
HUBBLE
25
HUBBLE
hangouts
More Hubble History
Thursday, January 29 2015 3pm EST 8pm UT, 9pm CET

1
00:00:07,190 --> 00:00:05,390
hello everybody and welcome to this

2
00:00:09,140 --> 00:00:07,200
week's Hubble hang out my name is Tony

3
00:00:11,209 --> 00:00:09,150
Darnell I work at the Space Telescope

4
00:00:14,120 --> 00:00:11,219
Science Institute and this week we are

5
00:00:17,060 --> 00:00:14,130
continuing our celebration of 25 years

6
00:00:18,470 --> 00:00:17,070
of the Hubble Space Telescope by what

7
00:00:21,349 --> 00:00:18,480
we're going to be talking a little bit

8
00:00:23,750 --> 00:00:21,359
with author Caroline Collins Peterson on

9
00:00:25,700 --> 00:00:23,760
the history of Hubble as well as dr.

10
00:00:27,380 --> 00:00:25,710
Antonella nota from the European Space

11
00:00:30,349 --> 00:00:27,390
Agency who will give us insights into

12
00:00:32,569 --> 00:00:30,359
her the european space agency's role in

13
00:00:35,299 --> 00:00:32,579

the history of Hubble but before I do

14
00:00:36,979 --> 00:00:35,309
that I gotta let you guys know how to we

15
00:00:38,780 --> 00:00:36,989
hope that you will send us questions and

16
00:00:44,420 --> 00:00:38,790
comments during the Hangout in the

17
00:00:47,299 --> 00:00:44,430
following ways twit twit tweet at us you

18
00:00:49,790 --> 00:00:47,309
can quit in us I the hashtag Hubble hang

19
00:00:51,680 --> 00:00:49,800
out as always we're also also did the

20
00:00:54,950 --> 00:00:51,690
easiest way is to also just use the Q&A

21
00:00:56,450 --> 00:00:54,960
app as well as the comments on the

22
00:00:58,790 --> 00:00:56,460
YouTube channel this is being broadcast

23
00:01:00,110 --> 00:00:58,800
in so please feel free to leave us

24
00:01:03,349 --> 00:01:00,120
questions and comments throughout and we

25
00:01:05,450 --> 00:01:03,359
will get to them as they come up and we

26
00:01:07,580 --> 00:01:05,460
and also if you have not subscribed to

27
00:01:09,350 --> 00:01:07,590
our YouTube channel we hope you'll do

28
00:01:11,390 --> 00:01:09,360
that it's Hubble site channel also

29
00:01:13,940 --> 00:01:11,400
follow us at at hubble telescope on

30
00:01:16,550 --> 00:01:13,950
twitter ok so joining me as always is

31
00:01:19,429 --> 00:01:16,560
dr. carolyn christian carol christian

32
00:01:22,940 --> 00:01:19,439
gonna see this throughout your breaking

33
00:01:24,530 --> 00:01:22,950
and you set of lips over there carol

34
00:01:26,270 --> 00:01:24,540
christian the outreach scientist for

35
00:01:29,270 --> 00:01:26,280
Hubble for the Space Telescope Science

36
00:01:31,149 --> 00:01:29,280
Institute ax and Scott Lewis the our

37
00:01:33,499 --> 00:01:31,159
driver of the Internet extraordinary

38
00:01:38,690 --> 00:01:33,509

welcome back guys it's going to you

39
00:01:41,929 --> 00:01:38,700
again so as I mentioned before we have

40
00:01:43,429 --> 00:01:41,939
we have we have an author and as a

41
00:01:45,770 --> 00:01:43,439
scientist to talk about the history of

42
00:01:48,380 --> 00:01:45,780
Hubble but there is also an opportunity

43
00:01:50,899 --> 00:01:48,390
coming up next week for you to

44
00:01:54,260 --> 00:01:50,909
participate in the 25th anniversary of

45
00:01:56,300 --> 00:01:54,270
Hubble Space Telescope the European

46
00:01:59,899 --> 00:01:56,310
Space Agency next week is launching a

47
00:02:02,389 --> 00:01:59,909
video contest to tell to allow you guys

48
00:02:03,950 --> 00:02:02,399
to express yourselves and to get

49
00:02:06,770 --> 00:02:03,960
involved in the celebration of Hubble

50
00:02:09,320 --> 00:02:06,780
and Scott I believe has a trailer that

51
00:02:10,290 --> 00:02:09,330
he's got cued up oh yeah I'll do that

52
00:02:22,220 --> 00:02:10,300
now I didn't know

53
00:02:28,880 --> 00:02:25,490
to celebrate 25 years of a truly

54
00:02:31,339 --> 00:02:28,890
remarkable telescope its staff and its

55
00:02:35,780 --> 00:02:31,349
fans we are pulling out all the stops

56
00:02:39,860 --> 00:02:35,790
for 2015 join us by being part of our

57
00:02:43,100 --> 00:02:39,870
biggest competition yet ode to Hubble

58
00:02:45,589 --> 00:02:43,110
will launch early next year and give you

59
00:02:49,130 --> 00:02:45,599
the chance to get creative and show how

60
00:02:51,830 --> 00:02:49,140
Hubble has inspired you as long as it

61
00:02:54,920 --> 00:02:51,840
can be uploaded as a YouTube video you

62
00:02:58,550 --> 00:02:54,930
can submit anything pan over a drawing

63
00:03:02,270 --> 00:02:58,560

scroll over a poem or text film your own

64
00:03:04,930 --> 00:03:02,280
hubblecast create an animation or record

65
00:03:10,280 --> 00:03:04,940
yourself performing composing music or

66
00:03:13,250 --> 00:03:10,290
broadcasting just make it innovative

67
00:03:15,710 --> 00:03:13,260
creative and most of all inspired by

68
00:03:21,229 --> 00:03:15,720
Hubble one of its great discoveries or

69
00:03:23,930 --> 00:03:21,239
one of its stunning images so there you

70
00:03:25,580 --> 00:03:23,940
go there's the trailer for the for the

71
00:03:27,740 --> 00:03:25,590
contest it's going to be launched next

72
00:03:30,289 --> 00:03:27,750
week you can watch the full video of our

73
00:03:33,890 --> 00:03:30,299
over on Space Telescope org they have a

74
00:03:35,360 --> 00:03:33,900
hubblecast section which comes out every

75
00:03:39,020 --> 00:03:35,370
how often does hubblecast come out

76
00:03:42,349 --> 00:03:39,030
antonella um you know when we have

77
00:03:44,599 --> 00:03:42,359
material to show something around pretty

78
00:03:47,300 --> 00:03:44,609
much every other month we have 81 in the

79
00:03:49,069 --> 00:03:47,310
library so far since the beginning so

80
00:03:51,949 --> 00:03:49,079
these are really nice videos to sort of

81
00:03:53,509 --> 00:03:51,959
keep you up to date on Hubble news and

82
00:03:55,190 --> 00:03:53,519
all kinds of cool things but this one is

83
00:03:57,589 --> 00:03:55,200
the one they made last year it was made

84
00:03:59,449 --> 00:03:57,599
in each summer to sort of get people

85
00:04:01,909 --> 00:03:59,459
ready for this for this for this video

86
00:04:03,830 --> 00:04:01,919
event so we hope you'll participate and

87
00:04:05,900 --> 00:04:03,840
we hope you'll go looking for the

88
00:04:07,430 --> 00:04:05,910

information in fact Anton I'll let me

89
00:04:10,099 --> 00:04:07,440
bring you in on this how can people

90
00:04:14,180 --> 00:04:10,109
learn more about this contest well there

91
00:04:18,159 --> 00:04:14,190
is a website is a Hubble www Space

92
00:04:21,469 --> 00:04:18,169
Telescope dot org that should look and

93
00:04:23,140 --> 00:04:21,479
there will be instructions but basically

94
00:04:27,200 --> 00:04:23,150
the competition is opening on monday

95
00:04:32,209 --> 00:04:27,210
will be out open for a month and a half

96
00:04:34,679 --> 00:04:32,219
and our hope is that people will respond

97
00:04:38,129 --> 00:04:34,689
and will be able to have a great

98
00:04:41,369 --> 00:04:38,139
selection or created videos and music

99
00:04:44,309 --> 00:04:41,379
and paintings because we want to select

100
00:04:49,199 --> 00:04:44,319
the winner and announce it actually two

101
00:04:51,600 --> 00:04:49,209
winners on a hubble birthday and the

102
00:04:55,100 --> 00:04:51,610
winners are you know there is a general

103
00:04:58,799 --> 00:04:55,110
category winner and there is a number 25

104
00:05:01,409 --> 00:04:58,809
because we felt it was really important

105
00:05:05,699 --> 00:05:01,419
to see what the next generation that is

106
00:05:09,109 --> 00:05:05,709
born was born with Hubble already Norway

107
00:05:11,429 --> 00:05:09,119
thinks of this amazing telescope Ryan

108
00:05:14,100 --> 00:05:11,439
calling them the Hubble generation right

109
00:05:16,709 --> 00:05:14,110
the whole generation and we also have

110
00:05:19,379 --> 00:05:16,719
some exciting prizes so I hope that

111
00:05:23,909 --> 00:05:19,389
people will be encouraged to participate

112
00:05:27,600 --> 00:05:23,919
because they can win actually pieces of

113
00:05:31,829 --> 00:05:27,610

the actual solar array is flown on the

114
00:05:34,109 --> 00:05:31,839
telescope between 1990 and 1993 so is

115
00:05:35,999 --> 00:05:34,119
very interesting these are these are

116
00:05:37,889 --> 00:05:36,009
actual Hubble artifacts that have been

117
00:05:40,649 --> 00:05:37,899
brought back from space after a repair

118
00:05:42,779 --> 00:05:40,659
mission yes this because Hubble

119
00:05:46,169 --> 00:05:42,789
contributed a pair of solar arrays

120
00:05:48,540 --> 00:05:46,179
didn't work you know as expected so they

121
00:05:50,609 --> 00:05:48,550
were removed and substituted and they

122
00:05:54,629 --> 00:05:50,619
were tested extensively on the ground

123
00:05:57,179 --> 00:05:54,639
because it's interesting to see how they

124
00:06:01,739 --> 00:05:57,189
were damaged by me through and meteoroid

125
00:06:04,229 --> 00:06:01,749
impacts and so one of the erased was

126
00:06:07,229 --> 00:06:04,239
already you know tested and pretty much

127
00:06:09,540 --> 00:06:07,239
cut in pieces for the testing we decided

128
00:06:11,939 --> 00:06:09,550
to use the remaining to produce some

129
00:06:16,049 --> 00:06:11,949
little interesting mementos that would

130
00:06:18,029 --> 00:06:16,059
be presented for the celebration on you

131
00:06:20,879 --> 00:06:18,039
know on the twenty-third and the winners

132
00:06:23,399 --> 00:06:20,889
of the competition will have will enjoy

133
00:06:25,199 --> 00:06:23,409
some of those so my question is can I

134
00:06:28,469 --> 00:06:25,209
get on in this since I'm technically a

135
00:06:32,429 --> 00:06:28,479
contractor and not an employee home you

136
00:06:33,719 --> 00:06:32,439
can always I like this I like this now

137
00:06:36,569 --> 00:06:33,729
you're up again now you're up against

138
00:06:37,340 --> 00:06:36,579

Scott people on the internet watch out

139
00:06:40,100 --> 00:06:37,350
of that

140
00:06:42,170 --> 00:06:40,110
heartless yeah I'm not going to be

141
00:06:44,450 --> 00:06:42,180
entering but I have also done quite a

142
00:06:45,980 --> 00:06:44,460
few ode to Hubble videos myself in fact

143
00:06:48,830 --> 00:06:45,990
the very first one I ever made the very

144
00:06:51,380 --> 00:06:48,840
first video I ever made 2006 was called

145
00:06:52,910 --> 00:06:51,390
the most important image ever taken it

146
00:06:55,700 --> 00:06:52,920
was a tribute to the Hubble Deep Field

147
00:06:58,100 --> 00:06:55,710
and I'm going to be working I'm working

148
00:07:00,380 --> 00:06:58,110
on one right now with an intern who is

149
00:07:04,130 --> 00:07:00,390
almost finished called the most

150
00:07:05,690 --> 00:07:04,140
important instrument ever built so that

151
00:07:07,100 --> 00:07:05,700
will be coming out on beep astronomy and

152
00:07:08,690 --> 00:07:07,110
I just wanted to like give myself a

153
00:07:12,230 --> 00:07:08,700
shameless plug there because that every

154
00:07:13,940 --> 00:07:12,240
chamber yeah I but I do this all the

155
00:07:17,750 --> 00:07:13,950
time I'm used to it i can't say enough

156
00:07:19,640 --> 00:07:17,760
good things about Hubble and and so so

157
00:07:22,670 --> 00:07:19,650
we this is your chance folks next week

158
00:07:25,400 --> 00:07:22,680
it opens at about eight I think you said

159
00:07:27,830 --> 00:07:25,410
eight a.m. eastern time in the United

160
00:07:32,020 --> 00:07:27,840
States right that's when the webpage

161
00:07:35,060 --> 00:07:32,030
will begin in case or that and you can

162
00:07:37,520 --> 00:07:35,070
how do you submit things do you get our

163
00:07:39,530 --> 00:07:37,530

upload videos to youtube and tell people

164
00:07:41,870 --> 00:07:39,540
about it or how do you yes basically

165
00:07:44,110 --> 00:07:41,880
submit a video and the video can you

166
00:07:47,350 --> 00:07:44,120
know can be everything can be yourself

167
00:07:50,000 --> 00:07:47,360
recording something can be you showing a

168
00:07:52,550 --> 00:07:50,010
piece playing a piece of music or

169
00:07:56,390 --> 00:07:52,560
painting over drawing but it has to be

170
00:07:57,770 --> 00:07:56,400
in a in a video format and the items

171
00:08:01,160 --> 00:07:57,780
that will be submitted will be

172
00:08:03,890 --> 00:08:01,170
crowdsource and then the finalists will

173
00:08:05,960 --> 00:08:03,900
be judged by a panel or four or four

174
00:08:09,050 --> 00:08:05,970
people who will have the tough that you

175
00:08:11,570 --> 00:08:09,060
know task to select among in all the

176
00:08:13,580 --> 00:08:11,580
very top finalists so so how does that

177
00:08:16,760 --> 00:08:13,590
work crowdsourcing you're gonna how will

178
00:08:20,540 --> 00:08:16,770
you how will that be handled basically

179
00:08:23,840 --> 00:08:20,550
we will let a few submission going you

180
00:08:25,970 --> 00:08:23,850
know from four for three weeks and then

181
00:08:28,370 --> 00:08:25,980
we'll open for crowdsourcing so people

182
00:08:30,350 --> 00:08:28,380
will have you know a subset that you

183
00:08:34,010 --> 00:08:30,360
know a basically a large said they will

184
00:08:40,060 --> 00:08:34,020
be able to vote on in pretty much as

185
00:08:45,860 --> 00:08:43,219
not most votes then the panel will

186
00:08:47,120 --> 00:08:45,870
decide and you've got a panel of Hubble

187
00:08:49,840 --> 00:08:47,130
scientists are going to be looking at

188
00:08:54,430 --> 00:08:49,850

the right yes well it will be a

189
00:08:56,680 --> 00:08:54,440
a sort of mixed panel we have I will be

190
00:09:01,420 --> 00:08:56,690
on that panel we also have Lars

191
00:09:03,550 --> 00:09:01,430
Christensen who in the Lisa over sorry

192
00:09:06,670 --> 00:09:03,560
the head of our is a Hubble outreach

193
00:09:10,930 --> 00:09:06,680
effort in Europe who have can sample the

194
00:09:14,379 --> 00:09:10,940
head of stsci as Hubble mission office

195
00:09:16,300 --> 00:09:14,389
and we thought we need to have a

196
00:09:19,420 --> 00:09:16,310
different perspective so we asked

197
00:09:22,120 --> 00:09:19,430
Rebecca Alvin hot burger the director of

198
00:09:24,009 --> 00:09:22,130
founder of the american visionary art

199
00:09:29,319 --> 00:09:24,019
museum involved in order to provide a

200
00:09:32,499 --> 00:09:29,329
you know artistic perspective it will be

201
00:09:36,040 --> 00:09:32,509
an interesting panel and we'll see what

202
00:09:37,120 --> 00:09:36,050
you know we recommend all right and

203
00:09:38,650 --> 00:09:37,130
Carol maybe what we ought to have a

204
00:09:41,410 --> 00:09:38,660
hangout with the winner or something and

205
00:09:53,400 --> 00:09:41,420
see or something winner yeah cuz I'm

206
00:09:59,340 --> 00:09:53,410
gonna win so I'm here boy maybe maybe I

207
00:10:05,170 --> 00:10:02,079
tell you that we tried a similar

208
00:10:08,910 --> 00:10:05,180
competition a few years ago was called

209
00:10:11,860 --> 00:10:08,920
the hidden treasure and for of

210
00:10:14,769 --> 00:10:11,870
experiments we weren't expecting like

211
00:10:18,970 --> 00:10:14,779
500 entries and we were expecting to be

212
00:10:22,990 --> 00:10:18,980
done in a month and we got 2,500 then we

213
00:10:26,860 --> 00:10:23,000

had to even expand the judging time and

214
00:10:29,139 --> 00:10:26,870
we're still using the images today that

215
00:10:30,970 --> 00:10:29,149
people produce at the time it was just

216
00:10:32,259 --> 00:10:30,980
incredible so yeah I thought that was a

217
00:10:33,819 --> 00:10:32,269
really interesting contest because

218
00:10:37,840 --> 00:10:33,829
that's where you had people go and just

219
00:10:41,370 --> 00:10:37,850
cut look for a sort of unknown or not

220
00:10:46,780 --> 00:10:41,380
well known images and banging about yes

221
00:10:48,910 --> 00:10:46,790
yes okay so uh okay so let's let's move

222
00:10:50,860 --> 00:10:48,920
on to so this there's your chance folks

223
00:10:52,780 --> 00:10:50,870
you get here's your opportunity to get

224
00:10:54,809 --> 00:10:52,790
involved in helping us celebrate 25

225
00:10:56,800 --> 00:10:54,819
years of the Hubble Space Telescope

226
00:10:58,269 --> 00:10:56,810
speaking of which it's been up there for

227
00:11:00,250 --> 00:10:58,279
a very long time and we've got people

228
00:11:01,900 --> 00:11:00,260
here who've also been involved with the

229
00:11:03,820 --> 00:11:01,910
project for quite a while I have my good

230
00:11:06,310 --> 00:11:03,830
friend she's an author Carolyn Collins

231
00:11:09,960 --> 00:11:06,320
Peterson she's from Colorado right now

232
00:11:15,010 --> 00:11:09,970
looking very sunny right now sardis

233
00:11:16,690 --> 00:11:15,020
actually yes no I was gonna snow okay so

234
00:11:19,870 --> 00:11:16,700
and she's written several books on

235
00:11:21,820 --> 00:11:19,880
Hubble and so so welcome Carolyn and I

236
00:11:23,430 --> 00:11:21,830
guess I'd like to get your insights into

237
00:11:26,640 --> 00:11:23,440
some of the work that you had done

238
00:11:30,310 --> 00:11:26,650

starting out in your career with Hubble

239
00:11:32,470 --> 00:11:30,320
well I first was on a team right about

240
00:11:34,570 --> 00:11:32,480
the time of launch I was working for on

241
00:11:37,090 --> 00:11:34,580
the Goddard high resolution spectrograph

242
00:11:41,830 --> 00:11:37,100
team and that was headed up by Jack

243
00:11:44,080 --> 00:11:41,840
Brant and Sally he who lead just retired

244
00:11:45,640 --> 00:11:44,090
from Goddard but they were sort of co

245
00:11:47,080 --> 00:11:45,650
heading the team so Jack was at the

246
00:11:49,060 --> 00:11:47,090
University of Colorado and I was working

247
00:11:50,920 --> 00:11:49,070
for him on that and also another

248
00:11:52,150 --> 00:11:50,930
research project having to do with

249
00:11:56,020 --> 00:11:52,160
comets which is another one of his

250
00:11:58,060 --> 00:11:56,030
interests so my original job was going

251
00:12:00,880 --> 00:11:58,070
to be too when the data started coming

252
00:12:03,940 --> 00:12:00,890
in to have some role in analyzing that

253
00:12:05,350 --> 00:12:03,950
data when the Hubble Space Telescope was

254
00:12:06,820 --> 00:12:05,360
found to have spherical aberration

255
00:12:09,280 --> 00:12:06,830
everything kind of ground to a halt

256
00:12:12,400 --> 00:12:09,290
because the sa really affected our

257
00:12:13,780 --> 00:12:12,410
instrument so we kind of had to wait we

258
00:12:16,270 --> 00:12:13,790
had to kind of sit and wait for some

259
00:12:17,590 --> 00:12:16,280
months until we could figure out til

260
00:12:18,760 --> 00:12:17,600
people could figure out how we were

261
00:12:20,200 --> 00:12:18,770
going to handle our data what we're

262
00:12:23,140 --> 00:12:20,210
going to pull out of it the

263
00:12:24,970 --> 00:12:23,150

deconvolution algorithms so for a while

264
00:12:27,010 --> 00:12:24,980
I didn't really do much of anything but

265
00:12:29,020 --> 00:12:27,020
sit there and watch the firestorm break

266
00:12:31,000 --> 00:12:29,030
out and I took a lot of notes about that

267
00:12:33,310 --> 00:12:31,010
and that that's sort of one of the

268
00:12:34,690 --> 00:12:33,320
reasons I've led to my book okay so what

269
00:12:37,540 --> 00:12:34,700
so described as your book this was a

270
00:12:39,940 --> 00:12:37,550
this was a you've written I think to

271
00:12:41,800 --> 00:12:39,950
write you had double vision and then it

272
00:12:43,120 --> 00:12:41,810
was one before that correct now Hubble

273
00:12:46,930 --> 00:12:43,130
vision was the first one there were two

274
00:12:49,560 --> 00:12:46,940
editions of it actually k Sita's sit and

275
00:12:54,300 --> 00:12:49,570
that's the first you lay collectors died

276
00:12:56,560 --> 00:12:54,310
and so what happened with that was about

277
00:12:59,470 --> 00:12:56,570
August of the year that we have

278
00:13:02,260 --> 00:12:59,480
spherical aberration of 1990 so that was

279
00:13:04,780 --> 00:13:02,270
discovered and announced in june i think

280
00:13:07,300 --> 00:13:04,790
is when the fire storm broke out about

281
00:13:08,680 --> 00:13:07,310
august i started seeing really good not

282
00:13:09,910 --> 00:13:08,690
really but good science coming out i

283
00:13:12,610 --> 00:13:09,920
think the first thing was a picture of

284
00:13:14,350 --> 00:13:12,620
Saturn and and Jack and I and everybody

285
00:13:16,390 --> 00:13:14,360
on the team's new well there's science

286
00:13:17,680 --> 00:13:16,400
being done you know the thing wasn't

287
00:13:19,810 --> 00:13:17,690
dead in the water we it was

288
00:13:21,130 --> 00:13:19,820

stumbling around you know with a site

289
00:13:24,070 --> 00:13:21,140
problem but it wasn't dead in the water

290
00:13:25,600 --> 00:13:24,080
so I started taking knows I started

291
00:13:26,980 --> 00:13:25,610
collecting every little bit of data that

292
00:13:28,810 --> 00:13:26,990
I could about the science that was being

293
00:13:32,980 --> 00:13:28,820
done we weren't doing a lot we were

294
00:13:35,980 --> 00:13:32,990
doing some i believe the uh what was

295
00:13:37,780 --> 00:13:35,990
john because instrument carol wife ochem

296
00:13:38,830 --> 00:13:37,790
Bob camera know the way I feel camera

297
00:13:41,020 --> 00:13:38,840
had problems at the other the other

298
00:13:45,130 --> 00:13:41,030
spectrograph was having problems as well

299
00:13:47,170 --> 00:13:45,140
and so at the end this I've never just

300
00:13:48,760 --> 00:13:47,180
problems all the way across and so I

301
00:13:50,290 --> 00:13:48,770
just started collecting it all and in

302
00:13:53,350 --> 00:13:50,300
the meantime I also started watching

303
00:13:54,880 --> 00:13:53,360
that the media how the media was

304
00:13:57,160 --> 00:13:54,890
treating and of course you all remember

305
00:13:59,770 --> 00:13:57,170
if you were there what the horrible

306
00:14:01,510 --> 00:13:59,780
horrible stories were the headlines I

307
00:14:03,850 --> 00:14:01,520
mean it's just you know the Hubble

308
00:14:05,890 --> 00:14:03,860
techno turkey you know Linderman and

309
00:14:10,060 --> 00:14:05,900
something new I mean I did a search on

310
00:14:11,730 --> 00:14:10,070
on the Nexus the news the newsgathering

311
00:14:15,610 --> 00:14:11,740
service and there were something like

312
00:14:17,050 --> 00:14:15,620
11,000 hit of stories that were done on

313
00:14:18,490 --> 00:14:17,060

the Hubble Space Telescope and about

314
00:14:20,350 --> 00:14:18,500
half of those were mentions on David

315
00:14:22,570 --> 00:14:20,360
Letterman you know people just repeating

316
00:14:25,750 --> 00:14:22,580
what he said and so I started watching

317
00:14:27,250 --> 00:14:25,760
that and science I'm collecting and then

318
00:14:29,790 --> 00:14:27,260
I'm sort of collecting this media stuff

319
00:14:32,050 --> 00:14:29,800
and at the time I was working on a

320
00:14:33,970 --> 00:14:32,060
master's degree in science journalism

321
00:14:35,500 --> 00:14:33,980
and telecommunications engineering I was

322
00:14:37,480 --> 00:14:35,510
thinking I was going to go into radio

323
00:14:40,030 --> 00:14:37,490
astronomy or something like that and so

324
00:14:42,190 --> 00:14:40,040
one of my people said one of my people

325
00:14:43,780 --> 00:14:42,200
in the other department said well you

326
00:14:45,250 --> 00:14:43,790
really had to keep track of this and so

327
00:14:47,200 --> 00:14:45,260
we did and that was ultimately what

328
00:14:49,180 --> 00:14:47,210
became my thesis for my master's degree

329
00:14:50,280 --> 00:14:49,190
and that was called the the media

330
00:14:53,050 --> 00:14:50,290
treatment of the Hubble Space Telescope

331
00:14:55,060 --> 00:14:53,060
but that was that was five years of data

332
00:14:58,300 --> 00:14:55,070
that i took what year did that come out

333
00:15:00,520 --> 00:14:58,310
your thesis 1996 so 96 so later there

334
00:15:03,670 --> 00:15:00,530
had been a repair mission done by then

335
00:15:07,120 --> 00:15:03,680
and and so things have gotten had gotten

336
00:15:08,170 --> 00:15:07,130
pretty had gotten fixed so or a lot at

337
00:15:09,880 --> 00:15:08,180
least a lot of things have been

338
00:15:12,010 --> 00:15:09,890

addressed so that you bring up an

339
00:15:14,170 --> 00:15:12,020
interesting I want to kind of go with a

340
00:15:17,920 --> 00:15:14,180
little bit here and that is the cultural

341
00:15:19,600 --> 00:15:17,930
impact of of Hubble and you are in a

342
00:15:21,310 --> 00:15:19,610
position I think to really give us the

343
00:15:23,020 --> 00:15:21,320
good insight on it you were in on the

344
00:15:25,690 --> 00:15:23,030
beginning when they when the public was

345
00:15:27,880 --> 00:15:25,700
maybe the conversation was much more

346
00:15:30,130 --> 00:15:27,890
negative I think we all agree now that

347
00:15:31,240 --> 00:15:30,140
is not the conversation with Hubble and

348
00:15:33,430 --> 00:15:31,250
the media

349
00:15:35,350 --> 00:15:33,440
certainly not with the general public

350
00:15:37,920 --> 00:15:35,360
how have you what do you think has been

351
00:15:40,090 --> 00:15:37,930
mostly responsible for that change I

352
00:15:42,940 --> 00:15:40,100
kind of address that in my thesis a

353
00:15:44,380 --> 00:15:42,950
little bit a lot of it was I mean well

354
00:15:45,790 --> 00:15:44,390
it was hard it's just say at that time

355
00:15:47,830 --> 00:15:45,800
when I was writing a thesis exactly

356
00:15:50,560 --> 00:15:47,840
where all the factors were but but I

357
00:15:52,360 --> 00:15:50,570
dressed the one issue was the continuing

358
00:15:54,280 --> 00:15:52,370
drumbeat of science coming out every

359
00:15:56,050 --> 00:15:54,290
time there was a pretty picture I like

360
00:15:57,940 --> 00:15:56,060
to think that one nasty headline died

361
00:15:59,890 --> 00:15:57,950
and went to heaven you know because it

362
00:16:01,240 --> 00:15:59,900
basically removed a little bit more

363
00:16:03,130 --> 00:16:01,250

negative but in the beginning you know

364
00:16:04,870 --> 00:16:03,140
we had people like like Barbara Mikulski

365
00:16:07,120 --> 00:16:04,880
saying the things that she said in the

366
00:16:09,310 --> 00:16:07,130
background I was talking to mission

367
00:16:11,140 --> 00:16:09,320
scientists sandy Faber and people like

368
00:16:12,580 --> 00:16:11,150
that and were saying okay we know what

369
00:16:13,870 --> 00:16:12,590
the problem is now we know what it is

370
00:16:15,880 --> 00:16:13,880
and so we can get our hands around it

371
00:16:17,170 --> 00:16:15,890
and we can fix it but but even then I

372
00:16:18,400 --> 00:16:17,180
knew that there was a lot of debate

373
00:16:19,780 --> 00:16:18,410
inside the community in those first

374
00:16:22,180 --> 00:16:19,790
couple of months about what was going to

375
00:16:23,320 --> 00:16:22,190
be done but every time a good picture

376
00:16:26,110 --> 00:16:23,330
came out every time that there was a

377
00:16:28,060 --> 00:16:26,120
positive story it would change the

378
00:16:30,190 --> 00:16:28,070
conversation a little bit however for

379
00:16:31,990 --> 00:16:30,200
about four years every single time there

380
00:16:33,940 --> 00:16:32,000
was a story that came out you would see

381
00:16:35,920 --> 00:16:33,950
hubble sees great picture of whatever

382
00:16:37,390 --> 00:16:35,930
and then at the very bottom of the story

383
00:16:39,880 --> 00:16:37,400
or somewhere in the story they wouldn't

384
00:16:40,840 --> 00:16:39,890
that the media would say but you have to

385
00:16:42,790 --> 00:16:40,850
remit they would say something like

386
00:16:45,130 --> 00:16:42,800
remember this was the Hubble you know 15

387
00:16:46,540 --> 00:16:45,140
1.5 billion dollar Hubble that had all

388
00:16:48,579 --> 00:16:46,550

these problems they would remind you of

389
00:16:49,930 --> 00:16:48,589
the problems as soon as you as soon as

390
00:16:51,070 --> 00:16:49,940
you'd say something good they would want

391
00:16:53,890 --> 00:16:51,080
to remind you but remember it had

392
00:16:55,750 --> 00:16:53,900
problems so this happened well after I

393
00:16:58,840 --> 00:16:55,760
started doing some really good work then

394
00:17:01,300 --> 00:16:58,850
oh yeah yeah but it was a slow process I

395
00:17:04,179 --> 00:17:01,310
so I traced I traced stories for about

396
00:17:05,380 --> 00:17:04,189
five years using nexus and and just

397
00:17:07,980 --> 00:17:05,390
looked at all the way you can sort of

398
00:17:10,600 --> 00:17:07,990
almost graph this very smooth curve of

399
00:17:11,949 --> 00:17:10,610
positive stories going up in negative

400
00:17:13,809 --> 00:17:11,959
stories going down but there was this

401
00:17:14,920 --> 00:17:13,819
long period where every time they said

402
00:17:17,650 --> 00:17:14,930
anything they'd have to bring up the bad

403
00:17:20,260 --> 00:17:17,660
stuff yeah so it was always the price

404
00:17:22,900 --> 00:17:20,270
first yeah yeah yeahs always had a prize

405
00:17:24,610 --> 00:17:22,910
first two yeah it's funny how with most

406
00:17:28,120 --> 00:17:24,620
NASA almost anything they always have to

407
00:17:31,720 --> 00:17:28,130
say what the mission yeah I'm if you

408
00:17:33,610 --> 00:17:31,730
don't see that with rosetta yeah so

409
00:17:36,850 --> 00:17:33,620
Jonathan isin hammer hi Jonathan he's a

410
00:17:38,860 --> 00:17:36,860
he's a co-worker he is young the qnap he

411
00:17:40,840 --> 00:17:38,870
said the other spectrograph was thus

412
00:17:43,580 --> 00:17:40,850
paint the faint objects Becca thank you

413
00:17:46,519 --> 00:17:43,590

I was facing it out thank you very much

414
00:17:49,279 --> 00:17:46,529
yeah okay so we all facing out though I

415
00:17:50,450 --> 00:17:49,289
mean really it's true my last yes got

416
00:17:52,820 --> 00:17:50,460
our space on the space let's go over

417
00:17:54,350 --> 00:17:52,830
here for but but carol and i just want

418
00:17:57,140 --> 00:17:54,360
to say i don't think it was limited to

419
00:17:58,940 --> 00:17:57,150
five years even i mean even after sir

420
00:18:01,279 --> 00:17:58,950
this fifth servicing mission people are

421
00:18:04,279 --> 00:18:01,289
saying oh does it work you know it's

422
00:18:07,039 --> 00:18:04,289
like amazing it's a main name yeah they

423
00:18:08,630 --> 00:18:07,049
sure is boring yeah I was tracing it

424
00:18:10,279 --> 00:18:08,640
through the media but you're right I do

425
00:18:12,110 --> 00:18:10,289
a lot of public talks and I will still

426
00:18:14,659 --> 00:18:12,120
get questions from people so how did

427
00:18:17,180 --> 00:18:14,669
they fix it you know Ord is it fixed or

428
00:18:23,960 --> 00:18:17,190
is this some more like who cares its

429
00:18:25,460 --> 00:18:23,970
Morgan that's great actually so I don't

430
00:18:27,710 --> 00:18:25,470
think that working it's doing a

431
00:18:29,720 --> 00:18:27,720
phenomenal job it's doing something it

432
00:18:32,539 --> 00:18:29,730
was never intended to do like frontier

433
00:18:35,659 --> 00:18:32,549
fields to me blows me away what was able

434
00:18:37,580 --> 00:18:35,669
to do well I actually I mean we all sort

435
00:18:39,919 --> 00:18:37,590
of have this perspective I mean I

436
00:18:41,480 --> 00:18:39,929
remember or the American response so and

437
00:18:43,399 --> 00:18:41,490
to know I'm actually interested in what

438
00:18:45,440 --> 00:18:43,409

the European rusalka that was because I

439
00:18:47,899 --> 00:18:45,450
don't have much insight into what was

440
00:18:49,850 --> 00:18:47,909
happening during that time well it was

441
00:18:52,549 --> 00:18:49,860
not only what I dwell on it but it

442
00:18:56,450 --> 00:18:52,559
really interesting because I was

443
00:18:59,120 --> 00:18:56,460
actually here so I had more exposure on

444
00:19:02,210 --> 00:18:59,130
the American side too because i arrived

445
00:19:05,539 --> 00:19:02,220
in actually in 86 working on this

446
00:19:07,580 --> 00:19:05,549
project so as Carolyn said I I lived

447
00:19:11,630 --> 00:19:07,590
exactly i was working on the faint

448
00:19:13,460 --> 00:19:11,640
object camera which was the european

449
00:19:16,490 --> 00:19:13,470
contribution and we were all living

450
00:19:18,649 --> 00:19:16,500
through those horrible times right where

451
00:19:21,380 --> 00:19:18,659
you know the press was negative and

452
00:19:23,389 --> 00:19:21,390
everything was very negative but but the

453
00:19:25,639 --> 00:19:23,399
one the only one thing and yes the press

454
00:19:28,070 --> 00:19:25,649
continue to be negative for a while but

455
00:19:31,789 --> 00:19:28,080
on the other hand i think that what was

456
00:19:34,760 --> 00:19:31,799
remarkable and that in a sense to me

457
00:19:37,399 --> 00:19:34,770
started changing and turning around the

458
00:19:40,480 --> 00:19:37,409
feeling of people is the amazing job

459
00:19:43,399 --> 00:19:40,490
that the astronauts did in orbit horse

460
00:19:46,460 --> 00:19:43,409
hallucination i still remember watching

461
00:19:49,279 --> 00:19:46,470
that and being glued to the screen just

462
00:19:52,310 --> 00:19:49,289
you know watching these people

463
00:19:56,790 --> 00:19:52,320

performing this amazingly complicated

464
00:19:58,860 --> 00:19:56,800
task with the needs and a hand like me

465
00:20:01,200 --> 00:19:58,870
Kingdom seemed so simple like they were

466
00:20:03,540 --> 00:20:01,210
working in their backyard and I think

467
00:20:06,270 --> 00:20:03,550
that that really and end the visibility

468
00:20:07,920 --> 00:20:06,280
that servicing mission had you know with

469
00:20:10,260 --> 00:20:07,930
the public and with the audience they

470
00:20:13,050 --> 00:20:10,270
were all saying well we'll naza be able

471
00:20:15,390 --> 00:20:13,060
to fix this or we're doing with the

472
00:20:19,320 --> 00:20:15,400
techno Turkey I think that that will

473
00:20:22,650 --> 00:20:19,330
change the history of the project and

474
00:20:25,940 --> 00:20:22,660
also the sense we established NASA's

475
00:20:28,890 --> 00:20:25,950
reputation at the level that was

476
00:20:33,600 --> 00:20:28,900
incredible i mean people acquire so much

477
00:20:36,600 --> 00:20:33,610
respect for for me could you know put it

478
00:20:40,260 --> 00:20:36,610
together and deliver you know in such

479
00:20:43,080 --> 00:20:40,270
astonishing fashion and then when the

480
00:20:45,870 --> 00:20:43,090
first image of well 100 came down and

481
00:20:49,710 --> 00:20:45,880
the comparison between the the pre-start

482
00:20:52,320 --> 00:20:49,720
operation and the corrected image I mean

483
00:20:56,460 --> 00:20:52,330
it was just I remembered the WoW in the

484
00:21:00,060 --> 00:20:56,470
room it was just not you incredible so

485
00:21:02,520 --> 00:21:00,070
that is when you know the tide Jay I

486
00:21:03,810 --> 00:21:02,530
mean particularly in the astronomical

487
00:21:05,670 --> 00:21:03,820
community because I think at that point

488
00:21:07,830 --> 00:21:05,680

I had just joined the american

489
00:21:10,020 --> 00:21:07,840
astronomical society is as a student

490
00:21:11,790 --> 00:21:10,030
members a graduate student and at the

491
00:21:12,750 --> 00:21:11,800
meetings you still had people in the

492
00:21:14,100 --> 00:21:12,760
very beginning saying you know we've

493
00:21:16,080 --> 00:21:14,110
wasted this money we could have put it

494
00:21:17,700 --> 00:21:16,090
elsewhere right this one of attitude and

495
00:21:19,680 --> 00:21:17,710
then when that first m100 picture came

496
00:21:21,900 --> 00:21:19,690
out and then later on when the Deep

497
00:21:23,760 --> 00:21:21,910
Field picture I think there was nobody

498
00:21:26,820 --> 00:21:23,770
that believed anything differently after

499
00:21:29,670 --> 00:21:26,830
that right yes so Debbie Smith Judy

500
00:21:32,880 --> 00:21:29,680
Smith has a comment or Schmidt I'm sorry

501
00:21:35,010 --> 00:21:32,890
Judy Schmidt hi Judy by the way I'm over

502
00:21:36,870 --> 00:21:35,020
25 but it feels like Hubble has always

503
00:21:38,670 --> 00:21:36,880
been there for me I was always too young

504
00:21:40,740 --> 00:21:38,680
to watch the news or care about Hubble's

505
00:21:42,390 --> 00:21:40,750
eyesight problems at the start it's

506
00:21:44,010 --> 00:21:42,400
almost like it never happened and I have

507
00:21:46,200 --> 00:21:44,020
to agree I felt like the first real

508
00:21:48,450 --> 00:21:46,210
introduction for me with Hubble was when

509
00:21:51,660 --> 00:21:48,460
I saw the first deep field in the

510
00:21:53,490 --> 00:21:51,670
mid-90s and I saw how what that and I

511
00:21:55,710 --> 00:21:53,500
understood what that image meant and how

512
00:21:58,140 --> 00:21:55,720
it was taken that's when I first got

513
00:21:59,580 --> 00:21:58,150

into Hubble a lot and the other stuff I

514
00:22:01,410 --> 00:21:59,590
had heard about it on the news and i had

515
00:22:04,320 --> 00:22:01,420
heard all the problems with it but it

516
00:22:07,770 --> 00:22:04,330
wouldn't by the way side after after I

517
00:22:10,470 --> 00:22:07,780
saw the Hubble Deep Field so anyway

518
00:22:13,620 --> 00:22:10,480
that's a so the

519
00:22:15,150 --> 00:22:13,630
carolyn the have you well how would you

520
00:22:18,539 --> 00:22:15,160
characterize the news coverage now of

521
00:22:20,250 --> 00:22:18,549
Hubble versus back then well I don't see

522
00:22:22,230 --> 00:22:20,260
too many people writing about what it

523
00:22:24,510 --> 00:22:22,240
costs I mean I'm now part of the media

524
00:22:27,090 --> 00:22:24,520
so I get to write about it I the news

525
00:22:28,830 --> 00:22:27,100
the media now is so strung out I mean

526
00:22:31,830 --> 00:22:28,840
you have the mainstream media you have

527
00:22:33,539 --> 00:22:31,840
online media new media and those of us

528
00:22:35,760 --> 00:22:33,549
who do a lot of the work basically take

529
00:22:37,230 --> 00:22:35,770
Hubble's pictures we put them into our

530
00:22:39,659 --> 00:22:37,240
videos we put them into our stories and

531
00:22:42,480 --> 00:22:39,669
we use them one thing that I've seen is

532
00:22:44,100 --> 00:22:42,490
that you'll see people writing about new

533
00:22:45,690 --> 00:22:44,110
observatories that are coming out that

534
00:22:47,610 --> 00:22:45,700
are going to be just as good as Hubble

535
00:22:49,890 --> 00:22:47,620
or better than Hubble when you would not

536
00:22:51,390 --> 00:22:49,900
have seen that two decades ago you know

537
00:22:52,740 --> 00:22:51,400
nobody would have said that I remember

538
00:22:54,600 --> 00:22:52,750

that from Gemini because I did some

539
00:22:55,680 --> 00:22:54,610
projects with them and they they were

540
00:22:57,659 --> 00:22:55,690
saying we think we can do better than

541
00:23:00,120 --> 00:22:57,669
Hubble and I thought well Hubble's

542
00:23:02,549 --> 00:23:00,130
arrived you know it's now a good

543
00:23:04,140 --> 00:23:02,559
comparator man I think today I think

544
00:23:05,750 --> 00:23:04,150
today it's just it's another great thing

545
00:23:08,280 --> 00:23:05,760
and now it's more focused on the science

546
00:23:10,919 --> 00:23:08,290
I'm going to go back to the comment

547
00:23:13,770 --> 00:23:10,929
about the servicing missions when we

548
00:23:16,260 --> 00:23:13,780
were probably at the darkest moments at

549
00:23:18,090 --> 00:23:16,270
the University some of the astronauts

550
00:23:19,650 --> 00:23:18,100
who were going to be working on the on

551
00:23:22,530 --> 00:23:19,660
the mission came out for some training

552
00:23:24,810 --> 00:23:22,540
at Martin I guess it whistle card Martin

553
00:23:26,850 --> 00:23:24,820
Martin Marietta at that time Claude

554
00:23:28,440 --> 00:23:26,860
Nicoli and some in John and some of

555
00:23:30,049 --> 00:23:28,450
those people and they came out and they

556
00:23:32,220 --> 00:23:30,059
met with all of us and they basically

557
00:23:34,260 --> 00:23:32,230
plighted their troughed us and we're

558
00:23:35,940 --> 00:23:34,270
going to do the darn best we can to make

559
00:23:37,680 --> 00:23:35,950
it happen for you and I think that went

560
00:23:39,120 --> 00:23:37,690
a long ways towards helping us

561
00:23:41,130 --> 00:23:39,130
individually feel it I mean you had to

562
00:23:43,500 --> 00:23:41,140
feel it we on our team it was like grief

563
00:23:45,320 --> 00:23:43,510

and not too long before that we'd lost

564
00:23:47,549 --> 00:23:45,330
Mars Observer we had a team that had

565
00:23:48,930 --> 00:23:47,559
been on Mars Observer I forget when that

566
00:23:51,480 --> 00:23:48,940
was lost but it was a few years before

567
00:23:52,500 --> 00:23:51,490
that but wasn't crushed right well we

568
00:23:55,200 --> 00:23:52,510
don't know we don't know what happened

569
00:23:56,460 --> 00:23:55,210
to it um but but you know basically one

570
00:23:58,230 --> 00:23:56,470
day I'm walking down the hallway one of

571
00:24:00,030 --> 00:23:58,240
my professors walks up and he said we've

572
00:24:02,010 --> 00:24:00,040
just lost Mars Observer and he was in

573
00:24:03,390 --> 00:24:02,020
tears it was like you've lost a family

574
00:24:05,490 --> 00:24:03,400
member and we felt the same way about

575
00:24:07,470 --> 00:24:05,500
Hubble I mean Hubble still feels like my

576
00:24:08,940 --> 00:24:07,480
baby because you know we grew up with it

577
00:24:11,010 --> 00:24:08,950
so there's a lot of us who you know

578
00:24:12,299 --> 00:24:11,020
how'd that Hubble as tight as we can but

579
00:24:13,680 --> 00:24:12,309
when they came out and told us we're

580
00:24:15,840 --> 00:24:13,690
going to do the best we can we really

581
00:24:17,310 --> 00:24:15,850
appreciate you know your faith in us I

582
00:24:19,049 --> 00:24:17,320
mean it went a long ways towards helping

583
00:24:20,789 --> 00:24:19,059
us then when they would actually went

584
00:24:23,460 --> 00:24:20,799
out and did it as as she just said um

585
00:24:24,360 --> 00:24:23,470
it's amazing this is amazing i was at

586
00:24:26,340 --> 00:24:24,370
that the k

587
00:24:27,780 --> 00:24:26,350
watching that after the launch and we

588
00:24:30,930 --> 00:24:27,790

just were glued to the TV for days

589
00:24:34,320 --> 00:24:30,940
watching it that's a great story so

590
00:24:37,410 --> 00:24:34,330
Antonella tell us a little bit about we

591
00:24:39,600 --> 00:24:37,420
always said we hear a lot about NASA and

592
00:24:41,700 --> 00:24:39,610
ISA together when it comes to Hubble can

593
00:24:45,150 --> 00:24:41,710
you give us some idea of what ESA's role

594
00:24:48,720 --> 00:24:45,160
is right well it was was there since the

595
00:24:51,060 --> 00:24:48,730
beginning because in a sense you know if

596
00:24:53,310 --> 00:24:51,070
you remember the very very old history

597
00:24:56,100 --> 00:24:53,320
you know Hubble was born as a 3-meter

598
00:24:58,500 --> 00:24:56,110
telescope was called the large space

599
00:25:02,040 --> 00:24:58,510
telescope you know in the beginning of

600
00:25:03,810 --> 00:25:02,050
the 70s but then as soon as people

601
00:25:05,940 --> 00:25:03,820
started you know now as i started doing

602
00:25:09,630 --> 00:25:05,950
feasibility studies they realize the

603
00:25:12,419 --> 00:25:09,640
mission was very complex and listen

604
00:25:16,200 --> 00:25:12,429
listen that the cost was going up and up

605
00:25:20,880 --> 00:25:16,210
and up and what's new right under the

606
00:25:24,560 --> 00:25:20,890
Sun and so Congress basically instructed

607
00:25:27,450 --> 00:25:24,570
NASA to disco that's why we have a 2.4

608
00:25:29,430 --> 00:25:27,460
Hubble Space Telescope discovering

609
00:25:31,049 --> 00:25:29,440
that's where you you basically roll it

610
00:25:32,790 --> 00:25:31,059
bro back different features that you

611
00:25:36,140 --> 00:25:32,800
thought you were gonna make and you know

612
00:25:38,610 --> 00:25:36,150
make it smaller right and also they were

613
00:25:42,510 --> 00:25:38,620

encouraged to look for international

614
00:25:45,419 --> 00:25:42,520
partners to to share the cost and iza

615
00:25:47,730 --> 00:25:45,429
was actually coming out from a very nice

616
00:25:51,049 --> 00:25:47,740
partnership experience with the

617
00:25:53,940 --> 00:25:51,059
international ultraviolet Explorer iue

618
00:25:57,510 --> 00:25:53,950
bernisa and nasa had partner very

619
00:25:59,490 --> 00:25:57,520
successfully so so and iza was

620
00:26:01,620 --> 00:25:59,500
potentially interested to play a role in

621
00:26:06,600 --> 00:26:01,630
the hubble and so the partnership

622
00:26:09,990 --> 00:26:06,610
basically was started then and you know

623
00:26:14,040 --> 00:26:10,000
there were few years of negotiation but

624
00:26:16,770 --> 00:26:14,050
by 1977 the formal Memorandum of

625
00:26:19,169 --> 00:26:16,780
Understanding was signed and that

626
00:26:22,440 --> 00:26:19,179
basically stated that easy was going to

627
00:26:24,990 --> 00:26:22,450
provide the solar some hardware and this

628
00:26:27,540 --> 00:26:25,000
were solar arrays and the faint object

629
00:26:30,600 --> 00:26:27,550
camera one of the imaging instruments

630
00:26:33,030 --> 00:26:30,610
and a complement of people to support

631
00:26:36,020 --> 00:26:33,040
the mission in what at the time was

632
00:26:37,490 --> 00:26:36,030
expected to be a sort of 100 people

633
00:26:41,930 --> 00:26:37,500
institution

634
00:26:46,490 --> 00:26:41,940
so for the Hubble and so when st SE I

635
00:26:49,400 --> 00:26:46,500
you know started in the 1980s at the

636
00:26:51,500 --> 00:26:49,410
same time when we had you know us

637
00:26:53,410 --> 00:26:51,510
scientists we also had either scientists

638
00:26:57,440 --> 00:26:53,420

already on the premises and we have kept

639
00:27:00,980 --> 00:26:57,450
15 scientists you know here in Baltimore

640
00:27:03,680 --> 00:27:00,990
supporting the HST mission since so I

641
00:27:06,380 --> 00:27:03,690
think that iza you know they're very

642
00:27:07,940 --> 00:27:06,390
happy to be in such you know a reliable

643
00:27:11,150 --> 00:27:07,950
partner for all these years and they

644
00:27:13,460 --> 00:27:11,160
have enjoy the return which is you know

645
00:27:16,910 --> 00:27:13,470
the astronomic European astronomical

646
00:27:19,700 --> 00:27:16,920
community as access to fifteen percent

647
00:27:22,250 --> 00:27:19,710
of the you know of the time which you

648
00:27:24,050 --> 00:27:22,260
know is one competitively anyway so it

649
00:27:27,830 --> 00:27:24,060
has never been enforced but that's what

650
00:27:30,560 --> 00:27:27,840
the MOU says your allocated fifteen

651
00:27:33,470 --> 00:27:30,570
percent of Hubble of all Hubble time

652
00:27:35,720 --> 00:27:33,480
well every year when there is an

653
00:27:39,140 --> 00:27:35,730
allocation you know we make sure that

654
00:27:42,020 --> 00:27:39,150
European astronomers receive you know

655
00:27:43,580 --> 00:27:42,030
fifteen percent you know it's not over

656
00:27:46,040 --> 00:27:43,590
the lifetime of the mission but that's

657
00:27:47,630 --> 00:27:46,050
what the MOU would say you know it's

658
00:27:49,430 --> 00:27:47,640
interesting I did not know that ok so

659
00:27:50,720 --> 00:27:49,440
when the time allocation committee meets

660
00:27:53,060 --> 00:27:50,730
they have to meet certain requirements

661
00:27:55,550 --> 00:27:53,070
and one of them is that me but I can

662
00:27:57,980 --> 00:27:55,560
tell you that we are that's Richard we

663
00:28:00,620 --> 00:27:57,990

never had to enforce it because it is

664
00:28:02,750 --> 00:28:00,630
basically people win competitively on

665
00:28:04,610 --> 00:28:02,760
them you know now you know if you look

666
00:28:07,780 --> 00:28:04,620
at how science has evolved over the

667
00:28:10,580 --> 00:28:07,790
years now oh come all you know

668
00:28:12,860 --> 00:28:10,590
collaborations are international yeah so

669
00:28:16,640 --> 00:28:12,870
you know you cannot even you know go in

670
00:28:18,440 --> 00:28:16,650
distinguish know who belongs to hot I

671
00:28:20,180 --> 00:28:18,450
was gonna I was going to actually say

672
00:28:22,280 --> 00:28:20,190
that we don't talk about that very often

673
00:28:24,740 --> 00:28:22,290
we talk a lot about the benefits and how

674
00:28:26,270 --> 00:28:24,750
Hubble has changed all the way science

675
00:28:28,100 --> 00:28:26,280
is done we talked about that with the

676
00:28:30,230 --> 00:28:28,110
Hubble Deep Field but I think also the

677
00:28:32,840 --> 00:28:30,240
fact that we collaborate and we have

678
00:28:35,570 --> 00:28:32,850
people at the Institute who work you

679
00:28:38,750 --> 00:28:35,580
know hand in hand as that's really i

680
00:28:40,580 --> 00:28:38,760
mean i've been there are 19 years and

681
00:28:42,440 --> 00:28:40,590
it's just part of the culture it's just

682
00:28:44,930 --> 00:28:42,450
the way it is but it's it's really

683
00:28:47,360 --> 00:28:44,940
amazing and it's I think it's really

684
00:28:49,340 --> 00:28:47,370
been beneficial it's really changed

685
00:28:50,950 --> 00:28:49,350
things I think then if it had been just

686
00:28:53,750 --> 00:28:50,960
an American

687
00:28:55,460 --> 00:28:53,760
okay so let me see here we got a

688
00:28:56,600 --> 00:28:55,470

question from Vance McCauley who's going

689
00:28:58,549 --> 00:28:56,610
thanks for putting this great panel

690
00:29:01,190 --> 00:28:58,559
together this afternoon you're welcome

691
00:29:03,169 --> 00:29:01,200
the entire HST design and retrofit

692
00:29:07,870 --> 00:29:03,179
missions are amazing too weak to me I

693
00:29:15,460 --> 00:29:07,880
wave at both HST and ISS when they come

694
00:29:21,919 --> 00:29:15,470
so I yeah exactly okay we lost bros tony

695
00:29:25,460 --> 00:29:21,929
frozen oh dear yeah oh let's see if he

696
00:29:27,590 --> 00:29:25,470
comes back there I think it's just

697
00:29:33,500 --> 00:29:27,600
google plus hangout because a plug-in

698
00:29:35,510 --> 00:29:33,510
because i just upgraded it won't let me

699
00:29:37,669 --> 00:29:35,520
do you know how when you switch from one

700
00:29:39,860 --> 00:29:37,679
year to another keeps pop up until you

701
00:29:41,210 --> 00:29:39,870
I'll be right though I did it right

702
00:29:42,470 --> 00:29:41,220
before the Hangout and I'm wondering a

703
00:29:45,740 --> 00:29:42,480
pest on screwing I should have probably

704
00:29:47,480 --> 00:29:45,750
closed my browser did before I started

705
00:29:51,200 --> 00:29:47,490
but anyway my apologies if I see if I

706
00:29:53,510 --> 00:29:51,210
freeze up again so uh ok so the what's

707
00:29:55,310 --> 00:29:53,520
what was your and to the how how did you

708
00:29:58,970 --> 00:29:55,320
get involved in in the Hubble mission

709
00:30:02,779 --> 00:29:58,980
your site itself first experience I was

710
00:30:05,840 --> 00:30:02,789
I was in Europe I just got my PhD and I

711
00:30:08,480 --> 00:30:05,850
was looking a job offer serum there and

712
00:30:11,330 --> 00:30:08,490
and these opportunity to come work on

713
00:30:14,240 --> 00:30:11,340

the Hubble up and I you know for

714
00:30:17,899 --> 00:30:14,250
me it was just living in a living Europe

715
00:30:21,799 --> 00:30:17,909
moving to a different continent and but

716
00:30:26,690 --> 00:30:21,809
I was um an adventure than in a traveler

717
00:30:28,940 --> 00:30:26,700
so I said yeah I'm all hahaha and this

718
00:30:31,970 --> 00:30:28,950
was it and the interesting thing is that

719
00:30:35,450 --> 00:30:31,980
i arrived in january 86 there was a big

720
00:30:39,889 --> 00:30:35,460
rush to get ready for launch because we

721
00:30:42,200 --> 00:30:39,899
were in a one shuttle launch from our in

722
00:30:46,970 --> 00:30:42,210
our lunch mission and then unfortunately

723
00:30:50,510 --> 00:30:46,980
you know in january Challenger blew up

724
00:30:53,419 --> 00:30:50,520
so that was a horrendous moment that we

725
00:30:55,190 --> 00:30:53,429
all live you know especially because we

726
00:30:58,250 --> 00:30:55,200
were just watching like this is the one

727
00:31:02,000 --> 00:30:58,260
last mission before we go and so then

728
00:31:04,150 --> 00:31:02,010
everything was put on a you know slower

729
00:31:07,360 --> 00:31:04,160
pace which was

730
00:31:11,290 --> 00:31:07,370
a good way to get ready for the actual

731
00:31:13,990 --> 00:31:11,300
launch in 1990 and I was a postdoc of

732
00:31:17,260 --> 00:31:14,000
doctoral fellow working on the faint

733
00:31:20,380 --> 00:31:17,270
object cameras that was my role at the

734
00:31:25,270 --> 00:31:20,390
time so exactly like Carolyn was working

735
00:31:30,190 --> 00:31:25,280
for the g hrs i was there worrying about

736
00:31:32,980 --> 00:31:30,200
the FOC and FOC you know being an imager

737
00:31:36,720 --> 00:31:32,990
you know it is further elaboration was

738
00:31:40,360 --> 00:31:36,730

so visible and anything right because

739
00:31:43,990 --> 00:31:40,370
spectral k you lose your sensitivity you

740
00:31:46,960 --> 00:31:44,000
lose your your photons with images the

741
00:31:50,400 --> 00:31:46,970
just you know the brutality of the

742
00:31:54,910 --> 00:31:50,410
Strawbridge of the center to halo

743
00:31:57,850 --> 00:31:54,920
library she was just brutal and I think

744
00:32:01,540 --> 00:31:57,860
that instrument sort of never recovered

745
00:32:04,000 --> 00:32:01,550
from from being hit so hard but then you

746
00:32:06,610 --> 00:32:04,010
know then there was the resurrection

747
00:32:10,450 --> 00:32:06,620
with co-star and the brilliant idea that

748
00:32:12,430 --> 00:32:10,460
some engineers and scientists had

749
00:32:14,920 --> 00:32:12,440
working together to figure out this

750
00:32:18,400 --> 00:32:14,930
complex device that would you know

751
00:32:21,190 --> 00:32:18,410
basically deploy little corrective arms

752
00:32:24,310 --> 00:32:21,200
in front of the apertures of of the

753
00:32:26,650 --> 00:32:24,320
spectrographs and and actually restore

754
00:32:29,770 --> 00:32:26,660
pretty much the caroling in your case I

755
00:32:31,540 --> 00:32:29,780
think you know the hrs were pretty well

756
00:32:34,690 --> 00:32:31,550
off yeah we were throwing away half our

757
00:32:37,270 --> 00:32:34,700
data every time right right so I think

758
00:32:39,010 --> 00:32:37,280
it was a collected again you know

759
00:32:42,100 --> 00:32:39,020
talking about the International nature

760
00:32:44,290 --> 00:32:42,110
of the mission and also of the rescue

761
00:32:47,140 --> 00:32:44,300
mission people really you know worked

762
00:32:50,440 --> 00:32:47,150
really amazingly well together to try to

763
00:32:53,170 --> 00:32:50,450

figure it out and and fix it and then

764
00:32:57,070 --> 00:32:53,180
the astronaut of course you know my you

765
00:33:00,040 --> 00:32:57,080
know did it installing co-star and

766
00:33:01,000 --> 00:33:00,050
making it happen yeah the astronaut did

767
00:33:05,980 --> 00:33:01,010
it but we all know where the real work

768
00:33:09,010 --> 00:33:05,990
was so you mentioned earlier that the

769
00:33:11,680 --> 00:33:09,020
that ISA had built the solar arrays that

770
00:33:14,020 --> 00:33:11,690
were first launched with Hubble did they

771
00:33:15,970 --> 00:33:14,030
build the subsequent replacement arrays

772
00:33:17,060 --> 00:33:15,980
or was that done so there was just a

773
00:33:19,370 --> 00:33:17,070
one-time thing

774
00:33:23,169 --> 00:33:19,380
okay so so the ones that are on there

775
00:33:25,820 --> 00:33:23,179
now I have not been built at ease no no

776
00:33:28,490 --> 00:33:25,830
because the one that were built by Aiza

777
00:33:32,269 --> 00:33:28,500
had a problem they were too peaceful and

778
00:33:36,409 --> 00:33:32,279
so leaving the Terminator during the day

779
00:33:39,620 --> 00:33:36,419
night transition thermal tension would

780
00:33:42,830 --> 00:33:39,630
create some you know how can I say

781
00:33:44,930 --> 00:33:42,840
shakes to the telescope which were which

782
00:33:47,389 --> 00:33:44,940
were really not something you want to

783
00:33:49,610 --> 00:33:47,399
see in your observation of you don't

784
00:33:51,649 --> 00:33:49,620
want a vibrating oh you know you live

785
00:33:53,899 --> 00:33:51,659
and learn you design something and then

786
00:33:55,999 --> 00:33:53,909
you you're faced with a situation in

787
00:33:58,460 --> 00:33:56,009
space it is different for what you're

788
00:34:01,389 --> 00:33:58,470

new and then you have to adapt and

789
00:34:05,980 --> 00:34:01,399
design a new set of solar array which is

790
00:34:08,359 --> 00:34:05,990
which can you know overcome that issue

791
00:34:10,399 --> 00:34:08,369
so we had a hangout a few months ago

792
00:34:13,099 --> 00:34:10,409
with the guys at Goddard who actually

793
00:34:17,329 --> 00:34:13,109
operate the Hubble Space Telescope and

794
00:34:19,129 --> 00:34:17,339
and it does ISA have a role in that at

795
00:34:21,230 --> 00:34:19,139
all or is that is that pretty much done

796
00:34:23,270 --> 00:34:21,240
by NASA ok so what diseases roll these

797
00:34:25,129 --> 00:34:23,280
days what do you guys what do you guys

798
00:34:27,740 --> 00:34:25,139
find yourself doing mostly with with the

799
00:34:30,470 --> 00:34:27,750
mission we basically provide the 15

800
00:34:32,030 --> 00:34:30,480
scientist who are basically allocated

801
00:34:35,599 --> 00:34:32,040
support the mission both of them are

802
00:34:38,059 --> 00:34:35,609
instrument scientists so they work on

803
00:34:40,520 --> 00:34:38,069
you know calibrating and user support

804
00:34:43,280 --> 00:34:40,530
for the various instruments on board of

805
00:34:46,040 --> 00:34:43,290
the telescope you know the interesting

806
00:34:48,800 --> 00:34:46,050
thing about the agreement was stipulated

807
00:34:51,500 --> 00:34:48,810
at the beginning is that our stuff is

808
00:34:54,169 --> 00:34:51,510
fully integrated so they can provided

809
00:34:57,380 --> 00:34:54,179
air staying within the Hubble mission

810
00:35:00,530 --> 00:34:57,390
and large they can you know move

811
00:35:02,599 --> 00:35:00,540
whatever they skillset brings them so I

812
00:35:06,200 --> 00:35:02,609
was head of the science mission office

813
00:35:08,480 --> 00:35:06,210

for a while for example but most of my

814
00:35:10,160 --> 00:35:08,490
colleagues and my team members are all

815
00:35:13,160 --> 00:35:10,170
instruments scientists but we have

816
00:35:15,260 --> 00:35:13,170
archived scientists in the past we never

817
00:35:18,710 --> 00:35:15,270
had anybody now which I think that's

818
00:35:20,329 --> 00:35:18,720
something you alchy they are reach ever

819
00:35:22,400 --> 00:35:20,339
said I've been involved in with ISA have

820
00:35:25,490 --> 00:35:22,410
been with the ones that also do other

821
00:35:27,380 --> 00:35:25,500
emissions as well like ESO and and la

822
00:35:28,910 --> 00:35:27,390
few other things so the people they are

823
00:35:30,130 --> 00:35:28,920
awesome and that's those are they're

824
00:35:32,950 --> 00:35:30,140
also the ones who Morgan

825
00:35:35,260 --> 00:35:32,960
stand down cemented this video contest

826
00:35:38,110 --> 00:35:35,270
that we just talked about yeah yeah of

827
00:35:40,900 --> 00:35:38,120
my team yeah yeah yeah glad girl I have

828
00:35:44,230 --> 00:35:40,910
a question for Carolyn so we've been

829
00:35:46,570 --> 00:35:44,240
talking sort of with uh because many of

830
00:35:48,850 --> 00:35:46,580
us are here at Space Telescope we've

831
00:35:51,520 --> 00:35:48,860
been talking about this sort of

832
00:35:54,130 --> 00:35:51,530
Baltimore Washington centric would it

833
00:35:56,470 --> 00:35:54,140
what it was like you guys are out in

834
00:35:59,470 --> 00:35:56,480
Colorado and you're seeing this disaster

835
00:36:02,320 --> 00:35:59,480
um I'm just wondering like what you know

836
00:36:05,080 --> 00:36:02,330
what what your perspective was then and

837
00:36:06,610 --> 00:36:05,090
then how that's changed and it must have

838
00:36:10,750 --> 00:36:06,620

been pretty frightening to be so a

839
00:36:13,090 --> 00:36:10,760
little bit if people fly to the to NASA

840
00:36:15,700 --> 00:36:13,100
or what what happened oh I think jack

841
00:36:18,610 --> 00:36:15,710
flew out right away in fact look um I

842
00:36:20,680 --> 00:36:18,620
believe he was tasked to be out at NASA

843
00:36:22,420 --> 00:36:20,690
for the first six months anywhere in the

844
00:36:26,580 --> 00:36:22,430
Baltimore area for the first six months

845
00:36:30,040 --> 00:36:26,590
after launch anyway um he came back and

846
00:36:31,900 --> 00:36:30,050
we knew I mean we sort of knew when for

847
00:36:33,850 --> 00:36:31,910
some of the first images were sent down

848
00:36:35,350 --> 00:36:33,860
we all looked at and everybody kind of

849
00:36:37,890 --> 00:36:35,360
knew this was going on but there was a

850
00:36:40,390 --> 00:36:37,900
lot of denial going on at the time about

851
00:36:41,860 --> 00:36:40,400
both sandy Faber basically said they had

852
00:36:44,230 --> 00:36:41,870
to stand up and shattered each other in

853
00:36:46,810 --> 00:36:44,240
meetings and when they when I think it

854
00:36:47,890 --> 00:36:46,820
was Tony angels dr. angel stood up and

855
00:36:50,590 --> 00:36:47,900
said let's looks like spherical

856
00:36:52,240 --> 00:36:50,600
aberration she been saying all along he

857
00:36:54,280 --> 00:36:52,250
said that's that she said that's when we

858
00:36:55,870 --> 00:36:54,290
knew we were well and truly dead she's

859
00:36:58,300 --> 00:36:55,880
telling me this like four years or three

860
00:37:00,880 --> 00:36:58,310
years after the fact at that point which

861
00:37:02,560 --> 00:37:00,890
was second third week in June Jack made

862
00:37:05,140 --> 00:37:02,570
a special trip back out to Colorado

863
00:37:07,150 --> 00:37:05,150

gathered us all and said we know what we

864
00:37:08,590 --> 00:37:07,160
think it is and we'd all been talking

865
00:37:11,770 --> 00:37:08,600
about it you're not to talk to the press

866
00:37:13,570 --> 00:37:11,780
let the Space Telescope Institute handle

867
00:37:15,310 --> 00:37:13,580
it because you guys were sort of at

868
00:37:17,050 --> 00:37:15,320
Ground Zero and then you were having to

869
00:37:18,700 --> 00:37:17,060
formalize it I mean you know basically

870
00:37:20,080 --> 00:37:18,710
come up with a response for all of this

871
00:37:21,970 --> 00:37:20,090
and it would not help for all of us out

872
00:37:23,020 --> 00:37:21,980
the field to say anything that being

873
00:37:25,630 --> 00:37:23,030
said we did get a lot of phone calls

874
00:37:27,520 --> 00:37:25,640
from the press locally and we would say

875
00:37:28,930 --> 00:37:27,530
things like what we knew we were allowed

876
00:37:31,930 --> 00:37:28,940
to say we would say otherwise we have to

877
00:37:34,000 --> 00:37:31,940
defer to so then so then how do you get

878
00:37:37,000 --> 00:37:34,010
how does the team get past that and then

879
00:37:41,800 --> 00:37:37,010
you know the participation now in you

880
00:37:43,000 --> 00:37:41,810
know once it was fixed well um once it

881
00:37:44,860 --> 00:37:43,010
was fixed

882
00:37:46,330 --> 00:37:44,870
we were dancing I mean you know we were

883
00:37:48,730 --> 00:37:46,340
getting data we weren't throwing half of

884
00:37:50,110 --> 00:37:48,740
it away the deconvolution algorithms

885
00:37:52,090 --> 00:37:50,120
we'd been able to pull things out before

886
00:37:55,360 --> 00:37:52,100
that's we we weren't throwing it quite

887
00:37:56,680 --> 00:37:55,370
away but when I first when I got back

888
00:37:58,120 --> 00:37:56,690

rien volved with it quite heavily

889
00:38:00,040 --> 00:37:58,130
because for long it there was something

890
00:38:02,290 --> 00:38:00,050
for you to do I came back in and I was

891
00:38:04,630 --> 00:38:02,300
helping to figure out how we were going

892
00:38:06,280 --> 00:38:04,640
to apply for time and how what we were

893
00:38:08,310 --> 00:38:06,290
going to do to make that day to work for

894
00:38:11,140 --> 00:38:08,320
us and you know with the pipeline

895
00:38:12,910 --> 00:38:11,150
processing and all that sort of stuff we

896
00:38:14,230 --> 00:38:12,920
were very busy working on that so we

897
00:38:15,550 --> 00:38:14,240
were focused on something that we knew

898
00:38:17,350 --> 00:38:15,560
would help make things better and that

899
00:38:19,120 --> 00:38:17,360
really helped a lot that you know this

900
00:38:20,890 --> 00:38:19,130
is a future thing this is not over dead

901
00:38:22,360 --> 00:38:20,900
in the water then when the first

902
00:38:24,190 --> 00:38:22,370
servicing mission results came back

903
00:38:26,680 --> 00:38:24,200
everybody was pretty much dancing and at

904
00:38:28,870 --> 00:38:26,690
that point i remember it was like okay

905
00:38:30,400 --> 00:38:28,880
it's more routine now I mean here they

906
00:38:31,510 --> 00:38:30,410
were still problems obviously I mean

907
00:38:33,490 --> 00:38:31,520
they were you know we have problems with

908
00:38:36,970 --> 00:38:33,500
submitting proposals on all this but but

909
00:38:38,320 --> 00:38:36,980
we got it done and we got people being

910
00:38:41,410 --> 00:38:38,330
able to say oh geez now I can finish my

911
00:38:43,270 --> 00:38:41,420
PhD you know it's a couple one of my one

912
00:38:45,130 --> 00:38:43,280
of my partners in the office was working

913
00:38:46,600 --> 00:38:45,140

on Alpha Ori and it's like oh my god how

914
00:38:48,940 --> 00:38:46,610
am I going to do this you know and then

915
00:38:51,010 --> 00:38:48,950
a couple years later when Dave leckrone

916
00:38:52,690 --> 00:38:51,020
did all the work on KY loopy that was

917
00:38:54,610 --> 00:38:52,700
sort of like the gold standard so to

918
00:38:57,790 --> 00:38:54,620
just explain that one Dave leckrone used

919
00:39:00,580 --> 00:38:57,800
the GHS look at the peculiar of peculiar

920
00:39:02,920 --> 00:39:00,590
Star Chi loopy and saw many many

921
00:39:04,600 --> 00:39:02,930
chemical species in it that normally had

922
00:39:06,070 --> 00:39:04,610
not been seen as stars before could not

923
00:39:08,170 --> 00:39:06,080
have been done without the work that was

924
00:39:10,090 --> 00:39:08,180
done on G hrs and he won an award for

925
00:39:12,130 --> 00:39:10,100
that I think that was a vindication and

926
00:39:13,600 --> 00:39:12,140
we talked a lot about that at the G hrs

927
00:39:15,820 --> 00:39:13,610
results conference we had a few years

928
00:39:17,140 --> 00:39:15,830
later so we actually were able to put

929
00:39:19,630 --> 00:39:17,150
together a book I have it back here it's

930
00:39:20,650 --> 00:39:19,640
a book about about that thick now of all

931
00:39:23,650 --> 00:39:20,660
the results that we did the first

932
00:39:25,060 --> 00:39:23,660
several years of G hrs data so at some

933
00:39:27,010 --> 00:39:25,070
point I think right after the first

934
00:39:28,870 --> 00:39:27,020
servicing mission it was like okay full

935
00:39:30,580 --> 00:39:28,880
speed ahead let's go yeah we know we had

936
00:39:32,890 --> 00:39:30,590
problems you know but we can put the

937
00:39:34,330 --> 00:39:32,900
oars in the water we can go so Carol let

938
00:39:35,980 --> 00:39:34,340

me put that same question back to you

939
00:39:41,080 --> 00:39:35,990
then what were things like at the

940
00:39:42,910 --> 00:39:41,090
Institute me your eyes on me um well

941
00:39:45,130 --> 00:39:42,920
well I was in there I was in the

942
00:39:47,440 --> 00:39:45,140
outreach office and I actually didn't

943
00:39:52,090 --> 00:39:47,450
join the project until the telescope was

944
00:39:54,460 --> 00:39:52,100
fixed okay oh so I see Carol is the

945
00:39:57,800 --> 00:39:54,470
master Crispin

946
00:40:00,890 --> 00:39:57,810
very smart ya know I was always working

947
00:40:03,680 --> 00:40:00,900
on the extreme ultraviolet Explorer okay

948
00:40:07,340 --> 00:40:03,690
i'm at that time in California and I got

949
00:40:10,670 --> 00:40:07,350
teased over to Baltimore you know garden

950
00:40:14,690 --> 00:40:10,680
spot of the mid-atlantic from home or

951
00:40:18,380 --> 00:40:14,700
neah when people tell me is coming hope

952
00:40:19,970 --> 00:40:18,390
you miss me highway um so I joined the

953
00:40:22,010 --> 00:40:19,980
office of public outreach and actually I

954
00:40:24,950 --> 00:40:22,020
joined it just won the first image came

955
00:40:26,980 --> 00:40:24,960
back from the sourcing mission um and it

956
00:40:30,440 --> 00:40:26,990
was it was great because at that point

957
00:40:33,320 --> 00:40:30,450
everybody was it was like oh my god this

958
00:40:36,530 --> 00:40:33,330
worked we have a close ago we were

959
00:40:39,080 --> 00:40:36,540
practically in tears lastic you know was

960
00:40:41,320 --> 00:40:39,090
really fantastic in it and from the

961
00:40:45,470 --> 00:40:41,330
community side i had been because i am a

962
00:40:49,970 --> 00:40:45,480
goal nirav red astronomer my nature but

963
00:40:52,040 --> 00:40:49,980

ground-based it we all were watching

964
00:40:53,720 --> 00:40:52,050
like and participating and how can you

965
00:40:56,870 --> 00:40:53,730
take the imagery and do this image

966
00:40:58,700 --> 00:40:56,880
processing complex image processing as

967
00:41:00,260 --> 00:40:58,710
Antonella talked about the coral you

968
00:41:02,180 --> 00:41:00,270
could get the core of the image but then

969
00:41:03,980 --> 00:41:02,190
there was all this god of light and you

970
00:41:05,270 --> 00:41:03,990
know can you process it and people

971
00:41:07,010 --> 00:41:05,280
tearing your hair out and making

972
00:41:08,900 --> 00:41:07,020
algorithms to see what they could get

973
00:41:10,460 --> 00:41:08,910
out of it and it they could tell that

974
00:41:13,010 --> 00:41:10,470
the telescope had a lot of promise

975
00:41:14,780 --> 00:41:13,020
because those cores were you know there

976
00:41:16,940 --> 00:41:14,790
are pinpoints it was like I mean if we

977
00:41:20,930 --> 00:41:16,950
can have that we get were golden and

978
00:41:23,420 --> 00:41:20,940
then it happened and so um it was just

979
00:41:25,730 --> 00:41:23,430
great and so people were learning how to

980
00:41:27,890 --> 00:41:25,740
then you have the normal situation where

981
00:41:29,750 --> 00:41:27,900
you have a telescope as if it's brand

982
00:41:31,910 --> 00:41:29,760
new and you start learning how to

983
00:41:34,160 --> 00:41:31,920
calibrate it and get the most out of the

984
00:41:36,890 --> 00:41:34,170
telescope of course you want fantastic

985
00:41:39,680 --> 00:41:36,900
early results and then you start combing

986
00:41:42,350 --> 00:41:39,690
through all that data to get every

987
00:41:45,650 --> 00:41:42,360
little bit out of the data because then

988
00:41:47,660 --> 00:41:45,660

the data was exquisite and then it was

989
00:41:50,780 --> 00:41:47,670
easy you made these images you said and

990
00:41:54,200 --> 00:41:50,790
keep putting them out the public then is

991
00:41:56,330 --> 00:41:54,210
starting to support you and you know

992
00:41:58,040 --> 00:41:56,340
then they were willing to understand

993
00:42:00,830 --> 00:41:58,050
that we could do even better by

994
00:42:02,870 --> 00:42:00,840
upgrading the telescope even more time

995
00:42:05,090 --> 00:42:02,880
so it was a really exciting time it

996
00:42:07,040 --> 00:42:05,100
still is I mean it's so great I mean I

997
00:42:07,310 --> 00:42:07,050
don't want the inter sense a brand new

998
00:42:10,670 --> 00:42:07,320
tell

999
00:42:12,560 --> 00:42:10,680
scope it was serviced in 2009 to me it's

1000
00:42:14,990 --> 00:42:12,570
a practically a five year old telescope

1001
00:42:16,940 --> 00:42:15,000
not 25 now one of the interesting things

1002
00:42:18,590 --> 00:42:16,950
to is from the all the work they did on

1003
00:42:20,330 --> 00:42:18,600
the deconvolution algorithms and the

1004
00:42:22,040 --> 00:42:20,340
work to pull that data out it actually

1005
00:42:24,500 --> 00:42:22,050
went and benefited other instruments do

1006
00:42:26,720 --> 00:42:24,510
not any found a still as other

1007
00:42:28,970 --> 00:42:26,730
telescopes so it was work that you know

1008
00:42:30,170 --> 00:42:28,980
at the time the how serendipitous it

1009
00:42:33,290 --> 00:42:30,180
sure looked like it was a pain at the

1010
00:42:35,750 --> 00:42:33,300
time exactly right so it's a good

1011
00:42:38,270 --> 00:42:35,760
technical contribution to science in

1012
00:42:40,100 --> 00:42:38,280
general yeah all right well that's

1013
00:42:42,020 --> 00:42:40,110

really great so I don't see any

1014
00:42:43,700 --> 00:42:42,030
questions or comments on that yet I've

1015
00:42:46,820 --> 00:42:43,710
got a great comment here oh ok go ahead

1016
00:42:49,700 --> 00:42:46,830
page from sub dust bunny says for me I

1017
00:42:52,580 --> 00:42:49,710
feel awesome pretty much all of society

1018
00:42:54,980 --> 00:42:52,590
cannot help but appreciate the HST it's

1019
00:42:56,420 --> 00:42:54,990
not only is it clear what is done for

1020
00:42:59,150 --> 00:42:56,430
science and the understanding of our

1021
00:43:01,280 --> 00:42:59,160
universe and then providing images that

1022
00:43:02,960 --> 00:43:01,290
allowed everyone even those with no

1023
00:43:04,730 --> 00:43:02,970
interest in science tomorrow at the

1024
00:43:07,010 --> 00:43:04,740
beauty and wonder of the universe and

1025
00:43:09,620 --> 00:43:07,020
inspires a new generation of scientists

1026
00:43:12,830 --> 00:43:09,630
that every complements our show by I

1027
00:43:17,660 --> 00:43:12,840
can't agree more i think that i know

1028
00:43:20,210 --> 00:43:17,670
inspired me i know that i'm the youngest

1029
00:43:24,500 --> 00:43:20,220
one in this hangout but it's been

1030
00:43:30,350 --> 00:43:24,510
something i don't have more by that um

1031
00:43:34,520 --> 00:43:30,360
oh carol is a close second yeah fine

1032
00:43:36,050 --> 00:43:34,530
fine but it's something that i feel very

1033
00:43:38,330 --> 00:43:36,060
proud to be able to help tell the story

1034
00:43:41,270 --> 00:43:38,340
of when it was something that had always

1035
00:43:43,220 --> 00:43:41,280
inspired me being able to see these

1036
00:43:44,750 --> 00:43:43,230
beautiful images and now having this

1037
00:43:48,080 --> 00:43:44,760
privilege of being able to be part of it

1038
00:43:50,360 --> 00:43:48,090

i absolutely love it i know that many of

1039
00:43:52,520 --> 00:43:50,370
my friends and colleagues that are up

1040
00:43:54,320 --> 00:43:52,530
here in California as well even though

1041
00:43:56,450 --> 00:43:54,330
they work in planetary science because

1042
00:43:58,610 --> 00:43:56,460
most of them are at JPL they tell all

1043
00:43:59,990 --> 00:43:58,620
the time that Hubble had inspired them

1044
00:44:01,610 --> 00:44:00,000
to get into science even though they're

1045
00:44:04,040 --> 00:44:01,620
doing something completely different it

1046
00:44:06,650 --> 00:44:04,050
still got them into space and wanting

1047
00:44:10,310 --> 00:44:06,660
them to find their own passion of

1048
00:44:12,650 --> 00:44:10,320
exploring space so handsome you do see

1049
00:44:14,180 --> 00:44:12,660
hubble pictures show up in interesting

1050
00:44:16,250 --> 00:44:14,190
places that I think maybe one of the

1051
00:44:17,510 --> 00:44:16,260
other hangouts I mentioned that you know

1052
00:44:19,520 --> 00:44:17,520
if you watch Star Trek The Next

1053
00:44:19,920 --> 00:44:19,530
Generation Star Trek Voyager some of

1054
00:44:22,170 --> 00:44:19,930
those image

1055
00:44:23,700 --> 00:44:22,180
showed up largely because of andre

1056
00:44:26,100 --> 00:44:23,710
bormanis and his love for it he would

1057
00:44:28,230 --> 00:44:26,110
say let's get these on there you see

1058
00:44:30,090 --> 00:44:28,240
them all the time and you know in many

1059
00:44:33,540 --> 00:44:30,100
places when I give I give a lot of

1060
00:44:35,520 --> 00:44:33,550
lectures on board ship and if I do a

1061
00:44:36,780 --> 00:44:35,530
Hubble talk it's like an instant hit you

1062
00:44:37,920 --> 00:44:36,790
know it doesn't matter what it is I

1063
00:44:39,030 --> 00:44:37,930

could show the same talk five times

1064
00:44:41,550 --> 00:44:39,040
everybody's gonna show up because they

1065
00:44:43,950 --> 00:44:41,560
really want to see it right well and one

1066
00:44:46,020 --> 00:44:43,960
that we just had a few weeks ago and you

1067
00:44:48,530 --> 00:44:46,030
know when my friends carry and carry

1068
00:44:52,800 --> 00:44:48,540
beam she's on the dawn mission oh yeah

1069
00:44:55,740 --> 00:44:52,810
they just released their their highest

1070
00:44:58,470 --> 00:44:55,750
resolution of series ever but Hubble was

1071
00:45:00,150 --> 00:44:58,480
used to in collaboration with those

1072
00:45:01,470 --> 00:45:00,160
other missions as well and she you know

1073
00:45:04,170 --> 00:45:01,480
she was always telling me about how

1074
00:45:06,720 --> 00:45:04,180
Hubble had inspired her and now she was

1075
00:45:08,520 --> 00:45:06,730
able to use Hubble data to help take

1076
00:45:10,880 --> 00:45:08,530
pictures to point the spacecraft at

1077
00:45:14,940 --> 00:45:10,890
series and now surpasses in resolution

1078
00:45:17,910 --> 00:45:14,950
for for serious so I think the phd zap

1079
00:45:20,370 --> 00:45:17,920
talent level stuff oh how far and wide

1080
00:45:22,170 --> 00:45:20,380
Hubble has been able to inspire people I

1081
00:45:23,850 --> 00:45:22,180
think that's been a little bit of a

1082
00:45:26,280 --> 00:45:23,860
surprise is that people don't think of

1083
00:45:29,820 --> 00:45:26,290
how much science has been done with in

1084
00:45:31,740 --> 00:45:29,830
this on solar system objects with Hubble

1085
00:45:34,710 --> 00:45:31,750
because you always think of Cosmos star

1086
00:45:37,230 --> 00:45:34,720
formation exoplanets you know you know

1087
00:45:39,150 --> 00:45:37,240
deep cosmology but there has been quite

1088
00:45:42,720 --> 00:45:39,160

a bit of work and you know and famously

1089
00:45:44,370 --> 00:45:42,730
the shoemaker-levy object that hit you

1090
00:45:48,780 --> 00:45:44,380
but it was early on to and that really

1091
00:45:50,850 --> 00:45:48,790
helped um the street creds for I was

1092
00:45:55,350 --> 00:45:50,860
going to share a little story antonella

1093
00:45:58,170 --> 00:45:55,360
and I many years ago um went to Papua

1094
00:46:02,940 --> 00:45:58,180
New Guinea and we were on a trip there

1095
00:46:05,820 --> 00:46:02,950
the families and we ran into well one of

1096
00:46:07,590 --> 00:46:05,830
the guys on the ship was a dive ship he

1097
00:46:09,750 --> 00:46:07,600
was not actually literate he couldn't

1098
00:46:11,670 --> 00:46:09,760
read and he sort of made a mark for his

1099
00:46:14,280 --> 00:46:11,680
name but he could pick Hubble out in the

1100
00:46:16,740 --> 00:46:14,290
sky he knew what about halls got was

1101
00:46:18,360 --> 00:46:16,750
that's great notice one night you

1102
00:46:22,110 --> 00:46:18,370
because it was really dr. we like Erica

1103
00:46:24,210 --> 00:46:22,120
very happy the number one number two we

1104
00:46:25,560 --> 00:46:24,220
handed out some we had just made a bunch

1105
00:46:29,100 --> 00:46:25,570
of these little trading cards with

1106
00:46:30,900 --> 00:46:29,110
galaxies and planets hotel and we had a

1107
00:46:32,700 --> 00:46:30,910
pack a couple packs of them with us and

1108
00:46:33,240 --> 00:46:32,710
we handed them out to these little kids

1109
00:46:35,220 --> 00:46:33,250
and they were

1110
00:46:39,390 --> 00:46:35,230
cool they had kind of heard about this

1111
00:46:40,980 --> 00:46:39,400
telescope and another thing was we had

1112
00:46:43,830 --> 00:46:40,990
we had been traveling around and we

1113
00:46:48,570 --> 00:46:43,840

visit a guy who had a cook plantation

1114
00:46:50,760 --> 00:46:48,580
and during our tour he radioed to the

1115
00:46:53,640 --> 00:46:50,770
captain the observations of the moon

1116
00:46:55,980 --> 00:46:53,650
from Hubble the results which I thought

1117
00:46:58,620 --> 00:46:55,990
was kind of amazing every man and we're

1118
00:47:00,840 --> 00:46:58,630
like oh oh it was kind of like that's

1119
00:47:04,020 --> 00:47:00,850
neat but how did they find us we were

1120
00:47:06,500 --> 00:47:04,030
trying to escape work they're sending us

1121
00:47:09,450 --> 00:47:06,510
work results and we're like neat but

1122
00:47:17,010 --> 00:47:09,460
okay thanks there's no order as you can

1123
00:47:19,530 --> 00:47:17,020
go Carol apparently not so Adam synergy

1124
00:47:21,240 --> 00:47:19,540
has an interesting question on QA if you

1125
00:47:23,580 --> 00:47:21,250
were to ask people that don't have a big

1126
00:47:26,910 --> 00:47:23,590
interest in astronomy to name a Space

1127
00:47:28,650 --> 00:47:26,920
Telescope what would they say and I

1128
00:47:29,790 --> 00:47:28,660
think we would have to be hubble right

1129
00:47:31,950 --> 00:47:29,800
if they're going to name I mean that

1130
00:47:35,130 --> 00:47:31,960
would be the one that that is is most

1131
00:47:37,290 --> 00:47:35,140
well known so but the great thing about

1132
00:47:39,510 --> 00:47:37,300
Hubble and in an astronomy in general

1133
00:47:41,280 --> 00:47:39,520
it's always been very easy to get people

1134
00:47:44,520 --> 00:47:41,290
interested in astronomy because of the

1135
00:47:46,530 --> 00:47:44,530
content the material is very it's very

1136
00:47:48,210 --> 00:47:46,540
accessible very beautiful they buried it

1137
00:47:50,070 --> 00:47:48,220
really captures the imagination so

1138
00:47:53,040 --> 00:47:50,080

astronomy has always made it very easy

1139
00:47:55,710 --> 00:47:53,050
to get people into science but Hubble

1140
00:48:00,300 --> 00:47:55,720
has given views of the sky that are just

1141
00:48:02,250 --> 00:48:00,310
unparalleled so I did so we got a couple

1142
00:48:04,770 --> 00:48:02,260
more comment questions here Cecil Morgan

1143
00:48:06,750 --> 00:48:04,780
is asking can we use interview excerpts

1144
00:48:10,860 --> 00:48:06,760
from the front from your hangouts and

1145
00:48:13,200 --> 00:48:10,870
our we use interview excerpts from your

1146
00:48:15,270 --> 00:48:13,210
hangouts in our video for the contest

1147
00:48:21,060 --> 00:48:15,280
not if you make us say things we didn't

1148
00:48:24,960 --> 00:48:21,070
intend to say out of context not a scary

1149
00:48:29,130 --> 00:48:24,970
the perilous seas all not sure Nikita

1150
00:48:31,080 --> 00:48:29,140
net is is asking is HST replacement when

1151
00:48:34,200 --> 00:48:31,090
needed a must for the Advancement of

1152
00:48:36,300 --> 00:48:34,210
science the explanation to the general

1153
00:48:42,760 --> 00:48:36,310
public and or the enhancement of other

1154
00:48:45,670 --> 00:48:42,770
projects uh the HTS replacement for days

1155
00:48:49,270 --> 00:48:45,680
yeah uh that guess that means jdub James

1156
00:48:54,550 --> 00:48:49,280
Webb Space Telescope magon w first after

1157
00:48:55,900 --> 00:48:54,560
ya w first following that uh it is it

1158
00:48:57,340 --> 00:48:55,910
needed for the advancement of science

1159
00:48:58,720 --> 00:48:57,350
and makes explanation to the general

1160
00:49:02,260 --> 00:48:58,730
public i would my answer to that would

1161
00:49:04,870 --> 00:49:02,270
be absolutely we cannot see some areas

1162
00:49:07,390 --> 00:49:04,880
of the universe without the webb space

1163
00:49:09,520 --> 00:49:07,400

telescope and the infrared capabilities

1164
00:49:11,530 --> 00:49:09,530
are going to make us see things that

1165
00:49:14,380 --> 00:49:11,540
also Hubble can't not currently c plus

1166
00:49:19,120 --> 00:49:14,390
the size of the objective resolution

1167
00:49:21,160 --> 00:49:19,130
will be way beyond what Hubble can

1168
00:49:23,710 --> 00:49:21,170
currently do so and it's a good analogy

1169
00:49:25,840 --> 00:49:23,720
is you know going from having just an

1170
00:49:27,820 --> 00:49:25,850
optical microscope to having a scanning

1171
00:49:30,700 --> 00:49:27,830
electron microscope the thinking the

1172
00:49:32,650 --> 00:49:30,710
things that we've learned by pushing our

1173
00:49:34,810 --> 00:49:32,660
limits of what we can observe with it so

1174
00:49:37,630 --> 00:49:34,820
it goes on all scales and when we're

1175
00:49:39,640 --> 00:49:37,640
able to observe things in a deeper way

1176
00:49:42,970 --> 00:49:39,650
so now we're having to look getting to

1177
00:49:45,010 --> 00:49:42,980
look at longer wavelengths with j ust it

1178
00:49:46,810 --> 00:49:45,020
has worked the same way in the opposite

1179
00:49:48,820 --> 00:49:46,820
direction so the further we can reach

1180
00:49:50,410 --> 00:49:48,830
into observing the universe in any

1181
00:49:53,380 --> 00:49:50,420
direction i think is going to help the

1182
00:49:56,080 --> 00:49:53,390
advancement of science well i also will

1183
00:49:58,210 --> 00:49:56,090
say that that Hubble makes it I mean any

1184
00:50:00,520 --> 00:49:58,220
telescope makes advances we do these

1185
00:50:03,310 --> 00:50:00,530
observations and so we get some answers

1186
00:50:05,380 --> 00:50:03,320
we do build models we say okay we think

1187
00:50:07,780 --> 00:50:05,390
it's like that but you know what what

1188
00:50:09,460 --> 00:50:07,790

about this other part or you know what

1189
00:50:12,610 --> 00:50:09,470
about if we looked back a little further

1190
00:50:15,910 --> 00:50:12,620
Oh clan we actually see resolve those

1191
00:50:18,400 --> 00:50:15,920
disks around planet so for every

1192
00:50:20,050 --> 00:50:18,410
breakthrough and discovery we have we

1193
00:50:21,820 --> 00:50:20,060
have more questions we want to know

1194
00:50:24,820 --> 00:50:21,830
things in greater detail we want to have

1195
00:50:28,450 --> 00:50:24,830
better models so it's it it that science

1196
00:50:30,460 --> 00:50:28,460
doesn't stop right one telescope can we

1197
00:50:31,450 --> 00:50:30,470
know everything well I thought yeah

1198
00:50:33,640 --> 00:50:31,460
that's what I thought we knew everything

1199
00:50:37,540 --> 00:50:33,650
about home for a while now so

1200
00:50:41,950 --> 00:50:37,550
yeah sorry oh okay the hub is the small

1201
00:50:43,840 --> 00:50:41,960
things yes oh poor meter is you know

1202
00:50:46,090 --> 00:50:43,850
comparing even to the ground-based

1203
00:50:48,490 --> 00:50:46,100
telescope we see now it's a small

1204
00:50:52,030 --> 00:50:48,500
telescope so if we want to go deeper

1205
00:50:54,460 --> 00:50:52,040
farther or more sensitive we need you

1206
00:50:55,840 --> 00:50:54,470
know a larger telescope in space so you

1207
00:50:58,450 --> 00:50:55,850
have this eve of the large

1208
00:51:00,430 --> 00:50:58,460
we need even larger telescope in the

1209
00:51:03,280 --> 00:51:00,440
future if you want to find life out

1210
00:51:06,190 --> 00:51:03,290
there for example so I'm gonna think

1211
00:51:07,960 --> 00:51:06,200
about that's true all right Scott if I

1212
00:51:09,730 --> 00:51:07,970
if I gotten everything did you do you

1213
00:51:11,290 --> 00:51:09,740

see anything else I and I believe have

1214
00:51:14,740 --> 00:51:11,300
everything else taking care of that I

1215
00:51:16,330 --> 00:51:14,750
can find all right well I guess we will

1216
00:51:18,010 --> 00:51:16,340
wrap it up there for this week folks i

1217
00:51:19,870 --> 00:51:18,020
want to thank Carolyn Collins Peterson

1218
00:51:21,190 --> 00:51:19,880
and Antonella nota for joining us thank

1219
00:51:23,710 --> 00:51:21,200
you both very much this has been a lot

1220
00:51:25,810 --> 00:51:23,720
of fun and candle be we will be back

1221
00:51:28,930 --> 00:51:25,820
next week where I think we're talking

1222
00:51:31,390 --> 00:51:28,940
about Jupiter yeah leave is that right

1223
00:51:33,280 --> 00:51:31,400
Carol okay well i sure will finalize the

1224
00:51:35,080 --> 00:51:33,290
exact time we're still working on the

1225
00:51:36,550 --> 00:51:35,090
calendar but it will be about some

1226
00:51:37,930 --> 00:51:36,560
images of jupiter and solar system

1227
00:51:40,060 --> 00:51:37,940
objects so they definitely want to come

1228
00:51:41,590 --> 00:51:40,070
back and see us for that one don't

1229
00:51:43,540 --> 00:51:41,600
forget about the video contest starting

1230
00:51:46,120 --> 00:51:43,550
on Monday morning and submit your

1231
00:51:49,210 --> 00:51:46,130
entries early and often and have it be

1232
00:51:50,710 --> 00:51:49,220
crowd-sourced and then whittled down and

1233
00:51:52,810 --> 00:51:50,720
hopefully you'll win a piece of the

1234
00:51:55,420 --> 00:51:52,820
solar panel anyway that's it for this

1235
00:51:57,640 --> 00:51:55,430
week Thank You Carol thank you Scott not

1236
00:51:59,290 --> 00:51:57,650
a problem Tony see ya did you go see you

1237
00:52:02,440 --> 00:51:59,300
guys next week thank you for watching as