1
00:00:11,289 --> 00:00:09,280
all the good things we can expect in the

2
00:00:14,259 --> 00:00:11,299
next year or two that's always a good

3
00:00:15,879 --> 00:00:14,269
introduction John thanks so much it's it

4
00:00:18,370 --> 00:00:15,889
is a pleasure for me to be here and I

5
00:00:21,609 --> 00:00:18,380
know this is a let me do a disclaimer

6
00:00:23,650 --> 00:00:21,619
before I start okay many of you know I

7
00:00:25,450 --> 00:00:23,660
can see right in here my Hubble family

8
00:00:28,120 --> 00:00:25,460
and there's some other people over there

9
00:00:29,560 --> 00:00:28,130
but I'm going to do this off the bat so

10
00:00:31,060 --> 00:00:29,570
it'll because there's some people who

11
00:00:33,520 --> 00:00:31,070
think I know something and I just want

12
00:00:35,410 --> 00:00:33,530
to let you all know as everybody who

13
00:00:37,630 --> 00:00:35,420

knows me knows I don't know anything so

14
00:00:39,340 --> 00:00:37,640
if you're here to get knowledge you're

15
00:00:42,700 --> 00:00:39,350
not going to get it now I'll tell you

16
00:00:45,880 --> 00:00:42,710
that second disclaimer there is probably

17
00:00:49,000 --> 00:00:45,890
no one under qualified to be here in

18
00:00:51,069 --> 00:00:49,010
this August group then the person who's

19
00:00:55,479 --> 00:00:51,079
here well I got a tip get on my

20
00:00:57,670 --> 00:00:55,489
tippy-toes they look over there and if

21
00:01:01,209 --> 00:00:57,680
there were three members of my first

22
00:01:03,819 --> 00:01:01,219
space shuttle crew sts 61c we launched

23
00:01:06,970 --> 00:01:03,829
on the twelfth of january nineteen

24
00:01:11,170 --> 00:01:06,980
eighty-six landed on the 18th of january

25
00:01:13,390 --> 00:01:11,180
1986 and over that period of time my my

26
00:01:16,410 --> 00:01:13,400
erstwhile mentor and Commander hoot

27
00:01:18,670 --> 00:01:16,420
gibson who taught me everything I know

28
00:01:21,790 --> 00:01:18,680
which will also let you know why I don't

29
00:01:24,250 --> 00:01:21,800
know very much who does a Navy fighter

30
00:01:26,050 --> 00:01:24,260
pilot I'm not even a good fighter pilot

31
00:01:27,460 --> 00:01:26,060
I'm an attack pilot from the Marine

32
00:01:30,100 --> 00:01:27,470
Corps and there is a distinct difference

33
00:01:33,070 --> 00:01:30,110
I won't bore you with the difference but

34
00:01:36,130 --> 00:01:33,080
I was going to tell you about who'd in

35
00:01:37,810 --> 00:01:36,140
my exploits one day on orbit he and I

36
00:01:42,210 --> 00:01:37,820
were sitting in the commander and pilot

37
00:01:47,140 --> 00:01:42,220
seat and we were doing pilot Lee things

38
00:01:48,520 --> 00:01:47,150

looking at the window and all of a

39
00:01:50,260 --> 00:01:48,530
sudden you know we kind of we were

40
00:01:53,740 --> 00:01:50,270
floating and we turned around and there

41
00:01:59,800 --> 00:01:53,750
was just this great ape this big piece

42
00:02:04,980 --> 00:01:59,810
of masking tape that dr. Stephen Holly I

43
00:02:07,870 --> 00:02:04,990
think astronomer dr. George pinky Nelson

44
00:02:10,719 --> 00:02:07,880
astrophysicist and dr. Franklin

45
00:02:12,880 --> 00:02:10,729
chang-diaz erstwhile plasma physicists

46
00:02:14,890 --> 00:02:12,890
one of the foremost in the world they

47
00:02:17,710 --> 00:02:14,900
had taped us into the four

48
00:02:19,449 --> 00:02:17,720
werd part of the compartment which in

49
00:02:21,490 --> 00:02:19,459
and of itself was okay but when we

50
00:02:23,619 --> 00:02:21,500
finally managed to float across the tape

51
00:02:26,020 --> 00:02:23,629
we turn and we look back and they had

52
00:02:28,270 --> 00:02:26,030
taken a piece of a big magic marker and

53
00:02:34,360 --> 00:02:28,280
they had written across it intellectual

54
00:02:36,190 --> 00:02:34,370
dead zone so with with that in mind that

55
00:02:39,550 --> 00:02:36,200
is who you have coming to speak to you

56
00:02:43,990 --> 00:02:39,560
today on astronomy astrophysics and

57
00:02:45,729 --> 00:02:44,000
other topics you know I want to wish all

58
00:02:48,430 --> 00:02:45,739
of you happy new year I'm not sure how

59
00:02:50,319 --> 00:02:48,440
many of you had as phenomenal a holiday

60
00:02:53,080 --> 00:02:50,329
period as I did my wife and I went home

61
00:02:55,270 --> 00:02:53,090
to Houston and we were blessed to have

62
00:02:57,640 --> 00:02:55,280
our two kids and our three

63
00:03:00,339 --> 00:02:57,650

granddaughters spend the entire time

64
00:03:03,520 --> 00:03:00,349
with us and the granddaughters are three

65
00:03:05,349 --> 00:03:03,530
through nine and so if there are any of

66
00:03:07,720 --> 00:03:05,359
you who are not grandparents and and

67
00:03:10,300 --> 00:03:07,730
you're not looking forward to it boy let

68
00:03:12,009 --> 00:03:10,310
me tell you it's great having kids is

69
00:03:15,039 --> 00:03:12,019
phenomenal having grandchildren is

70
00:03:16,750 --> 00:03:15,049
incredible and so this group would be

71
00:03:18,309 --> 00:03:16,760
proud to know my nine year old

72
00:03:20,500 --> 00:03:18,319
granddaughter had one request of her

73
00:03:22,240 --> 00:03:20,510
grandfather before Christmas she said I

74
00:03:24,369 --> 00:03:22,250
know what i want for christmas i said

75
00:03:25,990 --> 00:03:24,379
okay michaeli what is it she said when i

76
00:03:29,530 --> 00:03:26,000
come to houston i want to i want to meet

77
00:03:33,129 --> 00:03:29,540
a real rocket scientist and I said Matt

78
00:03:35,649 --> 00:03:33,139
can probably do that and and so the

79
00:03:37,300 --> 00:03:35,659
morning before her dead and and and the

80
00:03:42,189 --> 00:03:37,310
rest of the family and me decided to

81
00:03:44,680 --> 00:03:42,199
take her to see Navy beat Missouri there

82
00:03:47,649 --> 00:03:44,690
are no Missouri fans in here since there

83
00:03:48,909 --> 00:03:47,659
were no eggs that came up but that

84
00:03:51,099 --> 00:03:48,919
morning we spend at the Johnson Space

85
00:03:53,170 --> 00:03:51,109
Center and took them and they had an

86
00:03:55,599 --> 00:03:53,180
opportunity to to kind of look around at

87
00:03:57,640 --> 00:03:55,609
the mock-ups and and look at what we do

88
00:04:00,430 --> 00:03:57,650

what people who are in NASA do and i

89
00:04:02,680 --> 00:04:00,440
must say they were they were impressed

90
00:04:04,479 --> 00:04:02,690
and then the nine year old granddaughter

91
00:04:05,589 --> 00:04:04,489
before she went back to san diego had an

92
00:04:07,509 --> 00:04:05,599
opportunity to go down the street and

93
00:04:08,649 --> 00:04:07,519
and spend some time with an old friend

94
00:04:11,379 --> 00:04:08,659
of mine I've gentleman by the name of

95
00:04:13,420 --> 00:04:11,389
Bobby Mack and many of you will know him

96
00:04:15,219 --> 00:04:13,430
bow is a real rocket scientist he's been

97
00:04:16,990 --> 00:04:15,229
around since the early days of the

98
00:04:19,210 --> 00:04:17,000
earliest days of human space flight and

99
00:04:21,969 --> 00:04:19,220
he spent about an hour with her talking

100
00:04:24,129 --> 00:04:21,979
about rockets and stuff like that so you

101
00:04:25,950 --> 00:04:24,139
do good stuff and I want to talk a

102
00:04:29,440 --> 00:04:25,960
little bit about that

103
00:04:31,210 --> 00:04:29,450
and I apologize beforehand again because

104
00:04:33,730 --> 00:04:31,220
i'm going to read what i have here my

105
00:04:35,170 --> 00:04:33,740
wife tells me never do this she says

106
00:04:38,230 --> 00:04:35,180
because first of all you don't read very

107
00:04:39,700 --> 00:04:38,240
well and somebody else said well you

108
00:04:42,160 --> 00:04:39,710
know it's okay for you to read but when

109
00:04:44,350 --> 00:04:42,170
you read we can tell it because you're

110
00:04:45,910 --> 00:04:44,360
not passionate in your reading the way

111
00:04:47,950 --> 00:04:45,920
you are when you just talk to people

112
00:04:50,050 --> 00:04:47,960
well if you want to hear something

113
00:04:53,950 --> 00:04:50,060

substantive on something that you

114
00:04:56,770 --> 00:04:53,960
understand I got to read it okay so I'm

115
00:04:58,480 --> 00:04:56,780
going to do that as I said it is a

116
00:05:01,210 --> 00:04:58,490
pleasure for me to be here and I hope

117
00:05:04,900 --> 00:05:01,220
all of you are off to a an incredible

118
00:05:06,370 --> 00:05:04,910
new year the year ahead for us is is

119
00:05:08,460 --> 00:05:06,380
likely to be filled with some new

120
00:05:11,380 --> 00:05:08,470
achievements in space at least I hope so

121
00:05:13,030 --> 00:05:11,390
new discoveries we can't yet imagine you

122
00:05:15,760 --> 00:05:13,040
heard about some yesterday when the

123
00:05:17,860 --> 00:05:15,770
Kepler felt talked to you there's just

124
00:05:19,540 --> 00:05:17,870
an incredible number of missions that

125
00:05:23,890 --> 00:05:19,550
we're going to launch here in the coming

126
00:05:26,409 --> 00:05:23,900
months beginning this month that I think

127
00:05:28,420 --> 00:05:26,419
will will revolutionize the way we look

128
00:05:30,490 --> 00:05:28,430
at our world and I and I really mean it

129
00:05:32,350 --> 00:05:30,500
when I say that having having been a

130
00:05:35,230 --> 00:05:32,360
member of the the initial Hubble crew

131
00:05:38,230 --> 00:05:35,240
sts 31 crew we used to sit around in the

132
00:05:39,909 --> 00:05:38,240
crew quarters and talk often about what

133
00:05:41,140 --> 00:05:39,919
is this thing going to do and what's it

134
00:05:43,690 --> 00:05:41,150
going to mean and there were all kinds

135
00:05:46,990 --> 00:05:43,700
of people that most of you that I look

136
00:05:48,400 --> 00:05:47,000
around are too young to have any way to

137
00:05:49,870 --> 00:05:48,410
remember but some of you are old enough

138
00:05:52,300 --> 00:05:49,880

to remember when we were getting ridden

139
00:05:54,010 --> 00:05:52,310
launched Hubble and the discussion

140
00:05:56,860 --> 00:05:54,020
argument whatever you want to call it

141
00:05:58,659 --> 00:05:56,870
over the big bang theory and all other

142
00:06:02,320 --> 00:05:58,669
kinds of things were really raging in

143
00:06:04,480 --> 00:06:02,330
1990 and we frequently said is this

144
00:06:06,400 --> 00:06:04,490
really going to mean anything and if I

145
00:06:08,950 --> 00:06:06,410
were to say something that my crew

146
00:06:10,960 --> 00:06:08,960
universally felt we didn't know why but

147
00:06:13,060 --> 00:06:10,970
we but we universally felt it was that

148
00:06:16,630 --> 00:06:13,070
Hubble was going to change our entire

149
00:06:18,790 --> 00:06:16,640
approach to to the species and to the

150
00:06:21,070 --> 00:06:18,800
world in which we lived and i live and i

151
00:06:22,750 --> 00:06:21,080
think we found subsequent to that that

152
00:06:26,200 --> 00:06:22,760
it has done exactly that and every other

153
00:06:28,810 --> 00:06:26,210
instrument that we fly edge to that or

154
00:06:30,969 --> 00:06:28,820
complement it this year just ended was a

155
00:06:32,230 --> 00:06:30,979
remarkable one for our agency and if

156
00:06:34,750 --> 00:06:32,240
you'll let me i just want to mention

157
00:06:37,659 --> 00:06:34,760
some of the astrophysics highlights that

158
00:06:38,760 --> 00:06:37,669
you know so well Kepler was launched

159
00:06:40,920 --> 00:06:38,770
last March to

160
00:06:44,670 --> 00:06:40,930
ducti census of earth-sized planets in

161
00:06:46,589 --> 00:06:44,680
our galaxy just yesterday here the first

162
00:06:48,869 --> 00:06:46,599
couple of discoveries of large planets

163
00:06:51,480 --> 00:06:48,879

were announced and many more discoveries

164
00:06:54,149 --> 00:06:51,490
are anticipated during the it's three

165
00:06:56,279 --> 00:06:54,159
and a half year mission the wise mission

166
00:06:58,499 --> 00:06:56,289
was launched in december just last month

167
00:07:01,050 --> 00:06:58,509
our newest mission in the Explorer

168
00:07:03,480 --> 00:07:01,060
program it will gather a treasure trove

169
00:07:05,969 --> 00:07:03,490
of new data on the entire infrared sky

170
00:07:09,059 --> 00:07:05,979
going much deeper than previous surveys

171
00:07:10,830 --> 00:07:09,069
with much better resolution last week

172
00:07:13,620 --> 00:07:10,840
the protective cover was released and

173
00:07:15,330 --> 00:07:13,630
the first sky images were sent down the

174
00:07:16,890 --> 00:07:15,340
first light images will be released at a

175
00:07:20,730 --> 00:07:16,900
press conference here tomorrow or

176
00:07:24,390 --> 00:07:20,740
tomorrow maybe not here here okay here

177
00:07:27,210 --> 00:07:24,400
tomorrow so stay tuned for that i'm not

178
00:07:29,040 --> 00:07:27,220
going to preempt that Ed Weiler and our

179
00:07:32,459 --> 00:07:29,050
commenting coming into the hall that

180
00:07:35,129 --> 00:07:32,469
there are two big hurdles that any

181
00:07:37,040 --> 00:07:35,139
project like likewise has to overcome

182
00:07:41,279 --> 00:07:37,050
you got to get the cover off

183
00:07:44,850 --> 00:07:41,289
successfully and then you hope that it's

184
00:07:47,700 --> 00:07:44,860
in focus and that doesn't mean a lot to

185
00:07:52,170 --> 00:07:47,710
many of you but for those of you who

186
00:07:53,700 --> 00:07:52,180
work with me it means a lot the ISA NASA

187
00:07:55,350 --> 00:07:53,710
Herschel and plank missions were

188
00:07:56,909 --> 00:07:55,360

launched in May to study the far

189
00:07:59,100 --> 00:07:56,919
infrared universe in the Cosmic

190
00:08:01,290 --> 00:07:59,110
Microwave Background with

191
00:08:03,180 --> 00:08:01,300
state-of-the-art instrumentation the

192
00:08:07,499 --> 00:08:03,190
Chandra x-ray Observatory marked its

193
00:08:09,390 --> 00:08:07,509
10th anniversary in July Sofia reached a

194
00:08:12,390 --> 00:08:09,400
milestone with its first opened or

195
00:08:14,129 --> 00:08:12,400
flight test last month and Pete you're

196
00:08:15,689 --> 00:08:14,139
here aren't you Pete worden back there

197
00:08:17,219 --> 00:08:15,699
and they're probably some I don't know

198
00:08:20,370 --> 00:08:17,229
whether there's anybody here from dryden

199
00:08:23,459 --> 00:08:20,380
but you know I I want to publicly just

200
00:08:26,459 --> 00:08:23,469
think Pete the folk from dryden for the

201
00:08:28,860 --> 00:08:26,469
incredible work that was done in getting

202
00:08:31,190 --> 00:08:28,870
Sofia to where it is today some of you

203
00:08:33,630 --> 00:08:31,200
may know and most of you probably don't

204
00:08:36,269 --> 00:08:33,640
they went and resurrected the airplane

205
00:08:38,870 --> 00:08:36,279
from the desert where the project was

206
00:08:40,980 --> 00:08:38,880
really kind of struggling along and

207
00:08:43,350 --> 00:08:40,990
during the month of December when we

208
00:08:45,569 --> 00:08:43,360
flew a series of the initial tests and

209
00:08:47,040 --> 00:08:45,579
did the door openings until we finally

210
00:08:48,090 --> 00:08:47,050
had a full door opening testing

211
00:08:50,639 --> 00:08:48,100
everything and we're ready to start

212
00:08:51,900 --> 00:08:50,649
actually doing some serious work with

213
00:08:53,280 --> 00:08:51,910

Sofia

214
00:08:54,660 --> 00:08:53,290
the months ahead but i but i want to

215
00:08:56,700 --> 00:08:54,670
thank the whole team for what they did

216
00:08:58,710 --> 00:08:56,710
there the Fermi gamma-ray Space

217
00:09:00,840 --> 00:08:58,720
Telescope completed its first year of

218
00:09:03,360 --> 00:09:00,850
science operations revealing a new class

219
00:09:06,330 --> 00:09:03,370
of gamma-ray pulsars and giving us a

220
00:09:08,460 --> 00:09:06,340
glimpse of the nature of space-time the

221
00:09:10,710 --> 00:09:08,470
James Webb Space Telescope program has

222
00:09:12,960 --> 00:09:10,720
made significant progress in building

223
00:09:15,780 --> 00:09:12,970
for flight hardware such as the primary

224
00:09:18,020 --> 00:09:15,790
mirror segments Observatory structure

225
00:09:20,880 --> 00:09:18,030
science instruments and other subsystems

226
00:09:23,430 --> 00:09:20,890
Spitzer discovered the largest ring

227
00:09:25,440 --> 00:09:23,440
around Saturn by combining data from

228
00:09:27,600 --> 00:09:25,450
Chandra and other optical and infrared

229
00:09:30,260 --> 00:09:27,610
telescopes the most distant galaxy

230
00:09:33,240 --> 00:09:30,270
cluster ever found was discovered and

231
00:09:35,460 --> 00:09:33,250
there was and then there was the final

232
00:09:38,070 --> 00:09:35,470
hubble space telescope servicing mission

233
00:09:40,500 --> 00:09:38,080
bringing new life to our old friend I

234
00:09:42,480 --> 00:09:40,510
call Hubble a friend because I have a

235
00:09:45,510 --> 00:09:42,490
personal connection with this remarkable

236
00:09:48,300 --> 00:09:45,520
instrument I share that connection I get

237
00:09:50,340 --> 00:09:48,310
emotional I share that connection with a

238
00:09:54,390 --> 00:09:50,350

gentleman sitting down here dr. John

239
00:09:57,540 --> 00:09:54,400
Grunsfeld John was the was the master

240
00:10:01,500 --> 00:09:57,550
the lead II VA for sts-125 which was a

241
00:10:03,510 --> 00:10:01,510
final we know final shuttle Hubble

242
00:10:05,550 --> 00:10:03,520
servicing mission hi I have learned a

243
00:10:07,680 --> 00:10:05,560
long time ago since messing around with

244
00:10:13,230 --> 00:10:07,690
the Hubble folk you never say it's the

245
00:10:15,600 --> 00:10:13,240
final anything but but it was absolutely

246
00:10:18,120 --> 00:10:15,610
incredible and I thought just is a sense

247
00:10:20,880 --> 00:10:18,130
of levity I would tell you a little bit

248
00:10:23,820 --> 00:10:20,890
about about our deploy date on st s 31

249
00:10:25,590 --> 00:10:23,830
some few of you may remember this but we

250
00:10:28,950 --> 00:10:25,600
had trained for a number of years for

251
00:10:30,900 --> 00:10:28,960
the mission everything was was pretty

252
00:10:32,910 --> 00:10:30,910
much in hand and we knew what was going

253
00:10:34,980 --> 00:10:32,920
to go on there were very strict timeline

254
00:10:36,690 --> 00:10:34,990
Steve Hawley operating the remote

255
00:10:38,460 --> 00:10:36,700
manipulator system and I as his backup

256
00:10:39,900 --> 00:10:38,470
it's going to take us about 10 minutes

257
00:10:42,480 --> 00:10:39,910
to lift Hubble out of the payload Bay

258
00:10:44,790 --> 00:10:42,490
and put it in its pre deployed position

259
00:10:48,510 --> 00:10:44,800
so we could unfurl the solar arrays and

260
00:10:51,960 --> 00:10:48,520
do some other things and about two hours

261
00:10:55,740 --> 00:10:51,970
after we started the unbirthday we had

262
00:10:59,190 --> 00:10:55,750
moved hubble a matter of feet and what

263
00:11:01,380 --> 00:10:59,200

we found was that as much expertise as

264
00:11:03,540 --> 00:11:01,390
we had as much knowledge as we had and

265
00:11:05,380 --> 00:11:03,550
as precisely as the the remote

266
00:11:09,460 --> 00:11:05,390
manipulator system had been designed

267
00:11:12,520 --> 00:11:09,470
and for some reason 25,000 pounds is a

268
00:11:14,950 --> 00:11:12,530
lot of mass and the remote manipulator

269
00:11:18,100 --> 00:11:14,960
system with its joints and everything

270
00:11:19,930 --> 00:11:18,110
just at least in an unclassified flight

271
00:11:22,750 --> 00:11:19,940
was not accustomed to moving that much

272
00:11:24,910 --> 00:11:22,760
mass and so it it didn't behave exactly

273
00:11:26,860 --> 00:11:24,920
the way all the algorithm said and so

274
00:11:29,710 --> 00:11:26,870
Steve and I struggled with reading

275
00:11:31,960 --> 00:11:29,720
numbers to keep it precisely where it

276
00:11:33,310 --> 00:11:31,970
should be so that we didn't bump it we

277
00:11:34,960 --> 00:11:33,320
didn't want to do any damage but we

278
00:11:39,520 --> 00:11:34,970
finally got it out and got it in the pre

279
00:11:41,410 --> 00:11:39,530
deployed position the the high-gain

280
00:11:45,220 --> 00:11:41,420
antenna were deployed with no problem

281
00:11:48,130 --> 00:11:45,230
first solar away no problem second solar

282
00:11:52,090 --> 00:11:48,140
array got about 16 inches in stopped and

283
00:11:53,500 --> 00:11:52,100
I mean stop d it and i went i can

284
00:11:56,260 --> 00:11:53,510
remember telling who died said this

285
00:11:58,630 --> 00:11:56,270
can't be i said you know this is this

286
00:12:01,630 --> 00:11:58,640
was our last sim this was our last joint

287
00:12:04,360 --> 00:12:01,640
simulation in houston we had a failure

288
00:12:05,920 --> 00:12:04,370

of one of the solar arrays to deploy it

289
00:12:07,660 --> 00:12:05,930
had caused us they have to put Bruce

290
00:12:10,660 --> 00:12:07,670
McCandless and Kathy Sullivan in the

291
00:12:12,730 --> 00:12:10,670
suit out into the water tank you know

292
00:12:14,680 --> 00:12:12,740
they transported him over to the wet F

293
00:12:16,570 --> 00:12:14,690
and they had had to go out and exercise

294
00:12:18,490 --> 00:12:16,580
what we had practiced in Bristol England

295
00:12:20,200 --> 00:12:18,500
with the solar arrays they'd had to

296
00:12:22,660 --> 00:12:20,210
manually crank the solar arrays out

297
00:12:24,940 --> 00:12:22,670
which was okay but it would really just

298
00:12:28,030 --> 00:12:24,950
mess things up and so we really didn't

299
00:12:29,500 --> 00:12:28,040
want to do that and so for hours the

300
00:12:32,350 --> 00:12:29,510
ground when it went back and forth

301
00:12:34,060 --> 00:12:32,360
between the ground and us on orbit that

302
00:12:36,430 --> 00:12:34,070
we had to keep the shuttle in free drift

303
00:12:39,220 --> 00:12:36,440
so we wouldn't perturb ate the telescope

304
00:12:41,320 --> 00:12:39,230
and we were all over the place the thing

305
00:12:42,550 --> 00:12:41,330
that saved us was orbital mechanics you

306
00:12:44,830 --> 00:12:42,560
know you weren't going to fall out of

307
00:12:47,290 --> 00:12:44,840
the sky or anything but but attitude was

308
00:12:49,540 --> 00:12:47,300
we were just all over everywhere not

309
00:12:51,190 --> 00:12:49,550
wanting to perturb the telescope I mean

310
00:12:53,830 --> 00:12:51,200
after a number of hours the decision was

311
00:12:56,380 --> 00:12:53,840
made okay let's put Bruce and Kathy in

312
00:12:58,930 --> 00:12:56,390
the suit let's put them out and while

313
00:13:00,640 --> 00:12:58,940

they were very excited they were

314
00:13:03,760 --> 00:13:00,650
probably the only people in the whole

315
00:13:05,200 --> 00:13:03,770
hubble world excited about an e VA and i

316
00:13:07,750 --> 00:13:05,210
was what with what's called the

317
00:13:09,640 --> 00:13:07,760
intraocular crewmember so I my task was

318
00:13:11,290 --> 00:13:09,650
to get them in the suit and get him

319
00:13:13,390 --> 00:13:11,300
outside safely and we went down in the

320
00:13:15,550 --> 00:13:13,400
mid in the mid-deck started suiting him

321
00:13:17,080 --> 00:13:15,560
up I got them in the airlock did

322
00:13:18,460 --> 00:13:17,090
everything to the best of my ability

323
00:13:19,020 --> 00:13:18,470
made sure i followed the checklist and

324
00:13:22,470 --> 00:13:19,030
let me tell you

325
00:13:24,600 --> 00:13:22,480
John can tell you this putting a human

326
00:13:27,660 --> 00:13:24,610
being outside a spacecraft is not

327
00:13:29,910 --> 00:13:27,670
trivial and it is although we do it all

328
00:13:32,310 --> 00:13:29,920
the time and we make it easy may we make

329
00:13:34,530 --> 00:13:32,320
it look easy it is incredibly risky

330
00:13:37,410 --> 00:13:34,540
business and and my heart was beating

331
00:13:39,240 --> 00:13:37,420
probably harder than it is beat any time

332
00:13:40,560 --> 00:13:39,250
in the whole space program a young

333
00:13:42,530 --> 00:13:40,570
engineer at the Goddard Space Flight

334
00:13:46,200 --> 00:13:42,540
Center said he'll hold on there's um

335
00:13:48,000 --> 00:13:46,210
this just isn't right and he said there

336
00:13:50,610 --> 00:13:48,010
is a tension monitoring module a piece

337
00:13:53,430 --> 00:13:50,620
of software that we built into this

338
00:13:55,140 --> 00:13:53,440

thing to keep from ripping the solar

339
00:13:56,730 --> 00:13:55,150
arrays and I just think it's not

340
00:13:59,400 --> 00:13:56,740
functioning properly if you all let me

341
00:14:01,110 --> 00:13:59,410
just send a zero instead of a one I

342
00:14:02,970 --> 00:14:01,120
think we can take the tension monitoring

343
00:14:05,310 --> 00:14:02,980
module out and and everything will work

344
00:14:06,960 --> 00:14:05,320
right well on board Bruce McCandless

345
00:14:08,340 --> 00:14:06,970
earlier that morning had said I there's

346
00:14:10,200 --> 00:14:08,350
nothing wrong its attention monitoring

347
00:14:13,410 --> 00:14:10,210
module and for those of you who know

348
00:14:15,450 --> 00:14:13,420
Bruce this was good news but it was

349
00:14:18,570 --> 00:14:15,460
horrible news because once again it

350
00:14:20,010 --> 00:14:18,580
meant that Bruce was right and what was

351
00:14:24,450 --> 00:14:20,020
even worse Bruce had been right like

352
00:14:26,760 --> 00:14:24,460
hours ago so anyway they de-energized

353
00:14:29,430 --> 00:14:26,770
the tension monitoring module the solar

354
00:14:32,250 --> 00:14:29,440
array went out we deployed Hubble it was

355
00:14:35,280 --> 00:14:32,260
incredible to watch this this massive

356
00:14:37,890 --> 00:14:35,290
instrument drift away from from the from

357
00:14:39,750 --> 00:14:37,900
the shuttle and and in the meantime

358
00:14:41,340 --> 00:14:39,760
Bruce McCandless and Kathy Sullivan two

359
00:14:43,710 --> 00:14:41,350
people who had dedicated much of their

360
00:14:46,650 --> 00:14:43,720
astronaut lives to preparing for this

361
00:14:49,760 --> 00:14:46,660
mission did not get to see it they were

362
00:14:52,380 --> 00:14:49,770
locked depressurized in the airlock and

363
00:14:54,390 --> 00:14:52,390

and I couldn't bring him out until after

364
00:14:57,060 --> 00:14:54,400
we had deployed the telescope so they

365
00:15:00,420 --> 00:14:57,070
that's where they spent their deploy

366
00:15:01,710 --> 00:15:00,430
time and Hubble the rest now you know

367
00:15:04,560 --> 00:15:01,720
the rest of the story but Hubble

368
00:15:06,960 --> 00:15:04,570
continues to make discoveries that just

369
00:15:10,350 --> 00:15:06,970
overwhelm all of us and it continues and

370
00:15:12,000 --> 00:15:10,360
it will continue where you know it

371
00:15:14,280 --> 00:15:12,010
things like the first ever image taken

372
00:15:17,100 --> 00:15:14,290
of an extrasolar planet orbiting another

373
00:15:19,320 --> 00:15:17,110
star altogether NASA's science Mission

374
00:15:22,410 --> 00:15:19,330
Directorate supports over 60 operating

375
00:15:24,870 --> 00:15:22,420
space missions this year begins with 15

376
00:15:27,560 --> 00:15:24,880
NASA or NASA partnered space assets

377
00:15:31,519 --> 00:15:27,570
available to the astronomical community

378
00:15:34,809 --> 00:15:31,529
compare this with five in 1990

379
00:15:38,210 --> 00:15:34,819
and nine operating missions in 2000

380
00:15:39,980 --> 00:15:38,220
these missions are of great value to the

381
00:15:42,650 --> 00:15:39,990
nation and help us to meet the national

382
00:15:45,379 --> 00:15:42,660
needs in science education and

383
00:15:47,090 --> 00:15:45,389
technological innovation for both human

384
00:15:50,540 --> 00:15:47,100
and robotic missions of the future one

385
00:15:53,090 --> 00:15:50,550
fact will be common to all or one facet

386
00:15:54,350 --> 00:15:53,100
will be common to all we must develop a

387
00:15:56,749 --> 00:15:54,360
stronger partnership with the

388
00:15:58,340 --> 00:15:56,759

international community the cost and

389
00:16:01,009 --> 00:15:58,350
complexity of space programs require

390
00:16:04,189 --> 00:16:01,019
that both the achievements and the cost

391
00:16:05,980 --> 00:16:04,199
be shared among many nations for no one

392
00:16:08,569 --> 00:16:05,990
nation can carry this burden alone

393
00:16:11,119 --> 00:16:08,579
whether it be future human voyages

394
00:16:13,579 --> 00:16:11,129
beyond low-earth orbit are complex

395
00:16:16,280 --> 00:16:13,589
sample return missions from Mars or deep

396
00:16:19,249 --> 00:16:16,290
space objects or building future large

397
00:16:21,460 --> 00:16:19,259
space telescopes NASA must pursue a new

398
00:16:24,079 --> 00:16:21,470
era of international cooperation a

399
00:16:29,360 --> 00:16:24,089
relationship where our partners are

400
00:16:31,730 --> 00:16:29,370
treated as equals astronomy astronomy

401
00:16:34,460 --> 00:16:31,740
and science touches our communities in

402
00:16:36,110 --> 00:16:34,470
many other ways as well last fall I

403
00:16:38,600 --> 00:16:36,120
joined President Obama and the first

404
00:16:40,040 --> 00:16:38,610
family on the White House lawn to

405
00:16:41,990 --> 00:16:40,050
celebrate the international year of

406
00:16:43,429 --> 00:16:42,000
astronomy and for some of you who were

407
00:16:45,170 --> 00:16:43,439
here for breakfast this morning you may

408
00:16:47,480 --> 00:16:45,180
have heard I understand dr. John Holdren

409
00:16:49,970 --> 00:16:47,490
mentioned this night it I wasn't here

410
00:16:53,840 --> 00:16:49,980
but I can tell you what he told you is

411
00:16:56,720 --> 00:16:53,850
very very true to watch the president

412
00:16:58,280 --> 00:16:56,730
mrs. Obama and the girls but even more

413
00:17:01,129 --> 00:16:58,290

importantly to watch these young kids

414
00:17:02,990 --> 00:17:01,139
from all over Washington DC I mean to

415
00:17:05,299 --> 00:17:03,000
watch their eyes light up some of them

416
00:17:07,610 --> 00:17:05,309
had never seen a telescope some of them

417
00:17:08,929 --> 00:17:07,620
didn't have a clue what a telescope was

418
00:17:11,149 --> 00:17:08,939
and they had an opportunity to meet

419
00:17:12,740 --> 00:17:11,159
Galileo I mean you know we had two

420
00:17:16,250 --> 00:17:12,750
astronomers who had dressed up as

421
00:17:18,770 --> 00:17:16,260
Galileo and somebody else and and they

422
00:17:20,179 --> 00:17:18,780
carried around ancient telescopes and

423
00:17:23,449 --> 00:17:20,189
the like and they talked to the kids

424
00:17:25,610 --> 00:17:23,459
John was there Sally Ride was there Buzz

425
00:17:27,470 --> 00:17:25,620
Aldrin mae Jemison and they had an

426
00:17:29,539 --> 00:17:27,480
opportunity to interface with real live

427
00:17:31,490 --> 00:17:29,549
astronauts as they as they got ready to

428
00:17:34,100 --> 00:17:31,500
view through the telescopes and it was

429
00:17:35,480 --> 00:17:34,110
incredible the whole lawn of the white

430
00:17:38,090 --> 00:17:35,490
house was covered with telescopes

431
00:17:40,580 --> 00:17:38,100
inflatable planetariums and and these

432
00:17:42,770 --> 00:17:40,590
astronaut heroes did I mention present

433
00:17:44,440 --> 00:17:42,780
with us were 150 students from DC

434
00:17:45,850 --> 00:17:44,450
Maryland Virginia schools

435
00:17:48,340 --> 00:17:45,860
who learned of crater formation on the

436
00:17:51,039 --> 00:17:48,350
moon viewed Jupiter in its four Galilean

437
00:17:53,129 --> 00:17:51,049
moons as well as a distance as well as

438
00:17:55,570 --> 00:17:53,139

distant stars and nebula in our galaxy

439
00:17:56,950 --> 00:17:55,580
the President and First Lady joined the

440
00:17:58,480 --> 00:17:56,960
fun peering through some of the

441
00:18:00,639 --> 00:17:58,490
telescopes and mingling with the

442
00:18:03,370 --> 00:18:00,649
students and I'll tell you it was not a

443
00:18:05,320 --> 00:18:03,380
normal night it was cold that night and

444
00:18:07,090 --> 00:18:05,330
the president first lady were out there

445
00:18:08,889 --> 00:18:07,100
for a good 45 minutes to an hour just

446
00:18:10,509 --> 00:18:08,899
going from telescope to telescope

447
00:18:12,909 --> 00:18:10,519
planetarium displayed a planetarium

448
00:18:14,950 --> 00:18:12,919
display with us that night was a West

449
00:18:17,730 --> 00:18:14,960
Virginia high school student who had

450
00:18:20,200 --> 00:18:17,740
discovered a new astronomical object a

451
00:18:22,240 --> 00:18:20,210
strange type of neutron star never

452
00:18:25,690 --> 00:18:22,250
discovered before what's remarkable

453
00:18:27,129 --> 00:18:25,700
about Lucas Boyd's discovery is that he

454
00:18:29,529 --> 00:18:27,139
made it after he had studied two

455
00:18:32,159 --> 00:18:29,539
thousand data points collected from the

456
00:18:35,470 --> 00:18:32,169
Robert Byrd Green Bank telescope and

457
00:18:37,779 --> 00:18:35,480
originally found nothing but like young

458
00:18:40,060 --> 00:18:37,789
would-be astronomers he was determined

459
00:18:42,820 --> 00:18:40,070
to scrutinize his data looking for more

460
00:18:45,039 --> 00:18:42,830
his discovery was almost overlooked in

461
00:18:48,070 --> 00:18:45,049
the radio interference streaming in from

462
00:18:50,409 --> 00:18:48,080
space but he was persistent he was

463
00:18:52,960 --> 00:18:50,419

dedicated and as a result he made

464
00:18:55,870 --> 00:18:52,970
history also with us that night was

465
00:18:58,389 --> 00:18:55,880
Carolyn Moore a 14-year old and in love

466
00:19:01,750 --> 00:18:58,399
with science she discovered a supernova

467
00:19:04,600 --> 00:19:01,760
it wasn't your average supernova either

468
00:19:06,759 --> 00:19:04,610
this exploding star was so dim it was

469
00:19:10,539 --> 00:19:06,769
1,000 times dimmer than a typical

470
00:19:11,950 --> 00:19:10,549
supernova more a ninth-grader won the

471
00:19:14,769 --> 00:19:11,960
distinction of being the youngest person

472
00:19:16,180 --> 00:19:14,779
ever to discover a supernova what I

473
00:19:18,879 --> 00:19:16,190
witnessed that night on the White House

474
00:19:20,409 --> 00:19:18,889
lawn served as a reminder that astronomy

475
00:19:22,570 --> 00:19:20,419
and science can inspire the next

476
00:19:24,610 --> 00:19:22,580
generation to study the science

477
00:19:27,490 --> 00:19:24,620
technology engineering and math or STEM

478
00:19:30,519 --> 00:19:27,500
subjects so critical to America's future

479
00:19:31,840 --> 00:19:30,529
workforce of critical importance before

480
00:19:35,289 --> 00:19:31,850
we can inspire the rising generation

481
00:19:40,870 --> 00:19:35,299
however is to expose them to your craft

482
00:19:43,149 --> 00:19:40,880
and the tools you use you you must

483
00:19:45,129 --> 00:19:43,159
become engaged with students as early as

484
00:19:49,180 --> 00:19:45,139
elementary school and help them to learn

485
00:19:50,769 --> 00:19:49,190
that who you are and what you do why

486
00:19:53,169 --> 00:19:50,779
you're passionate about astronomy and

487
00:19:56,230 --> 00:19:53,179
astrophysics and the magic they brought

488
00:19:56,960 --> 00:19:56,240

to your lives you have to share that

489
00:19:59,419 --> 00:19:56,970
with them

490
00:20:02,240 --> 00:19:59,429
the years ahead promised a steady stream

491
00:20:03,710 --> 00:20:02,250
of new missions and new discoveries this

492
00:20:06,440 --> 00:20:03,720
spring the James Webb Space Telescope

493
00:20:08,720 --> 00:20:06,450
our next astrophysics flagship mission

494
00:20:11,060 --> 00:20:08,730
to study the distant universe in the

495
00:20:14,590 --> 00:20:11,070
infrared will go through its critical

496
00:20:17,810 --> 00:20:14,600
design review aiming for a 2014 launch

497
00:20:19,549 --> 00:20:17,820
Sofia I mentioned earlier the largest

498
00:20:21,620 --> 00:20:19,559
airborne observatory in the world that

499
00:20:24,200 --> 00:20:21,630
will study objects in the far infrared

500
00:20:26,720 --> 00:20:24,210
will produce initial science this year

501
00:20:30,440 --> 00:20:26,730
as it moves toward its full operational

502
00:20:33,710 --> 00:20:30,450
capability in 2014 new star the first

503
00:20:36,200 --> 00:20:33,720
focusing hard x-ray telescope mission to

504
00:20:38,840 --> 00:20:36,210
study black holes supernova remnants and

505
00:20:42,020 --> 00:20:38,850
the most extreme active galaxies will

506
00:20:44,750 --> 00:20:42,030
launch by early 2012 the gravity and

507
00:20:47,539 --> 00:20:44,760
extreme magnetism one of our small

508
00:20:49,880 --> 00:20:47,549
explorer explorer programs or gems

509
00:20:52,039 --> 00:20:49,890
mission there's a new small explorer

510
00:20:57,440 --> 00:20:52,049
x-ray mission being prepared for launch

511
00:20:59,659 --> 00:20:57,450
in 2014 and Astro H Japan six x ray s

512
00:21:02,419 --> 00:20:59,669
astronomy mission in collaboration with

513
00:21:05,510 --> 00:21:02,429

NASA is also being readied for launch in

514
00:21:07,789 --> 00:21:05,520
2014 and there will be more sounding

515
00:21:10,279 --> 00:21:07,799
rockets and more long-duration balloon

516
00:21:12,799 --> 00:21:10,289
missions but what of the what of the

517
00:21:16,760 --> 00:21:12,809
discoveries we cannot predict as this

518
00:21:18,649 --> 00:21:16,770
new year begins thus far more than 400

519
00:21:21,730 --> 00:21:18,659
extrasolar planets have been discovered

520
00:21:24,470 --> 00:21:21,740
orbiting other stars last month a

521
00:21:27,380 --> 00:21:24,480
super-earth was discovered that might be

522
00:21:29,180 --> 00:21:27,390
an all water world when when will

523
00:21:32,570 --> 00:21:29,190
someone in this audience discover a

524
00:21:35,049 --> 00:21:32,580
Pandora a real Pandora like the one in

525
00:21:37,880 --> 00:21:35,059
James Cameron's fabulous new movie and

526
00:21:41,060 --> 00:21:37,890
will such a discovery open a positive

527
00:21:43,610 --> 00:21:41,070
Pandora's box changing the way citizens

528
00:21:47,090 --> 00:21:43,620
of Earth view ourselves and our places

529
00:21:49,909 --> 00:21:47,100
in the cosmos only time and the best

530
00:21:52,399 --> 00:21:49,919
science will tell these are exciting

531
00:21:55,130 --> 00:21:52,409
times to be astrophysicist astronomers

532
00:21:56,659 --> 00:21:55,140
grad students and researchers it's a

533
00:21:59,450 --> 00:21:56,669
pretty exciting time to be the NASA

534
00:22:01,130 --> 00:21:59,460
Administrator also the scientific

535
00:22:03,409 --> 00:22:01,140
community and NASA have a relationship

536
00:22:06,409 --> 00:22:03,419
that dates back to the agency's earliest

537
00:22:08,299 --> 00:22:06,419
days yielding scientific discoveries in

538
00:22:09,660 --> 00:22:08,309

the bed is the bedrock of NASA's

539
00:22:11,280 --> 00:22:09,670
existence

540
00:22:13,110 --> 00:22:11,290
I just notice I'm giving you a light

541
00:22:17,400 --> 00:22:13,120
show back here as I play around with the

542
00:22:20,070 --> 00:22:17,410
computer as administrator I look upon it

543
00:22:23,580 --> 00:22:20,080
as a partnership this partnership takes

544
00:22:26,370 --> 00:22:23,590
many forms setting priorities developing

545
00:22:28,710 --> 00:22:26,380
new technologies building spacecraft and

546
00:22:30,660 --> 00:22:28,720
operating missions one of our biggest

547
00:22:33,210 --> 00:22:30,670
challenges is balancing resources

548
00:22:35,970 --> 00:22:33,220
between older facilities and enabling

549
00:22:38,220 --> 00:22:35,980
new missions and technologies we must

550
00:22:40,290 --> 00:22:38,230
also continuously work to optimize the

551
00:22:42,480 --> 00:22:40,300
agency's fiscal management and I

552
00:22:45,210 --> 00:22:42,490
appreciate how your community has worked

553
00:22:46,740 --> 00:22:45,220
with us to improve our efficiency many

554
00:22:49,080 --> 00:22:46,750
here are participating in the next

555
00:22:50,700 --> 00:22:49,090
decade old survey identifying more

556
00:22:53,250 --> 00:22:50,710
promising areas of discovery and

557
00:22:56,250 --> 00:22:53,260
astronomy and astrophysics for the

558
00:22:59,640 --> 00:22:56,260
decade ahead and designing a program to

559
00:23:01,800 --> 00:22:59,650
achieve it this decade Oh process first

560
00:23:03,210 --> 00:23:01,810
introduced in astronomy has become a

561
00:23:06,600 --> 00:23:03,220
model to be followed in other

562
00:23:09,420 --> 00:23:06,610
disciplines some of you serve on nasa

563
00:23:12,240 --> 00:23:09,430

advisory committees others participate

564
00:23:14,190 --> 00:23:12,250
in peer reviews to assure that the best

565
00:23:16,350 --> 00:23:14,200
scientific return that we get the best

566
00:23:18,360 --> 00:23:16,360
scientific return from these missions i

567
00:23:21,210 --> 00:23:18,370
want to thank all of you for your

568
00:23:23,250 --> 00:23:21,220
service because of it nasa addresses the

569
00:23:25,950 --> 00:23:23,260
most compelling science of our time a

570
00:23:28,860 --> 00:23:25,960
benchmark of excellence that as a model

571
00:23:31,320 --> 00:23:28,870
for the world space science requires a

572
00:23:34,230 --> 00:23:31,330
healthy space program and new ideas and

573
00:23:35,880 --> 00:23:34,240
innovative approaches this can only be

574
00:23:38,580 --> 00:23:35,890
achieved from a trained and skilled

575
00:23:41,160 --> 00:23:38,590
workforce to attract the best workers

576
00:23:45,060 --> 00:23:41,170
NASA must continue to develop missions

577
00:23:47,610 --> 00:23:45,070
that inspire as well as educate us so

578
00:23:49,350 --> 00:23:47,620
another big challenge is finding ways to

579
00:23:51,900 --> 00:23:49,360
share your discoveries with the public

580
00:23:55,230 --> 00:23:51,910
it's critical that we do so effectively

581
00:23:57,510 --> 00:23:55,240
and I know that this community has been

582
00:23:59,070 --> 00:23:57,520
very active in communicating with the

583
00:24:01,680 --> 00:23:59,080
public through press announcements

584
00:24:04,560 --> 00:24:01,690
partnering with museums and planetariums

585
00:24:06,480 --> 00:24:04,570
holding teacher workshops and developing

586
00:24:09,030 --> 00:24:06,490
classroom materials for young students

587
00:24:10,620 --> 00:24:09,040
I'm sure all of you would like to know

588
00:24:12,420 --> 00:24:10,630

what direction President Obama will

589
00:24:15,000 --> 00:24:12,430
choose for the future of the space

590
00:24:16,830 --> 00:24:15,010
program all I can say for now is that

591
00:24:18,300 --> 00:24:16,840
NASA is working closely with the

592
00:24:20,430 --> 00:24:18,310
executive office of the president in

593
00:24:23,100 --> 00:24:20,440
helping him determine the best path

594
00:24:24,660 --> 00:24:23,110
forward what I know however

595
00:24:27,960 --> 00:24:24,670
is that science is important to our

596
00:24:30,150 --> 00:24:27,970
president important to NASA and crucial

597
00:24:33,000 --> 00:24:30,160
to whatever way forward we are to follow

598
00:24:35,430 --> 00:24:33,010
I can make this commitment to you as the

599
00:24:38,070 --> 00:24:35,440
NASA Administrator the future of human

600
00:24:47,680 --> 00:24:38,080
space flight will not be paid for out of

601
00:24:52,520 --> 00:24:50,750
let me close with a little story and I

602
00:24:55,040 --> 00:24:52,530
learned this when I was on the White

603
00:24:56,540 --> 00:24:55,050
House lawn last summer in honor of the

604
00:24:58,850 --> 00:24:56,550
400th anniversary of Galileo's

605
00:25:00,440 --> 00:24:58,860
astronomical discoveries and in

606
00:25:03,020 --> 00:25:00,450
commemoration of the international year

607
00:25:04,790 --> 00:25:03,030
of astronomy one of Galileo's telescopes

608
00:25:07,280 --> 00:25:04,800
came to America for public for the

609
00:25:08,990 --> 00:25:07,290
public to see for five months the

610
00:25:11,030 --> 00:25:09,000
Franklin Institute in Philadelphia not

611
00:25:13,550 --> 00:25:11,040
only displayed the telescope on loan

612
00:25:16,280 --> 00:25:13,560
from Italy but also created an entire

613
00:25:19,130 --> 00:25:16,290

exhibit about Galileo and his age of

614
00:25:22,580 --> 00:25:19,140
discovery by our standards today the

615
00:25:24,740 --> 00:25:22,590
telescope looked quite crude only one of

616
00:25:27,140 --> 00:25:24,750
two original telescopes used by Galileo

617
00:25:29,480 --> 00:25:27,150
that survived there are only two that

618
00:25:31,130 --> 00:25:29,490
survived today but it helps spark a

619
00:25:34,430 --> 00:25:31,140
revolution in science whose consequences

620
00:25:36,950 --> 00:25:34,440
still echo across the centuries if we

621
00:25:39,800 --> 00:25:36,960
continue to develop our partnerships the

622
00:25:42,380 --> 00:25:39,810
day will come when Hubble and the Webb

623
00:25:44,600 --> 00:25:42,390
Space Telescope's will look just as

624
00:25:47,180 --> 00:25:44,610
primitive to our grandchildren and great

625
00:25:50,650 --> 00:25:47,190
grandchildren and future generations as

626
00:25:53,200 --> 00:25:50,660
the Galilean telescopes look to us today

627
00:25:55,670 --> 00:25:53,210
so let's embrace our future together

628
00:25:57,200 --> 00:25:55,680
along with new science will come the

629
00:25:59,810 --> 00:25:57,210
excitement and turbulence that always

630
00:26:01,700 --> 00:25:59,820
follows new discoveries you and I

631
00:26:04,610 --> 00:26:01,710
together along with our international

632
00:26:07,070 --> 00:26:04,620
partners must forge ahead mindful that

633
00:26:09,320 --> 00:26:07,080
our task remains to develop missions and

634
00:26:12,470 --> 00:26:09,330
programs that give value back to the

635
00:26:14,320 --> 00:26:12,480
taxpayer we must identify new ways to

636
00:26:17,090 --> 00:26:14,330
inspire the next generation of explorers

637
00:26:20,060 --> 00:26:17,100
the nation and the international science

638
00:26:23,420 --> 00:26:20,070

community expect no less of us with your

639
00:26:25,490 --> 00:26:23,430
partnership and cooperation NASA stands