1
00:00:04,470 --> 00:00:02,950
now earth day is uh coming up here a

2
00:00:06,070 --> 00:00:04,480
little later this month

3
00:00:08,150 --> 00:00:06,080
and uh over the course of the month

4
00:00:09,750 --> 00:00:08,160
we've been taking an effort to highlight

5
00:00:12,549 --> 00:00:09,760
some of the ways that the international

6
00:00:14,310 --> 00:00:12,559
space station science program is adding

7
00:00:16,550 --> 00:00:14,320
to the body of knowledge about our

8
00:00:18,790 --> 00:00:16,560
planet that includes a number of

9
00:00:21,029 --> 00:00:18,800
different cameras that are pointed down

10
00:00:23,509 --> 00:00:21,039
at the planet many of them gathering

11
00:00:25,750 --> 00:00:23,519
very specific kinds of data

12
00:00:28,790 --> 00:00:25,760
one of them is an experimental camera

13
00:00:31,109 --> 00:00:28,800

system known as iserv and it recently

14
00:00:32,790 --> 00:00:31,119
finished its first year of operation

15
00:00:35,190 --> 00:00:32,800
payload developer and principal

16
00:00:36,870 --> 00:00:35,200
investigator is burgess howell at nasa's

17
00:00:38,630 --> 00:00:36,880
marshall space flight center and he

18
00:00:39,670 --> 00:00:38,640
joins us this morning from huntsville

19
00:00:41,190 --> 00:00:39,680
alabama

20
00:00:42,869 --> 00:00:41,200
burgess you described this as an

21
00:00:46,709 --> 00:00:42,879
experimental system

22
00:00:51,350 --> 00:00:48,549
well pat the um

23
00:00:54,229 --> 00:00:51,360
as an earth observing scientist we see

24
00:00:56,630 --> 00:00:54,239
iss as an interesting uh

25
00:00:58,869 --> 00:00:56,640
interesting platform for various methods

26
00:01:00,950 --> 00:00:58,879
of earth observation uh covering various

27
00:01:02,869 --> 00:01:00,960
portions of the electromagnetic spectrum

28
00:01:05,109 --> 00:01:02,879
we're interested in for instance visible

29
00:01:08,550 --> 00:01:05,119
and near infrared mid and far infrared

30
00:01:10,310 --> 00:01:08,560
and even microwave radiation

31
00:01:11,990 --> 00:01:10,320
as opposed to what

32
00:01:13,830 --> 00:01:12,000
most people may be familiar with in

33
00:01:16,789 --> 00:01:13,840
terms of nasa's efforts with earth

34
00:01:18,070 --> 00:01:16,799
observation the the the most commonly uh

35
00:01:20,630 --> 00:01:18,080
known would be like the a train

36
00:01:21,749 --> 00:01:20,640
satellites landsat e01 those guys

37
00:01:24,870 --> 00:01:21,759
um

38
00:01:27,429 --> 00:01:24,880

iss has a a very interesting orbit and

39
00:01:30,069 --> 00:01:27,439
it allows us to see things on the earth

40
00:01:32,310 --> 00:01:30,079
from different locations with different

41
00:01:34,710 --> 00:01:32,320
sun angles different view angles

42
00:01:36,710 --> 00:01:34,720
and allows us to be

43
00:01:38,870 --> 00:01:36,720
sort of a calibration and validation

44
00:01:41,910 --> 00:01:38,880
source for a variety of other

45
00:01:43,350 --> 00:01:41,920
instruments that nasa and other agencies

46
00:01:45,830 --> 00:01:43,360
have flying so

47
00:01:48,389 --> 00:01:45,840
pathfinder is a low-cost high return on

48
00:01:50,469 --> 00:01:48,399
investment means for us to develop the

49
00:01:52,230 --> 00:01:50,479
processes and procedures

50
00:01:54,069 --> 00:01:52,240
and to gain experience and expertise in

51
00:01:55,270 --> 00:01:54,079
earth observation from the international

52
00:01:57,429 --> 00:01:55,280
space station

53
00:01:59,749 --> 00:01:57,439
in order to pave the way for future and

54
00:02:01,190 --> 00:01:59,759
more capable instrumentation

55
00:02:02,149 --> 00:02:01,200
tell me where

56
00:02:03,990 --> 00:02:02,159
your

57
00:02:05,429 --> 00:02:04,000
the genesis of this for for you this

58
00:02:07,510 --> 00:02:05,439
specific kind of camera where'd that

59
00:02:09,749 --> 00:02:07,520
come from

60
00:02:12,390 --> 00:02:09,759
well let me give you a little background

61
00:02:14,869 --> 00:02:12,400
we are we're part of uh a project called

62
00:02:16,070 --> 00:02:14,879
severe and i'll inflict my bad spanish

63
00:02:19,670 --> 00:02:16,080

on you here for a second it's the

64
00:02:21,430 --> 00:02:19,680
systema reggio now the visualization

65
00:02:23,750 --> 00:02:21,440
which translated into english is the

66
00:02:26,150 --> 00:02:23,760
regional system for visualization and

67
00:02:29,750 --> 00:02:26,160
monitoring

68
00:02:32,229 --> 00:02:29,760
we utilize the existing assets or assets

69
00:02:34,390 --> 00:02:32,239
from other sources other agencies

70
00:02:36,390 --> 00:02:34,400
to provide science-based applications

71
00:02:38,390 --> 00:02:36,400
and tools that will assist

72
00:02:40,390 --> 00:02:38,400
those who might make environmental

73
00:02:42,229 --> 00:02:40,400
decisions primarily in the developing

74
00:02:44,470 --> 00:02:42,239
world

75
00:02:46,390 --> 00:02:44,480
we operate mostly in

76
00:02:48,630 --> 00:02:46,400
the global earth observation system of

77
00:02:51,110 --> 00:02:48,640
systems societal benefits area there are

78
00:02:54,630 --> 00:02:51,120
nine of those health energy water

79
00:02:57,030 --> 00:02:54,640
ecosystems agriculture et cetera and

80
00:02:59,030 --> 00:02:57,040
one of them in particular disasters

81
00:03:01,430 --> 00:02:59,040
looked like a place where we could

82
00:03:03,670 --> 00:03:01,440
provide some tangible and valuable

83
00:03:05,670 --> 00:03:03,680
results while accomplishing the the test

84
00:03:07,750 --> 00:03:05,680
bed goals that i mentioned before of

85
00:03:10,229 --> 00:03:07,760
gaining the expertise and experience to

86
00:03:12,309 --> 00:03:10,239
uh to

87
00:03:14,710 --> 00:03:12,319
to provide the information for for

88
00:03:16,309 --> 00:03:14,720

future instrumentation systems and and

89
00:03:18,550 --> 00:03:16,319
we are going to show some pictures here

90
00:03:20,790 --> 00:03:18,560
in a minute but before we do uh describe

91
00:03:22,710 --> 00:03:20,800
the the camera equipment that's in use

92
00:03:24,869 --> 00:03:22,720
for for iserv and just where on the

93
00:03:27,509 --> 00:03:24,879
station it's located

94
00:03:29,830 --> 00:03:27,519
yeah sure um well first we we operate in

95
00:03:31,350 --> 00:03:29,840
the in the destiny module that's the the

96
00:03:32,390 --> 00:03:31,360
science module there

97
00:03:35,030 --> 00:03:32,400
there is a

98
00:03:37,990 --> 00:03:35,040
high quality earth facing

99
00:03:39,830 --> 00:03:38,000
window about 20 inches in diameter

100
00:03:41,430 --> 00:03:39,840
through which we are able to to see the

101
00:03:44,070 --> 00:03:41,440
earth we're in a

102
00:03:49,509 --> 00:03:44,080
a payload

103
00:03:51,910 --> 00:03:49,519
observational research facility wharf

104
00:03:55,350 --> 00:03:51,920
it's essentially a a light safe box a

105
00:03:59,270 --> 00:03:57,750
some mounting provisions and some

106
00:04:01,830 --> 00:03:59,280
connections to the infrastructure their

107
00:04:03,350 --> 00:04:01,840
power and data connections so that we

108
00:04:04,789 --> 00:04:03,360
can hook up the hardware and the

109
00:04:06,470 --> 00:04:04,799
computers that are required to run the

110
00:04:08,789 --> 00:04:06,480
system and uh and look out through that

111
00:04:10,789 --> 00:04:08,799
window uh down at the earth and and make

112
00:04:13,030 --> 00:04:10,799
our observations and shooting through

113
00:04:15,429 --> 00:04:13,040

the system

114
00:04:20,229 --> 00:04:18,069
it is uh it is just about the best glass

115
00:04:22,150 --> 00:04:20,239
uh you can get it's uh it's it's

116
00:04:23,189 --> 00:04:22,160
beautiful it's it's extraordinarily high

117
00:04:25,909 --> 00:04:23,199
quality

118
00:04:28,150 --> 00:04:25,919
uh virtually distortion free and uh it

119
00:04:29,590 --> 00:04:28,160
suits our purposes very well as well as

120
00:04:32,230 --> 00:04:29,600
the suit the purposes of other

121
00:04:34,550 --> 00:04:32,240
instruments that come behind us here

122
00:04:37,430 --> 00:04:34,560
the system is is based on commercial

123
00:04:39,990 --> 00:04:37,440
office self hardware it's it's the two

124
00:04:42,390 --> 00:04:40,000
primary components are a commercial uh

125
00:04:44,310 --> 00:04:42,400
digital single lens reflex camera and a

126
00:04:46,950 --> 00:04:44,320
nine and a quarter inch aperture

127
00:04:50,550 --> 00:04:46,960
astronomical grade telescope

128
00:04:52,790 --> 00:04:50,560
again commercially obtained here in town

129
00:04:54,150 --> 00:04:52,800
we do have some modifications some

130
00:04:56,629 --> 00:04:54,160
physical modifications to the system

131
00:04:58,870 --> 00:04:56,639
that improve our position within wharf

132
00:05:00,550 --> 00:04:58,880
and they also help our pointing geometry

133
00:05:03,110 --> 00:05:00,560
make us better located with respect to

134
00:05:05,350 --> 00:05:03,120
the window so we can see a broader field

135
00:05:06,790 --> 00:05:05,360
of view there plus we have some some

136
00:05:08,710 --> 00:05:06,800
other

137
00:05:10,469 --> 00:05:08,720
custom mounting bits power and data

138
00:05:12,150 --> 00:05:10,479

connections things like that are the

139
00:05:13,670 --> 00:05:12,160
crew members on orbit taking these

140
00:05:15,189 --> 00:05:13,680
pictures or are you taking them from the

141
00:05:18,070 --> 00:05:15,199
ground

142
00:05:19,670 --> 00:05:18,080
no the the system is is entirely uh

143
00:05:21,430 --> 00:05:19,680
remotely controlled from our science

144
00:05:22,870 --> 00:05:21,440
operations center here at uh the

145
00:05:24,150 --> 00:05:22,880
national space science and technology

146
00:05:25,909 --> 00:05:24,160
center we're affiliated with marshall

147
00:05:28,390 --> 00:05:25,919
here in huntsville alabama

148
00:05:30,710 --> 00:05:28,400
it's driven by some custom software that

149
00:05:32,390 --> 00:05:30,720
was developed here at marshall and

150
00:05:35,029 --> 00:05:32,400
we have the option to

151
00:05:36,629 --> 00:05:35,039
operate it in real time by you know

152
00:05:38,230 --> 00:05:36,639
sitting there watching the earth go by

153
00:05:41,110 --> 00:05:38,240
underneath us and and pushing the

154
00:05:42,790 --> 00:05:41,120
buttons as necessary or we can run via a

155
00:05:44,550 --> 00:05:42,800
timed command system which is our

156
00:05:49,029 --> 00:05:44,560
primary method of operation that allows

157
00:05:50,790 --> 00:05:49,039
us to pre-plan our our shots we just

158
00:05:53,430 --> 00:05:50,800
tell the camera when

159
00:05:56,070 --> 00:05:53,440
the target of interest is coming by what

160
00:05:58,230 --> 00:05:56,080
time it needs to swing over into

161
00:05:59,830 --> 00:05:58,240
the the right position to to acquire the

162
00:06:01,510 --> 00:05:59,840
images the station goes over and it

163
00:06:03,670 --> 00:06:01,520

takes the images and and stores them on

164
00:06:06,629 --> 00:06:03,680
board for us we then do the down linking

165
00:06:08,870 --> 00:06:06,639
here at uh at marshall and do the basic

166
00:06:10,790 --> 00:06:08,880
command processing uh i'm sorry the data

167
00:06:13,110 --> 00:06:10,800
processing before we archive and

168
00:06:14,710 --> 00:06:13,120
distribute the data sets the crew

169
00:06:16,870 --> 00:06:14,720
actually don't have any involvement

170
00:06:18,950 --> 00:06:16,880
except for uh helping us

171
00:06:21,830 --> 00:06:18,960
with a few hiccups and and we have had a

172
00:06:24,230 --> 00:06:21,840
few as we've operated we had a

173
00:06:27,430 --> 00:06:24,240
fairly significant pointing problem uh

174
00:06:29,189 --> 00:06:27,440
back uh last summer and uh koichi wataka

175
00:06:31,350 --> 00:06:29,199
was one of the uh the fellows who helped

176
00:06:34,070 --> 00:06:31,360
us out earlier this year and in getting

177
00:06:35,909 --> 00:06:34,080
our system repaired and back up let's

178
00:06:37,350 --> 00:06:35,919
take a look at some of the pictures that

179
00:06:39,670 --> 00:06:37,360
you're getting you

180
00:06:41,270 --> 00:06:39,680
provided us with a little sampling and

181
00:06:43,909 --> 00:06:41,280
we'll put the first one up on the screen

182
00:06:46,710 --> 00:06:43,919
right now describe uh what we're seeing

183
00:06:51,189 --> 00:06:46,720
here the uh this is part of mongolia

184
00:06:54,230 --> 00:06:51,199
right yeah this is um this is the uh the

185
00:06:56,790 --> 00:06:54,240
south western edge of the shore

186
00:06:59,029 --> 00:06:56,800
of a lake called uts nour it's in

187
00:07:00,390 --> 00:06:59,039
mongolia it's very interesting from from

188
00:07:02,550 --> 00:07:00,400

our point of view remember we look at

189
00:07:04,070 --> 00:07:02,560
things from environmental

190
00:07:07,510 --> 00:07:04,080
decision-making point of view this is

191
00:07:10,070 --> 00:07:07,520
the center of a a very delicate and very

192
00:07:15,029 --> 00:07:13,350
area of biodiversity in in mongolia

193
00:07:16,629 --> 00:07:15,039
the the lake itself is interesting

194
00:07:18,390 --> 00:07:16,639
because it's indirect in other words

195
00:07:20,070 --> 00:07:18,400
there's there's a flow only into the

196
00:07:21,510 --> 00:07:20,080
lake there's no flow out the basin

197
00:07:22,390 --> 00:07:21,520
around it flows in

198
00:07:24,550 --> 00:07:22,400
um

199
00:07:26,950 --> 00:07:24,560
this uh

200
00:07:28,230 --> 00:07:26,960
causes a couple things number one uh and

201
00:07:29,749 --> 00:07:28,240
most importantly it increases the

202
00:07:32,550 --> 00:07:29,759
salinity of the lake the lake is about

203
00:07:33,749 --> 00:07:32,560
half as salty as as ocean water but it

204
00:07:36,230 --> 00:07:33,759
creates a

205
00:07:37,830 --> 00:07:36,240
a very diverse landscape around and you

206
00:07:39,589 --> 00:07:37,840
see in this in this image here a lot of

207
00:07:41,990 --> 00:07:39,599
these bright spots these are actually

208
00:07:43,670 --> 00:07:42,000
salt deposits as the as the lake recedes

209
00:07:45,189 --> 00:07:43,680
as it evaporates and it is evaporating

210
00:07:47,110 --> 00:07:45,199
away it's one of the reasons why we're

211
00:07:48,869 --> 00:07:47,120
we're interested in it we're looking at

212
00:07:50,150 --> 00:07:48,879
how the the region is changing by the

213
00:07:52,150 --> 00:07:50,160

evaporation of the lake but the assault

214
00:07:53,749 --> 00:07:52,160
deposits left behind there okay it's

215
00:07:56,230 --> 00:07:53,759
kind of interesting to look at sorry to

216
00:07:58,309 --> 00:07:56,240
interrupt i i'm jumped ahead uh on your

217
00:08:01,270 --> 00:07:58,319
list i put up this picture of the grand

218
00:08:02,230 --> 00:08:01,280
canyon because i found that to be really

219
00:08:03,589 --> 00:08:02,240
amazing

220
00:08:05,350 --> 00:08:03,599
can you describe what we're seeing in

221
00:08:07,430 --> 00:08:05,360
that picture

222
00:08:09,350 --> 00:08:07,440
sure um you know grand canyon it's one

223
00:08:10,950 --> 00:08:09,360
of the the great geological formations

224
00:08:12,469 --> 00:08:10,960
of the world and it's it's part of the

225
00:08:14,469 --> 00:08:12,479
continent's physical and cultural

226
00:08:17,510 --> 00:08:14,479
heritage and we were very happy to get

227
00:08:19,270 --> 00:08:17,520
this uh get this image of it back last

228
00:08:21,830 --> 00:08:19,280
spring

229
00:08:23,749 --> 00:08:21,840
what you see here is is a shot that's

230
00:08:25,589 --> 00:08:23,759
very near the uh the grand canyon

231
00:08:27,749 --> 00:08:25,599
village it's unfortunately just out of

232
00:08:29,189 --> 00:08:27,759
frame lower left but at the very bottom

233
00:08:32,469 --> 00:08:29,199
i think you may be able to see there the

234
00:08:34,709 --> 00:08:32,479
parallel paths of the uh the rim highway

235
00:08:37,430 --> 00:08:34,719
and the uh and the train that that go

236
00:08:39,269 --> 00:08:37,440
into the um into the uh the grand canyon

237
00:08:41,509 --> 00:08:39,279
village uh of course through the center

238
00:08:43,829 --> 00:08:41,519

there is uh the grand can is the uh is

239
00:08:46,710 --> 00:08:43,839
the colorado river that uh

240
00:08:48,230 --> 00:08:46,720
that is responsible for carving the uh

241
00:08:49,670 --> 00:08:48,240
the landscape through the grand canyon

242
00:08:50,630 --> 00:08:49,680
there and it's uh

243
00:08:53,030 --> 00:08:50,640
uh

244
00:08:54,470 --> 00:08:53,040
it's a fascinating piece of geology i

245
00:08:56,550 --> 00:08:54,480
have a little bit of geology background

246
00:08:58,550 --> 00:08:56,560
and i i really enjoy looking at this

247
00:09:00,310 --> 00:08:58,560
stuff just uh near the center there just

248
00:09:01,990 --> 00:09:00,320
off center to the bottom that's the the

249
00:09:03,829 --> 00:09:02,000
trail head for the south kaibab trail

250
00:09:05,110 --> 00:09:03,839
one trail is one of the one of the very

251
00:09:07,430 --> 00:09:05,120
popular trails that goes down into the

252
00:09:09,670 --> 00:09:07,440
canyon itself and i look we have time

253
00:09:11,430 --> 00:09:09,680
for one more and i want to get you to

254
00:09:13,750 --> 00:09:11,440
to talk a little bit about the fact that

255
00:09:16,389 --> 00:09:13,760
sometimes you get called in to help uh

256
00:09:18,389 --> 00:09:16,399
to do work after disasters take place

257
00:09:20,870 --> 00:09:18,399
you showed us a

258
00:09:25,190 --> 00:09:20,880
a couple of pictures that you shot of

259
00:09:26,389 --> 00:09:25,200
where the tornado hit in moore oklahoma

260
00:09:28,710 --> 00:09:26,399
yeah um

261
00:09:31,110 --> 00:09:28,720
moore oklahoma of course back in in may

262
00:09:32,550 --> 00:09:31,120
of last year there was a the devastating

263
00:09:34,070 --> 00:09:32,560

tornado that

264
00:09:37,350 --> 00:09:34,080
ripped through moore

265
00:09:39,030 --> 00:09:37,360
and uh killed 24 people and it was a

266
00:09:41,910 --> 00:09:39,040
horrible tragic event we were asked to

267
00:09:44,070 --> 00:09:41,920
do some imaging uh in the aftermath to

268
00:09:45,910 --> 00:09:44,080
to document the the path of the the

269
00:09:47,829 --> 00:09:45,920
storm through moore there

270
00:09:49,509 --> 00:09:47,839
um as you can see running diagonally

271
00:09:50,550 --> 00:09:49,519
from lower left upper right that's the

272
00:09:53,509 --> 00:09:50,560
interstate that goes through the middle

273
00:09:55,910 --> 00:09:53,519
of town there just uh just to the upper

274
00:09:58,389 --> 00:09:55,920
left of that is where uh plaza towers

275
00:10:00,310 --> 00:09:58,399
elementary stood that was the site where

276
00:10:02,949 --> 00:10:00,320
those seven children were killed but we

277
00:10:04,790 --> 00:10:02,959
did this as as a

278
00:10:07,590 --> 00:10:04,800
a collaborative effort here with another

279
00:10:10,230 --> 00:10:07,600
group at uh at marshall that

280
00:10:12,389 --> 00:10:10,240
operates in uh looking at near real-time

281
00:10:14,710 --> 00:10:12,399
weather forecasting and they also uh

282
00:10:17,030 --> 00:10:14,720
look at the uh the effects of severe

283
00:10:18,630 --> 00:10:17,040
storms uh in uh primarily in the united

284
00:10:19,829 --> 00:10:18,640
states but in other parts of the country

285
00:10:22,870 --> 00:10:19,839
as well

286
00:10:24,389 --> 00:10:22,880
those are amazing pictures and i think

287
00:10:26,310 --> 00:10:24,399
it's great to see those kind of things

288
00:10:27,590 --> 00:10:26,320

uh burgess hell thank you for taking

289
00:10:29,670 --> 00:10:27,600
some time to

290
00:10:30,829 --> 00:10:29,680
tell us about iserv and what it's doing

291
00:10:32,790 --> 00:10:30,839
onboard the space

292
00:10:34,310 --> 00:10:32,800
station thank you pat we appreciate the

293
00:10:36,470 --> 00:10:34,320
opportunity to talk to you burgess

294
00:10:39,110 --> 00:10:36,480
howell is the payload developer and the

295
00:10:41,350 --> 00:10:39,120
principal investigator for the iserv