Methane 'Super-Emitters' Detected by NASA's New Earth Space Mission

with

Karen St. Germain - Earth Science Division Director, NASA

Robert Green - EMIT Principal Investigator, Senior Research Scientist, Jet Propulsion Laboratory

Andrew Thorpe - Research Technologist, Jet Propulsion Laboratory

Kirt Costello - Chief Scientist, NASA's International Space Station Program

1
00:00:03,530 --> 00:00:02,270
thank you all for standing by at this

2
00:00:05,390 --> 00:00:03,540
time I would like to inform all

3
00:00:07,070 --> 00:00:05,400
participants that your lines will be on

4
00:00:09,470 --> 00:00:07,080
the listen only mode until the question

5
00:00:10,910 --> 00:00:09,480
and answer a session of the call at that

6
00:00:13,850 --> 00:00:10,920
time if you would like to ask a question

7
00:00:16,070 --> 00:00:13,860
go ahead and press star one to queue up

8
00:00:18,230 --> 00:00:16,080
to ask your question

9
00:00:20,090 --> 00:00:18,240
call is being recorded if you have any

10
00:00:28,310 --> 00:00:20,100
objections you may disconnect at this

11
00:00:59,750 --> 00:00:45,770
thank you

12
00:01:06,170 --> 00:01:02,510
hello everybody and welcome to this

13
00:01:08,210 --> 00:01:06,180

telecon this NASA telecon about our emit

14
00:01:10,010 --> 00:01:08,220
Mission this is an instrument on the

15
00:01:13,070 --> 00:01:10,020
International Space Station and we're

16
00:01:16,250 --> 00:01:13,080
here today to talk about some unexpected

17
00:01:18,230 --> 00:01:16,260
abilities of this Mission uh I am Karen

18
00:01:20,870 --> 00:01:18,240
Fox with the office of communications at

19
00:01:23,030 --> 00:01:20,880
NASA headquarters in Washington DC we

20
00:01:24,649 --> 00:01:23,040
have four people on the line today who

21
00:01:26,469 --> 00:01:24,659
will be giving brief remarks and that

22
00:01:29,749 --> 00:01:26,479
will be available to answer questions

23
00:01:31,670 --> 00:01:29,759
they are Karen St Germain who is the

24
00:01:35,090 --> 00:01:31,680
earth science division director here at

25
00:01:38,270 --> 00:01:35,100
NASA headquarters we have Rob Green who

26
00:01:40,730 --> 00:01:38,280
is the emit principal investigator uh

27
00:01:43,609 --> 00:01:40,740
senior research scientist at the jet

28
00:01:45,350 --> 00:01:43,619
propulsion laboratory in California we

29
00:01:48,950 --> 00:01:45,360
have Andrew Thorpe a research

30
00:01:51,950 --> 00:01:48,960
technologist with jet the jet propulsion

31
00:01:53,929 --> 00:01:51,960
Laboratory and Kurt Costello who is

32
00:01:55,249 --> 00:01:53,939
NASA's Chief scientist for the

33
00:01:59,210 --> 00:01:55,259
International Space Station program

34
00:02:02,510 --> 00:01:59,220
research office we have imagery that you

35
00:02:09,729 --> 00:02:02,520
can follow along with I will say the URL

36
00:02:21,430 --> 00:02:15,430
www.jpl.nasa.gov slash emit Dash methane

37
00:02:28,790 --> 00:02:23,050
www.jpl.nasa.gov

38
00:02:30,229 --> 00:02:28,800

emit Dash methane Dot telecon and with

39
00:02:32,030 --> 00:02:30,239
that

40
00:02:33,410 --> 00:02:32,040
um I will hand it off to Karen St

41
00:02:36,410 --> 00:02:33,420
Germain

42
00:02:38,150 --> 00:02:36,420
great thank you Karen we are really

43
00:02:42,410 --> 00:02:38,160
excited to be here with you today to

44
00:02:44,570 --> 00:02:42,420
talk about admit emit is one of 25 NASA

45
00:02:47,630 --> 00:02:44,580
earth science missions on orbit today

46
00:02:50,570 --> 00:02:47,640
and one of seven NASA instruments aboard

47
00:02:53,449 --> 00:02:50,580
the International Space Station these

48
00:02:55,729 --> 00:02:53,459
missions provide us a global view of our

49
00:02:58,550 --> 00:02:55,739
Earth system by observing land

50
00:03:01,729 --> 00:02:58,560
atmosphere oceans and ice

51
00:03:04,790 --> 00:03:01,739
in this was selected as an earth Venture

52
00:03:07,369 --> 00:03:04,800
mission in 2018 and it's a first of its

53
00:03:09,770 --> 00:03:07,379
kind hyper-central instrument developed

54
00:03:12,949 --> 00:03:09,780
at the jet propulsion laboratory we

55
00:03:16,729 --> 00:03:12,959
launched a bit on July 14th installed it

56
00:03:18,890 --> 00:03:16,739
on the ISS on July 24th and got what we

57
00:03:21,589 --> 00:03:18,900
call First Light or the First Data from

58
00:03:24,050 --> 00:03:21,599
the instrument on July 28th

59
00:03:26,690 --> 00:03:24,060
on the screen you should see an image of

60
00:03:29,330 --> 00:03:26,700
emit where it is installed on the ISS

61
00:03:32,509 --> 00:03:29,340
payload platform

62
00:03:35,210 --> 00:03:32,519
so right now I should mention that emit

63
00:03:37,009 --> 00:03:35,220

is offline pending the installation of a

64
00:03:39,050 --> 00:03:37,019
replacement power module on the space

65
00:03:40,550 --> 00:03:39,060
station but we expect the mission to

66
00:03:43,850 --> 00:03:40,560
come back online and start delivering

67
00:03:46,910 --> 00:03:43,860
data again very soon this is um this is

68
00:03:48,770 --> 00:03:46,920
not uh anything out of the ordinary and

69
00:03:51,410 --> 00:03:48,780
we are really grateful for the the

70
00:03:53,570 --> 00:03:51,420
support that the ISS provides to keep

71
00:03:55,789 --> 00:03:53,580
our instruments going so

72
00:03:58,309 --> 00:03:55,799
primary mission is measuring dust

73
00:04:01,670 --> 00:03:58,319
sources and the effect of that dust on

74
00:04:03,890 --> 00:04:01,680
our climate but now emit is

75
00:04:07,009 --> 00:04:03,900
demonstrating a new and unplanned

76
00:04:08,030 --> 00:04:07,019
capability spotting super emitters from

77
00:04:11,330 --> 00:04:08,040
space

78
00:04:13,369 --> 00:04:11,340
so super emitters are you know they are

79
00:04:16,250 --> 00:04:13,379
facilities equipment and other

80
00:04:18,729 --> 00:04:16,260
infrastructure that emit methane at

81
00:04:21,710 --> 00:04:18,739
disproportionately high rates

82
00:04:23,510 --> 00:04:21,720
methane makes up a fraction of the

83
00:04:25,310 --> 00:04:23,520
greenhouse gas emissions from human

84
00:04:27,590 --> 00:04:25,320
activities

85
00:04:29,930 --> 00:04:27,600
what's important about methane is it's

86
00:04:32,629 --> 00:04:29,940
approximately 80 times more potent at

87
00:04:35,450 --> 00:04:32,639
trapping heat in the atmosphere than

88
00:04:37,850 --> 00:04:35,460

carbon dioxide even though it only stays

89
00:04:40,249 --> 00:04:37,860
in the atmosphere for about a decade

90
00:04:42,830 --> 00:04:40,259
so reducing methane emissions by

91
00:04:45,350 --> 00:04:42,840
identifying these super emitting sources

92
00:04:47,570 --> 00:04:45,360
is regarded as an essential strategy to

93
00:04:49,850 --> 00:04:47,580
limiting climate change and one that can

94
00:04:52,070 --> 00:04:49,860
really be implemented quickly and this

95
00:04:54,710 --> 00:04:52,080
is especially true if we have

96
00:04:57,590 --> 00:04:54,720
capabilities like emit that where we can

97
00:05:00,350 --> 00:04:57,600
identify these sources on a large scale

98
00:05:02,030 --> 00:05:00,360
so NASA has many Tools in orbit that are

99
00:05:05,570 --> 00:05:02,040
important to measuring changes to our

100
00:05:07,909 --> 00:05:05,580
climate but what makes emit special is

101
00:05:09,950 --> 00:05:07,919
the new technology and capability the

102
00:05:11,629 --> 00:05:09,960
hyperspectral observations at high

103
00:05:12,650 --> 00:05:11,639
spatial resolution in Broad area

104
00:05:15,770 --> 00:05:12,660
coverage

105
00:05:18,350 --> 00:05:15,780
this unplanned capability of measuring

106
00:05:22,550 --> 00:05:18,360
methane super emitters is super exciting

107
00:05:24,050 --> 00:05:22,560
and uh along with the the results that

108
00:05:26,629 --> 00:05:24,060
the other results that we'll see from

109
00:05:29,510 --> 00:05:26,639
the emit Mission and I'm really eager to

110
00:05:31,850 --> 00:05:29,520
see what else emit will show us so with

111
00:05:33,590 --> 00:05:31,860
that I'm going to turn it over to my

112
00:05:35,450 --> 00:05:33,600
colleagues from JPL to discuss the

113
00:05:36,650 --> 00:05:35,460

findings further

114
00:05:38,689 --> 00:05:36,660
Rob

115
00:05:40,189 --> 00:05:38,699
oh thank you very much Karen again this

116
00:05:41,990 --> 00:05:40,199
is Rob Green I'm the principal

117
00:05:44,150 --> 00:05:42,000
investigator from it it's a pleasure to

118
00:05:46,909 --> 00:05:44,160
be here and share the excitement with

119
00:05:49,610 --> 00:05:46,919
these somewhat unexpected results with

120
00:05:51,230 --> 00:05:49,620
the first emit measurements let me say a

121
00:05:53,090 --> 00:05:51,240
little bit about what emit is the

122
00:05:55,610 --> 00:05:53,100
instrument is an Imaging spectrometer

123
00:05:57,770 --> 00:05:55,620
and it's designed originally to look at

124
00:05:59,529 --> 00:05:57,780
the spectral Fingerprints of minerals on

125
00:06:03,050 --> 00:05:59,539
the Earth's surface so we can understand

126
00:06:04,670 --> 00:06:03,060
how mineral dust is emitted into the

127
00:06:07,370 --> 00:06:04,680
atmosphere and a condition I wins and

128
00:06:09,110 --> 00:06:07,380
impacts climate but in order to see

129
00:06:11,210 --> 00:06:09,120
those minerals we have to measure a

130
00:06:14,450 --> 00:06:11,220
wavelength range that includes their

131
00:06:17,990 --> 00:06:14,460
molecular signatures it turns out that

132
00:06:19,790 --> 00:06:18,000
methane also has a spectral signature in

133
00:06:22,129 --> 00:06:19,800
the same wavelength range and that's

134
00:06:24,950 --> 00:06:22,139
what allowed us has allowed us to be uh

135
00:06:26,629 --> 00:06:24,960
sensitive to to methane and just for

136
00:06:28,490 --> 00:06:26,639
reference the signal we're looking at

137
00:06:30,170 --> 00:06:28,500
originates from the Sun at sunlight

138
00:06:32,210 --> 00:06:30,180

coming from the Sun passes through the

139
00:06:33,710 --> 00:06:32,220
Earth's atmosphere to the surface is

140
00:06:35,930 --> 00:06:33,720
reflected by the surface that's where we

141
00:06:38,510 --> 00:06:35,940
get the mineral signatures and then back

142
00:06:42,170 --> 00:06:38,520
up emit on the ISS where we measure

143
00:06:44,870 --> 00:06:42,180
those signatures with 285 wavelengths

144
00:06:46,790 --> 00:06:44,880
from the visible to the infrared portion

145
00:06:48,110 --> 00:06:46,800
of the spectrum and of course we go

146
00:06:49,550 --> 00:06:48,120
through the atmosphere as we try to get

147
00:06:51,230 --> 00:06:49,560
those mineral signatures and that's

148
00:06:54,950 --> 00:06:51,240
where we've discovered this signature of

149
00:06:57,590 --> 00:06:54,960
methane so what we've seen are a series

150
00:07:00,350 --> 00:06:57,600
of methane super emitters in a very

151
00:07:01,790 --> 00:07:00,360
early data set collected by emit just

152
00:07:04,189 --> 00:07:01,800
after we were turned on we were doing

153
00:07:07,070 --> 00:07:04,199
the the early checkout and I'd like to

154
00:07:09,290 --> 00:07:07,080
show you uh a few examples of some of

155
00:07:11,170 --> 00:07:09,300
those detections I think the first one

156
00:07:15,770 --> 00:07:11,180
you'll see on the screen

157
00:07:18,469 --> 00:07:15,780
is a large methane plume uh in the

158
00:07:20,870 --> 00:07:18,479
Permian Basin which is an oil and gas

159
00:07:25,070 --> 00:07:20,880
region in New Mexico in the southwestern

160
00:07:26,870 --> 00:07:25,080
U.S this is a major methane plume again

161
00:07:28,249 --> 00:07:26,880
we're seeing the methane molecule in the

162
00:07:29,450 --> 00:07:28,259
atmosphere above the surface and we're

163
00:07:31,969 --> 00:07:29,460

able to detect that because it's

164
00:07:35,210 --> 00:07:31,979
absorbed energy and left its fingerprint

165
00:07:37,010 --> 00:07:35,220
uh you'll see the yellow zone in this

166
00:07:38,749 --> 00:07:37,020
plume is the high concentration of

167
00:07:40,490 --> 00:07:38,759
methane and then it fades to purple as

168
00:07:45,110 --> 00:07:40,500
we get to lower and lower concentration

169
00:07:46,850 --> 00:07:45,120
so this is about seven miles long and we

170
00:07:48,710 --> 00:07:46,860
did some initial estimates that this

171
00:07:52,129 --> 00:07:48,720
could be releasing methane on the order

172
00:07:55,189 --> 00:07:52,139
of 18 metric tons per hour with some

173
00:07:57,589 --> 00:07:55,199
uncertainty uh so this was again a

174
00:08:00,469 --> 00:07:57,599
really uh fascinating large plume that

175
00:08:03,710 --> 00:08:00,479
we're seeing in quite nice spatial

176
00:08:05,570 --> 00:08:03,720
detail with the capabilities of a mint

177
00:08:07,309 --> 00:08:05,580
um and hopefully people have seen that

178
00:08:09,409 --> 00:08:07,319
example on the screen now I'd like to

179
00:08:11,809 --> 00:08:09,419
move to an even more spectacular example

180
00:08:13,430 --> 00:08:11,819
which we saw quite early in the emit

181
00:08:15,350 --> 00:08:13,440
data set and again we were just checking

182
00:08:17,809 --> 00:08:15,360
out the mid data looking at our mineral

183
00:08:19,430 --> 00:08:17,819
signatures looking at the atmosphere and

184
00:08:21,189 --> 00:08:19,440
we started to see these these

185
00:08:24,290 --> 00:08:21,199
spectacular plumes so this is from

186
00:08:27,050 --> 00:08:24,300
Turkmenistan near the Caspian Sea and in

187
00:08:29,809 --> 00:08:27,060
this single emit image we have 12

188
00:08:32,269 --> 00:08:29,819

separate super emitters emitting methane

189
00:08:35,570 --> 00:08:32,279
into the atmosphere again the scale is

190
00:08:38,810 --> 00:08:35,580
the same yellow is high methane

191
00:08:41,510 --> 00:08:38,820
concentration fading to purple some of

192
00:08:44,269 --> 00:08:41,520
these plumes are 20 miles long and we've

193
00:08:46,070 --> 00:08:44,279
seen some longer as well so this is a

194
00:08:47,810 --> 00:08:46,080
quite a bit of methane again early

195
00:08:50,509 --> 00:08:47,820
estimates which we'll hear more about

196
00:08:53,090 --> 00:08:50,519
from my colleague in a few minutes are

197
00:08:55,850 --> 00:08:53,100
on the order potentially of 50 metric

198
00:08:57,650 --> 00:08:55,860
tons of methane per hour so significant

199
00:09:00,530 --> 00:08:57,660
Point sources and we're seeing with a

200
00:09:01,970 --> 00:09:00,540
technology that we understand why it

201
00:09:04,790 --> 00:09:01,980
works but it was designed originally to

202
00:09:08,449 --> 00:09:04,800
look at mineralogy our Prime science

203
00:09:10,550 --> 00:09:08,459
objectives so that's a second example

204
00:09:12,949 --> 00:09:10,560
now the third example is quite

205
00:09:15,829 --> 00:09:12,959
interesting as well this is methane

206
00:09:18,170 --> 00:09:15,839
coming from a landfill it turns out the

207
00:09:20,449 --> 00:09:18,180
buried organic waste in landfills when

208
00:09:22,550 --> 00:09:20,459
it decomposes can be quite a significant

209
00:09:25,009 --> 00:09:22,560
source of methane and this is an area of

210
00:09:27,710 --> 00:09:25,019
active research understanding how much

211
00:09:30,050 --> 00:09:27,720
methane is entering our atmosphere from

212
00:09:33,410 --> 00:09:30,060
from landfills and this is a significant

213
00:09:36,829 --> 00:09:33,420

plume uh estimated perhaps at eight

214
00:09:38,449 --> 00:09:36,839
metric tons per hour coming out of the

215
00:09:40,310 --> 00:09:38,459
earth and into the Earth's atmosphere

216
00:09:42,230 --> 00:09:40,320
from a landfill source so again this is

217
00:09:44,329 --> 00:09:42,240
an area of

218
00:09:46,130 --> 00:09:44,339
information that's quite helpful as we

219
00:09:50,410 --> 00:09:46,140
understand the different sources of

220
00:09:52,670 --> 00:09:50,420
methane uh as it impacts um

221
00:09:54,710 --> 00:09:52,680
climate change so this landfill actually

222
00:09:56,090 --> 00:09:54,720
is from the country of Iran there's no

223
00:09:58,250 --> 00:09:56,100
particular reason it should happen to be

224
00:10:01,430 --> 00:09:58,260
where we had collected data and noticed

225
00:10:04,490 --> 00:10:01,440
this methane plume so going forward as

226
00:10:07,190 --> 00:10:04,500
soon as emit begins to measure again we

227
00:10:09,110 --> 00:10:07,200
will cover large swaths of the planet

228
00:10:11,690 --> 00:10:09,120
Earth and we'll be looking in places

229
00:10:13,310 --> 00:10:11,700
where no one is currently planning to

230
00:10:15,650 --> 00:10:13,320
look for methane but if it's there we'll

231
00:10:17,090 --> 00:10:15,660
see it and we expect to see it and

232
00:10:20,329 --> 00:10:17,100
report it so that'll be new information

233
00:10:22,490 --> 00:10:20,339
as we all begin to understand the full

234
00:10:24,110 --> 00:10:22,500
range of sources of methane entering the

235
00:10:27,590 --> 00:10:24,120
Earth's atmosphere and it's an important

236
00:10:31,070 --> 00:10:27,600
role as a greenhouse gas and impacting

237
00:10:33,410 --> 00:10:31,080
uh transition climate change

238
00:10:36,410 --> 00:10:33,420

so moving moving on I will say that all

239
00:10:39,170 --> 00:10:36,420
these data will be released into the

240
00:10:41,329 --> 00:10:39,180
NASA land processes archive for the

241
00:10:42,949 --> 00:10:41,339
public to access and to look at and

242
00:10:44,690 --> 00:10:42,959
explore

243
00:10:46,190 --> 00:10:44,700
um and in regard to the mid instrument

244
00:10:48,050 --> 00:10:46,200
it it's quite an extraordinary

245
00:10:50,870 --> 00:10:48,060
instrument really is first of its kind

246
00:10:53,210 --> 00:10:50,880
and class uh launched into space to date

247
00:10:55,069 --> 00:10:53,220
uh it has broad area coverage good

248
00:10:57,170 --> 00:10:55,079
spatial resolution so we can see Point

249
00:10:59,930 --> 00:10:57,180
sources and excellent sensitivities

250
00:11:03,230 --> 00:10:59,940
that's high signal noise in our term and

251
00:11:05,690 --> 00:11:03,240
it's it's equivalent to 1 240

252
00:11:07,490 --> 00:11:05,700
spectrometers collecting 300 000 Spectra

253
00:11:10,610 --> 00:11:07,500
seconds so quite an extraordinary

254
00:11:12,230 --> 00:11:10,620
instrument it's also I will mention our

255
00:11:14,269 --> 00:11:12,240
important precursor to NASA's surface

256
00:11:16,250 --> 00:11:14,279
biology and geology mission that will

257
00:11:18,590 --> 00:11:16,260
have more than 6 000 cross-track

258
00:11:21,110 --> 00:11:18,600
measurements and is part of NASA's Earth

259
00:11:22,610 --> 00:11:21,120
system Observatory going forward so I'm

260
00:11:25,190 --> 00:11:22,620
going to conclude here and pass it off

261
00:11:27,769 --> 00:11:25,200
to my colleague Andrew Thorpe who is the

262
00:11:31,910 --> 00:11:27,779
lead methane scientist working with the

263
00:11:33,829 --> 00:11:31,920

emit methane measurements here at JPL

264
00:11:36,410 --> 00:11:33,839
great thank you Rob

265
00:11:37,850 --> 00:11:36,420
so given our previous work using the

266
00:11:40,250 --> 00:11:37,860
Airborne Imaging spectrometer average

267
00:11:43,130 --> 00:11:40,260
Next Generation or methane and carbon

268
00:11:46,370 --> 00:11:43,140
dioxide mapping we did anticipate that

269
00:11:49,130 --> 00:11:46,380
emit would sensitivity to these gases

270
00:11:50,329 --> 00:11:49,140
from space and as part of our efforts to

271
00:11:52,190 --> 00:11:50,339
check the accuracy of the Imaging

272
00:11:55,130 --> 00:11:52,200
spectrometers mineral data we did in

273
00:11:58,009 --> 00:11:55,140
fact verify that emit could detect and

274
00:12:00,190 --> 00:11:58,019
map methane and carbon dioxide blooms

275
00:12:02,990 --> 00:12:00,200
what we'll be showing next is a figure

276
00:12:06,230 --> 00:12:03,000
that shows some of the data products

277
00:12:11,269 --> 00:12:06,240
that are generated by emit the left

278
00:12:14,410 --> 00:12:11,279
panel will show a data Cube from emit

279
00:12:19,490 --> 00:12:14,420
the cover is an area of around

280
00:12:22,730 --> 00:12:19,500
2500 square miles in Turkmenistan

281
00:12:24,949 --> 00:12:22,740
the methane blooms are overlaid on the

282
00:12:28,250 --> 00:12:24,959
image as well and the rainbow colors

283
00:12:30,530 --> 00:12:28,260
that extend beneath the the data Cube

284
00:12:33,710 --> 00:12:30,540
represent the spectral fingerprints for

285
00:12:40,310 --> 00:12:33,720
each location within the scene

286
00:12:44,629 --> 00:12:43,009
[Music]

287
00:12:47,269 --> 00:12:44,639
paths the expected spectral fingerprint

288
00:12:49,970 --> 00:12:47,279

that was calculated using an atmospheric

289
00:12:51,829 --> 00:12:49,980
simulation and this was a result that we

290
00:12:54,530 --> 00:12:51,839
were very excited by given that there's

291
00:12:56,690 --> 00:12:54,540
a near perfect match with between the

292
00:12:59,329 --> 00:12:56,700
measured and modeled

293
00:13:02,629 --> 00:12:59,339
measurements that we're making within

294
00:13:04,730 --> 00:13:02,639
that emphasizes the high quality of emit

295
00:13:07,250 --> 00:13:04,740
data

296
00:13:09,530 --> 00:13:07,260
by analyzing each of our methane

297
00:13:12,530 --> 00:13:09,540
we can use the pollution shape and the

298
00:13:14,690 --> 00:13:12,540
methane concentrations to identify the

299
00:13:16,970 --> 00:13:14,700
location of the emission sources on the

300
00:13:20,690 --> 00:13:18,230
tribute methane

301
00:13:23,030 --> 00:13:20,700
in a specific industry sectors

302
00:13:25,970 --> 00:13:23,040
by using higher spatial resolution

303
00:13:27,110 --> 00:13:25,980
imagery to resolve locations on the

304
00:13:28,970 --> 00:13:27,120
ground and potential infrastructure

305
00:13:31,610 --> 00:13:28,980
structure points that might be emitting

306
00:13:35,750 --> 00:13:31,620
methane for example emissions from the

307
00:13:37,370 --> 00:13:35,760
oil and gas in amateur ore and landfill

308
00:13:40,550 --> 00:13:37,380
the examples that we're showing today

309
00:13:43,009 --> 00:13:40,560
are very large methane zooms both in

310
00:13:45,590 --> 00:13:43,019
terms of plume size as well as emission

311
00:13:47,210 --> 00:13:45,600
rates some of the plumes like the

312
00:13:50,150 --> 00:13:47,220
landfill examples have emission

313
00:13:52,009 --> 00:13:50,160

estimates that are within range of other

314
00:13:54,170 --> 00:13:52,019
studies that have been published

315
00:13:56,030 --> 00:13:54,180
recently

316
00:14:00,350 --> 00:13:56,040
other studies like the Turkmenistan

317
00:14:03,470 --> 00:14:00,360
plumes are very large in extent the this

318
00:14:06,110 --> 00:14:03,480
example had a boom that was in excess of

319
00:14:10,069 --> 00:14:06,120
20 miles downwind and the emission rate

320
00:14:14,329 --> 00:14:10,079
at 55.6 tons per hour is similar to the

321
00:14:16,310 --> 00:14:14,339
Aliso Canyon mission in 2015 from the

322
00:14:22,790 --> 00:14:16,320
Southern California Gas storage facility

323
00:14:27,490 --> 00:14:24,530
and I'll discharge of greenhouse gases

324
00:14:29,930 --> 00:14:27,500
in U.S history so this really underlies

325
00:14:33,290 --> 00:14:29,940
the importance and size of this

326
00:14:38,389 --> 00:14:35,870
the real strength that we made is that

327
00:14:40,009 --> 00:14:38,399
it combines coverage of a large portion

328
00:14:41,689 --> 00:14:40,019
of the Earth's surface with with

329
00:14:44,389 --> 00:14:41,699
spectral and spatial resolution that's

330
00:14:46,850 --> 00:14:44,399
required to map methane Point sources at

331
00:14:48,590 --> 00:14:46,860
the facility scale and because emit is

332
00:14:50,930 --> 00:14:48,600
on board the International Space Station

333
00:14:53,689 --> 00:14:50,940
which has an orbit of every 90 minutes

334
00:14:55,970 --> 00:14:53,699
or a lot of multiple observations of

335
00:14:58,009 --> 00:14:55,980
methane blooms over time which is really

336
00:15:00,470 --> 00:14:58,019
important to better understand if

337
00:15:03,050 --> 00:15:00,480
emissions are persistent that is to say

338
00:15:05,329 --> 00:15:03,060

if we see them over and over or if the

339
00:15:07,310 --> 00:15:05,339
emissions are intermittent

340
00:15:09,410 --> 00:15:07,320
so as we have shown with some of our

341
00:15:11,810 --> 00:15:09,420
previous Airborne surveys these types of

342
00:15:14,269 --> 00:15:11,820
results are increasingly being used by

343
00:15:15,710 --> 00:15:14,279
the public and private sectors and they

344
00:15:17,509 --> 00:15:15,720
often lead to voluntary mitigation

345
00:15:19,670 --> 00:15:17,519
therefore we're really excited about

346
00:15:21,650 --> 00:15:19,680
emet's potential for reducing methane

347
00:15:23,870 --> 00:15:21,660
emissions from human activity by

348
00:15:25,550 --> 00:15:23,880
pinpointing these emission sources and

349
00:15:28,430 --> 00:15:25,560
to facilitate the sharing of these

350
00:15:29,210 --> 00:15:28,440
results will be developing a JPL web

351
00:15:31,550 --> 00:15:29,220
core

352
00:15:33,829 --> 00:15:31,560
that will make emit methane data

353
00:15:37,250 --> 00:15:33,839
publicly available

354
00:15:38,509 --> 00:15:37,260
the results today showcase only a few

355
00:15:41,629 --> 00:15:38,519
examples

356
00:15:43,790 --> 00:15:41,639
analysis of emit data and we are really

357
00:15:45,470 --> 00:15:43,800
only scratching the surface of emit's

358
00:15:49,790 --> 00:15:45,480
potential for mapping greenhouse gases

359
00:15:54,110 --> 00:15:52,250
areas and emission sectors to better

360
00:15:56,030 --> 00:15:54,120
improve our understanding of greenhouse

361
00:15:59,090 --> 00:15:56,040
gas budgets

362
00:16:02,629 --> 00:15:59,100
and with that I will pass this on to

363
00:16:09,170 --> 00:16:05,449

thank you Andrew the International Space

364
00:16:14,509 --> 00:16:09,180
Station is a unique laboratory in low

365
00:16:18,050 --> 00:16:14,519
earth orbit as such it not only furthers

366
00:16:20,990 --> 00:16:18,060
our exploration research for NASA moving

367
00:16:23,090 --> 00:16:21,000
on to the moon and Mars but it also has

368
00:16:25,730 --> 00:16:23,100
a unique mission of being able to come

369
00:16:26,949 --> 00:16:25,740
contribute to benefits to humanity here

370
00:16:31,009 --> 00:16:26,959
on Earth

371
00:16:35,629 --> 00:16:31,019
the orbit that the ISS takes is uh

372
00:16:37,790 --> 00:16:35,639
unique to some Earth observation typical

373
00:16:41,210 --> 00:16:37,800
investigations they

374
00:16:44,150 --> 00:16:41,220
in a polar orbit which repeats over the

375
00:16:47,210 --> 00:16:44,160
same point at the same time of day every

376
00:16:50,150 --> 00:16:47,220
day we however are in a 52 degree

377
00:16:52,810 --> 00:16:50,160
inclined orbit what that means is that

378
00:16:55,970 --> 00:16:52,820
while we orbit the earth 16 times a day

379
00:16:57,829 --> 00:16:55,980
every time we go over the same spot you

380
00:17:00,650 --> 00:16:57,839
get a slightly different time of day

381
00:17:04,250 --> 00:17:00,660
observation this makes it really

382
00:17:06,650 --> 00:17:04,260
beneficial to start to tease out diurnal

383
00:17:09,650 --> 00:17:06,660
effects and to be able to see the

384
00:17:13,189 --> 00:17:09,660
lighting conditions in various time of

385
00:17:15,530 --> 00:17:13,199
day over a particular area it also means

386
00:17:18,350 --> 00:17:15,540
that due to the orbit that we have we

387
00:17:20,929 --> 00:17:18,360
can cover about 90 percent of the

388
00:17:23,630 --> 00:17:20,939

inhabited surface of the Earth and every

389
00:17:27,350 --> 00:17:23,640
90 days we repeat with the same lighting

390
00:17:29,270 --> 00:17:27,360
conditions so again a great tool and

391
00:17:31,970 --> 00:17:29,280
capability to be able to supply

392
00:17:35,090 --> 00:17:31,980
different views to instruments on board

393
00:17:36,770 --> 00:17:35,100
the ISS for Earth observation

394
00:17:39,230 --> 00:17:36,780
in fact we have many different

395
00:17:41,870 --> 00:17:39,240
instruments uh seven as you heard

396
00:17:44,930 --> 00:17:41,880
earlier dedicated to Earth uh science

397
00:17:48,110 --> 00:17:44,940
and observations on board the ISF we

398
00:17:51,529 --> 00:17:48,120
have 15 total reconfigurable slots on

399
00:17:54,049 --> 00:17:51,539
the ISS for external payloads and right

400
00:17:56,150 --> 00:17:54,059
now with the addition of ebit we are

401
00:17:58,850 --> 00:17:56,160
full on those slots so we are

402
00:18:01,370 --> 00:17:58,860
exceedingly happy about being able to

403
00:18:04,730 --> 00:18:01,380
contribute to the Earth Sciences

404
00:18:07,010 --> 00:18:04,740
divisions interests in low earth orbit

405
00:18:09,350 --> 00:18:07,020
and to be able to supply the type of

406
00:18:10,789 --> 00:18:09,360
data that emit is bringing to us and

407
00:18:14,870 --> 00:18:10,799
talking about today

408
00:18:17,210 --> 00:18:14,880
uh lastly as you heard there was an rpcm

409
00:18:20,450 --> 00:18:17,220
trip that is a remote power controller

410
00:18:23,810 --> 00:18:20,460
module and since uh that happened last

411
00:18:27,250 --> 00:18:23,820
month emit has been powered down however

412
00:18:30,710 --> 00:18:27,260
we have a plan to replace that rpcm

413
00:18:33,169 --> 00:18:30,720

external to the station on November 10th

414
00:18:35,930 --> 00:18:33,179
and after that time emit should be

415
00:18:38,330 --> 00:18:35,940
returned to full operability so we are

416
00:18:42,710 --> 00:18:38,340
looking very uh forward to those

417
00:18:49,250 --> 00:18:46,190
all right thank you all so much a

418
00:18:50,750 --> 00:18:49,260
reminder that you can gather the images

419
00:18:55,370 --> 00:18:50,760
that we've been showing at

420
00:19:02,750 --> 00:19:00,789
slash emit Dash methane Dash Telecom

421
00:19:04,789 --> 00:19:02,760
additionally we will start taking

422
00:19:07,850 --> 00:19:04,799
questions you can

423
00:19:10,610 --> 00:19:07,860
sign up for a question by pressing star

424
00:19:12,230 --> 00:19:10,620
one and we will also down the road be

425
00:19:13,789 --> 00:19:12,240
taking social media questions as well

426
00:19:17,150 --> 00:19:13,799
you can ask a social media question

427
00:19:19,250 --> 00:19:17,160
using the hashtag ask NASA or if you're

428
00:19:22,190 --> 00:19:19,260
following Along on YouTube you can

429
00:19:24,409 --> 00:19:22,200
simply drop your question in the chat so

430
00:19:27,110 --> 00:19:24,419
with that our first question is from

431
00:19:29,090 --> 00:19:27,120
Seth borenstein from the Associated

432
00:19:31,130 --> 00:19:29,100
Press opening up your line

433
00:19:33,110 --> 00:19:31,140
yes thank you for doing this I think

434
00:19:35,510 --> 00:19:33,120
this one would be for Andrew unless

435
00:19:37,909 --> 00:19:35,520
someone else wants to jump in

436
00:19:40,789 --> 00:19:37,919
um looking at you know as you said the

437
00:19:42,590 --> 00:19:40,799
Turkmenistan uh Figures were much higher

438
00:19:45,049 --> 00:19:42,600

than expected and if you could detail

439
00:19:48,289 --> 00:19:45,059
how you know what was expected and what

440
00:19:49,789 --> 00:19:48,299
as opposed to the 55.6 tons per hour you

441
00:19:52,070 --> 00:19:49,799
were getting

442
00:19:53,570 --> 00:19:52,080
um but that the Iran landfill was about

443
00:19:56,090 --> 00:19:53,580
what was expected when you look at

444
00:19:58,250 --> 00:19:56,100
everything all the super emitters you've

445
00:20:01,010 --> 00:19:58,260
found so far and and if you could tell

446
00:20:04,850 --> 00:20:01,020
us how many of those are are we are you

447
00:20:06,830 --> 00:20:04,860
seeing more than was expected or are you

448
00:20:10,130 --> 00:20:06,840
seeing about what was expected in other

449
00:20:11,750 --> 00:20:10,140
words is this oh my God we've got much

450
00:20:15,110 --> 00:20:11,760
more methane because methane has been

451
00:20:17,870 --> 00:20:15,120
hard to monitor or is this Yep this is

452
00:20:19,730 --> 00:20:17,880
about as bad as we thought

453
00:20:23,690 --> 00:20:19,740
I mean I think

454
00:20:25,850 --> 00:20:23,700
um we were certainly excited to see the

455
00:20:27,650 --> 00:20:25,860
types of examples that we're seeing

456
00:20:29,570 --> 00:20:27,660
um and we showcased just three examples

457
00:20:32,270 --> 00:20:29,580
there I would say that these are not

458
00:20:33,770 --> 00:20:32,280
necessarily unexpected given the

459
00:20:36,289 --> 00:20:33,780
previous work and some of the other

460
00:20:37,730 --> 00:20:36,299
studies that have indicated point source

461
00:20:40,310 --> 00:20:37,740
emissions from these different sectors

462
00:20:41,690 --> 00:20:40,320
but I would highlight the

463
00:20:44,029 --> 00:20:41,700

light that are like the Turkmenistan

464
00:20:46,370 --> 00:20:44,039
example and I did want to highlight that

465
00:20:49,510 --> 00:20:46,380
the size and the emission rate relative

466
00:20:52,130 --> 00:20:49,520
to Aliso Canyon for sort of comparison

467
00:20:55,750 --> 00:20:52,140
some of the other examples like the

468
00:20:57,710 --> 00:20:55,760
landfill exam sample are very large

469
00:20:59,630 --> 00:20:57,720
relative to some of our Airborne

470
00:21:01,909 --> 00:20:59,640
campaigns in California that you might

471
00:21:06,350 --> 00:21:01,919
be aware of California methane survey

472
00:21:08,570 --> 00:21:06,360
that occurred in 2017 2016 and 2017 but

473
00:21:10,310 --> 00:21:08,580
they are not unreasonable based on some

474
00:21:13,970 --> 00:21:10,320
more recent Publications that have

475
00:21:16,190 --> 00:21:13,980
showed emission rates that are that span

476
00:21:17,810 --> 00:21:16,200
the range what we observe but are there

477
00:21:19,909 --> 00:21:17,820
are some examples of landfills that are

478
00:21:22,130 --> 00:21:19,919
much larger so we're really excited to

479
00:21:23,990 --> 00:21:22,140
continue to look at more data to get a

480
00:21:25,549 --> 00:21:24,000
better understanding of the types of

481
00:21:28,970 --> 00:21:25,559
emissions globally

482
00:21:32,210 --> 00:21:28,980
and this might chime in we didn't know

483
00:21:33,950 --> 00:21:32,220
nobody had indicated that the Permian uh

484
00:21:35,510 --> 00:21:33,960
supermitter would be there or the

485
00:21:37,190 --> 00:21:35,520
landfill supermitter we knew

486
00:21:38,930 --> 00:21:37,200
turkmenistown was a place that was worth

487
00:21:40,850 --> 00:21:38,940
taking a look at we happened to get data

488
00:21:43,310 --> 00:21:40,860

over it that was clear sky so while

489
00:21:46,669 --> 00:21:43,320
these are in family with other

490
00:21:48,529 --> 00:21:46,679
comparable uh super emitters nobody knew

491
00:21:50,029 --> 00:21:48,539
to look for these no one knew of that

492
00:21:51,770 --> 00:21:50,039
that particular landfill so the

493
00:21:53,390 --> 00:21:51,780
advantage and the contribution we hope

494
00:21:55,549 --> 00:21:53,400
we can make is with the broad area

495
00:21:58,070 --> 00:21:55,559
coverage we can see if there are super

496
00:22:00,470 --> 00:21:58,080
meters in places no one has expected

497
00:22:01,970 --> 00:22:00,480
them much like maybe the the case of the

498
00:22:04,549 --> 00:22:01,980
landfill and nobody knew that that

499
00:22:06,169 --> 00:22:04,559
particular landfill uh was was a super

500
00:22:08,270 --> 00:22:06,179
emitter for example maybe to the heart

501
00:22:10,970 --> 00:22:08,280
of your question

502
00:22:12,230 --> 00:22:10,980
so getting just back to it is it fair to

503
00:22:14,990 --> 00:22:12,240
say

504
00:22:16,430 --> 00:22:15,000
I mean does this change the amount

505
00:22:18,649 --> 00:22:16,440
expected

506
00:22:24,529 --> 00:22:18,659
from Super emitters or is this just

507
00:22:29,029 --> 00:22:26,450
I would say that

508
00:22:31,549 --> 00:22:29,039
it at this point in the early stages we

509
00:22:35,450 --> 00:22:31,559
can't say that uh that it would change

510
00:22:37,010 --> 00:22:35,460
uh the sort of ongoing research area on

511
00:22:40,610 --> 00:22:37,020
this topic but I think these

512
00:22:42,350 --> 00:22:40,620
measurements go towards improving our

513
00:22:44,510 --> 00:22:42,360

ability to resolve these and look at

514
00:22:46,190 --> 00:22:44,520
these populations and one of the

515
00:22:48,110 --> 00:22:46,200
challenges as you might be aware is that

516
00:22:51,289 --> 00:22:48,120
there aren't enough measurements of

517
00:22:53,990 --> 00:22:51,299
these types of emitters and emit will I

518
00:22:55,549 --> 00:22:54,000
think complement some of the existing

519
00:22:58,310 --> 00:22:55,559
sensors that are out there in future

520
00:22:59,810 --> 00:22:58,320
sensors to give us more data density

521
00:23:01,370 --> 00:22:59,820
where we can start to actually answer

522
00:23:03,289 --> 00:23:01,380
the question that you've posed which is

523
00:23:05,029 --> 00:23:03,299
a really great one but unfortunately at

524
00:23:07,909 --> 00:23:05,039
this point we can't answer it just

525
00:23:09,529 --> 00:23:07,919
looking at the select emit lines that we

526
00:23:12,409 --> 00:23:09,539
have to date

527
00:23:16,789 --> 00:23:12,419
thank you

528
00:23:19,370 --> 00:23:16,799
those people on the phone if you'd like

529
00:23:22,070 --> 00:23:19,380
to ask a question you can press star one

530
00:23:25,130 --> 00:23:22,080
uh I will go to some questions from

531
00:23:26,649 --> 00:23:25,140
social media now uh the first question I

532
00:23:30,409 --> 00:23:26,659
have is from

533
00:23:33,350 --> 00:23:30,419
mouser58907 on YouTube who is asking how

534
00:23:38,210 --> 00:23:33,360
long will it take to map all of the

535
00:23:42,590 --> 00:23:40,310
so this is Rob I'll take a shot at that

536
00:23:44,570 --> 00:23:42,600
currently amidst Prime missionist map

537
00:23:46,970 --> 00:23:44,580
the Arid land regions of planet Earth

538
00:23:49,630 --> 00:23:46,980

for our Prime mission which is mineral

539
00:23:52,310 --> 00:23:49,640
dust sources so we can do all of the

540
00:23:54,710 --> 00:23:52,320
within one year in fact we'll have

541
00:23:56,330 --> 00:23:54,720
multiple observations because we worry a

542
00:23:58,490 --> 00:23:56,340
little bit about clouds so arid land

543
00:24:01,669 --> 00:23:58,500
there aren't so many clouds so the areas

544
00:24:04,250 --> 00:24:01,679
we're targeting can easily be covered in

545
00:24:06,289 --> 00:24:04,260
a year then we'll see after the Prime

546
00:24:08,990 --> 00:24:06,299
mission what the strategies are to

547
00:24:12,529 --> 00:24:09,000
expand that that coverage but the area

548
00:24:16,490 --> 00:24:12,539
accessible below the ISS is all the land

549
00:24:19,010 --> 00:24:16,500
and water both plus or minus 15 to 52

550
00:24:23,890 --> 00:24:19,020
degrees latitude as was indicated by

551
00:24:30,049 --> 00:24:28,430
great thank you uh another uh repeated

552
00:24:31,549 --> 00:24:30,059
uh question we're sort of getting from

553
00:24:34,010 --> 00:24:31,559
social media a couple people have been

554
00:24:36,470 --> 00:24:34,020
asking is uh what will be done with

555
00:24:37,669 --> 00:24:36,480
these findings what is the next step uh

556
00:24:41,570 --> 00:24:37,679
after we have located these super

557
00:24:47,810 --> 00:24:44,630
this is Andrew so we are in the early

558
00:24:52,570 --> 00:24:50,210
for and what we're doing with that data

559
00:24:55,970 --> 00:24:52,580
is we are going to be

560
00:24:58,310 --> 00:24:55,980
putting a website together through JPL

561
00:25:00,289 --> 00:24:58,320
where we will be visualizing the methane

562
00:25:02,570 --> 00:25:00,299
plumes that were observed and making

563
00:25:05,990 --> 00:25:02,580

that data available to the Public Public

564
00:25:09,470 --> 00:25:06,000
we are focusing on or aiming to have a

565
00:25:11,390 --> 00:25:09,480
release in early next year for that and

566
00:25:15,289 --> 00:25:11,400
then as Rob mentioned there's also

567
00:25:17,750 --> 00:25:15,299
avenues for getting the radiance data

568
00:25:20,510 --> 00:25:17,760
that's that's taken by Emit and putting

569
00:25:22,010 --> 00:25:20,520
it on the lp DAC which is a NASA dock

570
00:25:24,169 --> 00:25:22,020
that's accessible

571
00:25:26,149 --> 00:25:24,179
to any research group that's interested

572
00:25:28,250 --> 00:25:26,159
in using the data and we're certainly

573
00:25:30,470 --> 00:25:28,260
aware of a number of organizations that

574
00:25:32,570 --> 00:25:30,480
want to look at the data and do their

575
00:25:36,649 --> 00:25:32,580
own analyzes when it comes to methane

576
00:25:43,549 --> 00:25:39,590
and this is Karen I'll just augment that

577
00:25:46,549 --> 00:25:43,559
answer uh because NASA is also

578
00:25:48,669 --> 00:25:46,559
undertaking a larger effort around

579
00:25:52,269 --> 00:25:48,679
greenhouse gases

580
00:25:56,210 --> 00:25:52,279
standing up a new greenhouse gas Center

581
00:25:59,450 --> 00:25:56,220
virtual Center so that we'll bring the

582
00:26:02,029 --> 00:25:59,460
emits data into that Center as well and

583
00:26:04,669 --> 00:26:02,039
and that's a a partnership with other

584
00:26:08,090 --> 00:26:04,679
government agencies so so these data

585
00:26:10,370 --> 00:26:08,100
will begin to inform a broader set of

586
00:26:12,289 --> 00:26:10,380
decisions government-wide

587
00:26:16,610 --> 00:26:12,299
come on

588
00:26:19,190 --> 00:26:16,620

thank you so much uh we now have another

589
00:26:22,130 --> 00:26:19,200
question from the phone line uh Steve

590
00:26:26,210 --> 00:26:22,140
Gorman from Reuters your foot line is

591
00:26:29,529 --> 00:26:26,220
open so uh yeah hi uh so my question is

592
00:26:32,330 --> 00:26:29,539
uh uh

593
00:26:35,990 --> 00:26:32,340
yep yep the question question is whether

594
00:26:38,210 --> 00:26:36,000
if you could better uh uh or go over the

595
00:26:40,549 --> 00:26:38,220
the comparison of the alisso canyon

596
00:26:43,730 --> 00:26:40,559
league in uh just outside of Los Angeles

597
00:26:47,269 --> 00:26:43,740
in terms of size and rate of methane

598
00:26:49,130 --> 00:26:47,279
discharge how much to I think you said

599
00:26:51,590 --> 00:26:49,140
you were comparing it to the plumes that

600
00:26:54,370 --> 00:26:51,600
you found in Turkmenistan did you say

601
00:26:57,590 --> 00:26:54,380
that plumes together in Turkmenistan

602
00:27:00,529 --> 00:26:57,600
they get taken together were on the same

603
00:27:02,750 --> 00:27:00,539
order of magnitude as eliso Canyon plume

604
00:27:05,110 --> 00:27:02,760
there or that each of those plumes were

605
00:27:08,810 --> 00:27:05,120
like one Alissa Canyon maybe you could

606
00:27:10,730 --> 00:27:08,820
further uh describe that thank you

607
00:27:12,230 --> 00:27:10,740
absolutely Yep this is Andrew just

608
00:27:14,810 --> 00:27:12,240
responding so that's a great question

609
00:27:17,930 --> 00:27:14,820
and apologies if it wasn't clear so we

610
00:27:20,029 --> 00:27:17,940
did aggregate the 12 swim examples to

611
00:27:22,669 --> 00:27:20,039
have one emission rate that was on the

612
00:27:27,409 --> 00:27:22,679
order of the Aliso Canyon blowout in

613
00:27:31,610 --> 00:27:27,419

2015 around 50 tons per hour or so

614
00:27:35,210 --> 00:27:31,620
um so not not 12 individual booms each

615
00:27:37,850 --> 00:27:35,220
of an Aliso Canyon scaled emission it's

616
00:27:39,710 --> 00:27:37,860
in aggregate for that one one scene is

617
00:27:43,310 --> 00:27:39,720
that more clear now

618
00:27:45,110 --> 00:27:43,320
yeah and and what what were what is what

619
00:27:46,789 --> 00:27:45,120
are the sources uh in term medicine I

620
00:27:48,230 --> 00:27:46,799
guess there's a dozen of them maybe

621
00:27:50,810 --> 00:27:48,240
they're disparate they're all different

622
00:27:53,750 --> 00:27:50,820
but is there is there a typical kind of

623
00:27:56,330 --> 00:27:53,760
thing going on as your oil and gas uh

624
00:27:57,890 --> 00:27:56,340
operations there or or landfills or

625
00:27:59,269 --> 00:27:57,900
something else that's happening or do

626
00:28:00,890 --> 00:27:59,279
you not know

627
00:28:03,649 --> 00:28:00,900
yeah this is Andrew again yeah we've

628
00:28:05,870 --> 00:28:03,659
looked uh at each of those examples and

629
00:28:09,490 --> 00:28:05,880
in quite a bit of detail some of the

630
00:28:12,590 --> 00:28:09,500
plumes are clearly associated

631
00:28:15,350 --> 00:28:12,600
hydrocarbon pipelines at the surface or

632
00:28:16,789 --> 00:28:15,360
that are visible in the subsurface you

633
00:28:17,990 --> 00:28:16,799
can sort of see them popping out of the

634
00:28:20,810 --> 00:28:18,000
sand

635
00:28:23,690 --> 00:28:20,820
um other emission sources appear to be

636
00:28:24,950 --> 00:28:23,700
Associated uh with regions that are

637
00:28:27,470 --> 00:28:24,960
nearby that are associated with

638
00:28:29,269 --> 00:28:27,480

infrastructure so these do appear to be

639
00:28:31,370 --> 00:28:29,279
consistent with oil and gas

640
00:28:34,570 --> 00:28:31,380
infrastructure

641
00:28:39,289 --> 00:28:37,850
all right uh thank you so much we will

642
00:28:43,310 --> 00:28:39,299
go back to some questions from social

643
00:28:45,710 --> 00:28:43,320
media now Mark norling on YouTube is

644
00:28:47,990 --> 00:28:45,720
asking how long did it take between

645
00:28:51,710 --> 00:28:48,000
collecting the data and making it public

646
00:28:54,529 --> 00:28:51,720
is that immediate or does it take months

647
00:28:56,450 --> 00:28:54,539
this is Rob um again we have a

648
00:28:58,730 --> 00:28:56,460
commitment with NASA to get our data

649
00:29:00,230 --> 00:28:58,740
public as quickly as feasible but

650
00:29:02,510 --> 00:29:00,240
there's quite a few steps and right now

651
00:29:05,029 --> 00:29:02,520
we're we're just out of the initial

652
00:29:06,289 --> 00:29:05,039
in-orbit checkout phase where we're

653
00:29:09,110 --> 00:29:06,299
understanding the quality of our

654
00:29:10,909 --> 00:29:09,120
measurement so our plan right now for

655
00:29:12,649 --> 00:29:10,919
the first data sets will be released

656
00:29:16,310 --> 00:29:12,659
either late December early January

657
00:29:18,289 --> 00:29:16,320
fulfilling our commitment with NASA once

658
00:29:20,149 --> 00:29:18,299
we do that then future data sets because

659
00:29:23,090 --> 00:29:20,159
we have that processing pipeline now

660
00:29:24,889 --> 00:29:23,100
fully understood and working the the new

661
00:29:26,870 --> 00:29:24,899
data sets Will Come Out close to the

662
00:29:31,730 --> 00:29:26,880
Cadence at which we acquire them within

663
00:29:37,310 --> 00:29:35,750

thanks so much rob a reminder that you

664
00:29:39,769 --> 00:29:37,320
can ask a question on the line by

665
00:29:41,930 --> 00:29:39,779
pressing star one or if you are on

666
00:29:43,970 --> 00:29:41,940
social media to use the hashtag ask NASA

667
00:29:45,289 --> 00:29:43,980
or drop it in the YouTube chat at the

668
00:29:48,230 --> 00:29:45,299
moment we just have one more social

669
00:29:52,130 --> 00:29:48,240
media question uh so I will go with that

670
00:29:54,889 --> 00:29:52,140
uh Mattel Aquarius on YouTube asks uh

671
00:29:57,110 --> 00:29:54,899
can emit detect underwater pipeline

672
00:30:00,110 --> 00:29:57,120
lakes or does the methane get too

673
00:30:02,169 --> 00:30:00,120
dissolved or diffused

674
00:30:04,310 --> 00:30:02,179
maybe we don't know yet

675
00:30:06,710 --> 00:30:04,320
this is this is Andrew

676
00:30:09,409 --> 00:30:06,720
um we we have not tested the capability

677
00:30:11,990 --> 00:30:09,419
yet but I would say that some previous

678
00:30:14,090 --> 00:30:12,000
studies using very similar instruments

679
00:30:16,610 --> 00:30:14,100
that were developed at JPL have

680
00:30:19,970 --> 00:30:16,620
demonstrated that you can in fact detect

681
00:30:22,130 --> 00:30:19,980
methane plumes over water if you use Sun

682
00:30:24,470 --> 00:30:22,140
glint so if you get enough signal from

683
00:30:27,289 --> 00:30:24,480
the Sun into the instrument you can do

684
00:30:29,710 --> 00:30:27,299
this we may explore that going forward

685
00:30:33,769 --> 00:30:29,720
but again we're just in the early stages

686
00:30:36,169 --> 00:30:33,779
of looking at the data

687
00:30:37,669 --> 00:30:36,179
yeah I'll come in the first detection of

688
00:30:39,950 --> 00:30:37,679

methane with an Airborne Imaging

689
00:30:41,630 --> 00:30:39,960
spectrometer was of the methane seps in

690
00:30:43,549 --> 00:30:41,640
the Santa Barbara Channel and that goes

691
00:30:46,190 --> 00:30:43,559
back to about 2010 and that was with an

692
00:30:47,930 --> 00:30:46,200
Airborne simulator that somewhat uh

693
00:30:51,649 --> 00:30:47,940
related to to the emit Imaging

694
00:30:55,310 --> 00:30:53,870
UE thank you both that was Andrew Thorpe

695
00:30:57,590 --> 00:30:55,320
who answered first and Rob Green who

696
00:30:59,870 --> 00:30:57,600
chimed in afterwards

697
00:31:02,029 --> 00:30:59,880
um we are looks like we are finished

698
00:31:04,370 --> 00:31:02,039
with our questions for today so I want

699
00:31:06,529 --> 00:31:04,380
to say thank you very much for those of

700
00:31:08,870 --> 00:31:06,539
you who attended and for those of you

701
00:31:11,389 --> 00:31:08,880
who participated we will of course

702
00:31:14,330 --> 00:31:11,399
continue to share information about all

703
00:31:19,370 --> 00:31:14,340
of NASA's Earth Missions at nasa.gov

704
00:31:20,810 --> 00:31:19,380
Earth and we look forward to all the