STATION LIFE

1
00:01:24,200 --> 00:00:52,980
you

2
00:01:27,940 --> 00:01:25,720
so

3
00:01:30,490 --> 00:01:27,950
spacecraft to guide strategies for

4
00:01:38,610 --> 00:01:30,500
extinguishing accidental fires the new

5
00:01:44,380 --> 00:01:41,590
sapphire is contained inside a 2 foot by

6
00:01:47,770 --> 00:01:44,390
three foot by four foot box that

7
00:01:50,620 --> 00:01:47,780
consists of an avionics Bay containing

8
00:01:52,780 --> 00:01:50,630
the computer and instrumentation and a

9
00:01:55,210 --> 00:01:52,790
flow duct which holds the material to be

10
00:01:57,430 --> 00:01:55,220
burned this will be carried aboard

11
00:01:59,740 --> 00:01:57,440
orbitals Cygnus spacecraft during

12
00:02:02,770 --> 00:01:59,750
scheduled cargo resupply mission to the

13
00:02:05,650 --> 00:02:02,780

international space station once at the

14
00:02:07,990 --> 00:02:05,660
station sapphire will remain on Cygnus

15
00:02:10,840 --> 00:02:08,000
until all the supplies are offloaded by

16
00:02:12,940 --> 00:02:10,850
the crew of astronauts once supplies are

17
00:02:16,810 --> 00:02:12,950
offloaded and replaced with trash from

18
00:02:19,270 --> 00:02:16,820
the ISS Cygnus will depart once reaching

19
00:02:21,340 --> 00:02:19,280
a safe distance from the station nasa

20
00:02:22,660 --> 00:02:21,350
glenn r engineers working from orbitals

21
00:02:25,240 --> 00:02:22,670
mission control center in Dulles

22
00:02:27,550 --> 00:02:25,250
Virginia will remotely turn on the

23
00:02:29,949 --> 00:02:27,560
experiment Cygnus will then be put into

24
00:02:31,840 --> 00:02:29,959
free drift while the Sapphire experiment

25
00:02:34,900 --> 00:02:31,850
is conducted up to two and one-half

26
00:02:36,910 --> 00:02:34,910
hours the experiments sensors and video

27
00:02:39,580 --> 00:02:36,920
cameras are designed to capture valuable

28
00:02:42,160 --> 00:02:39,590
data and imagery documenting large-scale

29
00:02:44,890 --> 00:02:42,170
flame spread and material flammability

30
00:02:47,170 --> 00:02:44,900
limits at the conclusion of the sapphire

31
00:02:49,449 --> 00:02:47,180
experiment the Cygnus vehicle will

32
00:02:51,220 --> 00:02:49,459
remain in orbit while the data captured

33
00:02:52,570 --> 00:02:51,230
is down linked to several ground

34
00:02:55,060 --> 00:02:52,580
stations around the globe and

35
00:02:58,240 --> 00:02:55,070
transferred to NASA Glenn's scientists

36
00:03:00,580 --> 00:02:58,250
and engineers in Cleveland when downlink

37
00:03:01,900 --> 00:03:00,590
is complete Cygnus will then begin its

38
00:03:04,690 --> 00:03:01,910

re-entry through the Earth's atmosphere

39
00:03:30,640 --> 00:03:04,700
where it will burn up over the Pacific

40
00:03:35,240 --> 00:03:33,410
serious what are we gonna do today well

41
00:03:37,550 --> 00:03:35,250
today I well first I have to start off

42
00:03:40,010 --> 00:03:37,560
by saying that today I'm with someone

43
00:03:43,040 --> 00:03:40,020
who needs no introduction cuz you've all

44
00:03:45,830 --> 00:03:43,050
seen him before he's the guy we love dr.

45
00:03:48,800 --> 00:03:45,840
Don Pettit welcome to station life ah

46
00:03:50,390 --> 00:03:48,810
it's it's good to be back on station I

47
00:03:52,430 --> 00:03:50,400
guess we're really not back on station

48
00:03:55,580 --> 00:03:52,440
but it's good to be here on station life

49
00:03:58,370 --> 00:03:55,590
thank you yes and I am just beyond

50
00:04:00,230 --> 00:03:58,380
excited today because Don is not only

51
00:04:02,450 --> 00:04:00,240
one of the most fantastic astronauts

52
00:04:05,570 --> 00:04:02,460
ever he's like one of my favorite people

53
00:04:08,120 --> 00:04:05,580
so this is a landmark event in station

54
00:04:11,360 --> 00:04:08,130
life history that we have with us and we

55
00:04:13,699 --> 00:04:11,370
both studied chemistry in college and

56
00:04:18,140 --> 00:04:13,709
look right lastly I've got my periodic

57
00:04:22,340 --> 00:04:18,150
table shirt on okay coffee cup coffee

58
00:04:24,350 --> 00:04:22,350
cups so we have the first generation the

59
00:04:27,680 --> 00:04:24,360
second generation and both of these have

60
00:04:30,320 --> 00:04:27,690
been on station this is a food grade

61
00:04:36,650 --> 00:04:30,330
plastic so it meets flight sick you know

62
00:04:39,770 --> 00:04:36,660
that here is a variant of the second

63
00:04:42,230 --> 00:04:39,780

generation what's that for well this

64
00:04:44,810 --> 00:04:42,240
this is for Earth because this is slip

65
00:04:48,050 --> 00:04:44,820
cast out of porcelain and it has this

66
00:04:51,710 --> 00:04:48,060
really cool smooth look that shows off

67
00:04:55,280 --> 00:04:51,720
the form and the beauty of the design of

68
00:04:57,500 --> 00:04:55,290
this oh yeah but but porcelain is break

69
00:04:59,390 --> 00:04:57,510
a bowl you can make these sharp shards

70
00:05:00,680 --> 00:04:59,400
and in a weightless environment that

71
00:05:03,110 --> 00:05:00,690
could float around that you get in your

72
00:05:04,370 --> 00:05:03,120
eye or even worse you could inhale one

73
00:05:06,590 --> 00:05:04,380
of these Said's get them in your lungs

74
00:05:09,050 --> 00:05:06,600
so so we can't take the porcelain ones

75
00:05:10,610 --> 00:05:09,060
on orbit but they're really cool looking

76
00:05:15,200 --> 00:05:10,620
and we can use them here on earth

77
00:05:17,150 --> 00:05:15,210
awesome shall we shall we hmm notice

78
00:05:25,420 --> 00:05:17,160
your nose goes right in the kite and you

79
00:05:30,260 --> 00:05:25,430
get this burst of java java yeah mmm

80
00:05:31,939 --> 00:05:30,270
that's a good mix of cream yeah and oh

81
00:05:34,670 --> 00:05:31,949
let me read what it says it says space

82
00:05:37,879 --> 00:05:34,680
cup and that's the official name of this

83
00:05:39,860 --> 00:05:37,889
that's the OP nom for the space station

84
00:05:41,629 --> 00:05:39,870
the official sanction space station

85
00:05:43,279 --> 00:05:41,639
experiment it's the name of the

86
00:05:46,070 --> 00:05:43,289
experiment is capillary beverage

87
00:05:49,670 --> 00:05:46,080
capillary beverage and the name of the

88
00:05:51,140 --> 00:05:49,680

cup is space cot and and then they're

89
00:05:53,480 --> 00:05:51,150
the words on it says capillary

90
00:05:56,240 --> 00:05:53,490
experiments international space station

91
00:06:00,050 --> 00:05:56,250
that is skeleton people this would be a

92
00:06:06,230 --> 00:06:00,060
collector's item for sure I was seeking

93
00:06:09,980 --> 00:06:06,240
trace if you look at everything that i

94
00:06:12,020 --> 00:06:09,990
will have accomplished in my life in 400

95
00:06:14,570 --> 00:06:12,030
years nobody even remember that I was

96
00:06:17,350 --> 00:06:14,580
even walked the surface of Earth or

97
00:06:20,990 --> 00:06:17,360
floated around in space however I

98
00:06:23,330 --> 00:06:21,000
predicted in 400 years people living and

99
00:06:25,610 --> 00:06:23,340
working in space will be drinking

100
00:06:28,520 --> 00:06:25,620
sipping and toasting out of cups based

101
00:06:31,250 --> 00:06:28,530
on my design yes and and you will

102
00:06:33,290 --> 00:06:31,260
they'll be you'll be legend you are

103
00:06:35,570 --> 00:06:33,300
talking about they won't remember

104
00:06:39,439 --> 00:06:35,580
anything like do you remember who

105
00:06:43,010 --> 00:06:39,449
invented fire but the end and who

106
00:06:45,110 --> 00:06:43,020
invented the wheel you see nobody needs

107
00:06:46,760 --> 00:06:45,120
to remember who did these Saints the

108
00:06:48,680 --> 00:06:46,770
important thing is you got to know how

109
00:06:51,620 --> 00:06:48,690
to build a wheel you got to know how to

110
00:06:53,779 --> 00:06:51,630
control fire and then your civilization

111
00:06:55,969 --> 00:06:53,789
could take off and in space you don't

112
00:06:58,339 --> 00:06:55,979
need to remember who messed with the

113
00:07:00,290 --> 00:06:58,349

surface chemistry to make these but you

114
00:07:02,480 --> 00:07:00,300
need to know that you know how to make

115
00:07:07,550 --> 00:07:02,490
them and that you can use them and it

116
00:07:10,100 --> 00:07:07,560
will help build the Civil civilized

117
00:07:11,629 --> 00:07:10,110
nature of human beings interacting with

118
00:07:15,230 --> 00:07:11,639
each other when you're in a weightless

119
00:07:17,830 --> 00:07:15,240
environment well done I've just had so

120
00:07:20,230 --> 00:07:17,840
much fun having you on station life

121
00:07:22,810 --> 00:07:20,240
sharing your invention and your passion

122
00:07:24,250 --> 00:07:22,820
for science and and coffee and bringing

123
00:07:27,270 --> 00:07:24,260
people together and I think you've done

124
00:07:31,390 --> 00:07:27,280
that in a number of ways but none so

125
00:07:42,820 --> 00:07:31,400
illustrative as the space cop I call

126
00:07:45,400 --> 00:07:42,830
this a wrap me to a normal coffee cup or

127
00:07:46,450 --> 00:07:45,410
a normal open container just simply

128
00:07:49,930 --> 00:07:46,460
won't work in a weightless environment

129
00:07:52,180 --> 00:07:49,940
because the liquid will be in the bottom

130
00:07:54,159 --> 00:07:52,190
of the cup and you tip it up and it

131
00:07:56,500 --> 00:07:54,169
still stays in the bottom of the cup if

132
00:07:59,500 --> 00:07:56,510
you move it around to violently it'll

133
00:08:01,480 --> 00:07:59,510
all splash out make a big mess so we end

134
00:08:03,730 --> 00:08:01,490
up having to drink our beverages through

135
00:08:06,010 --> 00:08:03,740
a straw from a bag makes you feel like

136
00:08:09,070 --> 00:08:06,020
you're a big insect sucking the juices

137
00:08:11,920 --> 00:08:09,080
from another insect I wanted to see if I

138
00:08:13,840 --> 00:08:11,930

could figure out a way to have an open

139
00:08:16,180 --> 00:08:13,850
container cup in a weightless

140
00:08:19,150 --> 00:08:16,190
environment which would allow you to

141
00:08:20,650 --> 00:08:19,160
drink your tea and your coffee in a

142
00:08:23,070 --> 00:08:20,660
manner that's commensurate with how

143
00:08:26,620 --> 00:08:23,080
people drink their beverages on earth

144
00:08:30,310 --> 00:08:26,630
taking some of my surface chemistry that

145
00:08:32,589 --> 00:08:30,320
I learned in college I devised a cup

146
00:08:33,730 --> 00:08:32,599
with a special shape the cross section

147
00:08:37,630 --> 00:08:33,740
looks kind of like an airplane wing

148
00:08:40,839 --> 00:08:37,640
where it has a cusp and the cusp will

149
00:08:42,519 --> 00:08:40,849
allow channel flow so the liquid from

150
00:08:44,650 --> 00:08:42,529
the bottom of the cup will float up and

151
00:08:47,650 --> 00:08:44,660
just park itself right next to the rim

152
00:08:50,590 --> 00:08:47,660
and then you can drink it and it allows

153
00:08:52,960 --> 00:08:50,600
a crew to share a communal beverage you

154
00:08:54,790 --> 00:08:52,970
could share tea maybe you just come in

155
00:08:56,710 --> 00:08:54,800
from doing a space walk or something you

156
00:08:59,650 --> 00:08:56,720
want to celebrate a little bit if you

157
00:09:01,780 --> 00:08:59,660
have a real cup an open container it's

158
00:09:04,090 --> 00:09:01,790
so ingrained in human beings its own

159
00:09:06,530 --> 00:09:04,100
greened in culture it adds back the

160
00:09:46,090 --> 00:09:06,540
dimension of what it's like to be a huge

161
00:09:52,040 --> 00:09:49,759
okay flames and fluids are acting a

162
00:09:54,470 --> 00:09:52,050
little differently but that's not all

163
00:09:57,350 --> 00:09:54,480

take a look at how microgravity affects

164
00:10:02,389 --> 00:09:57,360
colloids magnetic fluids and smart

165
00:10:04,040 --> 00:10:02,399
materials if you have a smartphone take

166
00:10:06,730 --> 00:10:04,050
it out and run your fingers along the

167
00:10:09,710 --> 00:10:06,740
glass surface it's cool to the touch

168
00:10:12,530 --> 00:10:09,720
incredibly thin and strong and almost

169
00:10:16,370 --> 00:10:12,540
impervious to scratching you're now in

170
00:10:18,769 --> 00:10:16,380
contact with a smart material smart

171
00:10:20,870 --> 00:10:18,779
materials don't occur naturally instead

172
00:10:22,519 --> 00:10:20,880
they're designed by engineers working at

173
00:10:24,889 --> 00:10:22,529
the molecular level to produce

174
00:10:28,699 --> 00:10:24,899
substances made to order for futuristic

175
00:10:30,710 --> 00:10:28,709
applications the Corning Gorilla Glass

176
00:10:33,590 --> 00:10:30,720
that overlays the displays of many

177
00:10:36,259 --> 00:10:33,600
smartphones is a great example it gets

178
00:10:38,030 --> 00:10:36,269
its toughness in part from fat potassium

179
00:10:40,990 --> 00:10:38,040
ions stuffed into the empty spaces

180
00:10:43,430 --> 00:10:41,000
between old fashioned glass molecules

181
00:10:45,769 --> 00:10:43,440
when the molten glass cools during

182
00:10:48,259 --> 00:10:45,779
manufacturing densed pack molecules

183
00:10:49,790 --> 00:10:48,269
solidify into a transparent armor that

184
00:10:53,930 --> 00:10:49,800
gives Gorilla Glass as extraordinary

185
00:10:55,340 --> 00:10:53,940
properties around the world designers

186
00:10:57,980 --> 00:10:55,350
are working on other smart materials

187
00:11:00,680 --> 00:10:57,990
such as alloys that can change shape on

188
00:11:02,960 --> 00:11:00,690

demand plastics that heal themselves

189
00:11:05,240 --> 00:11:02,970
when ruptured and fluids that obey

190
00:11:08,060 --> 00:11:05,250
magnetic commands to flow or stiffen

191
00:11:09,860 --> 00:11:08,070
under computer control one of the

192
00:11:11,990 --> 00:11:09,870
greatest challenges in creating a smart

193
00:11:15,620 --> 00:11:12,000
material is arranging the molecules

194
00:11:18,680 --> 00:11:15,630
they're so small we want to create a new

195
00:11:21,319 --> 00:11:18,690
class of materials beyond smarts we need

196
00:11:23,350 --> 00:11:21,329
genius materials materials that arrange

197
00:11:25,600 --> 00:11:23,360
themselves

198
00:11:27,850 --> 00:11:25,610
the research to accomplish this is

199
00:11:30,970 --> 00:11:27,860
already underway on the International

200
00:11:32,889 --> 00:11:30,980
Space Station dr. first is the principal

201
00:11:35,980 --> 00:11:32,899
investigator of an experiment called in

202
00:11:38,710 --> 00:11:35,990
space three in the micro gravity of

203
00:11:41,079 --> 00:11:38,720
Earth orbit vials of fluid mixed with

204
00:11:42,790 --> 00:11:41,089
very small colloidal particles about a

205
00:11:46,180 --> 00:11:42,800
millionth of a meter in diameter are

206
00:11:48,009 --> 00:11:46,190
exposed to magnetic fields magnetism can

207
00:11:50,440 --> 00:11:48,019
be switched on and off again very

208
00:11:52,509 --> 00:11:50,450
rapidly this jostles the particles

209
00:11:54,670 --> 00:11:52,519
causing them to bump together and self

210
00:11:56,769 --> 00:11:54,680
assemble in the microscopic structures

211
00:11:58,900 --> 00:11:56,779
these structures can be very difficult

212
00:12:00,840 --> 00:11:58,910
to predict even using cutting-edge

213
00:12:03,250 --> 00:12:00,850

models running on supercomputers

214
00:12:05,500 --> 00:12:03,260
astronauts enjoy watching this process

215
00:12:07,480 --> 00:12:05,510
in action through microscopes because

216
00:12:09,370 --> 00:12:07,490
the samples are backlit by a green lamp

217
00:12:13,509 --> 00:12:09,380
they sometimes call it the green blob

218
00:12:15,910 --> 00:12:13,519
experiment first recently won an award

219
00:12:19,090 --> 00:12:15,920
from the American astronautical Society

220
00:12:21,250 --> 00:12:19,100
for his work on in space 3 just by

221
00:12:23,170 --> 00:12:21,260
toggling a magnetic field we're learning

222
00:12:24,940 --> 00:12:23,180
how to take many kinds of microscopic

223
00:12:26,769 --> 00:12:24,950
building blocks and get them to

224
00:12:29,120 --> 00:12:26,779
spontaneously form interesting

225
00:12:31,530 --> 00:12:29,130
structures

226
00:12:33,420 --> 00:12:31,540
recently observers have seen the

227
00:12:36,660 --> 00:12:33,430
colloidal particles forming long fibrous

228
00:12:38,250 --> 00:12:36,670
jeans first speculates that these could

229
00:12:41,880 --> 00:12:38,260
lead to materials that conduct heat or

230
00:12:43,650 --> 00:12:41,890
electricity in only one direction the

231
00:12:45,330 --> 00:12:43,660
experiment has also yielded crystalline

232
00:12:48,180 --> 00:12:45,340
structures that the team is just

233
00:12:49,890 --> 00:12:48,190
beginning to investigate the fluids

234
00:12:52,260 --> 00:12:49,900
underlying these tests are themselves

235
00:12:55,410 --> 00:12:52,270
very smart they're called

236
00:12:57,390 --> 00:12:55,420
magnetorheological or mr fluids because

237
00:13:00,390 --> 00:12:57,400
they harden or change shape when they

238
00:13:02,910 --> 00:13:00,400

feel a magnetic field if you own a

239
00:13:05,040 --> 00:13:02,920
sports or luxury car you might have Mr

240
00:13:07,020 --> 00:13:05,050
fluids in your shock absorbers the

241
00:13:08,970 --> 00:13:07,030
stiffness of magnetic shocks can be

242
00:13:11,160 --> 00:13:08,980
electronically adjusted thousands of

243
00:13:14,010 --> 00:13:11,170
times per second providing a remarkably

244
00:13:15,600 --> 00:13:14,020
smooth ride similar but more powerful

245
00:13:18,060 --> 00:13:15,610
devices have been installed at japan's

246
00:13:21,540 --> 00:13:18,070
national museum of emerging science and

247
00:13:23,580 --> 00:13:21,550
china's daunting Lake bridge they're

248
00:13:26,880 --> 00:13:23,590
there to counteract vibrations caused by

249
00:13:28,710 --> 00:13:26,890
earthquakes and gusts of wind some

250
00:13:30,540 --> 00:13:28,720
researchers have speculated that mr

251
00:13:32,550 --> 00:13:30,550
fluids might one day flow through the

252
00:13:35,130 --> 00:13:32,560
actuators and hydraulic dampers of

253
00:13:38,010 --> 00:13:35,140
robots moving artificial joints and

254
00:13:39,630 --> 00:13:38,020
limbs in life like fashion scientists

255
00:13:41,120 --> 00:13:39,640
and researchers are using these fluids

256
00:13:44,040 --> 00:13:41,130
as a laboratory for studying

257
00:13:46,260 --> 00:13:44,050
self-assembly mr fluids are by

258
00:13:48,510 --> 00:13:46,270
definition responsive to the magnetic

259
00:13:51,090 --> 00:13:48,520
nudging that sets self-assembly in

260
00:13:53,070 --> 00:13:51,100
motion furthermore in space the

261
00:13:55,500 --> 00:13:53,080
particles don't sediment out due to

262
00:13:58,560 --> 00:13:55,510
gravity we can study the full 3d

263
00:14:00,810 --> 00:13:58,570

evolution of the material burying the

264
00:14:02,550 --> 00:14:00,820
shape of the colloidal particles the

265
00:14:04,590 --> 00:14:02,560
cadence of magnetic toggling the

266
00:14:06,360 --> 00:14:04,600
temperature of the fluid and other

267
00:14:07,950 --> 00:14:06,370
factors will allow researchers and

268
00:14:10,980 --> 00:14:07,960
astronauts to further explore the

269
00:14:13,140 --> 00:14:10,990
frontiers of self-assembly touch the

270
00:14:16,130 --> 00:14:13,150
surface of your smartphone again that's

271
00:14:18,120 --> 00:14:16,140
just the beginning as you can see our

272
00:14:20,610 --> 00:14:18,130
International Space Station is an

273
00:14:23,100 --> 00:14:20,620
unprecedented research platform in space

274
00:14:24,810 --> 00:14:23,110
allowing researchers and scientists to

275
00:14:27,540 --> 00:14:24,820
conduct experiments that can't be done

276
00:14:29,520 --> 00:14:27,550
anywhere else this work off the earth

277
00:14:31,759 --> 00:14:29,530
will lead to a better understanding of

278
00:14:34,100 --> 00:14:31,769
the fundamentals of combustion

279
00:14:36,859 --> 00:14:34,110
attention and colloids in the absence of

280
00:14:38,600 --> 00:14:36,869
gravity benefiting us by helping us to

281
00:14:41,210 --> 00:14:38,610
make more efficient combustion engines

282
00:14:44,210 --> 00:14:41,220
better portable medical diagnostics

283
00:14:46,429 --> 00:14:44,220
stronger lighter alloys medicines with

284
00:14:48,100 --> 00:14:46,439
the longer shelf life and buildings that

285
00:14:50,090 --> 00:14:48,110
are more resistant to earthquakes

286
00:14:52,220 --> 00:14:50,100
research on the International Space

287
00:14:54,679 --> 00:14:52,230
Station continues to improve life here

288
00:14:56,359 --> 00:14:54,689

on the earth be sure to stay in touch

289
00:14:58,759 --> 00:14:56,369
and follow us on Facebook and Twitter

290
00:15:00,259 --> 00:14:58,769
for the latest research news and don't

291
00:15:02,539 --> 00:15:00,269
forget to download our app on your

292
00:15:37,740 --> 00:15:02,549
mobile device until next time we're

293
00:15:43,680 --> 00:15:39,960
oh my joke Aspen our toes turn out of

294
00:15:46,730 --> 00:15:43,690
customs kampala y es nuestra vida vh

295
00:15:50,810 --> 00:15:48,440
no I can you stand amazed at the nearest

296
00:15:54,350 --> 00:15:50,820
amo con toda esta vida en esta muerto en

297
00:15:58,160 --> 00:15:54,360
esta bajo de queda la chequera bozos

298
00:16:05,860 --> 00:15:58,170
Naruto stanza agrigento cosmos similar

299
00:16:14,950 --> 00:16:08,660
the Duchess motion at least and restored

300
00:16:22,190 --> 00:16:18,350
of course musica de sumidero crew the

301
00:16:24,740 --> 00:16:22,200
pan-american is depressed Rastra ranch

302
00:16:27,870 --> 00:16:24,750
in which a stencil yet reporters is an

303
00:16:35,369 --> 00:16:27,880
artistic element for dancing

304
00:16:40,409 --> 00:16:37,589
a chest of Nippon Arabic Morris

305
00:16:43,319 --> 00:16:40,419
advice kid period or daca aveti am acad

306
00:16:54,920 --> 00:16:43,329
see circumstances negationism compatible

307
00:16:54,930 --> 00:17:05,300
I'm sure she ain't news to him clay

308
00:17:05,310 --> 00:17:38,040
I leg skripochka yeah cusp enough

309
00:17:45,460 --> 00:17:43,090
bueno estamos de marte fisicamente no no

310
00:17:47,410 --> 00:17:45,470
Lola pero SI tenemos robust a cannon

311
00:18:00,640 --> 00:17:47,420
marte tenemos la madre y tenemos a

312
00:18:15,790 --> 00:18:00,650
curiosity mismo en nasa TV Lola yo yo la

313
00:18:15,800 --> 00:18:28,340

you

314
00:18:32,790 --> 00:18:30,960
good morning welcome to NASA

315
00:18:37,710 --> 00:18:32,800
headquarters ladies and gentlemen thank

316
00:18:41,629 --> 00:18:37,720
you for joining us tune in on the air