
PAO

1
00:00:04,789 --> 00:00:02,950
all right welcome everybody to the

2
00:00:07,030 --> 00:00:04,799
digital learning network here at nasa's

3
00:00:10,070 --> 00:00:07,040
johnson space center we have endeavour

4
00:00:11,190 --> 00:00:10,080
elementary school um from cocoa florida

5
00:00:13,030 --> 00:00:11,200
uh they're actually going to be

6
00:00:14,950 --> 00:00:13,040
connecting to mission control the

7
00:00:16,710 --> 00:00:14,960
international space station flight

8
00:00:18,950 --> 00:00:16,720
control room uh now i'd like to

9
00:00:21,109 --> 00:00:18,960
introduce uh folks inside mission

10
00:00:25,109 --> 00:00:21,119
control we have public affairs officer

11
00:00:28,310 --> 00:00:25,119
pat ryan and uh miss laura beachy who is

12
00:00:29,830 --> 00:00:28,320
an ethos officer inside mission control

13
00:00:31,669 --> 00:00:29,840

so now let's go ahead and take away go

14
00:00:33,350 --> 00:00:31,679
ahead and miss control and talk to the

15
00:00:35,270 --> 00:00:33,360
students thank you michael

16
00:00:36,790 --> 00:00:35,280
i'm pat ryan with the public affairs

17
00:00:39,190 --> 00:00:36,800
office here at the johnson space center

18
00:00:41,750 --> 00:00:39,200
in houston and with me is a laura beachy

19
00:00:43,910 --> 00:00:41,760
she is one of the ethos officers who is

20
00:00:45,750 --> 00:00:43,920
a member of the flight control team that

21
00:00:47,990 --> 00:00:45,760
is watching over the international space

22
00:00:50,389 --> 00:00:48,000
station as it flies laura explain

23
00:00:52,069 --> 00:00:50,399
quickly for us what an ethos officer

24
00:00:53,990 --> 00:00:52,079
does what parts of the station are you

25
00:00:56,709 --> 00:00:54,000
are you working with so i'm working with

26
00:00:59,189 --> 00:00:56,719
the environmental and thermal aspects we

27
00:01:01,189 --> 00:00:59,199
keep the space station at a

28
00:01:02,709 --> 00:01:01,199
certain pressure and temperature for

29
00:01:04,710 --> 00:01:02,719
crew comfort

30
00:01:06,789 --> 00:01:04,720
all of the equipment that's power

31
00:01:09,429 --> 00:01:06,799
generates heat so we have a water

32
00:01:11,429 --> 00:01:09,439
cooling system that takes the heat away

33
00:01:14,710 --> 00:01:11,439
from all of that equipment

34
00:01:16,710 --> 00:01:14,720
we manage iss emergencies if a fire were

35
00:01:18,310 --> 00:01:16,720
to occur on board or let's say we were

36
00:01:19,910 --> 00:01:18,320
to get hit by a piece of space debris

37
00:01:22,950 --> 00:01:19,920
and start losing pressure

38
00:01:24,630 --> 00:01:22,960

then we help the crew safe themselves

39
00:01:27,429 --> 00:01:24,640
and potentially try to isolate the

40
00:01:29,510 --> 00:01:27,439
leaking module we take care of if a

41
00:01:32,149 --> 00:01:29,520
toxic spill occurs we help lead the crew

42
00:01:34,230 --> 00:01:32,159
to safety and guide the team

43
00:01:36,710 --> 00:01:34,240
on the right steps to take to keep the

44
00:01:39,190 --> 00:01:36,720
crew and the vehicle safe

45
00:01:40,789 --> 00:01:39,200
we we provide for experiments that come

46
00:01:42,630 --> 00:01:40,799
out of marshall we provide them with

47
00:01:44,069 --> 00:01:42,640
smoke detection

48
00:01:45,109 --> 00:01:44,079
access to

49
00:01:46,950 --> 00:01:45,119
space

50
00:01:48,630 --> 00:01:46,960
for any experiments that want the vat to

51
00:01:50,550 --> 00:01:48,640
use the vacuum system

52
00:01:52,310 --> 00:01:50,560
it's a really cool job and we get to do

53
00:01:54,389 --> 00:01:52,320
a lot of coordinating with our ips a lot

54
00:01:56,950 --> 00:01:54,399
of different places uh so there's a good

55
00:02:07,030 --> 00:01:56,960
idea of what laura does here and i think

56
00:02:12,229 --> 00:02:09,029
when the questions breathe on the space

57
00:02:14,309 --> 00:02:12,239
station where does the carbon dioxide

58
00:02:15,910 --> 00:02:14,319
a little louder yeah

59
00:02:17,510 --> 00:02:15,920
i think your question was what happens

60
00:02:19,270 --> 00:02:17,520
to the carbon dioxide when the

61
00:02:20,949 --> 00:02:19,280
astronauts breathe on the station but

62
00:02:22,470 --> 00:02:20,959
yeah a little louder the next will help

63
00:02:24,710 --> 00:02:22,480

us what does happen to the carbon

64
00:02:26,390 --> 00:02:24,720
dioxide so we have two systems that

65
00:02:27,830 --> 00:02:26,400
collect the carbon dioxide there's one

66
00:02:30,390 --> 00:02:27,840
on the russian segment and one in the

67
00:02:32,949 --> 00:02:30,400
u.s on the russian segment we have the

68
00:02:35,110 --> 00:02:32,959
vas duke and on the u.s segment it's we

69
00:02:37,509 --> 00:02:35,120
call it this sidra so both of those

70
00:02:39,030 --> 00:02:37,519
systems can collect all the co2 out of

71
00:02:41,110 --> 00:02:39,040
the air that pass through them and then

72
00:02:42,949 --> 00:02:41,120
we hold on to them in these beds and

73
00:02:46,150 --> 00:02:42,959
then eventually it gets

74
00:02:48,710 --> 00:02:46,160
dumped overboard or on the u.s side we

75
00:02:50,790 --> 00:02:48,720
can actually take some of that co2 back

76
00:02:53,270 --> 00:02:50,800
and recombine it with hydrogen and make

77
00:02:53,280 --> 00:03:04,149
okay next question

78
00:03:06,149 --> 00:03:05,110
um

79
00:03:14,790 --> 00:03:06,159
no

80
00:03:16,630 --> 00:03:14,800
of people so you can see

81
00:03:18,149 --> 00:03:16,640
in in the videos of the control center

82
00:03:21,110 --> 00:03:18,159
there's a lot of people in the room that

83
00:03:23,110 --> 00:03:21,120
we all work together with and then even

84
00:03:25,190 --> 00:03:23,120
at my console there's i have a whole

85
00:03:27,030 --> 00:03:25,200
team of people that we take turns

86
00:03:29,110 --> 00:03:27,040
working at the console and we take turns

87
00:03:31,030 --> 00:03:29,120
you know doing our paperwork and all our

88
00:03:33,190 --> 00:03:31,040

coordination so there in the view you

89
00:03:34,869 --> 00:03:33,200
can see gosh at least

90
00:03:36,710 --> 00:03:34,879
10 or 15 people that are in the room

91
00:03:38,949 --> 00:03:36,720
right now we're all working together for

92
00:03:40,470 --> 00:03:38,959
the same goal and each of those people

93
00:03:43,190 --> 00:03:40,480
that you see that are in this room right

94
00:03:44,869 --> 00:03:43,200
now are working on a different

95
00:03:46,710 --> 00:03:44,879
part of the space station working on

96
00:03:49,270 --> 00:03:46,720
watching different systems and each one

97
00:03:50,869 --> 00:03:49,280
of them has another team of people in

98
00:03:52,229 --> 00:03:50,879
another room in the building somewhere

99
00:04:12,470 --> 00:03:52,239
that are helping them keep up with

100
00:04:20,870 --> 00:04:14,630
atmosphere

101
00:04:22,790 --> 00:04:20,880
so we fly nitrogen and oxygen up to

102
00:04:25,749 --> 00:04:22,800
space station to keep this station

103
00:04:27,749 --> 00:04:25,759
pressurized um and then we also have two

104
00:04:29,670 --> 00:04:27,759
pieces of equipment that can generate

105
00:04:32,230 --> 00:04:29,680
oxygen we've got the electron on the

106
00:04:35,189 --> 00:04:32,240
russian segment and the oga on the u.s

107
00:04:36,790 --> 00:04:35,199
segment so we can constantly make oxygen

108
00:04:38,550 --> 00:04:36,800
and then we've also got this stored

109
00:04:39,350 --> 00:04:38,560
nitrogen that we can add in when we need

110
00:04:40,790 --> 00:04:39,360
to

111
00:04:43,830 --> 00:04:40,800
we can bring

112
00:04:45,590 --> 00:04:43,840
oxygen up but that costs it's heavy and

113
00:04:47,189 --> 00:04:45,600

it costs a lot of money to fly things in

114
00:04:48,790 --> 00:04:47,199
space and that's why we have systems

115
00:05:02,950 --> 00:04:48,800
that can make it out of the things that

116
00:05:02,960 --> 00:05:07,110
how do they take showers in space

117
00:05:11,670 --> 00:05:08,710
so that's a really good question they

118
00:05:13,110 --> 00:05:11,680
don't yeah really they don't

119
00:05:14,550 --> 00:05:13,120
most of the crew members just sort of

120
00:05:16,710 --> 00:05:14,560
have to wipe themselves down with the

121
00:05:18,310 --> 00:05:16,720
cloth so it's just soap and water and

122
00:05:33,510 --> 00:05:18,320
you kind of just have to to wipe

123
00:05:38,550 --> 00:05:36,469
can they sweat in space

124
00:05:41,029 --> 00:05:38,560
yes the crew members can definitely

125
00:05:42,870 --> 00:05:41,039
sweat in space um the sweat acts a

126
00:05:45,029 --> 00:05:42,880
little bit differently um it kind of

127
00:05:46,950 --> 00:05:45,039
will stick to their skin because of all

128
00:05:49,270 --> 00:05:46,960
the surface tension and then can can all

129
00:05:51,270 --> 00:05:49,280
the water can collect and then they have

130
00:05:53,590 --> 00:05:51,280
to wipe themselves off with a towel to

131
00:05:56,230 --> 00:05:53,600
get it and then we actually

132
00:05:58,390 --> 00:05:56,240
take that sweat and collect it and then

133
00:06:15,510 --> 00:05:58,400
we can reprocess it into clean drinking

134
00:06:18,870 --> 00:06:17,189
why is the air taken out of the food

135
00:06:21,590 --> 00:06:18,880
packages

136
00:06:23,510 --> 00:06:21,600
so i i'm not the right person to to

137
00:06:26,230 --> 00:06:23,520
fully answer that question well the

138
00:06:28,870 --> 00:06:26,240

biggest reason is that that's how they

139
00:06:31,029 --> 00:06:28,880
can store it for a long period of time

140
00:06:32,230 --> 00:06:31,039
uh as i was saying before about oxygen

141
00:06:34,950 --> 00:06:32,240
anything that you bring up to the

142
00:06:37,029 --> 00:06:34,960
station it it's difficult to get things

143
00:06:38,710 --> 00:06:37,039
up in space and that includes the food

144
00:06:40,629 --> 00:06:38,720
but food is very important you have to

145
00:06:42,790 --> 00:06:40,639
have it so you

146
00:06:45,510 --> 00:06:42,800
send a lot of food that is made to be

147
00:06:47,270 --> 00:06:45,520
able to to last on board for a long

148
00:06:49,270 --> 00:06:47,280
period of time it can be up there for

149
00:06:51,430 --> 00:06:49,280
years before it's eaten and you take the

150
00:06:53,270 --> 00:06:51,440
air out of those packages so that it

151
00:06:55,189 --> 00:06:53,280
doesn't doesn't spoil while you're

152
00:06:56,950 --> 00:06:55,199
waiting for it to be eaten

153
00:06:58,390 --> 00:06:56,960
there's actually different kinds of food

154
00:07:00,230 --> 00:06:58,400
there's some of it that comes up in

155
00:07:03,029 --> 00:07:00,240
other kinds of packaging and they have a

156
00:07:04,070 --> 00:07:03,039
lot real variety of food but

157
00:07:18,950 --> 00:07:04,080
the

158
00:07:28,550 --> 00:07:20,629
why is it important for humans to

159
00:07:30,550 --> 00:07:28,560
explore space well that's a great

160
00:07:33,189 --> 00:07:30,560
question so

161
00:07:35,830 --> 00:07:33,199
for me personally i i just have this

162
00:07:38,710 --> 00:07:35,840
goal and drive to learn everything and

163
00:07:40,950 --> 00:07:38,720

all we can and i think space exploration

164
00:07:44,150 --> 00:07:40,960
just gives us an opportunity to satisfy

165
00:07:46,070 --> 00:07:44,160
that goal to learn as much as we can

166
00:07:48,150 --> 00:07:46,080
we're learning a lot about the history

167
00:07:50,550 --> 00:07:48,160
of the solar system and the history of

168
00:07:52,790 --> 00:07:50,560
our planet by exploring space

169
00:07:55,110 --> 00:07:52,800
just iss in particular gives us an

170
00:07:57,430 --> 00:07:55,120
opportunity to work with our

171
00:07:59,670 --> 00:07:57,440
international partners for a common goal

172
00:08:00,550 --> 00:07:59,680
and all work together for something

173
00:08:02,230 --> 00:08:00,560
um

174
00:08:04,390 --> 00:08:02,240
and on iss we're doing we're learning a

175
00:08:06,710 --> 00:08:04,400
lot about you know

176
00:08:09,189 --> 00:08:06,720
the way that humans adapt in extreme

177
00:08:11,990 --> 00:08:09,199
environments for the body and the mind

178
00:08:13,350 --> 00:08:12,000
and we're doing a lot of research on

179
00:08:16,070 --> 00:08:13,360
medicine

180
00:08:17,990 --> 00:08:16,080
and how and how things like fire fire

181
00:08:20,950 --> 00:08:18,000
reacts in space and all of that is

182
00:08:23,430 --> 00:08:20,960
helping us to understand just

183
00:08:35,909 --> 00:08:23,440
our bodies and systems more even on

184
00:08:39,750 --> 00:08:37,829
why is there a satellite on your mission

185
00:08:42,550 --> 00:08:39,760
path

186
00:08:47,590 --> 00:08:42,560
are you um which mission which mission

187
00:08:52,630 --> 00:08:50,310
the one in space

188
00:08:54,630 --> 00:08:52,640

is that the expedition 39 patch because

189
00:08:57,110 --> 00:08:54,640
i know that there's a actually there's a

190
00:08:58,790 --> 00:08:57,120
star above the

191
00:09:00,150 --> 00:08:58,800
above the international space station on

192
00:09:01,590 --> 00:09:00,160
that patch

193
00:09:04,310 --> 00:09:01,600
patches has

194
00:09:06,150 --> 00:09:04,320
all the crew members names and it has

195
00:09:07,910 --> 00:09:06,160
an image of the station and the soyuz

196
00:09:10,470 --> 00:09:07,920
vehicle that takes them there and that

197
00:09:12,550 --> 00:09:10,480
star that's above it on that patch is

198
00:09:14,070 --> 00:09:12,560
meant to represent explorations of the

199
00:09:15,910 --> 00:09:14,080
future uh

200
00:09:17,990 --> 00:09:15,920
as laura was saying before we want to

201
00:09:19,430 --> 00:09:18,000
explore space to go find out what's out

202
00:09:22,470 --> 00:09:19,440
there and there are going to be future

203
00:09:24,310 --> 00:09:22,480
explorations that go beyond this space

204
00:09:25,910 --> 00:09:24,320
station go beyond

205
00:09:28,550 --> 00:09:25,920
they're going to go back to the moon and

206
00:09:30,230 --> 00:09:28,560
go to asteroids and go to mars and go to

207
00:09:31,750 --> 00:09:30,240
other places and all of that is

208
00:09:41,350 --> 00:09:31,760
represented by that star on the

209
00:09:41,360 --> 00:09:45,590
how can oxygen start a fire in space

210
00:09:49,910 --> 00:09:46,790
so

211
00:09:52,310 --> 00:09:49,920
oxygen itself won't start the fire it

212
00:09:54,470 --> 00:09:52,320
also needs so we need the oxygen we need

213
00:09:56,790 --> 00:09:54,480

some kind of ignition source like a

214
00:09:58,630 --> 00:09:56,800
spark or a match um and then we need

215
00:10:00,870 --> 00:09:58,640
something to fuel the fire that would

216
00:10:02,550 --> 00:10:00,880
actually burn like some clothing or what

217
00:10:05,269 --> 00:10:02,560
would act as as your wood in your

218
00:10:08,150 --> 00:10:05,279
fireplace on the ground so you need all

219
00:10:10,389 --> 00:10:08,160
those three pieces i mean we take a lot

220
00:10:12,550 --> 00:10:10,399
of precautions on board to make sure

221
00:10:14,230 --> 00:10:12,560
that those three legs of the fire

222
00:10:15,590 --> 00:10:14,240
triangle

223
00:10:18,150 --> 00:10:15,600
don't won't

224
00:10:20,790 --> 00:10:18,160
combine yeah and start a fire and then

225
00:10:23,269 --> 00:10:20,800
our our fire fighting tactics involve

226
00:10:25,590 --> 00:10:23,279
trying to eliminate one of those three

227
00:10:27,670 --> 00:10:25,600
legs we can take out the oxygen source

228
00:10:29,430 --> 00:10:27,680
or we try to try to eliminate the spark

229
00:10:30,389 --> 00:10:29,440
or take away whatever it is that's

230
00:10:32,630 --> 00:10:30,399
burning

231
00:10:34,389 --> 00:10:32,640
oxygen could be a part of a fire in

232
00:10:36,870 --> 00:10:34,399
space just like it could be a part of a

233
00:10:38,310 --> 00:10:36,880
fire on earth but it doesn't burn just

234
00:10:40,150 --> 00:10:38,320
all by itself it has to be something

235
00:10:41,590 --> 00:10:40,160
else there that's right and we we take a

236
00:10:42,949 --> 00:10:41,600
lot of precautions with the materials

237
00:10:44,870 --> 00:10:42,959
that we fly on board to make sure that

238
00:10:46,710 --> 00:10:44,880

they're not fire propagating and

239
00:10:48,150 --> 00:10:46,720
managing our oxygen levels that they

240
00:10:52,710 --> 00:10:48,160
don't get too high

241
00:10:52,720 --> 00:10:59,190
why do astronauts train in space

242
00:11:03,030 --> 00:11:00,710
you want to ask the question again i

243
00:11:04,790 --> 00:11:03,040
mean training water

244
00:11:08,550 --> 00:11:04,800
that's trained in water

245
00:11:11,509 --> 00:11:08,560
yeah so um the crew trains at the nbl

246
00:11:14,550 --> 00:11:11,519
down here in houston and um the training

247
00:11:17,990 --> 00:11:14,560
underwater gives them an opportunity to

248
00:11:21,030 --> 00:11:18,000
experience as close to weightlessness as

249
00:11:22,949 --> 00:11:21,040
possible so we've got this huge above

250
00:11:25,590 --> 00:11:22,959
ground pool for them to get in that they

251
00:11:28,230 --> 00:11:25,600
have enough space to put on their suits

252
00:11:30,150 --> 00:11:28,240
we've got a mock-up of iss under the

253
00:11:31,509 --> 00:11:30,160
water and so

254
00:11:34,069 --> 00:11:31,519
that's just that's as close as we can

255
00:11:35,910 --> 00:11:34,079
get here on earth where we have gravity

256
00:11:37,990 --> 00:11:35,920
to the feeling like there's no gravity

257
00:11:40,389 --> 00:11:38,000
it's a way to to make it feel like

258
00:11:42,150 --> 00:11:40,399
you're weightless for an extended period

259
00:11:44,310 --> 00:11:42,160
of time we have another way to make

260
00:11:47,269 --> 00:11:44,320
people feel weightless for really short

261
00:11:50,069 --> 00:11:47,279
periods of time when they fly on an

262
00:11:51,670 --> 00:11:50,079
airplane that does a parabola and at the

263
00:11:53,430 --> 00:11:51,680

top of that arc

264
00:11:55,190 --> 00:11:53,440
people inside it experience

265
00:11:57,750 --> 00:11:55,200
weightlessness but only for about 20

266
00:11:59,350 --> 00:11:57,760
seconds at a time or so under water they

267
00:12:04,790 --> 00:11:59,360
can feel pretty much like they're

268
00:12:11,350 --> 00:12:06,870
why does air pressure change when door

269
00:12:17,269 --> 00:12:15,509
so when when a door lock is opened

270
00:12:19,350 --> 00:12:17,279
i think maybe what you're referring to

271
00:12:22,550 --> 00:12:19,360
is that there could be two different

272
00:12:24,870 --> 00:12:22,560
pressures on either side of a door so if

273
00:12:28,629 --> 00:12:24,880
a lock is open then you

274
00:12:30,470 --> 00:12:28,639
allow a pathway for air to pass through

275
00:12:32,710 --> 00:12:30,480
and then for the two

276
00:12:34,470 --> 00:12:32,720
pressures on either side to equalize so

277
00:12:36,550 --> 00:12:34,480
then you feel

278
00:12:37,990 --> 00:12:36,560
that feeling of of

279
00:12:39,430 --> 00:12:38,000
maybe if you're on the side of the door

280
00:12:40,949 --> 00:12:39,440
at the higher pressure

281
00:12:42,550 --> 00:12:40,959
you lose a little bit of pressure

282
00:12:44,230 --> 00:12:42,560
because it'll go down to the lower side

283
00:12:47,750 --> 00:12:44,240
or if you're on the side with the lower

284
00:12:49,590 --> 00:12:47,760
maybe you you feel that that burst or

285
00:12:51,110 --> 00:12:49,600
that moment where the pressure is

286
00:12:52,870 --> 00:12:51,120
equalizing and your pressure on your

287
00:12:55,190 --> 00:12:52,880
side is getting a little higher

288
00:12:58,069 --> 00:12:55,200

but naturally the the air pressure is

289
00:12:59,910 --> 00:12:58,079
going to seek a lower it's going to it's

290
00:13:01,590 --> 00:12:59,920
going to try to even out okay i got the

291
00:13:02,949 --> 00:13:01,600
right scientific word for it

292
00:13:04,550 --> 00:13:02,959
equalize it's going to try to get

293
00:13:06,470 --> 00:13:04,560
equalized so if you have high and low

294
00:13:08,069 --> 00:13:06,480
pressures at this at the same place

295
00:13:13,269 --> 00:13:08,079
they're going to try to get back to the

296
00:13:18,550 --> 00:13:14,949
what does internal

297
00:13:22,310 --> 00:13:20,550
and so i think you might mean in

298
00:13:24,710 --> 00:13:22,320
reference to what i do the internal

299
00:13:27,190 --> 00:13:24,720
thermal control system so for the

300
00:13:28,790 --> 00:13:27,200
internal thermal control system um

301
00:13:30,550 --> 00:13:28,800
that's that system where we have all

302
00:13:33,030 --> 00:13:30,560
these water loops running through the

303
00:13:34,710 --> 00:13:33,040
space station and we collect the heat

304
00:13:36,550 --> 00:13:34,720
from all the batteries and all the

305
00:13:38,470 --> 00:13:36,560
equipment that generates heat on the

306
00:13:39,990 --> 00:13:38,480
space station so we collect it in our

307
00:13:42,949 --> 00:13:40,000
water loop

308
00:13:44,790 --> 00:13:42,959
and then it comes to

309
00:13:47,910 --> 00:13:44,800
we call it an interface heat exchanger

310
00:13:50,629 --> 00:13:47,920
but so our warmed up water lines will

311
00:13:52,949 --> 00:13:50,639
then flow past really cold ammonia lines

312
00:13:55,269 --> 00:13:52,959
and we transfer our heat to the

313
00:14:06,069 --> 00:13:55,279

external thermal control system where it

314
00:14:13,030 --> 00:14:11,509
how do you stay warm or cold in space

315
00:14:14,150 --> 00:14:13,040
well it helps to be cool to start with

316
00:14:17,110 --> 00:14:14,160
it does

317
00:14:18,629 --> 00:14:17,120
and then on the space station

318
00:14:20,470 --> 00:14:18,639
there's actually air conditioners in a

319
00:14:21,910 --> 00:14:20,480
lot of the modules just like

320
00:14:23,110 --> 00:14:21,920
you have at home

321
00:14:24,310 --> 00:14:23,120
well of course they're set up a little

322
00:14:27,990 --> 00:14:24,320
bit differently

323
00:14:29,829 --> 00:14:28,000
but so the the space station itself

324
00:14:31,829 --> 00:14:29,839
there's a lot of heat from the equipment

325
00:14:33,590 --> 00:14:31,839
that's running from the crew members

326
00:14:35,030 --> 00:14:33,600
just body heat

327
00:14:37,509 --> 00:14:35,040
and then we run

328
00:14:39,030 --> 00:14:37,519
our air conditioners and and collect all

329
00:14:41,189 --> 00:14:39,040
that heat to keep things cool for the

330
00:14:43,269 --> 00:14:41,199
astronauts and they can call down and

331
00:14:45,189 --> 00:14:43,279
tell us you know hey i'm too cold can

332
00:14:46,949 --> 00:14:45,199
you make it warmer in here um then we

333
00:14:48,629 --> 00:14:46,959
can we can send some commands and adjust

334
00:14:49,910 --> 00:14:48,639
things for them or they can you know

335
00:14:55,829 --> 00:14:49,920
tell us they're too

336
00:14:55,839 --> 00:15:01,030
what do you enjoy most about your job

337
00:15:05,750 --> 00:15:01,990
so

338
00:15:07,110 --> 00:15:05,760

for me i i love the opportunities to

339
00:15:08,870 --> 00:15:07,120
coordinate with the international

340
00:15:11,670 --> 00:15:08,880
partners so we work with the russians

341
00:15:13,750 --> 00:15:11,680
the europeans the japanese every day

342
00:15:15,189 --> 00:15:13,760
i really like that

343
00:15:17,750 --> 00:15:15,199
i also definitely work with some of the

344
00:15:20,310 --> 00:15:17,760
smartest people in the world and we get

345
00:15:22,870 --> 00:15:20,320
opportunities to be really creative and

346
00:15:24,949 --> 00:15:22,880
innovative if something breaks then we

347
00:15:27,110 --> 00:15:24,959
can all get together and

348
00:15:30,150 --> 00:15:27,120
you know think about the the coolest

349
00:15:32,230 --> 00:15:30,160
ideas to fix it and really we get a lot

350
00:15:34,310 --> 00:15:32,240
of opportunities to think outside the

351
00:15:36,389 --> 00:15:34,320
box and use

352
00:15:40,069 --> 00:15:36,399
equipment for things that it wasn't

353
00:15:42,150 --> 00:15:40,079
necessarily designed or created to do

354
00:15:44,389 --> 00:15:42,160
i just i really love that it's a really

355
00:15:45,829 --> 00:15:44,399
fun job it's really dynamic so it keeps

356
00:15:50,230 --> 00:15:45,839
you on your toes it's constantly

357
00:15:55,430 --> 00:15:52,629
who or what inspired you to pursue your

358
00:15:58,629 --> 00:15:55,440
job

359
00:15:59,829 --> 00:15:58,639
so when i was in high school i had a

360
00:16:04,389 --> 00:15:59,839
really

361
00:16:05,590 --> 00:16:04,399
and he used

362
00:16:10,150 --> 00:16:05,600
a lot of

363
00:16:11,350 --> 00:16:10,160

class to show us how fun physics could

364
00:16:14,949 --> 00:16:11,360
really be

365
00:16:18,310 --> 00:16:14,959
so i opted to pursue physics in college

366
00:16:20,710 --> 00:16:18,320
and while there i developed a strong

367
00:16:22,870 --> 00:16:20,720
interest in biophysics and also

368
00:16:25,269 --> 00:16:22,880
astrophysics so after graduating there

369
00:16:28,069 --> 00:16:25,279
was really no place else to go so here

370
00:16:30,310 --> 00:16:28,079
at nasa i can explore my you know my

371
00:16:33,189 --> 00:16:30,320
astrophysics interests and then for me

372
00:16:34,790 --> 00:16:33,199
ethos was kind of the perfect place to

373
00:16:40,550 --> 00:16:34,800
to learn a little bit about biophysics

374
00:16:45,189 --> 00:16:44,389
what is the average temperature in space

375
00:16:47,910 --> 00:16:45,199
so

376
00:16:49,430 --> 00:16:47,920
space can get really really cold and and

377
00:16:53,430 --> 00:16:49,440
really really hot i've heard it can get

378
00:16:55,670 --> 00:16:53,440
to negative 450 fahrenheit and up to 450

379
00:16:57,829 --> 00:16:55,680
or 350 fahrenheit

380
00:17:00,949 --> 00:16:57,839
so it really depends on

381
00:17:03,910 --> 00:17:00,959
where you are relative to the sun and

382
00:17:05,590 --> 00:17:03,920
whether or not the sun is shining on you

383
00:17:07,909 --> 00:17:05,600
at that moment we've even heard

384
00:17:11,350 --> 00:17:07,919
astronauts who are outside the station

385
00:17:13,750 --> 00:17:11,360
during spacewalks uh talk about how

386
00:17:16,470 --> 00:17:13,760
they can feel a dramatic change just as

387
00:17:20,230 --> 00:17:16,480
the station moves from in the sun to in

388
00:17:22,630 --> 00:17:20,240

the shade from from sun uh in sun to sun

389
00:17:24,630 --> 00:17:22,640
down where sunrise again in the morning

390
00:17:26,710 --> 00:17:24,640
and they have to have heaters in their

391
00:17:28,309 --> 00:17:26,720
gloves and then their suits turned on to

392
00:17:29,430 --> 00:17:28,319
it to compensate for because they can

393
00:17:31,029 --> 00:17:29,440
change

394
00:17:33,350 --> 00:17:31,039
temperature outside around them can

395
00:17:35,029 --> 00:17:33,360
change by about 600 degrees in a matter

396
00:17:36,390 --> 00:17:35,039
of just a few minutes yeah i've heard

397
00:17:37,990 --> 00:17:36,400
that too even with like with their eyes

398
00:17:41,669 --> 00:17:38,000
closed and their visors down you can

399
00:17:47,430 --> 00:17:44,150
how much does sunlight affect the

400
00:17:49,190 --> 00:17:47,440
temperature in space

401
00:17:50,870 --> 00:17:49,200
yeah so that's a great follow-up

402
00:17:53,190 --> 00:17:50,880
question because the the sunlight is

403
00:17:55,350 --> 00:17:53,200
really what drastically makes an impact

404
00:17:58,070 --> 00:17:55,360
and and is really the only the only way

405
00:18:03,190 --> 00:17:58,080
to warm up the space around around the

406
00:18:09,029 --> 00:18:05,590
how much of waste water are you able to

407
00:18:14,310 --> 00:18:10,549
how much wastewater will be able to

408
00:18:16,549 --> 00:18:14,320
reuse ah yes so i've heard a stat that

409
00:18:18,950 --> 00:18:16,559
we are able to recycle

410
00:18:20,630 --> 00:18:18,960
more than 90 of our wastewater now and

411
00:18:23,190 --> 00:18:20,640
that's with all of our our systems

412
00:18:26,630 --> 00:18:23,200
operating properly so we have a system

413
00:18:28,390 --> 00:18:26,640

called the regenerative eclipse system

414
00:18:30,950 --> 00:18:28,400
and so we can collect

415
00:18:31,830 --> 00:18:30,960
urine and reprocess it into really clean

416
00:18:34,070 --> 00:18:31,840
water

417
00:18:36,630 --> 00:18:34,080
that sweat that we talked about earlier

418
00:18:39,750 --> 00:18:36,640
uh the carbon dioxide to make more water

419
00:18:40,830 --> 00:18:39,760
and make more solutions in the air

420
00:18:43,669 --> 00:18:40,840
bring out their

421
00:18:45,750 --> 00:18:43,679
towels yep everything yeah and that's

422
00:18:47,830 --> 00:18:45,760
really important um because we we end up

423
00:18:50,390 --> 00:18:47,840
saving a lot of money so we don't have

424
00:18:53,029 --> 00:18:50,400
to to fly up water

425
00:18:55,110 --> 00:18:53,039
and we save a lot of space the space is

426
00:18:57,110 --> 00:18:55,120
very limited on the space station so

427
00:18:58,549 --> 00:18:57,120
that way we don't have to store it and

428
00:19:00,630 --> 00:18:58,559
we can put other more important pieces

429
00:19:02,870 --> 00:19:00,640
of equipment there instead and and just

430
00:19:03,909 --> 00:19:02,880
as important for future missions when

431
00:19:05,909 --> 00:19:03,919
we're going to go

432
00:19:07,990 --> 00:19:05,919
far away from earth and can't keep

433
00:19:10,789 --> 00:19:08,000
sending up supplies we have to come up

434
00:19:13,029 --> 00:19:10,799
with a system in which we can reuse all

435
00:19:15,110 --> 00:19:13,039
the things that are there

436
00:19:16,950 --> 00:19:15,120
if a ship that's on its way to mars or

437
00:19:18,710 --> 00:19:16,960
some place can't wait for another

438
00:19:20,070 --> 00:19:18,720

shipment of supplies from earth so

439
00:19:21,909 --> 00:19:20,080
that's why we're developing these

440
00:19:24,870 --> 00:19:21,919
systems on the space station in order to

441
00:19:27,110 --> 00:19:24,880
be able to have a way to keep astronauts

442
00:19:32,710 --> 00:19:27,120
safe and and well supplied when they uh

443
00:19:38,630 --> 00:19:34,789
how much water do they use

444
00:19:42,310 --> 00:19:38,640
on the iss each day

445
00:19:44,710 --> 00:19:42,320
so we use a lot of water um as an ethos

446
00:19:46,870 --> 00:19:44,720
we try to take into account that on

447
00:19:49,590 --> 00:19:46,880
average a crew member may drink about

448
00:19:50,630 --> 00:19:49,600
two and a half liters of water a day

449
00:19:52,789 --> 00:19:50,640
so that's

450
00:19:54,710 --> 00:19:52,799
more than one of your soda bottles on

451
00:19:57,430 --> 00:19:54,720
the ground um

452
00:19:59,590 --> 00:19:57,440
so with with six people two and a half

453
00:20:03,750 --> 00:19:59,600
liters of water a day let's see that's

454
00:20:06,310 --> 00:20:03,760
what 12 15 15 liters of water per day

455
00:20:08,070 --> 00:20:06,320
and then that's split between the u.s

456
00:20:10,149 --> 00:20:08,080
crew members and and the russian crew

457
00:20:11,510 --> 00:20:10,159
members so we work together to to make

458
00:20:13,029 --> 00:20:11,520
sure that all of our crew members have

459
00:20:16,149 --> 00:20:13,039
enough water

460
00:20:19,750 --> 00:20:16,159
always but in and then as you said

461
00:20:22,390 --> 00:20:19,760
90 percent or so of that 15 liters gets

462
00:20:25,430 --> 00:20:22,400
reused gets recycled so we don't have to

463
00:20:27,430 --> 00:20:25,440

supply a new 15 liters every day right

464
00:20:29,750 --> 00:20:27,440
that's right we just got a new

465
00:20:32,149 --> 00:20:29,760
experiment on board the the veggie

466
00:20:34,789 --> 00:20:32,159
payload where the crew is growing

467
00:20:36,149 --> 00:20:34,799
food so now we're having to start

468
00:20:42,070 --> 00:20:36,159
accounting for a little bit more water

469
00:20:46,630 --> 00:20:44,070
we have one more question if it's okay

470
00:20:50,630 --> 00:20:48,470
if we have access to all these

471
00:20:53,350 --> 00:20:50,640
technologies in space

472
00:20:55,590 --> 00:20:53,360
to transfer waste into water and things

473
00:20:58,070 --> 00:20:55,600
like that why don't we use them more on

474
00:21:02,390 --> 00:21:00,710
well we do use them on earth

475
00:21:03,750 --> 00:21:02,400
some of the special systems that have

476
00:21:06,310 --> 00:21:03,760
been developed on the international

477
00:21:08,390 --> 00:21:06,320
space station are in use on earth right

478
00:21:10,310 --> 00:21:08,400
now uh it's a

479
00:21:12,710 --> 00:21:10,320
different philosophical and in some

480
00:21:14,870 --> 00:21:12,720
cases a political question in different

481
00:21:17,909 --> 00:21:14,880
areas of the world about why they don't

482
00:21:19,270 --> 00:21:17,919
use them more than they do right now

483
00:21:21,510 --> 00:21:19,280
but in fact

484
00:21:23,270 --> 00:21:21,520
the the water purification system that

485
00:21:25,750 --> 00:21:23,280
laura was talking about

486
00:21:27,909 --> 00:21:25,760
is in use in in places on the earth

487
00:21:30,390 --> 00:21:27,919
right now and especially

488
00:21:31,830 --> 00:21:30,400

because it's a fairly compact system has

489
00:21:34,390 --> 00:21:31,840
been able to be

490
00:21:36,710 --> 00:21:34,400
distributed in areas of the world where

491
00:21:39,190 --> 00:21:36,720
they don't have and can't afford their

492
00:21:41,510 --> 00:21:39,200
own systems so that the station

493
00:21:43,350 --> 00:21:41,520
science and the station technology is

494
00:21:45,510 --> 00:21:43,360
being used to help people on earth right

495
00:21:47,029 --> 00:21:45,520
now yep that's right and some of our

496
00:21:48,470 --> 00:21:47,039
systems kind of do

497
00:21:50,710 --> 00:21:48,480
what our earth's atmosphere does in

498
00:21:53,270 --> 00:21:50,720
terms of evaporation and then it rains

499
00:21:55,830 --> 00:21:53,280
and condensation and we we package that

500
00:21:58,870 --> 00:21:55,840
into a small box

501
00:22:02,149 --> 00:21:58,880
and to make it do what our huge earth

502
00:22:05,029 --> 00:22:03,590
all right and this is michael here at

503
00:22:07,190 --> 00:22:05,039
the digital learning network again i

504
00:22:09,190 --> 00:22:07,200
want to thank you guys for joining us

505
00:22:10,549 --> 00:22:09,200
today and uh

506
00:22:12,549 --> 00:22:10,559
endeavour elementary school would you

507
00:22:16,630 --> 00:22:12,559
like to say bye to the folks at mission

508
00:22:19,350 --> 00:22:18,230
all right thanks