



1  
00:01:02,430 --> 00:01:00,060  
from the Kennedy Space Center in Florida

2  
00:01:05,399 --> 00:01:02,440  
this is Space Shuttle Endeavor launch

3  
00:01:07,219 --> 00:01:05,409  
control the countdown for the launch of

4  
00:01:09,660 --> 00:01:07,229  
Endeavour on space shuttle mission STS

5  
00:01:12,960 --> 00:01:09,670  
68 is continuing on schedule this

6  
00:01:14,520 --> 00:01:12,970  
morning again the final inspection team

7  
00:01:16,080 --> 00:01:14,530  
is continuing to conduct their final

8  
00:01:17,580 --> 00:01:16,090  
portions of the work at the pad and they

9  
00:01:19,020 --> 00:01:17,590  
will be departing the pad shortly to

10  
00:01:21,690 --> 00:01:19,030  
make their final report to the launch

11  
00:01:23,490 --> 00:01:21,700  
director no issues have come up in the

12  
00:01:26,520 --> 00:01:23,500  
wake of their assessments and everything

13  
00:01:28,109 --> 00:01:26,530

continues to look good as the crew

14

00:01:29,850 --> 00:01:28,119

completes their breakfast they will soon

15

00:01:31,710 --> 00:01:29,860

be donning their flight suits and entry

16

00:01:33,150 --> 00:01:31,720

suits and the commander and pilot will

17

00:01:47,850 --> 00:01:33,160

be given a final briefing on today's

18

00:01:54,510 --> 00:01:50,690

starting with our commander Mike Baker

19

00:01:56,010 --> 00:01:54,520

all are being assisted with their suits

20

00:01:59,580 --> 00:01:56,020

by Kennedy Space Center and Johnson

21

00:02:00,990 --> 00:01:59,590

Space Center technicians these personnel

22

00:02:07,200 --> 00:02:01,000

were experts in the understanding of the

23

00:02:09,900 --> 00:02:07,210

details on how these suits work pilot

24

00:02:13,140 --> 00:02:09,910

today is Terry Wolcott he'll be making

25

00:02:16,530 --> 00:02:13,150

his first trip in his space shuttle

26  
00:02:18,660 --> 00:02:16,540  
Endeavour mission specialist mission

27  
00:02:22,590 --> 00:02:18,670  
specialist Steve Smith is making his

28  
00:02:27,900 --> 00:02:22,600  
first trip into space today also appears

29  
00:02:29,460 --> 00:02:27,910  
ready to fly ready to go up the bright

30  
00:02:33,570 --> 00:02:29,470  
orange colored suits are basically an

31  
00:02:37,160 --> 00:02:33,580  
altitude protection system and of course

32  
00:02:41,340 --> 00:02:37,170  
they're checked out prior to launch

33  
00:02:43,110 --> 00:02:41,350  
payload commander Tom Jones making his

34  
00:02:51,480 --> 00:02:43,120  
second trip into space his first trip

35  
00:02:58,160 --> 00:02:54,150  
mission specialist Jeff Weiss off making

36  
00:03:00,810 --> 00:02:58,170  
his second trip into space today a

37  
00:03:04,290 --> 00:03:00,820  
mission specialist dan birch making his

38  
00:03:07,170 --> 00:03:04,300

second trip into space today making

39

00:03:09,000 --> 00:03:07,180

preparations on his suit to make sure

40

00:03:16,160 --> 00:03:09,010

that it pressurizes as it should

41

00:03:20,010 --> 00:03:18,390

following launch and while on orbit the

42

00:03:21,630 --> 00:03:20,020

crew members change out of these suits

43

00:03:22,200 --> 00:03:21,640

into more conventional and comfortable

44

00:03:24,390 --> 00:03:22,210

clothing

45

00:03:27,590 --> 00:03:24,400

however they are required to return to

46

00:03:30,510 --> 00:03:27,600

these suits prior to prior to landing

47

00:03:36,290 --> 00:03:30,520

this is shuttle launch control we are

48

00:03:41,630 --> 00:03:38,430

everything continues to look good for

49

00:03:46,980 --> 00:03:41,640

our launch this morning at 7:16 a.m.

50

00:03:53,220 --> 00:03:46,990

from pad 39a with the space shuttle

51  
00:03:57,210 --> 00:03:55,229  
this is shuttle launch control at

52  
00:03:59,039 --> 00:03:57,220  
t-minus two hours 15 minutes and

53  
00:04:01,110 --> 00:03:59,049  
Counting and we have our sixth member of

54  
00:04:03,449 --> 00:04:01,120  
crew on the third floor of the

55  
00:04:05,420 --> 00:04:03,459  
operations and check-out building they

56  
00:04:08,460 --> 00:04:05,430  
have been suited and they're ready to

57  
00:04:11,369 --> 00:04:08,470  
take that 20-minute trip out to the pad

58  
00:04:13,500 --> 00:04:11,379  
getting on the elevator they'll be going

59  
00:04:25,409 --> 00:04:13,510  
down to the first floor at which time

60  
00:04:30,739 --> 00:04:27,149  
and our crew are walking out of the

61  
00:05:07,470 --> 00:04:30,749  
upper checkout building on their way to

62  
00:05:11,880 --> 00:05:09,240  
this is shuttle launch control at

63  
00:05:15,990 --> 00:05:11,890

t-minus 2 hours 34 minutes and Counting

64

00:05:19,170 --> 00:05:16,000

and the Astro van with the astronaut

65

00:05:22,170 --> 00:05:19,180

crew members inside has arrived at the

66

00:05:24,710 --> 00:05:22,180

base of pad 39a and they are at this

67

00:05:26,850 --> 00:05:24,720

time disembarking from the astronaut van

68

00:05:29,550 --> 00:05:26,860

and once they're all gathered in the

69

00:05:34,080 --> 00:05:29,560

elevator they'll make the trip up to the

70

00:05:37,980 --> 00:05:34,090

195-foot level of the fixed service

71

00:05:42,270 --> 00:05:37,990

structure and begin their ingress into

72

00:05:45,180 --> 00:05:42,280

the orbiter pad 39a is the southernmost

73

00:05:47,880 --> 00:05:45,190

pad of nasa's 2 shuttle launch

74

00:05:50,070 --> 00:05:47,890

facilities and it is nearly identical to

75

00:05:53,610 --> 00:05:50,080

pad 39b which is located just about a

76

00:05:55,830 --> 00:05:53,620

mile to the north it looks like our crew

77

00:06:00,150 --> 00:05:55,840

members have deviated a little bit from

78

00:06:01,640 --> 00:06:00,160

their desire to go straight up to the

79

00:06:04,470 --> 00:06:01,650

orbiter and they're going to stand

80

00:06:26,260 --> 00:06:04,480

beneath the mobile launcher platform and

81

00:06:31,770 --> 00:06:28,510

and we are at t-minus nine minutes and

82

00:06:34,510 --> 00:06:31,780

holding and all of our sights are

83

00:06:45,600 --> 00:06:34,520

observed go and forecast go as far as

84

00:06:49,990 --> 00:06:47,650

we're just a few seconds away from

85

00:06:57,670 --> 00:06:50,000

resuming the countdown for the launch of

86

00:06:59,230 --> 00:06:57,680

space shuttle Endeavour this morning and

87

00:07:02,740 --> 00:06:59,240

we're at t-minus nine minutes and

88

00:07:05,830 --> 00:07:02,750

## Counting and the ground launch sequencer

89

00:07:07,420 --> 00:07:05,840

has been initiated NASA test director

90

00:07:08,920 --> 00:07:07,430

Bill Dowdell was about to call for the

91

00:07:11,350 --> 00:07:08,930

transmittal of stored pre-launch

92

00:07:12,790 --> 00:07:11,360

commands as endeavour is only nine

93

00:07:15,250 --> 00:07:12,800

minutes from its seventh mission in

94

00:07:20,490 --> 00:07:15,260

space on board is the space radar

95

00:07:25,659 --> 00:07:23,409

t-minus seven minutes thirty seconds and

96

00:07:28,090 --> 00:07:25,669

the orbiter access arm is now being

97

00:07:30,070 --> 00:07:28,100

retracted away from the vehicle this is

98

00:07:31,510 --> 00:07:30,080

the walkway used by the crew to gain

99

00:07:33,040 --> 00:07:31,520

entry into and out of the vehicle and

100

00:07:45,910 --> 00:07:33,050

can be returned to position within

101  
00:07:50,780 --> 00:07:48,920  
and final eros eros surface checks of

102  
00:07:53,570 --> 00:07:50,790  
the orbiters flaps and rudder are being

103  
00:07:58,760 --> 00:07:53,580  
completed this verifies the orbiters

104  
00:08:00,500 --> 00:07:58,770  
hydraulic systems and the three main

105  
00:08:07,220 --> 00:08:00,510  
engines are being gimbal does a final

106  
00:08:13,430 --> 00:08:07,230  
test before launch t-minus two minutes

107  
00:08:15,050 --> 00:08:13,440  
30 seconds all is ready to fly today on

108  
00:08:37,010 --> 00:08:15,060  
NASA's four-and-a-half million pound

109  
00:08:39,440 --> 00:08:37,020  
space shuttle vehicle t-minus one minute

110  
00:08:40,940 --> 00:08:39,450  
50 seconds everything continues to look

111  
00:08:43,040 --> 00:08:40,950  
good for launch this morning as the

112  
00:08:45,050 --> 00:08:43,050  
space shuttle Endeavour soon will begin

113  
00:08:46,820 --> 00:08:45,060

its 10-day mission to continue its radar

114

00:09:03,639 --> 00:08:46,830

mapping expedition and study

115

00:09:08,290 --> 00:09:05,790

and we have a go for autosequence start

116

00:09:09,850 --> 00:09:08,300

endeavors onboard computers have primary

117

00:09:20,040 --> 00:09:09,860

control of all the vehicles critical

118

00:09:26,590 --> 00:09:20,050

functions t-minus 20 seconds fifteen

119

00:09:29,250 --> 00:09:26,600

twelve eleven ten nine eight seven we

120

00:09:34,900 --> 00:09:29,260

have a go for main engine start four

121

00:09:36,639 --> 00:09:34,910

three two one and liftoff of the space

122

00:09:49,800 --> 00:09:36,649

shuttle Endeavour on a mission to study

123

00:09:55,060 --> 00:09:52,530

endeavours roll maneuver is underway

124

00:09:58,450 --> 00:09:55,070

vehicles now in a heads-down position on

125

00:10:07,500 --> 00:09:58,460

course for a 57 degree 120 nautical mile

126  
00:10:11,350 --> 00:10:09,400  
approaching two minutes into the flight

127  
00:10:30,340 --> 00:10:11,360  
the next event is burnout in separation

128  
00:10:37,610 --> 00:10:33,530  
SRB separation is confirmed endeavours

129  
00:10:41,050 --> 00:10:37,620  
altitude is 170 thousand feet downrange

130  
00:10:44,510 --> 00:10:41,060  
from the launch site 32 nautical miles

131  
00:10:52,490 --> 00:10:44,520  
now traveling 4,400 feet per second or

132  
00:10:54,740 --> 00:10:52,500  
about 3,000 miles per hour three and a

133  
00:10:56,870 --> 00:10:54,750  
half minutes now into endeavours mission

134  
00:11:00,190 --> 00:10:56,880  
the orbiter is downrange from the launch

135  
00:11:03,320 --> 00:11:00,200  
site 91 nautical miles

136  
00:11:11,930 --> 00:11:03,330  
traveling 4,400 miles per hour at an

137  
00:11:14,300 --> 00:11:11,940  
altitude of 300 to 6000 feet endeavour

138  
00:11:21,680 --> 00:11:14,310

Houston we see a nominal nominal Mako

139

00:11:23,890 --> 00:11:21,690

homes one not required this is Mission

140

00:11:25,850 --> 00:11:23,900

Control Houston we're now receiving some

141

00:11:29,240 --> 00:11:25,860

videotape from the space shuttle

142

00:11:31,330 --> 00:11:29,250

Endeavour of the external tank as it

143

00:11:34,280 --> 00:11:31,340

drifts away from the shuttle Endeavour

144

00:11:36,950 --> 00:11:34,290

following today's 616 a.m. Central time

145

00:11:39,530 --> 00:11:36,960

launch from Kennedy Space Center this

146

00:11:41,120 --> 00:11:39,540

tape being sent down to us through the

147

00:12:11,150 --> 00:11:41,130

Merritt Island tracking station on the

148

00:12:20,690 --> 00:12:18,600

confirmed copy Roger roll endeavour

149

00:12:27,780 --> 00:12:20,700

looks like I don't we see the roll

150

00:12:37,150 --> 00:12:27,790

copy good bottle up 3 at 104 never go at

151  
00:12:37,160 --> 00:12:42,040  
that's our beset

152  
00:12:51,460 --> 00:12:48,040  
copy SRB set 103 converged so why'd you

153  
00:14:21,569 --> 00:12:51,470  
press one for endeavor single-engine

154  
00:14:34,660 --> 00:14:25,119  
we have five decibel tighter tighter

155  
00:14:42,789 --> 00:14:34,670  
tighter for the fuzzy logic you copy and

156  
00:14:45,549 --> 00:14:42,799  
endeavour Houston we copy all thanks 12

157  
00:14:48,069 --> 00:14:45,559  
the answer two plus 12 is sterilized not

158  
00:14:50,710 --> 00:14:48,079  
disable the messages I'll stand by for

159  
00:15:57,610 --> 00:14:50,720  
about 13 with your go all right we copy

160  
00:16:02,470 --> 00:16:00,190  
now let's talk about the first of the

161  
00:16:04,990 --> 00:16:02,480  
two experiments the first experiments

162  
00:16:07,330 --> 00:16:05,000  
called brick it's biological research in

163  
00:16:08,950 --> 00:16:07,340

canisters and it's sponsored by the

164

00:16:11,140 --> 00:16:08,960

United States Department of Agriculture

165

00:16:13,540 --> 00:16:11,150

there are five canisters aluminum

166

00:16:15,520 --> 00:16:13,550

canisters like this on board within each

167

00:16:17,260 --> 00:16:15,530

canister there are a thousand gypsy moth

168

00:16:18,430 --> 00:16:17,270

eggs so we have five thousand gypsy

169

00:16:20,680 --> 00:16:18,440

moths they explain what's this you're on

170

00:16:23,950 --> 00:16:20,690

endeavour now you might ask why do we

171

00:16:26,290 --> 00:16:23,960

have gypsy moth eggs on Endeavour it

172

00:16:28,240 --> 00:16:26,300

turns out that the gypsy moth is very

173

00:16:29,500 --> 00:16:28,250

destructive a very destructive pest in

174

00:16:32,470 --> 00:16:29,510

the United States especially to

175

00:16:33,610 --> 00:16:32,480

Northeast hardwood forests so

176

00:16:35,680 --> 00:16:33,620

the United States Department of

177

00:16:39,040 --> 00:16:35,690

Agriculture has a goal of controlling

178

00:16:41,230 --> 00:16:39,050

the population of gypsy moths in that

179

00:16:42,790 --> 00:16:41,240

area now the way they control gypsy

180

00:16:46,210 --> 00:16:42,800

moths population is by introducing

181

00:16:48,310 --> 00:16:46,220

sterile gypsy moths into the wild they

182

00:16:49,360 --> 00:16:48,320

tried to produce sterile gypsy moths on

183

00:16:53,920 --> 00:16:49,370

the ground but it's a very difficult

184

00:16:55,990 --> 00:16:53,930

process and also very time-consuming we

185

00:16:57,790 --> 00:16:56,000

also don't know exactly the mechanism

186

00:16:59,380 --> 00:16:57,800

within the gypsy moths that makes them

187

00:17:02,320 --> 00:16:59,390

stir but we do have a ground process

188

00:17:04,180 --> 00:17:02,330

that works well by by accident we have

189

00:17:05,760 --> 00:17:04,190

actually found out that gypsy moth eggs

190

00:17:09,790 --> 00:17:05,770

if they are carried in spaceflight

191

00:17:11,680 --> 00:17:09,800

produced Daryll gypsy moths we don't

192

00:17:14,920 --> 00:17:11,690

quite understand the mechanism and

193

00:17:17,050 --> 00:17:14,930

that's the goal of this experiment if we

194

00:17:19,240 --> 00:17:17,060

take these 5000 gypsy moth eggs with us

195

00:17:21,340 --> 00:17:19,250

and give them back to the USDA after the

196

00:17:23,590 --> 00:17:21,350

flight they should produce still gypsy

197

00:17:25,270 --> 00:17:23,600

moths and the USDA will be able to look

198

00:17:27,580 --> 00:17:25,280

at those gypsy moths and understand the

199

00:17:30,700 --> 00:17:27,590

exact mechanism that creates their

200

00:17:33,460 --> 00:17:30,710

sterility now they wouldn't want us to

201  
00:17:34,660 --> 00:17:33,470  
grow sterile gypsy moths in space for

202  
00:17:36,160 --> 00:17:34,670  
introduction to the wild at mass

203  
00:17:37,690 --> 00:17:36,170  
populations but they would like to

204  
00:17:39,700 --> 00:17:37,700  
understand the mechanisms that create

205  
00:17:42,040 --> 00:17:39,710  
sterility and hopefully reproduce it on

206  
00:17:43,810 --> 00:17:42,050  
the ground so there's one example how

207  
00:17:46,000 --> 00:17:43,820  
going away from the Earth's surface

208  
00:17:48,070 --> 00:17:46,010  
actually can be used to solve a problem

209  
00:17:50,470 --> 00:17:48,080  
we have on earth so that's the first of

210  
00:17:52,060 --> 00:17:50,480  
the two experiments

211  
00:17:53,710 --> 00:17:52,070  
the second experiment I'd like to

212  
00:17:55,359 --> 00:17:53,720  
discuss discuss with you today is called

213  
00:17:57,909 --> 00:17:55,369

the commercial protein crystal growth

214

00:18:00,820 --> 00:17:57,919

experiment or CPC G and it's sponsored

215

00:18:02,200 --> 00:18:00,830

by the University of Alabama now before

216

00:18:03,849 --> 00:18:02,210

I get into the details let me tell you

217

00:18:06,220 --> 00:18:03,859

that the goal of this experiment

218

00:18:08,859 --> 00:18:06,230

it's 132 times on the shuttle by the way

219

00:18:12,190 --> 00:18:08,869

is to either create new drugs or to

220

00:18:14,049 --> 00:18:12,200

improve drugs we already have now drug

221

00:18:15,549 --> 00:18:14,059

design in the United States now is based

222

00:18:18,519 --> 00:18:15,559

on a sophisticated process called

223

00:18:20,560 --> 00:18:18,529

structural based drug design

224

00:18:22,419 --> 00:18:20,570

that's where experiment is rather than

225

00:18:24,549 --> 00:18:22,429

taking a sample of a disease and

226

00:18:27,310 --> 00:18:24,559

applying different drugs to it in a

227

00:18:28,659 --> 00:18:27,320

somewhat haphazard way actually study

228

00:18:31,239 --> 00:18:28,669

the disease's structure

229

00:18:34,180 --> 00:18:31,249

study the drugs that they might consider

230

00:18:36,279 --> 00:18:34,190

what solve that disease so they just fit

231

00:18:39,519 --> 00:18:36,289

together so they actually look at the

232

00:18:41,080 --> 00:18:39,529

structure of this crystal or drug to try

233

00:18:43,149 --> 00:18:41,090

and find out what exactly fits into that

234

00:18:45,700 --> 00:18:43,159

disease actually would cure that disease

235

00:18:47,830 --> 00:18:45,710

now this National Institute of Health as

236

00:18:49,210 --> 00:18:47,840

a structural based drug design is one of

237

00:18:49,840 --> 00:18:49,220

their number-one priorities in the next

238

00:18:52,450 --> 00:18:49,850

ten years

239

00:18:54,909 --> 00:18:52,460

now unfortunately in some cases where we

240

00:18:57,759 --> 00:18:54,919

grow crystals on the ground again trying

241

00:19:00,129 --> 00:18:57,769

to analyze the crystals to heal this

242

00:19:02,229 --> 00:19:00,139

disease the crystals cannot be grown on

243

00:19:03,909 --> 00:19:02,239

the ground because of our gravity well

244

00:19:05,979 --> 00:19:03,919

the good news is that in space we don't

245

00:19:13,119 --> 00:19:05,989

have vanity and we can grow crystals for

246

00:19:15,430 --> 00:19:13,129

the scientists okay what I have here is

247

00:19:20,349 --> 00:19:15,440

a picture on the bottom of a

248

00:19:22,269 --> 00:19:20,359

ground-based crystal phone and on the

249

00:19:23,769 --> 00:19:22,279

top is the crystal grown in space now

250

00:19:25,659 --> 00:19:23,779

these photos are the same magnification

251  
00:19:27,430 --> 00:19:25,669  
of the same drug so you can see that

252  
00:19:29,229 --> 00:19:27,440  
these crystals on the ground grow on the

253  
00:19:31,450 --> 00:19:29,239  
ground we're limited in size and quality

254  
00:19:33,570 --> 00:19:31,460  
whereas the crystals grown in space are

255  
00:19:36,430 --> 00:19:33,580  
much bigger and much better quality

256  
00:19:38,190 --> 00:19:36,440  
therefore space flight produces crystals

257  
00:19:40,899 --> 00:19:38,200  
that are better quality and larger

258  
00:19:42,519 --> 00:19:40,909  
scientists can then can then take the

259  
00:19:43,419 --> 00:19:42,529  
crystals on the ground and analyze and

260  
00:19:45,759 --> 00:19:43,429  
now on earth while we're flying

261  
00:19:47,739 --> 00:19:45,769  
something called alpha interferon it's

262  
00:19:49,690 --> 00:19:47,749  
already a very successful drug around

263  
00:19:52,210 --> 00:19:49,700

the world used in 60 countries to treat

264

00:19:55,479 --> 00:19:52,220

various forms of cancer and also viral

265

00:19:57,609 --> 00:19:55,489

diseases however remember that the goal

266

00:20:00,070 --> 00:19:57,619

of C PGG is either to help discover new

267

00:20:02,470 --> 00:20:00,080

drugs or to improve current drugs and in

268

00:20:04,330 --> 00:20:02,480

our case we're trying to improve alpha

269

00:20:06,250 --> 00:20:04,340

interferon and when you try to

270

00:20:09,400 --> 00:20:06,260

prove a drug you're basically trying to

271

00:20:10,960 --> 00:20:09,410

eliminate some of the side effects so

272

00:20:13,600 --> 00:20:10,970

now that's the second experiment I've

273

00:20:15,490 --> 00:20:13,610

decided to describe to you and it's an

274

00:20:17,560 --> 00:20:15,500

excellent example of how we go into

275

00:20:19,930 --> 00:20:17,570

space to improve our lives on earth and

276

00:20:21,880 --> 00:20:19,940

to solve problems we have on earth so

277

00:20:24,460 --> 00:20:21,890

when you think of NASA and the shuttle

278

00:20:26,110 --> 00:20:24,470

program going up into space we go away

279

00:20:27,730 --> 00:20:26,120

from the Earth's surface to actually

280

00:20:28,090 --> 00:20:27,740

help our families and friends in the

281

00:21:48,240 --> 00:20:28,100

world

282

00:21:58,870 --> 00:21:55,240

the future load switch I'm doing that

283

00:22:01,270 --> 00:21:58,880

and pushing that ahead calibration

284

00:22:04,870 --> 00:22:01,280

go right to the green center left of the

285

00:22:10,169 --> 00:22:04,880

green center release

286

00:22:56,710 --> 00:22:12,570

a horizontal head calibration trial

287

00:23:00,830 --> 00:22:58,930

one of the medical experiments were

288

00:23:03,710 --> 00:23:00,840

participating in you may have noticed

289

00:23:09,550 --> 00:23:03,720

the device that's on Dan and my wrist

290

00:23:16,490 --> 00:23:13,670

and not only they monitoring the

291

00:23:18,770 --> 00:23:16,500

melatonin levels in our urine and saliva

292

00:23:20,330 --> 00:23:18,780

they're also monitoring the light levels

293

00:23:23,720 --> 00:23:20,340

that were exposed to light apparently

294

00:23:25,310 --> 00:23:23,730

controls the production of melatonin so

295

00:23:26,630 --> 00:23:25,320

the devices that we have on our wrists

296

00:23:29,030 --> 00:23:26,640

are actually measuring the light levels

297

00:23:30,770 --> 00:23:29,040

that were exposed to 24 hours a day in

298

00:23:32,420 --> 00:23:30,780

addition to measuring our levels of

299

00:23:34,460 --> 00:23:32,430

activity there's some accelerometers in

300

00:23:36,590 --> 00:23:34,470

these devices and so it measures the

301

00:23:37,880 --> 00:23:36,600

level of activity during the day and

302

00:23:40,100 --> 00:23:37,890

then particularly it's been the level of

303

00:23:41,930 --> 00:23:40,110

activity while we're sleeping it can

304

00:23:44,300 --> 00:23:41,940

tell them whether we're sleeping very

305

00:23:46,610 --> 00:23:44,310

well or not and therefore that's a good

306

00:23:49,640 --> 00:23:46,620

measure of how well we're adjusting our

307

00:23:51,230 --> 00:23:49,650

time clocks pretty much count on looking

308

00:23:53,590 --> 00:23:51,240

at the imagery after the mission we

309

00:23:56,300 --> 00:23:53,600

don't have ready access to NASA select

310

00:24:00,710 --> 00:23:56,310

but we're very excited about the work

311

00:24:02,990 --> 00:24:00,720

that you're doing and we'll be looking

312

00:26:55,100 --> 00:24:03,000

forward to seeing you after you get back

313

00:26:55,110 --> 00:30:57,080

burn some of their circuit boards

314

00:31:00,230 --> 00:30:58,850

we have a few minutes here at the end of

315

00:31:03,169 --> 00:31:00,240

the ship where I could tell you about

316

00:31:04,759 --> 00:31:03,179

our activities on board tell you about

317

00:31:07,100 --> 00:31:04,769

the major components of the space radar

318

00:31:09,919 --> 00:31:07,110

laboratory talk about our science goals

319

00:31:11,810 --> 00:31:09,929

for the week's activities and tell you

320

00:31:14,450 --> 00:31:11,820

about some of the examples of global

321

00:31:16,129 --> 00:31:14,460

change that we look forward to sharing

322

00:31:20,210 --> 00:31:16,139

with the people and the scientists back

323

00:31:22,879 --> 00:31:20,220

on earth this space radar lab - is part

324

00:31:25,610 --> 00:31:22,889

of NASA's mission to Planet Earth that's

325

00:31:29,659 --> 00:31:25,620

a program that NASA is conducting to

326

00:31:31,460 --> 00:31:29,669

look at Earth's Wiese land water the air

327

00:31:33,350 --> 00:31:31,470

around the planet and all the

328

00:31:35,930 --> 00:31:33,360

interactions of those components we're

329

00:31:38,239 --> 00:31:35,940

trying to understand earth as a single

330

00:31:41,029 --> 00:31:38,249

complex system so that we can get a

331

00:31:43,609 --> 00:31:41,039

handle on the real numbers behind the

332

00:31:46,609 --> 00:31:43,619

changes our globe is experiencing now

333

00:31:48,440 --> 00:31:46,619

spit the space radar lab goal as a part

334

00:31:51,019 --> 00:31:48,450

of mission to Planet Earth is to look

335

00:31:55,009 --> 00:31:51,029

for those hard numbers on Earth's

336

00:31:56,629 --> 00:31:55,019

changes most been made and natural to

337

00:31:58,249 --> 00:31:56,639

try to bring those back to North so we

338

00:31:59,960 --> 00:31:58,259

can understand how we're affecting the

339

00:32:02,960 --> 00:31:59,970

planet and how we have to cope with

340

00:32:04,669 --> 00:32:02,970

those changes now to do that we have a

341

00:32:07,340 --> 00:32:04,679

payload base full of sophisticated

342

00:32:09,799 --> 00:32:07,350

instruments the last flew in April on

343

00:32:11,330 --> 00:32:09,809

SPF 59 and I'd like to tell you a bit

344

00:32:13,190 --> 00:32:11,340

about those and I've got a little video

345

00:32:17,239 --> 00:32:13,200

segment here to show you those

346

00:32:19,509 --> 00:32:17,249

components the first component we have

347

00:32:24,529 --> 00:32:19,519

onboard space radar lab is a

348

00:32:26,180 --> 00:32:24,539

state-of-the-art imaging radar and we're

349

00:32:29,019 --> 00:32:26,190

going to show you here in this view as

350

00:32:31,519 --> 00:32:29,029

we come down from the overhead windows

351  
00:32:37,039 --> 00:32:31,529  
search the XR radar out in the payload

352  
00:32:39,200 --> 00:32:37,049  
Bay the other components of SRL is the

353  
00:32:40,669 --> 00:32:39,210  
maps air pollution sensor and in this

354  
00:32:43,279 --> 00:32:40,679  
year the payload Bay you can see the

355  
00:32:45,259 --> 00:32:43,289  
large radar array stretching from about

356  
00:32:48,619 --> 00:32:45,269  
the short end of the day all the way

357  
00:32:51,109 --> 00:32:48,629  
back to the tail it's labeled JPL that's

358  
00:32:53,210 --> 00:32:51,119  
the Circe X our instrument the wildly

359  
00:32:55,039 --> 00:32:53,220  
Research Center logo is on the mapped

360  
00:32:57,529 --> 00:32:55,049  
instrument just to the right of the

361  
00:33:00,289 --> 00:32:57,539  
screen to the left of the Canadian there

362  
00:33:02,629 --> 00:33:00,299  
arm and the small segment of antenna

363  
00:33:07,519 --> 00:33:02,639

labeled X R as the german-built

364

00:33:10,350 --> 00:33:07,529

component of space radar lab now these

365

00:33:12,630 --> 00:33:10,360

sensors in the cargo bay right

366

00:33:15,240 --> 00:33:12,640

useful unless we have the cruiser on

367

00:33:17,100 --> 00:33:15,250

board to operate them for the imaging

368

00:33:19,620 --> 00:33:17,110

radar part of the mission the crew has

369

00:33:21,029 --> 00:33:19,630

an essential role to play there's a huge

370

00:33:23,130 --> 00:33:21,039

amount of data coming down from the

371

00:33:25,409 --> 00:33:23,140

instrument out there as it images the

372

00:33:26,880 --> 00:33:25,419

Earth's surface and those images have to

373

00:33:29,490 --> 00:33:26,890

be transferred to the ground we don't

374

00:33:31,799 --> 00:33:29,500

have enough communications link onboard

375

00:33:34,500 --> 00:33:31,809

to transfer them all in real time so the

376

00:33:36,029 --> 00:33:34,510

first role the crew is to handle the

377

00:33:38,070 --> 00:33:36,039

data coming back from the radar we do

378

00:33:41,399 --> 00:33:38,080

that by changing out our data tapes

379

00:33:43,980 --> 00:33:41,409

onboard and about 207 data tapes onboard

380

00:33:46,830 --> 00:33:43,990

each of them holds 50 gigabytes of data

381

00:33:48,539 --> 00:33:46,840

and we've gotten really good at

382

00:33:50,759 --> 00:33:48,549

practicing changing out those tapes we

383

00:33:52,379 --> 00:33:50,769

hope to bring back about 50 to tera bits

384

00:33:54,659 --> 00:33:52,389

of data something like 20,000

385

00:33:57,210 --> 00:33:54,669

encyclopedia volumes of information by

386

00:34:00,180 --> 00:33:57,220

the time we're finished the second part

387

00:34:01,830 --> 00:34:00,190

of the cruise role is to handle a

388

00:34:04,259 --> 00:34:01,840

photography that supports the science

389

00:34:05,610 --> 00:34:04,269

investigations around the world in many

390

00:34:07,139 --> 00:34:05,620

freezes to the world we don't have

391

00:34:09,570 --> 00:34:07,149

scientific teams on the ground to

392

00:34:12,659 --> 00:34:09,580

validate the results from the radars or

393

00:34:14,760 --> 00:34:12,669

from the maps pollution sensor and so we

394

00:34:17,399 --> 00:34:14,770

are the ground troops photography from

395

00:34:20,579 --> 00:34:17,409

14,000 still photo frames is going to be

396

00:34:22,230 --> 00:34:20,589

used to provide the environmental

397

00:34:23,790 --> 00:34:22,240

conditions over those targets and remote

398

00:34:26,220 --> 00:34:23,800

areas of the globe will don't have

399

00:34:27,480 --> 00:34:26,230

independent certification and the last

400

00:34:29,129 --> 00:34:27,490

thing we're doing and probably the most

401  
00:34:31,139 --> 00:34:29,139  
important role that the crews playing on

402  
00:34:33,510 --> 00:34:31,149  
this mission is to point the payload Bay

403  
00:34:35,460 --> 00:34:33,520  
instruments at the required targets and

404  
00:34:38,159 --> 00:34:35,470  
to do that we're conducting a succession

405  
00:34:40,710 --> 00:34:38,169  
of maneuvers about 409 of them during

406  
00:34:42,329 --> 00:34:40,720  
the mission and that's about 25,000

407  
00:34:44,369 --> 00:34:42,339  
computer keystrokes to tell endeavours

408  
00:34:46,889 --> 00:34:44,379  
computers how to orient the payload

409  
00:34:50,579 --> 00:34:46,899  
basis to get the optimum data coming

410  
00:34:52,619 --> 00:34:50,589  
back down to the ground so the radar in

411  
00:34:55,200 --> 00:34:52,629  
the cargo bay thrust the XR is a

412  
00:34:56,669 --> 00:34:55,210  
synthetic aperture radar and it paints a

413  
00:34:59,040 --> 00:34:56,679

picture of the Earth's surface through

414

00:35:00,690 --> 00:34:59,050

darkness and clouds and conducts operate

415

00:35:03,000 --> 00:35:00,700

around the clock all the way around our

416

00:35:05,960 --> 00:35:03,010

orbits every 90 minutes around the globe

417

00:35:08,339 --> 00:35:05,970

the maps pollution sensor is an infrared

418

00:35:09,839 --> 00:35:08,349

spectrometer and it measures the amount

419

00:35:11,250 --> 00:35:09,849

of heat radiation coming up from the

420

00:35:13,470 --> 00:35:11,260

ground and converts that into

421

00:35:15,960 --> 00:35:13,480

information on how much carbon monoxide

422

00:35:18,060 --> 00:35:15,970

is lying just beneath the Space Shuttle

423

00:35:20,190 --> 00:35:18,070

as we go around the planet and over a

424

00:35:22,800 --> 00:35:20,200

couple of days we can construct a map of

425

00:35:23,470 --> 00:35:22,810

pollution sources and the way the co is

426

00:35:26,260 --> 00:35:23,480

moving around

427

00:35:28,120 --> 00:35:26,270

world on a day-to-day basis and this is

428

00:35:30,310 --> 00:35:28,130

a very good comparison with information

429

00:35:33,010 --> 00:35:30,320

we got last spring and on to previous

430

00:35:34,450 --> 00:35:33,020

flights of maps and this is just the key

431

00:35:36,490 --> 00:35:34,460

to our whole mission just looking for

432

00:35:39,220 --> 00:35:36,500

changes around the world we're looking

433

00:35:41,710 --> 00:35:39,230

for changes since last April's STS 59

434

00:35:43,300 --> 00:35:41,720

mission statement or lab 1 we're looking

435

00:35:45,940 --> 00:35:43,310

for changes in the previous Maps data

436

00:35:47,590 --> 00:35:45,950

over the last 10 years and these two

437

00:35:49,450 --> 00:35:47,600

flights and other flights and NASA's

438

00:35:52,120 --> 00:35:49,460

mission to pilots will show the ability

439

00:35:54,340 --> 00:35:52,130

to murder the earth or the global system

440

00:35:58,120 --> 00:35:54,350

on a permanent basis we're looking for

441

00:36:00,490 --> 00:35:58,130

changes like ecology changes phases

442

00:36:02,440 --> 00:36:00,500

around the world climate changes and

443

00:36:04,030 --> 00:36:02,450

some dramatic changes on the surface

444

00:36:06,390 --> 00:36:04,040

that we're more familiar with like

445

00:36:09,370 --> 00:36:06,400

volcanoes and storm systems for example

446

00:36:11,859 --> 00:36:09,380

in the area of ecology we're looking at

447

00:36:14,109 --> 00:36:11,869

clearing into forestation around the

448

00:36:16,270 --> 00:36:14,119

world with the tropical and northern

449

00:36:17,859 --> 00:36:16,280

forests of the world to see the rate at

450

00:36:18,970 --> 00:36:17,869

which we're destroying the forests and

451  
00:36:20,560 --> 00:36:18,980  
the rate at which they're renewing

452  
00:36:22,750 --> 00:36:20,570  
themselves so we can really quantify

453  
00:36:24,520 --> 00:36:22,760  
that important phenomenon in the

454  
00:36:26,740 --> 00:36:24,530  
ecosystem they've already seen a lot of

455  
00:36:29,710 --> 00:36:26,750  
forest fires over in Asia and in

456  
00:36:33,130 --> 00:36:29,720  
Australia some at night over Africa and

457  
00:36:34,690 --> 00:36:33,140  
in South America as well and our data

458  
00:36:37,240 --> 00:36:34,700  
when we come back will give us the rates

459  
00:36:39,250 --> 00:36:37,250  
of forest change around the world terms

460  
00:36:41,109 --> 00:36:39,260  
of pollution we're looking for the way

461  
00:36:42,910 --> 00:36:41,119  
that carbon monoxide drifts around the

462  
00:36:45,099 --> 00:36:42,920  
world from its sources like forest fires

463  
00:36:46,420 --> 00:36:45,109

and that will help us track these what

464

00:36:48,010 --> 00:36:46,430

we're looking for climate change by

465

00:36:50,980 --> 00:36:48,020

looking at the geology around the world

466

00:36:52,990 --> 00:36:50,990

for traces in the geologic past of radio

467

00:36:55,330 --> 00:36:53,000

radio and dryer periods in the Earth's

468

00:36:58,080 --> 00:36:55,340

deserts and the valleys that show

469

00:37:00,460 --> 00:36:58,090

alluvial fan erosion those are very key

470

00:37:02,800 --> 00:37:00,470

points to investigate for looking back

471

00:37:05,080 --> 00:37:02,810

into the Earth's climatic past before

472

00:37:07,540 --> 00:37:05,090

we've also been looking at several storm

473

00:37:09,700 --> 00:37:07,550

systems down in the southern ocean that

474

00:37:11,800 --> 00:37:09,710

which can track on a day-to-day basis

475

00:37:14,080 --> 00:37:11,810

and there are targets for birth to radar

476

00:37:16,510 --> 00:37:14,090

and some of the maps instruments because

477

00:37:18,880 --> 00:37:16,520

they are those phone systems can

478

00:37:20,200 --> 00:37:18,890

distribute pollution around the world we

479

00:37:22,540 --> 00:37:20,210

have a busy week ahead of us here on

480

00:37:24,670 --> 00:37:22,550

space radar lab we've got a lot of work

481

00:37:26,920 --> 00:37:24,680

to do in terms of maneuvering changing

482

00:37:28,570 --> 00:37:26,930

the tapes and most important for us on a

483

00:37:30,820 --> 00:37:28,580

daily basis is taking all those still

484

00:37:32,950 --> 00:37:30,830

photography still photos from the aft

485

00:37:34,860 --> 00:37:32,960

windows it keeps us constantly busy when

486

00:37:36,940 --> 00:37:34,870

there's a daylight pass going on

487

00:37:39,520 --> 00:37:36,950

that's not surprising news is a very

488

00:37:42,370 --> 00:37:39,530

complex system takes a lot of study to

489

00:37:44,140 --> 00:37:42,380

understand it and the only future

490

00:37:45,220 --> 00:37:44,150

permanent platform or suite of

491

00:37:47,170 --> 00:37:45,230

instruments in orbit it's going to be

492

00:37:49,330 --> 00:37:47,180

able to do that on a permanent basis and

493

00:37:50,830 --> 00:37:49,340

we hope that by flying this testbed will

494

00:37:52,960 --> 00:37:50,840

prove that that principle will in fact

495

00:37:54,220 --> 00:37:52,970

work we're getting a taste of some of

496

00:37:56,560 --> 00:37:54,230

the exciting results that we're

497

00:37:59,440 --> 00:37:56,570

anticipating here in orbit with our own

498

00:38:01,450 --> 00:37:59,450

eyes and it's going to be an exciting

499

00:38:03,490 --> 00:38:01,460

look at the data when we get back to the

500

00:38:05,680 --> 00:38:03,500

ground with those 207 data tapes and

501  
00:38:08,200 --> 00:38:05,690  
really see in full fidelity what the

502  
00:38:10,390 --> 00:38:08,210  
Circe XR and map sensors have brought

503  
00:38:11,440 --> 00:38:10,400  
back well we can see the changes here

504  
00:38:32,079 --> 00:38:11,450  
we're going to try to show them with you

505  
00:38:37,870 --> 00:38:34,589  
okay you should be getting this Europe

506  
00:38:40,539 --> 00:38:37,880  
through the square volcano you can see

507  
00:38:42,729 --> 00:38:40,549  
the upper slopes and there's a very

508  
00:38:46,719 --> 00:38:42,739  
active eruption going on from the

509  
00:38:50,109 --> 00:38:46,729  
northeast portion about des County is

510  
00:38:51,429 --> 00:38:50,119  
behind the smoke plume it will look

511  
00:38:52,959 --> 00:38:51,439  
like some the shadow heights you can

512  
00:38:55,809 --> 00:38:52,969  
even estimate the height of the eruption

513  
00:39:00,279 --> 00:38:55,819

through but we're guessing it at least

514

00:39:03,910 --> 00:39:00,289

35 or 40 thousand and that dark gray

515

00:39:11,439 --> 00:39:03,920

dust will goes down with at least 500

516

00:39:14,400 --> 00:39:11,449

kilometres if not more okay now this is

517

00:39:16,299 --> 00:39:14,410

a going away shot east end of the

518

00:39:18,130 --> 00:39:16,309

volcano you could still see the lava

519

00:39:20,370 --> 00:39:18,140

flows at the top of the screen where the

520

00:39:23,170 --> 00:39:20,380

eruption is actually originating and

521

00:39:25,199 --> 00:39:23,180

this gives you good users the profile of

522

00:39:28,569 --> 00:39:25,209

the clue and there's about a watch shop

523

00:39:35,019 --> 00:39:28,579

adaptogen starting to stat it shows you

524

00:39:37,749 --> 00:39:35,029

the extent of the ash this is Mission

525

00:39:40,569 --> 00:39:37,759

Control Houston we are receiving some

526

00:39:43,029 --> 00:39:40,579

data from the space radar laboratory

527

00:39:45,999 --> 00:39:43,039

instruments this particular data is

528

00:39:51,069 --> 00:39:46,009

coming down real-time or near real-time

529

00:39:56,019 --> 00:39:51,079

and is data as of the Kamchatka

530

00:39:59,380 --> 00:39:56,029

Peninsula the orbiter is flying over

531

00:40:01,479 --> 00:39:59,390

this peninsula that is to the east of

532

00:40:09,790 --> 00:40:01,489

Russia and on the western side of the

533

00:40:15,859 --> 00:40:11,750

he said there were you should be getting

534

00:40:18,470 --> 00:40:15,869

that video now that's affirmed and so

535

00:40:31,579 --> 00:40:18,480

once again really just a fantastic video

536

00:40:36,170 --> 00:40:34,150

from the synthetic aperture radar

537

00:40:38,900 --> 00:40:36,180

instrument onboard endeavor as it passes

538

00:40:46,589 --> 00:40:38,910

over the rico michigan super site these

539

00:40:56,309 --> 00:40:48,599

Rico Michigan is one of the ecology

540

00:40:57,660 --> 00:40:56,319

sites being studied the the ground looks

541

00:40:59,789 --> 00:40:57,670

just like it did then we have a

542

00:41:03,059 --> 00:40:59,799

beautiful mosaic of fall colors

543

00:41:06,089 --> 00:41:03,069

beginning to develop and you should be

544

00:41:08,789 --> 00:41:06,099

beginning to see lots of reds and

545

00:41:14,579 --> 00:41:08,799

yellows as you look down over our site

546

00:41:16,620 --> 00:41:14,589

in the days to come you know week last

547

00:41:18,390 --> 00:41:16,630

night will simply be looking for it the

548

00:41:20,640 --> 00:41:18,400

lighting so far is made a little hard to

549

00:41:22,920 --> 00:41:20,650

distinguish colors but we have noticed a

550

00:41:24,329 --> 00:41:22,930

little bit greener in wood near the

551  
00:41:27,599 --> 00:41:24,339  
coastal lines for the Great Lakes it's

552  
00:41:29,759 --> 00:41:27,609  
looked a little bit more far like well

553  
00:41:32,819 --> 00:41:29,769  
that should be proceeding along rather

554  
00:41:36,450 --> 00:41:32,829  
quickly now we've had two nights of good

555  
00:42:01,630 --> 00:41:36,460  
hard Frost's with clear weather and the

556  
00:42:07,019 --> 00:42:03,720  
and endeavours now moving across the

557  
00:42:09,609 --> 00:42:07,029  
northwestern portions of Africa again

558  
00:42:11,079 --> 00:42:09,619  
using the synthetic aperture radar it's

559  
00:42:13,720 --> 00:42:11,089  
very evident that the orbiter is now

560  
00:42:17,319 --> 00:42:13,730  
crossing over land this is a geological

561  
00:42:21,519 --> 00:42:17,329  
site a super site again over the Sahara

562  
00:42:24,339 --> 00:42:21,529  
Desert area and the Sahara is an area

563  
00:42:30,910 --> 00:42:24,349

which is about the size of the United

564

00:42:35,799 --> 00:42:30,920

States prior to its becoming a desert

565

00:42:40,539 --> 00:42:35,809

area it had been apparently well laden

566

00:42:42,880 --> 00:42:40,549

with fairly major drainage networks with

567

00:42:44,859 --> 00:42:42,890

increasing dominance of the wind and the

568

00:42:48,130 --> 00:42:44,869

sands and the channels and the various

569

00:42:51,370 --> 00:42:48,140

floodplains of the rivers began to be

570

00:42:53,769 --> 00:42:51,380

reworked into thin sheets and eventual

571

00:42:55,180 --> 00:42:53,779

scattered dunes this is Mission Control

572

00:42:57,400 --> 00:42:55,190

Houston we're now receiving some

573

00:43:00,039 --> 00:42:57,410

additional real-time downlink from the

574

00:43:02,079 --> 00:43:00,049

synthetic aperture radar instrument in

575

00:43:04,029 --> 00:43:02,089

endeavours payload Bay as it flies 118

576  
00:43:06,430 --> 00:43:04,039  
nautical miles over the coast of Japan

577  
00:43:09,400 --> 00:43:06,440  
with us again is dr. Jeffrey plow the

578  
00:43:10,479 --> 00:43:09,410  
geology representative for soar cxr dr.

579  
00:43:13,779 --> 00:43:10,489  
Platt what are we looking for in these

580  
00:43:16,059 --> 00:43:13,789  
XR images well at this point we're

581  
00:43:22,259 --> 00:43:16,069  
traveling over the Sea of Japan and this

582  
00:43:24,789 --> 00:43:22,269  
is an inland body not an inland body

583  
00:43:27,509 --> 00:43:24,799  
this is a strait between the main

584  
00:43:30,400 --> 00:43:27,519  
northern tip of the island of Hokkaido

585  
00:43:34,120 --> 00:43:30,410  
which was the vicinity of the offshore

586  
00:43:36,519 --> 00:43:34,130  
earthquake earlier today dr. Platt is

587  
00:43:38,140 --> 00:43:36,529  
there any possibility I need or line

588  
00:43:41,229 --> 00:43:38,150

because of the waves that have been in

589

00:43:43,479 --> 00:43:41,239

the area that is the type of observation

590

00:43:45,729 --> 00:43:43,489

that we would be interested in making

591

00:43:49,779 --> 00:43:45,739

and in this case perhaps looking for

592

00:43:52,059 --> 00:43:49,789

ponded water or any bright returns right

593

00:43:54,460 --> 00:43:52,069

radar returns from the near shore area

594

00:43:56,470 --> 00:43:54,470

here we're coming over the southwest

595

00:43:59,079 --> 00:43:56,480

corner and then beyond in the top of the

596

00:44:01,210 --> 00:43:59,089

screen there is the northeast section of

597

00:44:03,910 --> 00:44:01,220

the island and there's no obvious

598

00:44:07,269 --> 00:44:03,920

evidence of damage but this is going by

599

00:44:09,279 --> 00:44:07,279

rather fast and we'd certainly need more

600

00:44:11,650 --> 00:44:09,289

time to sit down and do a detailed

601  
00:44:14,049 --> 00:44:11,660  
processing and analysis of the image and

602  
00:44:14,920 --> 00:44:14,059  
the next day to take underway with the

603  
00:44:17,200 --> 00:44:14,930  
synthetic aperture

604  
00:44:19,599 --> 00:44:17,210  
radar in endeavours payload Bay as the

605  
00:44:25,380 --> 00:44:19,609  
orbiter tracks northeast now approaching

606  
00:44:32,770 --> 00:44:30,069  
the Reiko Michigan super site is located

607  
00:44:41,240 --> 00:44:32,780  
on the eastern end of Michigan's Upper

608  
00:44:48,080 --> 00:44:44,650  
the particular site of interest is

609  
00:44:51,260 --> 00:44:48,090  
located between forested regions in the

610  
00:44:55,130 --> 00:44:51,270  
northern temperate forest which is known

611  
00:44:58,250 --> 00:44:55,140  
as a transitional zone that is expected

612  
00:45:06,470 --> 00:44:58,260  
to be ecologically sensitive to global

613  
00:45:09,589 --> 00:45:06,480

changes the baseline studies are of the

614

00:45:11,330 --> 00:45:09,599

vegetation areas and those areas are

615

00:45:15,500 --> 00:45:11,340

essential for being studied in

616

00:45:18,260 --> 00:45:15,510

monitoring the global changes again the

617

00:45:23,530 --> 00:45:18,270

orbiter is tracking along the Great

618

00:45:32,359 --> 00:45:26,420

coming up here's the shoreline of one of

619

00:45:35,930 --> 00:45:32,369

the islands and we can clearly see the

620

00:45:37,790 --> 00:45:35,940

volcanoes on those islands these are

621

00:45:39,050 --> 00:45:37,800

some of the most remote volcanoes in the

622

00:45:40,430 --> 00:45:39,060

world and some of the least studies

623

00:45:43,089 --> 00:45:40,440

because of the remoteness and the

624

00:45:45,260 --> 00:45:43,099

difficulty of getting to them in

625

00:45:46,700 --> 00:45:45,270

addition this area is often cloud

626

00:45:48,290 --> 00:45:46,710

covered and makes it difficult for

627

00:46:15,180 --> 00:45:48,300

aerial observations or satellite

628

00:46:19,620 --> 00:46:17,640

once we get the radar set up and ready

629

00:46:21,450 --> 00:46:19,630

to go it's ready to start taking data

630

00:46:23,340 --> 00:46:21,460

and the next scene that you're going to

631

00:46:25,170 --> 00:46:23,350

see is a picture of us passing over the

632

00:46:26,910 --> 00:46:25,180

Sahara Desert as you can see that to the

633

00:46:28,500 --> 00:46:26,920

eye it doesn't look very like there many

634

00:46:29,550 --> 00:46:28,510

features but when you turn the radar on

635

00:46:30,600 --> 00:46:29,560

this is what the radar can see

636

00:46:33,270 --> 00:46:30,610

underneath the ground or ancient

637

00:46:34,650 --> 00:46:33,280

riverbeds and that was part of our study

638

00:46:36,120 --> 00:46:34,660

this was a geological site that we

639

00:46:37,710 --> 00:46:36,130

wouldn't understand the history of how

640

00:46:39,690 --> 00:46:37,720

the Sahara Desert became what it is

641

00:46:40,890 --> 00:46:39,700

today because obviously it's climate in

642

00:52:09,140 --> 00:46:40,900

the past must have been very different

643

00:52:12,650 --> 00:52:10,640

this is Mission Control Houston

644

00:52:14,539 --> 00:52:12,660

endeavours tracking across the Northeast

645

00:52:17,839 --> 00:52:14,549

portions of North America just to move

646

00:52:23,000 --> 00:52:17,849

off the coastline just to the north of

647

00:52:34,460 --> 00:52:23,010

Newfoundland we use coming from the

648

00:52:47,550 --> 00:52:37,710

it's see where it is it's see the

649

00:54:02,270 --> 00:52:47,560

pincers and there's covered involved in

650

00:54:02,280 --> 00:54:18,090

maybe

651  
00:54:18,100 --> 00:54:54,380  
looks like 68

652  
00:54:54,390 --> 00:55:25,080  
shoots away

653  
00:55:25,090 --> 00:55:39,160  
endeavor on energy at the 90

654  
00:55:39,170 --> 00:55:52,290  
approaching 1,000 feet

655  
00:56:08,109 --> 00:55:54,450  
and the landing gear is now down and

656  
00:56:08,119 --> 00:56:20,849  
main gear touchdown

657  
00:56:27,309 --> 00:56:24,459  
and nose gear touchdown endeavour

658  
00:56:29,549 --> 00:56:27,319  
rolling out on runway 2 to the Edwards

659  
00:56:33,009 --> 00:56:29,559  
Air Force Base facility in California

660  
00:57:10,690 --> 00:56:33,019  
after 183 orbits of the earth traveling

661  
00:57:16,840 --> 00:57:14,480  
Houston and order a wheel stop roger

662  
00:57:18,740 --> 00:57:16,850  
wheelstop endeavour and welcome home

663  
00:57:20,210 --> 00:57:18,750

makes you and your crew have done a

664

00:57:21,830 --> 00:57:20,220

great job made a significant

665

00:57:22,280 --> 00:57:21,840

contribution to the mission to Planet

666

00:57:24,590 --> 00:57:22,290

Earth

667

00:57:26,390 --> 00:57:24,600

we on the ground are proud of your work

668

00:57:52,160 --> 00:57:26,400

and proud to be a part of this flight

669

00:57:58,579 --> 00:57:55,599

Osby neighbor autoloader he's happy

670

00:57:59,059 --> 00:57:58,589

Roger wheel step endeavor and welcome

671

00:58:00,829 --> 00:57:59,069

home

672

00:58:02,329 --> 00:58:00,839

fakes here and your crew have done a

673

00:58:03,949 --> 00:58:02,339

great job made a significant

674

00:58:05,989 --> 00:58:03,959

contribution to the mission to planted

675

00:58:07,519 --> 00:58:05,999

everything we on the ground they're

676

00:58:14,269 --> 00:58:07,529

proud of your work and proud to be a