'm Mark

3367
02:20:18,349 --> 02:20:15,600
Simard I'm a swap principal investigator

3368
02:20:21,400 --> 02:20:18,359
and I studied a dance between the tides

3369
02:20:30,840 --> 02:20:28,840
[Music]

3370
02:20:39,050 --> 02:20:30,850
[Applause]

3371
02:20:43,370 --> 02:20:40,370
thank you

3372
02:20:46,490 --> 02:20:43,380
I'm from Quebec Canada from a city

3373
02:20:49,250 --> 02:20:46,500
called Joker I started studying physics

3374
02:20:52,130 --> 02:20:49,260
with specialization in astrophysics and

3375
02:20:53,990 --> 02:20:52,140
became enamored with the environment and

3376
02:20:56,389 --> 02:20:54,000
I actually became president of the

3377
02:20:58,429 --> 02:20:56,399
environmental Club I did a switch and I

3378
02:21:01,370 --> 02:20:58,439
started to apply what I learned in

3379
02:21:03,710 --> 02:21:01,380
physics to the environment so here is a

3380
02:21:05,270 --> 02:21:03,720
water level gauge water level gauges you

3381
02:21:08,929 --> 02:21:05,280
know our sparse points here and there

3382
02:21:11,450 --> 02:21:08,939
SWAT on the other end will give us these

3383
02:21:14,990 --> 02:21:11,460
same types of measurement on the ocean

3384
02:21:17,330 --> 02:21:15,000
the lakes and rivers of the entire globe

3385
02:21:20,929 --> 02:21:17,340
the Mississippi River delta currently is

3386
02:21:23,330 --> 02:21:20,939
losing land at the rhythm of about one

3387
02:21:26,090 --> 02:21:23,340
football field every hour there are

3388
02:21:28,550 --> 02:21:26,100

about 350 million people living on

3389
02:21:30,710 --> 02:21:28,560
Deltas around the world they live from

3390
02:21:33,110 --> 02:21:30,720
the Fisheries the agriculture the

3391
02:21:35,030 --> 02:21:33,120
aquaculture from those Deltas so if we

3392
02:21:37,250 --> 02:21:35,040
lose those datas we're not only talking

3393
02:21:40,370 --> 02:21:37,260
about losing land we're also talking

3394
02:21:41,630 --> 02:21:40,380
about losing livelihood for millions of

3395
02:21:44,150 --> 02:21:41,640
people

3396
02:21:47,690 --> 02:21:44,160
swap data will give us a global

3397
02:21:50,630 --> 02:21:47,700
perspective of how these Deltas can

3398
02:21:53,270 --> 02:21:50,640
survive and keep up with sea level rise

3399
02:21:56,510 --> 02:21:53,280
and other impacts of climate change all

3400
02:22:00,170 --> 02:21:56,520
the Rovers on Mars

3401
02:22:03,590 --> 02:22:00,180
does have a special place in my heart

3402
02:22:06,110 --> 02:22:03,600
and it's cool that it's not just us and

3403
02:22:07,150 --> 02:22:06,120
our nation it's the whole world going to

3404
02:22:08,650 --> 02:22:07,160
another world

3405
02:22:11,150 --> 02:22:08,660
[Music]

3406
02:22:13,130 --> 02:22:11,160
this is stuff that's good for for the

3407
02:22:15,530 --> 02:22:13,140
global community so this will be good

3408
02:22:18,710 --> 02:22:15,540
for all of us

3409
02:22:21,410 --> 02:22:18,720
this is a fun launch in my operational

3410
02:22:22,849 --> 02:22:21,420
function this this is about as good as

3411
02:22:25,010 --> 02:22:22,859
it gets

3412
02:22:27,590 --> 02:22:25,020
the anxiety level is higher the

3413
02:22:28,849 --> 02:22:27,600

adrenaline's flowing but what a cool way

3414
02:22:32,030 --> 02:22:28,859
to fly

3415
02:22:33,410 --> 02:22:32,040
solar team sport and we're all ready to

3416
02:22:36,650 --> 02:22:33,420
go

3417
02:22:39,349 --> 02:22:36,660
the guys really worked hard through the

3418
02:22:41,469 --> 02:22:39,359
day yesterday and Into the Night

3419
02:22:44,570 --> 02:22:41,479
but all is going well

3420
02:22:47,690 --> 02:22:44,580
Delta performed anomaly just the perfect

3421
02:22:49,550 --> 02:22:47,700
flight today and we're right on

3422
02:22:52,010 --> 02:22:49,560
here's a challenge

3423
02:22:56,630 --> 02:22:52,020
and a penalty that goes with doing these

3424
02:22:59,210 --> 02:22:56,640
things and I've seen the team react and

3425
02:23:01,130 --> 02:22:59,220
overcome all of that and it makes me

3426
02:23:03,889 --> 02:23:01,140
very proud

3427
02:23:06,830 --> 02:23:03,899
we got off on the first opportunity at

3428
02:23:09,290 --> 02:23:06,840
1002 in the morning looked great the

3429
02:23:12,290 --> 02:23:09,300
weather cooperated with us and the upper

3430
02:23:14,150 --> 02:23:12,300
level winds cooperated with us so the

3431
02:23:17,750 --> 02:23:14,160
vehicle was perfect the spacecraft was

3432
02:23:20,750 --> 02:23:17,760
perfect the range instrumentation worked

3433
02:23:22,969 --> 02:23:20,760
great couldn't ask for better

3434
02:23:25,610 --> 02:23:22,979
and all stations on the nlm net this is

3435
02:23:28,070 --> 02:23:25,620
the nlm with our final lunch Readiness

3436
02:23:30,309 --> 02:23:28,080
both launch Vehicles spacecraft and

3437
02:23:33,170 --> 02:23:30,319
range are reporting green

3438
02:23:35,929 --> 02:23:33,180

I guess at this point that means that we

3439
02:23:40,550 --> 02:23:35,939
can bring to our conclusion our coverage

3440
02:23:40,560 --> 02:23:46,910
the conclusion wow

3441
02:23:46,920 --> 02:23:52,010
how are you feeling

3442
02:23:52,020 --> 02:23:56,570
a lot of memories there

3443
02:24:03,290 --> 02:23:58,550
I can't leave

3444
02:24:07,670 --> 02:24:05,110
to convince you to stay

3445
02:24:09,530 --> 02:24:07,680
that was beautiful thank you thanks

3446
02:24:10,969 --> 02:24:09,540
everybody for putting that together I

3447
02:24:13,190 --> 02:24:10,979
know it took some work to do that and

3448
02:24:14,389 --> 02:24:13,200
that was beautiful a lot of memories

3449
02:24:15,530 --> 02:24:14,399
there

3450
02:24:20,570 --> 02:24:15,540
um

3451
02:24:23,870 --> 02:24:20,580
and uh you know that's our our family

3452
02:24:25,910 --> 02:24:23,880
the traveling circus

3453
02:24:28,190 --> 02:24:25,920
you know just to know that you've played

3454
02:24:30,410 --> 02:24:28,200
such a role in so many historical

3455
02:24:33,050 --> 02:24:30,420
missions and made such great friends

3456
02:24:34,429 --> 02:24:33,060
throughout the way enough to call them

3457
02:24:36,349 --> 02:24:34,439
a family

3458
02:24:37,730 --> 02:24:36,359
you'll be missed absolutely all right

3459
02:24:41,570 --> 02:24:37,740
you'll be missed and I'll miss them

3460
02:24:43,910 --> 02:24:41,580
that's uh you know this uh this job

3461
02:24:48,050 --> 02:24:43,920
takes a lot out of you because of the

3462
02:24:48,060 --> 02:24:55,210
um but you know

3463
02:25:01,010 --> 02:24:58,070

because we want to launcher we're out in

3464
02:25:04,130 --> 02:25:01,020
kwajalein doing a launch or I'm in DC or

3465
02:25:06,590 --> 02:25:04,140
Denver or something so there's a there's

3466
02:25:09,469 --> 02:25:06,600
a price you pay for this it's a very

3467
02:25:11,870 --> 02:25:09,479
rewarding job but uh you know it's time

3468
02:25:14,090 --> 02:25:11,880
for me to retire and maybe go do some of

3469
02:25:17,150 --> 02:25:14,100
those things I missed out on

3470
02:25:18,770 --> 02:25:17,160
so again hard to see you to leave but

3471
02:25:20,630 --> 02:25:18,780
you definitely deserve a wonderful

3472
02:25:22,969 --> 02:25:20,640
retirement over we wish you all the best

3473
02:25:24,530 --> 02:25:22,979
homework thank you thank you so much all

3474
02:25:26,990 --> 02:25:24,540
right guys back to you

3475
02:25:30,170 --> 02:25:27,000
Omar congratulations on your retirement

3476
02:25:32,270 --> 02:25:30,180
again you will be missed now Nadia do

3477
02:25:35,750 --> 02:25:32,280
you have any final thoughts about launch

3478
02:25:38,570 --> 02:25:35,760
and the swap Mission uh well uh today

3479
02:25:42,469 --> 02:25:38,580
was a truly pivotal and defining moment

3480
02:25:45,889 --> 02:25:42,479
for our Earth space science Industry uh

3481
02:25:48,830 --> 02:25:45,899
we're setting uh new standards uh in uh

3482
02:25:51,110 --> 02:25:48,840
in Satellite altimetry and that would

3483
02:25:54,349 --> 02:25:51,120
hopefully maximize our scientific and

3484
02:25:55,670 --> 02:25:54,359
societal returns so to my engineering

3485
02:25:58,309 --> 02:25:55,680
team

3486
02:26:00,110 --> 02:25:58,319
um thank you you guys did it you are all

3487
02:26:03,050 --> 02:26:00,120
miracle workers we appreciate it and

3488
02:26:05,030 --> 02:26:03,060

grateful and to my science team

3489
02:26:09,050 --> 02:26:05,040
um well let's get to work I cannot wait

3490
02:26:11,870 --> 02:26:09,060
to see your discoveries for societal

3491
02:26:14,690 --> 02:26:11,880
benefits and Raquel thank you for for

3492
02:26:16,429 --> 02:26:14,700
having me that was fun it was fun thank

3493
02:26:19,309 --> 02:26:16,439
you for joining us not yet now as a

3494
02:26:21,889 --> 02:26:19,319
mission scientist we appreciate all your

3495
02:26:24,110 --> 02:26:21,899
invaluable Insight today now that

3496
02:26:26,330 --> 02:26:24,120
concludes our launch coverage of Swatch

3497
02:26:28,670 --> 02:26:26,340
as we say goodbye from the West Coast

3498
02:26:31,490 --> 02:26:28,680
here's one last look at this morning's

3499
02:26:34,370 --> 02:26:31,500
Falcon 9 launch for updates on this and

3500
02:26:38,830 --> 02:26:34,380
future launches check out blogs.nasa.gov

3501
02:26:41,630 --> 02:26:38,840
SWAT and the NASA newsletter

3502
02:26:49,969 --> 02:26:41,640
thanks for watching

3503
02:26:51,349 --> 02:26:49,979
nine eight seven six five four three two

3504
02:26:54,950 --> 02:26:51,359
one

3505
02:26:57,950 --> 02:26:54,960
engine ignition and the liftoff liftoff

3506
02:27:00,349 --> 02:26:57,960
of SWAT our first Global survey of

3507
02:27:02,630 --> 02:27:00,359
Earth's surface water to study how this

3508
02:27:10,490 --> 02:27:02,640
ever-changing resource affects our

3509
02:27:15,410 --> 02:27:13,190
and there we get a nice view

3510
02:27:17,929 --> 02:27:15,420
from the ground camera and also we will

3511
02:27:20,210 --> 02:27:17,939
switch to the onboard camera