1
00:00:12,440 --> 00:00:10,220
well thank you all for coming out this

2
00:00:14,089 --> 00:00:12,450
morning it is a great pleasure to share

3
00:00:16,730 --> 00:00:14,099
the experience of space flight with

4
00:00:18,620 --> 00:00:16,740
those folks that make it happen if it

5
00:00:21,230 --> 00:00:18,630
wasn't for all the efforts of people

6
00:00:22,970 --> 00:00:21,240
around the NASA centers and here at JSC

7
00:00:26,089 --> 00:00:22,980
that support our missions none of this

8
00:00:29,029 --> 00:00:26,099
could occur and we're going to show you

9
00:00:30,500 --> 00:00:29,039
a film today followed by some slides but

10
00:00:33,560 --> 00:00:30,510
before we do that like to introduce the

11
00:00:36,350 --> 00:00:33,570
crew members one more time and one crew

12
00:00:38,690 --> 00:00:36,360
member is not here today that's Pedro

13
00:00:40,549 --> 00:00:38,700

Dookie he was selected to become an

14
00:00:42,350 --> 00:00:40,559
astronaut candidate in the next NASA

15
00:00:44,450 --> 00:00:42,360
class later this summer and he is back

16
00:00:46,850 --> 00:00:44,460
in Spain preparing to move here

17
00:00:48,410 --> 00:00:46,860
permanently down here in the front row

18
00:00:51,560 --> 00:00:48,420
we have our other all dat payload

19
00:01:00,860 --> 00:00:51,570
specialist dr. Luka rabbani from Italy

20
00:01:02,420 --> 00:01:00,870
Luca we trained as a crew of nine and

21
00:01:04,460 --> 00:01:02,430
for those not familiar with ultimate

22
00:01:06,530 --> 00:01:04,470
payload specialist roles they are

23
00:01:08,090 --> 00:01:06,540
prepared to step in and fill the shoes

24
00:01:09,679 --> 00:01:08,100
of one of the payload specialists up

25
00:01:11,420 --> 00:01:09,689
until the last minute so they went

26
00:01:13,820 --> 00:01:11,430
through all the training on all the

27
00:01:17,149 --> 00:01:13,830
medical baseline data collection and

28
00:01:19,789 --> 00:01:17,159
then once the mission lifted off took up

29
00:01:22,249 --> 00:01:19,799
role similar to a Capcom at the payload

30
00:01:25,580 --> 00:01:22,259
Operations Center in Marshall I'd like

31
00:01:27,890 --> 00:01:25,590
to begin introducing the crew at the far

32
00:01:31,429 --> 00:01:27,900
end of the table here is the pilot Kevin

33
00:01:34,760 --> 00:01:31,439
Kregel was on his second mission next to

34
00:01:38,120 --> 00:01:34,770
Kevin is dr. Chuck Brady a former navy

35
00:01:41,030 --> 00:01:38,130
flight surgeon on his first flight next

36
00:01:43,370 --> 00:01:41,040
to me on my left is dr. Bob thirst from

37
00:01:45,499 --> 00:01:43,380
the Canadian Space Agency flying his

38
00:01:48,469 --> 00:01:45,509

payload specialist number two on my

39
00:01:51,109 --> 00:01:48,479
right is Lieutenant Colonel Susan Helms

40
00:01:53,240 --> 00:01:51,119
she was mission specialist number two

41
00:01:54,920 --> 00:01:53,250
which is our flight engineer and also

42
00:01:59,090 --> 00:01:54,930
our payload commander a very challenging

43
00:02:02,359 --> 00:01:59,100
role next to Susan is our PhD in

44
00:02:04,819 --> 00:02:02,369
microgravity jean-jacques 5ea from

45
00:02:07,520 --> 00:02:04,829
canasta Canadian I'm sorry the french

46
00:02:10,040 --> 00:02:07,530
space agency and this was john jocks

47
00:02:12,180 --> 00:02:10,050
first flight his family has been living

48
00:02:14,250 --> 00:02:12,190
at Huntsville so he was very for me

49
00:02:15,900 --> 00:02:14,260
with Marshall Space Flight centers role

50
00:02:18,450 --> 00:02:15,910
in not only this mission but other

51
00:02:20,940 --> 00:02:18,460
microgravity science missions and at the

52
00:02:23,190 --> 00:02:20,950
end of the table is our first NASA

53
00:02:25,680 --> 00:02:23,200
Doctor of Veterinary Medicine to fly in

54
00:02:27,750 --> 00:02:25,690
space and that's Ric Linehan also on his

55
00:02:29,880 --> 00:02:27,760
first flight without any further ado

56
00:02:31,920 --> 00:02:29,890
we'd like to go ahead and begin the

57
00:02:35,070 --> 00:02:31,930
video if we could bring the lights down

58
00:02:37,590 --> 00:02:35,080
and roll the video and parts of the

59
00:02:40,410 --> 00:02:37,600
video we will narrate other portions

60
00:02:44,250 --> 00:02:40,420
include some of the intercom that was

61
00:02:46,200 --> 00:02:44,260
recorded during ass'n here we are

62
00:02:49,020 --> 00:02:46,210
suiting up at the Kennedy Space Center

63
00:02:54,290 --> 00:02:49,030

for our launch on jun 20th again Kevin

64
00:03:01,170 --> 00:02:57,600
jean-jacques 5ea from France very eager

65
00:03:02,910 --> 00:03:01,180
to get into space Susan Helms all

66
00:03:06,660 --> 00:03:02,920
pressure checked and ready to begin her

67
00:03:10,380 --> 00:03:06,670
third space flight and the alien here is

68
00:03:13,260 --> 00:03:10,390
a dr. Rick lenihan our veterinarian and

69
00:03:16,110 --> 00:03:13,270
dr. Chuck Brady also eager to get into

70
00:03:22,380 --> 00:03:16,120
space for his first time and from Canada

71
00:03:24,330 --> 00:03:22,390
dr. Bob Thirsk the launch morning

72
00:03:26,040 --> 00:03:24,340
schedule is quite quick paced no sooner

73
00:03:29,520 --> 00:03:26,050
had we suited up when it was time to

74
00:03:30,990 --> 00:03:29,530
head out to launch pad and levant would

75
00:03:32,340 --> 00:03:31,000
take us out there during this walk out

76
00:03:34,320 --> 00:03:32,350
we were thrilled to see some of our

77
00:03:35,729 --> 00:03:34,330
friends and colleagues who had gotten up

78
00:03:36,810 --> 00:03:35,739
early that morning to wish us all well

79
00:03:39,180 --> 00:03:36,820
as we were heading off on her mission

80
00:03:41,790 --> 00:03:39,190
and waiting for us at the launch pad was

81
00:03:42,900 --> 00:03:41,800
our beloved Columbia and at this point

82
00:03:45,180 --> 00:03:42,910
it seemed like it was a living creature

83
00:03:47,190 --> 00:03:45,190
as it's hissed and fumed and groaned and

84
00:03:50,070 --> 00:03:47,200
it seemed as eager as we were to get

85
00:03:52,140 --> 00:03:50,080
ready for the launch the crew was

86
00:03:54,420 --> 00:03:52,150
greeted at the launch pad done on the

87
00:03:55,890 --> 00:03:54,430
gantry by the closeout crew who helped

88
00:03:57,750 --> 00:03:55,900

us put on our harnesses and our

89
00:04:00,150 --> 00:03:57,760
parachutes and check out our equipment

90
00:04:03,150 --> 00:04:00,160
before we got inside Columbia the

91
00:04:06,570 --> 00:04:03,160
strapping in procedure is a quite a busy

92
00:04:08,490 --> 00:04:06,580
and highly choreographed affair and it's

93
00:04:10,920 --> 00:04:08,500
also a bit of an emotional affairs as

94
00:04:13,860 --> 00:04:10,930
well and for first-time flyer such as

95
00:04:16,320 --> 00:04:13,870
myself I found that my thoughts went to

96
00:04:18,020 --> 00:04:16,330
friends and family to the emergency

97
00:04:20,460 --> 00:04:18,030
procedures that I was going to have to

98
00:04:22,230 --> 00:04:20,470
perform in the event of an emergency and

99
00:04:24,150 --> 00:04:22,240
I bought this wonderful adventure I was

100
00:04:25,590 --> 00:04:24,160
heading off on it was really nice me to

101
00:04:25,860 --> 00:04:25,600
strap in the mid day at the same time

102
00:04:27,870 --> 00:04:25,870
that

103
00:04:29,730 --> 00:04:27,880
Hendrix a three-time flower was

104
00:04:31,110 --> 00:04:29,740
strapping in the flight deck if Tom

105
00:04:34,409 --> 00:04:31,120
thought this was a safe thing to do than

106
00:04:36,030 --> 00:04:34,419
i thought it was as well and these

107
00:05:03,020 --> 00:04:36,040
wonderful views you have the strapping

108
00:05:03,030 --> 00:05:17,320
view

109
00:05:17,330 --> 00:05:42,310
ok so I went down bit higher xq

110
00:06:03,800 --> 00:05:52,520
DC assamese agaric good riddance 313 hey

111
00:06:19,320 --> 00:06:03,810
girl horn bets are coming down or nascar

112
00:06:19,330 --> 00:06:33,050
and you can raise your visors

113
00:06:53,790 --> 00:06:38,530

at Mach 25 engines hitting the clock

114
00:06:58,830 --> 00:06:56,460
it was just absolutely fantastic to see

115
00:07:00,390 --> 00:06:58,840
the BN space and see this great piece of

116
00:07:02,339 --> 00:07:00,400
American technology involved the

117
00:07:04,260 --> 00:07:02,349
external tank it was really difficult

118
00:07:06,240 --> 00:07:04,270
for Rick and I to focus on getting

119
00:07:08,520 --> 00:07:06,250
pictures of this because here we saw the

120
00:07:11,640 --> 00:07:08,530
earth and landmasses and oceans floating

121
00:07:14,790 --> 00:07:11,650
beneath us but the external tank just

122
00:07:18,540 --> 00:07:14,800
did a super job and would perform

123
00:07:20,670 --> 00:07:18,550
greatly this is a mission that had dual

124
00:07:22,080 --> 00:07:20,680
objectives it was a microgravity mission

125
00:07:24,390 --> 00:07:22,090
and a life science mission combined

126
00:07:26,369 --> 00:07:24,400
together but the the focus of the very

127
00:07:29,279 --> 00:07:26,379
first day right after we got into space

128
00:07:32,070 --> 00:07:29,289
was to capture the life science data for

129
00:07:34,110 --> 00:07:32,080
documenting the adoption process so

130
00:07:35,520 --> 00:07:34,120
without any further ado as soon as we D

131
00:07:38,129 --> 00:07:35,530
suited people were working on

132
00:07:40,230 --> 00:07:38,139
experiments which is probably a first in

133
00:07:41,969 --> 00:07:40,240
the shuttle program as quickly as we did

134
00:07:44,129 --> 00:07:41,979
here you see Bob on one of our life

135
00:07:46,770 --> 00:07:44,139
science facilities it's a dynamometer

136
00:07:48,240 --> 00:07:46,780
and what it's meant to do is help

137
00:07:49,980 --> 00:07:48,250
measure both the static and dynamic

138
00:07:53,399 --> 00:07:49,990

performance of the musculoskeletal

139
00:07:55,170 --> 00:07:53,409
system we had several p I investigative

140
00:07:57,600 --> 00:07:55,180
teams that were part of this major

141
00:08:00,149 --> 00:07:57,610
experiment and here you see some of the

142
00:08:01,800 --> 00:08:00,159
activities taking place yeah that's me

143
00:08:04,140 --> 00:08:01,810
strapping in the TVD now being

144
00:08:07,290 --> 00:08:04,150
electrically stimulated involuntarily by

145
00:08:09,300 --> 00:08:07,300
a device which measures muscle

146
00:08:12,089 --> 00:08:09,310
contraction here's Chuck on the arm

147
00:08:14,100 --> 00:08:12,099
lever and we're measuring torque output

148
00:08:16,170 --> 00:08:14,110
and muscle strength and degradation over

149
00:08:19,019 --> 00:08:16,180
the 17 days of the flight on the torque

150
00:08:20,999 --> 00:08:19,029
velocity dynamometer and Chuck here is

151
00:08:22,830 --> 00:08:21,009
going through the different protocols

152
00:08:25,080 --> 00:08:22,840
you can see the IBM thinkpad up there on

153
00:08:26,939 --> 00:08:25,090
his right hand and he's following those

154
00:08:30,180 --> 00:08:26,949
and that interfaces with software in the

155
00:08:32,250 --> 00:08:30,190
TVD jean-jacques is holding a handgrip

156
00:08:34,769 --> 00:08:32,260
dynamometer and he is performing various

157
00:08:36,750 --> 00:08:34,779
protocols that t is reading on the

158
00:08:38,730 --> 00:08:36,760
thinkpad screen up there in front of him

159
00:08:41,339 --> 00:08:38,740
and they are anywhere from following

160
00:08:42,540 --> 00:08:41,349
curves to producing various contractions

161
00:08:46,230 --> 00:08:42,550
anywhere from ten to a hundred percent

162
00:08:47,939 --> 00:08:46,240
on the hand grip and all this will be

163
00:08:49,560 --> 00:08:47,949

compared to ground base theater when we

164
00:08:51,420 --> 00:08:49,570
get back when we are back now actually

165
00:08:54,120 --> 00:08:51,430
and look at changes in muscle physiology

166
00:08:55,949 --> 00:08:54,130
that's me again and I am on Alfie be a

167
00:08:58,319 --> 00:08:55,959
astronaut lung function experiment and

168
00:08:59,910 --> 00:08:58,329
I'm about to I get on there and start

169
00:09:01,769 --> 00:08:59,920
blowing into this tube and it's

170
00:09:03,960 --> 00:09:01,779
measuring gaseous exchange in the lungs

171
00:09:05,750 --> 00:09:03,970
and we're comparing pulmonary physiology

172
00:09:07,760 --> 00:09:05,760
on orbit

173
00:09:09,830 --> 00:09:07,770
based studies and right there I'm

174
00:09:11,960 --> 00:09:09,840
interfacing with the keyboard unit and

175
00:09:14,120 --> 00:09:11,970
reading the LEDs and following the flow

176
00:09:18,860 --> 00:09:14,130
the flow parameters up there on the

177
00:09:22,070 --> 00:09:18,870
screen and also we used Alfie with

178
00:09:24,020 --> 00:09:22,080
exercise we did a resting pfts here's a

179
00:09:27,230 --> 00:09:24,030
picture of jean-jacques with as many

180
00:09:28,850 --> 00:09:27,240
watches on and the magic masking has

181
00:09:31,520 --> 00:09:28,860
just gotten off your gamma tur and he's

182
00:09:34,460 --> 00:09:31,530
going on to Alfie right now to determine

183
00:09:36,800 --> 00:09:34,470
if there are any changes pre and post

184
00:09:40,790 --> 00:09:36,810
exercise here's Chuck with the Olympic

185
00:09:41,750 --> 00:09:40,800
torch and Chuck is hooked up to Alfie

186
00:09:43,700 --> 00:09:41,760
and the odometer right now

187
00:09:45,740 --> 00:09:43,710
simultaneously performing the exercises

188
00:09:47,840 --> 00:09:45,750

and it's measuring his pulmonary output

189
00:09:50,000 --> 00:09:47,850
and here's the rest of the crew offering

190
00:09:53,030 --> 00:09:50,010
to cheer Chuck on and share in the

191
00:09:54,620 --> 00:09:53,040
Olympic moment with the torch now that

192
00:09:56,030 --> 00:09:54,630
torch was later taken down by the

193
00:09:59,540 --> 00:09:56,040
orbiter crew and walked around the

194
00:10:01,910 --> 00:09:59,550
orbiter after we landed we had another

195
00:10:03,890 --> 00:10:01,920
study it was not relative to the lung

196
00:10:05,510 --> 00:10:03,900
function or the musculoskeletal studies

197
00:10:07,520 --> 00:10:05,520
that we have already talked about but we

198
00:10:09,910 --> 00:10:07,530
also were looking at the vestibular

199
00:10:12,440 --> 00:10:09,920
system the neuro vestibular system

200
00:10:14,000 --> 00:10:12,450
specifically on this experiment the the

201
00:10:16,970 --> 00:10:14,010
goal here is to try to capture what

202
00:10:18,740 --> 00:10:16,980
happens to I and head movements and

203
00:10:20,630 --> 00:10:18,750
posture movements when the inner ear

204
00:10:22,490 --> 00:10:20,640
becomes confused about what's up and

205
00:10:24,080 --> 00:10:22,500
what's down without the effect of

206
00:10:27,350 --> 00:10:24,090
gravity your inner ear doesn't really

207
00:10:29,330 --> 00:10:27,360
understand which way it's heading

208
00:10:31,730 --> 00:10:29,340
relative to the earth and so when you

209
00:10:34,310 --> 00:10:31,740
remove that effect the question is how

210
00:10:37,040 --> 00:10:34,320
does the inner ear then translate to the

211
00:10:38,960 --> 00:10:37,050
eyes and head how to move and so we had

212
00:10:40,430 --> 00:10:38,970
a number of experiments you can see some

213
00:10:41,780 --> 00:10:40,440

of them in progress here where we were

214
00:10:44,330 --> 00:10:41,790
doing very disciplined head and eye

215
00:10:47,090 --> 00:10:44,340
movements and likewise we did I've

216
00:10:48,110 --> 00:10:47,100
movements with and without knowledge of

217
00:10:50,180 --> 00:10:48,120
what was going on in the immediate

218
00:10:52,370 --> 00:10:50,190
environment and by comparing this

219
00:10:54,380 --> 00:10:52,380
relative to what was captured pre and

220
00:10:57,080 --> 00:10:54,390
post flight we hope to better understand

221
00:11:00,920 --> 00:10:57,090
how that whole inner ear I postural

222
00:11:02,660 --> 00:11:00,930
integrated system works together and of

223
00:11:04,460 --> 00:11:02,670
course an application for this is among

224
00:11:05,840 --> 00:11:04,470
other things the study of space motion

225
00:11:07,640 --> 00:11:05,850
sickness because we know that that's got

226
00:11:11,330 --> 00:11:07,650
an influence on how people react in

227
00:11:14,150 --> 00:11:11,340
space to that effect the award for the

228
00:11:16,450 --> 00:11:14,160
oddest-looking lms experiment goes to

229
00:11:18,710 --> 00:11:16,460
the torso rotation experiment this

230
00:11:20,600 --> 00:11:18,720
investigation also measure

231
00:11:22,730 --> 00:11:20,610
how the vestibular apparatus or inner

232
00:11:25,249 --> 00:11:22,740
ear adapts to the weightless environment

233
00:11:27,110 --> 00:11:25,259
we also hope to come up with a cause for

234
00:11:28,639 --> 00:11:27,120
this space motion sickness problem which

235
00:11:29,780 --> 00:11:28,649
afflicts about half of all astronauts

236
00:11:32,050 --> 00:11:29,790
during the first two or three days of

237
00:11:34,400 --> 00:11:32,060
spaceflight here in the mid-deck

238
00:11:36,259 --> 00:11:34,410

jean-jacques and I have just dawned the

239
00:11:37,999 --> 00:11:36,269
equipment which includes accelerometer

240
00:11:39,319 --> 00:11:38,009
packages on the top of our head and also

241
00:11:41,629 --> 00:11:39,329
on our back and we're performing a

242
00:11:43,629 --> 00:11:41,639
strange-looking dance which is actually

243
00:11:46,040 --> 00:11:43,639
important to calibrate the equipment

244
00:11:47,300 --> 00:11:46,050
since it's the only experiment on our

245
00:11:48,499 --> 00:11:47,310
flight that comes from Canada I thought

246
00:11:50,300 --> 00:11:48,509
it appropriate on one of the data

247
00:11:53,600 --> 00:11:50,310
collection days to where my team canada

248
00:11:54,920 --> 00:11:53,610
hockey jersey we hope also that the

249
00:11:56,540 --> 00:11:54,930
results of this experiment will help

250
00:11:58,069 --> 00:11:56,550
improve treatment programs for people

251
00:12:00,290 --> 00:11:58,079
that suffer from motion sickness and

252
00:12:02,600 --> 00:12:00,300
settings on the ground well this is the

253
00:12:04,340 --> 00:12:02,610
lace and sleepwear here you're seeing

254
00:12:05,990 --> 00:12:04,350
four of us come out of our bunks in the

255
00:12:08,269 --> 00:12:06,000
morning this is a study looking at the

256
00:12:09,829 --> 00:12:08,279
circadian rhythms and sleep patterns and

257
00:12:11,449 --> 00:12:09,839
this is the first time that astronauts

258
00:12:13,759 --> 00:12:11,459
were actually had their brainwaves

259
00:12:16,309 --> 00:12:13,769
measured at night during six nights on

260
00:12:17,600 --> 00:12:16,319
four subjects you see us coming out of

261
00:12:19,100 --> 00:12:17,610
there we're really a fashion statement

262
00:12:21,379 --> 00:12:19,110
here as you'll see in just a moment but

263
00:12:22,910 --> 00:12:21,389

Tom's giving us all up and we're going

264
00:12:24,530 --> 00:12:22,920
to line up here in just a second with

265
00:12:25,730 --> 00:12:24,540
all our sleep but equipment on we think

266
00:12:26,990 --> 00:12:25,740
we're going to get really great data

267
00:12:28,970 --> 00:12:27,000
from this we're looking at long-duration

268
00:12:31,009 --> 00:12:28,980
spaceflight and hopefully we'll be able

269
00:12:32,689 --> 00:12:31,019
to help people rest better and be more

270
00:12:36,710 --> 00:12:32,699
efficient both in space and here on the

271
00:12:38,360 --> 00:12:36,720
ground of course it's also important to

272
00:12:40,730 --> 00:12:38,370
try and quantify the changes in

273
00:12:43,879 --> 00:12:40,740
performance and on this flight we flew a

274
00:12:46,850 --> 00:12:43,889
small laptop computer which we would

275
00:12:48,920 --> 00:12:46,860
practice with a few times before flight

276
00:12:50,829 --> 00:12:48,930
during flight and then post flight and

277
00:12:52,999 --> 00:12:50,839
we could see the changes in our memory

278
00:12:55,730 --> 00:12:53,009
capabilities and in our hand eye

279
00:12:57,559 --> 00:12:55,740
coordination this mission was a life

280
00:13:01,309 --> 00:12:57,569
science mission but also a microgravity

281
00:13:03,290 --> 00:13:01,319
science mission and we had several field

282
00:13:07,509 --> 00:13:03,300
of investigations including a fluid

283
00:13:10,759 --> 00:13:07,519
physics and we see the fluid physics

284
00:13:15,350 --> 00:13:10,769
experiment called the bdp you for a

285
00:13:17,389 --> 00:13:15,360
bubble drop and particle unit h p i had

286
00:13:21,139 --> 00:13:17,399
the special container to be a head to

287
00:13:26,569 --> 00:13:21,149
load in this optical bench and we had to

288
00:13:29,000 --> 00:13:26,579

make some critical optimization before

289
00:13:31,520 --> 00:13:29,010
getting the end to

290
00:13:34,400 --> 00:13:31,530
to the ground and to the p.i these

291
00:13:36,830 --> 00:13:34,410
experiments work very well except one

292
00:13:40,730 --> 00:13:36,840
day we had a little problem that Kevin

293
00:13:46,940 --> 00:13:40,740
and myself and Susan are trying to fix a

294
00:13:51,260 --> 00:13:46,950
shortcut in the in the connector but

295
00:13:54,910 --> 00:13:51,270
when we get that fixed we were able to

296
00:13:58,820 --> 00:13:54,920
get very nice views of boiling in this

297
00:14:02,870 --> 00:13:58,830
particular experiment or convection

298
00:14:05,720 --> 00:14:02,880
driven by capillary forces like for this

299
00:14:08,480 --> 00:14:05,730
bubble in another experiment and we try

300
00:14:12,830 --> 00:14:08,490
to get the best quiet conditions for

301
00:14:14,720 --> 00:14:12,840
these critical phases another important

302
00:14:18,740 --> 00:14:14,730
experiment was the material science

303
00:14:22,660 --> 00:14:18,750
project a furnace in which we elaborated

304
00:14:25,370 --> 00:14:22,670
different kind of specimens alloyed

305
00:14:28,460 --> 00:14:25,380
aluminum alloy for instance as well as

306
00:14:31,700 --> 00:14:28,470
semiconductors so we try to get the best

307
00:14:33,650 --> 00:14:31,710
environment thermal environment to work

308
00:14:36,140 --> 00:14:33,660
study the kind of structure we can

309
00:14:39,410 --> 00:14:36,150
expect to get in space and as you can

310
00:14:43,700 --> 00:14:39,420
see here sometimes it's easier to work

311
00:14:47,830 --> 00:14:43,710
upside down to get accurate positioning

312
00:14:50,600 --> 00:14:47,840
of the cartridge inside a furnace and

313
00:14:54,170 --> 00:14:50,610

systems looks very comfortable doing

314
00:14:55,580 --> 00:14:54,180
that you see that the Space Lab is very

315
00:14:58,030 --> 00:14:55,590
busy with activities and lot of

316
00:15:00,440 --> 00:14:58,040
experiments we also were doing some

317
00:15:02,630 --> 00:15:00,450
experiments on the flight deck this is

318
00:15:05,270 --> 00:15:02,640
the voice command system it's a voice

319
00:15:07,370 --> 00:15:05,280
activated system for the payload Bay

320
00:15:09,980 --> 00:15:07,380
cameras and Tom and myself were working

321
00:15:12,890 --> 00:15:09,990
on this experiment and just seeing how

322
00:15:16,130 --> 00:15:12,900
well it performed on orbit we also got

323
00:15:18,860 --> 00:15:16,140
great views of outside the earth we had

324
00:15:20,120 --> 00:15:18,870
a full moon and it was a setting and as

325
00:15:23,000 --> 00:15:20,130
it sets and goes through the atmosphere

326
00:15:25,250 --> 00:15:23,010
it actually turned blue so we had a blue

327
00:15:29,360 --> 00:15:25,260
moon in on orbit we had a real blue moon

328
00:15:32,810 --> 00:15:29,370
which is second full moon in a month we

329
00:15:34,640 --> 00:15:32,820
thought we'd be fairly clever and we

330
00:15:36,470 --> 00:15:34,650
videoed this down to Mission Control

331
00:15:38,030 --> 00:15:36,480
Center but they were on top of us and

332
00:15:38,540 --> 00:15:38,040
they had the song to play when we were

333
00:15:43,490 --> 00:15:38,550
video

334
00:15:47,360 --> 00:15:43,500
down one of our best passes was early in

335
00:15:51,710 --> 00:15:47,370
the morning we had a nice pass above the

336
00:15:55,670 --> 00:15:51,720
medicon see Europe and Spain here we

337
00:15:59,960 --> 00:15:55,680
were able to see our hometowns this one

338
00:16:04,579 --> 00:15:59,970

was Spain and Madrid a hometown of pedo

339
00:16:07,579 --> 00:16:04,589
duka our alternate then we had some of

340
00:16:10,639 --> 00:16:07,589
these beautiful islands south of the

341
00:16:13,819 --> 00:16:10,649
coast of France that we also sometimes

342
00:16:19,100 --> 00:16:13,829
and it was not so cloudy and we

343
00:16:22,819 --> 00:16:19,110
continued above Italy and Greece and it

344
00:16:35,330 --> 00:16:22,829
was a very nice award in the morning to

345
00:16:40,540 --> 00:16:38,300
we also had some marvelous passes over

346
00:16:43,040 --> 00:16:40,550
the United States you may recall that

347
00:16:45,230 --> 00:16:43,050
during the end of June it was absolutely

348
00:16:47,900 --> 00:16:45,240
clear over most of North America and

349
00:16:50,750 --> 00:16:47,910
this is one seen here of us saying

350
00:16:53,870 --> 00:16:50,760
goodbye to California currently over

351
00:16:55,400 --> 00:16:53,880
Nevada New Mexico there's Lake Mead near

352
00:16:57,470 --> 00:16:55,410
Las Vegas nearly in the center of the

353
00:16:59,030 --> 00:16:57,480
picture and one of the current events

354
00:17:00,440 --> 00:16:59,040
that happened while we were on orbit

355
00:17:01,850 --> 00:17:00,450
were the wildfires in the Grand Canyon

356
00:17:03,230 --> 00:17:01,860
area and you can actually see those in

357
00:17:05,690 --> 00:17:03,240
the bottom left of the picture at this

358
00:17:08,540 --> 00:17:05,700
time coming into the field of you just

359
00:17:10,130 --> 00:17:08,550
before we head over into Mexico on this

360
00:17:12,260 --> 00:17:10,140
particular pass as you can see it was

361
00:17:14,330 --> 00:17:12,270
quite impressive from space just

362
00:17:16,700 --> 00:17:14,340
absolutely fantastic to travel from 39

363
00:17:18,380 --> 00:17:16,710

degrees north to 39 degrees south and

364
00:17:19,700 --> 00:17:18,390
this is a view of the Appalachian to

365
00:17:21,380 --> 00:17:19,710
Great Smoky Mountains from Tennessee to

366
00:17:22,940 --> 00:17:21,390
North Carolina now we're getting ready

367
00:17:24,830 --> 00:17:22,950
to come on I think anyone's wanted to

368
00:17:26,210 --> 00:17:24,840
come home but this is a view in size

369
00:17:28,190 --> 00:17:26,220
we're preparing for entry and as a

370
00:17:29,870 --> 00:17:28,200
rookie I can't begin to tell you just

371
00:17:31,010 --> 00:17:29,880
what a spectacular light show it was I

372
00:17:32,330 --> 00:17:31,020
was really glad there were three

373
00:17:33,740 --> 00:17:32,340
veterans on the flight deck with me

374
00:17:36,050 --> 00:17:33,750
because I felt like the whole front end

375
00:17:37,670 --> 00:17:36,060
the orbiter was coming on fire as you

376
00:17:40,340 --> 00:17:37,680
can see looking out the back that's just

377
00:17:42,050 --> 00:17:40,350
awesome a light show that's going on and

378
00:17:44,480 --> 00:17:42,060
when just a second we'll see the lights

379
00:17:47,000 --> 00:17:44,490
reflecting off of Tom and Kevin in front

380
00:17:48,740 --> 00:17:47,010
and illuminating fully in a darkened

381
00:17:51,260 --> 00:17:48,750
cabin Susan's face you're just an

382
00:17:55,370 --> 00:17:51,270
absolutely spectacular show as we reach

383
00:17:57,980 --> 00:17:55,380
the entry it's all videos on the launch

384
00:18:02,150 --> 00:17:57,990
we also had that small camera for videos

385
00:18:03,530 --> 00:18:02,160
out the front we're over the panhandle

386
00:18:05,300 --> 00:18:03,540
of Florida if you look in the middle of

387
00:18:06,740 --> 00:18:05,310
the picture it's kind of cloudy but you

388
00:18:09,230 --> 00:18:06,750

can actually see the coast of the fall

389
00:18:11,180 --> 00:18:09,240
Walton Beach Pensacola area as we come

390
00:18:14,150 --> 00:18:11,190
to land at the Kennedy Space Center it

391
00:18:16,430 --> 00:18:14,160
was an overcast day we had a clouds at

392
00:18:19,520 --> 00:18:16,440
about 20,000 feet we're at the heading

393
00:18:22,910 --> 00:18:19,530
alignment cone Tom's in a right hand

394
00:18:26,090 --> 00:18:22,920
turn trying to line up on Kennedy Space

395
00:18:27,500 --> 00:18:26,100
Center runway 33 we go through the

396
00:18:30,800 --> 00:18:27,510
clouds and this is looking out my window

397
00:18:32,840 --> 00:18:30,810
this is what I saw on the entry day we

398
00:18:35,960 --> 00:18:32,850
can see the rivers of the Kennedy Space

399
00:18:37,400 --> 00:18:35,970
Center as we make the turn coming around

400
00:18:40,550 --> 00:18:37,410
that the Henning line macomb we're doing

401
00:18:42,260 --> 00:18:40,560
about 300 miles per hour and we roll out

402
00:18:45,110 --> 00:18:42,270
about six miles from the runway at

403
00:18:47,840 --> 00:18:45,120
12,000 feet pointing 20 degrees nose low

404
00:18:48,960 --> 00:18:47,850
fairly steep approach Tom's lined up

405
00:18:51,060 --> 00:18:48,970
right on the

406
00:18:53,760 --> 00:18:51,070
numbers for our landing there on that

407
00:18:56,310 --> 00:18:53,770
morning several weeks ago of course the

408
00:18:59,190 --> 00:18:56,320
entry flight control team had gotten us

409
00:19:00,539 --> 00:18:59,200
to this point with a great effort by

410
00:19:02,990 --> 00:19:00,549
some of the folks here in the room with

411
00:19:05,760 --> 00:19:03,000
us today here we are at 2,000 feet

412
00:19:09,029 --> 00:19:05,770
beginning the gentle pull out from that

413
00:19:10,560 --> 00:19:09,039

steep dive to approach the runway using

414
00:19:13,200 --> 00:19:10,570
the lights to the left of the runway to

415
00:19:15,000 --> 00:19:13,210
achieve a one and a half degree approach

416
00:19:16,470 --> 00:19:15,010
Kevin puts the wheels down about ten

417
00:19:18,450 --> 00:19:16,480
seconds before touchdown and the

418
00:19:21,990 --> 00:19:18,460
airspeed is bleeding from about 300

419
00:19:25,289 --> 00:19:22,000
knots done to target of 205 a touchdown

420
00:19:27,180 --> 00:19:25,299
and we're intending to touchdown about

421
00:19:29,430 --> 00:19:27,190
here on the black marks as you can see

422
00:19:31,560 --> 00:19:29,440
that's about where we touch down so the

423
00:19:34,169 --> 00:19:31,570
numbers worked out well the pre-planned

424
00:19:36,419 --> 00:19:34,179
numbers at 195 Kevin pushes two buttons

425
00:19:38,730 --> 00:19:36,429
which deploys the drag chute I lower the

426
00:19:40,860 --> 00:19:38,740
nose to the runway and then we can use a

427
00:19:43,860 --> 00:19:40,870
nose wheel steering system on the

428
00:19:46,289 --> 00:19:43,870
orbiter much like an airliner to track

429
00:19:48,299 --> 00:19:46,299
the center line to see here it also has

430
00:19:51,659 --> 00:19:48,309
brakes like an airliner so we're slowing

431
00:19:53,340 --> 00:19:51,669
it with the brakes at about 60 knots

432
00:19:55,110 --> 00:19:53,350
Kevin punches another button which

433
00:19:56,730 --> 00:19:55,120
releases a drag chute so it doesn't

434
00:19:59,340 --> 00:19:56,740
drape down over the engines after we

435
00:20:01,500 --> 00:19:59,350
stop and we continue breaking until we

436
00:20:03,419 --> 00:20:01,510
come to a complete stop and that's the

437
00:20:05,789 --> 00:20:03,429
end of the flight portion of the mission

438
00:20:07,620 --> 00:20:05,799

but some of the most crucial data still

439
00:20:09,840 --> 00:20:07,630
had to be collected as these four

440
00:20:11,490 --> 00:20:09,850
payload crewmembers readapted to gravity

441
00:20:13,620 --> 00:20:11,500
so we very efficiently with the help of

442
00:20:15,750 --> 00:20:13,630
the folks here in Mission Control egress

443
00:20:17,430 --> 00:20:15,760
the vehicle they began their data takes

444
00:20:19,500 --> 00:20:17,440
and I think you can see from this that

445
00:20:24,779 --> 00:20:19,510
we were very pleased with the 17-day

446
00:20:31,740 --> 00:20:24,789
flight and we'll transition now to the

447
00:20:33,180 --> 00:20:31,750
slides the STS 78 mission links past

448
00:20:35,370 --> 00:20:33,190
with present through a crew patch

449
00:20:37,830 --> 00:20:35,380
influenced by Pacific Northwest Native

450
00:20:39,419 --> 00:20:37,840
American art central to the design is

451
00:20:41,700 --> 00:20:39,429
the space shuttle Columbia who shape

452
00:20:43,409 --> 00:20:41,710
evokes the image of the eagle an icon of

453
00:20:45,570 --> 00:20:43,419
power and prestige in the national

454
00:20:47,460 --> 00:20:45,580
symbol of the United States the eagles

455
00:20:49,049 --> 00:20:47,470
feathers representing both peace and

456
00:20:52,049 --> 00:20:49,059
friendship symbolize the spirit of

457
00:20:53,640 --> 00:20:52,059
international unity on STS 78 in orbit

458
00:20:55,890 --> 00:20:53,650
surrounding the mission number recalls a

459
00:20:57,870 --> 00:20:55,900
traditional NASA emblem the life

460
00:21:00,480 --> 00:20:57,880
sciences in microgravity space lab or

461
00:21:02,159 --> 00:21:00,490
LMS is housed in Colombia's payload Bay

462
00:21:04,440 --> 00:21:02,169
and is depicted in a manner

463
00:21:06,690 --> 00:21:04,450

I'm innocent of totem art the pulsating

464
00:21:08,879 --> 00:21:06,700
Sun a symbol of life displays three

465
00:21:11,399 --> 00:21:08,889
crystals representing STS seventy-eights

466
00:21:13,889 --> 00:21:11,409
3 microgravity materials processing

467
00:21:16,049 --> 00:21:13,899
facilities the constellation delphinus

468
00:21:18,299 --> 00:21:16,059
recalls the dolphin friend of sea

469
00:21:19,769 --> 00:21:18,309
explorers each star representing one

470
00:21:21,720 --> 00:21:19,779
member of STS seventy-eights

471
00:21:23,639 --> 00:21:21,730
international crew including our

472
00:21:26,249 --> 00:21:23,649
alternate payload specialist Pedro Duque

473
00:21:27,810 --> 00:21:26,259
and Luca Urbani the Olympic colored

474
00:21:29,489 --> 00:21:27,820
thrust rings at the base of Columbia

475
00:21:31,830 --> 00:21:29,499
signify the five continents of Earth

476
00:21:35,060 --> 00:21:31,840
United in global cooperation the

477
00:21:39,720 --> 00:21:35,070
advanced advancement of all humankind

478
00:21:41,159 --> 00:21:39,730
and this is a photo of the et after

479
00:21:43,769 --> 00:21:41,169
separation about a third of the way

480
00:21:46,049 --> 00:21:43,779
through the sequence and it's about to

481
00:21:48,330 --> 00:21:46,059
re-enter and it has started its tumble

482
00:21:50,580 --> 00:21:48,340
already and if you'll look up near the

483
00:21:52,560 --> 00:21:50,590
top of the et you can see kind of a

484
00:21:55,019 --> 00:21:52,570
bull's-eye like Mars grey and black and

485
00:21:58,289 --> 00:21:55,029
that is the characteristic burn scar of

486
00:22:00,269 --> 00:21:58,299
the SRBs this was taken with a nikon f 4

487
00:22:02,399 --> 00:22:00,279
and a 300 millimeter lens with the

488
00:22:03,960 --> 00:22:02,409

doubler on it kind of looked like a

489
00:22:06,210 --> 00:22:03,970
small bazooka actually when you get it

490
00:22:08,399 --> 00:22:06,220
out there so you can imagine a Chuck

491
00:22:10,049 --> 00:22:08,409
Chuck and I were both up there getting

492
00:22:11,820 --> 00:22:10,059
the cameras out with Susan's help and

493
00:22:14,220 --> 00:22:11,830
maneuvering ourselves into the back

494
00:22:18,119 --> 00:22:14,230
winner to take this picture and I think

495
00:22:20,039 --> 00:22:18,129
we got some good ones this is the

496
00:22:22,470 --> 00:22:20,049
shuttle amateur radio experiment what a

497
00:22:24,149 --> 00:22:22,480
delight this was each crew member got a

498
00:22:26,099 --> 00:22:24,159
chance to talk with school kids all

499
00:22:28,139 --> 00:22:26,109
around the world and many school kids

500
00:22:30,509 --> 00:22:28,149
had worked for six months or up to a

501
00:22:31,769 --> 00:22:30,519
year even preparing working in science

502
00:22:33,720 --> 00:22:31,779
and math studying the orbital

503
00:22:35,519 --> 00:22:33,730
trajectories of the shuttle getting

504
00:22:37,590 --> 00:22:35,529
ready with antennas and so forth to get

505
00:22:40,259 --> 00:22:37,600
a chance to talk with us on board the

506
00:22:42,599 --> 00:22:40,269
real credit goes to our X team here on

507
00:22:44,580 --> 00:22:42,609
site those guys and ladies that worked

508
00:22:46,019 --> 00:22:44,590
so hard on this program we got a chance

509
00:22:47,659 --> 00:22:46,029
to talk to many people around the world

510
00:22:49,680 --> 00:22:47,669
and just the feel of someone being

511
00:22:51,810 --> 00:22:49,690
whether it's an internet question or

512
00:22:53,789 --> 00:22:51,820
kacar our shuttle amateur radio

513
00:22:55,139 --> 00:22:53,799

experiment gets a chance for people to

514
00:22:58,759 --> 00:22:55,149
feel like they're inside the shuttle and

515
00:23:02,729 --> 00:23:01,259
it was another experiment that we had on

516
00:23:04,799 --> 00:23:02,739
our flight that wasn't seen in the film

517
00:23:06,299 --> 00:23:04,809
and that's the plant growth facility

518
00:23:09,239 --> 00:23:06,309
another number of people here interested

519
00:23:11,009 --> 00:23:09,249
in how plants grow in space we continue

520
00:23:12,839 --> 00:23:11,019
to do research in that area and

521
00:23:14,320 --> 00:23:12,849
jean-jacques and I were the two people

522
00:23:16,570 --> 00:23:14,330
that were designated to

523
00:23:18,370 --> 00:23:16,580
to monitor and harvest these plants

524
00:23:20,169 --> 00:23:18,380
after they had been growing in space for

525
00:23:22,419 --> 00:23:20,179
about a week and a half to two weeks

526
00:23:25,630 --> 00:23:22,429
what you see here is documentation of

527
00:23:27,460 --> 00:23:25,640
the chambers we had five chambers four

528
00:23:28,419 --> 00:23:27,470
of which were exposed to the cabin air

529
00:23:30,970 --> 00:23:28,429
and one of which was totally

530
00:23:34,360 --> 00:23:30,980
self-contained in the next slide you can

531
00:23:36,610 --> 00:23:34,370
see one of the chambers that was exposed

532
00:23:38,680 --> 00:23:36,620
to the cabin air and the Neal's are

533
00:23:41,110 --> 00:23:38,690
quite sparse to the plants are bent over

534
00:23:43,630 --> 00:23:41,120
on purpose to see if they can grow

535
00:23:45,610 --> 00:23:43,640
reactive tissue at the bend while

536
00:23:47,980 --> 00:23:45,620
they're in microgravity versus the ones

537
00:23:49,389 --> 00:23:47,990
that aren't bent at the middle but when

538
00:23:51,370 --> 00:23:49,399

we took out the one that had not been

539
00:23:54,250 --> 00:23:51,380
exposed to the cabin air it was like a

540
00:23:55,480 --> 00:23:54,260
lush tropical forest in there and when

541
00:23:57,009 --> 00:23:55,490
you thought about the fact that this is

542
00:23:58,629 --> 00:23:57,019
what it looks like when it's exposed to

543
00:24:01,620 --> 00:23:58,639
cabin air really made all of us pause

544
00:24:03,990 --> 00:24:01,630
for a minute wonder what was in our air

545
00:24:08,129 --> 00:24:04,000
I'm sure we're interested in hearing the

546
00:24:13,299 --> 00:24:11,649
and this is a picture of well we're

547
00:24:15,100 --> 00:24:13,309
taking blood from each other and believe

548
00:24:17,919 --> 00:24:15,110
it or not throughout the 17 day mission

549
00:24:21,220 --> 00:24:17,929
the payload crew all donated about 120

550
00:24:22,480 --> 00:24:21,230
cc's of blood per person Chuck is there

551
00:24:25,419 --> 00:24:22,490
with a tourniquet on his arm and that's

552
00:24:28,360 --> 00:24:25,429
me about to a place butterfly catheter

553
00:24:31,509 --> 00:24:28,370
into his vein to get a morning fasting

554
00:24:33,070 --> 00:24:31,519
blood sample and in many in many

555
00:24:35,500 --> 00:24:33,080
instances we were actually taking blood

556
00:24:39,279 --> 00:24:35,510
samples pre and post TVD exercises you

557
00:24:41,710 --> 00:24:39,289
saw that earlier in the slides here and

558
00:24:44,139 --> 00:24:41,720
we were measuring hormone levels and

559
00:24:47,320 --> 00:24:44,149
other physiologic functions with the

560
00:24:50,110 --> 00:24:47,330
blood and to my knowledge between the

561
00:24:51,850 --> 00:24:50,120
SLS series of flights this is one of the

562
00:24:54,580 --> 00:24:51,860
big successes here is that we managed to

563
00:24:56,200 --> 00:24:54,590

get every blood sample and so far from

564
00:24:57,940 --> 00:24:56,210
what we've heard from the pis they've

565
00:25:02,440 --> 00:24:57,950
all been very good and though they're

566
00:25:05,940 --> 00:25:02,450
getting the data they need so we

567
00:25:08,350 --> 00:25:05,950
recognize folks with a call the KCA

568
00:25:13,060 --> 00:25:08,360
equipment and really all it is is a

569
00:25:16,210 --> 00:25:13,070
video teleconferencing system we use the

570
00:25:19,480 --> 00:25:16,220
KO antenna on the orbiters capability to

571
00:25:21,639 --> 00:25:19,490
uplink video files and we had to a

572
00:25:23,649 --> 00:25:21,649
transmissions the age dick tracy is here

573
00:25:25,330 --> 00:25:23,659
with a little camera on the laptop

574
00:25:27,330 --> 00:25:25,340
computer we can see the people in

575
00:25:30,000 --> 00:25:27,340
Mission Control Center they

576
00:25:31,290 --> 00:25:30,010
see that it turned out to really help us

577
00:25:33,300 --> 00:25:31,300
out and we did when the in-flight

578
00:25:40,500 --> 00:25:33,310
maintenance works on the bubble

579
00:25:45,390 --> 00:25:40,510
experiment having the opportunity to see

580
00:25:47,910 --> 00:25:45,400
from the from space his hometown is for

581
00:25:50,430 --> 00:25:47,920
each of us a very good sex satisfaction

582
00:25:55,220 --> 00:25:50,440
here you have the south part of France

583
00:25:57,590 --> 00:25:55,230
with on the left bottom part the

584
00:26:01,320 --> 00:25:57,600
beginning of the French Riviera

585
00:26:04,530 --> 00:26:01,330
Marseille and going to the Italian

586
00:26:07,920 --> 00:26:04,540
border you can see also the Alps as it's

587
00:26:11,070 --> 00:26:07,930
a very nice mountains on the middle or

588
00:26:13,710 --> 00:26:11,080

right is some snow on top of the

589
00:26:16,050 --> 00:26:13,720
glaciers and just in the middle of the

590
00:26:20,370 --> 00:26:16,060
Grenoble Valley Kenobi's my home

591
00:26:25,310 --> 00:26:20,380
tone-tone and is also the capital of the

592
00:26:32,280 --> 00:26:28,680
another good shot of an important city

593
00:26:35,750 --> 00:26:32,290
for for us this is Madrid in Spain just

594
00:26:40,200 --> 00:26:35,760
in the middle of the Iberian Peninsula

595
00:26:43,740 --> 00:26:40,210
it's not very easy to see the city

596
00:26:48,630 --> 00:26:43,750
because of the colors which match

597
00:26:50,340 --> 00:26:48,640
actually the landscape around it but we

598
00:26:53,640 --> 00:26:50,350
are sure that matter is is just in the

599
00:26:56,070 --> 00:26:53,650
middle of this picture here and this was

600
00:27:02,760 --> 00:26:56,080
an important shot for a pedo Duque our

601
00:27:05,390 --> 00:27:02,770
alternate everyone recognizes the this

602
00:27:08,640 --> 00:27:05,400
is the boot of Italy and in particular

603
00:27:10,890 --> 00:27:08,650
along the spine of Italy near the east

604
00:27:12,750 --> 00:27:10,900
coast or the apennine mountains on the

605
00:27:15,150 --> 00:27:12,760
west coast about halfway down the boot

606
00:27:16,560 --> 00:27:15,160
is the city of Rome a little bit further

607
00:27:19,380 --> 00:27:16,570
down from that is the famous Bay of

608
00:27:21,810 --> 00:27:19,390
Naples to the left is the island of

609
00:27:25,130 --> 00:27:21,820
Sicily which in this very rare occasion

610
00:27:28,620 --> 00:27:25,140
during our mission was cloud-covered

611
00:27:30,060 --> 00:27:28,630
Italy is very important country a

612
00:27:32,790 --> 00:27:30,070
contributor to the international space

613
00:27:35,550 --> 00:27:32,800

program I got up every morning to look

614
00:27:36,870 --> 00:27:35,560
at this view thinking about Italy being

615
00:27:39,510 --> 00:27:36,880
the cradle of Western civilization

616
00:27:43,020 --> 00:27:39,520
centuries ago and about today its

617
00:27:45,480 --> 00:27:43,030
high-tech space program and also Italy

618
00:27:47,370 --> 00:27:45,490
is the home of Luca or Bonnie our

619
00:27:49,590 --> 00:27:47,380
alternate payload specialist who is a

620
00:27:51,780 --> 00:27:49,600
member of our crew we considered Luca

621
00:27:54,800 --> 00:27:51,790
and Pedro as members of our crew because

622
00:27:57,240 --> 00:27:54,810
not only their training but also of the

623
00:27:58,500 --> 00:27:57,250
payload development of procedures

624
00:28:00,540 --> 00:27:58,510
development ly contributed to our flight

625
00:28:01,890 --> 00:28:00,550
and it's very likely that Luca will have

626
00:28:06,810 --> 00:28:01,900
his own shuttle flight in the coming

627
00:28:08,910 --> 00:28:06,820
years moving on to the United States and

628
00:28:11,100 --> 00:28:08,920
the rest of North America this is a

629
00:28:13,740 --> 00:28:11,110
picture of the Cascade Range with the

630
00:28:17,070 --> 00:28:13,750
Diamonds of the mountains rarely seen

631
00:28:19,050 --> 00:28:17,080
from space without cloud cover just to

632
00:28:21,720 --> 00:28:19,060
orient you up to the very top of the

633
00:28:24,690 --> 00:28:21,730
picture you're basically looking at the

634
00:28:26,790 --> 00:28:24,700
South tip of British Columbia including

635
00:28:29,640 --> 00:28:26,800
Vancouver Island which is where Bob is

636
00:28:31,920 --> 00:28:29,650
from is from Victoria the mountain at

637
00:28:34,710 --> 00:28:31,930
the very top there is Mount Rainier and

638
00:28:35,990 --> 00:28:34,720

Chuck is from the Seattle area just

639
00:28:38,750 --> 00:28:36,000
nearby that area

640
00:28:40,010 --> 00:28:38,760
just to the south of Mount Rainier to

641
00:28:42,020 --> 00:28:40,020
the little bit to the right is Mount

642
00:28:44,500 --> 00:28:42,030
Adams and then a little bit further down

643
00:28:46,820 --> 00:28:44,510
there is a little white blotch with some

644
00:28:49,280 --> 00:28:46,830
brownish grey just to the north that's

645
00:28:51,680 --> 00:28:49,290
Mount Saint Helens and it looks like

646
00:28:53,000 --> 00:28:51,690
it's been had its cap blown off and of

647
00:28:54,380 --> 00:28:53,010
course that's exactly what happened in

648
00:28:56,930 --> 00:28:54,390
nineteen eighty and then the residue

649
00:28:58,730 --> 00:28:56,940
from the volcanic eruption you can still

650
00:29:00,980 --> 00:28:58,740
see from space here if you look at the

651
00:29:02,510 --> 00:29:00,990
gray area just to the north of that the

652
00:29:05,030 --> 00:29:02,520
next mountain down is near my hometown

653
00:29:06,320 --> 00:29:05,040
of Portland Oregon so we've crossed over

654
00:29:08,630 --> 00:29:06,330
the Columbia River into the state of

655
00:29:09,950 --> 00:29:08,640
Oregon and that's Mount Hood and then

656
00:29:12,710 --> 00:29:09,960
further down near the bottom of the

657
00:29:14,480 --> 00:29:12,720
picture is Mount Jefferson and at the

658
00:29:18,920 --> 00:29:14,490
very bottom are the three sisters which

659
00:29:21,080 --> 00:29:18,930
is in Central Oregon we also had some

660
00:29:22,520 --> 00:29:21,090
outstanding opportunities to take

661
00:29:24,920 --> 00:29:22,530
pictures of Denver and Colorado Springs

662
00:29:26,990 --> 00:29:24,930
if you look at this picture the the

663
00:29:29,720 --> 00:29:27,000

green is the rampart range south of

664
00:29:31,610 --> 00:29:29,730
Denver and the brown that's to the left

665
00:29:33,170 --> 00:29:31,620
of the picture near the bottom is Pikes

666
00:29:34,490 --> 00:29:33,180
Peak and of course I know you can see

667
00:29:36,920 --> 00:29:34,500
very clearly in the center of the

668
00:29:39,460 --> 00:29:36,930
picture the Air Force Academy which is

669
00:29:43,280 --> 00:29:39,470
the alma mater of myself Tom and Kevin

670
00:29:45,350 --> 00:29:43,290
like a second home so we were we were

671
00:29:47,480 --> 00:29:45,360
surprised how clearly we could see

672
00:29:49,400 --> 00:29:47,490
details of the Academy's got several

673
00:29:51,500 --> 00:29:49,410
unique landmarks and while we were up

674
00:29:54,290 --> 00:29:51,510
there we had the opportunity to to give

675
00:29:57,260 --> 00:29:54,300
a welcome to the incoming class of basic

676
00:29:59,180 --> 00:29:57,270
cadets that happened to be planned for

677
00:30:04,400 --> 00:29:59,190
graduation in the year 2000 so it was

678
00:30:07,610 --> 00:30:04,410
quite a landmark as Jean Jacques

679
00:30:10,010 --> 00:30:07,620
mentioned we all got to view our homes

680
00:30:15,050 --> 00:30:10,020
from space this is where my roots are

681
00:30:17,150 --> 00:30:15,060
it's Lake Erie is at the top right hand

682
00:30:20,420 --> 00:30:17,160
corner that's the western end of the

683
00:30:23,330 --> 00:30:20,430
lake and at that very corner of the lake

684
00:30:25,700 --> 00:30:23,340
is Toledo Ohio named after Toledo Spain

685
00:30:27,710 --> 00:30:25,710
I grew up in a small town called

686
00:30:29,240 --> 00:30:27,720
woodville just outside there so this was

687
00:30:32,180 --> 00:30:29,250
the first out of four flights that I'd

688
00:30:33,710 --> 00:30:32,190

been far enough North to see Ohio what

689
00:30:36,500 --> 00:30:33,720
you see in the center part of the screen

690
00:30:39,220 --> 00:30:36,510
which Michigan up in the upper half we

691
00:30:41,570 --> 00:30:39,230
also have Detroit in the field of view

692
00:30:44,030 --> 00:30:41,580
near the upper right-hand corner and

693
00:30:48,070 --> 00:30:44,040
then the landmass just across the river

694
00:30:55,310 --> 00:30:51,020
could you tell from my exit this is my

695
00:30:56,630 --> 00:30:55,320
hometown this is the longest island in

696
00:30:59,090 --> 00:30:56,640
the United States the second one is

697
00:31:01,160 --> 00:30:59,100
would be island where Chuck is from very

698
00:31:04,160 --> 00:31:01,170
cleverly we named it long island this is

699
00:31:06,680 --> 00:31:04,170
where I grew up in the south side just

700
00:31:09,440 --> 00:31:06,690
north of the beaches in the middle of

701
00:31:12,440 --> 00:31:09,450
the picture is my hometown of a medieval

702
00:31:14,030 --> 00:31:12,450
Long Island and a medieval Long Island

703
00:31:18,549 --> 00:31:14,040
has about seven million of this

704
00:31:24,409 --> 00:31:21,859
this is a picture of the Washington DC

705
00:31:27,109 --> 00:31:24,419
area our nation's capital you can see

706
00:31:29,690 --> 00:31:27,119
the coastline on the right side of the

707
00:31:32,599 --> 00:31:29,700
view you can see the Potomac River is

708
00:31:35,539 --> 00:31:32,609
coming in on the left side the central

709
00:31:37,699 --> 00:31:35,549
part of the view and then winds down

710
00:31:39,619 --> 00:31:37,709
through Washington DC in the very center

711
00:31:42,259 --> 00:31:39,629
of the frame and then exits near the

712
00:31:44,149 --> 00:31:42,269
bottom left hand corner we had the

713
00:31:46,399 --> 00:31:44,159

opportunity of celebrating the

714
00:31:48,139 --> 00:31:46,409
independence of three nations of our

715
00:31:50,839 --> 00:31:48,149
crew members during or shortly after the

716
00:31:53,659 --> 00:31:50,849
flight we celebrated canada day on the

717
00:31:55,249 --> 00:31:53,669
first of july we obviously celebrated

718
00:31:58,099 --> 00:31:55,259
independence day on the fourth of july

719
00:32:00,589 --> 00:31:58,109
for the US and then just last weekend we

720
00:32:02,209 --> 00:32:00,599
had the pleasure of celebrating the

721
00:32:07,579 --> 00:32:02,219
french national holiday on the

722
00:32:09,940 --> 00:32:07,589
fourteenth of july this is an infrared

723
00:32:12,680 --> 00:32:09,950
picture of the same area not directly

724
00:32:15,379 --> 00:32:12,690
from the same location this is looking

725
00:32:18,769 --> 00:32:15,389
straight down on Washington DC with

726
00:32:21,319 --> 00:32:18,779
infrared film the vegetation shows up

727
00:32:23,749 --> 00:32:21,329
green I'm sorry shows up bread as you

728
00:32:26,329 --> 00:32:23,759
can see the river shows up more blue or

729
00:32:28,909 --> 00:32:26,339
green as it winds through Washington DC

730
00:32:30,289 --> 00:32:28,919
in the city itself shows up very gray or

731
00:32:32,479 --> 00:32:30,299
white colored and some of the other

732
00:32:35,449 --> 00:32:32,489
white blotches you see are the tops of

733
00:32:37,909 --> 00:32:35,459
clouds and on the very left hand side of

734
00:32:40,690 --> 00:32:37,919
the slide you can see a Dulles Airport

735
00:32:43,759 --> 00:32:40,700
very distinctly so infrared photography

736
00:32:47,989 --> 00:32:43,769
can make man-made structures very

737
00:32:50,899 --> 00:32:47,999
distinct Atlanta Georgia home of the

738
00:32:52,399 --> 00:32:50,909

1996 summer olympics and just as the

739
00:32:53,839 --> 00:32:52,409
athletes are gathering this week from

740
00:32:55,579 --> 00:32:53,849
all around the world in a spirit of

741
00:32:57,649 --> 00:32:55,589
international goodwill and cooperation

742
00:32:59,029 --> 00:32:57,659
and our crew and our mission we're

743
00:33:01,190 --> 00:32:59,039
particularly blessed and having

744
00:33:03,949 --> 00:33:01,200
representatives from five nations and

745
00:33:05,419 --> 00:33:03,959
from four separate space agencies and we

746
00:33:06,919 --> 00:33:05,429
feel like that's a great forerunner of

747
00:33:09,199 --> 00:33:06,929
the International Space Station in a

748
00:33:15,469 --> 00:33:09,209
cooperation and goodwill that that four

749
00:33:19,509 --> 00:33:15,479
boats as you can tell from this scene we

750
00:33:22,579 --> 00:33:19,519
enjoyed our 17 days in space immensely

751
00:33:25,639 --> 00:33:22,589
we did not look forward to returning we

752
00:33:28,009 --> 00:33:25,649
were happy to stay on orbit a few more

753
00:33:28,790 --> 00:33:28,019
days gathering the data for the folks

754
00:33:30,080 --> 00:33:28,800
here on the ground

755
00:33:32,030 --> 00:33:30,090
but again as I mentioned at the

756
00:33:34,400 --> 00:33:32,040
introduction none of this would be

757
00:33:36,140 --> 00:33:34,410
possible without the tremendous efforts

758
00:33:38,390 --> 00:33:36,150
that people here at the Johnson Space

759
00:33:41,480 --> 00:33:38,400
Center the Kennedy Space Center and in

760
00:33:42,860 --> 00:33:41,490
our case the dedicated folks at the

761
00:33:45,440 --> 00:33:42,870
Marshall Space Flight Center that

762
00:33:47,780 --> 00:33:45,450
directed the science and data gathering

763
00:33:49,700 --> 00:33:47,790

during this mission so on behalf of the

764
00:33:51,350 --> 00:33:49,710
crew we would like to thank each of you