1
00:00:45,490 --> 00:00:11,990
you

2
00:00:49,819 --> 00:00:47,930
Space Shuttle coffee or this is the red

3
00:00:52,099 --> 00:00:49,829
jewel the blue shift is sleeping right

4
00:00:55,670 --> 00:00:52,109
now but we thought we would bring you

5
00:00:58,009 --> 00:00:55,680
some highlights of our date today I will

6
00:01:00,319 --> 00:00:58,019
videotape where we explain three

7
00:01:01,910 --> 00:01:00,329
different science experiments we have

8
00:01:03,920 --> 00:01:01,920
going on and then we've got a little bit

9
00:01:06,800 --> 00:01:03,930
ministration about what we eat aboard

10
00:01:08,359 --> 00:01:06,810
the space shuttle Columbia okay well

11
00:01:10,730 --> 00:01:08,369
they they even let the commander back in

12
00:01:12,230 --> 00:01:10,740
the space level once in a while for some

13
00:01:14,359 --> 00:01:12,240

of the more supports them it's this

14
00:01:17,300 --> 00:01:14,369
isn't some extent but it's one that has

15
00:01:19,700 --> 00:01:17,310
a lot of problems called H HDTV ahead

16
00:01:21,499 --> 00:01:19,710
tell diffusion test cell this is one of

17
00:01:23,649 --> 00:01:21,509
several protein crystal growth

18
00:01:26,180 --> 00:01:23,659
experiments that we have all born

19
00:01:27,800 --> 00:01:26,190
protein crystal growth lives of many

20
00:01:29,210 --> 00:01:27,810
settlements that there's a boaster

21
00:01:31,969 --> 00:01:29,220
because it's one of the most property

22
00:01:34,340 --> 00:01:31,979
and bec security research that we've

23
00:01:38,180 --> 00:01:34,350
identified to date is zero gravity we

24
00:01:40,249 --> 00:01:38,190
could grow bigger more perfect crystal

25
00:01:41,870 --> 00:01:40,259
those crystals of all kinds and as a

26
00:01:43,669 --> 00:01:41,880
result we can bring those back home and

27
00:01:46,130 --> 00:01:43,679
the scientists can study them where the

28
00:01:48,680 --> 00:01:46,140
next ray diffraction microscope and

29
00:01:50,240 --> 00:01:48,690
really understand the character of what

30
00:01:52,660 --> 00:01:50,250
they're trying to study for example this

31
00:01:54,740 --> 00:01:52,670
flight some of the proteins that we're

32
00:01:57,380 --> 00:01:54,750
crystals that we are growing might help

33
00:02:00,469 --> 00:01:57,390
out the development for remedies for

34
00:02:02,080 --> 00:02:00,479
arthritis some antibacterial drugs are

35
00:02:04,670 --> 00:02:02,090
on the horizon that we're studying the

36
00:02:08,300 --> 00:02:04,680
sexy actually shows where the test cells

37
00:02:10,190 --> 00:02:08,310
that that we're growing on the htpc

38
00:02:13,789 --> 00:02:10,200

that's located back there the Spacelab

39
00:02:16,460 --> 00:02:13,799
wall the crystals look like flexor

40
00:02:18,949 --> 00:02:16,470
drains of fans that to somebody like me

41
00:02:21,039 --> 00:02:18,959
who's perhaps by then 3 verse don't miss

42
00:02:23,569 --> 00:02:21,049
we have eight cells in each chamber

43
00:02:28,220 --> 00:02:23,579
breather selves actually have stuff

44
00:02:29,449 --> 00:02:28,230
growing at the current time I spent part

45
00:02:32,750 --> 00:02:29,459
of my day working on the large

46
00:02:34,880 --> 00:02:32,760
isothermal furnace called LIF it's a

47
00:02:37,220 --> 00:02:34,890
facility provided by the japanese space

48
00:02:38,690 --> 00:02:37,230
agency we've blown it on this is the

49
00:02:40,400 --> 00:02:38,700
fourth time it's been on a space lab

50
00:02:42,440 --> 00:02:40,410
flight and the third time i've had the

51
00:02:45,110 --> 00:02:42,450
privilege of flying women to large

52
00:02:46,699 --> 00:02:45,120
furnace we can put samples proximately

53
00:02:49,220 --> 00:02:46,709
eight inches long and about one inch in

54
00:02:52,969 --> 00:02:49,230
diameter and i'm pulling one of them out

55
00:02:54,319 --> 00:02:52,979
of the furnace right now we fly a 25

56
00:02:55,909 --> 00:02:54,329
days on our mission and we're just about

57
00:02:58,370 --> 00:02:55,919
done processing them i think we've done

58
00:03:00,440 --> 00:02:58,380
23 or 24 at this point

59
00:03:01,820 --> 00:03:00,450
and it was pretty much automated

60
00:03:04,610 --> 00:03:01,830
facility some wonder what you're going

61
00:03:06,470 --> 00:03:04,620
to see in the space station a job up

62
00:03:07,970 --> 00:03:06,480
here is basically to exchange samples

63
00:03:09,650 --> 00:03:07,980

we're here I'm taking one of them outs

64
00:03:12,080 --> 00:03:09,660
and I'm getting another one to put back

65
00:03:13,400 --> 00:03:12,090
into to start its processing there's a

66
00:03:15,020 --> 00:03:13,410
lot of ground commanding during the

67
00:03:17,750 --> 00:03:15,030
whole processing run of these

68
00:03:19,310 --> 00:03:17,760
experiments and doesn't involve on too

69
00:03:24,430 --> 00:03:19,320
much so it's a good way to get science

70
00:03:26,300 --> 00:03:24,440
with the minimal crew time on our part

71
00:03:28,220 --> 00:03:26,310
experiments were connecting right now a

72
00:03:31,040 --> 00:03:28,230
diffusion type experiments were looking

73
00:03:33,170 --> 00:03:31,050
at atomic motion and how accurate ease

74
00:03:36,650 --> 00:03:33,180
move around inside of a crystal

75
00:03:38,150 --> 00:03:36,660
structure and this is a sample of ten or

76
00:03:41,450 --> 00:03:38,160
in other ones we've been flying or led

77
00:03:45,020 --> 00:03:41,460
to in telluride or gallium and purity

78
00:03:46,400 --> 00:03:45,030
such as a tin and antimony in germanium

79
00:03:48,350 --> 00:03:46,410
these have great technological

80
00:03:52,340 --> 00:03:48,360
importance for electronics and infrared

81
00:03:53,810 --> 00:03:52,350
detectors one thing we always get asked

82
00:03:55,550 --> 00:03:53,820
is how we bring these little fires in

83
00:03:57,740 --> 00:03:55,560
space that's what I'm demonstrating here

84
00:04:00,560 --> 00:03:57,750
how do we do it safely the public to

85
00:04:02,060 --> 00:04:00,570
watch the experiment the chamber this is

86
00:04:05,030 --> 00:04:02,070
a gap that's the bottle would hold the

87
00:04:07,130 --> 00:04:05,040
gas we install that into the experiment

88
00:04:09,170 --> 00:04:07,140

that is released into the combustion

89
00:04:11,870 --> 00:04:09,180
chamber which is behind all those pieces

90
00:04:13,490 --> 00:04:11,880
of equipment in the front then that

91
00:04:15,610 --> 00:04:13,500
valve there is used after the experiment

92
00:04:18,440 --> 00:04:15,620
is over to vent the gas is to space

93
00:04:20,390 --> 00:04:18,450
during the experiment recorte de pues

94
00:04:23,600 --> 00:04:20,400
with four cameras which are pointing to

95
00:04:25,400 --> 00:04:23,610
here and don't have computers of course

96
00:04:26,780 --> 00:04:25,410
to monitor what's going on so the

97
00:04:29,150 --> 00:04:26,790
combustion is completely contained

98
00:04:30,800 --> 00:04:29,160
within the experiment this experiment

99
00:04:33,230 --> 00:04:30,810
the principal investigator is compliant

100
00:04:35,090 --> 00:04:33,240
Corbin Williams at the University of

101
00:04:38,030 --> 00:04:35,100
California San Diego this is a drop with

102
00:04:40,280 --> 00:04:38,040
warming between the needles the related

103
00:04:41,990 --> 00:04:40,290
ignites and burns this particular burden

104
00:04:43,640 --> 00:04:42,000
has a fibrous support but both of the

105
00:04:45,500 --> 00:04:43,650
droplets will burn we want the fiber

106
00:04:47,570 --> 00:04:45,510
support you can see the flame and the

107
00:04:49,340 --> 00:04:47,580
soup formation in the middle this tells

108
00:04:52,160 --> 00:04:49,350
us a tremendous amount about single

109
00:04:53,210 --> 00:04:52,170
droplet combustion okay let's put a mr.

110
00:04:54,980 --> 00:04:53,220
we're going to show you a little bit

111
00:04:58,040 --> 00:04:54,990
about the foods that we eat aboard the

112
00:05:00,590 --> 00:04:58,050
space shuttle so actually five different

113
00:05:03,290 --> 00:05:00,600

types of foods and the first thing I'd

114
00:05:11,110 --> 00:05:03,300
like to show you is a typical m.o.e a

115
00:05:17,120 --> 00:05:14,120
and Tim to show you what it's like

116
00:05:19,700 --> 00:05:17,130
basically it has been cooked so much

117
00:05:23,150 --> 00:05:19,710
said all the bacteria to taken out of it

118
00:05:25,250 --> 00:05:23,160
and Marines can take this into the field

119
00:05:27,050 --> 00:05:25,260
and eat it at any time that last three

120
00:05:28,940 --> 00:05:27,060
years years and years so that's one type

121
00:05:31,730 --> 00:05:28,950
of food that we flyers these normal

122
00:05:33,830 --> 00:05:31,740
stabilized there is worthy irradiated

123
00:05:35,870 --> 00:05:33,840
which is a similar technique but this

124
00:05:38,360 --> 00:05:35,880
isn't done for the military specifically

125
00:05:40,430 --> 00:05:38,370
it's done for us and the bacteria has

126
00:05:42,140 --> 00:05:40,440
once again been taken out of it and so

127
00:05:46,310 --> 00:05:42,150
it's eat right from the bag and this is

128
00:05:49,130 --> 00:05:46,320
a beefsteak Don Scott rehydrate about

129
00:05:52,940 --> 00:05:49,140
food this is a shrimp cocktail in its

130
00:05:57,890 --> 00:05:52,950
pre rehydrated form and what we do is we

131
00:06:01,100 --> 00:05:57,900
have water and here trip cocktail one of

132
00:06:04,490 --> 00:06:01,110
everybody's favorite drag can't forget

133
00:06:07,970 --> 00:06:04,500
the vegetables is that creamed spinach a

134
00:06:12,170 --> 00:06:07,980
which is also rehydrate able we have

135
00:06:14,240 --> 00:06:12,180
intermediate moisture foods which tim

136
00:06:20,030 --> 00:06:14,250
has dried apricots we just keep that

137
00:06:22,550 --> 00:06:20,040
straight out of the bag and dancer Apple

138
00:06:25,670 --> 00:06:22,560

can be considered any different number

139
00:06:27,920 --> 00:06:25,680
of items if Greg wants to pull something

140
00:06:30,140 --> 00:06:27,930
out with a spin you can see Arthur it

141
00:06:33,020 --> 00:06:30,150
sticks to the spin without getting all

142
00:06:41,980 --> 00:06:33,030
over the place every day David is

143
00:06:50,270 --> 00:06:47,690
everybody loves the drinks that we drink

144
00:06:53,360 --> 00:06:50,280
companies Silverbacks and they also have

145
00:06:56,210 --> 00:06:53,370
a tip where we can have water and shake

146
00:06:57,830 --> 00:06:56,220
about this case it's anxious and look

147
00:07:00,470 --> 00:06:57,840
something like this when it's got water

148
00:07:02,540 --> 00:07:00,480
in it in it and we had a straw and it

149
00:07:05,020 --> 00:07:02,550
drinks right on up the people on the

150
00:07:07,100 --> 00:07:05,030
ground that we've got our fingers and

151
00:07:08,750 --> 00:07:07,110
nutritionists decide whether or not we

152
00:07:10,550 --> 00:07:08,760
have the proper number calories and

153
00:07:13,100 --> 00:07:10,560
whether all the minerals are represented

154
00:07:14,720 --> 00:07:13,110
and if not don't recommend things that

155
00:07:16,610 --> 00:07:14,730
we add but of course once we get up here

156
00:07:21,350 --> 00:07:16,620
it's just up to us to eat our vegetables

157
00:08:41,049 --> 00:07:21,360
every day back at where dr. Troy

158
00:08:51,289 --> 00:08:49,999
place I'm Huntsville for Greg okay yes

159
00:08:52,489 --> 00:08:51,299
Greg just want to give you a heads up

160
00:09:02,090 --> 00:08:52,499
that it looks like we'll be ready to

161
00:09:03,470 --> 00:09:02,100
continue cm-1 at step Juliet at 2259 so

162
00:09:08,449 --> 00:09:03,480
that's right this is the one that needs

163
00:10:09,250 --> 00:09:08,459

that downlinking time to write that is

164
00:10:13,850 --> 00:10:11,900
Janice we have a special guest Alabama

165
00:10:15,800 --> 00:10:13,860
Senator Jeff Sessions here with us today

166
00:10:18,020 --> 00:10:15,810
at the Space Lab mission operations

167
00:10:20,840 --> 00:10:18,030
control center in huntsville he would

168
00:10:28,670 --> 00:10:20,850
like to speak with you senator sessions

169
00:10:37,930 --> 00:10:28,680
please go ahead good morning how are you

170
00:10:41,000 --> 00:10:37,940
doing we're real proud of that I

171
00:10:43,040 --> 00:10:41,010
Alabaman at all of America is it's not a

172
00:10:45,890 --> 00:10:43,050
great time I think we're moving into one

173
00:10:48,050 --> 00:10:45,900
of the finest centuries that will have

174
00:10:49,760 --> 00:10:48,060
in terms of Technology and advancement

175
00:10:51,920 --> 00:10:49,770
and you represent the very best this

176
00:10:53,270 --> 00:10:51,930
country has to offer it we're just very

177
00:10:58,160 --> 00:10:53,280
pleased with the work that you're doing

178
00:10:59,630 --> 00:10:58,170
and how well things are going thanks a

179
00:11:01,460 --> 00:10:59,640
lot we feel very privileged to be up

180
00:11:03,470 --> 00:11:01,470
here in such a tremendously for the

181
00:11:06,230 --> 00:11:03,480
space program with the Mars Pathfinder

182
00:11:08,180 --> 00:11:06,240
mission the heroic efforts going on the

183
00:11:10,220 --> 00:11:08,190
MIR space station to demonstrate what

184
00:11:11,510 --> 00:11:10,230
people can do in space and with all the

185
00:11:12,950 --> 00:11:11,520
great science here on the space our

186
00:11:15,230 --> 00:11:12,960
module which shows all the things we can

187
00:11:17,300 --> 00:11:15,240
learn from being up here well I

188
00:11:20,000 --> 00:11:17,310

certainly agree with that and I think

189
00:11:22,160 --> 00:11:20,010
this is a beginning of a commercially

190
00:11:24,950 --> 00:11:22,170
feasible adventure in the space and

191
00:11:26,810 --> 00:11:24,960
exploration that's what this nation what

192
00:11:29,450 --> 00:11:26,820
is characterized this nation I think we

193
00:11:31,400 --> 00:11:29,460
are a nation of explorers and we were

194
00:11:33,530 --> 00:11:31,410
proud of you can you tell us some about

195
00:11:38,390 --> 00:11:33,540
the experiments that are going on and

196
00:11:39,500 --> 00:11:38,400
what kind of success you've had yeah

197
00:11:40,880 --> 00:11:39,510
I'll talk a little bit about the

198
00:11:42,590 --> 00:11:40,890
combustion experiments because that's

199
00:11:44,480 --> 00:11:42,600
either mostly worked on and then I'll

200
00:11:46,430 --> 00:11:44,490
pass on to Roger Crouch is here with me

201
00:11:48,320 --> 00:11:46,440
and has been working on the board

202
00:11:49,670 --> 00:11:48,330
material science and watch experiments

203
00:11:51,350 --> 00:11:49,680
and then Mike can tell you a little bit

204
00:11:53,180 --> 00:11:51,360
about what he's been doing to the

205
00:11:54,410 --> 00:11:53,190
combustion experiments we had two brand

206
00:11:57,580 --> 00:11:54,420
new ones that are flying for the first

207
00:11:59,810 --> 00:11:57,590
time on the combined 83 and 94 the

208
00:12:01,880 --> 00:11:59,820
combustion module one which is a space

209
00:12:03,770 --> 00:12:01,890
station design and a drop of combustion

210
00:12:06,350 --> 00:12:03,780
experiment which is a droplet burning

211
00:12:08,300 --> 00:12:06,360
one all of these are looking at super

212
00:12:10,130 --> 00:12:08,310
combinations of production lean flames

213
00:12:12,370 --> 00:12:10,140

and just how flames burn in space so we

214
00:12:14,450 --> 00:12:12,380
can hopefully create better means of

215
00:12:15,770 --> 00:12:14,460
producing energy on the earth through

216
00:12:17,540 --> 00:12:15,780
brain which accounts for ninety percent

217
00:12:19,639 --> 00:12:17,550
of the way we generate energy on

218
00:12:21,980 --> 00:12:19,649
and those been going exceptionally well

219
00:12:23,090 --> 00:12:21,990
they as I understand experiment down

220
00:12:24,470 --> 00:12:23,100
there very excited about the results

221
00:12:29,420 --> 00:12:24,480
they're saying let me pass it off to

222
00:12:31,250 --> 00:12:29,430
Roger as far as the details of what the

223
00:12:32,750 --> 00:12:31,260
scientific experiments and objectives

224
00:12:34,940 --> 00:12:32,760
are I think probably the principal

225
00:12:36,470 --> 00:12:34,950
investigators there in the park will be

226
00:12:38,660 --> 00:12:36,480
able to give you a real good feel for

227
00:12:40,880 --> 00:12:38,670
that what I'd like to describe is that

228
00:12:43,160 --> 00:12:40,890
the pleasure that it is to be up here

229
00:12:45,350 --> 00:12:43,170
the opportunities to carry out these

230
00:12:47,170 --> 00:12:45,360
material science experiments that we're

231
00:12:50,540 --> 00:12:47,180
doing in LIF which is a cooperative

232
00:12:53,949 --> 00:12:50,550
program between the u.s. and Japan we've

233
00:12:57,350 --> 00:12:53,959
got the tempest which is a cooperative

234
00:12:58,960 --> 00:12:57,360
and so I think the international flavor

235
00:13:00,680 --> 00:12:58,970
that goes with that we have a

236
00:13:04,310 --> 00:13:00,690
accelerometer that's also an

237
00:13:07,280 --> 00:13:04,320
international German us and so I think

238
00:13:09,920 --> 00:13:07,290

that this is a for tender of the future

239
00:13:11,889 --> 00:13:09,930
that will be one world as we go to space

240
00:13:14,600 --> 00:13:11,899
out even going to Mars i think is a

241
00:13:17,060 --> 00:13:14,610
worldwide adventure rather than a single

242
00:13:22,100 --> 00:13:17,070
us or a single nation venture I'll patch

243
00:13:24,260 --> 00:13:22,110
it on over to break now that's just my

244
00:13:26,600 --> 00:13:24,270
role has been to keep the Space Shuttle

245
00:13:29,170 --> 00:13:26,610
flying and working i'm lee to support

246
00:13:32,210 --> 00:13:29,180
the science back in the lab here and

247
00:13:33,889 --> 00:13:32,220
fortunately we've had a beautiful ship

248
00:13:35,870 --> 00:13:33,899
this time we've had very few problems

249
00:13:37,699 --> 00:13:35,880
and been able to support all this great

250
00:13:39,410 --> 00:13:37,709
science the other thing i think it's

251
00:13:41,449 --> 00:13:39,420
real neat about this mission is it's

252
00:13:43,519 --> 00:13:41,459
kind of a bridge to the space station a

253
00:13:46,010 --> 00:13:43,529
lot of this experiments the techniques

254
00:13:47,240 --> 00:13:46,020
that we're using are the same kinds of

255
00:13:49,660 --> 00:13:47,250
things we'll be doing on Space Station

256
00:13:52,100 --> 00:13:49,670
and I think you mentioned

257
00:13:54,170 --> 00:13:52,110
commercialization a lot of the basic

258
00:13:56,329 --> 00:13:54,180
research we're doing now will evolve I

259
00:13:58,819 --> 00:13:56,339
believe in the space station era it's

260
00:14:00,530 --> 00:13:58,829
produced commercially viable drugs from

261
00:14:02,389 --> 00:14:00,540
the protein crystal growth and I think

262
00:14:04,460 --> 00:14:02,399
once that starts happening we're going

263
00:14:06,290 --> 00:14:04,470

to see space really open it up and low

264
00:14:07,970 --> 00:14:06,300
in orbit to all kinds of commercial

265
00:14:11,540 --> 00:14:07,980
opportunities which will be great for

266
00:14:13,639 --> 00:14:11,550
our country and for the world well I

267
00:14:15,889 --> 00:14:13,649
appreciate that it does sound like

268
00:14:17,750 --> 00:14:15,899
things are going well I serve on the

269
00:14:18,860 --> 00:14:17,760
Environment Committee and one of the

270
00:14:21,110 --> 00:14:18,870
things that we're constantly working

271
00:14:24,560 --> 00:14:21,120
about is how to burn cleaner and more

272
00:14:27,530 --> 00:14:24,570
effectively and just a one percent on

273
00:14:29,480 --> 00:14:27,540
half of one percent increase in learning

274
00:14:31,250 --> 00:14:29,490
on an ability to produce energy would be

275
00:14:33,020 --> 00:14:31,260
a marvelous thing for America and