



Jo

Johnson Sp

1  
00:00:04,309 --> 00:00:02,790  
good afternoon everybody from nasa's

2  
00:00:06,710 --> 00:00:04,319  
johnson space center here in houston

3  
00:00:09,830 --> 00:00:06,720  
texas i am josh byerly coming up on

4  
00:00:11,270 --> 00:00:09,840  
tuesday karen nyberg luca parmitano and

5  
00:00:12,790 --> 00:00:11,280  
fyodor yurchikhin are going to launch

6  
00:00:15,589 --> 00:00:12,800  
toward the international space station

7  
00:00:16,950 --> 00:00:15,599  
and join expedition 36 in progress on

8  
00:00:18,550 --> 00:00:16,960  
the orbiting complex there is quite a

9  
00:00:20,630 --> 00:00:18,560  
bit of operational activity ahead for

10  
00:00:21,750 --> 00:00:20,640  
this crew as well as a ton of science

11  
00:00:23,830 --> 00:00:21,760  
that's going to be going on over the

12  
00:00:25,269 --> 00:00:23,840  
next several months here to give us more

13  
00:00:27,269 --> 00:00:25,279

details about what's ahead is mike

14

00:00:29,669 --> 00:00:27,279

safranini the international space

15

00:00:31,189 --> 00:00:29,679

station program manager as well as gary

16

00:00:33,830 --> 00:00:31,199

horlocker who is the lead flight

17

00:00:35,990 --> 00:00:33,840

director for expedition 36 and we're

18

00:00:37,910 --> 00:00:36,000

also joined by tara rutley the associate

19

00:00:39,190 --> 00:00:37,920

program scientist for the international

20

00:00:40,549 --> 00:00:39,200

space station we're going to hear from

21

00:00:42,709 --> 00:00:40,559

each one of them and then we'll take

22

00:00:45,030 --> 00:00:42,719

some questions we'll start with mike

23

00:00:47,670 --> 00:00:45,040

well good afternoon of course uh with

24

00:00:50,950 --> 00:00:47,680

the return of tom chris and roman we

25

00:00:53,430 --> 00:00:50,960

began increment 36 on board iss

26

00:00:56,150 --> 00:00:53,440

uh the vehicles in in great shape as we

27

00:00:59,029 --> 00:00:56,160

as we continue to do research on board

28

00:01:00,549 --> 00:00:59,039

um last week we uh changed that well not

29

00:01:01,910 --> 00:01:00,559

last week couple weeks ago now we

30

00:01:03,590 --> 00:01:01,920

changed out the

31

00:01:06,550 --> 00:01:03,600

a pump on the

32

00:01:08,789 --> 00:01:06,560

2b or the port outboard

33

00:01:10,390 --> 00:01:08,799

solar ray cooling system and

34

00:01:12,390 --> 00:01:10,400

and that seemed to be the source of the

35

00:01:15,270 --> 00:01:12,400

big leak that we saw

36

00:01:17,910 --> 00:01:15,280

so we today finished transitioning all

37

00:01:19,350 --> 00:01:17,920

the loads back on on that particular

38

00:01:21,910 --> 00:01:19,360

power

39

00:01:24,070 --> 00:01:21,920

solar array and everything is configured

40

00:01:26,469 --> 00:01:24,080

in a nominal fashion

41

00:01:28,630 --> 00:01:26,479

as we proceed forward the other big

42

00:01:29,429 --> 00:01:28,640

thing going on system-wise today anyway

43

00:01:31,030 --> 00:01:29,439

is

44

00:01:33,350 --> 00:01:31,040

our russian colleagues who have been

45

00:01:36,710 --> 00:01:33,360

using a u.s developed treadmill we refer

46

00:01:38,870 --> 00:01:36,720

to as tvis it's a vibration isolated one

47

00:01:40,390 --> 00:01:38,880

of two vibration isolated

48

00:01:42,469 --> 00:01:40,400

treadmills on the international space

49

00:01:45,510 --> 00:01:42,479

station they're they're busy

50

00:01:47,510 --> 00:01:45,520

replacing the tvis with a russian-built

51  
00:01:49,830 --> 00:01:47,520  
treadmill that work is going on now and

52  
00:01:53,670 --> 00:01:49,840  
they'll begin testing here shortly

53  
00:01:55,749 --> 00:01:53,680  
that's a big event for us as well

54  
00:01:57,830 --> 00:01:55,759  
research-wise though the teams have

55  
00:01:59,830 --> 00:01:57,840  
really been focusing on making sure

56  
00:02:02,550 --> 00:01:59,840  
while we continue to maintain the

57  
00:02:04,389 --> 00:02:02,560  
systems on board that we get

58  
00:02:06,149 --> 00:02:04,399  
a number of hours for research the

59  
00:02:08,550 --> 00:02:06,159  
prescribed number of hours of course is

60  
00:02:10,550 --> 00:02:08,560  
an average of 35 hours a week

61  
00:02:11,670 --> 00:02:10,560  
and over the last several increments we

62  
00:02:13,190 --> 00:02:11,680  
have been

63  
00:02:15,350 --> 00:02:13,200

been beating that number by a good

64

00:02:17,030 --> 00:02:15,360

margin a little bit later tara will

65

00:02:18,869 --> 00:02:17,040

spend a little time with you talking

66

00:02:21,190 --> 00:02:18,879

about some of the research that we we

67

00:02:22,869 --> 00:02:21,200

plan to do on increment 36. now

68

00:02:24,949 --> 00:02:22,879

increment 36 is going to be one of the

69

00:02:26,869 --> 00:02:24,959

more challenging ones for us to to

70

00:02:29,270 --> 00:02:26,879

continue to provide

71

00:02:31,510 --> 00:02:29,280

the 35-hour average because of the fact

72

00:02:33,270 --> 00:02:31,520

that there are five evas

73

00:02:35,030 --> 00:02:33,280

during this period

74

00:02:38,070 --> 00:02:35,040

part of it goes into increment 30 second

75

00:02:39,190 --> 00:02:38,080

but 37 but while this crew is on board

76

00:02:41,670 --> 00:02:39,200

we'll have

77

00:02:43,430 --> 00:02:41,680

about five evas they're they're really

78

00:02:45,589 --> 00:02:43,440

geared towards the next major module to

79

00:02:46,710 --> 00:02:45,599

come to the iss which is the russian mrrn

80

00:02:48,390 --> 00:02:46,720

module

81

00:02:51,350 --> 00:02:48,400

which comes up in the december time

82

00:02:52,390 --> 00:02:51,360

frame and so evas by themself of course

83

00:02:56,790 --> 00:02:52,400

are

84

00:02:58,790 --> 00:02:56,800

to that we'll have the first

85

00:03:01,670 --> 00:02:58,800

it is a plan anyway to have the first

86

00:03:02,550 --> 00:03:01,680

orbital uh flight to iss the demo

87

00:03:04,630 --> 00:03:02,560

mission

88

00:03:08,550 --> 00:03:04,640

which right now we just uh recently uh

89

00:03:10,309 --> 00:03:08,560

slated for a launch on september 12th

90

00:03:12,470 --> 00:03:10,319

and so that's in our plan

91

00:03:14,149 --> 00:03:12,480

uh as well which will keep the the crew

92

00:03:16,550 --> 00:03:14,159

busy and of course during this period as

93

00:03:17,670 --> 00:03:16,560

soon as the crew arrives we have an atv

94

00:03:18,390 --> 00:03:17,680

arrive

95

00:03:20,630 --> 00:03:18,400

then

96

00:03:22,790 --> 00:03:20,640

towards the end of the summer we have an

97

00:03:24,869 --> 00:03:22,800

htv arrive and so

98

00:03:26,390 --> 00:03:24,879

this will all keep the crew busy while

99

00:03:27,509 --> 00:03:26,400

they're also trying to get the research

100

00:03:30,550 --> 00:03:27,519

work done

101

00:03:33,750 --> 00:03:30,560

also unique to this this period which

102

00:03:35,750 --> 00:03:33,760

which again is includes increment 37 as

103

00:03:37,430 --> 00:03:35,760

well while the crew is on board

104

00:03:39,990 --> 00:03:37,440

right at the end of the stay for this

105

00:03:41,750 --> 00:03:40,000

particular crew coming up uh will be a

106

00:03:43,430 --> 00:03:41,760

unique opportunity for the international

107

00:03:46,070 --> 00:03:43,440

space station to host

108

00:03:48,710 --> 00:03:46,080

the olympic torch on board our russian

109

00:03:50,789 --> 00:03:48,720

colleagues are working with us on a plan

110

00:03:55,509 --> 00:03:50,799

that would bring uh bring the torch to

111

00:03:56,710 --> 00:03:55,519

iss and and uh and then return it on uh

112

00:03:59,509 --> 00:03:56,720

with uh

113

00:04:01,429 --> 00:03:59,519

uh with fyodor and karen and luca on

114

00:04:02,789 --> 00:04:01,439

their return and so

115

00:04:04,789 --> 00:04:02,799

we're looking forward to that because

116

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

what's unique about that it's been been

117

00:04:09,190 --> 00:04:06,640

many many months uh since we've done

118

00:04:11,110 --> 00:04:09,200

what we call direct handover where where

119

00:04:13,509 --> 00:04:11,120

we have actually three soyuz attached to

120

00:04:16,469 --> 00:04:13,519

iss at one time and this is allow us to

121

00:04:19,270 --> 00:04:16,479

to bring the torch up uh with the crew

122

00:04:20,949 --> 00:04:19,280

that's arriving and then and then let

123

00:04:23,110 --> 00:04:20,959

fyodor and karen and luca bring it home

124

00:04:25,270 --> 00:04:23,120

on their vehicle a few days later

125

00:04:26,629 --> 00:04:25,280

so it's a very very busy

126

00:04:28,870 --> 00:04:26,639

increment for us

127

00:04:31,350 --> 00:04:28,880

our plan of course we still our plan

128

00:04:33,670 --> 00:04:31,360

still shows that we'll be able to get 35

129

00:04:35,590 --> 00:04:33,680

average hour uh

130

00:04:37,030 --> 00:04:35,600

accomplished but it we have a deficit

131

00:04:38,870 --> 00:04:37,040

today and so

132

00:04:40,310 --> 00:04:38,880

that's not uncommon the if you look at

133

00:04:42,710 --> 00:04:40,320

the plan it looks like it'll be

134

00:04:46,550 --> 00:04:42,720

difficult for us to do that but our ops

135

00:04:48,070 --> 00:04:46,560

team and engineering guys continually

136

00:04:50,629 --> 00:04:48,080

surprise us with their ability to

137

00:04:51,990 --> 00:04:50,639

overcome and so i fully expect us to do

138

00:04:53,430 --> 00:04:52,000

all those wonderful things we've talked

139

00:04:56,070 --> 00:04:53,440

about for this increment getting ready

140

00:04:58,390 --> 00:04:56,080

for mlm and the torch while at the same

141

00:05:00,310 --> 00:04:58,400

time getting the research done that we

142

00:05:01,749 --> 00:05:00,320

that we built space station to do

143

00:05:03,749 --> 00:05:01,759

and so with that i'll hand it over to

144

00:05:06,629 --> 00:05:03,759

gary and he'll he'll give you more

145

00:05:07,909 --> 00:05:06,639

details okay thanks mike no pressure i

146

00:05:10,310 --> 00:05:07,919

appreciate that

147

00:05:11,990 --> 00:05:10,320

so good afternoon everybody um i'm gary

148

00:05:14,629 --> 00:05:12,000

horlocker i'm the

149

00:05:16,230 --> 00:05:14,639

lead flight director for expedition 36

150

00:05:18,230 --> 00:05:16,240

which started as as you heard about a

151

00:05:20,230 --> 00:05:18,240

week ago and i'll continue my lead

152

00:05:22,710 --> 00:05:20,240

flight director duties um up until the

153

00:05:24,150 --> 00:05:22,720

end of the expedition in mid-september

154

00:05:26,310 --> 00:05:24,160

when david korth i believe we have a

155

00:05:29,110 --> 00:05:26,320

photo of him we'll we'll take over as a

156

00:05:30,550 --> 00:05:29,120

lead flight director for expedition 37

157

00:05:32,550 --> 00:05:30,560

and this transition occurs with the

158

00:05:33,909 --> 00:05:32,560

departure of the current crew that's on

159

00:05:35,909 --> 00:05:33,919

board and we'll talk about that more in

160

00:05:38,070 --> 00:05:35,919

a few minutes

161

00:05:40,150 --> 00:05:38,080

so expedition 36 began as as mike

162

00:05:42,390 --> 00:05:40,160

mentioned with the departure of uh chris

163

00:05:45,270 --> 00:05:42,400

hadfield roman romanenko and tom

164

00:05:47,830 --> 00:05:45,280

marshborn back on may 15th

165

00:05:49,670 --> 00:05:47,840

and uh remaining on board is a three

166

00:05:51,830 --> 00:05:49,680

crew members chris cassidy you see him

167

00:05:53,670 --> 00:05:51,840

here chris pavel vinogradov and

168

00:05:55,430 --> 00:05:53,680

alexander mazurkin

169

00:05:57,990 --> 00:05:55,440

and pavel is currently the commander of

170

00:05:59,189 --> 00:05:58,000

the space station for this expedition

171

00:06:01,830 --> 00:05:59,199

and they've been on board since the end

172

00:06:05,590 --> 00:06:03,189

the expedition will be augmented by

173

00:06:08,390 --> 00:06:05,600

three more crew members here next week

174

00:06:10,469 --> 00:06:08,400

their arrival on may 28th of of karen

175

00:06:11,590 --> 00:06:10,479

fyodor and luca and you can see them

176  
00:06:13,110 --> 00:06:11,600  
here

177  
00:06:15,590 --> 00:06:13,120  
karen's a

178  
00:06:17,350 --> 00:06:15,600  
veteran space flight

179  
00:06:19,590 --> 00:06:17,360  
astronaut she was a mission specialist

180  
00:06:20,390 --> 00:06:19,600  
on sts-124

181  
00:06:21,350 --> 00:06:20,400  
um

182  
00:06:25,029 --> 00:06:21,360  
back in

183  
00:06:26,390 --> 00:06:25,039  
2008 fyodor is our most experienced

184  
00:06:28,309 --> 00:06:26,400  
crew member in this in this crew

185  
00:06:30,469 --> 00:06:28,319  
compliment he's a veteran of three space

186  
00:06:33,189 --> 00:06:30,479  
flights two of them were to the

187  
00:06:35,990 --> 00:06:33,199  
iss and one to the shuttle

188  
00:06:37,830 --> 00:06:36,000

he was a mission specialist on scs 112

189

00:06:40,150 --> 00:06:37,840

back in 2002

190

00:06:43,270 --> 00:06:40,160

he was in the commander of expedition 15

191

00:06:46,629 --> 00:06:43,280

on the iss and then the flight engineer

192

00:06:49,270 --> 00:06:46,639

on expedition 24 and 25.

193

00:06:51,830 --> 00:06:49,280

and is our european space agency

194

00:06:53,590 --> 00:06:51,840

astronaut and an italian air force major

195

00:06:55,990 --> 00:06:53,600

and this will be his first uh space

196

00:06:59,510 --> 00:06:57,189

so i'm going to give you a quick

197

00:07:01,589 --> 00:06:59,520

overview here of karen fyodor and luca's

198

00:07:03,830 --> 00:07:01,599

final preparations for launch next week

199

00:07:05,990 --> 00:07:03,840

i think we have a short video

200

00:07:10,150 --> 00:07:06,000

to show you here

201  
00:07:10,160 --> 00:07:14,230  
baikonur in kazakhstan

202  
00:07:19,350 --> 00:07:15,990  
some photo opportunities before they get

203  
00:07:23,430 --> 00:07:19,360  
to get inside their soyuz capsule and

204  
00:07:27,749 --> 00:07:25,589  
and they're all suited up prior to uh

205  
00:07:29,670 --> 00:07:27,759  
another fit check

206  
00:07:34,070 --> 00:07:29,680  
here's karen again a fit check with her

207  
00:07:37,670 --> 00:07:36,309  
and here they are walking out to their

208  
00:07:40,469 --> 00:07:37,680  
vehicle to

209  
00:07:40,479 --> 00:07:44,550  
here's karen in her seat

210  
00:07:47,990 --> 00:07:46,550  
they also do uh several

211  
00:07:50,469 --> 00:07:48,000  
traditions prior to launch there at

212  
00:07:53,029 --> 00:07:50,479  
baikonur uh one of them is tree planting

213  
00:07:55,270 --> 00:07:53,039

you see luca planting history here

214

00:07:56,790 --> 00:07:55,280

and uh

215

00:07:58,469 --> 00:07:56,800

so they're well on their way to the to

216

00:08:00,309 --> 00:07:58,479

the launch next week so they'll continue

217

00:08:03,990 --> 00:08:00,319

their preparations the next few days and

218

00:08:05,510 --> 00:08:04,000

uh be ready to launch at 3 31 pm central

219

00:08:07,670 --> 00:08:05,520

time on

220

00:08:10,710 --> 00:08:07,680

may 28th with a docking about six hours

221

00:08:11,749 --> 00:08:10,720

later at 9 17 p.m

222

00:08:13,749 --> 00:08:11,759

so now i'm going to go ahead and walk

223

00:08:15,510 --> 00:08:13,759

you through a quick timeline of of the

224

00:08:17,270 --> 00:08:15,520

the highlights of this expedition which

225

00:08:18,629 --> 00:08:17,280

you're going to see the theme here is

226

00:08:20,869 --> 00:08:18,639

about every one to two weeks we got a

227

00:08:22,629 --> 00:08:20,879

major activity either a vehicle

228

00:08:25,430 --> 00:08:22,639

arriving at the station departing from

229

00:08:28,309 --> 00:08:25,440

station launching from the planet or or

230

00:08:30,390 --> 00:08:28,319

one of these five space walks so

231

00:08:31,589 --> 00:08:30,400

obviously starting next week on may 28th

232

00:08:33,509 --> 00:08:31,599

will be the

233

00:08:35,990 --> 00:08:33,519

launch of the 35 soyuz vehicle with

234

00:08:37,909 --> 00:08:36,000

karen fyodor and luke on board and

235

00:08:39,750 --> 00:08:37,919

they'll dock to the mrm docking port on

236

00:08:41,750 --> 00:08:39,760

the nadir side or the earth-facing side

237

00:08:43,509 --> 00:08:41,760

of the space station

238

00:08:47,190 --> 00:08:43,519

about a week later the

239

00:08:49,030 --> 00:08:47,200

european cargo vehicle atv4 will launch

240

00:08:50,550 --> 00:08:49,040

and start to

241

00:08:52,630 --> 00:08:50,560

head toward the space station here's a

242

00:08:56,710 --> 00:08:52,640

shot of of it in its final preparations

243

00:09:01,910 --> 00:08:58,870

following that on june 11th the progress

244

00:09:03,829 --> 00:09:01,920

51p vehicle will undock from the smf

245

00:09:06,389 --> 00:09:03,839

docking port which will clear the way

246

00:09:09,910 --> 00:09:06,399

for the atv4 to dock at that same port

247

00:09:11,829 --> 00:09:09,920

on june 15th just a few days later

248

00:09:14,150 --> 00:09:11,839

and then on june 26 will be the first of

249

00:09:15,350 --> 00:09:14,160

the three russian space walks and all

250

00:09:17,030 --> 00:09:15,360

three of these space walks will be

251  
00:09:19,350 --> 00:09:17,040  
performed by

252  
00:09:20,949 --> 00:09:19,360  
fyodor and alexander and this first

253  
00:09:22,550 --> 00:09:20,959  
spacewalk is going to focus on some

254  
00:09:24,150 --> 00:09:22,560  
external russian

255  
00:09:27,030 --> 00:09:24,160  
experiment

256  
00:09:28,630 --> 00:09:27,040  
work outside the vehicle

257  
00:09:31,430 --> 00:09:28,640  
a couple weeks later we'll come into

258  
00:09:35,110 --> 00:09:31,440  
july 9th and july 16th will be the two

259  
00:09:37,430 --> 00:09:35,120  
us evas eva's number 22 and 23 and r2

260  
00:09:38,389 --> 00:09:37,440  
spacewalkers are chris and luca for both

261  
00:09:39,910 --> 00:09:38,399  
of these

262  
00:09:41,750 --> 00:09:39,920  
evas

263  
00:09:43,350 --> 00:09:41,760

and uh coincidentally dave courts will

264

00:09:45,590 --> 00:09:43,360

will also be the lead flight director

265

00:09:48,310 --> 00:09:45,600

for both of these evas and he'll be back

266

00:09:52,310 --> 00:09:48,320

here sometime next month with a detailed

267

00:09:55,110 --> 00:09:52,320

briefing on both of those space walks

268

00:09:57,990 --> 00:09:55,120

a week later july 25th we'll see the

269

00:10:00,710 --> 00:09:58,000

progress 50p vehicle undocked from the

270

00:10:01,829 --> 00:10:00,720

dc1 docking port followed two days later

271

00:10:04,470 --> 00:10:01,839

by the

272

00:10:08,230 --> 00:10:04,480

launch and docking of the next progress

273

00:10:10,070 --> 00:10:08,240

vehicle the 52 vehicle at that same port

274

00:10:12,550 --> 00:10:10,080

and then the week after that we'll get

275

00:10:14,870 --> 00:10:12,560

the launch of the htv4 cargo vehicle

276  
00:10:15,910 --> 00:10:14,880  
from japan and i think we have a picture

277  
00:10:17,430 --> 00:10:15,920  
of

278  
00:10:20,069 --> 00:10:17,440  
actually the ht

279  
00:10:21,750 --> 00:10:20,079  
v3 vehicle in flight last time it was up

280  
00:10:26,710 --> 00:10:21,760  
so

281  
00:10:29,430 --> 00:10:26,720  
to the station there in july and august

282  
00:10:32,230 --> 00:10:29,440  
so we have a lot of cargo operations to

283  
00:10:34,389 --> 00:10:32,240  
to take care of in that time frame so on

284  
00:10:36,630 --> 00:10:34,399  
august 9th we'll go ahead and capture

285  
00:10:39,350 --> 00:10:36,640  
and birth that htv vehicle to the nader

286  
00:10:41,350 --> 00:10:39,360  
2 docking port on the space station

287  
00:10:43,190 --> 00:10:41,360  
and then we'll step right into the uh

288  
00:10:46,389 --> 00:10:43,200

the last two russian evas of this

289

00:10:47,990 --> 00:10:46,399

expedition that's eva 34 and 35.

290

00:10:50,150 --> 00:10:48,000

and both of these evas will continue

291

00:10:51,670 --> 00:10:50,160

external experiment work as well as as

292

00:10:53,509 --> 00:10:51,680

mike mentioned some preparations for

293

00:10:56,630 --> 00:10:53,519

that mrn module that will show up later

294

00:10:59,430 --> 00:10:58,630

and that will lead us into september 8th

295

00:11:01,509 --> 00:10:59,440

we'll

296

00:11:03,110 --> 00:11:01,519

hopefully have all htv

297

00:11:05,350 --> 00:11:03,120

operations complete we'll unbirth and

298

00:11:06,949 --> 00:11:05,360

release that vehicle and then two days

299

00:11:09,269 --> 00:11:06,959

later we'll see the end of this

300

00:11:09,990 --> 00:11:09,279

expedition with the departure and return

301  
00:11:15,829 --> 00:11:10,000  
of

302  
00:11:20,470 --> 00:11:17,269  
pavel so

303  
00:11:21,829 --> 00:11:20,480  
that'll kick off the expedition 37

304  
00:11:23,670 --> 00:11:21,839  
time frame

305  
00:11:25,509 --> 00:11:23,680  
now karen and fyodor and luca will

306  
00:11:27,670 --> 00:11:25,519  
remain on board

307  
00:11:29,590 --> 00:11:27,680  
through mid-november and they'll see the

308  
00:11:31,350 --> 00:11:29,600  
arrival of three more crew members at

309  
00:11:34,310 --> 00:11:31,360  
the end of september you see them here

310  
00:11:37,269 --> 00:11:34,320  
that's mike hopkins oleg kotov

311  
00:11:39,269 --> 00:11:37,279  
and uh sergei rozinski in uh like i said

312  
00:11:41,030 --> 00:11:39,279  
late september

313  
00:11:42,870 --> 00:11:41,040

so as you can see we got uh our

314

00:11:45,190 --> 00:11:42,880

challenges are definitely

315

00:11:47,190 --> 00:11:45,200

um managing all these visiting vehicles

316

00:11:49,750 --> 00:11:47,200

and their associated cargo operations as

317

00:11:51,509 --> 00:11:49,760

well as five evas

318

00:11:52,949 --> 00:11:51,519

with a lot going on just about every

319

00:11:53,910 --> 00:11:52,959

week so

320

00:11:55,430 --> 00:11:53,920

like mike said it's gonna be a

321

00:11:57,190 --> 00:11:55,440

challenging time for both the ground and

322

00:11:58,630 --> 00:11:57,200

the crew

323

00:12:00,470 --> 00:11:58,640

and on top of all that of course we've

324

00:12:02,949 --> 00:12:00,480

got a very very healthy science and

325

00:12:04,310 --> 00:12:02,959

research program to deal with as well so

326

00:12:05,430 --> 00:12:04,320

tara's going to give you some details on

327

00:12:07,509 --> 00:12:05,440

that

328

00:12:09,110 --> 00:12:07,519

yeah thanks very much i'm happy to be

329

00:12:10,870 --> 00:12:09,120

here with you all today to share some of

330

00:12:12,870 --> 00:12:10,880

the good things that are happening on

331

00:12:14,550 --> 00:12:12,880

the space station regarding the science

332

00:12:15,750 --> 00:12:14,560

i'm the associate program scientist for

333

00:12:18,069 --> 00:12:15,760

station

334

00:12:19,990 --> 00:12:18,079

i reside here at jsc and our offices

335

00:12:21,269 --> 00:12:20,000

have been really really busy and our

336

00:12:23,829 --> 00:12:21,279

teams have been really really busy

337

00:12:25,750 --> 00:12:23,839

managing the diverse research portfolio

338

00:12:27,190 --> 00:12:25,760

that's happening on station and the crew

339

00:12:30,389 --> 00:12:27,200

members have been busier than ever

340

00:12:32,069 --> 00:12:30,399

getting it done for us up there so

341

00:12:33,990 --> 00:12:32,079

i want to share with you guys some some

342

00:12:36,150 --> 00:12:34,000

stats as of today

343

00:12:38,710 --> 00:12:36,160

today on the space station approximately

344

00:12:40,790 --> 00:12:38,720

1600 investigations have actually been

345

00:12:43,509 --> 00:12:40,800

performed across the partnership and

346

00:12:46,550 --> 00:12:43,519

that's representing over 1500 scientists

347

00:12:48,150 --> 00:12:46,560

on the ground across 68 countries very

348

00:12:50,470 --> 00:12:48,160

busy and so through the remainder of

349

00:12:54,230 --> 00:12:50,480

this year we'll be looking at doing over

350

00:12:56,389 --> 00:12:54,240

300 investigations total through 2013

351

00:12:57,670 --> 00:12:56,399

and they cover the range of

352

00:13:00,550 --> 00:12:57,680

disciplines from biology and

353

00:13:03,110 --> 00:13:00,560

biotechnology to human research physical

354

00:13:05,829 --> 00:13:03,120

sciences education technology

355

00:13:08,230 --> 00:13:05,839

demonstration and human research

356

00:13:09,670 --> 00:13:08,240

each of these investigations is going to

357

00:13:11,829 --> 00:13:09,680

provide knowledge that advances the

358

00:13:14,310 --> 00:13:11,839

human exploration of space gives us some

359

00:13:17,030 --> 00:13:14,320

fundamental knowledge that we can gain

360

00:13:18,949 --> 00:13:17,040

to advance our own textbook knowledge

361

00:13:20,550 --> 00:13:18,959

and getting us some new discoveries and

362

00:13:21,590 --> 00:13:20,560

benefiting those of us here on earth as

363

00:13:23,110 --> 00:13:21,600

well

364

00:13:25,269 --> 00:13:23,120

although hundreds of investigations are

365

00:13:27,269 --> 00:13:25,279

going to be performed on expedition 36

366

00:13:29,110 --> 00:13:27,279

and 37 i only have time to talk to you

367

00:13:30,230 --> 00:13:29,120

about just a handful of those today so

368

00:13:31,430 --> 00:13:30,240

the ones i'll share with you are

369

00:13:33,750 --> 00:13:31,440

actually going to be particularly

370

00:13:35,030 --> 00:13:33,760

relevant to crew health and safety on

371

00:13:37,269 --> 00:13:35,040

orbit and they also have earth

372

00:13:38,710 --> 00:13:37,279

applications as well

373

00:13:40,949 --> 00:13:38,720

the first investigation i'll share with

374

00:13:42,790 --> 00:13:40,959

you today focuses on a new technique

375

00:13:45,190 --> 00:13:42,800

aimed at identifying the best ways to

376

00:13:48,230 --> 00:13:45,200

maintain bone health in microgravity and

377

00:13:49,990 --> 00:13:48,240

this is the hip qct investigation which

378

00:13:52,550 --> 00:13:50,000

will use quantitative computed

379

00:13:54,949 --> 00:13:52,560

tomography and that's the qct part

380

00:13:56,629 --> 00:13:54,959

to look at the quality of the hip bone

381

00:13:58,790 --> 00:13:56,639

in our astronauts returning from long

382

00:14:00,470 --> 00:13:58,800

duration space flight on station and we

383

00:14:02,069 --> 00:14:00,480

really want to use this technology to

384

00:14:04,069 --> 00:14:02,079

basically get an idea of how good our

385

00:14:05,990 --> 00:14:04,079

countermeasures work on orbit see now

386

00:14:07,590 --> 00:14:06,000

normally here on earth our bones stay

387

00:14:09,829 --> 00:14:07,600

healthy and strong by undergoing a

388

00:14:11,750 --> 00:14:09,839

constant remodeling process and that is

389

00:14:13,590 --> 00:14:11,760

the breakdown of old bone

390

00:14:15,430 --> 00:14:13,600

and replacement of new bone and so it's

391

00:14:16,870 --> 00:14:15,440

constantly happening without even us

392

00:14:19,110 --> 00:14:16,880

knowing about it

393

00:14:21,269 --> 00:14:19,120

so the cells you see here right now are

394

00:14:24,310 --> 00:14:21,279

called osteoclasts and it's their job to

395

00:14:26,870 --> 00:14:24,320

take down and break away the old bone uh

396

00:14:28,230 --> 00:14:26,880

and and in preparation for these cells

397

00:14:30,870 --> 00:14:28,240

that'll come along next called

398

00:14:32,949 --> 00:14:30,880

osteoblasts the osteoblasts come along

399

00:14:34,870 --> 00:14:32,959

and add back the new bone and it's this

400

00:14:36,710 --> 00:14:34,880

constant process of remodeling that

401  
00:14:38,790 --> 00:14:36,720  
keeps our bones healthy and hold us up

402  
00:14:40,629 --> 00:14:38,800  
against the gravity vector on earth

403  
00:14:42,629 --> 00:14:40,639  
now on earth it's a good natural balance

404  
00:14:44,949 --> 00:14:42,639  
but in space there are changes in this

405  
00:14:47,829 --> 00:14:44,959  
balance and so you get what you get as a

406  
00:14:49,990 --> 00:14:47,839  
net result of a loss of bone mass

407  
00:14:51,350 --> 00:14:50,000  
without adequate replacement of the bone

408  
00:14:53,670 --> 00:14:51,360  
mass so

409  
00:14:55,430 --> 00:14:53,680  
this puts us at a risk of a higher

410  
00:14:57,430 --> 00:14:55,440  
fracture for risk and so we care about

411  
00:14:59,509 --> 00:14:57,440  
these kind of changes we want strong and

412  
00:15:01,030 --> 00:14:59,519  
healthy bones we care about it for our

413  
00:15:03,030 --> 00:15:01,040

crew members as we stay longer and

414

00:15:04,790 --> 00:15:03,040

longer in space but we also can use this

415

00:15:06,949 --> 00:15:04,800

information that we learn from from our

416

00:15:08,790 --> 00:15:06,959

studies on orbit to help those of us

417

00:15:10,550 --> 00:15:08,800

here on earth that may be dealing with

418

00:15:12,550 --> 00:15:10,560

osteoporosis

419

00:15:14,629 --> 00:15:12,560

in fact astronauts lose bone mass at a

420

00:15:16,949 --> 00:15:14,639

rate of about two percent per month in

421

00:15:19,110 --> 00:15:16,959

some areas of the body so it's a big

422

00:15:20,629 --> 00:15:19,120

issue for space exploration it's also a

423

00:15:22,150 --> 00:15:20,639

big issue here on earth

424

00:15:24,310 --> 00:15:22,160

you know space station scientists have

425

00:15:26,150 --> 00:15:24,320

investigated different countermeasures

426

00:15:28,230 --> 00:15:26,160

in an effort to maintain bone health on

427

00:15:30,629 --> 00:15:28,240

orbit this includes pharmaceuticals and

428

00:15:32,710 --> 00:15:30,639

exercise and proper nutrition

429

00:15:33,990 --> 00:15:32,720

in fact a recent space station study was

430

00:15:36,230 --> 00:15:34,000

published in the journal of bone and

431

00:15:37,750 --> 00:15:36,240

mineral research last fall that's shown

432

00:15:39,670 --> 00:15:37,760

that a combination of high load

433

00:15:41,269 --> 00:15:39,680

resistive exercise on orbit such as what

434

00:15:43,750 --> 00:15:41,279

you're looking at here using the

435

00:15:45,590 --> 00:15:43,760

advanced resistive exercise device along

436

00:15:47,990 --> 00:15:45,600

with adequate intake of vitamin d at

437

00:15:49,670 --> 00:15:48,000

about 800 ius per day and eating the

438

00:15:51,990 --> 00:15:49,680

right amount of calories

439

00:15:54,470 --> 00:15:52,000

can help maintain bone mass and this is

440

00:15:56,470 --> 00:15:54,480

a big big finding for us

441

00:15:58,389 --> 00:15:56,480

so our data has been traditionally

442

00:16:00,310 --> 00:15:58,399

collected using dexa scans of the bone

443

00:16:03,030 --> 00:16:00,320

that tells you something about the bone

444

00:16:05,189 --> 00:16:03,040

mineral density of the bone

445

00:16:07,269 --> 00:16:05,199

and this is also used on the ground in

446

00:16:08,550 --> 00:16:07,279

patients with to monitor osteoporosis

447

00:16:10,550 --> 00:16:08,560

progression

448

00:16:12,150 --> 00:16:10,560

but it doesn't tell us much about the

449

00:16:13,509 --> 00:16:12,160

the quality of what's going on on the

450

00:16:15,910 --> 00:16:13,519

inside of the bone and that's what we

451  
00:16:17,590 --> 00:16:15,920  
really really want to know about because

452  
00:16:19,990 --> 00:16:17,600  
we really want to know about the risk

453  
00:16:21,189 --> 00:16:20,000  
for fracture so

454  
00:16:23,509 --> 00:16:21,199  
it's important to determine the

455  
00:16:26,069 --> 00:16:23,519  
structure of the bone is is healthy so

456  
00:16:28,629 --> 00:16:26,079  
the hip qct study is underway it's going

457  
00:16:31,110 --> 00:16:28,639  
to take pre and post flight measurements

458  
00:16:33,670 --> 00:16:31,120  
of crew members of the hip

459  
00:16:36,069 --> 00:16:33,680  
using the qct the qct is a three

460  
00:16:37,189 --> 00:16:36,079  
dimensional 3d imaging capability that

461  
00:16:39,430 --> 00:16:37,199  
can tell us something about what's

462  
00:16:41,509 --> 00:16:39,440  
actually happening to the structure and

463  
00:16:43,430 --> 00:16:41,519

the quality of the bone

464

00:16:45,910 --> 00:16:43,440

qct is also used here on earth for

465

00:16:47,269 --> 00:16:45,920

osteoporosis monitoring and can tell us

466

00:16:48,790 --> 00:16:47,279

details about the different parts of the

467

00:16:51,670 --> 00:16:48,800

bone such as what you see in the image

468

00:16:53,350 --> 00:16:51,680

on the right what we can find out about

469

00:16:55,990 --> 00:16:53,360

are changes that happen to the cortical

470

00:16:57,590 --> 00:16:56,000

bone and the trabecular bone now the

471

00:16:58,870 --> 00:16:57,600

reason we care about these two parts of

472

00:17:00,389 --> 00:16:58,880

the bone in particular is because they

473

00:17:01,990 --> 00:17:00,399

have to work together

474

00:17:03,430 --> 00:17:02,000

to maintain the overall structural

475

00:17:05,669 --> 00:17:03,440

quality of the bone so we really want to

476

00:17:08,069 --> 00:17:05,679

know the details of what's happening in

477

00:17:09,669 --> 00:17:08,079

maintenance of these areas of the bone

478

00:17:11,029 --> 00:17:09,679

now what we're going to gain from this

479

00:17:12,470 --> 00:17:11,039

is a good understanding of how our

480

00:17:14,150 --> 00:17:12,480

countermeasures are working together to

481

00:17:16,150 --> 00:17:14,160

help mitigate bone loss and keep our

482

00:17:18,549 --> 00:17:16,160

astronauts protected longer

483

00:17:20,230 --> 00:17:18,559

for longer durations we can also gain

484

00:17:22,069 --> 00:17:20,240

and use any of this data that we collect

485

00:17:25,189 --> 00:17:22,079

here for understanding what's happening

486

00:17:27,350 --> 00:17:25,199

to our uh disuse osteoporosis or our

487

00:17:30,070 --> 00:17:27,360

normal osteoporosis patients on earth

488

00:17:34,950 --> 00:17:30,080

osteoporosis affects about 75 million

489

00:17:36,549 --> 00:17:34,960

people across europe japan and america

490

00:17:37,909 --> 00:17:36,559

another area of importance in keeping

491

00:17:39,909 --> 00:17:37,919

astronauts healthy in the future of

492

00:17:42,070 --> 00:17:39,919

space exploration is understanding how

493

00:17:43,990 --> 00:17:42,080

plants grow the ability for plants to

494

00:17:45,750 --> 00:17:44,000

provide a food source and participate in

495

00:17:47,510 --> 00:17:45,760

environmental life support systems can

496

00:17:50,150 --> 00:17:47,520

prove critical for astronauts as they

497

00:17:51,590 --> 00:17:50,160

stay longer and longer in space now

498

00:17:53,590 --> 00:17:51,600

plants have had about three to four

499

00:17:54,950 --> 00:17:53,600

billions worth a billion years worth of

500

00:17:56,710 --> 00:17:54,960

adapting to the

501  
00:17:58,310 --> 00:17:56,720  
environments here on earth which makes

502  
00:18:00,150 --> 00:17:58,320  
them really responsive to any changes in

503  
00:18:02,070 --> 00:18:00,160  
their environment so on the space

504  
00:18:03,750 --> 00:18:02,080  
station

505  
00:18:05,350 --> 00:18:03,760  
experiments have provided us information

506  
00:18:07,750 --> 00:18:05,360  
about how plants grow when you change

507  
00:18:10,470 --> 00:18:07,760  
things like temperature and lighting and

508  
00:18:12,549 --> 00:18:10,480  
moisture and atmosphere and specifically

509  
00:18:13,750 --> 00:18:12,559  
also gravity of course

510  
00:18:15,430 --> 00:18:13,760  
so

511  
00:18:17,669 --> 00:18:15,440  
when we do more work we need to do more

512  
00:18:19,110 --> 00:18:17,679  
work and understanding how plants grow

513  
00:18:20,870 --> 00:18:19,120

and we can put it all together to

514

00:18:22,549 --> 00:18:20,880

successfully tell us how we can grow

515

00:18:24,870 --> 00:18:22,559

plants that'll be helpful to us on

516

00:18:26,549 --> 00:18:24,880

exploration class missions

517

00:18:28,470 --> 00:18:26,559

so a new investigation from our partners

518

00:18:31,510 --> 00:18:28,480

at the japanese aerospace exploration

519

00:18:33,510 --> 00:18:31,520

agency jaxa will investigate how tiny

520

00:18:36,150 --> 00:18:33,520

tubular proteins in plants called

521

00:18:37,990 --> 00:18:36,160

microtubules will arrange themselves to

522

00:18:39,990 --> 00:18:38,000

direct their plant growth and structure

523

00:18:41,590 --> 00:18:40,000

under microgravity conditions now we

524

00:18:43,830 --> 00:18:41,600

know that these microtubules play a

525

00:18:46,470 --> 00:18:43,840

major role on earth in helping plant

526  
00:18:49,190 --> 00:18:46,480  
cells reorganize in response to disease

527  
00:18:50,710 --> 00:18:49,200  
and external environmental signals now

528  
00:18:52,390 --> 00:18:50,720  
on the green left image that you can see

529  
00:18:53,990 --> 00:18:52,400  
on your screen you can see that under

530  
00:18:55,750 --> 00:18:54,000  
normal gravity conditions these

531  
00:18:58,630 --> 00:18:55,760  
microtubules will arrange themselves

532  
00:19:00,470 --> 00:18:58,640  
transversely in stems as the plant grows

533  
00:19:02,549 --> 00:19:00,480  
for optimal structural support so they

534  
00:19:04,070 --> 00:19:02,559  
provide structure but our jaxa

535  
00:19:05,990 --> 00:19:04,080  
scientists have found that plants grown

536  
00:19:07,830 --> 00:19:06,000  
under hyper gravity conditions such as

537  
00:19:09,669 --> 00:19:07,840  
the 3g depiction you see here on the

538  
00:19:12,470 --> 00:19:09,679

right in green they'll change their

539

00:19:15,029 --> 00:19:12,480

microtubule orientation to longitudinal

540

00:19:17,270 --> 00:19:15,039

and what you get is a shorter thicker

541

00:19:19,430 --> 00:19:17,280

body that's designed to withstand the

542

00:19:21,750 --> 00:19:19,440

increased effects of gravity and this is

543

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

known as plant anisotropy

544

00:19:24,789 --> 00:19:23,440

and this kind of response is one example

545

00:19:26,630 --> 00:19:24,799

of the plant's way of adapting to

546

00:19:29,110 --> 00:19:26,640

changes in its environment

547

00:19:30,310 --> 00:19:29,120

now on station jackson investigators are

548

00:19:32,390 --> 00:19:30,320

going to look at the resulting

549

00:19:34,150 --> 00:19:32,400

microtubule arrangement of arapadapsa

550

00:19:36,310 --> 00:19:34,160

seedlings grown under microgravity

551  
00:19:37,990 --> 00:19:36,320  
conditions and given what they know they

552  
00:19:39,830 --> 00:19:38,000  
expect to see an increase in the

553  
00:19:42,470 --> 00:19:39,840  
transverse arrangements of the

554  
00:19:44,150 --> 00:19:42,480  
microtubules along with longer thinner

555  
00:19:45,430 --> 00:19:44,160  
stems so we're going to see something a

556  
00:19:47,190 --> 00:19:45,440  
little different

557  
00:19:48,549 --> 00:19:47,200  
and we care about this kind of result

558  
00:19:49,510 --> 00:19:48,559  
because plants

559  
00:19:53,430 --> 00:19:49,520  
use

560  
00:19:55,430 --> 00:19:53,440  
about efficiency of the energy that they

561  
00:19:57,110 --> 00:19:55,440  
use to help themselves grow that we can

562  
00:19:58,870 --> 00:19:57,120  
gain knowledge from and contribute to

563  
00:20:00,230 --> 00:19:58,880

our database and understanding the

564

00:20:02,549 --> 00:20:00,240

entire story about how to help

565

00:20:04,310 --> 00:20:02,559

successfully grow plants in space

566

00:20:05,830 --> 00:20:04,320

so investigations like this will

567

00:20:07,990 --> 00:20:05,840

contribute to plant growth knowledge to

568

00:20:09,510 --> 00:20:08,000

help develop sustainable and economical

569

00:20:11,270 --> 00:20:09,520

means of

570

00:20:13,110 --> 00:20:11,280

human life support in space and we can

571

00:20:15,909 --> 00:20:13,120

learn some things as well that will help

572

00:20:17,909 --> 00:20:15,919

us advance agricultural production here

573

00:20:19,830 --> 00:20:17,919

on earth

574

00:20:21,830 --> 00:20:19,840

the next investigation i'll talk about

575

00:20:25,029 --> 00:20:21,840

is the multi-gas monitor now the space

576

00:20:26,630 --> 00:20:25,039

station is an ideal platform to advance

577

00:20:28,950 --> 00:20:26,640

technology development important for

578

00:20:29,990 --> 00:20:28,960

crew health and safety

579

00:20:31,909 --> 00:20:30,000

and so

580

00:20:34,870 --> 00:20:31,919

the multi-gas monitor demonstration will

581

00:20:37,190 --> 00:20:34,880

get underway during expedition 37. now

582

00:20:39,430 --> 00:20:37,200

the multi-gas monitor is the first

583

00:20:41,430 --> 00:20:39,440

application of laser spectroscopy to

584

00:20:43,350 --> 00:20:41,440

simultaneously measure multiple gases in

585

00:20:46,230 --> 00:20:43,360

the internal space station environment

586

00:20:48,470 --> 00:20:46,240

this includes oxygen carbon dioxide and

587

00:20:50,710 --> 00:20:48,480

ammonia it'll also measure water vapor

588

00:20:51,909 --> 00:20:50,720

or humidity in a real time continuous

589

00:20:54,789 --> 00:20:51,919

fashion

590

00:20:57,029 --> 00:20:54,799

now this kind of portable optical laser

591

00:20:59,270 --> 00:20:57,039

gas analysis technology or olga as you

592

00:21:01,190 --> 00:20:59,280

see there is designed to be very

593

00:21:03,190 --> 00:21:01,200

selective for particular environmental

594

00:21:05,190 --> 00:21:03,200

constituents with a very high amount of

595

00:21:07,830 --> 00:21:05,200

sensitivity and accuracy and no

596

00:21:09,270 --> 00:21:07,840

environmental cross-contamination so i

597

00:21:10,789 --> 00:21:09,280

actually brought along an engineering

598

00:21:13,510 --> 00:21:10,799

unit that i

599

00:21:15,029 --> 00:21:13,520

brought to show and tell you guys today

600

00:21:16,310 --> 00:21:15,039

and i know right it's always fun when

601  
00:21:17,830 --> 00:21:16,320  
you can actually bring some hardware to

602  
00:21:19,669 --> 00:21:17,840  
show and tell and so this is an

603  
00:21:22,950 --> 00:21:19,679  
engineering unit the flight unit's much

604  
00:21:24,230 --> 00:21:22,960  
more robust but it's designed overall to

605  
00:21:26,149 --> 00:21:24,240  
be modular

606  
00:21:28,549 --> 00:21:26,159  
battery powered and actually flexible

607  
00:21:30,310 --> 00:21:28,559  
enough in the future to look for things

608  
00:21:32,470 --> 00:21:30,320  
like combustion products in the

609  
00:21:33,830 --> 00:21:32,480  
atmosphere as well so if you you can see

610  
00:21:35,750 --> 00:21:33,840  
here it has a display and it gives a

611  
00:21:37,350 --> 00:21:35,760  
real-time reading of the data that it's

612  
00:21:40,149 --> 00:21:37,360  
collecting so you can see the water the

613  
00:21:42,470 --> 00:21:40,159

carbon dioxide the ammonia

614

00:21:44,310 --> 00:21:42,480

it'll collect data on iss while housed

615

00:21:46,230 --> 00:21:44,320

in iraq and then also crew members can

616

00:21:48,710 --> 00:21:46,240

take it around and make it portable and

617

00:21:50,470 --> 00:21:48,720

test certain areas of the iss as well

618

00:21:52,710 --> 00:21:50,480

and then that data will be compared to

619

00:21:56,070 --> 00:21:52,720

environmental data that's collected from

620

00:21:58,070 --> 00:21:56,080

the existing eclipse systems on orbit

621

00:21:59,510 --> 00:21:58,080

and and just kind of see how far this

622

00:22:00,870 --> 00:21:59,520

technology can go

623

00:22:02,630 --> 00:22:00,880

um you all in the room are welcome to

624

00:22:04,630 --> 00:22:02,640

come up after the briefing and and and

625

00:22:06,549 --> 00:22:04,640

test its capabilities as well you're

626

00:22:08,789 --> 00:22:06,559

invited to come up here

627

00:22:10,070 --> 00:22:08,799

uh what i wanted to to add for this is

628

00:22:11,590 --> 00:22:10,080

this kind of

629

00:22:15,029 --> 00:22:11,600

multi multi

630

00:22:16,950 --> 00:22:15,039

sensor capability is uh has really good

631

00:22:18,710 --> 00:22:16,960

use for potential on earth in in areas

632

00:22:20,870 --> 00:22:18,720

such as personnel

633

00:22:23,909 --> 00:22:20,880

and health and personal safety and

634

00:22:25,990 --> 00:22:23,919

health monitoring in industrial plants

635

00:22:27,909 --> 00:22:26,000

atmospheric research pollution

636

00:22:30,470 --> 00:22:27,919

monitoring and even food quality

637

00:22:31,909 --> 00:22:30,480

assurance

638

00:22:33,430 --> 00:22:31,919

the final investigation i'll tell you

639

00:22:35,830 --> 00:22:33,440

about today is actually wrapping up

640

00:22:38,950 --> 00:22:35,840

during expedition 36 and this is the

641

00:22:40,950 --> 00:22:38,960

bass investigation alba stands for the

642

00:22:42,630 --> 00:22:40,960

burning and suppression of solids so we

643

00:22:44,710 --> 00:22:42,640

have a flame investigation i'll talk

644

00:22:46,390 --> 00:22:44,720

about so you know combustion experiments

645

00:22:48,470 --> 00:22:46,400

performed on station tell us not only

646

00:22:49,990 --> 00:22:48,480

about how to keep our crew members safe

647

00:22:52,230 --> 00:22:50,000

but it also gives us data for

648

00:22:53,990 --> 00:22:52,240

earth-based models that drive

649

00:22:55,669 --> 00:22:54,000

improvements in the designs of fire

650

00:22:56,470 --> 00:22:55,679

detection and suppression systems on

651  
00:22:57,830 --> 00:22:56,480  
earth

652  
00:22:59,430 --> 00:22:57,840  
uh so what you're looking at in this

653  
00:23:01,669 --> 00:22:59,440  
graphic is some examples of flame

654  
00:23:03,350 --> 00:23:01,679  
behavior we see in space and in general

655  
00:23:05,190 --> 00:23:03,360  
we've learned that in microgravity

656  
00:23:07,029 --> 00:23:05,200  
without the buoyancy driven convection

657  
00:23:08,390 --> 00:23:07,039  
flames will burn at a lower temperature

658  
00:23:10,070 --> 00:23:08,400  
at a lower rate

659  
00:23:12,070 --> 00:23:10,080  
and with less oxygen needed than in

660  
00:23:14,070 --> 00:23:12,080  
normal gravity we've also learned that

661  
00:23:15,430 --> 00:23:14,080  
even smoke detection times are longer in

662  
00:23:17,029 --> 00:23:15,440  
space because of the different burning

663  
00:23:19,110 --> 00:23:17,039

characteristics in the microgravity

664

00:23:20,390 --> 00:23:19,120

environment so the space station is a

665

00:23:21,990 --> 00:23:20,400

great place to do all kinds of

666

00:23:24,789 --> 00:23:22,000

combustion experiments using different

667

00:23:26,149 --> 00:23:24,799

fuel types different means of detection

668

00:23:27,350 --> 00:23:26,159

and different types of suppression

669

00:23:28,789 --> 00:23:27,360

methods

670

00:23:30,549 --> 00:23:28,799

now the bass investigation has been

671

00:23:34,950 --> 00:23:30,559

looking at the effects of burning

672

00:23:37,270 --> 00:23:34,960

various solid fuels inside the msg and

673

00:23:39,430 --> 00:23:37,280

it's burns fuel such as acrylic

674

00:23:41,430 --> 00:23:39,440

different types of plastics and cotton

675

00:23:43,110 --> 00:23:41,440

and these different fuels will be of

676

00:23:44,549 --> 00:23:43,120

different sizes and shapes and then

677

00:23:46,070 --> 00:23:44,559

we'll test them out under different

678

00:23:48,070 --> 00:23:46,080

atmospheric conditions with different

679

00:23:49,830 --> 00:23:48,080

suppression techniques

680

00:23:51,510 --> 00:23:49,840

so what you're looking at uh here is

681

00:23:53,270 --> 00:23:51,520

chris cassidy showing us a sample of

682

00:23:55,110 --> 00:23:53,280

what one of the solid fuels looks like

683

00:23:57,590 --> 00:23:55,120

before it's burned and then you'll see

684

00:24:00,710 --> 00:23:57,600

don pettit uh performing the performing

685

00:24:03,190 --> 00:24:00,720

the very first bass test on on iss

686

00:24:05,830 --> 00:24:03,200

this is a test in particular that's

687

00:24:09,110 --> 00:24:05,840

burning a composite fabric of fiberglass

688

00:24:12,390 --> 00:24:09,120

and cotton in ordinary iss air now the

689

00:24:14,070 --> 00:24:12,400

airflow here is from right to left

690

00:24:16,310 --> 00:24:14,080

and the investigators are watching for

691

00:24:18,549 --> 00:24:16,320

changes in flame color and size as the

692

00:24:20,710 --> 00:24:18,559

airflow is varied the goal of this

693

00:24:22,230 --> 00:24:20,720

particular test was to determine

694

00:24:24,230 --> 00:24:22,240

the effect of air flow speed on the

695

00:24:26,149 --> 00:24:24,240

flame spread rate and extinction and

696

00:24:28,230 --> 00:24:26,159

we're real excited to learn about the

697

00:24:30,070 --> 00:24:28,240

data that we get from this study which

698

00:24:31,909 --> 00:24:30,080

will contribute to the combustion models

699

00:24:34,070 --> 00:24:31,919

used in the design of future fire

700

00:24:36,310 --> 00:24:34,080

suppression and detection systems both

701  
00:24:38,470 --> 00:24:36,320  
in space and on the ground

702  
00:24:39,750 --> 00:24:38,480  
and while this set of basic objectives

703  
00:24:41,909 --> 00:24:39,760  
are wrapping up we're looking forward to

704  
00:24:44,390 --> 00:24:41,919  
next year when we'll see bass 2 with an

705  
00:24:46,710 --> 00:24:44,400  
increased number of types of fuels an

706  
00:24:48,310 --> 00:24:46,720  
increased number of investigators and an

707  
00:24:50,149 --> 00:24:48,320  
increased number of test points and all

708  
00:24:51,830 --> 00:24:50,159  
of those things will contribute to even

709  
00:24:55,190 --> 00:24:51,840  
larger more complex combustion

710  
00:24:56,789 --> 00:24:55,200  
investigations for solid fuels

711  
00:24:58,870 --> 00:24:56,799  
so to sum it all up

712  
00:25:00,870 --> 00:24:58,880  
we have some really neat and interesting

713  
00:25:04,149 --> 00:25:00,880

and unique science happening on the

714

00:25:06,070 --> 00:25:04,159

station during expedition 36 and 37

715

00:25:07,990 --> 00:25:06,080

you can learn more about these and and

716

00:25:09,510 --> 00:25:08,000

all of them that are happening on 36 37

717

00:25:11,590 --> 00:25:09,520

if you go to [nasa.gov](http://nasa.gov) and visit the

718

00:25:12,870 --> 00:25:11,600

press kits we're looking forward to

719

00:25:14,070 --> 00:25:12,880

working with the crew on this we're

720

00:25:15,990 --> 00:25:14,080

really excited i know they're real

721

00:25:18,070 --> 00:25:16,000

excited and that's real important

722

00:25:19,350 --> 00:25:18,080

research that we'll be able to perform

723

00:25:21,190 --> 00:25:19,360

throughout the year

724

00:25:22,549 --> 00:25:21,200

that's all i have okay thank you tara

725

00:25:24,230 --> 00:25:22,559

let's take some questions now we've got

726  
00:25:25,029 --> 00:25:24,240  
the news media here in houston as well

727  
00:25:30,630 --> 00:25:25,039  
as

728  
00:25:32,789 --> 00:25:30,640  
well so we'll start over here

729  
00:25:36,070 --> 00:25:32,799  
with mark do you have a question yeah

730  
00:25:37,750 --> 00:25:36,080  
thank you mark caro for aviation week i

731  
00:25:40,470 --> 00:25:37,760  
have a couple of questions i think

732  
00:25:42,789 --> 00:25:40,480  
they're primarily operational

733  
00:25:44,710 --> 00:25:42,799  
operationally oriented and the first has

734  
00:25:47,110 --> 00:25:44,720  
to do with the developments today i

735  
00:25:49,190 --> 00:25:47,120  
think you're you put the 2b power

736  
00:25:51,269 --> 00:25:49,200  
channel

737  
00:25:54,070 --> 00:25:51,279  
back in the mix and i'm just wondering

738  
00:25:56,549 --> 00:25:54,080

if it is your leak chase

739

00:25:59,510 --> 00:25:56,559

sort of settled now or will you continue

740

00:26:04,149 --> 00:26:02,230

the p6 solar power module to see if

741

00:26:05,110 --> 00:26:04,159

there's still a leak of some kind out

742

00:26:07,110 --> 00:26:05,120

there

743

00:26:09,669 --> 00:26:07,120

let's see

744

00:26:12,310 --> 00:26:09,679

so p6 is

745

00:26:13,669 --> 00:26:12,320

basically had a leak since um early in

746

00:26:15,909 --> 00:26:13,679

its life

747

00:26:19,029 --> 00:26:15,919

and in fact we've re reloaded refilled

748

00:26:20,870 --> 00:26:19,039

it once already on orbit which is a

749

00:26:23,110 --> 00:26:20,880

something we'd planned for small leaks

750

00:26:24,870 --> 00:26:23,120

that you can't find you just

751  
00:26:26,950 --> 00:26:24,880  
we just refill every so often and it

752  
00:26:30,310 --> 00:26:26,960  
goes four or five years

753  
00:26:32,950 --> 00:26:30,320  
that leak rate increased a couple years

754  
00:26:34,789 --> 00:26:32,960  
back i think to

755  
00:26:37,029 --> 00:26:34,799  
to a slightly higher leak rate but not

756  
00:26:38,950 --> 00:26:37,039  
one that was alarming i think it went

757  
00:26:40,390 --> 00:26:38,960  
from about five years to maybe three to

758  
00:26:42,470 --> 00:26:40,400  
four years

759  
00:26:45,190 --> 00:26:42,480  
and then right before the um

760  
00:26:47,430 --> 00:26:45,200  
the holidays the christmas holidays if

761  
00:26:49,110 --> 00:26:47,440  
you recall we the leak rate increased

762  
00:26:50,789 --> 00:26:49,120  
significantly we went outside and

763  
00:26:53,990 --> 00:26:50,799

isolated the

764

00:26:56,230 --> 00:26:54,000

the radiator on this 2b1 and and the

765

00:26:58,230 --> 00:26:56,240

leak rate changed

766

00:27:02,230 --> 00:26:58,240

to be significantly less

767

00:27:05,029 --> 00:27:02,240

but the radiator was uh held tight so

768

00:27:07,510 --> 00:27:05,039

then this last leak occurred it it was

769

00:27:10,149 --> 00:27:07,520

much bigger it was five pound per day

770

00:27:12,549 --> 00:27:10,159

kind of leak it was very high leak

771

00:27:14,310 --> 00:27:12,559

um and and of course we saw the ammonia

772

00:27:16,070 --> 00:27:14,320

so we changed out the pump

773

00:27:18,390 --> 00:27:16,080

that leak rate is gone

774

00:27:20,070 --> 00:27:18,400

but the smaller leak rates uh the two

775

00:27:21,430 --> 00:27:20,080

smaller leak weights i mentioned earlier

776

00:27:23,430 --> 00:27:21,440

it will take us

777

00:27:25,110 --> 00:27:23,440

it'll take us a couple months to see

778

00:27:26,789 --> 00:27:25,120

probably a couple of three months to

779

00:27:29,430 --> 00:27:26,799

confirm that

780

00:27:31,110 --> 00:27:29,440

that the slightly higher leak rate is is

781

00:27:33,190 --> 00:27:31,120

not there and then the small leak rate

782

00:27:35,669 --> 00:27:33,200

it could take us six months to a year to

783

00:27:37,350 --> 00:27:35,679

really can conclude that that's gone as

784

00:27:38,950 --> 00:27:37,360

well so it'll take us a little time to

785

00:27:40,390 --> 00:27:38,960

sort that out but if either those leaks

786

00:27:42,630 --> 00:27:40,400

are still with us you're still talking

787

00:27:44,470 --> 00:27:42,640

years and that's kind of in our plan

788

00:27:45,990 --> 00:27:44,480

to refill this every so often as

789

00:27:47,190 --> 00:27:46,000  
necessary

790

00:27:49,350 --> 00:27:47,200  
okay go ahead

791

00:27:52,230 --> 00:27:49,360  
um i noticed uh

792

00:27:55,269 --> 00:27:52,240  
that the may 28th soyuz launch will

793

00:27:58,870 --> 00:27:55,279  
again be uh the sort of express

794

00:28:00,830 --> 00:27:58,880  
transit and i wonder if is that going to

795

00:28:03,669 --> 00:28:00,840  
be the routine is that still to be

796

00:28:05,830 --> 00:28:03,679  
determined um i'm just wondering whether

797

00:28:08,230 --> 00:28:05,840  
that's so desirable now that you can do

798

00:28:10,549 --> 00:28:08,240  
that each time or it sort of depends

799

00:28:12,549 --> 00:28:10,559  
well what we did it in the end i think

800

00:28:14,310 --> 00:28:12,559  
ultimately it will depend we have not we

801  
00:28:16,230 --> 00:28:14,320  
have not decided as a partnership that

802  
00:28:17,350 --> 00:28:16,240  
that's the the uh

803  
00:28:18,230 --> 00:28:17,360  
the plan

804  
00:28:19,590 --> 00:28:18,240  
uh

805  
00:28:22,710 --> 00:28:19,600  
the given plan

806  
00:28:23,830 --> 00:28:22,720  
um we we have addressed it now on the on

807  
00:28:25,830 --> 00:28:23,840  
the first flight we did it as an

808  
00:28:27,750 --> 00:28:25,840  
individual flight uh we put in some

809  
00:28:30,149 --> 00:28:27,760  
countermeasures to make sure the crew

810  
00:28:32,710 --> 00:28:30,159  
was as rested and ready to perform the

811  
00:28:35,350 --> 00:28:32,720  
the docking event as possible

812  
00:28:38,310 --> 00:28:35,360  
it went very well

813  
00:28:40,310 --> 00:28:38,320

so based on that review and assuming the

814

00:28:41,510 --> 00:28:40,320

same counter measures we agreed to look

815

00:28:43,029 --> 00:28:41,520

at it again

816

00:28:45,830 --> 00:28:43,039

and then in the summer time we're going

817

00:28:49,110 --> 00:28:45,840

to step back based on those two flights

818

00:28:50,549 --> 00:28:49,120

and and our experiences and and make a

819

00:28:52,470 --> 00:28:50,559

determination

820

00:28:54,389 --> 00:28:52,480

uh and a recommendation to our russian

821

00:28:55,430 --> 00:28:54,399

colleagues about what we plan for in the

822

00:28:57,350 --> 00:28:55,440

future

823

00:28:58,549 --> 00:28:57,360

and i suspect there will be

824

00:28:59,590 --> 00:28:58,559

you know some

825

00:29:01,190 --> 00:28:59,600

some

826

00:29:03,590 --> 00:29:01,200

answer that says

827

00:29:05,190 --> 00:29:03,600

uh if you agree to do this when you do

828

00:29:06,789 --> 00:29:05,200

it and maybe not in all cases would you

829

00:29:08,710 --> 00:29:06,799

plan to do a four-orbit rendezvous so we

830

00:29:11,029 --> 00:29:08,720

hope to sort that all out and kind of

831

00:29:13,750 --> 00:29:11,039

decide what the plan is for the future

832

00:29:14,549 --> 00:29:13,760

after this after this next flight

833

00:29:15,990 --> 00:29:14,559

okay

834

00:29:20,870 --> 00:29:16,000

robert

835

00:29:24,830 --> 00:29:20,880

with a few questions um

836

00:29:27,590 --> 00:29:24,840

with regards to uh the expedited uh

837

00:29:29,350 --> 00:29:27,600

um rendezvous uh were there was there

838

00:29:31,350 --> 00:29:29,360

any feedback from chris cassidy or the

839

00:29:34,230 --> 00:29:31,360

other crew members that played directly

840

00:29:36,950 --> 00:29:34,240

into any direct changes for this crew

841

00:29:39,110 --> 00:29:36,960

in terms of crew comfort or um or

842

00:29:40,549 --> 00:29:39,120

managing the six-hour

843

00:29:43,269 --> 00:29:40,559

compressed schedule

844

00:29:45,110 --> 00:29:43,279

well uh the biggest comment we first of

845

00:29:47,510 --> 00:29:45,120

all the crews all said it went very well

846

00:29:49,510 --> 00:29:47,520

they were very comfortable

847

00:29:52,230 --> 00:29:49,520

the biggest comment they made was we had

848

00:29:54,630 --> 00:29:52,240

started sleep shifting the crew

849

00:29:56,630 --> 00:29:54,640

right after they arrived in baikonur and

850

00:29:58,149 --> 00:29:56,640

so when you sleep shift the crew you

851

00:29:59,990 --> 00:29:58,159

have to sleep shift everybody that's

852

00:30:02,149 --> 00:30:00,000

working with the crew

853

00:30:03,830 --> 00:30:02,159

so it's a dramatic impact to the to the

854

00:30:04,870 --> 00:30:03,840

team at baikonur and the crew came back

855

00:30:06,789 --> 00:30:04,880

to us

856

00:30:09,350 --> 00:30:06,799

post-docking and said you know that was

857

00:30:11,190 --> 00:30:09,360

that was probably not necessary and in

858

00:30:13,430 --> 00:30:11,200

fact the sleep shift plan this time

859

00:30:15,430 --> 00:30:13,440

really starts the sleep shift after

860

00:30:16,950 --> 00:30:15,440

uh sometime after the second fit check

861

00:30:19,830 --> 00:30:16,960

it's it's in fact we're doing a

862

00:30:21,510 --> 00:30:19,840

variation to this time it's more along

863

00:30:23,830 --> 00:30:21,520

the lines of

864

00:30:25,750 --> 00:30:23,840

of you basically

865

00:30:27,190 --> 00:30:25,760

let the crew sleep like they normally do

866

00:30:29,190 --> 00:30:27,200

all the way up to close to launch day

867

00:30:31,669 --> 00:30:29,200

then you we call it slam shifting you do

868

00:30:33,269 --> 00:30:31,679

a big shift you give them a nap before

869

00:30:35,029 --> 00:30:33,279

launch and then they and then they go

870

00:30:37,110 --> 00:30:35,039

fly so it's just another technique for

871

00:30:38,630 --> 00:30:37,120

sleep shifting that people use

872

00:30:41,110 --> 00:30:38,640

because you're very rested when you go

873

00:30:43,269 --> 00:30:41,120

to fly and generally speaking the nap is

874

00:30:44,470 --> 00:30:43,279

a very useful nap meaning it works

875

00:30:46,310 --> 00:30:44,480

you're able to sleep during the nap

876

00:30:47,669 --> 00:30:46,320

period and

877

00:30:49,029 --> 00:30:47,679

and so we're going to try this technique

878

00:30:51,029 --> 00:30:49,039

we think maybe next time there's a

879

00:30:52,630 --> 00:30:51,039

variation on that theme so we'll look at

880

00:30:55,110 --> 00:30:52,640

different sleep shift plans to see which

881

00:30:56,789 --> 00:30:55,120

is best but the crew really felt like

882

00:30:59,110 --> 00:30:56,799

that much of a sleep shift for that long

883

00:31:00,389 --> 00:30:59,120

a period of time was not necessary

884

00:31:03,110 --> 00:31:00,399

other than that they pretty much

885

00:31:05,110 --> 00:31:03,120

confirmed the the other mitigations that

886

00:31:06,870 --> 00:31:05,120

we put in place primarily the probably

887

00:31:08,149 --> 00:31:06,880

one the biggest one after

888

00:31:10,310 --> 00:31:08,159

after

889

00:31:11,510 --> 00:31:10,320

having the appropriate meds available

890

00:31:19,269 --> 00:31:11,520

and

891

00:31:20,549 --> 00:31:19,279

things you'd want to do

892

00:31:21,830 --> 00:31:20,559

stretch your legs a little bit before

893

00:31:23,430 --> 00:31:21,840

you have to get back in the seat for the

894

00:31:25,430 --> 00:31:23,440

docking sequence so

895

00:31:27,190 --> 00:31:25,440

um they largely just confirmed what we

896

00:31:28,789 --> 00:31:27,200

did that it that it wouldn't work very

897

00:31:31,830 --> 00:31:28,799

well

898

00:31:34,470 --> 00:31:31,840

and with regards to atv4's launch and

899

00:31:36,870 --> 00:31:34,480

progress 51's undocking

900

00:31:40,070 --> 00:31:36,880

there's been some talk about possible

901  
00:31:42,710 --> 00:31:40,080  
damage given the antennas

902  
00:31:44,310 --> 00:31:42,720  
not retracting

903  
00:31:46,789 --> 00:31:44,320  
what will be the course of action in

904  
00:31:49,509 --> 00:31:46,799  
terms of you're launching or isis

905  
00:31:51,509 --> 00:31:49,519  
launching atv4 before progress 51

906  
00:31:53,430 --> 00:31:51,519  
undocks so i don't know if you get a

907  
00:31:55,430 --> 00:31:53,440  
good look beforehand they're both using

908  
00:31:58,230 --> 00:31:55,440  
the same port what if that port is

909  
00:32:00,149 --> 00:31:58,240  
damaged what happens with atv

910  
00:32:02,870 --> 00:32:00,159  
so so the antenna actually failed to

911  
00:32:04,070 --> 00:32:02,880  
deploy as opposed to retract um that's

912  
00:32:06,070 --> 00:32:04,080  
all right the other time we had an

913  
00:32:07,669 --> 00:32:06,080

antenna problem it failed to retract so

914

00:32:09,750 --> 00:32:07,679

it's um

915

00:32:12,310 --> 00:32:09,760

and the there if you look at the antenna

916

00:32:13,590 --> 00:32:12,320

it's got kind of a rim area and then i

917

00:32:15,750 --> 00:32:13,600

call it the hat shape where the

918

00:32:18,549 --> 00:32:15,760

electronics are on the back the rim area

919

00:32:20,710 --> 00:32:18,559

is very very thin aluminum with a little

920

00:32:22,630 --> 00:32:20,720

white kind of cloth material over so

921

00:32:25,830 --> 00:32:22,640

it's very flimsy

922

00:32:29,509 --> 00:32:25,840

we expected that that did contact the

923

00:32:32,149 --> 00:32:29,519

outer mold line of the docking

924

00:32:35,990 --> 00:32:32,159

the docking ring and and is probably

925

00:32:38,950 --> 00:32:36,000

resting on this mrr this um

926  
00:32:40,710 --> 00:32:38,960  
retro reflector that the atv needs to

927  
00:32:43,190 --> 00:32:40,720  
use

928  
00:32:44,710 --> 00:32:43,200  
but the loads are such that we don't

929  
00:32:46,710 --> 00:32:44,720  
expect that we damage the retro

930  
00:32:48,389 --> 00:32:46,720  
reflector it is possible two things are

931  
00:32:50,870 --> 00:32:48,399  
possible have occurred one is there's

932  
00:32:52,950 --> 00:32:50,880  
some mli on this outer mold line of the

933  
00:32:55,029 --> 00:32:52,960  
on this housing around the docking

934  
00:32:57,509 --> 00:32:55,039  
we don't believe it's come loose as a

935  
00:32:59,909 --> 00:32:57,519  
result of that but it's possible that

936  
00:33:02,710 --> 00:32:59,919  
it's come loose the other is and just in

937  
00:33:04,149 --> 00:33:02,720  
the act of rubbing up along the side of

938  
00:33:05,830 --> 00:33:04,159

the docking thing we might have put some

939

00:33:08,950 --> 00:33:05,840

contamination on the retro reflector

940

00:33:11,190 --> 00:33:08,960

which would perhaps make it difficult to

941

00:33:13,190 --> 00:33:11,200

reflect the right energy back to the atv

942

00:33:15,509 --> 00:33:13,200

when it approaches

943

00:33:17,509 --> 00:33:15,519

so the plan is for undocking of 51

944

00:33:19,190 --> 00:33:17,519

progress we'll we have these cameras

945

00:33:20,630 --> 00:33:19,200

they have cameras that look both ways

946

00:33:23,029 --> 00:33:20,640

and so we'll look at the progress

947

00:33:25,190 --> 00:33:23,039

cameras it departs to see if the mli is

948

00:33:27,269 --> 00:33:25,200

is interfering at all with field of view

949

00:33:30,470 --> 00:33:27,279

it's a very simple check

950

00:33:31,830 --> 00:33:30,480

uh and and then assuming that that's the

951  
00:33:33,269 --> 00:33:31,840  
that it's

952  
00:33:35,269 --> 00:33:33,279  
doesn't look like it's impeding the

953  
00:33:37,669 --> 00:33:35,279  
ability to utilize the

954  
00:33:39,190 --> 00:33:37,679  
mro then we'll go ahead and let atv

955  
00:33:41,190 --> 00:33:39,200  
approach and in fact we've already given

956  
00:33:43,590 --> 00:33:41,200  
a go for launch for atv

957  
00:33:45,110 --> 00:33:43,600  
for pending the

958  
00:33:46,789 --> 00:33:45,120  
uh the launch review that they have

959  
00:33:49,029 --> 00:33:46,799  
close to flight but from a program

960  
00:33:50,310 --> 00:33:49,039  
standpoint we've said we're good for atv

961  
00:33:52,149 --> 00:33:50,320  
force launch

962  
00:33:55,430 --> 00:33:52,159  
it approaches it acquires these targets

963  
00:33:57,110 --> 00:33:55,440

at about 240 meters at that point if it

964

00:33:58,870 --> 00:33:57,120

can't get a good reflection back it'll

965

00:34:00,470 --> 00:33:58,880

try for about 90 minutes and then it'll

966

00:34:02,389 --> 00:34:00,480

do an escape

967

00:34:04,630 --> 00:34:02,399

so at no time would the iss be at any

968

00:34:07,430 --> 00:34:04,640

risk and then at that point we'll know

969

00:34:09,349 --> 00:34:07,440

the mrr was either contaminated or

970

00:34:11,109 --> 00:34:09,359

there's some other problem with it and

971

00:34:13,510 --> 00:34:11,119

um and this crew that's going up is

972

00:34:15,349 --> 00:34:13,520

bringing up a spare with them and so the

973

00:34:18,470 --> 00:34:15,359

our russian colleagues will do

974

00:34:21,669 --> 00:34:18,480

an eba to r r that uh fyodors actually

975

00:34:22,710 --> 00:34:21,679

looked at the r r procedure and

976  
00:34:23,909 --> 00:34:22,720  
since he's

977  
00:34:25,829 --> 00:34:23,919  
had a little time with it so he's

978  
00:34:27,190 --> 00:34:25,839  
familiar he's probably the one that'll

979  
00:34:28,069 --> 00:34:27,200  
go outside

980  
00:34:37,270 --> 00:34:28,079  
and

981  
00:34:38,310 --> 00:34:37,280  
don't expect her to be any issue

982  
00:34:39,589 --> 00:34:38,320  
but

983  
00:34:42,310 --> 00:34:39,599  
you know what they say it's all about

984  
00:34:46,069 --> 00:34:43,829  
okay who else has questions raise your

985  
00:34:48,790 --> 00:34:46,079  
hand

986  
00:34:50,389 --> 00:34:48,800  
go ahead over here um

987  
00:34:52,470 --> 00:34:50,399  
i was curious when

988  
00:34:54,550 --> 00:34:52,480

you're trying to cycle them into like

989

00:34:56,869 --> 00:34:54,560

the sleep shifting process

990

00:34:58,790 --> 00:34:56,879

um and you were saying um appropriate

991

00:35:01,270 --> 00:34:58,800

drugs i mean like sleeping pills or

992

00:35:03,030 --> 00:35:01,280

melatonin i'm just curious

993

00:35:05,670 --> 00:35:03,040

well i don't get too deep in all that

994

00:35:08,630 --> 00:35:05,680

but we do have we do have different

995

00:35:09,670 --> 00:35:08,640

types of medications that we provide

996

00:35:11,910 --> 00:35:09,680

uh

997

00:35:13,829 --> 00:35:11,920

that the the

998

00:35:15,270 --> 00:35:13,839

flight docs provide to help the crew

999

00:35:16,470 --> 00:35:15,280

sleep

1000

00:35:18,550 --> 00:35:16,480

there's also

1001  
00:35:20,950 --> 00:35:18,560  
medications they can use to help them

1002  
00:35:22,790 --> 00:35:20,960  
stay alert the medications i was

1003  
00:35:25,270 --> 00:35:22,800  
referring to though is

1004  
00:35:26,870 --> 00:35:25,280  
space adaptation sickness is a is a

1005  
00:35:28,470 --> 00:35:26,880  
phenomenon that

1006  
00:35:30,630 --> 00:35:28,480  
is

1007  
00:35:31,829 --> 00:35:30,640  
widespread in terms of space flight but

1008  
00:35:33,589 --> 00:35:31,839  
it's not

1009  
00:35:35,510 --> 00:35:33,599  
it's hard to decide who's going to react

1010  
00:35:37,030 --> 00:35:35,520  
to it and who's not some people fly

1011  
00:35:38,870 --> 00:35:37,040  
don't feel anything

1012  
00:35:41,430 --> 00:35:38,880  
some people fly and have mild

1013  
00:35:43,510 --> 00:35:41,440

inconvenience others fly and it's

1014

00:35:47,030 --> 00:35:43,520

a little more aggressive and so

1015

00:35:48,790 --> 00:35:47,040

on the ground we spend some time

1016

00:35:50,550 --> 00:35:48,800

testing these meds different types of

1017

00:35:52,790 --> 00:35:50,560

meds on different crews to see how they

1018

00:35:54,150 --> 00:35:52,800

react to make sure that they

1019

00:35:56,470 --> 00:35:54,160

don't react in a way that would make

1020

00:35:58,710 --> 00:35:56,480

them unable to do their job

1021

00:36:00,470 --> 00:35:58,720

and so they they spend some time with

1022

00:36:02,390 --> 00:36:00,480

each crew member trying different meds

1023

00:36:03,750 --> 00:36:02,400

to see which ones works best for them

1024

00:36:05,270 --> 00:36:03,760

and that's what i was referring to and

1025

00:36:06,710 --> 00:36:05,280

then they do that for pre-launch and

1026  
00:36:07,910 --> 00:36:06,720  
then they have those meds available for

1027  
00:36:10,390 --> 00:36:07,920  
them if they want to take

1028  
00:36:12,790 --> 00:36:10,400  
prophylactically before they fly or at

1029  
00:36:14,150 --> 00:36:12,800  
the onset during flight most of the time

1030  
00:36:16,150 --> 00:36:14,160  
if they have a concern they'll take it

1031  
00:36:18,790 --> 00:36:16,160  
before they fly so they don't have to

1032  
00:36:20,390 --> 00:36:18,800  
wait for it to to work for them

1033  
00:36:22,310 --> 00:36:20,400  
uh on orbit so that's what i was

1034  
00:36:23,990 --> 00:36:22,320  
referring to

1035  
00:36:25,109 --> 00:36:24,000  
anybody else

1036  
00:36:26,550 --> 00:36:25,119  
back here in the back

1037  
00:36:28,150 --> 00:36:26,560  
um can you talk a little bit more about

1038  
00:36:29,349 --> 00:36:28,160

the space walks that you have scheduled

1039

00:36:30,870 --> 00:36:29,359

like are they just

1040

00:36:31,910 --> 00:36:30,880

what kind of maintenance or anything are

1041

00:36:33,349 --> 00:36:31,920

they doing

1042

00:36:35,270 --> 00:36:33,359

you know i'll let gary talk about that

1043

00:36:37,510 --> 00:36:35,280

he's gonna he's gonna have to get deep

1044

00:36:39,430 --> 00:36:37,520

into it so why don't we let gary do that

1045

00:36:43,109 --> 00:36:39,440

yeah so the i'll talk about the two u.s

1046

00:36:45,190 --> 00:36:43,119

space walks we have planned in july

1047

00:36:46,630 --> 00:36:45,200

so now that space station assembly is

1048

00:36:47,910 --> 00:36:46,640

pretty much complete you know back when

1049

00:36:49,510 --> 00:36:47,920

we were building the space station we

1050

00:36:51,510 --> 00:36:49,520

were going outside at pretty much every

1051  
00:36:53,430 --> 00:36:51,520  
mission every few months that we got up

1052  
00:36:55,670 --> 00:36:53,440  
there with space shuttle and and

1053  
00:36:58,069 --> 00:36:55,680  
built this incredible vehicle so

1054  
00:36:59,910 --> 00:36:58,079  
now that it's assembled we we don't have

1055  
00:37:01,510 --> 00:36:59,920  
to go outside very much except for when

1056  
00:37:03,190 --> 00:37:01,520  
issues like that ammonia leak popped up

1057  
00:37:04,470 --> 00:37:03,200  
a couple weeks ago we went outside and

1058  
00:37:06,390 --> 00:37:04,480  
fixed that so

1059  
00:37:08,310 --> 00:37:06,400  
so we kind of have a kind of a backlog

1060  
00:37:10,150 --> 00:37:08,320  
of maintenance items we like to go out

1061  
00:37:11,990 --> 00:37:10,160  
and take care of um

1062  
00:37:13,750 --> 00:37:12,000  
kind of like around your house when

1063  
00:37:15,190 --> 00:37:13,760

you take a few months off and all of a

1064

00:37:17,910 --> 00:37:15,200

sudden you've got all this

1065

00:37:19,510 --> 00:37:17,920

little to-do list you got to go do so

1066

00:37:21,270 --> 00:37:19,520

the first spacewalk one of the things

1067

00:37:24,390 --> 00:37:21,280

that brought up some hardware on the

1068

00:37:26,310 --> 00:37:24,400

spacex mission a couple months ago

1069

00:37:28,470 --> 00:37:26,320

that will allow us to

1070

00:37:29,750 --> 00:37:28,480

to repair the radiators if we ever have

1071

00:37:31,670 --> 00:37:29,760

a problem in the future they're pretty

1072

00:37:33,910 --> 00:37:31,680

big pieces of hardware so we temporarily

1073

00:37:35,990 --> 00:37:33,920

stowed them robotically outside

1074

00:37:37,030 --> 00:37:36,000

and so the first spacewalk one of the

1075

00:37:38,550 --> 00:37:37,040

main things we're going to do is go

1076  
00:37:41,349 --> 00:37:38,560  
ahead and take those from the temporary

1077  
00:37:43,270 --> 00:37:41,359  
location and go get them stowed properly

1078  
00:37:44,790 --> 00:37:43,280  
on the on the truss on each side so

1079  
00:37:45,990 --> 00:37:44,800  
they're ready to go when we need them in

1080  
00:37:47,829 --> 00:37:46,000  
the future

1081  
00:37:49,589 --> 00:37:47,839  
um

1082  
00:37:51,670 --> 00:37:49,599  
now you know one of the other things we

1083  
00:37:53,990 --> 00:37:51,680  
had a failure of one of our high data

1084  
00:37:55,829 --> 00:37:54,000  
rate antenna systems couple months ago

1085  
00:37:58,069 --> 00:37:55,839  
we have two of them so it was just a

1086  
00:37:59,990 --> 00:37:58,079  
loss of redundancy on on

1087  
00:38:01,750 --> 00:38:00,000  
the ability to transmit high data rates

1088  
00:38:02,630 --> 00:38:01,760

up to the vehicle the downlink side was

1089

00:38:03,829 --> 00:38:02,640

fine

1090

00:38:05,430 --> 00:38:03,839

so that piece of hardware we're going to

1091

00:38:07,829 --> 00:38:05,440

swap that out and get that back up and

1092

00:38:09,430 --> 00:38:07,839

functioning as well

1093

00:38:11,349 --> 00:38:09,440

then we've got several other other like

1094

00:38:13,190 --> 00:38:11,359

i said miscellaneous items one of one of

1095

00:38:14,470 --> 00:38:13,200

the things we're doing is running some

1096

00:38:17,109 --> 00:38:14,480

power and

1097

00:38:18,550 --> 00:38:17,119

data connections down the us segment and

1098

00:38:20,630 --> 00:38:18,560

those will be available for our russian

1099

00:38:22,310 --> 00:38:20,640

colleagues on their spacewalks to hook

1100

00:38:23,589 --> 00:38:22,320

up to those for the the module we

1101  
00:38:24,710 --> 00:38:23,599  
mentioned is coming up at the end of the

1102  
00:38:26,790 --> 00:38:24,720  
year so

1103  
00:38:29,670 --> 00:38:26,800  
that's preparation for that that new

1104  
00:38:31,670 --> 00:38:29,680  
module coming up

1105  
00:38:33,349 --> 00:38:31,680  
the second spacewalk

1106  
00:38:35,430 --> 00:38:33,359  
one of the other things we're doing is

1107  
00:38:36,950 --> 00:38:35,440  
as part of that radiator repair

1108  
00:38:38,550 --> 00:38:36,960  
capability we've got some hardware

1109  
00:38:39,589 --> 00:38:38,560  
that's currently stowed inside the

1110  
00:38:41,589 --> 00:38:39,599  
vehicle

1111  
00:38:43,109 --> 00:38:41,599  
and and as you can probably understand

1112  
00:38:44,790 --> 00:38:43,119  
the amount of cargo we have coming up

1113  
00:38:46,470 --> 00:38:44,800

with all these cargo ships if if we can

1114

00:38:47,910 --> 00:38:46,480

get a little more space inside so we're

1115

00:38:50,390 --> 00:38:47,920

going to take these two big pieces of

1116

00:38:52,550 --> 00:38:50,400

hardware outside and put them in a more

1117

00:38:54,550 --> 00:38:52,560

permanent location

1118

00:38:56,550 --> 00:38:54,560

and have them ready for a future

1119

00:38:57,750 --> 00:38:56,560

repair job if we need it

1120

00:38:59,270 --> 00:38:57,760

and

1121

00:39:01,030 --> 00:38:59,280

then we got

1122

00:39:02,790 --> 00:39:01,040

we've got a one of the antennas that we

1123

00:39:04,550 --> 00:39:02,800

use for the space walks

1124

00:39:08,150 --> 00:39:04,560

uh failed a while back so we're gonna go

1125

00:39:09,349 --> 00:39:08,160

ahead and and work on that and um

1126  
00:39:11,109 --> 00:39:09,359  
and like i said a couple other little

1127  
00:39:12,230 --> 00:39:11,119  
things like cameras that have had issues

1128  
00:39:13,829 --> 00:39:12,240  
over the years

1129  
00:39:15,349 --> 00:39:13,839  
so again a lot of it's kind of catch-up

1130  
00:39:17,750 --> 00:39:15,359  
work since we we really haven't gone

1131  
00:39:19,750 --> 00:39:17,760  
outside to other than for um you know

1132  
00:39:21,990 --> 00:39:19,760  
kind of a contingency repair capability

1133  
00:39:25,190 --> 00:39:22,000  
in the last year or two so we're gonna

1134  
00:39:26,230 --> 00:39:25,200  
try and do a lot of catch-up work

1135  
00:39:27,349 --> 00:39:26,240  
okay let's go to the phone lines real

1136  
00:39:28,710 --> 00:39:27,359  
quick and we'll come back here i think

1137  
00:39:36,069 --> 00:39:28,720  
we've got stephen clark with space

1138  
00:39:36,079 --> 00:39:39,030

stephen can you hear us

1139

00:39:44,390 --> 00:39:42,069

okay how about miriam cramer

1140

00:39:46,870 --> 00:39:44,400

hi yeah can you hear me yeah

1141

00:39:49,990 --> 00:39:46,880

oh hi this is miriam with space.com um

1142

00:39:52,230 --> 00:39:50,000

so i just have a quick question um will

1143

00:39:54,470 --> 00:39:52,240

the astronauts be continuing the

1144

00:39:57,510 --> 00:39:54,480

research that has already been done on

1145

00:39:59,030 --> 00:39:57,520

station about uh measuring their height

1146

00:40:00,950 --> 00:39:59,040

using an ultrasound machine will that

1147

00:40:03,990 --> 00:40:00,960

still be an experiment that's

1148

00:40:05,829 --> 00:40:04,000

that's done during this expedition

1149

00:40:07,829 --> 00:40:05,839

oh sure yeah that's an ongoing

1150

00:40:09,990 --> 00:40:07,839

investigation looking at changes in the

1151

00:40:11,510 --> 00:40:10,000

spine they do use the ultrasound for

1152

00:40:13,270 --> 00:40:11,520

lots of different types of

1153

00:40:14,790 --> 00:40:13,280

investigations looking at the heart

1154

00:40:16,710 --> 00:40:14,800

looking at the spine

1155

00:40:18,550 --> 00:40:16,720

looking at the eye

1156

00:40:23,030 --> 00:40:18,560

changes in the eye so yeah it's going to

1157

00:40:27,430 --> 00:40:25,910

great thanks sure okay

1158

00:40:30,950 --> 00:40:27,440

uh let's try steven one more time see if

1159

00:40:34,790 --> 00:40:33,510

i think we may have lost mr clark okay

1160

00:40:36,310 --> 00:40:34,800

let's come back here to houston who else

1161

00:40:38,630 --> 00:40:36,320

has questions here in the room

1162

00:40:39,910 --> 00:40:38,640

here in the front row um can you

1163

00:40:41,829 --> 00:40:39,920

potentially tell me a little bit about

1164

00:40:43,589 --> 00:40:41,839

any meteorology observations going on at

1165

00:40:44,630 --> 00:40:43,599

the iss either planned or currently

1166

00:40:48,069 --> 00:40:44,640

going on

1167

00:40:50,470 --> 00:40:48,079

um do you have any in mind in particular

1168

00:40:53,109 --> 00:40:50,480

saw earlier like a graph of ozone

1169

00:40:54,390 --> 00:40:53,119

distributed things like that oh yeah

1170

00:40:56,470 --> 00:40:54,400

there are a couple there are a couple of

1171

00:40:58,550 --> 00:40:56,480

external facilities that are on station

1172

00:41:01,910 --> 00:40:58,560

um that look at lots of different things

1173

00:41:03,589 --> 00:41:01,920

changes in uh the coastal ocean imaging

1174

00:41:05,430 --> 00:41:03,599

using hyperspectral

1175

00:41:06,870 --> 00:41:05,440

capabilities

1176

00:41:09,030 --> 00:41:06,880

there are

1177

00:41:10,470 --> 00:41:09,040

geez a whole a whole slew of

1178

00:41:11,910 --> 00:41:10,480

dod

1179

00:41:13,829 --> 00:41:11,920

sponsored

1180

00:41:15,190 --> 00:41:13,839

payloads looking at

1181

00:41:16,710 --> 00:41:15,200

changes in the atmosphere changes in

1182

00:41:17,589 --> 00:41:16,720

plasma

1183

00:41:19,190 --> 00:41:17,599

changes

1184

00:41:20,790 --> 00:41:19,200

across the board so

1185

00:41:22,390 --> 00:41:20,800

there are lots of different payloads

1186

00:41:23,750 --> 00:41:22,400

there are future capabilities that are

1187

00:41:26,470 --> 00:41:23,760

also up and coming that are looking at

1188

00:41:27,349 --> 00:41:26,480

the atmospheric aerosol changes looking

1189

00:41:29,430 --> 00:41:27,359

at

1190

00:41:31,430 --> 00:41:29,440

zooming in a lot more closely on the

1191

00:41:33,270 --> 00:41:31,440

on the climate changes look for

1192

00:41:34,630 --> 00:41:33,280

an investigation called

1193

00:41:36,630 --> 00:41:34,640

cats

1194

00:41:37,990 --> 00:41:36,640

look for a couple there are a couple

1195

00:41:39,510 --> 00:41:38,000

other larger ones that are going to be

1196

00:41:41,109 --> 00:41:39,520

permanently mounted on the external

1197

00:41:43,670 --> 00:41:41,119

truss of station in the next two to

1198

00:41:45,589 --> 00:41:43,680

three years our external facilities

1199

00:41:47,430 --> 00:41:45,599

capabilities for earth observation are

1200

00:41:49,829 --> 00:41:47,440

really really ramping up

1201  
00:41:53,430 --> 00:41:49,839  
beyond what we have already had so

1202  
00:41:55,430 --> 00:41:53,440  
there's a whole there's a wide array yep

1203  
00:41:57,270 --> 00:41:55,440  
okay who else

1204  
00:41:59,750 --> 00:41:57,280  
right here

1205  
00:42:04,710 --> 00:41:59,760  
do any of the other power units have

1206  
00:42:07,990 --> 00:42:05,750  
okay

1207  
00:42:09,589 --> 00:42:08,000  
it's simple

1208  
00:42:11,109 --> 00:42:09,599  
i'd like to give you more details but

1209  
00:42:12,470 --> 00:42:11,119  
there are no more details to give you

1210  
00:42:14,829 --> 00:42:12,480  
we'd like that answer yeah we do like

1211  
00:42:15,190 --> 00:42:14,839  
that answer over here in the

1212  
00:42:18,069 --> 00:42:15,200  
row and why did you choose those

1213  
00:42:21,349 --> 00:42:19,589

for this particular investigation

1214

00:42:24,630 --> 00:42:21,359

they're going to grow arabidopsis which

1215

00:42:26,390 --> 00:42:24,640

is a mustard type derivative of a plant

1216

00:42:27,910 --> 00:42:26,400

and they're going to sprout these from

1217

00:42:29,829 --> 00:42:27,920

seedlings and they choose a rabbit

1218

00:42:31,910 --> 00:42:29,839

auspices because it's a model plant they

1219

00:42:34,230 --> 00:42:31,920

know a whole lot about the genetics the

1220

00:42:35,829 --> 00:42:34,240

the phenotype the way the plant grows

1221

00:42:37,510 --> 00:42:35,839

here on earth and so

1222

00:42:39,270 --> 00:42:37,520

once you know that about a particular

1223

00:42:41,270 --> 00:42:39,280

organism it becomes the model organism

1224

00:42:42,950 --> 00:42:41,280

by which you can compare the changes

1225

00:42:45,030 --> 00:42:42,960

that you see

1226

00:42:47,109 --> 00:42:45,040

in the biology world the c elegans the

1227

00:42:49,829 --> 00:42:47,119

worm is the equivalent of the of the

1228

00:42:52,230 --> 00:42:49,839

model there so uh so yeah that's why we

1229

00:42:53,829 --> 00:42:52,240

chose arabidopsis there's a whole in

1230

00:42:55,750 --> 00:42:53,839

most of the most of the investigations

1231

00:42:56,950 --> 00:42:55,760

we'll use arabidopsis other

1232

00:42:59,270 --> 00:42:56,960

investigations though if you're looking

1233

00:43:01,270 --> 00:42:59,280

at food crop we've done radish and

1234

00:43:03,510 --> 00:43:01,280

tomatoes and

1235

00:43:04,710 --> 00:43:03,520

just run a whole gamut and the trick for

1236

00:43:06,790 --> 00:43:04,720

plant growth is to be able to get

1237

00:43:08,069 --> 00:43:06,800

something that goes from seed to seed

1238

00:43:09,910 --> 00:43:08,079

stages so you want to be able to make

1239

00:43:12,550 --> 00:43:09,920

the whole cycle so you can prove the

1240

00:43:14,309 --> 00:43:12,560

plant will be useful on orbit but for

1241

00:43:17,990 --> 00:43:14,319

these kind of scientific investigations

1242

00:43:23,190 --> 00:43:18,000

the arabidopsis is the model of choice

1243

00:43:27,190 --> 00:43:25,109

back over here right here in the middle

1244

00:43:29,670 --> 00:43:27,200

hi i was wondering if you

1245

00:43:31,589 --> 00:43:29,680

if there were any um

1246

00:43:33,829 --> 00:43:31,599

pharmaceutical investigations going on

1247

00:43:35,349 --> 00:43:33,839

with the bone density or the bone

1248

00:43:36,790 --> 00:43:35,359

remodeling

1249

00:43:37,910 --> 00:43:36,800

that you guys had going on it's a good

1250

00:43:39,430 --> 00:43:37,920

question so

1251

00:43:41,510 --> 00:43:39,440

there have been a number of them

1252

00:43:43,190 --> 00:43:41,520

bisphosphonates is one that they're

1253

00:43:45,030 --> 00:43:43,200

looking at crew members can choose to

1254

00:43:47,349 --> 00:43:45,040

sign up for these uh to implement on

1255

00:43:49,349 --> 00:43:47,359

orbit as well so bisphosphonate's one

1256

00:43:50,150 --> 00:43:49,359

potential countermeasure there have been

1257

00:43:52,069 --> 00:43:50,160

other

1258

00:43:54,150 --> 00:43:52,079

pharmaceuticals tested in rodents in the

1259

00:43:56,550 --> 00:43:54,160

past looking at osteoprotegrin

1260

00:43:59,030 --> 00:43:56,560

myostatins and and products that are

1261

00:44:01,109 --> 00:43:59,040

commercially available and and used in

1262

00:44:03,829 --> 00:44:01,119

patients in osteoporosis here on the

1263

00:44:05,510 --> 00:44:03,839

ground uh pharmaceutical-wise so i think

1264

00:44:09,109 --> 00:44:05,520

bisphosphonates is the only one that's

1265

00:44:10,470 --> 00:44:09,119

going on right now

1266

00:44:13,430 --> 00:44:10,480

okay over here

1267

00:44:15,829 --> 00:44:13,440

um what are current plans for testing

1268

00:44:18,870 --> 00:44:15,839

with the robonaut 2 device that's on the

1269

00:44:21,349 --> 00:44:18,880

space station right now well robonaut 2

1270

00:44:24,150 --> 00:44:21,359

has a task board on orbit and so the

1271

00:44:25,910 --> 00:44:24,160

goal for robonaut 2 is to to test its uh

1272

00:44:27,510 --> 00:44:25,920

tactile functions and capabilities by

1273

00:44:28,790 --> 00:44:27,520

programming either from the ground or by

1274

00:44:31,430 --> 00:44:28,800

the crew members who are already on

1275

00:44:33,030 --> 00:44:31,440

orbit so robonaut's got this task board

1276

00:44:34,790 --> 00:44:33,040

that has lots of different capabilities

1277

00:44:36,710 --> 00:44:34,800

to draw out some of the strengths and

1278

00:44:38,950 --> 00:44:36,720

weaknesses and the text tactile function

1279

00:44:41,270 --> 00:44:38,960

and operations i know that there's some

1280

00:44:43,109 --> 00:44:41,280

discussion uh in the future

1281

00:44:45,750 --> 00:44:43,119

uh about expanding the robonaut

1282

00:44:48,230 --> 00:44:45,760

capabilities to perhaps uh have have

1283

00:44:50,950 --> 00:44:48,240

legs is what i'm hearing and maybe an

1284

00:44:53,109 --> 00:44:50,960

external and eva a mounted robonaut as

1285

00:44:54,550 --> 00:44:53,119

well so once we get through these first

1286

00:44:55,750 --> 00:44:54,560

couple of rough technology

1287

00:44:57,349 --> 00:44:55,760

demonstrations and get really

1288

00:45:00,950 --> 00:44:57,359

comfortable with the progress it's going

1289

00:45:03,589 --> 00:45:00,960

to become a more complex design

1290

00:45:05,589 --> 00:45:03,599

okay over here

1291

00:45:06,390 --> 00:45:05,599

back to the meteorological stuff you

1292

00:45:07,510 --> 00:45:06,400

were saying that you're going to be

1293

00:45:09,190 --> 00:45:07,520

ramping up

1294

00:45:11,670 --> 00:45:09,200

stuff there more in the couple the next

1295

00:45:14,150 --> 00:45:11,680

couple of years is global climate change

1296

00:45:15,270 --> 00:45:14,160

and like extreme weather encouraging

1297

00:45:16,870 --> 00:45:15,280

this sort of

1298

00:45:18,710 --> 00:45:16,880

i mean is that part of what that's about

1299

00:45:20,950 --> 00:45:18,720

i don't think it's a reaction to that

1300

00:45:23,270 --> 00:45:20,960

necessarily i think it's just

1301  
00:45:24,790 --> 00:45:23,280  
a reaction to the community recognizing

1302  
00:45:26,870 --> 00:45:24,800  
that we have the capabilities and the

1303  
00:45:28,550 --> 00:45:26,880  
access to the capabilities

1304  
00:45:30,230 --> 00:45:28,560  
and there's always an interest in

1305  
00:45:32,470 --> 00:45:30,240  
climate control there's been for years

1306  
00:45:35,109 --> 00:45:32,480  
and so so i think it's it's not really a

1307  
00:45:36,470 --> 00:45:35,119  
reaction to to latest news but but more

1308  
00:45:39,430 --> 00:45:36,480  
reaction to the availability of the

1309  
00:45:40,470 --> 00:45:39,440  
facilities that's a good question

1310  
00:45:42,950 --> 00:45:40,480  
over here

1311  
00:45:45,190 --> 00:45:42,960  
did the astronauts get any exposure to

1312  
00:45:47,589 --> 00:45:45,200  
the sun through the windows and you know

1313  
00:45:49,030 --> 00:45:47,599

both types of uv rays come in through it

1314

00:45:50,630 --> 00:45:49,040

i don't think they get any kind of

1315

00:45:51,270 --> 00:45:50,640

exposure

1316

00:45:53,430 --> 00:45:51,280

of

1317

00:45:54,870 --> 00:45:53,440

not through not through the well hang on

1318

00:45:56,390 --> 00:45:54,880

there's some kind of radiation levels

1319

00:45:57,430 --> 00:45:56,400

inside the space station that's a really

1320

00:45:58,790 --> 00:45:57,440

good question

1321

00:46:00,870 --> 00:45:58,800

we have

1322

00:46:02,870 --> 00:46:00,880

lots of different types of detectors

1323

00:46:04,470 --> 00:46:02,880

inside the station that are different

1324

00:46:06,630 --> 00:46:04,480

types of technologies

1325

00:46:08,470 --> 00:46:06,640

we're testing out the best one of those

1326  
00:46:10,630 --> 00:46:08,480  
that could be potentially used on future

1327  
00:46:12,150 --> 00:46:10,640  
long duration missions the vehicle it's

1328  
00:46:13,990 --> 00:46:12,160  
it but even that's a challenge because

1329  
00:46:15,589 --> 00:46:14,000  
the vehicle is so well designed to

1330  
00:46:19,109 --> 00:46:15,599  
protect the crew against the radiation

1331  
00:46:21,109 --> 00:46:19,119  
that um you know it's and it varies by

1332  
00:46:23,990 --> 00:46:21,119  
uh module and by location inside the

1333  
00:46:25,990 --> 00:46:24,000  
vehicle so uh so we we strategically

1334  
00:46:27,589 --> 00:46:26,000  
place those detectors in places where uh

1335  
00:46:28,950 --> 00:46:27,599  
that are pertinent to the measurements

1336  
00:46:30,550 --> 00:46:28,960  
that we want to take but there's all

1337  
00:46:32,390 --> 00:46:30,560  
kinds of different uh measurements

1338  
00:46:33,990 --> 00:46:32,400

inside yeah

1339

00:46:36,150 --> 00:46:34,000

yeah there's ub

1340

00:46:38,150 --> 00:46:36,160

protection on the windows on the u.s

1341

00:46:39,750 --> 00:46:38,160

segment there's a couple of windows on

1342

00:46:41,190 --> 00:46:39,760

the russian segment don't have that and

1343

00:46:43,109 --> 00:46:41,200

so

1344

00:46:44,790 --> 00:46:43,119

we uh well first we don't encourage

1345

00:46:46,950 --> 00:46:44,800

crews to use them very often and when

1346

00:46:48,390 --> 00:46:46,960

they do use them and they uh they wear

1347

00:46:50,470 --> 00:46:48,400

sunglasses

1348

00:46:52,069 --> 00:46:50,480

and and actually actually they can use

1349

00:46:53,750 --> 00:46:52,079

sunscreen too they don't use the windows

1350

00:46:57,190 --> 00:46:53,760

very often now that we have the cupola

1351  
00:46:58,230 --> 00:46:57,200  
but in the past they had

1352  
00:47:04,390 --> 00:46:58,240  
mark

1353  
00:47:06,470 --> 00:47:04,400  
and i think for uh tara rutley

1354  
00:47:09,430 --> 00:47:06,480  
you talked a little bit about the the

1355  
00:47:12,309 --> 00:47:09,440  
research uh profile from a quantitative

1356  
00:47:14,630 --> 00:47:12,319  
sense and the 35 hours was kind of the

1357  
00:47:17,270 --> 00:47:14,640  
mark could you could you dial back maybe

1358  
00:47:19,510 --> 00:47:17,280  
a couple of months i think the last crew

1359  
00:47:21,750 --> 00:47:19,520  
flipped over that kind of what some of

1360  
00:47:23,670 --> 00:47:21,760  
the high points are and what you're what

1361  
00:47:26,390 --> 00:47:23,680  
you're striving for now

1362  
00:47:29,030 --> 00:47:26,400  
yeah i think we've we've seen an average

1363  
00:47:31,030 --> 00:47:29,040

of way over 35 hours a week for the last

1364

00:47:33,109 --> 00:47:31,040

several couple of months right was that

1365

00:47:34,150 --> 00:47:33,119

uh four or five months now i've lost

1366

00:47:36,470 --> 00:47:34,160

track but

1367

00:47:39,109 --> 00:47:36,480

um and uh and they've just been keeping

1368

00:47:41,990 --> 00:47:39,119

busy giving us given us science uh

1369

00:47:44,390 --> 00:47:42,000

getting the data back um even when we we

1370

00:47:46,390 --> 00:47:44,400

encounter you know on-orbit tricks

1371

00:47:48,309 --> 00:47:46,400

it's not been an impact to the science

1372

00:47:49,589 --> 00:47:48,319

and our office has always asked first

1373

00:47:52,790 --> 00:47:49,599

what's the impact of science is very

1374

00:47:55,750 --> 00:47:52,800

first and foremost and so uh it's it's

1375

00:47:57,910 --> 00:47:55,760

been a pleasure to to implement the

1376

00:47:58,870 --> 00:47:57,920

the research portfolio just

1377

00:48:00,550 --> 00:47:58,880

um

1378

00:48:03,109 --> 00:48:00,560

the high points are getting the data

1379

00:48:04,790 --> 00:48:03,119

back getting results that uh in in the

1380

00:48:07,589 --> 00:48:04,800

form of technical publications and

1381

00:48:10,069 --> 00:48:07,599

really high impact journals that we can

1382

00:48:11,430 --> 00:48:10,079

turn around and share with the community

1383

00:48:12,470 --> 00:48:11,440

such as some of the results that have

1384

00:48:15,109 --> 00:48:12,480

come from the alpha magnetic

1385

00:48:16,630 --> 00:48:15,119

spectrometer recently and professor ting

1386

00:48:19,109 --> 00:48:16,640

some of the bone

1387

00:48:20,870 --> 00:48:19,119

mitigation loss results some plant

1388

00:48:23,270 --> 00:48:20,880

papers that have recently come out

1389

00:48:25,430 --> 00:48:23,280

showing how plants respond not only to

1390

00:48:27,349 --> 00:48:25,440

the gravity stimulus but also

1391

00:48:29,270 --> 00:48:27,359

it's critical for light

1392

00:48:30,390 --> 00:48:29,280

light as well which we we suspected but

1393

00:48:33,030 --> 00:48:30,400

it's interesting when you look at it

1394

00:48:35,670 --> 00:48:33,040

from a root perspective

1395

00:48:37,349 --> 00:48:35,680

roots uh waving and skewing so uh

1396

00:48:38,950 --> 00:48:37,359

there's been al you know the the best

1397

00:48:40,390 --> 00:48:38,960

part of the research is when you get the

1398

00:48:41,750 --> 00:48:40,400

results you get to communicate to the

1399

00:48:43,670 --> 00:48:41,760

community and and you know what is

1400

00:48:46,069 --> 00:48:43,680

science takes time and that's just the

1401

00:48:47,990 --> 00:48:46,079

way it is so it's not always one big

1402

00:48:50,390 --> 00:48:48,000

bang highlight after the next but over

1403

00:48:51,910 --> 00:48:50,400

the last few months um it's been really

1404

00:48:54,309 --> 00:48:51,920

great to see that the science has been

1405

00:48:55,990 --> 00:48:54,319

protected and the crew is able to to

1406

00:48:57,750 --> 00:48:56,000

perform the on-orbit uh work they need

1407

00:48:59,030 --> 00:48:57,760

to do and still get the get the research

1408

00:49:01,190 --> 00:48:59,040

done

1409

00:49:03,109 --> 00:49:01,200

cli

1410

00:49:04,710 --> 00:49:03,119

six weeks ago i think it was six weeks

1411

00:49:06,390 --> 00:49:04,720

ago roughly speaking a few weeks ago

1412

00:49:09,510 --> 00:49:06,400

we'd have to get you exact time

1413

00:49:11,190 --> 00:49:09,520

week we had 72 hours in one week so that

1414

00:49:12,950 --> 00:49:11,200

was uh that was the

1415

00:49:14,950 --> 00:49:12,960

highest number of hours for research in

1416

00:49:17,109 --> 00:49:14,960

any week since space station started

1417

00:49:19,190 --> 00:49:17,119

flying so that was a big deal the week

1418

00:49:21,670 --> 00:49:19,200

we did the eba two weeks ago we did the

1419

00:49:23,950 --> 00:49:21,680

eba which is always a big impact to crew

1420

00:49:28,309 --> 00:49:23,960

time we actually did

1421

00:49:30,470 --> 00:49:28,319

42 43 hours of research so it's

1422

00:49:32,390 --> 00:49:30,480

it's been amazing now that eva was

1423

00:49:34,870 --> 00:49:32,400

unique we had basically planned for this

1424

00:49:37,109 --> 00:49:34,880

eba as one or two options back in the

1425

00:49:39,190 --> 00:49:37,119

christmas time we just finished getting

1426

00:49:41,349 --> 00:49:39,200

the suit uh checked out so we didn't

1427

00:49:42,870 --> 00:49:41,359

have to do a lot of extra suit work

1428

00:49:44,790 --> 00:49:42,880

the two crew members that went outside

1429

00:49:47,990 --> 00:49:44,800

had actually been outside they changed

1430

00:49:49,750 --> 00:49:48,000

the batteries out on this trust together

1431

00:49:51,510 --> 00:49:49,760

a few years back so there were a lot of

1432

00:49:54,309 --> 00:49:51,520

reasons why this eba was able to be done

1433

00:49:56,069 --> 00:49:54,319

relatively quickly and had a

1434

00:49:59,589 --> 00:49:56,079

less of an impact on research but still

1435

00:50:01,670 --> 00:49:59,599

to do an eva any eba and get 40 hours of

1436

00:50:04,309 --> 00:50:01,680

40 plus hours of research is an amazing

1437

00:50:05,750 --> 00:50:04,319

feat so it's a it's the testimony to the

1438

00:50:08,390 --> 00:50:05,760

efficiencies that we're starting to gain

1439

00:50:10,870 --> 00:50:08,400

but also the time the crew is putting in

1440

00:50:12,549 --> 00:50:10,880

to get things done and

1441

00:50:14,790 --> 00:50:12,559

and in fact i have to continually

1442

00:50:16,390 --> 00:50:14,800

caution them not to work themselves to

1443

00:50:18,150 --> 00:50:16,400

death you know this is a marathon on

1444

00:50:19,670 --> 00:50:18,160

station not not a sprint like we used to

1445

00:50:21,270 --> 00:50:19,680

do in shuttle so

1446

00:50:22,150 --> 00:50:21,280

we constantly remind them make sure that

1447

00:50:27,030 --> 00:50:22,160

you're

1448

00:50:28,390 --> 00:50:27,040

ready to go every day as opposed to you

1449

00:50:29,670 --> 00:50:28,400

know really kill it for a couple weeks

1450

00:50:34,230 --> 00:50:29,680

and then then have a hard time

1451  
00:50:41,270 --> 00:50:37,670  
but um during your increment

1452  
00:50:42,470 --> 00:50:41,280  
who's trained for the big 12 repairs is

1453  
00:50:44,870 --> 00:50:42,480  
it all

1454  
00:50:47,510 --> 00:50:44,880  
all three chris plus uh

1455  
00:50:49,510 --> 00:50:47,520  
luca parmitano and karen nyberg or just

1456  
00:50:52,390 --> 00:50:49,520  
two on the u.s segment

1457  
00:50:54,630 --> 00:50:52,400  
yeah so chris karen and luca are all

1458  
00:50:56,150 --> 00:50:54,640  
fully qualified for spacewalks so that

1459  
00:50:57,430 --> 00:50:56,160  
all three of them are capable that's

1460  
00:50:58,630 --> 00:50:57,440  
correct

1461  
00:50:59,750 --> 00:50:58,640  
yep

1462  
00:51:01,510 --> 00:50:59,760  
okay we've got time for one more go

1463  
00:51:03,430 --> 00:51:01,520

ahead robert um

1464

00:51:05,589 --> 00:51:03,440

all right earlier this week they

1465

00:51:07,109 --> 00:51:05,599

announced that that the earth cam was

1466

00:51:09,670 --> 00:51:07,119

good our iss earthquake was going to be

1467

00:51:12,470 --> 00:51:09,680

renamed sally rider cam

1468

00:51:14,069 --> 00:51:12,480

is that your one continuous science

1469

00:51:16,150 --> 00:51:14,079

student outreach science experiment or

1470

00:51:18,150 --> 00:51:16,160

do you have others that are running

1471

00:51:20,150 --> 00:51:18,160

continuously on the space station

1472

00:51:22,309 --> 00:51:20,160

through expeditions

1473

00:51:23,349 --> 00:51:22,319

and does student experiments count into

1474

00:51:25,349 --> 00:51:23,359

the

1475

00:51:27,349 --> 00:51:25,359

science total when you when you count up

1476

00:51:29,829 --> 00:51:27,359

hours

1477

00:51:32,230 --> 00:51:29,839

oh gosh yeah um there are a couple of

1478

00:51:34,470 --> 00:51:32,240

education payloads that are ongoing that

1479

00:51:37,430 --> 00:51:34,480

have been ongoing for years overstation

1480

00:51:39,030 --> 00:51:37,440

one of them is the iss ham radio

1481

00:51:40,790 --> 00:51:39,040

where the crew can connect with students

1482

00:51:43,270 --> 00:51:40,800

across the globe

1483

00:51:45,430 --> 00:51:43,280

formally to call down using ham radio

1484

00:51:47,270 --> 00:51:45,440

and the students get to

1485

00:51:49,109 --> 00:51:47,280

ask the crew questions which is a really

1486

00:51:51,589 --> 00:51:49,119

important part of it you know there's

1487

00:51:53,430 --> 00:51:51,599

always some kind of ongoing competitions

1488

00:51:56,230 --> 00:51:53,440

for students especially through the the

1489

00:51:58,390 --> 00:51:56,240

nanoracks experience and the uh

1490

00:52:00,549 --> 00:51:58,400

and the uh the studies for uh the

1491

00:52:02,630 --> 00:52:00,559

student experiments for design for space

1492

00:52:04,710 --> 00:52:02,640

flight um

1493

00:52:06,069 --> 00:52:04,720

it's it's an ongoing process i can only

1494

00:52:07,510 --> 00:52:06,079

think of those two at the top of my head

1495

00:52:09,430 --> 00:52:07,520

but there's there's quite a handful that

1496

00:52:11,349 --> 00:52:09,440

have been uh continuous

1497

00:52:12,950 --> 00:52:11,359

one in one program we don't talk about

1498

00:52:14,870 --> 00:52:12,960

and we really should do a better job we

1499

00:52:16,069 --> 00:52:14,880

have a growing program we refer to as

1500

00:52:19,750 --> 00:52:16,079

hunch and i can't tell you what the

1501  
00:52:20,950 --> 00:52:19,760  
acronym stands for today but it involves

1502  
00:52:22,390 --> 00:52:20,960  
primarily

1503  
00:52:24,390 --> 00:52:22,400  
high school

1504  
00:52:25,829 --> 00:52:24,400  
i'll say juniors and seniors i don't

1505  
00:52:27,750 --> 00:52:25,839  
think it's limited

1506  
00:52:29,589 --> 00:52:27,760  
necessarily just junior seizure but high

1507  
00:52:31,589 --> 00:52:29,599  
schools and some

1508  
00:52:32,630 --> 00:52:31,599  
colleges and junior colleges where we

1509  
00:52:34,549 --> 00:52:32,640  
actually

1510  
00:52:36,870 --> 00:52:34,559  
work with the students to build hardware

1511  
00:52:38,549 --> 00:52:36,880  
for us and generally speaking

1512  
00:52:40,630 --> 00:52:38,559  
largely they spend they build the

1513  
00:52:44,150 --> 00:52:40,640

training hardware for us but there have

1514

00:52:45,750 --> 00:52:44,160

been simple even flight items they have

1515

00:52:47,670 --> 00:52:45,760

built for us and this has been growing

1516

00:52:49,510 --> 00:52:47,680

for years now and i don't remember the

1517

00:52:51,829 --> 00:52:49,520

number off top my head i've signed a

1518

00:52:53,910 --> 00:52:51,839

number of agreements in in

1519

00:52:55,910 --> 00:52:53,920

in recent months but

1520

00:52:58,230 --> 00:52:55,920

it's grown it started off as

1521

00:53:00,470 --> 00:52:58,240

one or two of three schools and and

1522

00:53:02,630 --> 00:53:00,480

mostly in the houston area to i don't

1523

00:53:05,430 --> 00:53:02,640

know the exact figures but i bet we have

1524

00:53:06,470 --> 00:53:05,440

25 30 schools involved now across the

1525

00:53:08,470 --> 00:53:06,480

country

1526  
00:53:09,910 --> 00:53:08,480  
um and it's an amazing program because

1527  
00:53:12,630 --> 00:53:09,920  
it introduces

1528  
00:53:15,270 --> 00:53:12,640  
uh kids to the to the practical

1529  
00:53:17,349 --> 00:53:15,280  
application of the of the science and

1530  
00:53:18,309 --> 00:53:17,359  
engineering and math the kind of things

1531  
00:53:20,069 --> 00:53:18,319  
that we're

1532  
00:53:23,670 --> 00:53:20,079  
trying to encourage in kids today it's

1533  
00:53:24,950 --> 00:53:23,680  
been it's been a a great program from

1534  
00:53:26,950 --> 00:53:24,960  
the standpoint of getting interest

1535  
00:53:28,470 --> 00:53:26,960  
because you know anything like me it's

1536  
00:53:30,470 --> 00:53:28,480  
great to go do the math and stuff but

1537  
00:53:32,390 --> 00:53:30,480  
it's where you get to get your hands on

1538  
00:53:33,829 --> 00:53:32,400

hardware build hardware

1539

00:53:35,030 --> 00:53:33,839

see the fruits of your labor that you

1540

00:53:37,349 --> 00:53:35,040

really get

1541

00:53:40,630 --> 00:53:37,359

energized and you really learn about the

1542

00:53:42,710 --> 00:53:40,640

practicality of the of the analysis that

1543

00:53:44,710 --> 00:53:42,720

you've been learning or the the the

1544

00:53:47,109 --> 00:53:44,720

techniques that you've been learning so

1545

00:53:49,990 --> 00:53:47,119

that's uh that's been a growing uh

1546

00:53:51,430 --> 00:53:50,000

program uh for us and it's we don't talk

1547

00:53:53,910 --> 00:53:51,440

much about it because it's

1548

00:53:55,910 --> 00:53:53,920

not too much of the hardware goes

1549

00:53:57,990 --> 00:53:55,920

to flight and if it does it's not it's

1550

00:53:59,990 --> 00:53:58,000

not giant i mean they built bags and

1551  
00:54:00,870 --> 00:54:00,000  
some onesie two's the other items on

1552  
00:54:01,670 --> 00:54:00,880  
orbit

1553  
00:54:03,430 --> 00:54:01,680  
um

1554  
00:54:05,829 --> 00:54:03,440  
but it's it's a really big deal to the

1555  
00:54:07,990 --> 00:54:05,839  
kids and i think it's helping

1556  
00:54:11,109 --> 00:54:08,000  
uh grow the the

1557  
00:54:12,630 --> 00:54:11,119  
or instill the the interest level in the

1558  
00:54:14,630 --> 00:54:12,640  
students when they get to do something

1559  
00:54:16,390 --> 00:54:14,640  
practical with the with what they're

1560  
00:54:18,230 --> 00:54:16,400  
learning

1561  
00:54:19,829 --> 00:54:18,240  
if there's a minute um you know space

1562  
00:54:23,270 --> 00:54:19,839  
station research has actually touched

1563  
00:54:25,750 --> 00:54:23,280

about 42 million students worldwide i

1564

00:54:28,790 --> 00:54:25,760

mean and of the us that would be about

1565

00:54:31,510 --> 00:54:28,800

30 million in the us so um that's just

1566

00:54:32,870 --> 00:54:31,520

since 2000 so whether it's k-12 or

1567

00:54:34,069 --> 00:54:32,880

undergraduates or graduate students

1568

00:54:35,510 --> 00:54:34,079

crunching numbers

1569

00:54:37,589 --> 00:54:35,520

there's some kind of participation in

1570

00:54:39,030 --> 00:54:37,599

just about every investigation that's

1571

00:54:40,790 --> 00:54:39,040

happening on station for student

1572

00:54:42,150 --> 00:54:40,800

involvement

1573

00:54:43,349 --> 00:54:42,160

okay with that we're going to wrap it up

1574

00:54:45,510 --> 00:54:43,359

let's take a look at our coverage that

1575

00:54:46,790 --> 00:54:45,520

is planned for tuesday as luca karan and

1576

00:54:48,790 --> 00:54:46,800

fiora get ready to launch to the

1577

00:54:50,309 --> 00:54:48,800

international space station our live

1578

00:54:51,990 --> 00:54:50,319

coverage here on nasa television begins

1579

00:54:54,309 --> 00:54:52,000

at 2 30 p.m

1580

00:54:55,829 --> 00:54:54,319

uh central time launch will take place a

1581

00:54:58,150 --> 00:54:55,839

little more than an hour after that at 3

1582

00:55:00,870 --> 00:54:58,160

31 pm central time that is going to be

1583

00:55:02,790 --> 00:55:00,880

bright and early at about 2 31 a.m there

1584

00:55:04,309 --> 00:55:02,800

locally in kazakhstan

1585

00:55:06,710 --> 00:55:04,319

uh be a long day for those folks down

1586

00:55:08,150 --> 00:55:06,720

there docking coverage begins at 8 30 pm

1587

00:55:10,710 --> 00:55:08,160

uh central time with docking taking

1588

00:55:12,309 --> 00:55:10,720

place at 9 16 p.m and then we'll have a

1589

00:55:14,309 --> 00:55:12,319

separate broadcast as the hatches are

1590

00:55:16,710 --> 00:55:14,319

opened at around 10 30 p.m central time

1591

00:55:18,150 --> 00:55:16,720

the actual hatch opening at 10 55. for

1592

00:55:19,910 --> 00:55:18,160

all the latest just log on to the nasa

1593

00:55:21,589 --> 00:55:19,920

website at [nasa.gov](http://nasa.gov)