



1
00:00:29,109 --> 00:00:26,870
it's uh indeed a pleasure and a

2
00:00:31,109 --> 00:00:29,119
privilege for the crew to be back here

3
00:00:34,069 --> 00:00:31,119
to share with all of you our experience

4
00:00:37,030 --> 00:00:34,079
in space for 15 days

5
00:00:39,270 --> 00:00:37,040
iml 2 was a record breaking flight we

6
00:00:40,069 --> 00:00:39,280
stayed up longer than any other shuttle

7
00:00:41,430 --> 00:00:40,079
and

8
00:00:44,150 --> 00:00:41,440
i think we did a lot of good science

9
00:00:46,630 --> 00:00:44,160
while we were up there i tried to stress

10
00:00:49,190 --> 00:00:46,640
while we were in space the importance of

11
00:00:50,069 --> 00:00:49,200
international microgravity lab too

12
00:00:52,389 --> 00:00:50,079
that

13
00:00:54,229 --> 00:00:52,399

this was setting the groundwork for

14

00:00:57,189 --> 00:00:54,239

future operations aboard international

15

00:00:59,590 --> 00:00:57,199

space station and these guys just did an

16

00:01:01,270 --> 00:00:59,600

absolutely super job i

17

00:01:03,430 --> 00:01:01,280

i'll share with you a little bit of the

18

00:01:05,509 --> 00:01:03,440

the emotion after landing

19

00:01:06,550 --> 00:01:05,519

when we got to wheels stop

20

00:01:17,510 --> 00:01:06,560

i

21

00:01:19,190 --> 00:01:17,520

felt at wheelstop after such a

22

00:01:21,190 --> 00:01:19,200

successful mission

23

00:01:23,590 --> 00:01:21,200

and i hated to give up the orbiter when

24

00:01:25,590 --> 00:01:23,600

it came time for scotty horowitz one of

25

00:01:27,510 --> 00:01:25,600

the astronaut support personnel to come

26
00:01:29,990 --> 00:01:27,520
inside and he said it's okay bob you got

27
00:01:32,230 --> 00:01:30,000
it all safe now you can leave and

28
00:01:35,030 --> 00:01:32,240
after 15 days i was kind of attached to

29
00:01:35,749 --> 00:01:35,040
colombia it was just a super spaceship

30
00:01:37,590 --> 00:01:35,759
but

31
00:01:39,590 --> 00:01:37,600
i've i've said all along in a lot of

32
00:01:41,350 --> 00:01:39,600
briefings that people just see the

33
00:01:42,789 --> 00:01:41,360
astronaut office

34
00:01:45,109 --> 00:01:42,799
you know when we fly in space we're a

35
00:01:46,630 --> 00:01:45,119
small part of it unfortunately we're a

36
00:01:49,510 --> 00:01:46,640
very visible part

37
00:01:51,030 --> 00:01:49,520
but it is a team effort and this was

38
00:01:53,270 --> 00:01:51,040

your space flight

39

00:01:55,910 --> 00:01:53,280

you guys just did an absolutely super

40

00:01:57,590 --> 00:01:55,920

job preparing us preparing the payloads

41

00:01:59,030 --> 00:01:57,600

training us making sure that everything

42

00:02:01,830 --> 00:01:59,040

operated correctly while we were on

43

00:02:05,190 --> 00:02:01,840

orbit providing the support we needed to

44

00:02:07,270 --> 00:02:05,200

have such a successful mission so uh all

45

00:02:09,830 --> 00:02:07,280

these medals that we got today they're

46

00:02:12,390 --> 00:02:09,840

special for us but you should also take

47

00:02:13,910 --> 00:02:12,400

pride in their being awarded to us

48

00:02:16,070 --> 00:02:13,920

because it was through your efforts that

49

00:02:17,750 --> 00:02:16,080

we were able to receive them so we'd

50

00:02:19,589 --> 00:02:17,760

like to thank all of you very much for

51
00:02:21,190 --> 00:02:19,599
your hard work and we're just really

52
00:02:22,790 --> 00:02:21,200
happy to be here with you and share some

53
00:02:24,470 --> 00:02:22,800
of these pictures

54
00:02:26,309 --> 00:02:24,480
i guess we're on nasa's select now so

55
00:02:28,790 --> 00:02:26,319
before we get going i'd like to

56
00:02:30,790 --> 00:02:28,800
just reintroduce the uh the crew here

57
00:02:33,030 --> 00:02:30,800
for everybody and talk a little bit

58
00:02:34,710 --> 00:02:33,040
about them i i can take

59
00:02:37,190 --> 00:02:34,720
a chance to do that

60
00:02:39,350 --> 00:02:37,200
on my right uh my right hand man here my

61
00:02:40,390 --> 00:02:39,360
pilot jim halsell this was jim's first

62
00:02:42,710 --> 00:02:40,400
flight

63
00:02:44,470 --> 00:02:42,720

jim had flown sr-71s in the air force

64

00:02:46,229 --> 00:02:44,480

before he came to nasa as an astronaut

65

00:02:48,309 --> 00:02:46,239

so he was used to going mach

66

00:02:50,630 --> 00:02:48,319

3 3 and a half but

67

00:02:53,990 --> 00:02:50,640

we got him going a little faster and he

68

00:02:58,309 --> 00:02:55,830

no stranger to y'all is rick of

69

00:02:59,910 --> 00:02:58,319

course rick worked here at jsc before he

70

00:03:02,470 --> 00:02:59,920

was selected to be an astronaut with

71

00:03:04,309 --> 00:03:02,480

myself in 1985 and

72

00:03:07,030 --> 00:03:04,319

we were pretty proud and pleased to have

73

00:03:09,750 --> 00:03:07,040

two of the 85 class as the commander and

74

00:03:12,149 --> 00:03:09,760

payload commander on this flight

75

00:03:13,589 --> 00:03:12,159

rick just i can't say enough good things

76

00:03:16,070 --> 00:03:13,599

about the job he did as payload

77

00:03:18,550 --> 00:03:16,080

commander he the payload crew was

78

00:03:19,910 --> 00:03:18,560

assigned to this flight two years

79

00:03:22,229 --> 00:03:19,920

ahead of time

80

00:03:24,710 --> 00:03:22,239

and the travel and the work that these

81

00:03:27,350 --> 00:03:24,720

guys put in preparing these better than

82

00:03:28,949 --> 00:03:27,360

80 experiments from 15 countries around

83

00:03:30,309 --> 00:03:28,959

the world and six different space

84

00:03:32,630 --> 00:03:30,319

agencies

85

00:03:35,110 --> 00:03:32,640

was phenomenal and when

86

00:03:37,110 --> 00:03:35,120

the orbiter crew got assigned uh all we

87

00:03:38,550 --> 00:03:37,120

had to do was get up to speed a little

88

00:03:40,390 --> 00:03:38,560

bit on what was going to be done on the

89

00:03:41,910 --> 00:03:40,400

job and show them that we knew how to

90

00:03:43,509 --> 00:03:41,920

fly the orbiter but these guys were

91

00:03:44,869 --> 00:03:43,519

ready to go and

92

00:03:46,550 --> 00:03:44,879

it was an awful lot of hard work and

93

00:03:49,030 --> 00:03:46,560

they did a super job

94

00:03:52,309 --> 00:03:49,040

it was worth it

95

00:03:54,949 --> 00:03:52,319

carl walsh next to rick was ms2

96

00:03:57,429 --> 00:03:54,959

this was carl's second flight

97

00:03:59,110 --> 00:03:57,439

you probably remember he flew on sts-51

98

00:04:01,270 --> 00:03:59,120

got to do a spacewalk and took those

99

00:04:02,869 --> 00:04:01,280

fantastic imax pictures that are part of

100

00:04:05,030 --> 00:04:02,879

destiny in space

101
00:04:07,030 --> 00:04:05,040
this time we didn't let him do anything

102
00:04:09,350 --> 00:04:07,040
so exotic we locked him up in a space

103
00:04:11,030 --> 00:04:09,360
lab for 15 days but

104
00:04:12,869 --> 00:04:11,040
he did get to be the commander on the

105
00:04:14,949 --> 00:04:12,879
blue shift for the few hours that i

106
00:04:17,110 --> 00:04:14,959
didn't sleep each night and

107
00:04:19,349 --> 00:04:17,120
he just did a super job keeping the

108
00:04:20,710 --> 00:04:19,359
orbiter running so these guys could do

109
00:04:26,710 --> 00:04:20,720
great science

110
00:04:31,510 --> 00:04:29,590
dr leroy ciao uh on the blue team back

111
00:04:33,510 --> 00:04:31,520
in the lab and i'm going to talk about

112
00:04:37,350 --> 00:04:33,520
leroy and don together because in my

113
00:04:41,110 --> 00:04:37,360

mind i just can't separate them

114

00:04:42,710 --> 00:04:41,120

dr don thomas uh these guys just

115

00:04:44,230 --> 00:04:42,720

unbelievable the amount of work they

116

00:04:46,469 --> 00:04:44,240

were doing they were bouncing from one

117

00:04:48,150 --> 00:04:46,479

experiment to another back there the

118

00:04:50,070 --> 00:04:48,160

folks at huntsville just couldn't wear

119

00:04:52,150 --> 00:04:50,080

them down and

120

00:04:54,629 --> 00:04:52,160

i'm really proud of the work that they

121

00:04:57,270 --> 00:04:54,639

put forth getting the science done back

122

00:04:58,870 --> 00:04:57,280

in the lab they just did a super job

123

00:05:01,030 --> 00:04:58,880

getting everything that was asked of

124

00:05:02,469 --> 00:05:01,040

them completed and

125

00:05:04,070 --> 00:05:02,479

i think the folks at huntsville were

126

00:05:05,830 --> 00:05:04,080

surprised they could get so much out of

127

00:05:07,830 --> 00:05:05,840

a crew

128

00:05:09,830 --> 00:05:07,840

and finally last but certainly not least

129

00:05:13,029 --> 00:05:09,840

dr chiaki mukai

130

00:05:15,590 --> 00:05:13,039

chiaki our payload specialist from nasda

131

00:05:17,029 --> 00:05:15,600

was an alternate payload specialist on

132

00:05:17,990 --> 00:05:17,039

space lab j

133

00:05:19,749 --> 00:05:18,000

and

134

00:05:21,670 --> 00:05:19,759

she was well familiar with most of the

135

00:05:23,510 --> 00:05:21,680

experiments we were flying and was

136

00:05:24,390 --> 00:05:23,520

prepared to fly in space

137

00:05:26,310 --> 00:05:24,400

and

138

00:05:28,469 --> 00:05:26,320

the only problem we had with shiaki was

139

00:05:29,590 --> 00:05:28,479

trying to slow her down she has got one

140

00:05:30,469 --> 00:05:29,600

speed

141

00:05:34,870 --> 00:05:30,479

and

142

00:05:36,870 --> 00:05:34,880

to tell her that in microgravity you

143

00:05:39,670 --> 00:05:36,880

don't need to go that fast you can slow

144

00:05:41,430 --> 00:05:39,680

down a little bit and get things done

145

00:05:43,110 --> 00:05:41,440

i think we're making a little bit of a

146

00:05:45,749 --> 00:05:43,120

impact toward the end of the flight but

147

00:05:47,830 --> 00:05:45,759

not much she just

148

00:05:49,510 --> 00:05:47,840

extremely enthusiastic hard worker and

149

00:05:51,189 --> 00:05:49,520

did a super job

150

00:05:52,790 --> 00:05:51,199

one person we don't have with us today

151
00:05:55,670 --> 00:05:52,800
is our alternate payload specialist

152
00:05:57,110 --> 00:05:55,680
jean-jacques favier and jean-jacques was

153
00:05:59,430 --> 00:05:57,120
an extreme help

154
00:06:01,990 --> 00:05:59,440
preparing for the flight in helping

155
00:06:03,909 --> 00:06:02,000
ensure that we got all the science done

156
00:06:05,110 --> 00:06:03,919
working at the payload operations center

157
00:06:07,110 --> 00:06:05,120
in marshall

158
00:06:08,950 --> 00:06:07,120
so we're extremely pleased to be here

159
00:06:10,309 --> 00:06:08,960
and without any more words i'd like to

160
00:06:12,390 --> 00:06:10,319
share some of the pictures we're going

161
00:06:14,950 --> 00:06:12,400
to start out with some 70 millimeter

162
00:06:17,029 --> 00:06:14,960
slides if we can have the slides first

163
00:06:18,469 --> 00:06:17,039

and the lights down

164

00:06:20,150 --> 00:06:18,479

we tried to pick

165

00:06:21,670 --> 00:06:20,160

slides i'm gonna give you a little tour

166

00:06:24,070 --> 00:06:21,680

of the earth we're gonna start out down

167

00:06:26,230 --> 00:06:24,080

at the galveston island and work our way

168

00:06:28,710 --> 00:06:26,240

around

169

00:06:29,830 --> 00:06:28,720

the slides that we picked show changes

170

00:06:31,510 --> 00:06:29,840

in the earth

171

00:06:34,070 --> 00:06:31,520

that are significant from previous

172

00:06:36,469 --> 00:06:34,080

shuttle missions or else pictures that

173

00:06:40,230 --> 00:06:36,479

maybe hadn't been documented before on

174

00:06:46,469 --> 00:06:42,870

of course no slide briefing is complete

175

00:06:48,390 --> 00:06:46,479

without a picture of our launch and

176

00:06:49,990 --> 00:06:48,400

first time flyers chime in was it worth

177

00:06:51,670 --> 00:06:50,000

all the work

178

00:06:54,710 --> 00:06:51,680

i'd say it was well worth it

179

00:06:56,390 --> 00:06:54,720

yes well worth it it was a right now uh

180

00:06:58,150 --> 00:06:56,400

my heart at this point the picture this

181

00:06:59,670 --> 00:06:58,160

picture was taken i think my heart is uh

182

00:07:04,710 --> 00:06:59,680

somewhere in my throat i couldn't

183

00:07:08,550 --> 00:07:06,710

once we got on orbit we opened up the

184

00:07:10,629 --> 00:07:08,560

payload bay doors and

185

00:07:12,790 --> 00:07:10,639

this is a view that the guys in the blue

186

00:07:14,469 --> 00:07:12,800

team and well the red team back in the

187

00:07:16,469 --> 00:07:14,479

lab also didn't get to see a whole lot

188

00:07:18,309 --> 00:07:16,479

it was a space lab from the outside they

189

00:07:22,790 --> 00:07:18,319

saw the inside of it

190

00:07:25,189 --> 00:07:22,800

and it's a fantastic laboratory

191

00:07:26,950 --> 00:07:25,199

it's set up just like a lab on earth

192

00:07:29,029 --> 00:07:26,960

only it's got an environment that you

193

00:07:30,710 --> 00:07:29,039

just can't get anywhere else

194

00:07:32,710 --> 00:07:30,720

we were in a microgravity environment in

195

00:07:33,990 --> 00:07:32,720

a very fine microgravity environment for

196

00:07:37,270 --> 00:07:34,000

15 days

197

00:07:39,110 --> 00:07:37,280

14 days worth of science and

198

00:07:40,790 --> 00:07:39,120

the only thing that we need to do is do

199

00:07:42,629 --> 00:07:40,800

it for longer and

200

00:07:44,390 --> 00:07:42,639

build space station international space

201
00:07:45,909 --> 00:07:44,400
station so that

202
00:07:48,150 --> 00:07:45,919
we can have this environment and

203
00:07:50,790 --> 00:07:48,160
continue on the work that we've started

204
00:07:55,189 --> 00:07:53,589
i i will point out that i had four hair

205
00:07:57,029 --> 00:07:55,199
balls on board for those that don't know

206
00:08:00,150 --> 00:07:57,039
what a hair ball is that's a an

207
00:08:01,670 --> 00:08:00,160
astronaut that was selected in 1990 and

208
00:08:03,189 --> 00:08:01,680
i think this is the most that they ever

209
00:08:05,350 --> 00:08:03,199
had congregated at one time in

210
00:08:07,110 --> 00:08:05,360
microgravity and in spite of having four

211
00:08:08,629 --> 00:08:07,120
hair balls the orbiter was pretty clean

212
00:08:10,629 --> 00:08:08,639
and there wasn't a whole lot of lint in

213
00:08:15,749 --> 00:08:10,639

the filters it was the most most that

214

00:08:20,390 --> 00:08:17,990

we were also extremely privileged to be

215

00:08:21,189 --> 00:08:20,400

airborne during the 25th anniversary of

216

00:08:23,350 --> 00:08:21,199

the

217

00:08:26,629 --> 00:08:23,360

apollo 11 lunar landing

218

00:08:29,029 --> 00:08:26,639

and we couldn't help but uh draw on the

219

00:08:30,710 --> 00:08:29,039

similarities between the missions in

220

00:08:32,310 --> 00:08:30,720

some ways or

221

00:08:34,469 --> 00:08:32,320

well first off we were extremely proud

222

00:08:35,350 --> 00:08:34,479

to be aboard colombia not only the

223

00:08:41,430 --> 00:08:35,360

the

224

00:08:44,230 --> 00:08:41,440

carried

225

00:08:46,150 --> 00:08:44,240

those guys to the moon 25 years ago we

226
00:08:48,070 --> 00:08:46,160
also launched from the same launch pad

227
00:08:49,750 --> 00:08:48,080
aboard the same mobile launch platform

228
00:08:51,670 --> 00:08:49,760
as apollo 11

229
00:08:54,389 --> 00:08:51,680
so that was kind of special

230
00:08:56,150 --> 00:08:54,399
and we were trading stories down on the

231
00:08:57,509 --> 00:08:56,160
mid deck one night and

232
00:08:58,389 --> 00:08:57,519
we thought it was pretty neat that we

233
00:09:01,590 --> 00:08:58,399
had a

234
00:09:03,829 --> 00:09:01,600
an apollo uh capcom dr story musgrave

235
00:09:06,389 --> 00:09:03,839
down on console uh talking to us

236
00:09:08,389 --> 00:09:06,399
everybody asked us well where were you

237
00:09:11,030 --> 00:09:08,399
when apollo 11 launched or when those

238
00:09:13,030 --> 00:09:11,040

guys landed on the moon and we all had

239

00:09:15,350 --> 00:09:13,040

our stories and we said uh well story

240

00:09:17,670 --> 00:09:15,360

where were you and story was in the uh

241

00:09:19,670 --> 00:09:17,680

at the at the launch at kennedy when

242

00:09:21,670 --> 00:09:19,680

they launched and in the moker when they

243

00:09:22,550 --> 00:09:21,680

landed so he had some good stories for

244

00:09:25,190 --> 00:09:22,560

us too

245

00:09:26,470 --> 00:09:25,200

but it it certainly was neat to uh to

246

00:09:27,590 --> 00:09:26,480

look at the moon up there and think

247

00:09:28,949 --> 00:09:27,600

about

248

00:09:30,389 --> 00:09:28,959

where we've been and know that we're

249

00:09:32,150 --> 00:09:30,399

going to build international space

250

00:09:33,509 --> 00:09:32,160

station and

251

00:09:36,230 --> 00:09:33,519

lay the groundwork for future

252

00:09:37,509 --> 00:09:36,240

exploration beyond our planet

253

00:09:38,949 --> 00:09:37,519

if you look real close there right in

254

00:09:40,710 --> 00:09:38,959

the center that dark area on the moon

255

00:09:45,269 --> 00:09:40,720

that's a sea of tranquility where apollo

256

00:09:50,230 --> 00:09:47,350

jim you want to talk about

257

00:09:51,990 --> 00:09:50,240

making sure we had good pictures

258

00:09:54,070 --> 00:09:52,000

one of the unavoidable duties of the

259

00:09:55,910 --> 00:09:54,080

pilot is to be the janitor i think

260

00:09:57,509 --> 00:09:55,920

myself and carl agree that we we got

261

00:09:58,790 --> 00:09:57,519

good at taking care of all the ship

262

00:10:00,630 --> 00:09:58,800

shaped kind of duties that you need to

263

00:10:01,910 --> 00:10:00,640

do to stay in space for 14 days

264

00:10:05,269 --> 00:10:01,920

comfortably and here you see a picture

265

00:10:07,990 --> 00:10:05,279

of me cleaning the windows and i do do

266

00:10:10,870 --> 00:10:09,350

it actually is more important than just

267

00:10:12,949 --> 00:10:10,880

from a cleanliness point of view we try

268

00:10:15,910 --> 00:10:12,959

to take a lot of 70 millimeter

269

00:10:17,590 --> 00:10:15,920

photography both color and color ir and

270

00:10:19,430 --> 00:10:17,600

to get the best possible photo it's

271

00:10:21,509 --> 00:10:19,440

important to clean the to clean the

272

00:10:23,990 --> 00:10:21,519

windows two or even three times a day

273

00:10:25,430 --> 00:10:24,000

because as you can imagine as the lab

274

00:10:26,870 --> 00:10:25,440

guys get a little bit of free time

275

00:10:29,269 --> 00:10:26,880

they're all up at the window plastering

276

00:10:31,430 --> 00:10:29,279

their noses right up to the window

277

00:10:33,030 --> 00:10:31,440

so occasionally like a good housewife or

278

00:10:35,190 --> 00:10:33,040

a house person i would

279

00:10:37,509 --> 00:10:35,200

admonish them to try to keep their noses

280

00:10:38,949 --> 00:10:37,519

off the window

281

00:10:40,470 --> 00:10:38,959

and it really is important there's

282

00:10:42,150 --> 00:10:40,480

nothing more frustrating when you get

283

00:10:43,990 --> 00:10:42,160

back and you've taken all these

284

00:10:45,509 --> 00:10:44,000

beautiful pictures of the earth and you

285

00:10:47,110 --> 00:10:45,519

find out that they're a little soft

286

00:10:48,389 --> 00:10:47,120

they're not quite in focus and it's not

287

00:10:49,670 --> 00:10:48,399

because you did anything wrong with the

288

00:10:51,030 --> 00:10:49,680

cameras because the windows weren't

289

00:10:54,949 --> 00:10:51,040

clean so we wanted to make sure we had

290

00:11:00,710 --> 00:10:57,190

it was a tremendous opportunity to view

291

00:11:02,870 --> 00:11:00,720

the earth on blue shift we saw a lot of

292

00:11:05,190 --> 00:11:02,880

north africa

293

00:11:06,870 --> 00:11:05,200

and we saw a lot of australia we flew

294

00:11:08,389 --> 00:11:06,880

over india but i can't tell you whether

295

00:11:10,150 --> 00:11:08,399

i saw in or

296

00:11:12,470 --> 00:11:10,160

whether there was really india beneath

297

00:11:14,790 --> 00:11:12,480

us because of these this huge monsoon

298

00:11:16,069 --> 00:11:14,800

cloud sort of hung over india for two

299

00:11:21,110 --> 00:11:16,079

weeks and they were just getting a

300

00:11:25,990 --> 00:11:23,350

if you look real close you'll notice

301
00:11:28,310 --> 00:11:26,000
galveston island and bolivar peninsula

302
00:11:33,190 --> 00:11:28,320
clear lake area is underneath that one

303
00:11:37,030 --> 00:11:35,190
but uh it really was a nice shot at

304
00:11:38,630 --> 00:11:37,040
galveston island when we went over this

305
00:11:39,990 --> 00:11:38,640
day if you

306
00:11:42,710 --> 00:11:40,000
when you look really close it's kind of

307
00:11:44,949 --> 00:11:42,720
hard to see in the lighting here but you

308
00:11:47,430 --> 00:11:44,959
can actually see the the moody center in

309
00:11:52,550 --> 00:11:47,440
the in the beaches in this one area

310
00:11:56,550 --> 00:11:54,150
coming down into

311
00:11:57,829 --> 00:11:56,560
south america this was just a gorgeous

312
00:11:59,509 --> 00:11:57,839
shot looking

313
00:12:01,910 --> 00:11:59,519

down the andes

314

00:12:03,750 --> 00:12:01,920

you can see the west coast of south

315

00:12:05,430 --> 00:12:03,760

america on the

316

00:12:07,990 --> 00:12:05,440

right of the screen there

317

00:12:10,949 --> 00:12:08,000

the andes with the dry lakes and then

318

00:12:13,030 --> 00:12:10,959

off that hazy area that you see

319

00:12:14,629 --> 00:12:13,040

on the far left of the screen there is

320

00:12:19,829 --> 00:12:14,639

over into the

321

00:12:24,710 --> 00:12:22,550

this is the rio grande river in

322

00:12:27,670 --> 00:12:24,720

bolivia and what you see there is not

323

00:12:29,430 --> 00:12:27,680

smoke that is the wind coming down and

324

00:12:34,310 --> 00:12:29,440

actually picking up

325

00:12:38,230 --> 00:12:36,389

this is one of they've seen this before

326

00:12:40,710 --> 00:12:38,240

on shuttle flights this is one of the

327

00:12:42,870 --> 00:12:40,720

better pictures of it this

328

00:12:46,150 --> 00:12:42,880

airborne dust particulate when it gets

329

00:12:48,150 --> 00:12:46,160

airborne is actually a nutrient for the

330

00:12:49,190 --> 00:12:48,160

rain forest as it gets carried off into

331

00:12:53,590 --> 00:12:49,200

the

332

00:12:58,470 --> 00:12:56,069

here we are over uh

333

00:13:01,110 --> 00:12:58,480

central south america you can see some

334

00:13:07,670 --> 00:13:01,120

of the the biomass burning getting ready

335

00:13:12,150 --> 00:13:08,790

again

336

00:13:19,110 --> 00:13:12,160

cultivation in the rain forest area in

337

00:13:22,949 --> 00:13:20,870

it doesn't show up quite as clearly on

338

00:13:25,670 --> 00:13:22,959

this screen but this is just a gorgeous

339

00:13:26,949 --> 00:13:25,680

shot of rio de janeiro as we come to the

340

00:13:28,629 --> 00:13:26,959

east coast of

341

00:13:30,629 --> 00:13:28,639

south america

342

00:13:32,870 --> 00:13:30,639

you can see the runway on the island

343

00:13:34,870 --> 00:13:32,880

there it was just exceptionally a clear

344

00:13:36,310 --> 00:13:34,880

day a lot of the time

345

00:13:37,590 --> 00:13:36,320

south america was in the clouds but

346

00:13:38,790 --> 00:13:37,600

toward the end of the mission the clouds

347

00:13:44,069 --> 00:13:38,800

cleared out and we just had some

348

00:13:49,350 --> 00:13:45,990

much in the news lately

349

00:13:55,910 --> 00:13:49,360

haiti on the island of hispaniola

350

00:14:01,269 --> 00:13:58,629

here's another phenomenon that

351
00:14:03,910 --> 00:14:01,279
they had not documented with photography

352
00:14:06,230 --> 00:14:03,920
they knew it was happening the smoke

353
00:14:07,509 --> 00:14:06,240
what looks like smoke at the top of the

354
00:14:10,310 --> 00:14:07,519
picture there you can see the light

355
00:14:13,590 --> 00:14:10,320
coral area that's actually the bahamas

356
00:14:15,750 --> 00:14:13,600
were just east of florida and the cloud

357
00:14:18,710 --> 00:14:15,760
that you see is actually dust it's

358
00:14:21,030 --> 00:14:18,720
particulate that has blown from africa

359
00:14:21,750 --> 00:14:21,040
across the atlantic ocean

360
00:14:24,069 --> 00:14:21,760
and

361
00:14:26,230 --> 00:14:24,079
this again is a particulate matter

362
00:14:28,389 --> 00:14:26,240
that's in the air that gets blown into

363
00:14:34,310 --> 00:14:28,399

south america and is actually a nutrient

364

00:14:39,430 --> 00:14:35,990

this is in

365

00:14:41,590 --> 00:14:39,440

saudi arabia and you can see

366

00:14:44,310 --> 00:14:41,600

center point irrigation where they're

367

00:14:47,030 --> 00:14:44,320

actually bringing up deep water from an

368

00:14:48,949 --> 00:14:47,040

aquifer and irrigating the land you'll

369

00:14:50,790 --> 00:14:48,959

notice some of the areas

370

00:14:53,430 --> 00:14:50,800

bright green where it's being irrigated

371

00:14:55,750 --> 00:14:53,440

others where it's not in the desert is

372

00:15:01,189 --> 00:14:55,760

actually reclaiming some of these center

373

00:15:06,150 --> 00:15:03,030

this has been well documented in a lot

374

00:15:11,269 --> 00:15:06,160

of shuttle federal actually back to 1965

375

00:15:15,269 --> 00:15:12,790

what you're seeing here in the center of

376

00:15:18,710 --> 00:15:15,279

the picture the the water area is

377

00:15:20,990 --> 00:15:18,720

approximately 15 to 20 percent

378

00:15:23,110 --> 00:15:21,000

the size of the lake that was there in

379

00:15:28,230 --> 00:15:23,120

1965 it's something that nasa's been

380

00:15:35,189 --> 00:15:32,069

uh this is uh lake turkana on the uh

381

00:15:37,910 --> 00:15:35,199

kenya ethiopian border uh where the

382

00:15:39,110 --> 00:15:37,920

river omo is uh building a delta into

383

00:15:40,389 --> 00:15:39,120

the lake

384

00:15:42,230 --> 00:15:40,399

this lake

385

00:15:43,910 --> 00:15:42,240

the delta that you see in the north

386

00:15:45,750 --> 00:15:43,920

there you can see the mud the silt being

387

00:15:48,870 --> 00:15:45,760

dumped in there but the actual delt up

388

00:15:51,350 --> 00:15:48,880

at the top is about 400 percent larger

389

00:15:57,509 --> 00:15:51,360

than it was first documented back during

390

00:16:01,590 --> 00:15:59,590

it doesn't show up real well here but in

391

00:16:04,069 --> 00:16:01,600

the water you see some

392

00:16:06,069 --> 00:16:04,079

pinkish swirls

393

00:16:09,910 --> 00:16:06,079

this is the red sea and this is a

394

00:16:11,509 --> 00:16:09,920

plankton bloom in the red sea

395

00:16:16,949 --> 00:16:11,519

and it's something that they'd not seen

396

00:16:20,710 --> 00:16:18,230

carl mentioned

397

00:16:22,870 --> 00:16:20,720

india being under water a lot or under

398

00:16:25,749 --> 00:16:22,880

cloud cover due to the monsoon season

399

00:16:28,470 --> 00:16:25,759

this is the brahmaputra river

400

00:16:30,470 --> 00:16:28,480

just coming out of the

401
00:16:32,629 --> 00:16:30,480
himalayas you can see the mountains the

402
00:16:34,629 --> 00:16:32,639
dark green area in the

403
00:16:37,590 --> 00:16:34,639
upper right corner of the picture and

404
00:16:39,829 --> 00:16:37,600
what is normally a an extremely braided

405
00:16:42,470 --> 00:16:39,839
river you can see all the the small

406
00:16:43,910 --> 00:16:42,480
little river uh roulettes or however you

407
00:16:45,829 --> 00:16:43,920
want to say it but

408
00:16:47,590 --> 00:16:45,839
uh you notice it's getting much wider as

409
00:16:50,069 --> 00:16:47,600
it fills with rain it just becomes a

410
00:16:55,749 --> 00:16:50,079
huge almost a moving lake as opposed to

411
00:17:00,710 --> 00:16:58,389
this is a melville island off the west

412
00:17:02,150 --> 00:17:00,720
coast of australia

413
00:17:04,870 --> 00:17:02,160

we saw

414

00:17:07,029 --> 00:17:04,880

australia quite a bit uh and you could

415

00:17:12,470 --> 00:17:07,039

see quite a bit of agricultural burning

416

00:17:17,189 --> 00:17:15,270

this is in the uh philippine sea uh jim

417

00:17:18,630 --> 00:17:17,199

took this picture you want to talk about

418

00:17:20,069 --> 00:17:18,640

sun glen

419

00:17:21,909 --> 00:17:20,079

yeah help me out if i can't remember i

420

00:17:23,590 --> 00:17:21,919

took so many pictures over the part of

421

00:17:24,870 --> 00:17:23,600

the flight but i sung blind is a very

422

00:17:26,390 --> 00:17:24,880

interesting phenomenon where if you

423

00:17:27,750 --> 00:17:26,400

catch the angle just right reflecting

424

00:17:29,669 --> 00:17:27,760

back up towards you you can get some

425

00:17:31,669 --> 00:17:29,679

really interesting photos of what's

426
00:17:33,270 --> 00:17:31,679
happening not only at the surface of the

427
00:17:35,350 --> 00:17:33,280
water but also to a certain depth

428
00:17:37,750 --> 00:17:35,360
beneath it and what you see here is the

429
00:17:40,789 --> 00:17:37,760
surface of the ocean the star the the

430
00:17:43,669 --> 00:17:40,799
black splotches are

431
00:17:45,350 --> 00:17:43,679
shadows from clouds so disregard that

432
00:17:46,870 --> 00:17:45,360
but what's really interesting to the

433
00:17:48,630 --> 00:17:46,880
oceanographers

434
00:17:49,510 --> 00:17:48,640
and if i can figure out how to operate

435
00:17:51,029 --> 00:17:49,520
this

436
00:17:53,669 --> 00:17:51,039
okay

437
00:17:56,070 --> 00:17:53,679
uh this area right here and bob you help

438
00:17:58,150 --> 00:17:56,080

me out with a scientific name of that

439

00:18:01,510 --> 00:17:58,160

well large internal waves uh they're

440

00:18:03,270 --> 00:18:01,520

called sulois bengakis but

441

00:18:04,789 --> 00:18:03,280

it's just the wave interaction that

442

00:18:06,630 --> 00:18:04,799

actually looks like a deep trough there

443

00:18:07,990 --> 00:18:06,640

but actually it you know if you were

444

00:18:11,029 --> 00:18:08,000

down on the surface of the ocean it

445

00:18:13,590 --> 00:18:11,039

would look level to you so from space

446

00:18:15,430 --> 00:18:13,600

we can see

447

00:18:17,590 --> 00:18:15,440

formations in the water that can't be

448

00:18:19,190 --> 00:18:17,600

seen on the surface of the ocean and the

449

00:18:21,590 --> 00:18:19,200

oceanographers are trying to understand

450

00:18:23,430 --> 00:18:21,600

better how the air masses and the water

451

00:18:24,870 --> 00:18:23,440

currents all interact together to

452

00:18:26,870 --> 00:18:24,880

develop the world's

453

00:18:28,710 --> 00:18:26,880

world's climates and this these this

454

00:18:31,510 --> 00:18:28,720

kind of photography really helps them

455

00:18:34,470 --> 00:18:32,950

uh this

456

00:18:36,950 --> 00:18:34,480

for a couple of reasons we picked this

457

00:18:38,950 --> 00:18:36,960

slide uh up at the terminator well first

458

00:18:41,430 --> 00:18:38,960

off we're crossing from uh nighttime

459

00:18:43,830 --> 00:18:41,440

into daylight and you can actually see

460

00:18:45,990 --> 00:18:43,840

the uh

461

00:18:48,630 --> 00:18:46,000

terminator right across there but right

462

00:18:51,510 --> 00:18:48,640

there that's a huge typhoon that was up

463

00:18:54,150 --> 00:18:51,520

near uh the philippines in okinawa while

464

00:18:56,870 --> 00:18:54,160

we were flying the eye of it is actually

465

00:18:58,710 --> 00:18:56,880

right about in there i got a hurricane

466

00:19:01,430 --> 00:18:58,720

coming up that was even more well

467

00:19:03,590 --> 00:19:01,440

developed but very interesting to track

468

00:19:05,029 --> 00:19:03,600

the storms from up there and i thought

469

00:19:07,190 --> 00:19:05,039

just a beautiful

470

00:19:12,630 --> 00:19:07,200

the earth limb with the the terminator

471

00:19:17,270 --> 00:19:14,950

jim took this shot and if you could see

472

00:19:21,750 --> 00:19:17,280

this in better detail this is just a a

473

00:19:23,430 --> 00:19:21,760

phenomenal shot of uh hawaii

474

00:19:26,070 --> 00:19:23,440

he was looking at the

475

00:19:28,950 --> 00:19:26,080

the wake of the island as the ocean

476

00:19:30,950 --> 00:19:28,960

currents come by up here and

477

00:19:32,549 --> 00:19:30,960

it's cut off a little bit here on the

478

00:19:35,190 --> 00:19:32,559

size of the screen but if you look at

479

00:19:38,070 --> 00:19:35,200

the detail the field patterns and

480

00:19:40,950 --> 00:19:38,080

so you got to orient myself pearl harbor

481

00:19:47,750 --> 00:19:40,960

in the airfields it's just it's really a

482

00:19:51,909 --> 00:19:49,430

we're going to show you more this is

483

00:19:53,669 --> 00:19:51,919

hurricane amelia and jim's going to talk

484

00:19:56,310 --> 00:19:53,679

about it in our video

485

00:19:59,750 --> 00:19:56,320

extremely well developed hurricane

486

00:20:02,390 --> 00:19:59,760

the eye here and the size of it wins

487

00:20:05,750 --> 00:20:02,400

over 150 miles an hour

488

00:20:07,430 --> 00:20:05,760

jim took just a tremendous shot here

489

00:20:08,870 --> 00:20:07,440

if i had to pick out one highlight of

490

00:20:11,350 --> 00:20:08,880

the whole mission from looking out the

491

00:20:14,150 --> 00:20:11,360

window this would be it i was minding my

492

00:20:16,070 --> 00:20:14,160

own business exercising on the ergometer

493

00:20:18,150 --> 00:20:16,080

and i see this come within the field of

494

00:20:19,990 --> 00:20:18,160

view so automatically i uh stop

495

00:20:21,590 --> 00:20:20,000

exercising pick up the camera and start

496

00:20:23,750 --> 00:20:21,600

shooting and i got lucky in getting this

497

00:20:25,590 --> 00:20:23,760

picture and i think it actually conveys

498

00:20:27,110 --> 00:20:25,600

the depth that we're dealing with here

499

00:20:28,710 --> 00:20:27,120

i'm just guessing but i guess the top of

500

00:20:31,029 --> 00:20:28,720

the hurricane must have been somewhere

501
00:20:33,110 --> 00:20:31,039
at 40 or 50 000 feet

502
00:20:35,029 --> 00:20:33,120
and the the side walls of the eye of the

503
00:20:37,590 --> 00:20:35,039
hurricane look perfectly

504
00:20:38,950 --> 00:20:37,600
vertical and you could see straight down

505
00:20:40,630 --> 00:20:38,960
and the blue that you see in the center

506
00:20:43,190 --> 00:20:40,640
there is the pacific ocean in the eye of

507
00:20:45,430 --> 00:20:43,200
the hurricane

508
00:20:46,789 --> 00:20:45,440
it was such a powerful force of nature i

509
00:20:49,590 --> 00:20:46,799
actually felt that i could see the

510
00:20:51,430 --> 00:20:49,600
swirling in close to the eye the

511
00:20:56,870 --> 00:20:51,440
the wind speeds were so high it was a

512
00:21:02,390 --> 00:20:59,990
uh with that we'd like to go to our

513
00:21:15,270 --> 00:21:02,400

crew movie and share a little bit of the

514

00:21:15,280 --> 00:21:20,710

these are color bars

515

00:21:24,549 --> 00:21:22,950

well here we are uh getting suited up

516

00:21:25,909 --> 00:21:24,559

ready to go fly

517

00:21:27,430 --> 00:21:25,919

uh

518

00:21:29,270 --> 00:21:27,440

i mean look all the way there carl

519

00:21:32,230 --> 00:21:29,280

waving at everybody thumbs up he's ready

520

00:21:34,310 --> 00:21:32,240

to go leroy's ready to go

521

00:21:36,310 --> 00:21:34,320

this was really a gentlemanly flight for

522

00:21:38,549 --> 00:21:36,320

me i'm used to getting up at two in the

523

00:21:41,029 --> 00:21:38,559

morning and getting suited up

524

00:21:43,270 --> 00:21:41,039

the red team got to sleep in until 7 30

525

00:21:46,310 --> 00:21:43,280

or something we had virtually no sleep

526

00:21:49,190 --> 00:21:47,990

we were ready to go walking out in

527

00:21:51,350 --> 00:21:49,200

daylight instead of the middle of the

528

00:21:52,470 --> 00:21:51,360

night with lights shining

529

00:21:54,390 --> 00:21:52,480

uh

530

00:21:59,510 --> 00:21:54,400

bringing up the end here the guys that

531

00:22:03,029 --> 00:22:01,110

certainly for any first time pilot

532

00:22:04,789 --> 00:22:03,039

ascent is the highlight of an aviation

533

00:22:06,549 --> 00:22:04,799

career here we see the the three main

534

00:22:08,149 --> 00:22:06,559

engines igniting and from the inside you

535

00:22:09,590 --> 00:22:08,159

can see the vibration that we feel as

536

00:22:10,630 --> 00:22:09,600

the main engines light but before

537

00:22:11,990 --> 00:22:10,640

liftoff

538

00:22:14,310 --> 00:22:12,000

now we'll go back to the outside you'll

539

00:22:16,549 --> 00:22:14,320

see the solid rocket boosters ignite the

540

00:22:17,510 --> 00:22:16,559

explosive bolts fire and we are on our

541

00:22:18,789 --> 00:22:17,520

way

542

00:22:20,390 --> 00:22:18,799

there's no doubt at this point in time

543

00:22:22,310 --> 00:22:20,400

that we're going uh we're headed out of

544

00:22:24,870 --> 00:22:22,320

town i think the next shot will be from

545

00:22:27,270 --> 00:22:24,880

the inside of the vehicle and you'll get

546

00:22:29,350 --> 00:22:27,280

another shot of when the srbs ignite and

547

00:22:30,470 --> 00:22:29,360

then once again

548

00:22:32,470 --> 00:22:30,480

liftoff

549

00:22:34,470 --> 00:22:32,480

immediately after this the row program

550

00:22:36,950 --> 00:22:34,480

starts we can see the horizon out the

551
00:22:39,270 --> 00:22:36,960
side windows twisting beneath us and as

552
00:22:40,710 --> 00:22:39,280
we point the nose gently down toward the

553
00:22:42,310 --> 00:22:40,720
horizon

554
00:22:43,830 --> 00:22:42,320
head out over the atlantic ocean to the

555
00:22:46,070 --> 00:22:43,840
east

556
00:22:49,190 --> 00:22:46,080
certainly first stage is a tremendous

557
00:22:50,950 --> 00:22:49,200
acceleration tremendous vibration to

558
00:22:52,950 --> 00:22:50,960
exciting right at about right now i was

559
00:22:55,190 --> 00:22:52,960
able to sneak a peek out my side window

560
00:22:57,990 --> 00:22:55,200
and already i was able to see the

561
00:23:00,549 --> 00:22:58,000
the sky darkened to a deep purple

562
00:23:02,549 --> 00:23:00,559
during a summer afternoon launch in

563
00:23:04,390 --> 00:23:02,559

florida high humidity so you can see the

564

00:23:06,950 --> 00:23:04,400

shock waves the condensation from the

565

00:23:08,390 --> 00:23:06,960

shock waves as we go supersonic coming

566

00:23:10,230 --> 00:23:08,400

off the nose of the vehicle and off the

567

00:23:11,350 --> 00:23:10,240

external tank

568

00:23:13,110 --> 00:23:11,360

in a moment you're going to see an

569

00:23:14,310 --> 00:23:13,120

outstanding view

570

00:23:15,990 --> 00:23:14,320

of a

571

00:23:17,669 --> 00:23:16,000

something we've never really seen before

572

00:23:18,870 --> 00:23:17,679

and that's a condensation shock right

573

00:23:20,870 --> 00:23:18,880

there

574

00:23:22,870 --> 00:23:20,880

just shortly after that we have the

575

00:23:24,630 --> 00:23:22,880

solid rocket boosters complete their two

576

00:23:26,630 --> 00:23:24,640

minutes of thrusting

577

00:23:28,390 --> 00:23:26,640

and they separate from the vehicle you

578

00:23:29,669 --> 00:23:28,400

can see the large plume of smoke and

579

00:23:32,470 --> 00:23:29,679

this is what it looked like from the

580

00:23:34,950 --> 00:23:32,480

inside you can see the the separation

581

00:23:37,510 --> 00:23:34,960

motors fire across the windscreen and

582

00:23:38,549 --> 00:23:37,520

the orange plume come across the windows

583

00:23:39,990 --> 00:23:38,559

from that point in time for the

584

00:23:41,830 --> 00:23:40,000

remainder of the flight those windows

585

00:23:43,430 --> 00:23:41,840

were covered with a residue that kind of

586

00:23:45,430 --> 00:23:43,440

hampered our photography efforts from

587

00:23:47,750 --> 00:23:45,440

those front windows

588

00:23:50,390 --> 00:23:47,760

this is the thumbs up there's bob giving

589

00:23:52,710 --> 00:23:50,400

an enthusiastic thumbs up shortly after

590

00:23:55,990 --> 00:23:52,720

solid rocket booster ignition and we are

591

00:23:58,390 --> 00:23:56,000

continuing on up to mikko that 17 500

592

00:24:00,310 --> 00:23:58,400

miles per hour and just saw carl

593

00:24:03,270 --> 00:24:00,320

recognize the fact that we went through

594

00:24:05,510 --> 00:24:03,280

50 miles nautical miles in altitude here

595

00:24:07,750 --> 00:24:05,520

is miko and you can see how we move

596

00:24:11,190 --> 00:24:07,760

forward in our seats as the three times

597

00:24:13,510 --> 00:24:11,200

our normal weight is relaxed off of us

598

00:24:15,110 --> 00:24:13,520

here's a view looking out

599

00:24:16,950 --> 00:24:15,120

toward the external tank as it is

600

00:24:18,950 --> 00:24:16,960

separated from the vehicle there's

601
00:24:21,350 --> 00:24:18,960
another picture i believe taken by don

602
00:24:23,669 --> 00:24:21,360
or leroy and that's true speed we're

603
00:24:26,710 --> 00:24:23,679
down at uh we're coasting uphill from 70

604
00:24:30,149 --> 00:24:26,720
miles or altitude at this point and you

605
00:24:32,149 --> 00:24:30,159
can see how fast the world is going by

606
00:24:34,310 --> 00:24:32,159
once we got on orbit uh we opened up the

607
00:24:37,190 --> 00:24:34,320
payload bay doors activated the lab and

608
00:24:39,990 --> 00:24:37,200
uh went to work for 14 days of uh

609
00:24:41,990 --> 00:24:40,000
exciting microgravity experiments here i

610
00:24:44,710 --> 00:24:42,000
am headed back through the tunnel to see

611
00:24:46,870 --> 00:24:44,720
how the guys are doing back there on a

612
00:24:48,390 --> 00:24:46,880
turnover between shifts

613
00:24:49,669 --> 00:24:48,400

most of the time we had two people back

614

00:24:51,909 --> 00:24:49,679

in the lab but

615

00:24:54,070 --> 00:24:51,919

twice a day they traded notes to find

616

00:24:55,990 --> 00:24:54,080

out how the lab was operating and what

617

00:24:58,390 --> 00:24:56,000

was going on

618

00:25:00,470 --> 00:24:58,400

the the laboratory is just

619

00:25:02,630 --> 00:25:00,480

it's a fantastic piece of equipment and

620

00:25:04,950 --> 00:25:02,640

it sure certainly increases the amount

621

00:25:06,710 --> 00:25:04,960

of working volume that you have

622

00:25:08,470 --> 00:25:06,720

this was my first flight with a space

623

00:25:11,110 --> 00:25:08,480

lab and besides the fact that it's the

624

00:25:13,190 --> 00:25:11,120

world's finest microgravity laboratory

625

00:25:14,390 --> 00:25:13,200

it was a unique place to work because

626

00:25:15,990 --> 00:25:14,400

it's it's

627

00:25:18,310 --> 00:25:16,000

much bigger than just the inside of the

628

00:25:19,750 --> 00:25:18,320

flight deck in the mid deck you can see

629

00:25:20,789 --> 00:25:19,760

all four of us are back here that's

630

00:25:22,549 --> 00:25:20,799

because we're in the middle of a

631

00:25:24,070 --> 00:25:22,559

handover

632

00:25:25,750 --> 00:25:24,080

we're all handing over the notes from

633

00:25:27,510 --> 00:25:25,760

the previous shift to the next shift so

634

00:25:29,590 --> 00:25:27,520

we could keep up continuous ops we

635

00:25:32,070 --> 00:25:29,600

worked steady in there in there

636

00:25:34,149 --> 00:25:32,080

two shifts a day for the 14 days or so

637

00:25:35,990 --> 00:25:34,159

that we had the lab operating we had

638

00:25:37,990 --> 00:25:36,000

about 80 experiments

639

00:25:40,149 --> 00:25:38,000

several which were life sciences two of

640

00:25:41,350 --> 00:25:40,159

the life sciences were looking at us as

641

00:25:43,110 --> 00:25:41,360

the subjects

642

00:25:44,950 --> 00:25:43,120

chiaki is in the lower body negative

643

00:25:46,789 --> 00:25:44,960

pressure device which is managed by

644

00:25:48,310 --> 00:25:46,799

folks right here at jsc

645

00:25:49,990 --> 00:25:48,320

and i was the operator on this

646

00:25:51,510 --> 00:25:50,000

particular experiment then later it'd be

647

00:25:54,070 --> 00:25:51,520

my turn to get into the lower body

648

00:25:56,149 --> 00:25:54,080

negative pressure device we also flew a

649

00:25:57,590 --> 00:25:56,159

suite of experiments by a canadian team

650

00:25:59,909 --> 00:25:57,600

from vancouver

651
00:26:02,149 --> 00:25:59,919
spinal changes in microgravity which was

652
00:26:03,830 --> 00:26:02,159
looking at what happens to your body and

653
00:26:05,590 --> 00:26:03,840
particularly what happens to your spinal

654
00:26:08,230 --> 00:26:05,600
column it's well known that we get a

655
00:26:09,830 --> 00:26:08,240
little bit taller in space and of course

656
00:26:11,269 --> 00:26:09,840
that means you're pulling on the spinal

657
00:26:13,029 --> 00:26:11,279
cord

658
00:26:15,510 --> 00:26:13,039
and this was another experiment that was

659
00:26:16,710 --> 00:26:15,520
looking at changes in our ability to

660
00:26:19,909 --> 00:26:16,720
perform

661
00:26:21,590 --> 00:26:19,919
cognitive and motor tasks it was called

662
00:26:23,990 --> 00:26:21,600
paws the performance assessment

663
00:26:30,630 --> 00:26:24,000

workstation and it's uh somewhat like a

664

00:26:35,029 --> 00:26:33,110

this is the biorack facility uh this has

665

00:26:37,029 --> 00:26:35,039

flown on previous missions and it's got

666

00:26:39,990 --> 00:26:37,039

a centrifuge there to spin some samples

667

00:26:42,630 --> 00:26:40,000

up to create a 1g condition we had other

668

00:26:44,549 --> 00:26:42,640

samples under 0g and we had many plant

669

00:26:45,750 --> 00:26:44,559

and small animal experiments in each of

670

00:26:47,990 --> 00:26:45,760

these small

671

00:26:50,070 --> 00:26:48,000

containers that you see me inserting in

672

00:26:53,669 --> 00:26:50,080

there so we could we had a good 1g and

673

00:26:55,909 --> 00:26:53,679

0g comparison between these two in space

674

00:26:57,909 --> 00:26:55,919

here i'm doing the micro uh looking at

675

00:27:00,470 --> 00:26:57,919

the microscope we have a lot of

676
00:27:03,430 --> 00:27:00,480
biotechnological experiment like cell

677
00:27:07,029 --> 00:27:03,440
culture and protein crystal growth and

678
00:27:10,789 --> 00:27:09,269
well the fruit flies that you see here i

679
00:27:12,630 --> 00:27:10,799
watched them every day over the course

680
00:27:14,710 --> 00:27:12,640
of the flight and the ones on the left

681
00:27:16,470 --> 00:27:14,720
are microgravity as don mentioned we had

682
00:27:18,549 --> 00:27:16,480
the ability to have some in zero g and

683
00:27:20,310 --> 00:27:18,559
some in one g tell you what the ones in

684
00:27:23,510 --> 00:27:20,320
zero g quickly learned not to try and

685
00:27:25,750 --> 00:27:23,520
fly here comes a german experiment uh

686
00:27:27,830 --> 00:27:25,760
using very special facility it's a slow

687
00:27:30,310 --> 00:27:27,840
rotating facility it's a jellyfish to

688
00:27:32,549 --> 00:27:30,320

find out it's gravitational sense

689

00:27:34,950 --> 00:27:32,559

so we have a lot of life science

690

00:27:36,149 --> 00:27:34,960

experiment we had more than 82

691

00:27:38,789 --> 00:27:36,159

experiments

692

00:27:41,669 --> 00:27:38,799

and this is a the gold fish and some of

693

00:27:43,669 --> 00:27:41,679

the goldfish doesn't have inner ear

694

00:27:45,750 --> 00:27:43,679

the organ so

695

00:27:48,230 --> 00:27:45,760

this experiment to find out

696

00:27:50,149 --> 00:27:48,240

how fish react to the microgravity and

697

00:27:53,110 --> 00:27:50,159

also how fish

698

00:27:55,510 --> 00:27:53,120

orient themselves and here there's other

699

00:27:58,310 --> 00:27:55,520

different kind of fish called medaka

700

00:28:00,549 --> 00:27:58,320

killfish and the researchers are pretty

701

00:28:03,350 --> 00:28:00,559

much excited to find out

702

00:28:06,070 --> 00:28:03,360

their mating behavior and also the egg

703

00:28:09,190 --> 00:28:06,080

development and you can see small belly

704

00:28:12,070 --> 00:28:09,200

fishes these eggs are laid on earth and

705

00:28:14,549 --> 00:28:12,080

hatched on space and this is

706

00:28:17,110 --> 00:28:14,559

and they are developed very well and

707

00:28:19,430 --> 00:28:17,120

also this is a nude experiment and we

708

00:28:22,149 --> 00:28:19,440

have such a very special uh facility

709

00:28:24,789 --> 00:28:22,159

called aquatic animal holding facility

710

00:28:26,950 --> 00:28:24,799

and made by japanese space agency and

711

00:28:29,430 --> 00:28:26,960

this is a nude and uh

712

00:28:31,430 --> 00:28:29,440

and these are the baby news and

713

00:28:34,070 --> 00:28:31,440

researchers are pretty much interested

714

00:28:36,950 --> 00:28:34,080

in the inner ear organ which

715

00:28:38,470 --> 00:28:36,960

uh usually necessary for

716

00:28:41,510 --> 00:28:38,480

the earth condition

717

00:28:43,590 --> 00:28:41,520

so we have such a very a lot of life

718

00:28:45,350 --> 00:28:43,600

science experiment on board

719

00:28:46,950 --> 00:28:45,360

the other half of our experiments focus

720

00:28:48,870 --> 00:28:46,960

on material science where we were

721

00:28:50,710 --> 00:28:48,880

looking at crystal growth and some fluid

722

00:28:52,789 --> 00:28:50,720

science i'm in front of one of the

723

00:28:54,710 --> 00:28:52,799

german facilities here called tempus

724

00:28:56,870 --> 00:28:54,720

which was an electromagnetic levitating

725

00:28:58,310 --> 00:28:56,880

furnace we had small samples about the

726

00:29:00,470 --> 00:28:58,320

size of a marble that you see here

727

00:29:02,149 --> 00:29:00,480

heating up and beginning to glow as it's

728

00:29:04,389 --> 00:29:02,159

melting you can see it's oscillating a

729

00:29:05,909 --> 00:29:04,399

little bit and its surface is

730

00:29:07,669 --> 00:29:05,919

you can see the oscillation pattern

731

00:29:09,669 --> 00:29:07,679

there and it's a containerless facility

732

00:29:11,750 --> 00:29:09,679

where we can heat samples up and melt

733

00:29:13,669 --> 00:29:11,760

them and re-solidify them without ever

734

00:29:15,669 --> 00:29:13,679

touching the walls

735

00:29:17,190 --> 00:29:15,679

this is another fluids experiment called

736

00:29:19,350 --> 00:29:17,200

the critical point facility and with

737

00:29:21,669 --> 00:29:19,360

this we're studying a phase transition

738

00:29:24,070 --> 00:29:21,679

between liquid and gas and this facility

739

00:29:25,350 --> 00:29:24,080

operated almost 24 hours a day non-stop

740

00:29:27,269 --> 00:29:25,360

for the entire

741

00:29:28,470 --> 00:29:27,279

14-day mission of the science back in

742

00:29:29,990 --> 00:29:28,480

the lab

743

00:29:35,029 --> 00:29:30,000

they even let the commander back in the

744

00:29:38,470 --> 00:29:36,789

this is uh one of our fluids experiments

745

00:29:40,070 --> 00:29:38,480

called the bubble drop particle unit and

746

00:29:41,750 --> 00:29:40,080

here we have a heater near the center of

747

00:29:43,269 --> 00:29:41,760

this test cell where we're forming

748

00:29:44,950 --> 00:29:43,279

bubbles just heating up the element

749

00:29:46,630 --> 00:29:44,960

there and forming bubbles like you would

750

00:29:47,990 --> 00:29:46,640

on your oven at home but we can do that

751
00:29:49,350 --> 00:29:48,000
in a controlled manner and look how they

752
00:29:51,830 --> 00:29:49,360
move under different temperature

753
00:29:53,430 --> 00:29:51,840
gradients and how they coalesce how the

754
00:29:55,029 --> 00:29:53,440
bubbles form together here so you'll see

755
00:29:56,710 --> 00:29:55,039
a bunch of bubbles just forming and

756
00:29:58,789 --> 00:29:56,720
grouping together under microgravity

757
00:30:00,950 --> 00:29:58,799
conditions

758
00:30:03,110 --> 00:30:00,960
this is a french electrophoresis unit

759
00:30:05,430 --> 00:30:03,120
it's one of two electrophoresis units we

760
00:30:07,269 --> 00:30:05,440
flew and we were trying to separate

761
00:30:08,389 --> 00:30:07,279
different proteins

762
00:30:09,990 --> 00:30:08,399
and you can see up there where i'm

763
00:30:11,830 --> 00:30:10,000

pointing up to the control and display

764

00:30:13,990 --> 00:30:11,840

screen and if you look real close you

765

00:30:15,990 --> 00:30:14,000

can see uh two peaks this is the

766

00:30:17,909 --> 00:30:16,000

electrophoresis cell where the sample

767

00:30:20,630 --> 00:30:17,919

was actually injected and the

768

00:30:22,149 --> 00:30:20,640

electrophoretic separation performed

769

00:30:24,389 --> 00:30:22,159

well as you know we did a lot of repair

770

00:30:25,909 --> 00:30:24,399

in flight i'm spinning this bag around

771

00:30:27,430 --> 00:30:25,919

trying to get the air bubbles out the

772

00:30:29,029 --> 00:30:27,440

big problem with a couple of the units

773

00:30:30,789 --> 00:30:29,039

we worked on was that bubbles weren't

774

00:30:32,950 --> 00:30:30,799

places they shouldn't be

775

00:30:35,990 --> 00:30:32,960

so jim and i worked together to try and

776
00:30:37,110 --> 00:30:36,000
purge the japanese electrophoresis unit

777
00:30:39,029 --> 00:30:37,120
of the air

778
00:30:40,950 --> 00:30:39,039
so our first job was to get purge while

779
00:30:43,029 --> 00:30:40,960
it didn't have air bubbles in it so

780
00:30:46,070 --> 00:30:43,039
we're very carefully squeezing some out

781
00:30:47,750 --> 00:30:46,080
of one bag sucking it into a syringe

782
00:30:49,350 --> 00:30:47,760
this is the electrophoresis unit which

783
00:30:51,909 --> 00:30:49,360
wasn't really designed to be worked on

784
00:30:54,630 --> 00:30:51,919
in space but in fact we took it out a

785
00:30:56,710 --> 00:30:54,640
total of six times as we tried to purge

786
00:30:59,110 --> 00:30:56,720
all the air bubbles out of it

787
00:31:00,710 --> 00:30:59,120
this is one of the medical dsos or

788
00:31:03,190 --> 00:31:00,720

experiments that we performed on the

789

00:31:05,430 --> 00:31:03,200

flight this particular one i'm doing has

790

00:31:07,990 --> 00:31:05,440

to do with uh seeing how the eye and the

791

00:31:09,669 --> 00:31:08,000

head track targets in the absence of

792

00:31:11,750 --> 00:31:09,679

using your inner ear

793

00:31:13,190 --> 00:31:11,760

i'm wearing a laser on my head and

794

00:31:15,590 --> 00:31:13,200

you'll see a red dot on the middeck

795

00:31:17,909 --> 00:31:15,600

lockers there as i kind of move it

796

00:31:19,750 --> 00:31:17,919

between targets and try to acquire them

797

00:31:21,430 --> 00:31:19,760

and sensitive electrodes will measure

798

00:31:23,830 --> 00:31:21,440

the electrical impulses to see how my

799

00:31:25,669 --> 00:31:23,840

eyes moved and an accelerometer also on

800

00:31:26,870 --> 00:31:25,679

the helmet unit there will measure the

801
00:31:29,510 --> 00:31:26,880
accelerations

802
00:31:31,430 --> 00:31:29,520
uh during our flight we exercised quite

803
00:31:33,909 --> 00:31:31,440
a bit and we were very interested in how

804
00:31:35,909 --> 00:31:33,919
the exercise perturbed the microgravity

805
00:31:37,909 --> 00:31:35,919
environment and so we carried the

806
00:31:39,830 --> 00:31:37,919
microgravity measuring device which was

807
00:31:41,990 --> 00:31:39,840
built right right here at johnson space

808
00:31:44,830 --> 00:31:42,000
center and we were able to look at the

809
00:31:47,350 --> 00:31:44,840
vibration modes of the cycle

810
00:31:49,509 --> 00:31:47,360
ergometer jim's heading on down from the

811
00:31:51,350 --> 00:31:49,519
flight deck down to the mid deck we

812
00:31:52,230 --> 00:31:51,360
showed you the science on board now

813
00:31:54,230 --> 00:31:52,240

we're going to show you a little bit

814

00:31:55,590 --> 00:31:54,240

about living in space for a long period

815

00:31:57,430 --> 00:31:55,600

of time

816

00:31:59,750 --> 00:31:57,440

of course the mid decks are

817

00:32:01,590 --> 00:31:59,760

our living quarters it's where we sleep

818

00:32:02,470 --> 00:32:01,600

and eat you can see our sleep station

819

00:32:04,389 --> 00:32:02,480

here

820

00:32:06,950 --> 00:32:04,399

yeah they really woke me up for this

821

00:32:08,710 --> 00:32:06,960

picture yeah this wasn't staged we got

822

00:32:14,549 --> 00:32:08,720

one a gym that's a little staged but we

823

00:32:14,559 --> 00:32:19,750

i quickly caught on however

824

00:32:23,750 --> 00:32:21,669

every morning like i do at home i wanted

825

00:32:25,350 --> 00:32:23,760

to read the morning news so this is how

826

00:32:28,070 --> 00:32:25,360

we get our morning news in space it

827

00:32:29,509 --> 00:32:28,080

comes out of the tips machine fantastic

828

00:32:31,509 --> 00:32:29,519

machine it really worked great but you

829

00:32:33,110 --> 00:32:31,519

can see the kind of updates we got a

830

00:32:35,110 --> 00:32:33,120

little bit of that is news and the rest

831

00:32:38,789 --> 00:32:35,120

is changes to what we were going to do

832

00:32:41,590 --> 00:32:39,750

well

833

00:32:47,590 --> 00:32:41,600

you enjoy your food up there

834

00:32:52,310 --> 00:32:50,630

this was carl's one task on board and

835

00:32:54,149 --> 00:32:52,320

i've never seen anybody do it better was

836

00:32:54,950 --> 00:32:54,159

keep track of all our consumables and

837

00:32:57,750 --> 00:32:54,960

he's

838

00:32:59,269 --> 00:32:57,760

making sure everything's right

839

00:33:01,669 --> 00:32:59,279

we carried the

840

00:33:03,750 --> 00:33:01,679

rinseless body baths and the shampoo to

841

00:33:06,389 --> 00:33:03,760

keep ourselves clean and they worked

842

00:33:07,830 --> 00:33:06,399

surprisingly well we were able to uh to

843

00:33:10,549 --> 00:33:07,840

clean ourselves up real well it's the

844

00:33:12,070 --> 00:33:10,559

same same baths and shampoos that

845

00:33:13,269 --> 00:33:12,080

hospitals use in their intensive care

846

00:33:14,789 --> 00:33:13,279

units

847

00:33:18,149 --> 00:33:14,799

nobody wants to live with somebody that

848

00:33:21,269 --> 00:33:18,159

hasn't cleaned up in 15 days

849

00:33:22,870 --> 00:33:21,279

i mentioned exercise here's a shot of me

850

00:33:26,389 --> 00:33:22,880

exercising

851

00:33:29,269 --> 00:33:26,399

we had some very strong

852

00:33:32,070 --> 00:33:29,279

ords that isolated the ergometer from

853

00:33:34,389 --> 00:33:32,080

the floor to help damp oscillations i

854

00:33:37,509 --> 00:33:34,399

had a great opportunity to talk with the

855

00:33:39,029 --> 00:33:37,519

japanese student uh using amateur

856

00:33:41,110 --> 00:33:39,039

the ham radio

857

00:33:43,190 --> 00:33:41,120

and it was fantastic

858

00:33:45,110 --> 00:33:43,200

and they are the people uh in my

859

00:33:47,029 --> 00:33:45,120

hometown were so excited

860

00:33:48,389 --> 00:33:47,039

this shows uh padam operations where we

861

00:33:49,990 --> 00:33:48,399

have an opportunity to send messages

862

00:33:51,269 --> 00:33:50,000

home as you can imagine being away from

863

00:33:52,789 --> 00:33:51,279

home for 15 days you get a little

864

00:33:54,389 --> 00:33:52,799

homesick just like going to summer camp

865

00:33:56,789 --> 00:33:54,399

and that was always a great thing to get

866

00:33:58,950 --> 00:33:56,799

messages from home

867

00:34:01,830 --> 00:33:58,960

we were fortunate enough to be airborne

868

00:34:03,509 --> 00:34:01,840

for the anniversary of apollo 11's

869

00:34:05,110 --> 00:34:03,519

launch and

870

00:34:06,789 --> 00:34:05,120

and the first steps of humans on the

871

00:34:08,790 --> 00:34:06,799

moon and so we

872

00:34:13,349 --> 00:34:08,800

had a presentation at

873

00:34:17,510 --> 00:34:15,430

jim mentioned in that still photo the

874

00:34:21,030 --> 00:34:17,520

importance of keeping the

875

00:34:29,829 --> 00:34:22,629

jim got so carried away he was keeping

876

00:34:35,109 --> 00:34:31,909

but it really was important the cape

877

00:34:37,270 --> 00:34:35,119

gave us a fantastic vehicle and we

878

00:34:39,190 --> 00:34:37,280

wanted to deliver it back to them as

879

00:34:41,669 --> 00:34:39,200

clean as they gave it to us

880

00:34:43,430 --> 00:34:41,679

and as i said before we couldn't have

881

00:34:45,109 --> 00:34:43,440

got all those great pictures without

882

00:34:46,389 --> 00:34:45,119

having clean windows to shoot them out

883

00:34:48,550 --> 00:34:46,399

of

884

00:34:50,470 --> 00:34:48,560

here's uh jim getting ready to take some

885

00:34:54,950 --> 00:34:50,480

of those pictures while i was talking on

886

00:34:58,790 --> 00:34:56,790

i'd like to give a tribute to all of our

887

00:34:59,990 --> 00:34:58,800

trainers in this case the photography

888

00:35:01,990 --> 00:35:00,000

training people were able to take

889

00:35:03,670 --> 00:35:02,000

somebody who had never really taken

890

00:35:05,109 --> 00:35:03,680

pictures before and we were able to

891

00:35:06,710 --> 00:35:05,119

return something useful back to the

892

00:35:08,390 --> 00:35:06,720

experimenters here

893

00:35:09,589 --> 00:35:08,400

this is australia

894

00:35:10,710 --> 00:35:09,599

shark bay

895

00:35:12,390 --> 00:35:10,720

and then

896

00:35:13,589 --> 00:35:12,400

looking

897

00:35:15,190 --> 00:35:13,599

toward the upper

898

00:35:16,550 --> 00:35:15,200

upper left portion of the screen the

899

00:35:19,030 --> 00:35:16,560

whole uh

900

00:35:20,950 --> 00:35:19,040

south the west coast of australia

901
00:35:23,829 --> 00:35:20,960
they're down to perth

902
00:35:25,430 --> 00:35:23,839
just a beautiful view and this is the

903
00:35:27,589 --> 00:35:25,440
coburg peninsula in the northern

904
00:35:30,710 --> 00:35:27,599
territories of australia there's a

905
00:35:32,950 --> 00:35:30,720
wildlife preserve attached to it and

906
00:35:35,030 --> 00:35:32,960
just a tremendous view

907
00:35:41,829 --> 00:35:35,040
australia sort of looks like mars it has

908
00:35:45,510 --> 00:35:43,430
here's another shot this time from the

909
00:35:47,430 --> 00:35:45,520
video camera that bob set up of

910
00:35:48,870 --> 00:35:47,440
hurricane amelia

911
00:35:50,630 --> 00:35:48,880
i told you how i was exercising on the

912
00:35:52,630 --> 00:35:50,640
ergometer and this came into my the

913
00:35:54,630 --> 00:35:52,640

field of view at that point in time bob

914

00:35:56,630 --> 00:35:54,640

was talking to a school in sarax and i

915

00:35:57,910 --> 00:35:56,640

think by the expression of my face he

916

00:35:59,829 --> 00:35:57,920

knew something very special was

917

00:36:01,670 --> 00:35:59,839

happening outside so while he was

918

00:36:03,670 --> 00:36:01,680

simultaneously talking on the ham radio

919

00:36:07,430 --> 00:36:03,680

he fired up the the video camera and we

920

00:36:12,390 --> 00:36:10,230

it really was an awesome hurricane

921

00:36:14,230 --> 00:36:12,400

this is a very special shot i really

922

00:36:15,829 --> 00:36:14,240

enjoy this one this we're going over

923

00:36:17,670 --> 00:36:15,839

central south america and you're going

924

00:36:19,510 --> 00:36:17,680

to see some very special things happen

925

00:36:21,670 --> 00:36:19,520

up here you're going to see

926
00:36:23,030 --> 00:36:21,680
thunderstorms lightning at night these

927
00:36:24,069 --> 00:36:23,040
are city lights now i want you to look

928
00:36:27,829 --> 00:36:24,079
right here and you're going to see

929
00:36:31,349 --> 00:36:29,349
right there was a

930
00:36:32,390 --> 00:36:31,359
a meteorite entering the earth's

931
00:36:34,550 --> 00:36:32,400
atmosphere you're going to see another

932
00:36:36,069 --> 00:36:34,560
one right up here right there

933
00:36:37,510 --> 00:36:36,079
and we got the opportunity all of us

934
00:36:38,950 --> 00:36:37,520
during the course of the flight to just

935
00:36:41,430 --> 00:36:38,960
happen to be looking out the window at

936
00:36:42,950 --> 00:36:41,440
the right time to see a meteor rearing

937
00:36:44,790 --> 00:36:42,960
entering the earth's atmosphere from

938
00:36:45,990 --> 00:36:44,800

above and i think that's a very special

939

00:36:47,430 --> 00:36:46,000

memory

940

00:36:49,829 --> 00:36:47,440

here's our tribute to the people of the

941

00:36:51,510 --> 00:36:49,839

cape uh months before we launched they

942

00:36:53,589 --> 00:36:51,520

told us to the second one we were going

943

00:36:55,430 --> 00:36:53,599

to launch they gave us a perfect vehicle

944

00:36:57,270 --> 00:36:55,440

and right here you can see the cape that

945

00:36:59,109 --> 00:36:57,280

should be the shuttle landing runway

946

00:37:01,670 --> 00:36:59,119

right there the vertical assembly

947

00:37:03,670 --> 00:37:01,680

building right there the crawl way going

948

00:37:05,430 --> 00:37:03,680

out to the two pads our pad being that

949

00:37:07,190 --> 00:37:05,440

one right there

950

00:37:09,910 --> 00:37:07,200

i was amazed at the level of detail you

951
00:37:11,750 --> 00:37:09,920
could see just with the human eye

952
00:37:13,349 --> 00:37:11,760
unfortunately all good space flights

953
00:37:14,870 --> 00:37:13,359
have to come to an end and here jim and

954
00:37:16,310 --> 00:37:14,880
i are finally getting to do some pilot

955
00:37:18,390 --> 00:37:16,320
stuff we're doing the flight control

956
00:37:20,230 --> 00:37:18,400
system checkout the day before our first

957
00:37:22,790 --> 00:37:20,240
uh entry attempt

958
00:37:24,710 --> 00:37:22,800
jim is using uh pilot here it's a little

959
00:37:27,910 --> 00:37:24,720
portable computer we had on board

960
00:37:30,470 --> 00:37:27,920
actually a workstation that actually has

961
00:37:32,630 --> 00:37:30,480
actual orbiter software in it uh that he

962
00:37:34,470 --> 00:37:32,640
can practice landings on

963
00:37:41,349 --> 00:37:34,480

unfortunately this is as close as jim

964

00:37:44,230 --> 00:37:42,790

but when you're up there for a long

965

00:37:46,950 --> 00:37:44,240

period of time it gives you a chance to

966

00:37:48,710 --> 00:37:46,960

look at the displays and get your

967

00:37:50,230 --> 00:37:48,720

mindset on landing again what you need

968

00:37:53,190 --> 00:37:50,240

to look at and what you need to prepare

969

00:37:54,470 --> 00:37:53,200

for for a landing so this was jim's one

970

00:37:56,870 --> 00:37:54,480

view of landing and we're going to give

971

00:37:58,950 --> 00:37:56,880

you another one here pretty soon

972

00:38:00,390 --> 00:37:58,960

and this is uh the end of the space lab

973

00:38:02,550 --> 00:38:00,400

portion of the flight i'm shutting down

974

00:38:03,990 --> 00:38:02,560

the uh although we've done and i spent

975

00:38:05,750 --> 00:38:04,000

the day shutting the facilities down and

976
00:38:07,589 --> 00:38:05,760
now we're just turning out the last bits

977
00:38:09,670 --> 00:38:07,599
of light and

978
00:38:10,950 --> 00:38:09,680
putting up closing up the hatch that

979
00:38:14,630 --> 00:38:10,960
closing out the tunnel part that goes

980
00:38:19,030 --> 00:38:16,870
this is just after entry interface you

981
00:38:21,030 --> 00:38:19,040
can see the pink glow out the windows

982
00:38:23,270 --> 00:38:21,040
rick said wave adam he's got a handheld

983
00:38:24,950 --> 00:38:23,280
camera the flashing that you see is from

984
00:38:26,630 --> 00:38:24,960
the energized plasma and the overhead

985
00:38:29,109 --> 00:38:26,640
windows the light reflecting off our

986
00:38:30,390 --> 00:38:29,119
suits and helmets and rick's got the

987
00:38:32,069 --> 00:38:30,400
camera and that's what it looked like

988
00:38:33,349 --> 00:38:32,079

out the overhead window it's just

989

00:38:38,310 --> 00:38:33,359

awesome that's not the tail of the

990

00:38:43,750 --> 00:38:40,870

just the whole reentry was at night and

991

00:38:45,030 --> 00:38:43,760

it was just a bright pink glow you can't

992

00:38:47,030 --> 00:38:45,040

quite see it here but there's little

993

00:38:48,950 --> 00:38:47,040

sparks flying by as pieces of the

994

00:38:51,510 --> 00:38:48,960

orbiter are heating up and coming off

995

00:38:53,349 --> 00:38:51,520

little small pieces

996

00:38:55,349 --> 00:38:53,359

here very small

997

00:38:57,430 --> 00:38:55,359

really small

998

00:38:59,670 --> 00:38:57,440

here we are coming on

999

00:39:02,150 --> 00:38:59,680

turning onto the heading alignment cone

1000

00:39:03,990 --> 00:39:02,160

getting ready to land at Kennedy and the

1001

00:39:07,030 --> 00:39:04,000

space shuttle is just an absolutely

1002

00:39:08,950 --> 00:39:07,040

fantastic machine it it launches like a

1003

00:39:10,950 --> 00:39:08,960

rocket flies like a spaceship you can

1004

00:39:12,950 --> 00:39:10,960

turn it into a space station and it

1005

00:39:15,030 --> 00:39:12,960

flies like a super airplane here's a

1006

00:39:18,230 --> 00:39:15,040

little subsonic arrow maneuver we did a

1007

00:39:20,790 --> 00:39:18,240

little flight test to document the

1008

00:39:23,510 --> 00:39:20,800

flying qualities of the vehicle get some

1009

00:39:27,190 --> 00:39:23,520

aerodynamic data you can see the vab out

1010

00:39:32,150 --> 00:39:29,589

transitioning from the 18 degree outer

1011

00:39:34,310 --> 00:39:32,160

glide slope at 300 knots to our

1012

00:39:36,390 --> 00:39:34,320

one and a half degree inner glide slope

1013

00:39:41,270 --> 00:39:36,400

we were trying to touch down at 200

1014

00:39:47,030 --> 00:39:44,230

here we are pulling out about uh 1800

1015

00:39:53,670 --> 00:39:47,040

feet above the ground in uh don't miss

1016

00:40:01,510 --> 00:39:55,750

300 feet above the ground jim that was

1017

00:40:05,670 --> 00:40:03,190

jim did a great job on that that's

1018

00:40:07,270 --> 00:40:05,680

career limiting if uh if he doesn't get

1019

00:40:13,589 --> 00:40:07,280

those down i'm gonna recommend he gets

1020

00:40:19,190 --> 00:40:15,829

and here we are coming in uh touching

1021

00:40:20,710 --> 00:40:19,200

down at runway 33 at ksc

1022

00:40:22,630 --> 00:40:20,720

and you're going to see the shoot come

1023

00:40:24,069 --> 00:40:22,640

out here in a minute

1024

00:40:27,829 --> 00:40:24,079

bob said he was supposed touched out at

1025

00:40:31,910 --> 00:40:27,839

200 it was what 199.2 yeah yeah i missed

1026

00:40:37,190 --> 00:40:34,550

the drag shoot is just an extremely

1027

00:40:39,190 --> 00:40:37,200

effective deceleration device it really

1028

00:40:43,109 --> 00:40:39,200

slows the vehicle down i i did hardly

1029

00:40:49,829 --> 00:40:46,950

jim deployed it at 178 knots we

1030

00:40:53,829 --> 00:40:49,839

de-rotated at 175 and then at 60 knots

1031

00:40:57,270 --> 00:40:53,839

he jettisoned it and here's a nice wheel

1032

00:40:59,670 --> 00:40:57,280

stop shop shot columbia's home and it