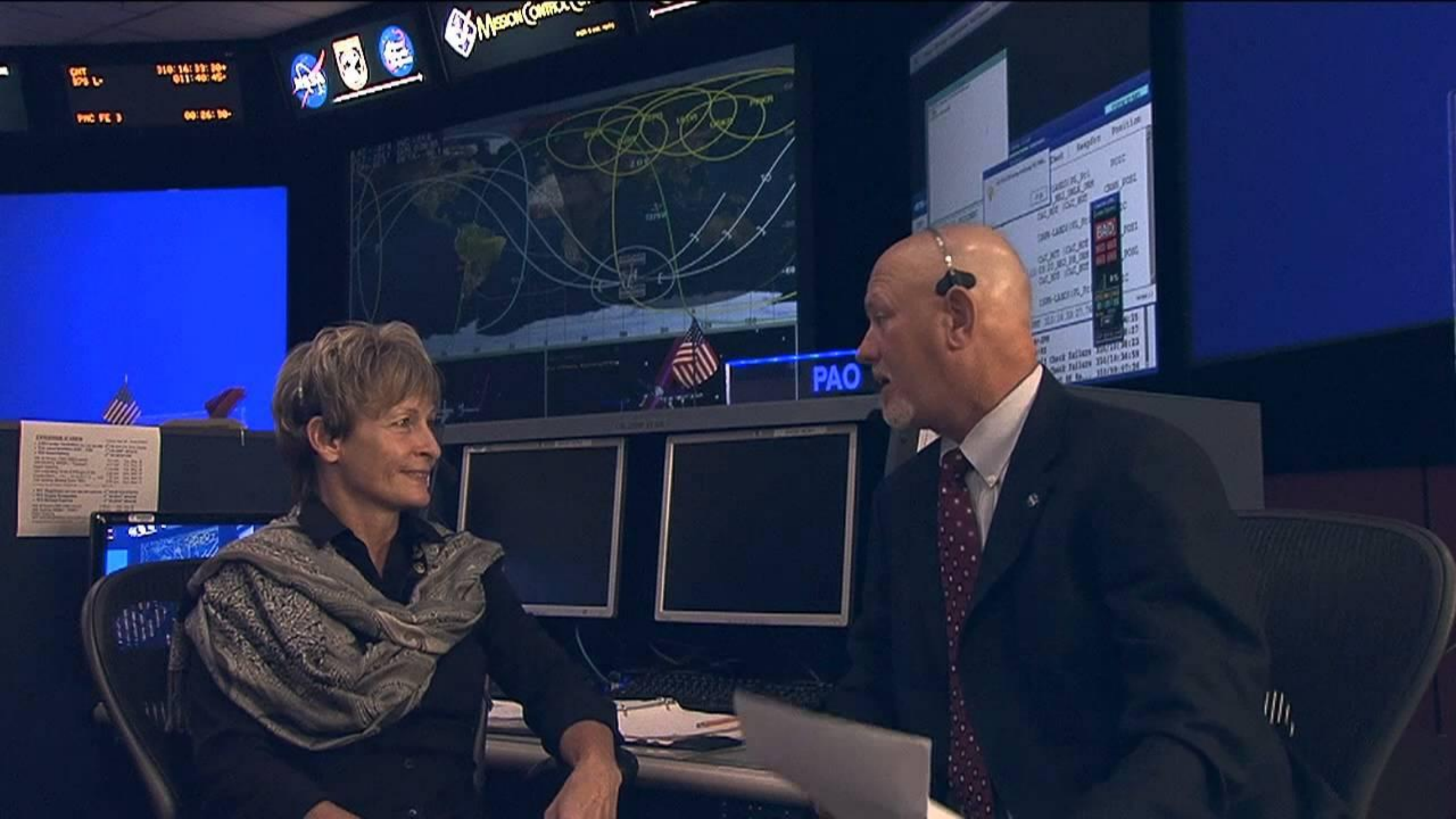
PAO

1
00:00:05,590 --> 00:00:03,510
and we have a special guest with us here

2
00:00:08,150 --> 00:00:05,600
in mission control houston today uh

3
00:00:11,110 --> 00:00:08,160
two-time long duration space flier peggy

4
00:00:14,230 --> 00:00:11,120
whitson uh as mentioned an accomplished

5
00:00:16,630 --> 00:00:14,240
biochemist in her own right with a

6
00:00:18,070 --> 00:00:16,640
degree from rice university in

7
00:00:19,590 --> 00:00:18,080
biochemistry

8
00:00:21,510 --> 00:00:19,600
peggy welcome

9
00:00:23,269 --> 00:00:21,520
it's great to be here today we're glad

10
00:00:24,630 --> 00:00:23,279
to have you on space station live and

11
00:00:26,550 --> 00:00:24,640
and the reason we're talking with you

12
00:00:28,070 --> 00:00:26,560
today is we're talking about micro

13
00:00:30,790 --> 00:00:28,080

encapsulation

14
00:00:31,990 --> 00:00:30,800
uh and i'm gonna let you explain it but

15
00:00:35,270 --> 00:00:32,000
the reason we're talking about micro

16
00:00:37,590 --> 00:00:35,280
encapsulation is because uh we did a

17
00:00:38,950 --> 00:00:37,600
countdown of the ten top research uh

18
00:00:40,310 --> 00:00:38,960
results and experiments on the

19
00:00:42,950 --> 00:00:40,320
international space stations we're

20
00:00:45,270 --> 00:00:42,960
getting ready to recognize the 15-year

21
00:00:46,869 --> 00:00:45,280
anniversary of the first element launch

22
00:00:49,670 --> 00:00:46,879
you were one of the early space station

23
00:00:51,110 --> 00:00:49,680
crew members on expedition 5

24
00:00:53,430 --> 00:00:51,120
and you worked with the micro

25
00:00:55,270 --> 00:00:53,440
encapsulation experiment on orbit tell

26
00:00:57,430 --> 00:00:55,280
us a little bit about it well actually

27
00:00:58,790 --> 00:00:57,440
the micro encapsulation experiment on

28
00:01:00,310 --> 00:00:58,800
orbit

29
00:01:02,630 --> 00:01:00,320
was actually from a crew member

30
00:01:04,869 --> 00:01:02,640
perspective relatively simple we just

31
00:01:07,030 --> 00:01:04,879
put in these canisters and activated

32
00:01:10,950 --> 00:01:07,040
them and what we were doing is building

33
00:01:13,030 --> 00:01:10,960
these little basically the bubbles

34
00:01:15,270 --> 00:01:13,040
that can be used in

35
00:01:17,350 --> 00:01:15,280
uh technology as either

36
00:01:20,149 --> 00:01:17,360
delivering drugs and and various

37
00:01:21,749 --> 00:01:20,159
different techniques for uh application

38
00:01:23,429 --> 00:01:21,759

here on the earth but we were just

39
00:01:27,429 --> 00:01:23,439
trying to build the bubbles and

40
00:01:29,670 --> 00:01:27,439
understand what what makes them uh

41
00:01:31,510 --> 00:01:29,680
how to make them the best way and most

42
00:01:34,789 --> 00:01:31,520
effectively and so we were using the

43
00:01:37,190 --> 00:01:34,799
lack of gravity as our tool to see

44
00:01:38,230 --> 00:01:37,200
what other variables can influence how

45
00:01:40,149 --> 00:01:38,240
these

46
00:01:42,630 --> 00:01:40,159
little capsules can be made here on

47
00:01:44,789 --> 00:01:42,640
earth which is great for us because you

48
00:01:47,350 --> 00:01:44,799
know up on orbit we can we can test

49
00:01:49,590 --> 00:01:47,360
these things out and find out all the

50
00:01:52,149 --> 00:01:49,600
nuances of the different things that

51
00:01:54,310 --> 00:01:52,159
influence making these capsules

52
00:01:55,910 --> 00:01:54,320
and what's really i know it's been since

53
00:01:57,510 --> 00:01:55,920
expedition five and that seems like a

54
00:01:59,990 --> 00:01:57,520
long time ago but that's actually kind

55
00:02:02,469 --> 00:02:00,000
of how research runs especially research

56
00:02:05,670 --> 00:02:02,479
that involves human beings uh you know

57
00:02:07,749 --> 00:02:05,680
it's taken this many years to get uh

58
00:02:09,990 --> 00:02:07,759
these capsules to the point where we're

59
00:02:12,070 --> 00:02:10,000
going to actually try and test them here

60
00:02:13,510 --> 00:02:12,080
on earth to carry

61
00:02:16,229 --> 00:02:13,520
in some cases they're going to carry

62
00:02:18,390 --> 00:02:16,239
markers that can be used then to

63
00:02:20,949 --> 00:02:18,400

by the doctors to visualize where the

64
00:02:23,750 --> 00:02:20,959
cancers might be located so the the

65
00:02:26,550 --> 00:02:23,760
capsules will go and know how to attack

66
00:02:27,830 --> 00:02:26,560
and and attach to a particular type of

67
00:02:30,550 --> 00:02:27,840
cancer

68
00:02:32,869 --> 00:02:30,560
and then the doctors can

69
00:02:34,229 --> 00:02:32,879
visualize that cancer better because the

70
00:02:36,550 --> 00:02:34,239
bubbles inside will have a little

71
00:02:38,309 --> 00:02:36,560
fluorescent or marker beads that can

72
00:02:40,949 --> 00:02:38,319
actually be visualized and the doctors

73
00:02:43,110 --> 00:02:40,959
can attack it directly by using

74
00:02:45,670 --> 00:02:43,120
ultrasound to visualize it and inject

75
00:02:47,110 --> 00:02:45,680
things it's also a plan for future uses

76
00:02:49,910 --> 00:02:47,120
where you would actually

77
00:02:52,150 --> 00:02:49,920
put drugs inside those little bubbles

78
00:02:54,790 --> 00:02:52,160
and they would then attack the cancers

79
00:02:56,229 --> 00:02:54,800
directly so it's really exciting that we

80
00:02:58,309 --> 00:02:56,239
we're getting to that phase where we're

81
00:03:00,710 --> 00:02:58,319
taking something that we we tested out

82
00:03:02,229 --> 00:03:00,720
on orbit found out how to optimize

83
00:03:04,550 --> 00:03:02,239
making these little capsules on the

84
00:03:07,509 --> 00:03:04,560
ground by taking out gravity as a

85
00:03:09,670 --> 00:03:07,519
variable and now we can we can test

86
00:03:11,670 --> 00:03:09,680
something in human beings that hopefully

87
00:03:14,630 --> 00:03:11,680
will have a future for us

88
00:03:16,710 --> 00:03:14,640

in helping to cure cancers or not so

89
00:03:19,110 --> 00:03:16,720
much cure cancers but to help us fight

90
00:03:20,790 --> 00:03:19,120
more effectively cancers as they as they

91
00:03:22,470 --> 00:03:20,800
grow in our bodies well and that could

92
00:03:24,630 --> 00:03:22,480
also as i understand the way they're

93
00:03:27,350 --> 00:03:24,640
hoping to use this in drug delivery help

94
00:03:29,190 --> 00:03:27,360
make cancer treatments a lot less hard

95
00:03:31,670 --> 00:03:29,200
to deal with for the patient right now

96
00:03:33,990 --> 00:03:31,680
you pretty much pollute the entire body

97
00:03:36,149 --> 00:03:34,000
with the anti-cancer chemicals this

98
00:03:38,229 --> 00:03:36,159
allows you to pollute just the area that

99
00:03:40,390 --> 00:03:38,239
you really want to target yes that's a

100
00:03:43,270 --> 00:03:40,400
very good point so it'll be very much a

101
00:03:47,030 --> 00:03:43,280
targeted drug delivery mechanism so it's

102
00:03:49,990 --> 00:03:47,040
very exciting but human research uh does

103
00:03:52,390 --> 00:03:50,000
take years especially from the concept

104
00:03:55,509 --> 00:03:52,400
the idea and then to get it to where

105
00:03:57,830 --> 00:03:55,519
we're actually testing it uh in in human

106
00:03:59,990 --> 00:03:57,840
beings it does take years and that's

107
00:04:01,670 --> 00:04:00,000
that's standard here on the ground when

108
00:04:03,589 --> 00:04:01,680
we're doing research it takes that long

109
00:04:05,830 --> 00:04:03,599
but it's very exciting that something

110
00:04:08,550 --> 00:04:05,840
that began on the international space

111
00:04:09,350 --> 00:04:08,560
station has come this far

112
00:04:10,789 --> 00:04:09,360
well

113
00:04:12,630 --> 00:04:10,799

so tell us

114
00:04:15,589 --> 00:04:12,640
as a biochemist are there any other

115
00:04:16,390 --> 00:04:15,599
experiments that are particularly

116
00:04:18,870 --> 00:04:16,400
uh

117
00:04:20,229 --> 00:04:18,880
interesting in your view

118
00:04:21,749 --> 00:04:20,239
that have come out of space station

119
00:04:23,430 --> 00:04:21,759
research

120
00:04:25,749 --> 00:04:23,440
oh well

121
00:04:28,390 --> 00:04:25,759
i i have lots of favorites that i've

122
00:04:29,670 --> 00:04:28,400
i've worked on over the years

123
00:04:31,430 --> 00:04:29,680
doing different

124
00:04:33,030 --> 00:04:31,440
research but the ones that are most

125
00:04:34,629 --> 00:04:33,040
appealing to me

126
00:04:36,469 --> 00:04:34,639
are the ones where the crew member gets

127
00:04:38,950 --> 00:04:36,479
to interact the most you know we do a

128
00:04:41,270 --> 00:04:38,960
lot of crystallization but mostly that's

129
00:04:44,870 --> 00:04:41,280
activating and starting an experiment

130
00:04:46,629 --> 00:04:44,880
and zero gravity is the variable that

131
00:04:49,110 --> 00:04:46,639
causes these things to happen

132
00:04:50,710 --> 00:04:49,120
independent of the crew member so from a

133
00:04:52,310 --> 00:04:50,720
crew member perspective the ones that

134
00:04:54,230 --> 00:04:52,320
are most interesting are the ones where

135
00:04:56,310 --> 00:04:54,240
we get to actually be involved and be a

136
00:04:57,510 --> 00:04:56,320
part of the experiment

137
00:04:59,830 --> 00:04:57,520
one of the

138
00:05:01,110 --> 00:04:59,840

more interesting ones for me again that

139
00:05:03,270 --> 00:05:01,120
illustrates

140
00:05:05,670 --> 00:05:03,280
why we do research in an environment

141
00:05:08,830 --> 00:05:05,680
like the space station was an in-space

142
00:05:11,830 --> 00:05:08,840
experiment where we were looking at this

143
00:05:15,189 --> 00:05:11,840
um colloidal suspension of iron

144
00:05:17,749 --> 00:05:15,199
particles in a magnetic field

145
00:05:18,790 --> 00:05:17,759
and one day i turned the magnetic field

146
00:05:21,189 --> 00:05:18,800
or the

147
00:05:22,710 --> 00:05:21,199
magnetic electromagnetic field and set

148
00:05:24,150 --> 00:05:22,720
it at the wrong setting because my eyes

149
00:05:25,510 --> 00:05:24,160
were getting a little old and i missed

150
00:05:28,070 --> 00:05:25,520
the decimal point

151
00:05:30,550 --> 00:05:28,080
instead of 20 hertz it was two

152
00:05:33,670 --> 00:05:30,560
just two decimal zero

153
00:05:35,670 --> 00:05:33,680
and we saw a very different response to

154
00:05:37,110 --> 00:05:35,680
what they'd seen on the ground

155
00:05:38,950 --> 00:05:37,120
and so once we finished up the

156
00:05:41,189 --> 00:05:38,960
experiments at 20 hertz we went back and

157
00:05:42,790 --> 00:05:41,199
repeated them at 2 hertz

158
00:05:45,110 --> 00:05:42,800
so the investigators would have this

159
00:05:47,590 --> 00:05:45,120
whole new data set that we just by

160
00:05:49,590 --> 00:05:47,600
accident found on orbit and a lot of

161
00:05:51,670 --> 00:05:49,600
times research in the laboratory here on

162
00:05:54,469 --> 00:05:51,680
the ground the most interesting research

163
00:05:56,150 --> 00:05:54,479

is i wonder why that happened

164
00:05:58,150 --> 00:05:56,160
and you go and try and figure out why

165
00:05:59,830 --> 00:05:58,160
did that happen well serendipity was

166
00:06:01,590 --> 00:05:59,840
always my best friend when i was doing

167
00:06:03,590 --> 00:06:01,600
any kind of a research for

168
00:06:05,189 --> 00:06:03,600
my college degree yeah and you know mike

169
00:06:07,350 --> 00:06:05,199
hopkins was working with the in space

170
00:06:09,350 --> 00:06:07,360
experiment yesterday uh he had us some

171
00:06:11,270 --> 00:06:09,360
extra time and he was able to pull that

172
00:06:12,710 --> 00:06:11,280
together and and do some work in the

173
00:06:14,070 --> 00:06:12,720
microgravity glove lock so it's

174
00:06:15,590 --> 00:06:14,080
obviously still a favorite up there

175
00:06:17,189 --> 00:06:15,600
because you can see things happening

176
00:06:19,029 --> 00:06:17,199
right yeah and it's a lot of fun because

177
00:06:20,710 --> 00:06:19,039
the crew members are very involved and

178
00:06:21,830 --> 00:06:20,720
they have to set up things and you get

179
00:06:23,830 --> 00:06:21,840
to watch

180
00:06:25,430 --> 00:06:23,840
what's happening at the time and so from

181
00:06:28,230 --> 00:06:25,440
a crew member perspective those are the

182
00:06:30,550 --> 00:06:28,240
fun ones to do i liked enjoyed doing the

183
00:06:32,950 --> 00:06:30,560
ultrasound we were using developing

184
00:06:36,950 --> 00:06:32,960
ultrasound technology

185
00:06:39,909 --> 00:06:36,960
and distance telemedicine techniques to

186
00:06:41,990 --> 00:06:39,919
utilize this technology for remote

187
00:06:43,830 --> 00:06:42,000
medicine onboard the space station but

188
00:06:45,990 --> 00:06:43,840

obviously that that could apply here on

189
00:06:48,950 --> 00:06:46,000
earth in remote rural locations where

190
00:06:51,029 --> 00:06:48,960
you might not have an expert

191
00:06:53,189 --> 00:06:51,039
ultrasound technologist but you could do

192
00:06:55,189 --> 00:06:53,199
some remote guidance from somewhere else

193
00:06:56,950 --> 00:06:55,199
and have the experts look at the data

194
00:06:58,469 --> 00:06:56,960
and tell you you know what what might be

195
00:07:00,710 --> 00:06:58,479
the problem so

196
00:07:03,110 --> 00:07:00,720
all of this is great application for us

197
00:07:04,790 --> 00:07:03,120
going on beyond

198
00:07:06,070 --> 00:07:04,800
you know low earth orbit and doing

199
00:07:07,749 --> 00:07:06,080
exploration in the future but it's

200
00:07:09,990 --> 00:07:07,759
really neat that it actually does apply

201
00:07:11,510 --> 00:07:10,000
here on the ground as well

202
00:07:13,029 --> 00:07:11,520
definitely we're looking at the benefits

203
00:07:14,550 --> 00:07:13,039
for humanity from the international

204
00:07:15,909 --> 00:07:14,560
space station i want to thank you peggy

205
00:07:18,550 --> 00:07:15,919
whitson for coming to visit with us

206
00:07:20,629 --> 00:07:18,560
today we appreciate you great taking

207
00:07:22,309 --> 00:07:20,639
time out of your day

208
00:07:24,309 --> 00:07:22,319
and to share your expertise with

209
00:07:26,070 --> 00:07:24,319
research and your experience onboard the

210
00:07:27,990 --> 00:07:26,080
international space station no problem