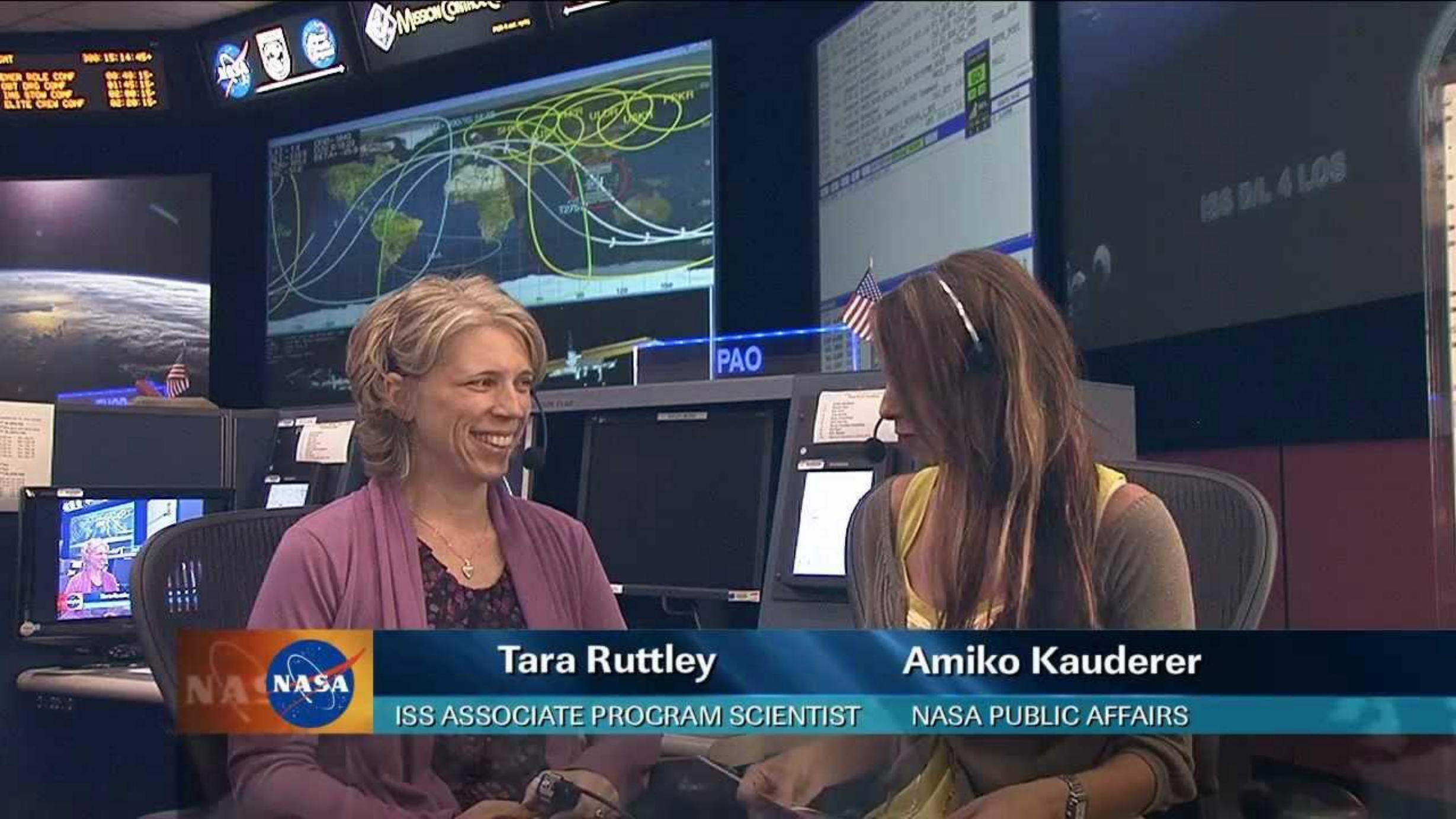
PAO
ISS SAL 4 LOS
NASA
Tara Ruttley
ISS ASSOCIATE PROGRAM SCIENTIST
Amiko Kauderer
NASA PUBLIC AFFAIRS

1
00:00:05,630 --> 00:00:03,350
hi welcome to the International Space

2
00:00:08,240 --> 00:00:05,640
Station flight control room we are here

3
00:00:09,799 --> 00:00:08,250
where the orbit 2 team now is monitoring

4
00:00:11,120 --> 00:00:09,809
the systems aboard the International

5
00:00:13,400 --> 00:00:11,130
Space Station and also the crews

6
00:00:16,490 --> 00:00:13,410
activities here with me today I have

7
00:00:19,540 --> 00:00:16,500
terribly Tara thank you for coming Tara

8
00:00:22,460 --> 00:00:19,550
is the associate program scientist for

9
00:00:23,689 --> 00:00:22,470
International Space Station and so what

10
00:00:27,259 --> 00:00:23,699
she's going to do we're going to have

11
00:00:28,730 --> 00:00:27,269
here today is a just a wrap up of it's

12
00:00:30,290 --> 00:00:28,740
just we're going to call this science

13
00:00:32,860 --> 00:00:30,300

friday so we're going to do today is

14
00:00:36,470 --> 00:00:32,870
have a wrap of the science that has been

15
00:00:37,610 --> 00:00:36,480
being worked on on orbit all during this

16
00:00:39,470 --> 00:00:37,620
week and then we have some other little

17
00:00:41,630 --> 00:00:39,480
things that we want to talk about that

18
00:00:43,900 --> 00:00:41,640
had gone up on the SpaceX Dragon

19
00:00:46,729 --> 00:00:43,910
spacecraft that is going to be leaving

20
00:00:48,950 --> 00:00:46,739
sunday this weekend so welcome to it

21
00:00:50,479 --> 00:00:48,960
first of all before we get into any of

22
00:00:52,100 --> 00:00:50,489
all this stuff I just want you to

23
00:00:54,770 --> 00:00:52,110
explain to me a little about your roles

24
00:00:56,060 --> 00:00:54,780
and responsibilities here as the program

25
00:00:58,340 --> 00:00:56,070
scientist for International Space

26
00:01:01,040 --> 00:00:58,350
Station sure let's see how there are

27
00:01:02,990 --> 00:01:01,050
many first and foremost I'm involved in

28
00:01:05,329 --> 00:01:03,000
helping to coordinate the research plans

29
00:01:07,580 --> 00:01:05,339
that happen on Space Station and look

30
00:01:09,109 --> 00:01:07,590
across all investigations and then as

31
00:01:13,160 --> 00:01:09,119
the investigations are happening on

32
00:01:16,039 --> 00:01:13,170
orbit I help identify impacts to science

33
00:01:17,570 --> 00:01:16,049
that may be important for pursuing or

34
00:01:19,550 --> 00:01:17,580
promoting the science that happens on

35
00:01:21,170 --> 00:01:19,560
station so we help prioritize the

36
00:01:23,030 --> 00:01:21,180
science make sure it gets implemented we

37
00:01:26,240 --> 00:01:23,040
meet the needs of the investigators and

38
00:01:28,219 --> 00:01:26,250

then after the experiments are done our

39
00:01:29,660 --> 00:01:28,229
team works to get the result and turn

40
00:01:31,160 --> 00:01:29,670
them into something that's communicable

41
00:01:32,929 --> 00:01:31,170
to the public so we try to communicate

42
00:01:35,870 --> 00:01:32,939
the value of what's happening on Space

43
00:01:37,160 --> 00:01:35,880
Station okay great um okay so we're

44
00:01:38,960 --> 00:01:37,170
going to we're going to do a little

45
00:01:39,859 --> 00:01:38,970
recap of some of the science that's been

46
00:01:41,749 --> 00:01:39,869
taking place and there's a lot of

47
00:01:43,100 --> 00:01:41,759
science and I think that that's that's

48
00:01:45,020 --> 00:01:43,110
going on a lot of times we hear a lot

49
00:01:47,090 --> 00:01:45,030
about you know oh we had to fix this so

50
00:01:48,460 --> 00:01:47,100
we had to fix that and and while we got

51
00:01:50,719 --> 00:01:48,470
to understand that this is their home

52
00:01:52,249 --> 00:01:50,729
that is orbiting so there there is

53
00:01:54,740 --> 00:01:52,259
maintenance that is required but

54
00:01:56,480 --> 00:01:54,750
meanwhile it is a laboratory and I don't

55
00:01:59,690 --> 00:01:56,490
want to forget that and that science is

56
00:02:02,270 --> 00:01:59,700
taking place every day 24 7 even when

57
00:02:04,069 --> 00:02:02,280
the crew is sleeping at times depending

58
00:02:06,230 --> 00:02:04,079
on what the experiment is or this study

59
00:02:08,719 --> 00:02:06,240
so first before we get into some of

60
00:02:10,339 --> 00:02:08,729
these experiments or investigations that

61
00:02:12,229 --> 00:02:10,349
are taking place this week I want to go

62
00:02:13,630 --> 00:02:12,239
and talk about this education

63
00:02:16,480 --> 00:02:13,640

publication there's a recent

64
00:02:19,600 --> 00:02:16,490
location that was done and it really

65
00:02:21,790 --> 00:02:19,610
kind of goes over some all the history

66
00:02:23,860 --> 00:02:21,800
of the space station science you want to

67
00:02:25,150 --> 00:02:23,870
go ahead and tell sure yeah just this

68
00:02:28,059 --> 00:02:25,160
month our office put out a new

69
00:02:29,620 --> 00:02:28,069
publication it's called inspiring the

70
00:02:32,020 --> 00:02:29,630
next generation and it's basically a

71
00:02:34,090 --> 00:02:32,030
compilation of the results of the

72
00:02:36,340 --> 00:02:34,100
student participation in space station

73
00:02:38,290 --> 00:02:36,350
over the last 12 years so just about

74
00:02:40,060 --> 00:02:38,300
just about every investigation that

75
00:02:42,670 --> 00:02:40,070
happens on on orbit has some kind of

76
00:02:45,010 --> 00:02:42,680
educational component whether it's true

77
00:02:47,380 --> 00:02:45,020
student design and competition where

78
00:02:50,949 --> 00:02:47,390
it's actual student experiments on orbit

79
00:02:53,229 --> 00:02:50,959
or it could be just all the way back to

80
00:02:56,080 --> 00:02:53,239
on-orbit activities that can be pursued

81
00:02:57,729 --> 00:02:56,090
in the classroom in parallel even even

82
00:02:59,350 --> 00:02:57,739
crew call bounce to students all of

83
00:03:01,509 --> 00:02:59,360
these things are rolled into this

84
00:03:03,370 --> 00:03:01,519
publication and an effort to communicate

85
00:03:04,630 --> 00:03:03,380
the value of station in a way that

86
00:03:07,960 --> 00:03:04,640
promotes science technology engineering

87
00:03:11,590 --> 00:03:07,970
and math so the stem is real critical

88
00:03:13,150 --> 00:03:11,600

right to to space station value and what

89
00:03:14,320 --> 00:03:13,160
we found is is going through the

90
00:03:16,390 --> 00:03:14,330
publication as we were putting it

91
00:03:18,250 --> 00:03:16,400
together looks like space station has

92
00:03:20,110 --> 00:03:18,260
reached students across students and

93
00:03:23,590 --> 00:03:20,120
teachers across 44 different countries

94
00:03:25,630 --> 00:03:23,600
well in the last 12 years and about 44

95
00:03:28,600 --> 00:03:25,640
42 million students have been reached

96
00:03:30,430 --> 00:03:28,610
and on some level involving space

97
00:03:33,250 --> 00:03:30,440
station activities which is really

98
00:03:36,340 --> 00:03:33,260
really mind-blowing and nearly 3 million

99
00:03:37,600 --> 00:03:36,350
teachers as well yeah so it was yeah it

100
00:03:39,940 --> 00:03:37,610
was pretty eye-opening as we were going

101
00:03:42,729 --> 00:03:39,950
through and now the publication also

102
00:03:44,979 --> 00:03:42,739
details how you as students and teachers

103
00:03:46,660 --> 00:03:44,989
can get on board and participate in

104
00:03:48,850 --> 00:03:46,670
competitions that are up and coming and

105
00:03:49,960 --> 00:03:48,860
that are always ongoing so if you feel

106
00:03:51,789 --> 00:03:49,970
like this is something you want to look

107
00:03:53,770 --> 00:03:51,799
through which I highly encourage if you

108
00:03:55,090 --> 00:03:53,780
have ideas if your student in you you

109
00:03:57,520 --> 00:03:55,100
have some ideas you're not sure where to

110
00:03:59,110 --> 00:03:57,530
go this publication is really a great

111
00:04:00,460 --> 00:03:59,120
place for you to start because you can

112
00:04:01,960 --> 00:04:00,470
see what other students have done and

113
00:04:04,720 --> 00:04:01,970

some of the results and how you can

114
00:04:06,009 --> 00:04:04,730
participate and to do that you can we

115
00:04:08,500 --> 00:04:06,019
have copies that are coming out and

116
00:04:11,770 --> 00:04:08,510
print this month but but in the meantime

117
00:04:17,740 --> 00:04:11,780
it's online right now if you go to ww na

118
00:04:20,080 --> 00:04:17,750
sa govt /i SS science you can find

119
00:04:21,610 --> 00:04:20,090
there's a for teachers section and a for

120
00:04:23,500 --> 00:04:21,620
student section and if you click on

121
00:04:25,520 --> 00:04:23,510
those links there's lots of information

122
00:04:27,830 --> 00:04:25,530
there and you can find a

123
00:04:30,710 --> 00:04:27,840
the online version of in terms of PDF

124
00:04:32,000 --> 00:04:30,720
format for this publication okay thank

125
00:04:35,420 --> 00:04:32,010
you you should check it out really get a

126
00:04:37,129 --> 00:04:35,430
good information there um so let's go

127
00:04:38,810 --> 00:04:37,139
ahead and talk about a couple of the

128
00:04:41,360 --> 00:04:38,820
experiments that are taking place this

129
00:04:44,300 --> 00:04:41,370
week and you know they're gonna be

130
00:04:45,830 --> 00:04:44,310
ongoing but one of the things I know is

131
00:04:47,840 --> 00:04:45,840
the meter on and this is something that

132
00:04:49,520 --> 00:04:47,850
Sonny was working with earlier this

133
00:04:51,440 --> 00:04:49,530
morning to deactivate and that's what I

134
00:04:54,710 --> 00:04:51,450
think a neat we have a little picture

135
00:04:56,360 --> 00:04:54,720
here yeah of Meteorology is this little

136
00:04:58,790 --> 00:04:56,370
guy is actually called mock-up and he's

137
00:05:01,030 --> 00:04:58,800
part of the meter on project which is an

138
00:05:02,720 --> 00:05:01,040

ISA European Space Agency sponsored

139
00:05:04,730 --> 00:05:02,730
investigation that'll actually happen

140
00:05:07,310 --> 00:05:04,740
over a period of two to three years on

141
00:05:11,120 --> 00:05:07,320
station and the goal of this meter on

142
00:05:13,100 --> 00:05:11,130
project is to as to check out and and

143
00:05:14,960 --> 00:05:13,110
just basically characterize and

144
00:05:17,180 --> 00:05:14,970
understand human robotic interaction

145
00:05:21,950 --> 00:05:17,190
from when you're on orbit and down to

146
00:05:23,480 --> 00:05:21,960
earth so it's a unique capability to be

147
00:05:24,830 --> 00:05:23,490
able to what study did this week with

148
00:05:26,750 --> 00:05:24,840
which was pretty cool was she actually

149
00:05:29,840 --> 00:05:26,760
controlled this little creature called

150
00:05:31,640 --> 00:05:29,850
mock-up from ISS and this mock-up is

151
00:05:35,030 --> 00:05:31,650
located at a piece of control facility

152
00:05:36,790 --> 00:05:35,040
and in Germany so she actually commanded

153
00:05:39,110 --> 00:05:36,800
it from space and it was pretty exciting

154
00:05:41,990 --> 00:05:39,120
the robot from what I understand is is

155
00:05:43,670 --> 00:05:42,000
on a in an area that's simulated with

156
00:05:44,840 --> 00:05:43,680
you know simulated Mars environment so

157
00:05:48,260 --> 00:05:44,850
what you're doing is simulating

158
00:05:50,960 --> 00:05:48,270
controlling a robot from far far away in

159
00:05:53,300 --> 00:05:50,970
space and so I understand that the

160
00:05:54,620 --> 00:05:53,310
communication hesitation or delay was

161
00:05:56,150 --> 00:05:54,630
only two to three seconds from when

162
00:05:59,080 --> 00:05:56,160
Sonny sent the command when the little

163
00:06:01,490 --> 00:05:59,090

robot did perform her command and then

164
00:06:03,080 --> 00:06:01,500
so really what this is proving out is

165
00:06:05,300 --> 00:06:03,090
something called the late ah Luren sneck

166
00:06:07,850 --> 00:06:05,310
working and so a really critical

167
00:06:10,010 --> 00:06:07,860
component of technology demonstration

168
00:06:12,050 --> 00:06:10,020
from for use on space station is being

169
00:06:14,360 --> 00:06:12,060
able to use technology that is going to

170
00:06:17,090 --> 00:06:14,370
take us beyond low-earth orbit right so

171
00:06:20,060 --> 00:06:17,100
delay tolerant networking is a series of

172
00:06:21,830 --> 00:06:20,070
network communications established for

173
00:06:24,650 --> 00:06:21,840
four networks like space station that

174
00:06:26,750 --> 00:06:24,660
have loss of signal and their d TNS the

175
00:06:29,659 --> 00:06:26,760
late dollar networks on on earth as well

176
00:06:31,430 --> 00:06:29,669
so anytime that we lose signal on orbit

177
00:06:33,830 --> 00:06:31,440
what happens is the little packets of

178
00:06:35,839 --> 00:06:33,840
information gets stored and then can be

179
00:06:37,370 --> 00:06:35,849
I guess you could think projected

180
00:06:39,480 --> 00:06:37,380
forward once the communication is

181
00:06:43,320 --> 00:06:39,490
reestablished so this is a way

182
00:06:45,270 --> 00:06:43,330
for us to test out a very basic human

183
00:06:47,070 --> 00:06:45,280
robot interaction along with the DTN

184
00:06:49,650 --> 00:06:47,080
network and think about how we would

185
00:06:51,749 --> 00:06:49,660
evolve these robotic features out past

186
00:06:53,610 --> 00:06:51,759
just this little mock-up robot now

187
00:06:56,540 --> 00:06:53,620
mock-ups the first but in series over

188
00:06:59,089 --> 00:06:56,550

the next several years isa plans to

189
00:07:02,040 --> 00:06:59,099
progress and all the way up to the

190
00:07:03,839 --> 00:07:02,050
exoskeleton type wearable components

191
00:07:06,360 --> 00:07:03,849
human robotic interaction so basically

192
00:07:09,059 --> 00:07:06,370
you can donna a big arm or a glove and

193
00:07:11,100 --> 00:07:09,069
control it that way versus just computer

194
00:07:14,129 --> 00:07:11,110
and joystick which up on station now

195
00:07:16,230 --> 00:07:14,139
yeah so so I meteor on is really good

196
00:07:17,790 --> 00:07:16,240
example technology demonstration it's

197
00:07:20,999 --> 00:07:17,800
very visible it's really fun to watch

198
00:07:22,559 --> 00:07:21,009
and and we're looking forward to just

199
00:07:24,300 --> 00:07:22,569
just more progression as this one loose

200
00:07:27,390 --> 00:07:24,310
so what she did actually with her

201
00:07:28,920 --> 00:07:27,400
commanding meter on or the mock-up of on

202
00:07:30,839 --> 00:07:28,930
the space station was almost a little

203
00:07:33,480 --> 00:07:30,849
reverse of what we see here because here

204
00:07:35,820 --> 00:07:33,490
the ground teams will often be operating

205
00:07:37,170 --> 00:07:35,830
the robotically you know Exxon station

206
00:07:39,809 --> 00:07:37,180
so that's right of interesting to see

207
00:07:42,990 --> 00:07:39,819
that great so another one we have here i

208
00:07:44,969 --> 00:07:43,000
have a list listen iowa i like um just

209
00:07:46,740 --> 00:07:44,979
because i like fitness and kind of

210
00:07:48,089 --> 00:07:46,750
things i'm going to talk about vo2 max

211
00:07:51,959 --> 00:07:48,099
and i understand it's not really that

212
00:07:54,270 --> 00:07:51,969
fun to do okay pretty strenuous yeah so

213
00:07:56,580 --> 00:07:54,280

maybe Sonny enjoys it because she loves

214
00:07:58,080 --> 00:07:56,590
fitting so much but I don't know so talk

215
00:07:59,850 --> 00:07:58,090
to me a little about vo2 max what

216
00:08:01,320 --> 00:07:59,860
exactly i mean it's it's your measure

217
00:08:04,350 --> 00:08:01,330
the measurement of your aerobic capacity

218
00:08:06,719 --> 00:08:04,360
but tell me why is this important vo2

219
00:08:09,330 --> 00:08:06,729
max it it's a measurement like you said

220
00:08:11,790 --> 00:08:09,340
of aerobic capacity so how how well the

221
00:08:13,890 --> 00:08:11,800
crew members can take up their oxygen as

222
00:08:15,990 --> 00:08:13,900
they're exercising and it's done on

223
00:08:18,300 --> 00:08:16,000
earth to and athletes and anyone who's

224
00:08:20,249 --> 00:08:18,310
interested in and it represents it's a

225
00:08:21,390 --> 00:08:20,259
reflection of your cardio fitness your

226
00:08:23,490 --> 00:08:21,400
credit vascular fitness and your

227
00:08:25,430 --> 00:08:23,500
respiratory fitness and that has huge

228
00:08:28,649 --> 00:08:25,440
impacts on your physical overall

229
00:08:30,089 --> 00:08:28,659
capabilities and so in terms of crew

230
00:08:31,740 --> 00:08:30,099
members the reason why i want to check

231
00:08:34,350 --> 00:08:31,750
it out is because you know when the crew

232
00:08:36,389 --> 00:08:34,360
has to potentially maybe emergency

233
00:08:37,800 --> 00:08:36,399
egress what kind of fitness are they and

234
00:08:40,860 --> 00:08:37,810
what kind of cardio and respiratory

235
00:08:43,800 --> 00:08:40,870
shape are they and can they do it can

236
00:08:45,690 --> 00:08:43,810
they go on long intense uva's if we

237
00:08:48,329 --> 00:08:45,700
should go beyond low-earth orbit and

238
00:08:49,800 --> 00:08:48,339

arrive at a terrestrial location that

239
00:08:51,960 --> 00:08:49,810
they have to get out and start really

240
00:08:54,569 --> 00:08:51,970
manually laboring for a while so

241
00:08:57,689 --> 00:08:54,579
oh so the really cool thing about vo2

242
00:09:00,269 --> 00:08:57,699
max is that it just it directly measures

243
00:09:02,249 --> 00:09:00,279
the crew as they're exercising the crew

244
00:09:04,050 --> 00:09:02,259
breathes into a device and out of advice

245
00:09:05,879 --> 00:09:04,060
as they're really high-intensity

246
00:09:07,710 --> 00:09:05,889
exercising they got to go max that's

247
00:09:09,869 --> 00:09:07,720
what the max stands for so it's pretty

248
00:09:11,819 --> 00:09:09,879
intense and the device that they're

249
00:09:14,189 --> 00:09:11,829
breathing in measures the carbon dioxide

250
00:09:15,329 --> 00:09:14,199
to oxygen ratio that they are taking in

251
00:09:17,550 --> 00:09:15,339
and producing and then their

252
00:09:19,259 --> 00:09:17,560
calculations back on how efficient their

253
00:09:22,259 --> 00:09:19,269
their lungs in their cardiovascular

254
00:09:23,999 --> 00:09:22,269
system are and with vo2 max this week

255
00:09:26,999 --> 00:09:24,009
there was the very last session that was

256
00:09:28,740 --> 00:09:27,009
performed ever so they wrapped up a

257
00:09:31,889 --> 00:09:28,750
study that I think has been ongoing

258
00:09:34,650 --> 00:09:31,899
since 2009 and they needed 12 subjects

259
00:09:36,929 --> 00:09:34,660
to be successful human subjects and

260
00:09:38,850 --> 00:09:36,939
human subjects is valuable and very

261
00:09:40,679 --> 00:09:38,860
sought-after commodity on Space Station

262
00:09:42,059 --> 00:09:40,689
but it's very critical to the human

263
00:09:43,410 --> 00:09:42,069

research program that we understand

264
00:09:45,749 --> 00:09:43,420
these things before we go beyond

265
00:09:47,249 --> 00:09:45,759
low-earth orbit or low Earth orbit so

266
00:09:49,980 --> 00:09:47,259
it's really cool to get the last subject

267
00:09:51,629 --> 00:09:49,990
in now they're they're needed 12 and

268
00:09:53,040 --> 00:09:51,639
they got additional two more for good

269
00:09:54,389 --> 00:09:53,050
measure as a scientist you want to make

270
00:09:56,160 --> 00:09:54,399
sure you cover all your bases you have

271
00:09:57,740 --> 00:09:56,170
as much data as possible so I understand

272
00:10:00,660 --> 00:09:57,750
though before they do this they actually

273
00:10:02,449 --> 00:10:00,670
do their vo2 max measure that before

274
00:10:05,040 --> 00:10:02,459
yeah I leave so they have a baseline

275
00:10:07,740 --> 00:10:05,050
absolutely then and then on a little bit

276
00:10:09,689 --> 00:10:07,750
and then return again on post flight

277
00:10:12,210 --> 00:10:09,699
yeah preflight and a flight and a

278
00:10:13,439 --> 00:10:12,220
non-return to just measure across how

279
00:10:15,569 --> 00:10:13,449
much is lost and then how much they

280
00:10:17,730 --> 00:10:15,579
actually will regain back once they once

281
00:10:19,170 --> 00:10:17,740
they land as well over time how they

282
00:10:21,990 --> 00:10:19,180
compare with some of the the Olympics

283
00:10:25,110 --> 00:10:22,000
and I don't know maybe honey I want to

284
00:10:26,699 --> 00:10:25,120
find that out hi hi numbers okay so the

285
00:10:28,049 --> 00:10:26,709
next one this is kind of a fun one to

286
00:10:32,309 --> 00:10:28,059
and actually we were talking about this

287
00:10:33,840 --> 00:10:32,319
earlier aki was actually just measuring

288
00:10:35,910 --> 00:10:33,850

the water volume of this particular

289
00:10:38,309 --> 00:10:35,920
habitat is called the aquatic habitat

290
00:10:40,470 --> 00:10:38,319
this is kind of exciting good um it's

291
00:10:42,329 --> 00:10:40,480
for fish it's been efficient air base

292
00:10:44,549 --> 00:10:42,339
yeah so talk to me a little about this

293
00:10:46,590 --> 00:10:44,559
yeah this is the fun this is fun stuff

294
00:10:48,090 --> 00:10:46,600
right so so the aquatic habitat was

295
00:10:49,740 --> 00:10:48,100
actually itself the hardware was

296
00:10:51,990 --> 00:10:49,750
launched this summer on an HTV vehicle

297
00:10:53,790 --> 00:10:52,000
and in the meantime the crew have been

298
00:10:55,999 --> 00:10:53,800
working on and off to set up the water

299
00:10:57,869 --> 00:10:56,009
the test the pH get all the bubbles out

300
00:11:00,509 --> 00:10:57,879
surprisingly bubbles were a bad thing to

301
00:11:02,009 --> 00:11:00,519
have in a fluid environment in space set

302
00:11:04,790 --> 00:11:02,019
up the filtration units and get ready

303
00:11:06,980 --> 00:11:04,800
for the fish that just arrived on 32's

304
00:11:09,380 --> 00:11:06,990
and I heard as of this morning the fish

305
00:11:11,810 --> 00:11:09,390
medaka fish have been inserted into the

306
00:11:15,530 --> 00:11:11,820
into the aquarium and so the purpose of

307
00:11:17,600 --> 00:11:15,540
these medaka fish are is to basically

308
00:11:19,910 --> 00:11:17,610
start an investigation that looks at the

309
00:11:22,160 --> 00:11:19,920
development of fish over time and

310
00:11:23,389 --> 00:11:22,170
microgravity the longest time of fish a

311
00:11:26,870 --> 00:11:23,399
particular fish has lived in

312
00:11:30,110 --> 00:11:26,880
microgravity has has been about 16 days

313
00:11:31,759 --> 00:11:30,120

or so on Space Shuttle missions and so

314
00:11:33,860 --> 00:11:31,769
now we're looking at a breeding tank

315
00:11:35,870 --> 00:11:33,870
that can hold fish over three different

316
00:11:37,430 --> 00:11:35,880
generations of reading these fish braid

317
00:11:39,110 --> 00:11:37,440
pretty quickly I think over two to three

318
00:11:41,210 --> 00:11:39,120
weeks and so you can start to see

319
00:11:43,250 --> 00:11:41,220
different generations of development and

320
00:11:44,930 --> 00:11:43,260
if you and you can also look at the

321
00:11:46,699 --> 00:11:44,940
motor microscope you can tag them with

322
00:11:49,160 --> 00:11:46,709
red and green colors that you see on the

323
00:11:51,139 --> 00:11:49,170
screen that drive certain cells to

324
00:11:52,519 --> 00:11:51,149
behave in certain way you can see what's

325
00:11:54,920 --> 00:11:52,529
happening with those certain cells so if

326
00:11:56,240 --> 00:11:54,930
you tagged bone cells red you can see

327
00:11:57,620 --> 00:11:56,250
what's happening to the bone the

328
00:11:58,990 --> 00:11:57,630
skeletal system and these fishes they

329
00:12:01,699 --> 00:11:59,000
evolved in a microgravity environment

330
00:12:03,710 --> 00:12:01,709
crew on orbit the longer they stay they

331
00:12:05,150 --> 00:12:03,720
face muscle and bone loss because of

332
00:12:07,490 --> 00:12:05,160
this use they're not using it as often

333
00:12:09,230 --> 00:12:07,500
as they are on earth and so we want to

334
00:12:10,699 --> 00:12:09,240
understand some of the issues associated

335
00:12:12,500 --> 00:12:10,709
with that the processes that control

336
00:12:14,030 --> 00:12:12,510
that and one way you can do it is

337
00:12:15,980 --> 00:12:14,040
through these fish especially as you

338
00:12:18,110 --> 00:12:15,990

look at their development over time so

339
00:12:21,800 --> 00:12:18,120
the first study will look at the bone

340
00:12:25,970 --> 00:12:21,810
development and and sub sub in a subset

341
00:12:27,740 --> 00:12:25,980
so follow on studies okay I'd sacks

342
00:12:30,050 --> 00:12:27,750
myself in a corner without follow-on

343
00:12:32,060 --> 00:12:30,060
studies will look at other parts other

344
00:12:33,590 --> 00:12:32,070
different physiological processes of the

345
00:12:35,540 --> 00:12:33,600
fish and really cool it would be to see

346
00:12:38,079 --> 00:12:35,550
just how they develop and what they end

347
00:12:40,639 --> 00:12:38,089
up acting like and looking like after

348
00:12:42,050 --> 00:12:40,649
generations in space yeah so it's

349
00:12:44,030 --> 00:12:42,060
exciting though and me and you mentioned

350
00:12:47,269 --> 00:12:44,040
32s so that just arrived so you're

351
00:12:49,160 --> 00:12:47,279
talking about the Soyuz with Kevin Ford

352
00:12:51,139 --> 00:12:49,170
yeah and his and his two cosmonaut

353
00:12:54,170 --> 00:12:51,149
crewmates as well so yeah and they just

354
00:12:56,720 --> 00:12:54,180
arrived this week to fish are now on

355
00:12:59,290 --> 00:12:56,730
station and we call most of them are

356
00:13:03,110 --> 00:12:59,300
inside the aquarium hey ho very cool

357
00:13:06,110 --> 00:13:03,120
okay so um last but not least we have

358
00:13:08,829 --> 00:13:06,120
one other one and Sonny was also working

359
00:13:11,900 --> 00:13:08,839
a little bit with it I think just

360
00:13:14,660 --> 00:13:11,910
replacing it on on station this morning

361
00:13:17,210 --> 00:13:14,670
and this is called a micro 6 yeah

362
00:13:19,250 --> 00:13:17,220
one thing about micro sixes it actually

363
00:13:20,810 --> 00:13:19,260

came up and I want to talk about more

364
00:13:22,400 --> 00:13:20,820
other things this is something that

365
00:13:23,810 --> 00:13:22,410
they're working on this week but it is

366
00:13:25,600 --> 00:13:23,820
one that actually arrived at the

367
00:13:28,910 --> 00:13:25,610
international space station aboard the

368
00:13:31,070 --> 00:13:28,920
first yes we supply cargo craft at

369
00:13:33,230 --> 00:13:31,080
commercial resupply cargo craft the

370
00:13:36,470 --> 00:13:33,240
dragon which is actually set to

371
00:13:39,710 --> 00:13:36,480
splashdown depart from the station and /

372
00:13:41,270 --> 00:13:39,720
down on Sunday but so talk to me first I

373
00:13:43,190 --> 00:13:41,280
want to talk about more science that was

374
00:13:44,390 --> 00:13:43,200
brought up on Dragon but first talk to

375
00:13:45,650 --> 00:13:44,400
me a little about micro sick since

376
00:13:46,880 --> 00:13:45,660
that's something that they have been

377
00:13:49,310 --> 00:13:46,890
working on during this week as well

378
00:13:51,230 --> 00:13:49,320
absolutely micro six it's what's called

379
00:13:54,140 --> 00:13:51,240
a sortie and we haven't had sorties

380
00:13:56,000 --> 00:13:54,150
since retirement a shuttle so a sortie

381
00:13:57,980 --> 00:13:56,010
is an investigation that you can you

382
00:13:59,960 --> 00:13:57,990
launch up on a vehicle activate it

383
00:14:01,700 --> 00:13:59,970
during the time that the vehicle stocked

384
00:14:02,930 --> 00:14:01,710
and then return it right away home and

385
00:14:05,630 --> 00:14:02,940
since we haven't had returned

386
00:14:07,760 --> 00:14:05,640
capabilities we haven't had a sortie in

387
00:14:09,920 --> 00:14:07,770
a long time so micro six is one of two

388
00:14:12,830 --> 00:14:09,930

sorties that are on station right now

389
00:14:15,080 --> 00:14:12,840
and and it's coming home like you said I

390
00:14:16,880 --> 00:14:15,090
saw the video of Sonny packing these

391
00:14:19,940 --> 00:14:16,890
these what's called these gaps these

392
00:14:22,550 --> 00:14:19,950
circular components inside of a return

393
00:14:25,100 --> 00:14:22,560
box that's coming home on SpaceX and

394
00:14:27,050 --> 00:14:25,110
inside of these particular gaps it's

395
00:14:29,840 --> 00:14:27,060
what the hardware is called is a type of

396
00:14:32,510 --> 00:14:29,850
yeast called Candida albicans and in

397
00:14:34,610 --> 00:14:32,520
candida albicans is a normal part of the

398
00:14:36,410 --> 00:14:34,620
micro flora and fauna flora that are

399
00:14:38,510 --> 00:14:36,420
located in your gut and they're there

400
00:14:40,640 --> 00:14:38,520
they're part of who we are but sometimes

401
00:14:43,640 --> 00:14:40,650
if your balance of these microbes inside

402
00:14:46,310 --> 00:14:43,650
your get get off these yeast these type

403
00:14:48,770 --> 00:14:46,320
of yeast can become more active and take

404
00:14:51,140 --> 00:14:48,780
over and cause issues such as yeast

405
00:14:53,240 --> 00:14:51,150
infections and thrust in the mouth and

406
00:14:55,640 --> 00:14:53,250
so these these infections can become an

407
00:14:57,350 --> 00:14:55,650
issue on earth but you can imagine they

408
00:14:59,690 --> 00:14:57,360
could also become an issue in space as

409
00:15:01,730 --> 00:14:59,700
well so we're interested interested in

410
00:15:03,110 --> 00:15:01,740
them in terms of crew health but what's

411
00:15:04,640 --> 00:15:03,120
really cool about the microgravity

412
00:15:07,100 --> 00:15:04,650
environment is that we found with the

413
00:15:09,620 --> 00:15:07,110

way bacteria behave and other microbes

414
00:15:11,930 --> 00:15:09,630
that sometimes certain ones become more

415
00:15:14,560 --> 00:15:11,940
aggressive in space and so they'll up

416
00:15:17,240 --> 00:15:14,570
regulate their kind of nastiness and so

417
00:15:19,340 --> 00:15:17,250
so with that we've been able to identify

418
00:15:21,470 --> 00:15:19,350
types of genes that are involved in

419
00:15:23,360 --> 00:15:21,480
driving the kind of aggressiveness and

420
00:15:25,250 --> 00:15:23,370
if you can identify the types of genes

421
00:15:26,840 --> 00:15:25,260
that are involved in that behavior you

422
00:15:27,680 --> 00:15:26,850
can potentially get to a cure or vaccine

423
00:15:29,660 --> 00:15:27,690
or

424
00:15:31,610 --> 00:15:29,670
regent quicker so that's what's being

425
00:15:33,110 --> 00:15:31,620
done with the micro six investigation

426
00:15:35,150 --> 00:15:33,120
the scientists who are sending this one

427
00:15:36,080 --> 00:15:35,160
up are going to get the samples home and

428
00:15:38,330 --> 00:15:36,090
they're going to look at things like

429
00:15:40,520 --> 00:15:38,340
what genes were upregulated in these

430
00:15:42,200 --> 00:15:40,530
cells as they were incubated on Space

431
00:15:43,550 --> 00:15:42,210
Station in the microgravity environment

432
00:15:45,260 --> 00:15:43,560
and then they might think about what

433
00:15:46,790 --> 00:15:45,270
might cause their activation based on

434
00:15:48,290 --> 00:15:46,800
these genes that that are that are

435
00:15:49,310 --> 00:15:48,300
activated what's causing this what about

436
00:15:51,110 --> 00:15:49,320
the microgravity environment that's

437
00:15:53,210 --> 00:15:51,120
doing it they're also going to look at

438
00:15:55,280 --> 00:15:53,220

their their physical structure because

439
00:15:57,170 --> 00:15:55,290
when sometimes when microbes become

440
00:15:59,030 --> 00:15:57,180
aggressive part of that is that they

441
00:16:00,440 --> 00:15:59,040
create biofilms and they start that's a

442
00:16:01,880 --> 00:16:00,450
good way for them to communicate and

443
00:16:04,700 --> 00:16:01,890
hang out with each other and become more

444
00:16:06,470 --> 00:16:04,710
aggressive and then lastly I understand

445
00:16:09,080 --> 00:16:06,480
that this investigation is also testing

446
00:16:10,820 --> 00:16:09,090
an antifungal treatment so it'll be

447
00:16:13,070 --> 00:16:10,830
interesting to see the response in the

448
00:16:14,810 --> 00:16:13,080
in the cultures to this antifungal

449
00:16:16,910 --> 00:16:14,820
treatment as they were cultured in

450
00:16:19,610 --> 00:16:16,920
microgravity so these guys are going to

451
00:16:21,260 --> 00:16:19,620
come home on SpaceX and and we're

452
00:16:23,000 --> 00:16:21,270
looking forward to those results they're

453
00:16:25,100 --> 00:16:23,010
one of many that are going to come home

454
00:16:27,890 --> 00:16:25,110
about 400 kilograms are coming home on

455
00:16:29,690 --> 00:16:27,900
SpaceX in support of countless

456
00:16:31,010 --> 00:16:29,700
investigations my job right now is to

457
00:16:32,420 --> 00:16:31,020
untangle the countless number of

458
00:16:35,300 --> 00:16:32,430
investigations that are actually coming

459
00:16:37,460 --> 00:16:35,310
home they range from cold stowage

460
00:16:38,870 --> 00:16:37,470
samples which is a new capability for us

461
00:16:40,940 --> 00:16:38,880
as well we haven't had that since

462
00:16:44,120 --> 00:16:40,950
shuttles gone away being able to return

463
00:16:45,980 --> 00:16:44,130

samples that are frozen or cold like the

464
00:16:47,390 --> 00:16:45,990
blood and the urine the critical human

465
00:16:49,760 --> 00:16:47,400
samples the critical plant tissue

466
00:16:51,200 --> 00:16:49,770
samples things that have been up and in

467
00:16:53,570 --> 00:16:51,210
the freezers and Space Station for a

468
00:16:55,850 --> 00:16:53,580
while and need to come home before they

469
00:16:57,500 --> 00:16:55,860
expire so to speak and the cells start

470
00:16:59,090 --> 00:16:57,510
to break down so the science return on

471
00:17:01,580 --> 00:16:59,100
these is critical and that's a big

472
00:17:03,950 --> 00:17:01,590
return capability of SpaceX and we also

473
00:17:07,069 --> 00:17:03,960
have some ambient samples coming home in

474
00:17:09,380 --> 00:17:07,079
terms of materials even some some

475
00:17:10,760 --> 00:17:09,390
ambient samples that don't require that

476
00:17:13,069 --> 00:17:10,770
our human base that don't require

477
00:17:14,960 --> 00:17:13,079
freezing as well we also have physical

478
00:17:16,309 --> 00:17:14,970
sciences capabilities some material

479
00:17:19,250 --> 00:17:16,319
samples that are being returned and even

480
00:17:21,710 --> 00:17:19,260
videotapes of the data that was taken

481
00:17:23,960 --> 00:17:21,720
during investigations on orbit as well

482
00:17:26,090 --> 00:17:23,970
so it's going to be fully loaded we've

483
00:17:29,150 --> 00:17:26,100
maximized our capacity for return on

484
00:17:33,230 --> 00:17:29,160
SpaceX about 200 kilograms went up on

485
00:17:35,690 --> 00:17:33,240
SpaceX to support about oh anyway we

486
00:17:38,060 --> 00:17:35,700
have 165 investigations going on right

487
00:17:40,100 --> 00:17:38,070
now in this six-month period so it

488
00:17:41,390 --> 00:17:40,110

probably doesn't support every single

489
00:17:42,590 --> 00:17:41,400
one of them but a good handful

490
00:17:44,720 --> 00:17:42,600
those are being supported in the up

491
00:17:47,180 --> 00:17:44,730
massive space X and the return is going

492
00:17:48,980 --> 00:17:47,190
to be really an exciting deal not just

493
00:17:51,020 --> 00:17:48,990
this you know the splashdown and being

494
00:17:53,270 --> 00:17:51,030
able the scene of it all and but knowing

495
00:17:56,210 --> 00:17:53,280
that the step is home and it's returned

496
00:17:57,740 --> 00:17:56,220
safely and collecting you know get some

497
00:18:00,050 --> 00:17:57,750
information out of there that could be

498
00:18:02,330 --> 00:18:00,060
useful to us not only in space and our

499
00:18:04,900 --> 00:18:02,340
endeavor there but also here on earth

500
00:18:07,760 --> 00:18:04,910
because some of these a lot of these

501
00:18:10,610 --> 00:18:07,770
studies that we're doing you know on the

502
00:18:12,140 --> 00:18:10,620
station also have application to us here

503
00:18:16,250 --> 00:18:12,150
on earth so I think it's very very

504
00:18:19,420 --> 00:18:16,260
important and as we know we also the

505
00:18:22,580 --> 00:18:19,430
basics dragon is I'm going to be

506
00:18:25,760 --> 00:18:22,590
splashing down on Sunday it departs from

507
00:18:28,790 --> 00:18:25,770
the International Space Station Sunday

508
00:18:31,520 --> 00:18:28,800
morning we all have live coverage for

509
00:18:34,430 --> 00:18:31,530
you here on nasa television of the route

510
00:18:36,620 --> 00:18:34,440
there and birth and the release and that

511
00:18:39,170 --> 00:18:36,630
will start at six a.m. central time

512
00:18:40,820 --> 00:18:39,180
sunday again watch that and then i will

513
00:18:44,320 --> 00:18:40,830

give you will provide some video later

514
00:18:48,710 --> 00:18:44,330
that afternoon of the at the splashdown

515
00:18:49,760 --> 00:18:48,720
and here are some the time matches of

516
00:18:51,710 --> 00:18:49,770
everything that's going to be taking

517
00:18:53,690 --> 00:18:51,720
place again the coverage will begin at

518
00:18:55,970 --> 00:18:53,700
six a.m. central time here on NASA

519
00:18:57,800 --> 00:18:55,980
television with a release scheduled for

520
00:19:03,140 --> 00:18:57,810
eight twenty six a.m. and splashdown

521
00:19:04,550 --> 00:19:03,150
later at 220 p.m. that afternoon Tara

522
00:19:06,710 --> 00:19:04,560
thank you so much for coming here and

523
00:19:08,510 --> 00:19:06,720
giving us this science friday and giving

524
00:19:10,340 --> 00:19:08,520
us a wrap up again like I said it's I

525
00:19:12,860 --> 00:19:10,350
think it's a very important element and

526
00:19:14,750 --> 00:19:12,870
something that you know we too often get

527
00:19:16,700 --> 00:19:14,760
caught up in in the whole you know we

528
00:19:18,800 --> 00:19:16,710
got to keep our home claim and clean and

529
00:19:20,480 --> 00:19:18,810
maintain but there's it is a laboratory

530
00:19:22,190 --> 00:19:20,490
that's right and death so thank you very

531
00:19:26,750 --> 00:19:22,200
much and we also have a website you can

532
00:19:28,940 --> 00:19:26,760
go to at www a govt ass wash station

533
00:19:31,100 --> 00:19:28,950
slice research and you can find all the

534
00:19:32,990 --> 00:19:31,110
information you want yep addenda and

535
00:19:34,490 --> 00:19:33,000
then some yeah thank you again for

536
00:19:35,990 --> 00:19:34,500
coming out thanksss always so fun to