1
00:00:26,710 --> 00:00:24,630
thank you very much the first thing i'd

2
00:00:28,150 --> 00:00:26,720
like to do is thank all of you i know

3
00:00:29,910 --> 00:00:28,160
that there are a lot of people here

4
00:00:32,630 --> 00:00:29,920
today who made a lot of contributions to

5
00:00:33,430 --> 00:00:32,640
this mission and the mission went very

6
00:00:35,670 --> 00:00:33,440
well

7
00:00:37,350 --> 00:00:35,680
because of all the work that everybody

8
00:00:39,510 --> 00:00:37,360
did here at jsc

9
00:00:41,270 --> 00:00:39,520
jpl and the kennedy space center and

10
00:00:43,030 --> 00:00:41,280
many other places around the united

11
00:00:46,229 --> 00:00:43,040
states and around the world

12
00:00:49,350 --> 00:00:46,239
this mission was a real team effort

13
00:00:52,709 --> 00:00:49,360

between a lot of groups that

14
00:00:54,709 --> 00:00:52,719
don't usually work together on projects

15
00:00:56,389 --> 00:00:54,719
just because we don't usually do that

16
00:00:58,869 --> 00:00:56,399
many projects with the jet propulsion

17
00:01:01,110 --> 00:00:58,879
lab but in in this particular case

18
00:01:03,750 --> 00:01:01,120
everybody worked together as a team

19
00:01:05,910 --> 00:01:03,760
and the end result i think uh speaks

20
00:01:07,750 --> 00:01:05,920
well for that teamwork

21
00:01:09,429 --> 00:01:07,760
and so i'd like to thank everybody out

22
00:01:11,030 --> 00:01:09,439
in the audience who participated in one

23
00:01:12,469 --> 00:01:11,040
way or another

24
00:01:14,070 --> 00:01:12,479
to this mission

25
00:01:15,350 --> 00:01:14,080
the second thing i'd like to do is

26
00:01:16,950 --> 00:01:15,360
introduce the crew up here and then

27
00:01:18,149 --> 00:01:16,960
we'll get on with the video on the

28
00:01:21,510 --> 00:01:18,159
slides

29
00:01:22,950 --> 00:01:21,520
to my right is the pilot kevin chilton

30
00:01:27,510 --> 00:01:22,960
and

31
00:01:31,190 --> 00:01:27,520
godwin

32
00:01:33,510 --> 00:01:31,200
and the ms-1 and uh the second shift

33
00:01:36,870 --> 00:01:33,520
commander j app

34
00:01:38,789 --> 00:01:36,880
and our ms2

35
00:01:40,550 --> 00:01:38,799
are basically flight engineer the fellow

36
00:01:42,230 --> 00:01:40,560
that helps us going uphill and downhill

37
00:01:45,830 --> 00:01:42,240
uh rich clifford

38
00:01:49,670 --> 00:01:48,149

and then we have uh tom jones who is the

39
00:01:51,550 --> 00:01:49,680
payload commander on the second shift

40
00:01:54,870 --> 00:01:51,560
and will be the payload commander on

41
00:01:56,469 --> 00:01:54,880
sts-68 and they're going to be off doing

42
00:01:57,590 --> 00:01:56,479
this mission again in a different period

43
00:02:01,030 --> 00:01:57,600
of the year

44
00:02:02,230 --> 00:02:01,040
and that's basically the flight crew

45
00:02:04,789 --> 00:02:02,240
and

46
00:02:07,749 --> 00:02:04,799
all of them worked very hard as part of

47
00:02:09,589 --> 00:02:07,759
this overall team and overall crew and

48
00:02:11,029 --> 00:02:09,599
with that in mind now i'd like to get on

49
00:02:12,790 --> 00:02:11,039
to the interesting hopefully the

50
00:02:13,990 --> 00:02:12,800
interesting part of this afternoon and

51
00:02:16,150 --> 00:02:14,000
we'd like to show you a little bit of

52
00:02:17,990 --> 00:02:16,160
our crew movie and then some slides we

53
00:02:26,790 --> 00:02:18,000
took of the planet earth while we were

54
00:02:31,190 --> 00:02:28,229
this was our patch

55
00:02:33,670 --> 00:02:31,200
uh the kevin chilton was in in charge of

56
00:02:35,350 --> 00:02:33,680
uh making sure it all got approved most

57
00:02:36,550 --> 00:02:35,360
of the design was actually from tom

58
00:02:38,309 --> 00:02:36,560
jones

59
00:02:39,589 --> 00:02:38,319
uh this is us while we're on orbit you

60
00:02:40,949 --> 00:02:39,599
can tell that we're having a good time

61
00:02:42,869 --> 00:02:40,959
this was our

62
00:02:43,910 --> 00:02:42,879
crew press conference uh while we were

63
00:02:46,470 --> 00:02:43,920

up there

64
00:02:48,869 --> 00:02:46,480
and uh just gives you another chance uh

65
00:02:51,190 --> 00:02:48,879
to see all of us up in space

66
00:02:53,110 --> 00:02:51,200
this was uh the morning we actually

67
00:02:55,990 --> 00:02:53,120
launched we're headed out to the pad uh

68
00:02:58,470 --> 00:02:56,000
we went out twice and uh and launched on

69
00:02:59,910 --> 00:02:58,480
the second attempt so we were we were

70
00:03:01,030 --> 00:02:59,920
happy to do that it turned out that the

71
00:03:02,470 --> 00:03:01,040
weather wasn't that great after we

72
00:03:03,750 --> 00:03:02,480
launched so if we hadn't gotten off that

73
00:03:06,149 --> 00:03:03,760
day we'd have been waiting around for

74
00:03:08,390 --> 00:03:06,159
some time

75
00:03:09,910 --> 00:03:08,400
the vehicle really feels great when

76
00:03:12,470 --> 00:03:09,920
those main engines finally start they

77
00:03:15,110 --> 00:03:12,480
run for about seven seconds or so and we

78
00:03:16,710 --> 00:03:15,120
launched right at the crack of dawn

79
00:03:18,070 --> 00:03:16,720
so as you can see here i know some of

80
00:03:19,990 --> 00:03:18,080
you were down there for the launch it

81
00:03:21,830 --> 00:03:20,000
had to be absolutely uh beautiful the

82
00:03:22,790 --> 00:03:21,840
only better view was uh in the rearview

83
00:03:24,149 --> 00:03:22,800
mirror

84
00:03:25,990 --> 00:03:24,159
that was the view we had as we were

85
00:03:27,990 --> 00:03:26,000
headed up there

86
00:03:29,990 --> 00:03:28,000
and um we've got a number of launch

87
00:03:32,789 --> 00:03:30,000
pictures here just because uh i think it

88
00:03:34,630 --> 00:03:32,799

was an incredible launch

89
00:03:39,110 --> 00:03:34,640
you can see we're arcing up toward the

90
00:03:41,750 --> 00:03:39,120
north heading into a 57 degree orbit

91
00:03:43,430 --> 00:03:41,760
it was a beautiful crisp morning so they

92
00:03:45,830 --> 00:03:43,440
were able to track us for a long range

93
00:03:50,470 --> 00:03:45,840
so we've got a lot of uh of good launch

94
00:03:53,509 --> 00:03:51,589
and

95
00:03:55,350 --> 00:03:53,519
it feels like you're awfully small out

96
00:03:59,270 --> 00:03:55,360
on the end of this giant explosion which

97
00:04:03,190 --> 00:04:00,949
you'll see the srbs come off and then

98
00:04:06,949 --> 00:04:03,200
you'll see a shot from the orbiter

99
00:04:09,990 --> 00:04:08,789
and then you can see the it was so clear

100
00:04:11,910 --> 00:04:10,000
that morning that they've got some good

101
00:04:13,429 --> 00:04:11,920
shots here of the srbs falling away or

102
00:04:15,990 --> 00:04:13,439
floating away

103
00:04:17,430 --> 00:04:16,000
and the main engines continued to burn

104
00:04:19,830 --> 00:04:17,440
our children told us we looked like a

105
00:04:20,789 --> 00:04:19,840
star going over the horizon

106
00:04:22,870 --> 00:04:20,799
and

107
00:04:25,670 --> 00:04:22,880
really really felt great to get into

108
00:04:25,680 --> 00:04:30,230
here's the external tank separation

109
00:04:32,950 --> 00:04:31,749
we don't see this real time and that's

110
00:04:36,870 --> 00:04:32,960
probably good that you don't see all

111
00:04:39,270 --> 00:04:38,469
might make you just a little bit nervous

112
00:04:40,310 --> 00:04:39,280
but

113
00:04:41,749 --> 00:04:40,320

that's all

114
00:04:43,030 --> 00:04:41,759
basically ice and things like that

115
00:04:46,870 --> 00:04:43,040
floating around it's not really a

116
00:04:52,870 --> 00:04:50,469
and the next shot is one

117
00:04:54,550 --> 00:04:52,880
jay took after we rotated the vehicle to

118
00:04:56,310 --> 00:04:54,560
get some footage of the external tank

119
00:04:57,830 --> 00:04:56,320
and linda was shooting some 35

120
00:05:00,950 --> 00:04:57,840
millimeter shots at this time to get

121
00:05:04,629 --> 00:05:03,189
now we're on orbit this is the sunrise

122
00:05:06,310 --> 00:05:04,639
and as the sun comes up it's just a

123
00:05:08,469 --> 00:05:06,320
beautiful view of seeing the tail of the

124
00:05:09,909 --> 00:05:08,479
orbiter come into view and then our

125
00:05:12,629 --> 00:05:09,919
payload in the payload bay you can see

126
00:05:14,310 --> 00:05:12,639
the large antenna structure uh the jpl

127
00:05:16,070 --> 00:05:14,320
project and the german and italian space

128
00:05:17,670 --> 00:05:16,080
agency it's a large antenna and in the

129
00:05:18,469 --> 00:05:17,680
foreground where you can't see it is uh

130
00:05:23,590 --> 00:05:18,479
the

131
00:05:25,270 --> 00:05:23,600
research center

132
00:05:27,270 --> 00:05:25,280
in the forward flight deck sits busy

133
00:05:29,029 --> 00:05:27,280
here putting in one of the 412 maneuvers

134
00:05:30,710 --> 00:05:29,039
that we did during the mission uh

135
00:05:32,870 --> 00:05:30,720
basically wait for one maneuver to time

136
00:05:35,749 --> 00:05:32,880
out and then enter in the next one um

137
00:05:37,189 --> 00:05:35,759
those allowed us to do some yaw

138
00:05:39,189 --> 00:05:37,199

steering to help the the radar

139
00:05:40,310 --> 00:05:39,199
ambiguities another major thing we

140
00:05:42,070 --> 00:05:40,320
performed during the mission were all

141
00:05:44,870 --> 00:05:42,080
the tape changes and tom's doing one

142
00:05:46,469 --> 00:05:44,880
here we did a i think 163 tape changes

143
00:05:48,469 --> 00:05:46,479
on time during the mission

144
00:05:50,550 --> 00:05:48,479
uh that's where all the radar data was

145
00:05:52,150 --> 00:05:50,560
recorded and we had two recorders on the

146
00:05:53,909 --> 00:05:52,160
the left side of the yeah flight deck

147
00:05:57,029 --> 00:05:53,919
where tom is working here and another

148
00:05:58,790 --> 00:05:57,039
one on the other side for three total

149
00:06:00,150 --> 00:05:58,800
the flight deck was where the action was

150
00:06:01,749 --> 00:06:00,160
on this mission there's no doubt about

151
00:06:03,430 --> 00:06:01,759
it and we had some extra panel covers

152
00:06:05,590 --> 00:06:03,440
made with velcro squares on them you can

153
00:06:07,189 --> 00:06:05,600
see them in the back and

154
00:06:09,909 --> 00:06:07,199
basically it held all of our cameras and

155
00:06:11,830 --> 00:06:09,919
lenses and sid was using the len hop and

156
00:06:13,670 --> 00:06:11,840
chili's just surrounded by a hasselblad

157
00:06:14,309 --> 00:06:13,680
camera bodies and a spot meteor or two

158
00:06:16,950 --> 00:06:14,319
and

159
00:06:18,870 --> 00:06:16,960
uh ready to go to work

160
00:06:20,150 --> 00:06:18,880
this is our linhof film changing bag i

161
00:06:22,150 --> 00:06:20,160
did it a couple of times during the

162
00:06:23,029 --> 00:06:22,160
mission we had to change out our linhof

163
00:06:24,309 --> 00:06:23,039

film

164
00:06:26,070 --> 00:06:24,319
and once your hands are in there you

165
00:06:27,590 --> 00:06:26,080
can't come out to your done and there's

166
00:06:29,830 --> 00:06:27,600
you've got exposed film in there a new

167
00:06:31,430 --> 00:06:29,840
film and the role you're

168
00:06:32,870 --> 00:06:31,440
trying to work it into and finally

169
00:06:34,230 --> 00:06:32,880
success

170
00:06:35,909 --> 00:06:34,240
i think jay did most of our film

171
00:06:37,430 --> 00:06:35,919
changing during the mission briefly a

172
00:06:40,070 --> 00:06:37,440
nice view from one of the aft cameras

173
00:06:41,029 --> 00:06:40,080
showing the payload and our aft windows

174
00:06:42,309 --> 00:06:41,039
um

175
00:06:43,909 --> 00:06:42,319
the iflight deck was really where we did

176
00:06:44,870 --> 00:06:43,919
all of our uh work on the daylight

177
00:06:46,230 --> 00:06:44,880
passes we were doing a lot of

178
00:06:47,510 --> 00:06:46,240
photography and support of the radar

179
00:06:49,189 --> 00:06:47,520
observations

180
00:06:51,270 --> 00:06:49,199
on the left there you see the linhof

181
00:06:52,150 --> 00:06:51,280
camera mounted to a bracket on window

182
00:06:53,990 --> 00:06:52,160
number

183
00:06:56,070 --> 00:06:54,000
seven and you could tilt that to line it

184
00:06:57,270 --> 00:06:56,080
up with the radar bore sight and then

185
00:06:58,710 --> 00:06:57,280
rich here is working with a 40

186
00:07:00,629 --> 00:06:58,720
millimeter lens out the window and we

187
00:07:01,990 --> 00:07:00,639
had a lot of handheld shots of the

188
00:07:04,550 --> 00:07:02,000

targets of interest to the radar and the

189
00:07:06,230 --> 00:07:04,560
maps folks this is a sweeping pass

190
00:07:07,909 --> 00:07:06,240
coming southeast across the california

191
00:07:10,950 --> 00:07:07,919
coastline

192
00:07:12,710 --> 00:07:10,960
north of san francisco across the uh

193
00:07:13,990 --> 00:07:12,720
approaches to the sierra nevada and very

194
00:07:16,629 --> 00:07:14,000
soon you're going to see some landmarks

195
00:07:18,230 --> 00:07:16,639
out here that you'll recognize from your

196
00:07:19,990 --> 00:07:18,240
geography lessons

197
00:07:22,390 --> 00:07:20,000
the sierra nevada is a snow-capped range

198
00:07:24,469 --> 00:07:22,400
here you come into view of pyramid lake

199
00:07:26,390 --> 00:07:24,479
right here and then lake tahoe coming

200
00:07:28,150 --> 00:07:26,400
into view at the bottom of the screen

201
00:07:30,950 --> 00:07:28,160
and as we walk down the sierra nevada we

202
00:07:33,270 --> 00:07:30,960
saw our super site for hydrology at

203
00:07:35,110 --> 00:07:33,280
mammoth mountain right next to mono lake

204
00:07:36,790 --> 00:07:35,120
here this is where mammoth mountain is

205
00:07:38,629 --> 00:07:36,800
and then if you follow the owens valley

206
00:07:39,990 --> 00:07:38,639
down the front of the sierra nevada

207
00:07:41,909 --> 00:07:40,000
you'll come to

208
00:07:43,830 --> 00:07:41,919
owens dry lake right down at the bottom

209
00:07:45,909 --> 00:07:43,840
here stepping across to panama valley

210
00:07:47,589 --> 00:07:45,919
and then death valley and here you see

211
00:07:49,749 --> 00:07:47,599
cotton ball basin and the bad water the

212
00:07:51,830 --> 00:07:49,759
lowest point in north america at some

213
00:07:53,189 --> 00:07:51,840

200 feet below sea level this is a jet

214
00:07:54,070 --> 00:07:53,199
propulsion lab

215
00:07:55,990 --> 00:07:54,080
graphic

216
00:07:58,070 --> 00:07:56,000
showing our radar imagery collected on

217
00:07:59,830 --> 00:07:58,080
the mission laid onto a topographic map

218
00:08:01,510 --> 00:07:59,840
of death valley this is the northern end

219
00:08:03,110 --> 00:08:01,520
of the valley and cotton ball basin and

220
00:08:04,869 --> 00:08:03,120
as you fly

221
00:08:06,790 --> 00:08:04,879
through this virtual reality

222
00:08:08,070 --> 00:08:06,800
presentation north out of death valley

223
00:08:09,430 --> 00:08:08,080
we sweep around the northern end of the

224
00:08:11,990 --> 00:08:09,440
panament range

225
00:08:13,350 --> 00:08:12,000
and this is the stove pipe wells target

226
00:08:15,189 --> 00:08:13,360
in death valley that we imaged many

227
00:08:17,189 --> 00:08:15,199
times on the mission and we studied the

228
00:08:18,790 --> 00:08:17,199
interaction of the surface there with

229
00:08:20,710 --> 00:08:18,800
the wind and measured that with the

230
00:08:22,230 --> 00:08:20,720
radar roughness measurements now you can

231
00:08:24,309 --> 00:08:22,240
look back south down death valley to

232
00:08:25,589 --> 00:08:24,319
cotton ball basin and bad water and

233
00:08:28,070 --> 00:08:25,599
these are the panama ranges and the

234
00:08:30,150 --> 00:08:28,080
black mountains on the left

235
00:08:31,589 --> 00:08:30,160
here on the atlantic again you see uh

236
00:08:34,310 --> 00:08:31,599
jay using the

237
00:08:36,149 --> 00:08:34,320
90 millimeter linhoff camera so we had

238
00:08:37,750 --> 00:08:36,159

two big lenses out the back window to

239
00:08:40,070 --> 00:08:37,760
document the radar

240
00:08:41,269 --> 00:08:40,080
sweep across the earth and i'm using the

241
00:08:42,709 --> 00:08:41,279
spot meter here to get the right

242
00:08:44,230 --> 00:08:42,719
exposure level for all of all the

243
00:08:46,310 --> 00:08:44,240
cameras we're using on the flight tech

244
00:08:47,990 --> 00:08:46,320
this is siberia it's so bright with this

245
00:08:49,430 --> 00:08:48,000
snow cover that you actually have to use

246
00:08:50,630 --> 00:08:49,440
sunglasses to get a good look at the

247
00:08:52,949 --> 00:08:50,640
surface down there and we saw the

248
00:08:54,230 --> 00:08:52,959
trans-siberian railway region many times

249
00:08:56,470 --> 00:08:54,240
in the first third of the mission as the

250
00:08:58,550 --> 00:08:56,480
top of our orbit took us over siberia we

251
00:09:01,030 --> 00:08:58,560
had a lot of ecological and geological

252
00:09:03,190 --> 00:09:01,040
targets in that region

253
00:09:04,310 --> 00:09:03,200
now we have a picture here of jay and

254
00:09:05,910 --> 00:09:04,320
rich conducting one of the many

255
00:09:07,509 --> 00:09:05,920
maneuvers

256
00:09:08,630 --> 00:09:07,519
on the flight to point the radar

257
00:09:10,630 --> 00:09:08,640
accurately

258
00:09:12,070 --> 00:09:10,640
and uh as they entered the mute uh

259
00:09:14,150 --> 00:09:12,080
entered the maneuver into the orbiter

260
00:09:16,310 --> 00:09:14,160
computers then the orbiter did a slow

261
00:09:18,630 --> 00:09:16,320
walk during our passes to point the

262
00:09:20,870 --> 00:09:18,640
radar uh just so

263
00:09:22,389 --> 00:09:20,880

this is a the sahara desert region we

264
00:09:24,070 --> 00:09:22,399
had a lot of investigations here to use

265
00:09:26,070 --> 00:09:24,080
the radar to penetrate below the dry

266
00:09:28,870 --> 00:09:26,080
sand in the sahara to look at the

267
00:09:31,269 --> 00:09:28,880
bedrock below and the drainages revealed

268
00:09:33,269 --> 00:09:31,279
by penetrating the sand sheet here show

269
00:09:35,030 --> 00:09:33,279
us how those drainages were formed and

270
00:09:37,750 --> 00:09:35,040
what the past climate of the sahara was

271
00:09:39,350 --> 00:09:37,760
like here's our payload commander linda

272
00:09:41,750 --> 00:09:39,360
godwin on the aft flight deck getting

273
00:09:44,230 --> 00:09:41,760
ready for a pass down uh over the

274
00:09:45,910 --> 00:09:44,240
ukraine and the caspian sea here you see

275
00:09:47,829 --> 00:09:45,920
the many farms in

276
00:09:50,470 --> 00:09:47,839
the ukraine beautiful area from out

277
00:09:54,550 --> 00:09:50,480
there getting down to the area near the

278
00:09:56,070 --> 00:09:54,560
oil fields at the top of the caspian sea

279
00:09:58,949 --> 00:09:56,080
and here's the beautiful geological

280
00:10:00,550 --> 00:09:58,959
feature there going out to the caspian

281
00:10:01,590 --> 00:10:00,560
which is a very interesting feature

282
00:10:03,269 --> 00:10:01,600
studied

283
00:10:05,829 --> 00:10:03,279
by a lot of the scientists here at

284
00:10:07,750 --> 00:10:05,839
johnson space center the level of the

285
00:10:11,350 --> 00:10:07,760
caspian sea has changed greatly and by

286
00:10:13,110 --> 00:10:11,360
studying features like the seacoast here

287
00:10:15,590 --> 00:10:13,120
the folks here

288
00:10:16,870 --> 00:10:15,600

can tell how high the sea level has gone

289
00:10:19,190 --> 00:10:16,880
or how low it's gone it actually has

290
00:10:20,870 --> 00:10:19,200
gone up about two meters in the last few

291
00:10:22,550 --> 00:10:20,880
months about six feet

292
00:10:24,790 --> 00:10:22,560
you can imagine what that would do to us

293
00:10:26,870 --> 00:10:24,800
here in houston you see the roads and so

294
00:10:28,790 --> 00:10:26,880
forth down there here's a beautiful

295
00:10:29,990 --> 00:10:28,800
picture of the radar and the payload bay

296
00:10:33,430 --> 00:10:30,000
showing

297
00:10:37,829 --> 00:10:33,440
everything out there and here's the uh

298
00:10:39,750 --> 00:10:37,839
redshift wearing blue shirts on uh

299
00:10:41,269 --> 00:10:39,760
that's right on

300
00:10:42,470 --> 00:10:41,279
the flight deck and you can see just how

301
00:10:45,269 --> 00:10:42,480
busy it was getting ready for one of

302
00:10:47,110 --> 00:10:45,279
these data passes overlaid here with on

303
00:10:48,790 --> 00:10:47,120
the outside is our

304
00:10:51,269 --> 00:10:48,800
tv cameras out in the payload bay on the

305
00:10:52,790 --> 00:10:51,279
inside that little square is the radar

306
00:10:54,630 --> 00:10:52,800
so you can see how much more is revealed

307
00:10:56,310 --> 00:10:54,640
by the radar these white blobs that you

308
00:10:58,310 --> 00:10:56,320
see turning into black in the radar area

309
00:10:59,590 --> 00:10:58,320
are frozen lakes in canada

310
00:11:01,670 --> 00:10:59,600
we were talking to some of those people

311
00:11:04,069 --> 00:11:01,680
on frozen lakes uh down here on the

312
00:11:05,910 --> 00:11:04,079
shuttle amateur radio experiment uh

313
00:11:07,670 --> 00:11:05,920

built by folks at motorola and here at

314
00:11:08,870 --> 00:11:07,680
johnson space center and we loved

315
00:11:10,230 --> 00:11:08,880
talking to people on the ground with

316
00:11:12,230 --> 00:11:10,240
that it really made us feel connected

317
00:11:14,069 --> 00:11:12,240
with them we talked to students in nine

318
00:11:15,910 --> 00:11:14,079
schools throughout the world that's not

319
00:11:18,150 --> 00:11:15,920
all we did up there with the schools we

320
00:11:19,990 --> 00:11:18,160
spent a lot of time on educational

321
00:11:21,910 --> 00:11:20,000
activities up there both live downlinks

322
00:11:24,150 --> 00:11:21,920
that some of you may have seen

323
00:11:26,150 --> 00:11:24,160
in making an educational film on

324
00:11:27,910 --> 00:11:26,160
geography which we hope will be released

325
00:11:28,870 --> 00:11:27,920
for students in uh schools here real

326
00:11:30,790 --> 00:11:28,880
soon

327
00:11:32,069 --> 00:11:30,800
it's shift handover and sids kick the

328
00:11:33,750 --> 00:11:32,079
blue shift down to the mid deck and

329
00:11:35,509 --> 00:11:33,760
that's what you see us doing tom coming

330
00:11:36,949 --> 00:11:35,519
down and i'm shortly followed by myself

331
00:11:38,389 --> 00:11:36,959
here we're coming down to the mid deck

332
00:11:40,310 --> 00:11:38,399
to do some of the orbiter activities

333
00:11:42,310 --> 00:11:40,320
associated with uh with maintaining the

334
00:11:44,550 --> 00:11:42,320
spacecraft in good condition you're

335
00:11:46,630 --> 00:11:44,560
going to see a shot of tj here working

336
00:11:48,150 --> 00:11:46,640
out on the ergometer right behind tom

337
00:11:49,670 --> 00:11:48,160
over his left shoulder is our rowing

338
00:11:51,030 --> 00:11:49,680

machine which we also carried up there

339
00:11:52,949 --> 00:11:51,040
some people use the rower some people

340
00:11:54,389 --> 00:11:52,959
use the ergometer for longer flights

341
00:11:56,710 --> 00:11:54,399
these things are almost critical to the

342
00:11:57,990 --> 00:11:56,720
operation and the infamous galley is

343
00:12:00,310 --> 00:11:58,000
just above the rower there where we had

344
00:12:03,670 --> 00:12:00,320
some problems this was an experiment of

345
00:12:05,430 --> 00:12:03,680
moving a rigid body in space

346
00:12:07,430 --> 00:12:05,440
getting ready for the sleep shift it's

347
00:12:09,509 --> 00:12:07,440
uh sped up a little bit it's two to one

348
00:12:10,710 --> 00:12:09,519
just so we can get it done in time

349
00:12:13,829 --> 00:12:10,720
then we had to slow the film down to

350
00:12:17,590 --> 00:12:15,750
but the sleep stations were really handy

351
00:12:19,190 --> 00:12:17,600
we had a good time with them we used a

352
00:12:22,310 --> 00:12:19,200
four-tier sleep station the bottom tier

353
00:12:25,190 --> 00:12:22,320
was used for strictly stowage

354
00:12:28,389 --> 00:12:25,200
and

355
00:12:32,470 --> 00:12:29,829
but the the sleep stations really

356
00:12:34,710 --> 00:12:32,480
provide a good quiet and uh

357
00:12:36,069 --> 00:12:34,720
light tight area for us to get a restful

358
00:12:37,750 --> 00:12:36,079
six to eight hours of sleep during each

359
00:12:40,150 --> 00:12:37,760
period you're going to follow this with

360
00:12:42,069 --> 00:12:40,160
some more orbiter activities

361
00:12:43,910 --> 00:12:42,079
mainly some meal operations and some

362
00:12:45,430 --> 00:12:43,920
cleaning and you'll see the crew doing

363
00:12:47,269 --> 00:12:45,440

different operations and how we maintain

364
00:12:51,509 --> 00:12:47,279
good hygiene in space

365
00:12:51,519 --> 00:12:53,750
what a body

366
00:12:57,030 --> 00:12:55,670
but it's interesting to take a sponge

367
00:12:59,269 --> 00:12:57,040
bath up there which is of course the way

368
00:13:01,990 --> 00:12:59,279
we had to do it you just use the hygiene

369
00:13:04,069 --> 00:13:02,000
hose and put some liquid soap on the rag

370
00:13:05,750 --> 00:13:04,079
along with uh some water and wash off

371
00:13:08,069 --> 00:13:05,760
your body especially needed after an

372
00:13:10,389 --> 00:13:08,079
exercise period a quick view of some of

373
00:13:11,750 --> 00:13:10,399
the food operations behind

374
00:13:13,350 --> 00:13:11,760
the crew on the forward flight deck

375
00:13:15,350 --> 00:13:13,360
lockers are three food trays which you

376
00:13:17,110 --> 00:13:15,360
can see are in use right now

377
00:13:18,870 --> 00:13:17,120
they were useful for stowage this is a

378
00:13:20,069 --> 00:13:18,880
water dump a unique view of that chile

379
00:13:21,910 --> 00:13:20,079
has set up the water dump looking out

380
00:13:23,910 --> 00:13:21,920
the pilots window number one and then

381
00:13:26,310 --> 00:13:23,920
giving you a close-up view of how it

382
00:13:28,230 --> 00:13:26,320
forms the the ice particles immediately

383
00:13:29,910 --> 00:13:28,240
on expulsion into space

384
00:13:32,310 --> 00:13:29,920
and following this we're going to have

385
00:13:34,150 --> 00:13:32,320
some other experiments with

386
00:13:36,310 --> 00:13:34,160
space science here this is seeing how a

387
00:13:37,910 --> 00:13:36,320
gyroscope works in space these are our

388
00:13:39,590 --> 00:13:37,920

gyro stabilized binoculars and what i've

389
00:13:41,350 --> 00:13:39,600
done is i've just turned them on and you

390
00:13:42,790 --> 00:13:41,360
can see how they try to maintain a

391
00:13:44,230 --> 00:13:42,800
position in space these were

392
00:13:46,069 --> 00:13:44,240
particularly useful for looking at some

393
00:13:48,949 --> 00:13:46,079
of the earth observation sites for

394
00:13:50,150 --> 00:13:48,959
close-up views

395
00:13:52,550 --> 00:13:50,160
now uh

396
00:13:53,750 --> 00:13:52,560
now we're over to chile

397
00:13:55,189 --> 00:13:53,760
well you'd think someone had flown

398
00:13:57,509 --> 00:13:55,199
before and know how to eat cashews in

399
00:13:59,189 --> 00:13:57,519
space but

400
00:14:00,629 --> 00:13:59,199
i got a little help there

401
00:14:03,990 --> 00:14:00,639
she knows

402
00:14:06,550 --> 00:14:05,269
you gotta enjoy yourself while you're up

403
00:14:07,910 --> 00:14:06,560
there in the little free time that you

404
00:14:10,230 --> 00:14:07,920
have between in particular when you got

405
00:14:12,550 --> 00:14:10,240
the whole shift for both shifts together

406
00:14:14,710 --> 00:14:12,560
and tom found a unique way to use the uh

407
00:14:16,389 --> 00:14:14,720
tips paper roll when the roll was out he

408
00:14:18,389 --> 00:14:16,399
turned it into a blow gun for shooting

409
00:14:19,350 --> 00:14:18,399
uh malted milk balls across the cockpit

410
00:14:20,949 --> 00:14:19,360
there

411
00:14:22,310 --> 00:14:20,959
i think jay was declared the champion

412
00:14:25,990 --> 00:14:22,320
the only one who could successfully grab

413
00:14:30,069 --> 00:14:27,829

rich had done an experiment with fluids

414
00:14:31,430 --> 00:14:30,079
on his previous flight and so uh he he

415
00:14:33,269 --> 00:14:31,440
convinced us that we needed to do a

416
00:14:34,710 --> 00:14:33,279
little experiment on this flight and

417
00:14:36,790 --> 00:14:34,720
this is always a good thing to show the

418
00:14:38,310 --> 00:14:36,800
school children how fluids behave

419
00:14:39,670 --> 00:14:38,320
floating free in gravity and to

420
00:14:42,150 --> 00:14:39,680
demonstrate to them that this is not in

421
00:14:43,269 --> 00:14:42,160
fact a bubble but a solid sphere of

422
00:14:45,189 --> 00:14:43,279
liquid and

423
00:14:47,189 --> 00:14:45,199
rick demonstrates that here as it wicks

424
00:14:48,550 --> 00:14:47,199
away onto the

425
00:14:50,470 --> 00:14:48,560
towel just before it hits the overhead

426
00:14:52,629 --> 00:14:50,480
window

427
00:14:53,910 --> 00:14:52,639
this is the entry into the beginning of

428
00:14:55,750 --> 00:14:53,920
my favorite part of the flight which is

429
00:14:56,550 --> 00:14:55,760
entry and here we are on fcs checkout

430
00:14:59,829 --> 00:14:56,560
day

431
00:15:01,110 --> 00:14:59,839
home we didn't have many payloads that

432
00:15:03,189 --> 00:15:01,120
moved on this so we had to throw the

433
00:15:05,430 --> 00:15:03,199
elevon in here coming up during the

434
00:15:07,189 --> 00:15:05,440
fcs checkout

435
00:15:08,710 --> 00:15:07,199
that the radar is pretty static back

436
00:15:11,750 --> 00:15:08,720
there in the aft

437
00:15:13,030 --> 00:15:11,760
but entry was pretty uh fantastic and of

438
00:15:15,189 --> 00:15:13,040

course there's always a little bit of

439
00:15:15,990 --> 00:15:15,199
regret with your final uh view of the

440
00:15:18,949 --> 00:15:16,000
last

441
00:15:21,910 --> 00:15:18,959
sunset on orbit before you come home but

442
00:15:23,990 --> 00:15:21,920
as the sun sets on endeavor here we come

443
00:15:25,670 --> 00:15:24,000
back to a spectacular sequence here that

444
00:15:27,509 --> 00:15:25,680
tom jones shot

445
00:15:28,949 --> 00:15:27,519
carrying the camcorder in the back seat

446
00:15:30,389 --> 00:15:28,959
during entry here you can see over

447
00:15:32,150 --> 00:15:30,399
should sid shoulder in the front the

448
00:15:34,230 --> 00:15:32,160
orange glow out the front and now tom

449
00:15:35,670 --> 00:15:34,240
zooms in on his mirror to look out the

450
00:15:37,509 --> 00:15:35,680
overhead window and here's the wake of

451
00:15:39,509 --> 00:15:37,519
the orbiter during entering so you can

452
00:15:41,509 --> 00:15:39,519
see the hot plasma forming a plume of

453
00:15:43,030 --> 00:15:41,519
fire behind the orbiter

454
00:15:44,870 --> 00:15:43,040
outside the window it's still hot and

455
00:15:46,870 --> 00:15:44,880
glowing out my window you can see that

456
00:15:48,629 --> 00:15:46,880
i've gone into daylight and then this

457
00:15:51,269 --> 00:15:48,639
tremendous right turn that we made for

458
00:15:53,189 --> 00:15:51,279
the majority of re-entry around the

459
00:15:55,030 --> 00:15:53,199
crater lake and mount shasta and mount

460
00:15:57,430 --> 00:15:55,040
lassen in california and on down the san

461
00:15:59,269 --> 00:15:57,440
joaquin valley was just a tremendous

462
00:16:01,189 --> 00:15:59,279
re-entry view as we came down the whole

463
00:16:02,949 --> 00:16:01,199

length of the state of california

464
00:16:03,990 --> 00:16:02,959
sid did a beautiful job rolling us onto

465
00:16:05,590 --> 00:16:04,000
the hack

466
00:16:07,670 --> 00:16:05,600
and flew right on the money all the way

467
00:16:10,069 --> 00:16:07,680
around here you see him rolling out on

468
00:16:12,069 --> 00:16:10,079
final on the outer glide slope

469
00:16:13,030 --> 00:16:12,079
tom still holding this 500 pound camera

470
00:16:14,949 --> 00:16:13,040
now

471
00:16:17,189 --> 00:16:14,959
looking out the uh over my right

472
00:16:19,590 --> 00:16:17,199
shoulder you can see the uh ramp there

473
00:16:21,430 --> 00:16:19,600
at edwards air force base and tom was a

474
00:16:22,629 --> 00:16:21,440
real trooper carrying that thing all the

475
00:16:24,470 --> 00:16:22,639
way down

476
00:16:26,629 --> 00:16:24,480
through landing here having at the ready

477
00:16:28,550 --> 00:16:26,639
to film a few sequences here

478
00:16:30,230 --> 00:16:28,560
an absolutely beautiful day to land at

479
00:16:31,829 --> 00:16:30,240
edwards air force base and sid made an

480
00:16:34,230 --> 00:16:31,839
equally beautiful touchdown nice and

481
00:16:36,310 --> 00:16:34,240
smooth on the hard runway there runway

482
00:16:38,389 --> 00:16:36,320
2-2 we were constrained because of our

483
00:16:40,790 --> 00:16:38,399
weight in cg to land on a hard surface

484
00:16:43,269 --> 00:16:40,800
runway so we had no choice other than

485
00:16:45,189 --> 00:16:43,279
kennedy and edwards 2-2 for for coming

486
00:16:46,069 --> 00:16:45,199
home this day and we were happy to come

487
00:16:48,790 --> 00:16:46,079
home

488
00:16:50,470 --> 00:16:48,800

after waving off the first opportunity

489
00:16:52,629 --> 00:16:50,480
the drag shoot worked as advertised and

490
00:16:54,069 --> 00:16:52,639
rollout was great again tom looking over

491
00:16:55,910 --> 00:16:54,079
my right shoulder here as we jettison

492
00:16:57,269 --> 00:16:55,920
the drag chute uh rolling out on the

493
00:16:58,550 --> 00:16:57,279
runway at edwards air force base to

494
00:17:02,550 --> 00:16:58,560
wheel stop

495
00:17:04,470 --> 00:17:02,560
bittersweet moment for the whole crew

496
00:17:06,390 --> 00:17:04,480
you're certainly happy and pleased

497
00:17:08,549 --> 00:17:06,400
to be back home uh you hate to see the

498
00:17:10,949 --> 00:17:08,559
mission end but uh one more time around

499
00:17:12,710 --> 00:17:10,959
the cockpit here uh congratula

500
00:17:15,270 --> 00:17:12,720
congratulations for sid for a wonderful

501
00:17:17,110 --> 00:17:15,280
landing and a happy flight deck crew and

502
00:17:22,789 --> 00:17:17,120
no longer a rookie tom jones getting

503
00:17:25,669 --> 00:17:23,829
we've got

504
00:17:27,669 --> 00:17:25,679
a lot of ways of sharing with you and

505
00:17:29,590 --> 00:17:27,679
one of them is the film for the things

506
00:17:31,590 --> 00:17:29,600
that moved on board but mostly what

507
00:17:34,950 --> 00:17:31,600
moved on board was the earth

508
00:17:36,390 --> 00:17:34,960
and us so we'd like to use a few of the

509
00:17:38,230 --> 00:17:36,400
uh remaining minutes to show you a

510
00:17:40,630 --> 00:17:38,240
number of still pictures that we took

511
00:17:42,789 --> 00:17:40,640
with a lot of the cameras that we had on

512
00:17:45,350 --> 00:17:42,799
board and uh

513
00:17:47,190 --> 00:17:45,360

the first fewer of some of the crew

514
00:17:48,950 --> 00:17:47,200
all right this for those of you in the

515
00:17:49,830 --> 00:17:48,960
audience who created it is our morning

516
00:17:51,590 --> 00:17:49,840
mail

517
00:17:53,590 --> 00:17:51,600
and uh it would come out of the

518
00:17:55,270 --> 00:17:53,600
teleprinter over here or out of the tags

519
00:17:57,110 --> 00:17:55,280
i beg your pardon and uh

520
00:17:58,070 --> 00:17:57,120
tips tips

521
00:18:00,950 --> 00:17:58,080
you just went through the whole history

522
00:18:04,070 --> 00:18:00,960
of the faith that's right

523
00:18:06,950 --> 00:18:04,080
and uh would come out and uh the crew

524
00:18:09,830 --> 00:18:06,960
would get together and look it over and

525
00:18:12,310 --> 00:18:09,840
post it to the books

526
00:18:14,710 --> 00:18:12,320
this is uh another shot of waking up in

527
00:18:16,549 --> 00:18:14,720
the morning here's the redshift in their

528
00:18:18,549 --> 00:18:16,559
bunks we thought the bunks were really

529
00:18:21,909 --> 00:18:18,559
swell pieces of gear and we all got real

530
00:18:25,350 --> 00:18:23,430
this is what it looks like getting ready

531
00:18:26,830 --> 00:18:25,360
to come home this is linda and her best

532
00:18:29,590 --> 00:18:26,840
friend on the

533
00:18:31,590 --> 00:18:29,600
crew and uh it truly was a good friend

534
00:18:34,070 --> 00:18:31,600
of all of ours the suit we got to know

535
00:18:36,710 --> 00:18:34,080
it uh real well after uh three wave offs

536
00:18:38,150 --> 00:18:36,720
attempts uh at the cape and uh we're

537
00:18:40,310 --> 00:18:38,160
very glad to use it finally to come down

538
00:18:43,029 --> 00:18:40,320

to edwards

539
00:18:44,870 --> 00:18:43,039
and uh finally this is a a still shot of

540
00:18:47,270 --> 00:18:44,880
our flight deck and you can see the

541
00:18:48,789 --> 00:18:47,280
myriad of cameras here in a little uh

542
00:18:50,789 --> 00:18:48,799
more organized fashion than we normally

543
00:18:52,950 --> 00:18:50,799
had them uh including the big four inch

544
00:18:54,390 --> 00:18:52,960
by five inch arrow linhoff camera and

545
00:18:56,710 --> 00:18:54,400
what we're going to do now is to show

546
00:18:58,870 --> 00:18:56,720
you some of the results of some of these

547
00:19:00,710 --> 00:18:58,880
cameras and i should point out uh also

548
00:19:02,310 --> 00:19:00,720
on the flight deck since there's some

549
00:19:04,310 --> 00:19:02,320
folks here that are from all of the

550
00:19:06,150 --> 00:19:04,320
centers that contributed these are the

551
00:19:07,830 --> 00:19:06,160
integrated science timeline from the jet

552
00:19:08,789 --> 00:19:07,840
propulsion laboratory down in the lower

553
00:19:11,990 --> 00:19:08,799
left

554
00:19:13,990 --> 00:19:12,000
some maps from jet propulsion laboratory

555
00:19:16,549 --> 00:19:14,000
right under the linhof camera and some

556
00:19:18,470 --> 00:19:16,559
maps that we created here at johnson

557
00:19:19,830 --> 00:19:18,480
space center right by tom's belly there

558
00:19:21,029 --> 00:19:19,840
and we used all of those to find the

559
00:19:21,830 --> 00:19:21,039
features that we're going to next show

560
00:19:23,430 --> 00:19:21,840
you

561
00:19:25,669 --> 00:19:23,440
well on the next slide is uh one

562
00:19:28,390 --> 00:19:25,679
introduction to the earth this is up

563
00:19:30,390 --> 00:19:28,400

around uh alaska right on the coast and

564
00:19:32,310 --> 00:19:30,400
i think you can see how low we were

565
00:19:33,750 --> 00:19:32,320
this uh which is just about the view you

566
00:19:35,990 --> 00:19:33,760
head out the window shows you some of

567
00:19:39,750 --> 00:19:36,000
the beautiful glaciers and the mountains

568
00:19:42,950 --> 00:19:41,430
as jace mentioned we were pretty low on

569
00:19:45,750 --> 00:19:42,960
the trip and

570
00:19:47,190 --> 00:19:45,760
probably the the most uh exciting thing

571
00:19:49,669 --> 00:19:47,200
to do is to look through some of the

572
00:19:51,830 --> 00:19:49,679
cameras we had with the magnification on

573
00:19:54,070 --> 00:19:51,840
them most spectacularly i'd say was the

574
00:19:55,590 --> 00:19:54,080
35 millimeter with a 300 millimeter lens

575
00:19:57,430 --> 00:19:55,600
and then a multiplier which gave you a

576
00:19:59,990 --> 00:19:57,440
600 millimeter effective

577
00:20:01,590 --> 00:20:00,000
zoom and watch the world go by this is

578
00:20:03,590 --> 00:20:01,600
san francisco bay

579
00:20:04,870 --> 00:20:03,600
in the lower center you can see the

580
00:20:06,549 --> 00:20:04,880
golden gate bridge and if you look

581
00:20:07,909 --> 00:20:06,559
closely on this photograph you can

582
00:20:09,510 --> 00:20:07,919
actually see the towers of the golden

583
00:20:12,070 --> 00:20:09,520
gate bridge

584
00:20:13,590 --> 00:20:12,080
as we flew by so it was the detail that

585
00:20:14,710 --> 00:20:13,600
we were able to enjoy up there was very

586
00:20:16,950 --> 00:20:14,720
dramatic

587
00:20:20,310 --> 00:20:16,960
also from a mission point of view here

588
00:20:22,149 --> 00:20:20,320

we see just off the coast at the or past

589
00:20:23,990 --> 00:20:22,159
the mouth of the golden gate you can see

590
00:20:25,190 --> 00:20:24,000
the extension of the san andreas fault

591
00:20:27,430 --> 00:20:25,200
here that runs

592
00:20:29,190 --> 00:20:27,440
up the coast of california and then off

593
00:20:34,710 --> 00:20:29,200
into the ocean as you go a little

594
00:20:38,470 --> 00:20:36,149
my hometown so i had to show this

595
00:20:40,070 --> 00:20:38,480
picture this is los angeles and we had

596
00:20:42,470 --> 00:20:40,080
believe it or not three clear days over

597
00:20:46,630 --> 00:20:44,870
and actually some really pretty

598
00:20:48,310 --> 00:20:46,640
photography of course some interest the

599
00:20:49,830 --> 00:20:48,320
san andreas fault continues on down

600
00:20:51,669 --> 00:20:49,840
through this area and just off the

601
00:20:53,750 --> 00:20:51,679
photograph to the north is would be the

602
00:20:56,950 --> 00:20:53,760
epicenter of the last major earthquake

603
00:20:58,630 --> 00:20:56,960
they had in southern california out by

604
00:21:00,710 --> 00:20:58,640
northridge

605
00:21:02,070 --> 00:21:00,720
but of course the most important picture

606
00:21:02,950 --> 00:21:02,080
here and i point this out for our

607
00:21:05,350 --> 00:21:02,960
training

608
00:21:09,590 --> 00:21:05,360
lead don thomas is dodger stadium which

609
00:21:15,270 --> 00:21:12,070
on into some of our science objectives

610
00:21:16,950 --> 00:21:15,280
this is the mammoth mountain area mono

611
00:21:18,310 --> 00:21:16,960
lake california in the top right hand

612
00:21:19,029 --> 00:21:18,320
corner of the picture you may have heard

613
00:21:22,070 --> 00:21:19,039

of

614
00:21:24,070 --> 00:21:22,080
and then just down below that area is

615
00:21:25,909 --> 00:21:24,080
crowley lake and those are the pointers

616
00:21:28,149 --> 00:21:25,919
we used looking out the window to take

617
00:21:30,789 --> 00:21:28,159
photography of this mountain area right

618
00:21:32,549 --> 00:21:30,799
here in the right center of the frame

619
00:21:33,990 --> 00:21:32,559
which is mammoth mountain california

620
00:21:36,630 --> 00:21:34,000
it's a big ski resort but we weren't

621
00:21:38,710 --> 00:21:36,640
taking pictures to for future ski trips

622
00:21:41,110 --> 00:21:38,720
the interest in this area

623
00:21:42,149 --> 00:21:41,120
of course for california is a hydrology

624
00:21:43,510 --> 00:21:42,159
interest

625
00:21:44,549 --> 00:21:43,520
you know they've come out of a period of

626
00:21:46,789 --> 00:21:44,559
drought

627
00:21:48,630 --> 00:21:46,799
and now they're in a pretty reasonable

628
00:21:50,390 --> 00:21:48,640
shape for water consumption out there

629
00:21:51,750 --> 00:21:50,400
but there's always the threat of a

630
00:21:53,510 --> 00:21:51,760
drought in this area because of the

631
00:21:54,710 --> 00:21:53,520
large population in southern california

632
00:21:55,990 --> 00:21:54,720
taking the water out of the sierra

633
00:21:57,669 --> 00:21:56,000
nevada and using it for drinking and

634
00:21:58,950 --> 00:21:57,679
other purposes

635
00:22:00,950 --> 00:21:58,960
one thing we've never been able to do is

636
00:22:03,110 --> 00:22:00,960
predict the amount of water runoff from

637
00:22:05,190 --> 00:22:03,120
the snowpack we're still using the same

638
00:22:07,110 --> 00:22:05,200

techniques we used 50 years ago sending

639
00:22:09,430 --> 00:22:07,120
skiers up into the mountains during the

640
00:22:11,750 --> 00:22:09,440
winter and pounding pipes into the snow

641
00:22:12,950 --> 00:22:11,760
to estimate the depth of the snowpack

642
00:22:14,950 --> 00:22:12,960
but that doesn't really give you the

643
00:22:16,470 --> 00:22:14,960
density of the moisture in that snowpack

644
00:22:17,510 --> 00:22:16,480
because if you've ever skied or been in

645
00:22:20,630 --> 00:22:17,520
the mountains you know you can have some

646
00:22:21,990 --> 00:22:20,640
dry snow days some wet snow days and so

647
00:22:23,990 --> 00:22:22,000
just measuring the depth doesn't really

648
00:22:25,270 --> 00:22:24,000
answer the question and there's a lot of

649
00:22:27,270 --> 00:22:25,280
hope that the

650
00:22:29,190 --> 00:22:27,280
imagery taken by the

651
00:22:31,190 --> 00:22:29,200
radars on this particular flight and on

652
00:22:33,190 --> 00:22:31,200
future flights will help us to better

653
00:22:34,149 --> 00:22:33,200
predict the actual moisture content of

654
00:22:36,310 --> 00:22:34,159
the snow

655
00:22:37,510 --> 00:22:36,320
in the sierra nevada and at other sites

656
00:22:39,669 --> 00:22:37,520
around the world

657
00:22:41,270 --> 00:22:39,679
so that we can better predict runoff and

658
00:22:43,029 --> 00:22:41,280
forecast the

659
00:22:44,549 --> 00:22:43,039
possibility or probability of droughts

660
00:22:46,149 --> 00:22:44,559
for the coming season and then we can

661
00:22:51,029 --> 00:22:46,159
better manage and ration our water

662
00:22:55,270 --> 00:22:52,630
further on down the sierras and just a

663
00:22:57,190 --> 00:22:55,280

little bit to the east from mammoth

664
00:23:00,549 --> 00:22:57,200
mountain was our another major site we

665
00:23:02,710 --> 00:23:00,559
had and that is uh death valley and as

666
00:23:04,230 --> 00:23:02,720
we pointed out earlier on the film

667
00:23:05,990 --> 00:23:04,240
the area and around death valley was

668
00:23:07,430 --> 00:23:06,000
interesting to us

669
00:23:08,630 --> 00:23:07,440
from a scientific point of view for a

670
00:23:11,830 --> 00:23:08,640
couple reasons

671
00:23:14,710 --> 00:23:11,840
uh scientists are studying the uh

672
00:23:16,549 --> 00:23:14,720
movement of sand in this area uh aeolian

673
00:23:18,470 --> 00:23:16,559
effects they call it

674
00:23:21,270 --> 00:23:18,480
the movement of topsoil if you will due

675
00:23:23,909 --> 00:23:21,280
to the wind effects and so one of their

676
00:23:26,230 --> 00:23:23,919
test sites up near the sand dunes in the

677
00:23:28,950 --> 00:23:26,240
northern portion of the valley was being

678
00:23:32,470 --> 00:23:28,960
observed in addition to that areas known

679
00:23:34,310 --> 00:23:32,480
as alluvial fans which are large runoffs

680
00:23:37,029 --> 00:23:34,320
mostly caused by water

681
00:23:39,190 --> 00:23:37,039
eroding the mountainsides and there are

682
00:23:40,870 --> 00:23:39,200
huge fans out in the

683
00:23:43,029 --> 00:23:40,880
death valley region that we think were

684
00:23:45,750 --> 00:23:43,039
caused back in the last period of of

685
00:23:47,430 --> 00:23:45,760
glaciation in this area and we don't

686
00:23:49,269 --> 00:23:47,440
have any real good method of dating

687
00:23:50,950 --> 00:23:49,279
these fans or mapping them around the

688
00:23:52,630 --> 00:23:50,960

world and the radar provides this

689
00:23:55,190 --> 00:23:52,640
opportunity to do that and turns out to

690
00:23:57,269 --> 00:23:55,200
be a good platform for measuring them

691
00:23:59,029 --> 00:23:57,279
and once we've calibrated the radar

692
00:24:00,950 --> 00:23:59,039
based on these sites in death valley

693
00:24:02,789 --> 00:24:00,960
we'll be able to to measure them all

694
00:24:04,630 --> 00:24:02,799
around the world

695
00:24:07,510 --> 00:24:04,640
i'd like to go to a radar image of the

696
00:24:10,230 --> 00:24:09,430
uh here we are looking at death valley

697
00:24:12,710 --> 00:24:10,240
again

698
00:24:15,110 --> 00:24:12,720
and a similar image that we saw in the

699
00:24:17,669 --> 00:24:15,120
motion picture

700
00:24:19,029 --> 00:24:17,679
that tom narrated where we flew down

701
00:24:21,430 --> 00:24:19,039
into the valley

702
00:24:22,870 --> 00:24:21,440
using the radar imagery so

703
00:24:24,470 --> 00:24:22,880
the big advantages to the radar is it

704
00:24:26,870 --> 00:24:24,480
gives us an opportunity to look at these

705
00:24:28,390 --> 00:24:26,880
things in a way we can't look at them

706
00:24:30,789 --> 00:24:28,400
and get information that we cannot get

707
00:24:32,630 --> 00:24:30,799
from visual photography or for or from

708
00:24:34,470 --> 00:24:32,640
infrared that gives us a year-round

709
00:24:40,470 --> 00:24:34,480
capability to do this whether it's sunny

710
00:24:42,710 --> 00:24:41,190
so

711
00:24:44,549 --> 00:24:42,720
next frame switches us all the way

712
00:24:45,590 --> 00:24:44,559
across north america to the east coast

713
00:24:46,870 --> 00:24:45,600

and

714
00:24:50,310 --> 00:24:46,880
if you look

715
00:24:53,269 --> 00:24:50,320
in western virginia you'll recognize

716
00:24:55,269 --> 00:24:53,279
i've got this one okay you'll recognize

717
00:24:56,710 --> 00:24:55,279
the two forks of the shenandoah river

718
00:24:57,830 --> 00:24:56,720
here as they run up towards the potomac

719
00:24:59,269 --> 00:24:57,840
this is the

720
00:25:01,029 --> 00:24:59,279
south fork and the north fork of the

721
00:25:03,110 --> 00:25:01,039
shenandoah river

722
00:25:05,590 --> 00:25:03,120
in the shenandoah valley right here and

723
00:25:07,669 --> 00:25:05,600
the two forks join and then run up

724
00:25:09,750 --> 00:25:07,679
with the shenandoah river to the potomac

725
00:25:11,029 --> 00:25:09,760
up here in western maryland at harpers

726
00:25:13,029 --> 00:25:11,039
ferry

727
00:25:14,789 --> 00:25:13,039
this is a great picture because it shows

728
00:25:16,310 --> 00:25:14,799
how sun glint can light up

729
00:25:17,669 --> 00:25:16,320
hydrologic features like these river

730
00:25:18,950 --> 00:25:17,679
valleys and we looked for this all

731
00:25:21,269 --> 00:25:18,960
around the world as part of our

732
00:25:23,510 --> 00:25:21,279
documentation of the areas being imaged

733
00:25:25,350 --> 00:25:23,520
by the radar but it also just gives you

734
00:25:27,350 --> 00:25:25,360
a great view of some

735
00:25:28,789 --> 00:25:27,360
regional history this is the blue ridge

736
00:25:30,630 --> 00:25:28,799
running right along here from front

737
00:25:32,390 --> 00:25:30,640
royal virginia you can actually in this

738
00:25:33,669 --> 00:25:32,400

photograph trace the skyline drive up

739
00:25:35,590 --> 00:25:33,679
here along the mountain ridge as it goes

740
00:25:38,549 --> 00:25:35,600
south towards north carolina

741
00:25:39,830 --> 00:25:38,559
also uh from front royal all the way

742
00:25:41,990 --> 00:25:39,840
south past

743
00:25:43,590 --> 00:25:42,000
mata sutton mountain here you can see

744
00:25:45,830 --> 00:25:43,600
the whole area that stonewall jackson

745
00:25:47,750 --> 00:25:45,840
made famous back in 1862 when he

746
00:25:50,149 --> 00:25:47,760
confounded the yankee armies in this

747
00:25:52,710 --> 00:25:50,159
entire shenandoah area and then later at

748
00:25:54,870 --> 00:25:52,720
cedar creek in 1864 phil sheridan

749
00:25:57,269 --> 00:25:54,880
cleaned the rebels out of the shenandoah

750
00:25:59,430 --> 00:25:57,279
at a famous battle here so this is a

751
00:26:00,870 --> 00:25:59,440
great uh view for me personally i've

752
00:26:02,630 --> 00:26:00,880
tromped over a lot of this area and it

753
00:26:04,549 --> 00:26:02,640
was great to see it from orbit

754
00:26:06,470 --> 00:26:04,559
and this was just to the

755
00:26:07,990 --> 00:26:06,480
south of a big radar swath that we

756
00:26:12,149 --> 00:26:08,000
repeated on many days that cut across

757
00:26:15,110 --> 00:26:14,310
this is a superb view of

758
00:26:18,070 --> 00:26:15,120
the

759
00:26:20,230 --> 00:26:18,080
new york city area at night and

760
00:26:22,070 --> 00:26:20,240
we were all struck by the beauty of the

761
00:26:23,350 --> 00:26:22,080
cities in north america and around the

762
00:26:24,549 --> 00:26:23,360
world but particularly in our own

763
00:26:27,430 --> 00:26:24,559

country

764
00:26:28,710 --> 00:26:27,440
by the um the the star-spangled effect

765
00:26:30,470 --> 00:26:28,720
of the cities on the black velvet

766
00:26:31,830 --> 00:26:30,480
background of the earth and you can see

767
00:26:33,669 --> 00:26:31,840
a lot of detail in this picture this is

768
00:26:35,350 --> 00:26:33,679
manhattan island here with the dark

769
00:26:37,350 --> 00:26:35,360
oblong of central park

770
00:26:39,669 --> 00:26:37,360
uh in the original uh negative you can

771
00:26:41,029 --> 00:26:39,679
see the two lights from ellis and

772
00:26:42,870 --> 00:26:41,039
liberty islands and the statue of

773
00:26:45,269 --> 00:26:42,880
liberty is about right there

774
00:26:47,190 --> 00:26:45,279
jfk airport is here and of course this

775
00:26:48,230 --> 00:26:47,200
is brooklyn and queens

776
00:26:51,909 --> 00:26:48,240
and

777
00:26:53,909 --> 00:26:51,919
the ocean to the east over here is

778
00:26:55,990 --> 00:26:53,919
staten island and the new jersey coast

779
00:26:57,350 --> 00:26:56,000
up along the hudson river proceeding on

780
00:26:59,830 --> 00:26:57,360
up towards west point which is rich's

781
00:27:01,830 --> 00:26:59,840
alma mater and these these sites were

782
00:27:06,310 --> 00:27:01,840
just uh stunningly beautiful each night

783
00:27:08,630 --> 00:27:06,320
as we came up across the continent

784
00:27:11,430 --> 00:27:08,640
here we skip across the atlantic one of

785
00:27:14,390 --> 00:27:11,440
the oceanographic sites that we imaged

786
00:27:16,630 --> 00:27:14,400
uh almost every day was uh the straits

787
00:27:18,950 --> 00:27:16,640
of gibraltar and the radar imagery here

788
00:27:20,950 --> 00:27:18,960

was aimed at looking at internal waves

789
00:27:22,789 --> 00:27:20,960
and the circulation of ocean currents in

790
00:27:24,789 --> 00:27:22,799
and out of the mediterranean

791
00:27:26,149 --> 00:27:24,799
as we flew over each day now you can't

792
00:27:27,909 --> 00:27:26,159
see any of the currents here in this

793
00:27:29,510 --> 00:27:27,919
picture but you can see a lot of the

794
00:27:30,950 --> 00:27:29,520
regional geology

795
00:27:33,029 --> 00:27:30,960
this is spain

796
00:27:36,149 --> 00:27:33,039
the sierra nevada here is snow capped

797
00:27:37,750 --> 00:27:36,159
over along the mediterranean coast

798
00:27:38,549 --> 00:27:37,760
you can see from gibraltar here around

799
00:27:41,110 --> 00:27:38,559
the

800
00:27:42,870 --> 00:27:41,120
cadiz

801
00:27:44,070 --> 00:27:42,880
and sevilla

802
00:27:45,669 --> 00:27:44,080
one of the larger cities in southern

803
00:27:47,990 --> 00:27:45,679
spain is right here

804
00:27:50,070 --> 00:27:48,000
across the straits of gibraltar is

805
00:27:51,669 --> 00:27:50,080
tangier and then you see the first

806
00:27:54,389 --> 00:27:51,679
traces of the atlas mountain stretching

807
00:27:56,710 --> 00:27:54,399
off into north africa in this picture

808
00:27:58,310 --> 00:27:56,720
and this is a wide angle shot

809
00:28:00,149 --> 00:27:58,320
that gives you a good sweep over the

810
00:28:01,590 --> 00:28:00,159
mediterranean

811
00:28:03,590 --> 00:28:01,600
we were actually much closer to the

812
00:28:07,430 --> 00:28:03,600
ground visually by using the naked eye

813
00:28:11,750 --> 00:28:09,669

this is a shot of kuwait city

814
00:28:12,870 --> 00:28:11,760
in the head of the persian gulf

815
00:28:14,470 --> 00:28:12,880
and

816
00:28:16,230 --> 00:28:14,480
this is the persian gulf stretching up

817
00:28:18,230 --> 00:28:16,240
here to the chatel arab and the border

818
00:28:19,590 --> 00:28:18,240
with iraq and this is the city area

819
00:28:21,909 --> 00:28:19,600
itself and the amount of detail in this

820
00:28:23,430 --> 00:28:21,919
photograph is really quite amazing you

821
00:28:25,830 --> 00:28:23,440
can see the large international airport

822
00:28:27,590 --> 00:28:25,840
here even down to the white blocks at

823
00:28:28,950 --> 00:28:27,600
each end of the runway

824
00:28:31,029 --> 00:28:28,960
we could also see a lot of the street

825
00:28:33,830 --> 00:28:31,039
grid very clearly the docks here in the

826
00:28:35,510 --> 00:28:33,840
harbor and down to the

827
00:28:38,070 --> 00:28:35,520
left edge of the photograph are some oil

828
00:28:40,470 --> 00:28:38,080
fields and you can see a faint trace of

829
00:28:43,190 --> 00:28:40,480
the soot left on the sand from the fires

830
00:28:46,310 --> 00:28:43,200
of about three years ago and linda notes

831
00:28:49,510 --> 00:28:46,320
that um when she flew with jay on

832
00:28:50,950 --> 00:28:49,520
sts 37 three years ago this entire area

833
00:28:52,789 --> 00:28:50,960
was uh black

834
00:28:54,549 --> 00:28:52,799
soot covered and there was a huge smoke

835
00:28:59,190 --> 00:28:54,559
poll of course over this entire area so

836
00:29:03,510 --> 00:29:01,269
in the previous view if you just move

837
00:29:05,110 --> 00:29:03,520
north of kuwait city up into just inland

838
00:29:07,190 --> 00:29:05,120

of the north end of the persian gulf

839
00:29:08,789 --> 00:29:07,200
this is another area in iraq

840
00:29:10,389 --> 00:29:08,799
most the time we fly around the world we

841
00:29:11,669 --> 00:29:10,399
don't have a whole lot of insight into

842
00:29:14,310 --> 00:29:11,679
the politics that are going on on the

843
00:29:14,320 --> 00:29:19,029
but in this area of iraq the

844
00:29:22,870 --> 00:29:21,430
the marshy area

845
00:29:24,789 --> 00:29:22,880
in the i guess as you're viewing this

846
00:29:27,830 --> 00:29:24,799
the photo in the upper left corner most

847
00:29:30,230 --> 00:29:27,840
of the upper part has been drained and

848
00:29:33,190 --> 00:29:30,240
now sudam hussein has set fires in that

849
00:29:36,470 --> 00:29:33,200
area basically to try to drive out the

850
00:29:37,990 --> 00:29:36,480
his foes that live there so these were

851
00:29:40,310 --> 00:29:38,000
one type of the

852
00:29:41,990 --> 00:29:40,320
human made fires that we we did identify

853
00:29:43,029 --> 00:29:42,000
on orbit for uh

854
00:29:44,630 --> 00:29:43,039
uh

855
00:29:46,630 --> 00:29:44,640
science reasons in terms of our air

856
00:29:48,230 --> 00:29:46,640
pollution sensor but also it's just kind

857
00:29:49,750 --> 00:29:48,240
of interesting picture here because that

858
00:29:51,590 --> 00:29:49,760
gives you some insight into what's going

859
00:29:57,830 --> 00:29:51,600
on politically on the ground in this

860
00:29:57,840 --> 00:30:02,230
and this is lake bolkas in kazakhstan

861
00:30:05,269 --> 00:30:03,909
a couple of things to point out here

862
00:30:07,430 --> 00:30:05,279
first of all you'll notice that it's ice

863
00:30:09,029 --> 00:30:07,440

covered and in a lot of the northern

864
00:30:10,630 --> 00:30:09,039
hemisphere that we flew over during our

865
00:30:12,630 --> 00:30:10,640
mission we saw a lot of ice and the

866
00:30:14,789 --> 00:30:12,640
state of the water on the ground is of

867
00:30:16,470 --> 00:30:14,799
interest under the radar people because

868
00:30:18,630 --> 00:30:16,480
uh their instrument receives a different

869
00:30:20,630 --> 00:30:18,640
signal from the ground depending on

870
00:30:23,110 --> 00:30:20,640
how the water is whether it's

871
00:30:24,710 --> 00:30:23,120
flooded arid or frozen or some in

872
00:30:26,789 --> 00:30:24,720
between state and you can see the ice is

873
00:30:29,110 --> 00:30:26,799
beginning to crack on our mission in

874
00:30:30,789 --> 00:30:29,120
april we really saw this kind of uh both

875
00:30:32,470 --> 00:30:30,799
in canada and in russia and siberia and

876
00:30:34,789 --> 00:30:32,480
kazakhstan and basically the northern

877
00:30:36,630 --> 00:30:34,799
hemisphere we saw the change of state of

878
00:30:38,549 --> 00:30:36,640
the world they're going from winter to

879
00:30:40,630 --> 00:30:38,559
spring another thing that we tracked and

880
00:30:41,990 --> 00:30:40,640
north is basically down or to the lower

881
00:30:43,990 --> 00:30:42,000
left corner in this picture and you can

882
00:30:45,350 --> 00:30:44,000
see the snow line here

883
00:30:47,029 --> 00:30:45,360
and this is typical of how we could see

884
00:30:48,470 --> 00:30:47,039
the snow line on the ground and at

885
00:30:49,830 --> 00:30:48,480
various parts of

886
00:30:51,350 --> 00:30:49,840
the world as we went around we did see

887
00:30:52,630 --> 00:30:51,360
it receding toward the north during the

888
00:30:54,149 --> 00:30:52,640

mission

889
00:30:55,590 --> 00:30:54,159
that's typical the kind of observations

890
00:30:57,110 --> 00:30:55,600
we tried to keep to help out the

891
00:31:00,870 --> 00:30:57,120
investigators so they can interpret

892
00:31:05,669 --> 00:31:02,950
and this is the aral c at one time it

893
00:31:07,350 --> 00:31:05,679
was the fourth largest uh body of fresh

894
00:31:08,710 --> 00:31:07,360
water in the world and it's slowly been

895
00:31:10,070 --> 00:31:08,720
shrinking now this is an area that's

896
00:31:11,509 --> 00:31:10,080
been photographed several times from

897
00:31:13,669 --> 00:31:11,519
space it's one way we've been able to

898
00:31:15,990 --> 00:31:13,679
keep an eye on it and that's basically

899
00:31:17,669 --> 00:31:16,000
induced by humans uh softening off water

900
00:31:20,070 --> 00:31:17,679
for irrigation for their cotton fields

901
00:31:22,230 --> 00:31:20,080
so this part of the world definitely is

902
00:31:24,950 --> 00:31:22,240
a changing state and we had a radar site

903
00:31:26,870 --> 00:31:24,960
about 100 miles north of here so

904
00:31:28,389 --> 00:31:26,880
we had our ground tracks take us near

905
00:31:33,750 --> 00:31:28,399
this area several times during the

906
00:31:38,310 --> 00:31:35,909
this is uh

907
00:31:40,630 --> 00:31:38,320
the burma and bangladesh if you can

908
00:31:41,990 --> 00:31:40,640
imagine at the top of this slide is

909
00:31:43,909 --> 00:31:42,000
is south

910
00:31:46,070 --> 00:31:43,919
and over here another example of how we

911
00:31:47,430 --> 00:31:46,080
could see fires from space it took a

912
00:31:49,269 --> 00:31:47,440
little practice by the way to make sure

913
00:31:52,070 --> 00:31:49,279

that we were identifying fires and and

914
00:31:53,830 --> 00:31:52,080
not smoke that i mean not clouds uh but

915
00:31:55,269 --> 00:31:53,840
become came easier during the mission

916
00:31:56,470 --> 00:31:55,279
and when you look real closely you can

917
00:31:58,789 --> 00:31:56,480
tell the difference because there are

918
00:32:00,230 --> 00:31:58,799
always a point sources basically for the

919
00:32:02,230 --> 00:32:00,240
fires although in this picture there are

920
00:32:03,830 --> 00:32:02,240
so many of them they almost start to

921
00:32:05,590 --> 00:32:03,840
look like clouds if you can't see the

922
00:32:07,509 --> 00:32:05,600
source of the fire

923
00:32:08,549 --> 00:32:07,519
and over here is mouth of the ganges

924
00:32:09,509 --> 00:32:08,559
river

925
00:32:10,789 --> 00:32:09,519
and

926
00:32:12,789 --> 00:32:10,799
just shows you the kind of things we can

927
00:32:14,710 --> 00:32:12,799
also see from orbit the sediment

928
00:32:16,950 --> 00:32:14,720
washing into the water and if you can

929
00:32:18,870 --> 00:32:16,960
imagine almost uh east of here and out

930
00:32:27,190 --> 00:32:18,880
of the the upper right corner of the

931
00:32:32,310 --> 00:32:29,350
and this is yeah that's a view of lake

932
00:32:34,549 --> 00:32:32,320
baikal again in central russia it's just

933
00:32:36,630 --> 00:32:34,559
above the mongolian border

934
00:32:38,310 --> 00:32:36,640
and this is as you can see the entire

935
00:32:41,110 --> 00:32:38,320
lake is covered in ice

936
00:32:43,909 --> 00:32:41,120
i saw the same view last december 92 on

937
00:32:44,950 --> 00:32:43,919
sts-53 and uh one of the interesting

938
00:32:47,190 --> 00:32:44,960

things that tom's going to be able to

939
00:32:48,549 --> 00:32:47,200
see is by look flying over it in august

940
00:32:50,470 --> 00:32:48,559
he's going to see that the lake should

941
00:32:52,470 --> 00:32:50,480
be free by that time and should have a

942
00:32:55,190 --> 00:32:52,480
different color another interesting fact

943
00:32:56,870 --> 00:32:55,200
is that the lake looks almost white the

944
00:32:59,029 --> 00:32:56,880
ice is white however when you look at

945
00:33:01,190 --> 00:32:59,039
lake balkash it was a kind of a blue ice

946
00:33:02,389 --> 00:33:01,200
so that's interesting feature which both

947
00:33:03,430 --> 00:33:02,399
of them were imaged by the radar it

948
00:33:05,350 --> 00:33:03,440
might be interesting to see the

949
00:33:07,190 --> 00:33:05,360
difference between them you can see some

950
00:33:10,230 --> 00:33:07,200
features here

951
00:33:12,389 --> 00:33:10,240
this is the salinga river delta shown up

952
00:33:16,870 --> 00:33:12,399
here and the city of varcoust is just

953
00:33:21,110 --> 00:33:18,630
continuing our walk across asia we're

954
00:33:23,509 --> 00:33:21,120
looking at the kamchatka peninsula here

955
00:33:26,470 --> 00:33:23,519
a radar site looking at uh several

956
00:33:28,230 --> 00:33:26,480
things one ice floes in the city of cost

957
00:33:30,870 --> 00:33:28,240
which is here we're looking to the uh to

958
00:33:34,070 --> 00:33:30,880
the south on this view here and uh

959
00:33:36,149 --> 00:33:34,080
volcanoes the bessie miani and uh

960
00:33:37,990 --> 00:33:36,159
kirchikoya and chile is looking at me

961
00:33:39,750 --> 00:33:38,000
very funny about my russian speaking

962
00:33:42,149 --> 00:33:39,760
capabilities

963
00:33:43,669 --> 00:33:42,159

but you can see clearly some of the sea

964
00:33:48,389 --> 00:33:43,679
ice that's formed along the coast here

965
00:33:51,990 --> 00:33:50,549
this is uh in the curiel island chain

966
00:33:54,230 --> 00:33:52,000
just off the the southern edge of

967
00:33:55,990 --> 00:33:54,240
kamchatka this is only cotton island and

968
00:34:02,230 --> 00:33:56,000
you see the remnants of two large

969
00:34:07,110 --> 00:34:04,470
this was a very pretty site to us this

970
00:34:08,389 --> 00:34:07,120
is osaka airport the floating airport

971
00:34:10,470 --> 00:34:08,399
they built in the

972
00:34:13,190 --> 00:34:10,480
in the osaka bay

973
00:34:14,950 --> 00:34:13,200
and that's one long runway

974
00:34:16,869 --> 00:34:14,960
possibly using it for a contingency

975
00:34:30,710 --> 00:34:16,879
landing site

976
00:34:33,829 --> 00:34:31,829
uh

977
00:34:34,790 --> 00:34:33,839
we're in the philippines now a little

978
00:34:35,750 --> 00:34:34,800
bit

979
00:34:37,990 --> 00:34:35,760
south of

980
00:34:39,829 --> 00:34:38,000
kimchatka and we're looking at mount

981
00:34:41,349 --> 00:34:39,839
pinatubo

982
00:34:43,510 --> 00:34:41,359
which is

983
00:34:47,510 --> 00:34:43,520
one of the volcanoes or the volcano in

984
00:34:49,430 --> 00:34:47,520
the in the philippines that made so much

985
00:34:51,829 --> 00:34:49,440
noise and news

986
00:34:53,589 --> 00:34:51,839
some years ago when it erupted and

987
00:34:56,389 --> 00:34:53,599
you'll recall that

988
00:34:58,310 --> 00:34:56,399

as a result of that clark air force base

989
00:34:59,750 --> 00:34:58,320
down here eventually wound up being

990
00:35:01,670 --> 00:34:59,760
closed as a result of that and the

991
00:35:03,670 --> 00:35:01,680
political climate but the eruption put

992
00:35:05,670 --> 00:35:03,680
so much ash on it that it was

993
00:35:09,030 --> 00:35:05,680
economically

994
00:35:11,670 --> 00:35:09,040
not smart to go back and recover it

995
00:35:12,710 --> 00:35:11,680
one of the concerns now is

996
00:35:14,950 --> 00:35:12,720
because of

997
00:35:17,430 --> 00:35:14,960
all the flows and everything coming down

998
00:35:20,550 --> 00:35:17,440
from mount pinatubo uh they're becoming

999
00:35:23,030 --> 00:35:20,560
concerned about eventual mudslides and

1000
00:35:24,790 --> 00:35:23,040
what that may have on the area around

1001
00:35:26,230 --> 00:35:24,800
the volcano is around as well as the

1002
00:35:27,589 --> 00:35:26,240
villagers and the villages and

1003
00:35:28,950 --> 00:35:27,599
everything that are located around the

1004
00:35:31,589 --> 00:35:28,960
volcano

1005
00:35:33,670 --> 00:35:31,599
we imaged it uh with our handheld

1006
00:35:36,230 --> 00:35:33,680
photography and we also imaged it uh

1007
00:35:38,230 --> 00:35:36,240
with the srl with the radar and this is

1008
00:35:40,630 --> 00:35:38,240
a picture of what it looks like from the

1009
00:35:42,230 --> 00:35:40,640
radar you can see that you get a lot you

1010
00:35:43,430 --> 00:35:42,240
get different detail you see different

1011
00:35:46,069 --> 00:35:43,440
things when you're looking with the

1012
00:35:47,109 --> 00:35:46,079
radar so they complement each other and

1013
00:35:49,990 --> 00:35:47,119

it's nice to have both of the

1014
00:35:50,870 --> 00:35:50,000
photographs to compare the two

1015
00:35:56,630 --> 00:35:50,880
and

1016
00:35:59,349 --> 00:35:56,640
without actually having to have people

1017
00:36:01,030 --> 00:35:59,359
all over the uh all over the site

1018
00:36:05,190 --> 00:36:01,040
that you're imaging at that particular

1019
00:36:10,550 --> 00:36:07,910
this is a shot of another site that we

1020
00:36:13,910 --> 00:36:10,560
imaged a lot it's a real close-up of the

1021
00:36:17,270 --> 00:36:13,920
galapagos islands and um you can see

1022
00:36:19,990 --> 00:36:17,280
several volcanoes on them and um they're

1023
00:36:23,270 --> 00:36:20,000
basically a giant uh shield volcanoes

1024
00:36:26,069 --> 00:36:23,280
down here and uh the galapagos are very

1025
00:36:27,910 --> 00:36:26,079
interesting uh islands because there

1026
00:36:29,589 --> 00:36:27,920
hadn't been a lot of contact between

1027
00:36:31,270 --> 00:36:29,599
them and other parts of the world so

1028
00:36:33,349 --> 00:36:31,280
there are some very interesting species

1029
00:36:35,589 --> 00:36:33,359
that live out there as we were flying

1030
00:36:37,750 --> 00:36:35,599
over the islands on our on our

1031
00:36:40,470 --> 00:36:37,760
flight you may recall one time we called

1032
00:36:42,470 --> 00:36:40,480
down and indicated that we saw a rather

1033
00:36:45,109 --> 00:36:42,480
dark cloud

1034
00:36:47,190 --> 00:36:45,119
over uh part of one of the islands and

1035
00:36:49,910 --> 00:36:47,200
we weren't sure exactly what it was but

1036
00:36:51,510 --> 00:36:49,920
it was darker than uh than

1037
00:36:54,150 --> 00:36:51,520
the typical clouds you would see from

1038
00:36:55,829 --> 00:36:54,160

space and about 24 hours later the

1039
00:36:57,829 --> 00:36:55,839
ground uh

1040
00:36:59,589 --> 00:36:57,839
payload community got back to us and

1041
00:37:01,430 --> 00:36:59,599
told us that there was indeed a fire on

1042
00:37:03,910 --> 00:37:01,440
the islands you may have read about it a

1043
00:37:06,470 --> 00:37:03,920
little bit since then the fire's

1044
00:37:07,990 --> 00:37:06,480
been burning and it's been threatening

1045
00:37:10,069 --> 00:37:08,000
some of the

1046
00:37:11,510 --> 00:37:10,079
interesting species down there including

1047
00:37:14,950 --> 00:37:11,520
some

1048
00:37:17,430 --> 00:37:14,960
large tortoises i guess

1049
00:37:22,230 --> 00:37:17,440
so we took some srl photography of this

1050
00:37:26,870 --> 00:37:25,030
this is um

1051
00:37:31,109 --> 00:37:26,880
the one constellation

1052
00:37:34,630 --> 00:37:32,790
decided that if nobody else could

1053
00:37:36,550 --> 00:37:34,640
recognize additional constellations if

1054
00:37:37,910 --> 00:37:36,560
we ever lost our inertial units on orbit

1055
00:37:39,750 --> 00:37:37,920
we'd have to go around around the world

1056
00:37:42,470 --> 00:37:39,760
till i found orion

1057
00:37:45,349 --> 00:37:42,480
and uh this is orion here you can see

1058
00:37:46,630 --> 00:37:45,359
the most uh most visible part of it here

1059
00:37:47,510 --> 00:37:46,640
and um

1060
00:37:54,550 --> 00:37:47,520
it's

1061
00:37:55,829 --> 00:37:54,560
atmosphere and you can see some of the

1062
00:37:56,630 --> 00:37:55,839
aurora

1063
00:37:58,950 --> 00:37:56,640

here

1064
00:38:01,670 --> 00:37:58,960
and so overall we think this is a pretty

1065
00:38:03,270 --> 00:38:01,680
spectacular photograph obviously

1066
00:38:04,950 --> 00:38:03,280
the stars are pretty big because we had

1067
00:38:07,670 --> 00:38:04,960
to expose it for some period of time in

1068
00:38:09,910 --> 00:38:07,680
order to see it because it shot at night

1069
00:38:11,910 --> 00:38:09,920
i was very excited to see the aurora on

1070
00:38:13,750 --> 00:38:11,920
this flight because my last flight was

1071
00:38:15,510 --> 00:38:13,760
into a 39 degree inclination and we

1072
00:38:17,430 --> 00:38:15,520
couldn't didn't get to see the aurora

1073
00:38:19,430 --> 00:38:17,440
from there

1074
00:38:22,950 --> 00:38:19,440
i'll tell you a couple things about it

1075
00:38:25,510 --> 00:38:22,960
first of all it's um seeing it the the

1076
00:38:27,349 --> 00:38:25,520
photographs really do do justice to it

1077
00:38:29,270 --> 00:38:27,359
in terms of its um

1078
00:38:31,589 --> 00:38:29,280
color and

1079
00:38:33,750 --> 00:38:31,599
and basic visual characteristics so

1080
00:38:36,390 --> 00:38:33,760
being able to look at a photograph of it

1081
00:38:38,470 --> 00:38:36,400
is very close to seeing it up there in

1082
00:38:40,950 --> 00:38:38,480
orbit the big difference is that it

1083
00:38:44,950 --> 00:38:40,960
actually dances around a lot so if you

1084
00:38:46,710 --> 00:38:44,960
can see um and we and we there is some

1085
00:38:50,150 --> 00:38:46,720
motion picture or a camcorder

1086
00:38:52,069 --> 00:38:50,160
photography of it and uh that does a um

1087
00:38:54,310 --> 00:38:52,079
pretty good job of capturing the

1088
00:38:56,310 --> 00:38:54,320

movement of it it's it's amazing that it

1089
00:38:57,750 --> 00:38:56,320
jumps around the way it does

1090
00:38:59,670 --> 00:38:57,760
and um

1091
00:39:01,109 --> 00:38:59,680
and the last thing that you can't see

1092
00:39:02,870 --> 00:39:01,119
from the ground unfortunately is the

1093
00:39:04,710 --> 00:39:02,880
fact that you're actually flying through

1094
00:39:06,950 --> 00:39:04,720
it i mean here we're kind of looking out

1095
00:39:08,150 --> 00:39:06,960
at it but uh in this case we're either i

1096
00:39:10,069 --> 00:39:08,160
don't know whether we're nose forward or

1097
00:39:12,069 --> 00:39:10,079
tail forward at this time but we've

1098
00:39:14,150 --> 00:39:12,079
either just flown through this or we're

1099
00:39:15,910 --> 00:39:14,160
getting ready to fly through it and it's

1100
00:39:17,270 --> 00:39:15,920
actually amazing seeing this stuff up

1101
00:39:19,349 --> 00:39:17,280
there

1102
00:39:20,870 --> 00:39:19,359
going up you know well above what you

1103
00:39:22,310 --> 00:39:20,880
would normally consider the atmosphere

1104
00:39:23,910 --> 00:39:22,320
and then you're actually flying through

1105
00:39:29,990 --> 00:39:23,920
it

1106
00:39:31,750 --> 00:39:30,000
like out there this is the payload bay

1107
00:39:33,349 --> 00:39:31,760
of the orbiter

1108
00:39:34,390 --> 00:39:33,359
and the tail

1109
00:39:37,030 --> 00:39:34,400
and

1110
00:39:37,990 --> 00:39:37,040
you can see we're

1111
00:39:39,910 --> 00:39:38,000
flying

1112
00:39:42,390 --> 00:39:39,920
through or have just flown through it

1113
00:39:43,670 --> 00:39:42,400

and you can also see an rcs thruster jet

1114
00:39:45,990 --> 00:39:43,680
firing here

1115
00:39:48,150 --> 00:39:46,000
so it's a it's a pretty uh amazing

1116
00:39:50,630 --> 00:39:48,160
photograph um

1117
00:39:51,990 --> 00:39:50,640
we shot quite a few photographs in order

1118
00:39:53,910 --> 00:39:52,000
to get a few of these that actually

1119
00:39:55,270 --> 00:39:53,920
turned out because they're so difficult

1120
00:39:57,030 --> 00:39:55,280
to expose

1121
00:39:59,190 --> 00:39:57,040
but we thought it was worthwhile and jay

1122
00:40:00,710 --> 00:39:59,200
got a lot of film on board for us

1123
00:40:03,589 --> 00:40:00,720
to be able to expose a lot of

1124
00:40:06,710 --> 00:40:03,599
photographs and wind up with a few

1125
00:40:08,150 --> 00:40:06,720
to bring down to i think really capture

1126
00:40:10,630 --> 00:40:08,160
for folks here on the ground what it

1127
00:40:12,550 --> 00:40:10,640
looks like to see this up in space it's

1128
00:40:14,630 --> 00:40:12,560
probably the most beautiful part of this