
NASA
Daniel Caruso
SAC-D Project Manager, CONAE, Argentina

1
00:00:08,710 --> 00:00:06,470
welcome to nasa headquarters in

2
00:00:10,230 --> 00:00:08,720
washington i'm steve cole of the office

3
00:00:11,990 --> 00:00:10,240
of communications

4
00:00:13,990 --> 00:00:12,000
we are just over three weeks away from

5
00:00:16,870 --> 00:00:14,000
the launch of nasa's next earth

6
00:00:18,950 --> 00:00:16,880
observing mission aquarius sac d a

7
00:00:21,189 --> 00:00:18,960
collaboration with argentina's space

8
00:00:23,990 --> 00:00:21,199
agency konai is going to do something

9
00:00:26,630 --> 00:00:24,000
that we have never done before

10
00:00:28,870 --> 00:00:26,640
nasa has studied the world's oceans in

11
00:00:32,150 --> 00:00:28,880
from space for decades but this will be

12
00:00:35,030 --> 00:00:32,160
the first missions of nasa's to study a

13
00:00:37,110 --> 00:00:35,040

new a key ingredient missing ingredient

14
00:00:38,310 --> 00:00:37,120
of our understanding of earth's climate

15
00:00:39,670 --> 00:00:38,320
from space

16
00:00:41,990 --> 00:00:39,680
salt

17
00:00:44,950 --> 00:00:42,000
scientists expect to learn a great deal

18
00:00:47,190 --> 00:00:44,960
about our planet by measuring very small

19
00:00:50,470 --> 00:00:47,200
changes in the amount of salt to the

20
00:00:52,069 --> 00:00:50,480
salinity in the oceans of the world

21
00:00:54,470 --> 00:00:52,079
here to tell you about the mission and

22
00:00:57,990 --> 00:00:54,480
what scientists hope to learn are five

23
00:01:00,869 --> 00:00:58,000
key people involved with aquarius zac d

24
00:01:03,349 --> 00:01:00,879
first will be eric lindstrom

25
00:01:05,030 --> 00:01:03,359
aquarius program scientist from nasa

26
00:01:08,230 --> 00:01:05,040
headquarters

27
00:01:10,710 --> 00:01:08,240
eric ianson aquarius program executive

28
00:01:13,350 --> 00:01:10,720
from nasa headquarters

29
00:01:15,510 --> 00:01:13,360
gary lagerloff aquarius principal

30
00:01:18,469 --> 00:01:15,520
investigator from earth and space

31
00:01:21,830 --> 00:01:18,479
research in seattle washington

32
00:01:23,830 --> 00:01:21,840
ahmed sen aquarius project manager from

33
00:01:25,670 --> 00:01:23,840
nasa's jet propulsion laboratory in

34
00:01:28,950 --> 00:01:25,680
pasadena

35
00:01:32,469 --> 00:01:28,960
and danielle caruso sac d project

36
00:01:34,630 --> 00:01:32,479
manager from konai in argentina

37
00:01:36,789 --> 00:01:34,640
after our panel's presentations we'll be

38
00:01:38,710 --> 00:01:36,799

taking questions from the audience and

39
00:01:41,749 --> 00:01:38,720
from the reporters here in the in the

40
00:01:45,030 --> 00:01:41,759
auditorium as well as on the phone lines

41
00:01:46,710 --> 00:01:45,040
so let's start off with eric lindstrom

42
00:01:49,190 --> 00:01:46,720
thanks steve

43
00:01:50,710 --> 00:01:49,200
measuring ocean surface salinity from

44
00:01:53,190 --> 00:01:50,720
space is

45
00:01:55,510 --> 00:01:53,200
nasa's latest

46
00:01:58,230 --> 00:01:55,520
technology achievement and it's really

47
00:02:00,550 --> 00:01:58,240
going to be a great leap forward for the

48
00:02:02,630 --> 00:02:00,560
science of oceanography

49
00:02:06,230 --> 00:02:02,640
uh for many of you

50
00:02:07,510 --> 00:02:06,240
salinity is a rather obscure quantity

51
00:02:09,830 --> 00:02:07,520
and

52
00:02:12,390 --> 00:02:09,840
but i must tell you that it's of

53
00:02:16,390 --> 00:02:12,400
critical importance in the ocean

54
00:02:18,710 --> 00:02:16,400
circulation in the climate system and in

55
00:02:20,710 --> 00:02:18,720
diagnosing the flow of fresh water

56
00:02:22,470 --> 00:02:20,720
through our earth system

57
00:02:25,990 --> 00:02:22,480
uh salinity

58
00:02:29,670 --> 00:02:26,000
uh is the amount of uh salt dissolved in

59
00:02:32,070 --> 00:02:29,680
seawater and uh you may be surprised to

60
00:02:34,630 --> 00:02:32,080
know that it varies through the ocean we

61
00:02:37,830 --> 00:02:34,640
oceanographers get down to the last uh

62
00:02:40,790 --> 00:02:37,840
digits in measuring it it's difficult to

63
00:02:42,470 --> 00:02:40,800

measure uh from a ship but uh we've

64
00:02:46,229 --> 00:02:42,480
collected probably a few million

65
00:02:50,470 --> 00:02:46,239
measurements over the last 100 years

66
00:02:52,949 --> 00:02:50,480
it's measured in grams of salt of salt

67
00:02:56,070 --> 00:02:52,959
in kilograms of seawater

68
00:02:58,869 --> 00:02:56,080
its typical range is from 32 parts per

69
00:03:01,350 --> 00:02:58,879
thousand to 38 parts per thousand these

70
00:03:03,910 --> 00:03:01,360
are small numbers small differences but

71
00:03:06,070 --> 00:03:03,920
they make an enormous difference in the

72
00:03:07,910 --> 00:03:06,080
circulation and climate

73
00:03:10,390 --> 00:03:07,920
so we'll hear more about measuring

74
00:03:11,509 --> 00:03:10,400
salinity from space from gary in a few

75
00:03:14,070 --> 00:03:11,519
minutes

76
00:03:16,149 --> 00:03:14,080
i'd like to spend a minute and put this

77
00:03:17,830 --> 00:03:16,159
in the perspective of

78
00:03:19,990 --> 00:03:17,840
nasa's other

79
00:03:23,830 --> 00:03:20,000
research missions can have the first

80
00:03:29,589 --> 00:03:26,229
so we have uh in the earth science

81
00:03:31,750 --> 00:03:29,599
division 13 missions on orbit now and

82
00:03:32,789 --> 00:03:31,760
about half of them

83
00:03:35,110 --> 00:03:32,799
measure

84
00:03:36,470 --> 00:03:35,120
ocean quantities we get the sea surface

85
00:03:38,070 --> 00:03:36,480
temperature

86
00:03:40,949 --> 00:03:38,080
ocean winds

87
00:03:43,430 --> 00:03:40,959
sea level ocean color and the changing

88
00:03:44,869 --> 00:03:43,440

mass of the ocean from a number of these

89
00:03:48,229 --> 00:03:44,879
satellites

90
00:03:50,550 --> 00:03:48,239
a key missing piece uh that is really in

91
00:03:53,910 --> 00:03:50,560
demand by the ocean science community is

92
00:03:56,869 --> 00:03:53,920
salinity and uh together with surface

93
00:03:59,190 --> 00:03:56,879
temperature salinity uh determines the

94
00:04:01,350 --> 00:03:59,200
density of the surface water of the

95
00:04:04,309 --> 00:04:01,360
ocean and

96
00:04:07,030 --> 00:04:04,319
density variations and wind drive the

97
00:04:09,670 --> 00:04:07,040
ocean circulation so this is why we want

98
00:04:11,910 --> 00:04:09,680
to get this missing piece

99
00:04:12,830 --> 00:04:11,920
particularly the deep waters of the

100
00:04:16,069 --> 00:04:12,840
ocean

101
00:04:17,990 --> 00:04:16,079
uh get their uh properties at the sea

102
00:04:19,670 --> 00:04:18,000
surface in winter

103
00:04:21,909 --> 00:04:19,680
so their temperature and salinity are

104
00:04:24,150 --> 00:04:21,919
set for their lifetime they'd get dense

105
00:04:26,790 --> 00:04:24,160
and sink to the bottom of the ocean and

106
00:04:28,790 --> 00:04:26,800
fill up the ocean basins collecting the

107
00:04:30,870 --> 00:04:28,800
data about the the salinity and the

108
00:04:33,189 --> 00:04:30,880
temperature in winter in the southern

109
00:04:35,590 --> 00:04:33,199
ocean or in the greenland sea is

110
00:04:37,030 --> 00:04:35,600
horrible you don't want to go do that

111
00:04:40,150 --> 00:04:37,040
you would be much better to get that

112
00:04:42,150 --> 00:04:40,160
from space so i'm all in favor of this

113
00:04:44,390 --> 00:04:42,160

uh i don't want to spend any more days

114
00:04:46,070 --> 00:04:44,400
out in 50 foot waves

115
00:04:48,950 --> 00:04:46,080
so uh

116
00:04:51,990 --> 00:04:48,960
we stand to discover a lot from the

117
00:04:55,030 --> 00:04:52,000
aquarius measurements by uh having a

118
00:04:57,270 --> 00:04:55,040
year-round measurements of salinity

119
00:05:00,310 --> 00:04:57,280
from space to add to our other

120
00:05:03,029 --> 00:05:00,320
measurements another uh a sort of a

121
00:05:06,070 --> 00:05:03,039
grand problem in

122
00:05:07,110 --> 00:05:06,080
earth science is to understand the water

123
00:05:11,029 --> 00:05:07,120
cycle

124
00:05:14,390 --> 00:05:11,039
evaporation from the ocean clouds rain

125
00:05:16,870 --> 00:05:14,400
the uh formation of ice the runoff from

126
00:05:21,110 --> 00:05:16,880
the land back into the sea

127
00:05:22,790 --> 00:05:21,120
and the ocean salinity is uh really

128
00:05:26,790 --> 00:05:22,800
turns out to be a

129
00:05:30,390 --> 00:05:26,800
a pretty useful diagnostic of uh the big

130
00:05:32,870 --> 00:05:30,400
picture in the water cycle so

131
00:05:35,670 --> 00:05:32,880
let's have the next slide and i'll show

132
00:05:37,670 --> 00:05:35,680
you what we know about the average ocean

133
00:05:40,950 --> 00:05:37,680
surface salinity here

134
00:05:44,629 --> 00:05:40,960
the range on on the

135
00:05:45,590 --> 00:05:44,639
right hand side from 31 to 39 and the

136
00:05:47,909 --> 00:05:45,600
red

137
00:05:50,469 --> 00:05:47,919
patches are the high salinity zones that

138
00:05:53,590 --> 00:05:50,479

are in mid-latitudes the middles of the

139
00:05:54,390 --> 00:05:53,600
subtropical gyres we call them

140
00:05:57,510 --> 00:05:54,400
and

141
00:06:00,150 --> 00:05:57,520
the the blue patches lower salinity in

142
00:06:01,990 --> 00:06:00,160
high latitudes and in the uh tropical

143
00:06:03,749 --> 00:06:02,000
rain belt

144
00:06:05,590 --> 00:06:03,759
particularly noticeable across the

145
00:06:08,629 --> 00:06:05,600
pacific

146
00:06:13,430 --> 00:06:10,150
i would say

147
00:06:15,029 --> 00:06:13,440
salinity is really closely tied to the

148
00:06:16,790 --> 00:06:15,039
water cycle

149
00:06:19,350 --> 00:06:16,800
and you can see that

150
00:06:21,350 --> 00:06:19,360
by its key driver the difference between

151
00:06:23,510 --> 00:06:21,360
evaporation and precipitation over the

152
00:06:26,390 --> 00:06:23,520
ocean the next slide

153
00:06:29,110 --> 00:06:26,400
shows this uh difference between

154
00:06:30,550 --> 00:06:29,120
evaporation and precipitation in meters

155
00:06:35,350 --> 00:06:30,560
per year

156
00:06:38,870 --> 00:06:35,360
evaporation in middle latitudes make the

157
00:06:41,189 --> 00:06:38,880
salinity higher and a few meters excess

158
00:06:44,230 --> 00:06:41,199
per year of rain and the rain belts

159
00:06:46,550 --> 00:06:44,240
cause the low salinity patches

160
00:06:48,390 --> 00:06:46,560
so you could see this correspondence

161
00:06:50,629 --> 00:06:48,400
between the

162
00:06:54,469 --> 00:06:50,639
evaporation and precipitation this water

163
00:06:56,550 --> 00:06:54,479

cycle indicator and uh the salinity uh

164
00:06:59,189 --> 00:06:56,560
there uh

165
00:07:01,670 --> 00:06:59,199
ocean salinity is then is a sensitive

166
00:07:03,510 --> 00:07:01,680
sort of integrated indicator

167
00:07:05,189 --> 00:07:03,520
of the movement of fresh water through

168
00:07:08,309 --> 00:07:05,199
the earth's system and that's what's got

169
00:07:10,469 --> 00:07:08,319
us on the buzz here to

170
00:07:13,510 --> 00:07:10,479
get the aquarius data

171
00:07:17,270 --> 00:07:13,520
the next slide shows historical

172
00:07:20,309 --> 00:07:17,280
salinity data for the last 50 years from

173
00:07:22,150 --> 00:07:20,319
1950 to 2000 this was published last

174
00:07:25,350 --> 00:07:22,160
year an analysis

175
00:07:28,550 --> 00:07:25,360
it's in tenths of parts per thousand the

176
00:07:30,790 --> 00:07:28,560
trend over 50 years red patches

177
00:07:33,430 --> 00:07:30,800
increasing salinity

178
00:07:35,589 --> 00:07:33,440
blue patches lower salinity and you can

179
00:07:38,629 --> 00:07:35,599
immediately see the correspondence

180
00:07:39,990 --> 00:07:38,639
between the previous maps that

181
00:07:46,629 --> 00:07:40,000
the

182
00:07:48,710 --> 00:07:46,639
uh that

183
00:07:50,309 --> 00:07:48,720
is uh in the next slide i'll show that

184
00:07:52,950 --> 00:07:50,319
more clearly

185
00:07:55,510 --> 00:07:52,960
with this uh the salinity map on the top

186
00:07:56,550 --> 00:07:55,520
and the trend map on the bottom

187
00:07:59,110 --> 00:07:56,560
uh

188
00:08:02,469 --> 00:07:59,120

is this an indication that we're having

189
00:08:04,550 --> 00:08:02,479
acceleration of the planet's water cycle

190
00:08:07,029 --> 00:08:04,560
uh that uh uh

191
00:08:08,629 --> 00:08:07,039
these uh these salty places in the

192
00:08:11,189 --> 00:08:08,639
subtropical gyres are having more

193
00:08:13,749 --> 00:08:11,199
evaporation the rain belts are having

194
00:08:16,309 --> 00:08:13,759
more precipitation and the ocean is

195
00:08:18,950 --> 00:08:16,319
giving us this signal that looks much

196
00:08:20,469 --> 00:08:18,960
like its own average salinity

197
00:08:22,790 --> 00:08:20,479
so

198
00:08:26,950 --> 00:08:22,800
i think that this uh

199
00:08:29,029 --> 00:08:26,960
really uh uh is an indicator but uh uh

200
00:08:31,189 --> 00:08:29,039
there could be other explanations for

201
00:08:33,589 --> 00:08:31,199
this that it could be the ocean

202
00:08:36,070 --> 00:08:33,599
circulation is changing it could be that

203
00:08:38,389 --> 00:08:36,080
ocean mixing is changing what we really

204
00:08:41,829 --> 00:08:38,399
need to do as oceanographers is uh dig

205
00:08:44,870 --> 00:08:41,839
into this more deeply and aquarius will

206
00:08:47,590 --> 00:08:44,880
help us illuminate these processes uh

207
00:08:49,509 --> 00:08:47,600
it's a diagnostic for the water cycle

208
00:08:52,230 --> 00:08:49,519
but it can also help us tell about ocean

209
00:08:54,949 --> 00:08:52,240
circulation and mixing in the ocean uh

210
00:08:57,430 --> 00:08:54,959
the next slide shows uh we're planning

211
00:09:00,389 --> 00:08:57,440
to with the after the launch of aquarius

212
00:09:03,269 --> 00:09:00,399
some really uh extensive field campaigns

213
00:09:05,110 --> 00:09:03,279

to go out and really uh measure salinity

214
00:09:06,870 --> 00:09:05,120
at the surface and below the surface

215
00:09:08,870 --> 00:09:06,880
with every bit of technology we can

216
00:09:12,150 --> 00:09:08,880
bring to bear to understand the

217
00:09:15,190 --> 00:09:12,160
processes that change salinity in the

218
00:09:18,150 --> 00:09:15,200
upper ocean i'm just really excited

219
00:09:18,949 --> 00:09:18,160
about the idea that we can get this data

220
00:09:20,870 --> 00:09:18,959
with

221
00:09:24,150 --> 00:09:20,880
all over the planet and

222
00:09:27,430 --> 00:09:24,160
and be able to diagnose what's going on

223
00:09:29,670 --> 00:09:27,440
with the water cycle so uh with that i

224
00:09:31,190 --> 00:09:29,680
would like to turn it over to eric and

225
00:09:35,110 --> 00:09:31,200
talk about the

226
00:09:39,190 --> 00:09:37,509
thank you eric um

227
00:09:41,750 --> 00:09:39,200
indeed this is an exciting day for all

228
00:09:43,269 --> 00:09:41,760
of us on the aquarius sacd team

229
00:09:45,030 --> 00:09:43,279
as eric described

230
00:09:47,269 --> 00:09:45,040
the expected science return from this

231
00:09:49,350 --> 00:09:47,279
mission will be fantastic

232
00:09:52,949 --> 00:09:49,360
another important aspect of the mission

233
00:09:56,790 --> 00:09:52,959
though is nasa's continued partnership

234
00:09:58,550 --> 00:09:56,800
with the argentina space agency konai

235
00:10:02,310 --> 00:09:58,560
nasa frequently collaborates with other

236
00:10:05,590 --> 00:10:02,320
space agencies on satellite missions

237
00:10:07,750 --> 00:10:05,600
in nasa and konai have worked together

238
00:10:09,030 --> 00:10:07,760

successfully over the last 15 years

239
00:10:11,750 --> 00:10:09,040
however

240
00:10:13,590 --> 00:10:11,760
aquarius sac d represents

241
00:10:15,829 --> 00:10:13,600
a quantum leap forward

242
00:10:16,870 --> 00:10:15,839
in the collaboration between the two

243
00:10:19,509 --> 00:10:16,880
agencies

244
00:10:22,230 --> 00:10:19,519
for one it is by far

245
00:10:23,750 --> 00:10:22,240
the most complex and challenging mission

246
00:10:26,389 --> 00:10:23,760
ever attempted through a partnership

247
00:10:29,910 --> 00:10:26,399
between the united states and argentina

248
00:10:32,150 --> 00:10:29,920
and has a capability as comp comparable

249
00:10:34,949 --> 00:10:32,160
to any earth science mission that nasa

250
00:10:40,630 --> 00:10:37,030
secondly the responsibilities of each

251
00:10:41,910 --> 00:10:40,640
agency are of equivalent importance

252
00:10:43,750 --> 00:10:41,920
wherein

253
00:10:46,870 --> 00:10:43,760
nasa is providing

254
00:10:48,550 --> 00:10:46,880
the primary instrument aquarius and

255
00:10:49,350 --> 00:10:48,560
the launch vehicle

256
00:10:52,470 --> 00:10:49,360
and

257
00:10:53,829 --> 00:10:52,480
konai is providing the satellite bus

258
00:10:55,509 --> 00:10:53,839
sac-d

259
00:10:56,790 --> 00:10:55,519
and the mission operations and ground

260
00:10:58,550 --> 00:10:56,800
system

261
00:11:01,110 --> 00:10:58,560
now when we think about space missions

262
00:11:03,829 --> 00:11:01,120
we're often in awe of the

263
00:11:05,829 --> 00:11:03,839

technical complexities in developing

264
00:11:08,069 --> 00:11:05,839
instruments and spacecraft getting them

265
00:11:09,350 --> 00:11:08,079
into orbit and delivering breakthrough

266
00:11:11,750 --> 00:11:09,360
science

267
00:11:13,430 --> 00:11:11,760
in the case of aquarius sac d

268
00:11:16,550 --> 00:11:13,440
the logistics of the project were as

269
00:11:18,710 --> 00:11:16,560
challenging as the technical aspects due

270
00:11:20,630 --> 00:11:18,720
to the numerous participants

271
00:11:23,670 --> 00:11:20,640
and

272
00:11:25,190 --> 00:11:23,680
facilities involved in the project

273
00:11:26,790 --> 00:11:25,200
i'd like to take a few minutes to walk

274
00:11:28,230 --> 00:11:26,800
you through the path

275
00:11:33,269 --> 00:11:28,240
that this mission took to get to the

276
00:11:37,750 --> 00:11:35,269
the aquarius instrument is comprised of

277
00:11:39,030 --> 00:11:37,760
a radiometer built at the nasa goddard

278
00:11:40,069 --> 00:11:39,040
space flight center in greenbelt

279
00:11:41,910 --> 00:11:40,079
maryland

280
00:11:43,590 --> 00:11:41,920
and a scatterometer built at the jet

281
00:11:46,150 --> 00:11:43,600
propulsion laboratory in pasadena

282
00:11:47,509 --> 00:11:46,160
california once both major components of

283
00:11:49,670 --> 00:11:47,519
the instrument were completed the

284
00:11:51,350 --> 00:11:49,680
radiometer was trucked across the u.s

285
00:11:52,389 --> 00:11:51,360
from goddard to jpl where it was

286
00:11:53,590 --> 00:11:52,399
integrated with the rest of the

287
00:11:56,949 --> 00:11:53,600
instrument

288
00:11:58,870 --> 00:11:56,959

go to the next slide please

289
00:12:00,949 --> 00:11:58,880
following the successful completion of

290
00:12:02,629 --> 00:12:00,959
testing of the fully integrated aquarius

291
00:12:04,550 --> 00:12:02,639
instrument it was placed in a shipping

292
00:12:07,590 --> 00:12:04,560
container and airlifted

293
00:12:08,829 --> 00:12:07,600
by the u.s air force from uh

294
00:12:12,470 --> 00:12:08,839
to san

295
00:12:13,910 --> 00:12:12,480
carlos san carlos de berloche argentina

296
00:12:16,470 --> 00:12:13,920
where under konai's direction it was

297
00:12:19,110 --> 00:12:16,480
integrated with the sac d observatory

298
00:12:21,190 --> 00:12:19,120
go to the next slide

299
00:12:23,430 --> 00:12:21,200
at about the same time that aquarius was

300
00:12:24,790 --> 00:12:23,440
being delivered to argentina konai was

301
00:12:27,269 --> 00:12:24,800
receiving instrument and instrument

302
00:12:29,110 --> 00:12:27,279
components from canada france and italy

303
00:12:30,870 --> 00:12:29,120
as additional science payloads to be

304
00:12:32,470 --> 00:12:30,880
added to the observatory

305
00:12:34,550 --> 00:12:32,480
a total of eight instruments with

306
00:12:35,829 --> 00:12:34,560
aquarius designated as the primary were

307
00:12:37,030 --> 00:12:35,839
integrated with the observatory in

308
00:12:40,150 --> 00:12:37,040
argentina

309
00:12:43,829 --> 00:12:42,230
following successful integration and

310
00:12:45,910 --> 00:12:43,839
functional testing of the observatory in

311
00:12:47,509 --> 00:12:45,920
argentina the observatory was airlifted

312
00:12:49,190 --> 00:12:47,519
again with the help of a u.s air force

313
00:12:52,069 --> 00:12:49,200

c-17 aircraft

314
00:12:54,310 --> 00:12:52,079
to san jose dos campos brazil for

315
00:12:56,310 --> 00:12:54,320
environmental testing

316
00:12:58,550 --> 00:12:56,320
utilizing the brazilian space agency in

317
00:13:01,509 --> 00:12:58,560
pays state-of-the-art facilities

318
00:13:03,190 --> 00:13:01,519
aquarius sac-d was subjected to a

319
00:13:04,710 --> 00:13:03,200
battery of environmental conditions to

320
00:13:07,030 --> 00:13:04,720
verify its readiness for what it will

321
00:13:09,590 --> 00:13:07,040
see during launch and on orbit

322
00:13:11,269 --> 00:13:09,600
we can go to the next slide

323
00:13:13,750 --> 00:13:11,279
after all these tests were successfully

324
00:13:15,590 --> 00:13:13,760
completed the observatory had a last

325
00:13:17,750 --> 00:13:15,600
transcontinental journey to make this

326
00:13:20,470 --> 00:13:17,760
time using two c-17

327
00:13:21,829 --> 00:13:20,480
u.s air force transports from two

328
00:13:23,590 --> 00:13:21,839
different air force bases the

329
00:13:25,590 --> 00:13:23,600
observatory and associated support

330
00:13:27,910 --> 00:13:25,600
equipment were airlifted from brazil to

331
00:13:29,910 --> 00:13:27,920
vandenberg air force base in california

332
00:13:32,310 --> 00:13:29,920
where it now awaits one last transport

333
00:13:35,190 --> 00:13:32,320
and that's launched into orbit on june

334
00:13:36,790 --> 00:13:35,200
9th

335
00:13:38,949 --> 00:13:36,800
i'd now like to turn it back over to

336
00:13:41,189 --> 00:13:38,959
some of my colleagues who will uh talk a

337
00:13:42,949 --> 00:13:41,199
little bit more about aquarius sacd what

338
00:13:45,829 --> 00:13:42,959

it'll do and how it will do it over to

339
00:13:48,230 --> 00:13:45,839
you gary thank you very much eric

340
00:13:50,870 --> 00:13:48,240
as as principal investigator for the

341
00:13:52,710 --> 00:13:50,880
aquarius mission for nasa uh oftentimes

342
00:13:54,150 --> 00:13:52,720
i'm speaking to people about

343
00:13:56,150 --> 00:13:54,160
we're flying a satellite to measure

344
00:13:58,150 --> 00:13:56,160
ocean salinity and one of the first

345
00:14:00,629 --> 00:13:58,160
questions i get is how do you measure

346
00:14:02,389 --> 00:14:00,639
ocean salinity from a satellite so i'll

347
00:14:04,470 --> 00:14:02,399
attempt to explain a little bit of that

348
00:14:06,150 --> 00:14:04,480
to you today and describe to you how

349
00:14:08,310 --> 00:14:06,160
this mission is designed to make the

350
00:14:10,710 --> 00:14:08,320
global measurements of ocean salinity

351
00:14:13,750 --> 00:14:10,720
that so are so important to the climate

352
00:14:15,350 --> 00:14:13,760
questions that eric described earlier

353
00:14:16,629 --> 00:14:15,360
so if we were just bring up my first

354
00:14:18,870 --> 00:14:16,639
slide here

355
00:14:21,189 --> 00:14:18,880
you see here a picture of the aquarius

356
00:14:23,509 --> 00:14:21,199
sac d observatory the aquarius

357
00:14:25,030 --> 00:14:23,519
instrument is about the left hand third

358
00:14:26,389 --> 00:14:25,040
of the image that you're seeing on the

359
00:14:30,629 --> 00:14:26,399
screen right now

360
00:14:32,470 --> 00:14:30,639
and you see a large oval shaped um

361
00:14:33,990 --> 00:14:32,480
gold covered

362
00:14:35,670 --> 00:14:34,000
feature there that's the antenna

363
00:14:38,230 --> 00:14:35,680

reflector of the

364
00:14:41,110 --> 00:14:38,240
aquarius instrument and belief beneath

365
00:14:42,870 --> 00:14:41,120
that are three microwave radiometers the

366
00:14:44,949 --> 00:14:42,880
microwave radiometers are really the

367
00:14:47,350 --> 00:14:44,959
heart of the aquarius instrument and the

368
00:14:49,750 --> 00:14:47,360
way salinity is measured is basically

369
00:14:52,629 --> 00:14:49,760
like this we microwave radiometers

370
00:14:53,990 --> 00:14:52,639
detect the microwave emissions off the

371
00:14:57,110 --> 00:14:54,000
sea surface

372
00:14:59,269 --> 00:14:57,120
those microwave emissions are modulated

373
00:15:01,350 --> 00:14:59,279
or changed by the variations in the

374
00:15:03,269 --> 00:15:01,360
electrical conductivity of sea water

375
00:15:04,230 --> 00:15:03,279
itself well electrical conductivity is

376
00:15:08,710 --> 00:15:04,240
directly

377
00:15:10,870 --> 00:15:08,720
measuring this emissivity off the sea

378
00:15:13,189 --> 00:15:10,880
surface we can through some equations

379
00:15:15,030 --> 00:15:13,199
derive what the ocean salinity is the

380
00:15:17,990 --> 00:15:15,040
microwave radiometers themselves are

381
00:15:19,750 --> 00:15:18,000
actually very sensitive radio receivers

382
00:15:21,990 --> 00:15:19,760
and this equipment

383
00:15:23,670 --> 00:15:22,000
in order to make the precise and

384
00:15:25,910 --> 00:15:23,680
accurate measurements that we need to

385
00:15:27,910 --> 00:15:25,920
achieve our science objectives these

386
00:15:29,509 --> 00:15:27,920
microwaves radiometers were built with

387
00:15:31,749 --> 00:15:29,519
the highest accuracy standards of any

388
00:15:33,829 --> 00:15:31,759

that's ever been built before for for an

389
00:15:36,310 --> 00:15:33,839
earth observing mission

390
00:15:37,910 --> 00:15:36,320
uh so if we could go to the next slide

391
00:15:39,670 --> 00:15:37,920
what i'd like to explain to you here is

392
00:15:41,110 --> 00:15:39,680
basically how this mission is designed

393
00:15:43,189 --> 00:15:41,120
how we're going to collect the global

394
00:15:44,790 --> 00:15:43,199
samples on the right hand side of this

395
00:15:46,310 --> 00:15:44,800
image you see in the upper right hand

396
00:15:48,150 --> 00:15:46,320
corner again the same image of the

397
00:15:49,910 --> 00:15:48,160
satellite that i just showed you and you

398
00:15:52,389 --> 00:15:49,920
see some colored lines extending

399
00:15:54,550 --> 00:15:52,399
downward and you see three oval-shaped

400
00:15:55,509 --> 00:15:54,560
patterns on on the lower part of the

401
00:15:57,990 --> 00:15:55,519
figure

402
00:15:59,430 --> 00:15:58,000
basically the radiation from the earth

403
00:16:01,670 --> 00:15:59,440
from the spot on the earth that's

404
00:16:03,509 --> 00:16:01,680
indicated by those different colored

405
00:16:06,069 --> 00:16:03,519
ellipses there

406
00:16:07,910 --> 00:16:06,079
their radiation is goes off the antenna

407
00:16:09,670 --> 00:16:07,920
reflector and into the individual

408
00:16:11,670 --> 00:16:09,680
radiometers the position of the

409
00:16:13,829 --> 00:16:11,680
radiometers oriented with the reflector

410
00:16:16,150 --> 00:16:13,839
determines what where the

411
00:16:18,310 --> 00:16:16,160
beam is located on the surface so we

412
00:16:21,350 --> 00:16:18,320
have three beams located across what we

413
00:16:23,829 --> 00:16:21,360

call a swath that swath is about 390

414
00:16:26,470 --> 00:16:23,839
kilometers wide as the satellite flies

415
00:16:28,629 --> 00:16:26,480
in its orbit we trace this swath across

416
00:16:30,470 --> 00:16:28,639
the surface of the ocean so if you look

417
00:16:31,990 --> 00:16:30,480
on the left hand side here you see a map

418
00:16:34,389 --> 00:16:32,000
of the western hemisphere and you see

419
00:16:35,990 --> 00:16:34,399
one orbit that's colored uh

420
00:16:38,389 --> 00:16:36,000
in a darker color and you can see the

421
00:16:40,389 --> 00:16:38,399
trace of those little uh ovals as they

422
00:16:42,470 --> 00:16:40,399
move across the earth's surface

423
00:16:44,389 --> 00:16:42,480
basically on the on over the course of

424
00:16:46,790 --> 00:16:44,399
one orbit we create a swath over the

425
00:16:49,670 --> 00:16:46,800
ground that's about 400 kilometers wide

426
00:16:51,749 --> 00:16:49,680
and then the the orbit itself is timed

427
00:16:54,470 --> 00:16:51,759
with the earth's rotation so over the

428
00:16:56,629 --> 00:16:54,480
period of seven days we actually map out

429
00:16:58,389 --> 00:16:56,639
the entire globe so those light colored

430
00:16:59,910 --> 00:16:58,399
lines that you see on that figure there

431
00:17:01,829 --> 00:16:59,920
are actually the ground tracks of the

432
00:17:04,789 --> 00:17:01,839
satellite itself and that's the grid

433
00:17:07,029 --> 00:17:04,799
that we observe over a seven day period

434
00:17:09,510 --> 00:17:07,039
if we move on to the next uh

435
00:17:10,949 --> 00:17:09,520
image here this is a video clip this is

436
00:17:13,029 --> 00:17:10,959
an artist's rendition of what the

437
00:17:14,069 --> 00:17:13,039
satellite will be looking like in orbit

438
00:17:15,990 --> 00:17:14,079

and how

439
00:17:17,590 --> 00:17:16,000
it will be sampling the earth so you see

440
00:17:19,029 --> 00:17:17,600
the satellite now flying over the

441
00:17:21,029 --> 00:17:19,039
surface of the earth

442
00:17:22,710 --> 00:17:21,039
there's an image of the swath on the

443
00:17:25,750 --> 00:17:22,720
ground you'll see it coming on here in

444
00:17:29,990 --> 00:17:28,309
and so as it flies along it's basically

445
00:17:32,070 --> 00:17:30,000
mapping out the salinity within that

446
00:17:34,230 --> 00:17:32,080
swath the satellite is actually turned

447
00:17:36,630 --> 00:17:34,240
on and collecting data over all surfaces

448
00:17:39,909 --> 00:17:36,640
of the earth

449
00:17:43,830 --> 00:17:41,590
the the other thing that the satellite

450
00:17:45,510 --> 00:17:43,840
is carrying on board as eric ianson

451
00:17:47,029 --> 00:17:45,520
mentioned is a radar the radar

452
00:17:49,190 --> 00:17:47,039
scannerometer and this measures the

453
00:17:51,029 --> 00:17:49,200
surface winds the surface winds are an

454
00:17:52,230 --> 00:17:51,039
important measurement because we use

455
00:17:54,230 --> 00:17:52,240
that data

456
00:17:56,470 --> 00:17:54,240
to correct for the effect of surface

457
00:17:58,310 --> 00:17:56,480
roughness on the salinity measurements

458
00:18:00,549 --> 00:17:58,320
and you'll also see that the satellite

459
00:18:02,150 --> 00:18:00,559
is flying right at the boundary between

460
00:18:03,669 --> 00:18:02,160
night and day and that's an important

461
00:18:05,750 --> 00:18:03,679
for the design of the instrument because

462
00:18:07,350 --> 00:18:05,760
we want to look away from the sun so as

463
00:18:09,270 --> 00:18:07,360

you see here over the course of a couple

464
00:18:11,350 --> 00:18:09,280
of days we filled in most of the gaps

465
00:18:13,270 --> 00:18:11,360
between the orbits and over seven days

466
00:18:15,510 --> 00:18:13,280
we obtain a complete global map and you

467
00:18:17,669 --> 00:18:15,520
see this is the rendition of salinity

468
00:18:19,909 --> 00:18:17,679
that we we would capture every seven

469
00:18:21,430 --> 00:18:19,919
days so the final image that i'm showing

470
00:18:23,669 --> 00:18:21,440
you here what you see on the screen

471
00:18:25,029 --> 00:18:23,679
should be seeing on the screen right now

472
00:18:27,270 --> 00:18:25,039
is uh

473
00:18:29,510 --> 00:18:27,280
based on our simulation we have created

474
00:18:31,510 --> 00:18:29,520
a computer simulation to

475
00:18:33,029 --> 00:18:31,520
to represent how the exactly how the

476
00:18:35,669 --> 00:18:33,039
aquarius instrument will work and

477
00:18:37,510 --> 00:18:35,679
function uh and produce salinity data

478
00:18:39,270 --> 00:18:37,520
and this is an example of of what that

479
00:18:41,430 --> 00:18:39,280
simulator produces so this is what we

480
00:18:43,350 --> 00:18:41,440
anticipate the satellite observations

481
00:18:45,270 --> 00:18:43,360
we'll actually be making this has the

482
00:18:47,430 --> 00:18:45,280
same pattern of ocean salinity as you've

483
00:18:48,870 --> 00:18:47,440
seen from eric earlier the red patches

484
00:18:51,270 --> 00:18:48,880
of the higher salinities in the ocean

485
00:18:53,430 --> 00:18:51,280
the blue patches or the lower salinities

486
00:18:55,750 --> 00:18:53,440
the most important thing to achieve the

487
00:18:58,310 --> 00:18:55,760
science objectives that we've set out

488
00:19:00,789 --> 00:18:58,320

for this mission is that the accuracy of

489
00:19:02,870 --> 00:19:00,799
how accurately we can retrieve salinity

490
00:19:04,390 --> 00:19:02,880
and our goal is to retrieve salinity at

491
00:19:07,430 --> 00:19:04,400
0.2

492
00:19:09,990 --> 00:19:07,440
parts per thousand that's two tenths two

493
00:19:11,669 --> 00:19:10,000
parts in ten thousand two parts and ten

494
00:19:13,990 --> 00:19:11,679
thousand now that's the equivalent

495
00:19:16,630 --> 00:19:14,000
concentration if you were to take a a

496
00:19:18,549 --> 00:19:16,640
dash of salt which is about the same as

497
00:19:20,870 --> 00:19:18,559
one-eighth of a teaspoon eric is holding

498
00:19:23,110 --> 00:19:20,880
up a one-eighth of a teaspoon measure if

499
00:19:25,430 --> 00:19:23,120
you would take that small amount of salt

500
00:19:26,630 --> 00:19:25,440
and put it in a gallon of water

501
00:19:29,029 --> 00:19:26,640
that's the

502
00:19:31,350 --> 00:19:29,039
amount of salinity change that aquarius

503
00:19:34,549 --> 00:19:31,360
will be able to observe from month to

504
00:19:36,870 --> 00:19:34,559
month over any part of the ocean

505
00:19:38,070 --> 00:19:36,880
so that concludes my remark about this

506
00:19:40,070 --> 00:19:38,080
my remarks about the salinity

507
00:19:41,669 --> 00:19:40,080
measurement ahmet sen our project

508
00:19:43,430 --> 00:19:41,679
manager is going to talk about the

509
00:19:46,150 --> 00:19:43,440
development of the aquarius instrument

510
00:19:48,150 --> 00:19:46,160
thank you thank you gary

511
00:19:51,190 --> 00:19:48,160
well i will take you

512
00:19:53,590 --> 00:19:51,200
through pictures and videos and images

513
00:19:55,510 --> 00:19:53,600

and to tell you how this complex

514
00:19:57,990 --> 00:19:55,520
international mission this challenging

515
00:19:59,110 --> 00:19:58,000
mission is underway and going towards

516
00:20:02,710 --> 00:19:59,120
launch

517
00:20:04,390 --> 00:20:02,720
now gary explained how the instrument is

518
00:20:06,950 --> 00:20:04,400
and i'm going to show you in pictures

519
00:20:08,950 --> 00:20:06,960
how it all started eric also mentioned

520
00:20:10,470 --> 00:20:08,960
to you about the journey and i will show

521
00:20:12,870 --> 00:20:10,480
you in pictures and video how this

522
00:20:15,750 --> 00:20:12,880
journey took place and it came down to

523
00:20:18,070 --> 00:20:15,760
where we stand today at the launch site

524
00:20:20,630 --> 00:20:18,080
so let's go to the next slide

525
00:20:22,870 --> 00:20:20,640
the next slide talks about the concept

526
00:20:24,789 --> 00:20:22,880
now like any scientific experiment we

527
00:20:26,789 --> 00:20:24,799
have a theory and in order for

528
00:20:28,390 --> 00:20:26,799
scientists to believe in that theory and

529
00:20:29,590 --> 00:20:28,400
move it forward we have to run an

530
00:20:31,029 --> 00:20:29,600
experiment

531
00:20:33,110 --> 00:20:31,039
so in about

532
00:20:36,310 --> 00:20:33,120
mid to late 90s

533
00:20:38,470 --> 00:20:36,320
at jpl in pasadena where i'm from

534
00:20:40,310 --> 00:20:38,480
they constructed an instrument which has

535
00:20:42,310 --> 00:20:40,320
a radiometer and a scatterometer much

536
00:20:45,029 --> 00:20:42,320
like that was described before

537
00:20:47,590 --> 00:20:45,039
and the scientists created a pool a

538
00:20:48,470 --> 00:20:47,600

controlled area where they can inject

539
00:20:50,310 --> 00:20:48,480
salt

540
00:20:52,310 --> 00:20:50,320
and change the temperature to see how

541
00:20:54,230 --> 00:20:52,320
the instrument will perform

542
00:20:56,470 --> 00:20:54,240
so once they convince themselves that

543
00:20:58,310 --> 00:20:56,480
the instrument is performing adequately

544
00:21:00,470 --> 00:20:58,320
they said they didn't want to stop there

545
00:21:02,870 --> 00:21:00,480
they wanted to take it up on an aircraft

546
00:21:05,029 --> 00:21:02,880
and to see taking that same instrument

547
00:21:07,110 --> 00:21:05,039
take it up on an aircraft going over the

548
00:21:09,750 --> 00:21:07,120
oceans and trying to measure if they can

549
00:21:11,510 --> 00:21:09,760
detect the same type of signature and

550
00:21:12,710 --> 00:21:11,520
measurement as they have done in the

551
00:21:16,230 --> 00:21:12,720
laboratory

552
00:21:18,070 --> 00:21:16,240
so guess what they did and once they

553
00:21:20,950 --> 00:21:18,080
proved beyond doubt that they could

554
00:21:22,789 --> 00:21:20,960
measure this in with this instrument uh

555
00:21:25,590 --> 00:21:22,799
the signature of salt

556
00:21:28,149 --> 00:21:25,600
they they validated the experiment by

557
00:21:30,870 --> 00:21:28,159
ship observation that has taken samples

558
00:21:32,470 --> 00:21:30,880
before they matched up so with this

559
00:21:34,549 --> 00:21:32,480
concept in mind

560
00:21:36,549 --> 00:21:34,559
the scientists said let's now build an

561
00:21:38,870 --> 00:21:36,559
instrument that we can take it to outer

562
00:21:40,230 --> 00:21:38,880
space looking at earth remote sensing

563
00:21:42,390 --> 00:21:40,240

going around the earth and measuring

564
00:21:44,789 --> 00:21:42,400
salinity globally

565
00:21:45,990 --> 00:21:44,799
that's how it started let's go to the

566
00:21:51,990 --> 00:21:46,000
next picture

567
00:21:53,750 --> 00:21:52,000
radiometer the inerts of the instrument

568
00:21:56,230 --> 00:21:53,760
now it looks like boxes that the

569
00:21:58,630 --> 00:21:56,240
engineers and technicians are working at

570
00:22:00,549 --> 00:21:58,640
yes that was laid out on our table box

571
00:22:02,230 --> 00:22:00,559
by box and with very critical

572
00:22:03,669 --> 00:22:02,240
measurements the radiometer is

573
00:22:06,230 --> 00:22:03,679
constructed

574
00:22:09,029 --> 00:22:06,240
this is the most sensitive radiometer

575
00:22:11,430 --> 00:22:09,039
nasa has ever built to measure salinity

576
00:22:13,830 --> 00:22:11,440
it's amazing the performance of it that

577
00:22:16,950 --> 00:22:13,840
gary just mentioned we measure the

578
00:22:19,909 --> 00:22:16,960
precision of that 0.2 psu

579
00:22:22,870 --> 00:22:19,919
408 miles above the earth

580
00:22:26,789 --> 00:22:22,880
so with that the radiometer got shipped

581
00:22:28,789 --> 00:22:26,799
from goddard from maryland to pasadena

582
00:22:30,549 --> 00:22:28,799
in california so let's go to the next

583
00:22:35,029 --> 00:22:30,559
picture

584
00:22:37,990 --> 00:22:35,039
fully constructed aquarius instrument at

585
00:22:41,270 --> 00:22:38,000
jpl at jpl not only they took the

586
00:22:44,390 --> 00:22:41,280
radiometer boxes and assembled into an

587
00:22:46,470 --> 00:22:44,400
unit which more looks like a piano shape

588
00:22:49,110 --> 00:22:46,480

and with the three horns

589
00:22:50,950 --> 00:22:49,120
where the reflector focuses the beams

590
00:22:52,789 --> 00:22:50,960
from the earth the white is the

591
00:22:55,190 --> 00:22:52,799
reflector antenna that gary mentioned

592
00:22:58,070 --> 00:22:55,200
earlier now what you see

593
00:22:59,990 --> 00:22:58,080
is a configuration that is ready for

594
00:23:02,549 --> 00:23:00,000
shipment and for launch

595
00:23:05,110 --> 00:23:02,559
once in orbit that reflector will be

596
00:23:06,230 --> 00:23:05,120
deployed and it will be focusing the

597
00:23:07,990 --> 00:23:06,240
beams

598
00:23:10,070 --> 00:23:08,000
for the energy from the earth and

599
00:23:13,110 --> 00:23:10,080
reflecting it to the radiometers and the

600
00:23:15,350 --> 00:23:13,120
scatterometer um horns

601
00:23:17,590 --> 00:23:15,360
now what i'm going to do is in the

602
00:23:19,669 --> 00:23:17,600
interest of time over the last three

603
00:23:23,029 --> 00:23:19,679
years what we have done from 2008 to

604
00:23:25,029 --> 00:23:23,039
2011 i will take you on a time journey

605
00:23:26,710 --> 00:23:25,039
that will fast forward you

606
00:23:29,510 --> 00:23:26,720
from building the aquarius instrument at

607
00:23:30,789 --> 00:23:29,520
jpl and moving it forward all the way to

608
00:23:31,590 --> 00:23:30,799
california

609
00:23:33,750 --> 00:23:31,600
thus

610
00:23:36,390 --> 00:23:33,760
please roll the video

611
00:23:40,149 --> 00:23:36,400
this is the birth of aquarius so the

612
00:23:42,230 --> 00:23:40,159
aquarius was being built at jpl and as

613
00:23:44,789 --> 00:23:42,240

you see people are really working fast

614
00:23:46,630 --> 00:23:44,799
but we don't really work that fast it is

615
00:23:48,630 --> 00:23:46,640
it is a composition of images that you

616
00:23:50,789 --> 00:23:48,640
see over months taken so that you can

617
00:23:53,990 --> 00:23:50,799
get a view of how challenging this

618
00:23:56,230 --> 00:23:54,000
mission is as you see on the left side

619
00:23:58,310 --> 00:23:56,240
um the instrument is being put together

620
00:23:59,750 --> 00:23:58,320
it's been hoisted now it's putting into

621
00:24:02,149 --> 00:23:59,760
a shipping container where it's going to

622
00:24:03,110 --> 00:24:02,159
get shipped all the way to argentina

623
00:24:04,710 --> 00:24:03,120
where it's going to be put on the

624
00:24:07,350 --> 00:24:04,720
spacecraft

625
00:24:10,310 --> 00:24:07,360
now we are in argentina and the

626
00:24:12,630 --> 00:24:10,320
equipment has arrived making its journey

627
00:24:14,950 --> 00:24:12,640
we have taken it out of the container

628
00:24:16,710 --> 00:24:14,960
now we're going to test it before we

629
00:24:18,630 --> 00:24:16,720
convince ourselves it's ready to put

630
00:24:19,990 --> 00:24:18,640
onto the spacecraft

631
00:24:22,149 --> 00:24:20,000
as you see

632
00:24:24,870 --> 00:24:22,159
in the left side it is being put onto

633
00:24:26,470 --> 00:24:24,880
the spacecraft being functionally tested

634
00:24:28,789 --> 00:24:26,480
and electrically tested to convince

635
00:24:31,269 --> 00:24:28,799
ourselves and move to brazil for

636
00:24:33,669 --> 00:24:31,279
environmental tests what it does at this

637
00:24:36,390 --> 00:24:33,679
point is to convince ourselves that the

638
00:24:38,710 --> 00:24:36,400

testing is complete enough to be worthy

639
00:24:39,750 --> 00:24:38,720
of space flight we then move the

640
00:24:41,909 --> 00:24:39,760
equipment

641
00:24:44,149 --> 00:24:41,919
from brazil to vandenberg air force

642
00:24:45,510 --> 00:24:44,159
where it sits today

643
00:24:47,830 --> 00:24:45,520
you see the picture over here at

644
00:24:50,470 --> 00:24:47,840
vandenberg air force base being a

645
00:24:52,549 --> 00:24:50,480
satellite being ready to be processed

646
00:24:54,710 --> 00:24:52,559
let's go to the next picture

647
00:24:56,230 --> 00:24:54,720
this picture shows you the observatory

648
00:24:58,870 --> 00:24:56,240
being prepared by the engineers and

649
00:25:02,390 --> 00:24:58,880
technicians the last fitting the last

650
00:25:03,909 --> 00:25:02,400
look to make it all right to put it on

651
00:25:06,070 --> 00:25:03,919
top of the rocket

652
00:25:09,990 --> 00:25:06,080
let's go to the next image

653
00:25:13,190 --> 00:25:10,000
this is full glory how aquarius sac d

654
00:25:16,630 --> 00:25:13,200
stands today in vandenberg

655
00:25:19,590 --> 00:25:16,640
now this equipment is rather large it's

656
00:25:21,669 --> 00:25:19,600
about approximately five meters in

657
00:25:25,430 --> 00:25:21,679
height or in length as it lays down on

658
00:25:26,230 --> 00:25:25,440
the side and it's about 1.4 tons

659
00:25:29,350 --> 00:25:26,240
that

660
00:25:31,830 --> 00:25:29,360
fills the entire fairing of a delta ii

661
00:25:33,669 --> 00:25:31,840
rocket that is going to go on we are the

662
00:25:36,070 --> 00:25:33,679
only satellite inside the delta ii

663
00:25:38,950 --> 00:25:36,080

fairing once again the configuration

664
00:25:41,350 --> 00:25:38,960
that you see is for launch so that it

665
00:25:43,350 --> 00:25:41,360
stays within the fairing that we have

666
00:25:45,909 --> 00:25:43,360
designated for

667
00:25:48,870 --> 00:25:45,919
i will now focus you to where the rocket

668
00:25:51,430 --> 00:25:48,880
is so let's go to the next page

669
00:25:54,710 --> 00:25:51,440
what you see is a delta ii

670
00:25:57,110 --> 00:25:54,720
rocket at space launch complex 2 at

671
00:25:59,350 --> 00:25:57,120
vandenberg air force base this is our

672
00:26:01,990 --> 00:25:59,360
rocket and what you don't see is the top

673
00:26:04,230 --> 00:26:02,000
of the rocket that that is where

674
00:26:06,789 --> 00:26:04,240
aquarius and sakti will sit

675
00:26:08,789 --> 00:26:06,799
once it's put on

676
00:26:10,390 --> 00:26:08,799
let's go to the next picture

677
00:26:13,510 --> 00:26:10,400
this picture shows you

678
00:26:16,230 --> 00:26:13,520
what it will be on june 9th

679
00:26:18,789 --> 00:26:16,240
at 7 20 a.m in the morning pacific

680
00:26:20,070 --> 00:26:18,799
daylight time we are ready to set sail

681
00:26:23,110 --> 00:26:20,080
and launch

682
00:26:25,669 --> 00:26:23,120
so once we launch in about less than

683
00:26:28,950 --> 00:26:25,679
five minutes the fairing that you see

684
00:26:30,870 --> 00:26:28,960
opening up will open up and expose the

685
00:26:34,149 --> 00:26:30,880
observatory to space

686
00:26:37,269 --> 00:26:34,159
from that time onwards 45 minutes later

687
00:26:39,909 --> 00:26:37,279
the rocket will disengage itself and

688
00:26:42,549 --> 00:26:39,919

aquarius and sakti will set sail

689
00:26:45,190 --> 00:26:42,559
measuring sea surface salinity and open

690
00:26:48,070 --> 00:26:45,200
its solar panels to energize itself

691
00:26:48,870 --> 00:26:48,080
and start this great journey now with

692
00:26:52,230 --> 00:26:48,880
that

693
00:26:54,230 --> 00:26:52,240
i will take you to daniel caruso the

694
00:26:56,470 --> 00:26:54,240
sac-d project manager from konai and

695
00:26:58,630 --> 00:26:56,480
he's going to tell us more about sakti

696
00:27:01,190 --> 00:26:58,640
daniel thank you amit

697
00:27:03,590 --> 00:27:01,200
okay i would like to to reinforce what

698
00:27:05,190 --> 00:27:03,600
eric has mentioned before

699
00:27:07,190 --> 00:27:05,200
if you

700
00:27:09,029 --> 00:27:07,200
take a look on the first slide that

701
00:27:11,669 --> 00:27:09,039
presented here what i wanted to

702
00:27:13,990 --> 00:27:11,679
reinforce the partnership in between

703
00:27:14,870 --> 00:27:14,000
konai and nasa

704
00:27:16,310 --> 00:27:14,880
and

705
00:27:18,470 --> 00:27:16,320
this is an international complete

706
00:27:19,750 --> 00:27:18,480
competitive missions between both

707
00:27:21,110 --> 00:27:19,760
agencies

708
00:27:23,269 --> 00:27:21,120
nasa is

709
00:27:25,110 --> 00:27:23,279
is providing the aquarius instrument the

710
00:27:26,630 --> 00:27:25,120
launch vehicles and the land and the

711
00:27:28,950 --> 00:27:26,640
launch services

712
00:27:30,389 --> 00:27:28,960
whereas while konai is providing the

713
00:27:32,389 --> 00:27:30,399

spacecraft bus

714
00:27:34,470 --> 00:27:32,399
seven other instruments and the mission

715
00:27:37,190 --> 00:27:34,480
operations during the entire emission

716
00:27:40,630 --> 00:27:39,430
the the objectives of these missions are

717
00:27:43,510 --> 00:27:40,640
aligned with

718
00:27:46,470 --> 00:27:43,520
both nasa and with the argentinian space

719
00:27:48,630 --> 00:27:46,480
program that connie is following in

720
00:27:51,350 --> 00:27:48,640
the mission was managed the aquarius

721
00:27:54,470 --> 00:27:51,360
portion by amit sen my counterpart from

722
00:27:55,669 --> 00:27:54,480
jpl and myself from nasa from from konai

723
00:27:58,230 --> 00:27:55,679
site

724
00:28:00,590 --> 00:27:58,240
if we go to the next slide

725
00:28:03,909 --> 00:28:00,600
you will see that the more than 17

726
00:28:05,350 --> 00:28:03,919
organizations universities corporate and

727
00:28:07,110 --> 00:28:05,360
international

728
00:28:09,590 --> 00:28:07,120
institutions

729
00:28:11,830 --> 00:28:09,600
contributed to the to these missions

730
00:28:14,710 --> 00:28:11,840
several of them being part of the

731
00:28:18,070 --> 00:28:14,720
scientific and technologic

732
00:28:22,630 --> 00:28:19,590
i would like to also

733
00:28:24,549 --> 00:28:22,640
also to reinforce in the next slide

734
00:28:26,549 --> 00:28:24,559
that about the what is the ground

735
00:28:28,389 --> 00:28:26,559
operations and mission operations that

736
00:28:30,470 --> 00:28:28,399
is provided by connie the mission

737
00:28:32,870 --> 00:28:30,480
operations center

738
00:28:35,029 --> 00:28:32,880

for aquarius active mission is based on

739
00:28:38,470 --> 00:28:35,039
the existing one that was developed for

740
00:28:40,870 --> 00:28:38,480
sax emission and has been performing

741
00:28:43,269 --> 00:28:40,880
successfully since 2000

742
00:28:44,389 --> 00:28:43,279
and that mission operation center is

743
00:28:46,149 --> 00:28:44,399
located

744
00:28:48,310 --> 00:28:46,159
in the same

745
00:28:51,029 --> 00:28:48,320
facility that konai has in the province

746
00:28:53,510 --> 00:28:51,039
of cordoba in argentina

747
00:28:56,230 --> 00:28:53,520
and that that ground station which will

748
00:28:57,110 --> 00:28:56,240
be the primary ground station will have

749
00:29:01,110 --> 00:28:57,120
the

750
00:29:03,029 --> 00:29:01,120
provided by nasa

751
00:29:05,269 --> 00:29:03,039
ground network and two other ground

752
00:29:07,990 --> 00:29:05,279
stations provided by the italian space

753
00:29:11,990 --> 00:29:08,000
agency one located in italy and another

754
00:29:14,070 --> 00:29:12,000
one located in kenya in africa

755
00:29:16,630 --> 00:29:14,080
all the commanding capabilities and the

756
00:29:18,470 --> 00:29:16,640
telemetry data and scientific data will

757
00:29:20,950 --> 00:29:18,480
be managed by the mission operation

758
00:29:23,269 --> 00:29:20,960
center there in cordoba and will be

759
00:29:24,870 --> 00:29:23,279
distributed using the kunai

760
00:29:27,350 --> 00:29:24,880
um

761
00:29:29,750 --> 00:29:27,360
services to do that

762
00:29:32,230 --> 00:29:29,760
to that function

763
00:29:33,830 --> 00:29:32,240

in the next slide i presented pictures

764
00:29:35,909 --> 00:29:33,840
for the from the

765
00:29:37,029 --> 00:29:35,919
for the eight instruments that are being

766
00:29:38,950 --> 00:29:37,039
part of the

767
00:29:41,269 --> 00:29:38,960
scientific payload of the satellite

768
00:29:43,750 --> 00:29:41,279
aquarius being the primary one

769
00:29:46,149 --> 00:29:43,760
but there are another seven instruments

770
00:29:48,630 --> 00:29:46,159
two of them the carmen one was provided

771
00:29:51,269 --> 00:29:48,640
by the nest from france contribution

772
00:29:53,190 --> 00:29:51,279
from france and another one is the rosa

773
00:29:55,830 --> 00:29:53,200
instrument it's a contribution from the

774
00:29:57,510 --> 00:29:55,840
italian space agency and another five

775
00:29:59,110 --> 00:29:57,520
instrument that we are developed by

776
00:30:01,029 --> 00:29:59,120
konai

777
00:30:04,470 --> 00:30:01,039
from those instruments which are the

778
00:30:06,950 --> 00:30:04,480
names are the tdp and data collection

779
00:30:08,710 --> 00:30:06,960
system hsc i would like only just to

780
00:30:09,909 --> 00:30:08,720
highlight the two main instruments for

781
00:30:12,630 --> 00:30:09,919
konai

782
00:30:15,990 --> 00:30:12,640
which are the nearest which is

783
00:30:19,110 --> 00:30:16,000
is a thermal camera that will images in

784
00:30:22,149 --> 00:30:19,120
three frequency bands and allowing

785
00:30:24,710 --> 00:30:22,159
to have tilting capabilities to increase

786
00:30:25,909 --> 00:30:24,720
the revisit of the sum some selected

787
00:30:28,230 --> 00:30:25,919
areas

788
00:30:29,269 --> 00:30:28,240

and a microwave radiometer

789
00:30:31,430 --> 00:30:29,279
which

790
00:30:32,389 --> 00:30:31,440
is sensible to two different frequency

791
00:30:35,110 --> 00:30:32,399
bands

792
00:30:36,950 --> 00:30:35,120
and will be covering the almost the same

793
00:30:40,230 --> 00:30:36,960
area that's aquarius

794
00:30:42,389 --> 00:30:40,240
as aquarius we will do will do improving

795
00:30:44,710 --> 00:30:42,399
the acquiring surface identities

796
00:30:46,389 --> 00:30:44,720
generated data

797
00:30:50,950 --> 00:30:46,399
in the next slide

798
00:30:52,310 --> 00:30:50,960
i present i put here three um three

799
00:30:54,789 --> 00:30:52,320
simulations of

800
00:30:56,549 --> 00:30:54,799
of the data and that will be provided by

801
00:30:59,029 --> 00:30:56,559
the nurse camera

802
00:31:01,590 --> 00:30:59,039
the two on one on the left side left

803
00:31:03,990 --> 00:31:01,600
side and the in the middle of of the of

804
00:31:05,830 --> 00:31:04,000
the picture and one and the other one on

805
00:31:07,590 --> 00:31:05,840
the right hand for the microwave

806
00:31:08,549 --> 00:31:07,600
thermometer

807
00:31:10,789 --> 00:31:08,559
the

808
00:31:13,590 --> 00:31:10,799
nurse camera will be used for monitoring

809
00:31:16,549 --> 00:31:13,600
the fires and volcanoes while the

810
00:31:19,750 --> 00:31:16,559
mwr instrument the radiometer will be

811
00:31:22,310 --> 00:31:19,760
devoted for wind speed rainfall

812
00:31:25,110 --> 00:31:22,320
measurements increasing the sea surface

813
00:31:27,509 --> 00:31:25,120

salinity that acquires will be

814
00:31:29,909 --> 00:31:27,519
done or will be provided

815
00:31:32,310 --> 00:31:29,919
finally in my last chart

816
00:31:35,110 --> 00:31:32,320
i just devoted that to the observatory

817
00:31:37,990 --> 00:31:35,120
as it stayed right here right now in

818
00:31:40,870 --> 00:31:38,000
vandenberg as amit says

819
00:31:42,110 --> 00:31:40,880
this spacecraft this observatory

820
00:31:46,310 --> 00:31:42,120
is about

821
00:31:49,750 --> 00:31:46,320
2.7 meters across and about almost five

822
00:31:52,070 --> 00:31:49,760
meters tall in his launch configuration

823
00:31:54,870 --> 00:31:52,080
was based on the sexy observatory that

824
00:31:58,549 --> 00:31:54,880
that is flying since 2000

825
00:31:59,669 --> 00:31:58,559
but the sag the acquired stack d is 2.5

826
00:32:04,149 --> 00:31:59,679
times

827
00:32:05,750 --> 00:32:04,159
this is

828
00:32:07,029 --> 00:32:05,760
my my last

829
00:32:08,470 --> 00:32:07,039
slide and

830
00:32:10,389 --> 00:32:08,480
back to you still

831
00:32:13,029 --> 00:32:10,399
okay thank you danielle and thank you to

832
00:32:15,430 --> 00:32:13,039
our panelists uh we'll now open it up to

833
00:32:18,389 --> 00:32:15,440
questions from media in the auditorium

834
00:32:20,549 --> 00:32:18,399
and then we'll shift over to

835
00:32:22,630 --> 00:32:20,559
some of the questions with media on the

836
00:32:28,630 --> 00:32:22,640
phone i think we have

837
00:32:33,190 --> 00:32:30,789
how much time do you expect the aquarius

838
00:32:35,830 --> 00:32:33,200

to live in its trip around the world how

839
00:32:36,870 --> 00:32:35,840
much years can it live there and when

840
00:32:39,190 --> 00:32:36,880
are you

841
00:32:41,350 --> 00:32:39,200
expecting to have the first information

842
00:32:44,070 --> 00:32:41,360
i i know that the satellite is going to

843
00:32:46,149 --> 00:32:44,080
be traveling on june 9. when it's

844
00:32:50,389 --> 00:32:46,159
beginning to work when are we going to

845
00:32:55,430 --> 00:32:53,269
your question is how long is the mission

846
00:32:57,269 --> 00:32:55,440
designed to last the first answer to

847
00:32:59,350 --> 00:32:57,279
that question the aquarius portion of

848
00:33:01,750 --> 00:32:59,360
the mission has a min a minimum lifetime

849
00:33:03,909 --> 00:33:01,760
of three years the observatory is

850
00:33:05,110 --> 00:33:03,919
designed for a minimum lifetime of five

851
00:33:06,470 --> 00:33:05,120
years

852
00:33:07,750 --> 00:33:06,480
and of course if the instruments are

853
00:33:09,669 --> 00:33:07,760
working at the end of their minimum

854
00:33:12,070 --> 00:33:09,679
lifetimes we we make every effort to

855
00:33:14,149 --> 00:33:12,080
continue to collect data beyond that

856
00:33:16,230 --> 00:33:14,159
uh the the second part of your question

857
00:33:18,149 --> 00:33:16,240
is how long after launch before we begin

858
00:33:20,950 --> 00:33:18,159
to turn on the instruments

859
00:33:22,630 --> 00:33:20,960
for aquarius that begins about 25 days

860
00:33:25,269 --> 00:33:22,640
after launch we start to turn on

861
00:33:27,430 --> 00:33:25,279
sequence which lasts about a week

862
00:33:29,190 --> 00:33:27,440
and once all the components of the

863
00:33:30,470 --> 00:33:29,200

instrument are turned on and stabilized

864
00:33:32,950 --> 00:33:30,480
we'll start collecting data and

865
00:33:34,870 --> 00:33:32,960
evaluating that data the the sakti

866
00:33:36,630 --> 00:33:34,880
instruments begin their turn on sequence

867
00:33:37,830 --> 00:33:36,640
as soon as the aquarius is finished so

868
00:33:39,909 --> 00:33:37,840
roughly

869
00:33:41,750 --> 00:33:39,919
maybe another week after that all of the

870
00:33:44,310 --> 00:33:41,760
sakti instruments will be powered up so

871
00:33:45,909 --> 00:33:44,320
i would say 40 days or so after launch

872
00:33:49,990 --> 00:33:45,919
will everything will be completely

873
00:33:52,950 --> 00:33:51,669
and that data will be collected in

874
00:33:54,630 --> 00:33:52,960
cordova

875
00:33:56,389 --> 00:33:54,640
okay

876
00:33:59,909 --> 00:33:56,399
one will be distributed from the from

877
00:34:03,830 --> 00:34:01,430
okay thank you i think we have another

878
00:34:05,750 --> 00:34:03,840
question here in the auditorium

879
00:34:08,629 --> 00:34:05,760
hi it's frank mooring with aviation week

880
00:34:11,829 --> 00:34:08,639
i have a couple of questions one

881
00:34:13,829 --> 00:34:11,839
a science question and that is

882
00:34:15,750 --> 00:34:13,839
what are the implications of the kinds

883
00:34:18,389 --> 00:34:15,760
of of discoveries that you expect to

884
00:34:19,990 --> 00:34:18,399
make in terms of the water cycle

885
00:34:21,909 --> 00:34:20,000
specifically what does that mean if it

886
00:34:24,389 --> 00:34:21,919
is accelerating and why might it be

887
00:34:26,629 --> 00:34:24,399
accelerating what sorts of of

888
00:34:29,510 --> 00:34:26,639

information for example uh could you

889
00:34:31,349 --> 00:34:29,520
find that would apply to um to climate

890
00:34:33,190 --> 00:34:31,359
change uh global warming that sort of

891
00:34:36,149 --> 00:34:33,200
thing

892
00:34:38,629 --> 00:34:36,159
i'll try and give you a quick answer on

893
00:34:42,149 --> 00:34:38,639
that is that

894
00:34:45,030 --> 00:34:42,159
if we can confirm

895
00:34:47,829 --> 00:34:45,040
water cycle acceleration

896
00:34:49,829 --> 00:34:47,839
what this means to us in practical way

897
00:34:53,510 --> 00:34:49,839
is that there's uh

898
00:34:55,829 --> 00:34:53,520
more extremes in uh there's more water

899
00:34:58,390 --> 00:34:55,839
circulating through the atmosphere

900
00:35:01,109 --> 00:34:58,400
uh the you know more flooding more

901
00:35:03,430 --> 00:35:01,119
drought these are the extremes of the

902
00:35:04,390 --> 00:35:03,440
water cycle is generally the what we

903
00:35:06,310 --> 00:35:04,400
picture

904
00:35:08,710 --> 00:35:06,320
and so

905
00:35:10,790 --> 00:35:08,720
that what we'd like to do with aquarius

906
00:35:15,750 --> 00:35:10,800
is try and confirm

907
00:35:18,710 --> 00:35:15,760
uh uh the speculations on the the uh how

908
00:35:20,790 --> 00:35:18,720
the water cycle is changing over time we

909
00:35:24,310 --> 00:35:20,800
need to understand ocean processes as

910
00:35:26,150 --> 00:35:24,320
well as uh atmospheric processes there

911
00:35:28,230 --> 00:35:26,160
just to follow up how would the data

912
00:35:30,150 --> 00:35:28,240
load from this

913
00:35:31,430 --> 00:35:30,160

instrument compared to what's already

914
00:35:33,510 --> 00:35:31,440
available

915
00:35:36,150 --> 00:35:33,520
what's been collected in the past well

916
00:35:39,109 --> 00:35:36,160
the let me try the

917
00:35:42,390 --> 00:35:39,119
amount of data collected by aquarius is

918
00:35:44,470 --> 00:35:42,400
going to be comparable to

919
00:35:47,670 --> 00:35:44,480
something like a satellite altimeter

920
00:35:49,589 --> 00:35:47,680
uh it and uh but maybe about three times

921
00:35:52,470 --> 00:35:49,599
more because we have three beams versus

922
00:35:55,990 --> 00:35:52,480
one beam so so it's comparable to other

923
00:35:58,390 --> 00:35:56,000
non-imaging earth science uh instruments

924
00:35:59,990 --> 00:35:58,400
and so it's not an excessive data load

925
00:36:02,230 --> 00:36:00,000
we're going to average the data on

926
00:36:05,750 --> 00:36:02,240
weekly and monthly time scales and

927
00:36:07,829 --> 00:36:05,760
roughly one degree latitude longitude um

928
00:36:10,470 --> 00:36:07,839
uh grid over the earth

929
00:36:12,710 --> 00:36:10,480
and uh and and produce those maps for

930
00:36:14,550 --> 00:36:12,720
scientific analysis

931
00:36:16,470 --> 00:36:14,560
perhaps another answer to that question

932
00:36:18,230 --> 00:36:16,480
is that there are vast tracts of the

933
00:36:21,829 --> 00:36:18,240
ocean where salinity has never been

934
00:36:23,829 --> 00:36:21,839
collected ever and uh so there are uh

935
00:36:26,150 --> 00:36:23,839
probably uh one to two million data

936
00:36:28,550 --> 00:36:26,160
points uh in that have been collected

937
00:36:31,030 --> 00:36:28,560
over the last hundred years uh we're

938
00:36:32,950 --> 00:36:31,040

going to be sampling the whole planet in

939
00:36:35,349 --> 00:36:32,960
one week so

940
00:36:37,670 --> 00:36:35,359
it's a different kind of data load that

941
00:36:40,069 --> 00:36:37,680
you get from a satellite than you get

942
00:36:41,829 --> 00:36:40,079
from a ship but there'll be places that

943
00:36:43,270 --> 00:36:41,839
have never been sampled that will be

944
00:36:44,550 --> 00:36:43,280
sampled now

945
00:36:46,790 --> 00:36:44,560
if i could just ask one more question

946
00:36:48,470 --> 00:36:46,800
while i have this microphone

947
00:36:50,790 --> 00:36:48,480
in some of the literature

948
00:36:53,190 --> 00:36:50,800
this mission is or this spacecraft is

949
00:36:55,349 --> 00:36:53,200
listed as a pathfinder i wonder if it's

950
00:36:56,390 --> 00:36:55,359
a pathfinder or what it's a pathfinder

951
00:36:58,630 --> 00:36:56,400
too

952
00:37:01,510 --> 00:36:58,640
and also for senior coverage so what

953
00:37:02,310 --> 00:37:01,520
what plans has coney have does coney

954
00:37:04,390 --> 00:37:02,320
have

955
00:37:06,230 --> 00:37:04,400
for future spacecraft development is

956
00:37:08,230 --> 00:37:06,240
this going to be your niche the earth

957
00:37:09,910 --> 00:37:08,240
observation satellites are you working

958
00:37:10,870 --> 00:37:09,920
in other areas as well

959
00:37:12,470 --> 00:37:10,880
okay

960
00:37:14,310 --> 00:37:12,480
i'll take the

961
00:37:16,390 --> 00:37:14,320
question about being a pathfinder this

962
00:37:20,230 --> 00:37:16,400
is part of the earth system science

963
00:37:23,430 --> 00:37:20,240

pathfinder uh program and uh one of the

964
00:37:25,510 --> 00:37:23,440
objectives of the mission is to be a

965
00:37:26,710 --> 00:37:25,520
proof of concept that could be applied

966
00:37:28,710 --> 00:37:26,720
to uh

967
00:37:31,030 --> 00:37:28,720
to future missions so future operational

968
00:37:32,390 --> 00:37:31,040
missions so right now our main goal it's

969
00:37:34,950 --> 00:37:32,400
an experimental mission to try and

970
00:37:37,430 --> 00:37:34,960
figure out can we do this

971
00:37:39,829 --> 00:37:37,440
to the degree which we expect to do it

972
00:37:42,870 --> 00:37:39,839
and if we can then it becomes a real

973
00:37:44,069 --> 00:37:42,880
candidate for operational missions

974
00:37:46,630 --> 00:37:44,079
yes

975
00:37:47,510 --> 00:37:46,640
on the second portion of your question

976
00:37:49,109 --> 00:37:47,520
is that

977
00:37:51,990 --> 00:37:49,119
this is the

978
00:37:55,349 --> 00:37:52,000
during the last 15 years we were

979
00:37:57,349 --> 00:37:55,359
working in partnership with with nasa

980
00:37:59,510 --> 00:37:57,359
and we have

981
00:38:02,069 --> 00:37:59,520
developed three scientific satellite

982
00:38:03,510 --> 00:38:02,079
missions sake suck b and saxi and this

983
00:38:05,829 --> 00:38:03,520
is the sag-b

984
00:38:08,150 --> 00:38:05,839
and and all the missions satellite

985
00:38:10,390 --> 00:38:08,160
missions from for kunai is have to

986
00:38:12,790 --> 00:38:10,400
fulfill what it is stated in the

987
00:38:14,710 --> 00:38:12,800
argentinian national space program and

988
00:38:15,510 --> 00:38:14,720

that national space program called for

989
00:38:17,910 --> 00:38:15,520
some

990
00:38:20,470 --> 00:38:17,920
specific measurements from this front

991
00:38:23,829 --> 00:38:20,480
from the in the space of some different

992
00:38:24,710 --> 00:38:23,839
valuable variables and can i has

993
00:38:26,390 --> 00:38:24,720
one

994
00:38:31,190 --> 00:38:26,400
more

995
00:38:33,589 --> 00:38:31,200
observing mission just in progress right

996
00:38:36,790 --> 00:38:33,599
now in under development and there are

997
00:38:40,550 --> 00:38:36,800
plans for future missions also

998
00:38:42,550 --> 00:38:40,560
in the area of the earth observation

999
00:38:44,950 --> 00:38:42,560
all right we have one question on the

1000
00:38:52,069 --> 00:38:44,960
phone lines so we'll go there jonathan

1001
00:38:56,710 --> 00:38:54,390
uh thanks stephen and um

1002
00:38:58,950 --> 00:38:56,720
greetings from london i think this is a

1003
00:39:01,510 --> 00:38:58,960
question for uh for gary

1004
00:39:03,430 --> 00:39:01,520
there is already a satellite in orbit uh

1005
00:39:05,109 --> 00:39:03,440
measuring ocean salinity and that's the

1006
00:39:07,030 --> 00:39:05,119
european smart

1007
00:39:08,550 --> 00:39:07,040
mission and that's a mission that gary

1008
00:39:11,670 --> 00:39:08,560
knows well i think because he sits on

1009
00:39:13,510 --> 00:39:11,680
the science uh advisory group can he

1010
00:39:16,470 --> 00:39:13,520
compare the two missions their

1011
00:39:19,430 --> 00:39:16,480
capabilities and and how will the two

1012
00:39:21,750 --> 00:39:19,440
satellites work together uh in the data

1013
00:39:23,750 --> 00:39:21,760

that they're gathering uh and also if he

1014
00:39:26,829 --> 00:39:23,760
could explain how

1015
00:39:29,190 --> 00:39:26,839
um aquarius will counter the uh the

1016
00:39:32,150 --> 00:39:29,200
interference uh that smos

1017
00:39:33,990 --> 00:39:32,160
uh encountered when it first launched

1018
00:39:36,150 --> 00:39:34,000
all right i think i picked up three

1019
00:39:37,430 --> 00:39:36,160
different questions uh woven together

1020
00:39:38,710 --> 00:39:37,440
there i'll try and get through them one

1021
00:39:42,310 --> 00:39:38,720
at a time

1022
00:39:44,710 --> 00:39:42,320
uh yes the the the two teams have worked

1023
00:39:46,230 --> 00:39:44,720
in parallel for a decade now developing

1024
00:39:48,150 --> 00:39:46,240
their respective missions uh the

1025
00:39:50,150 --> 00:39:48,160
european smosh mission and the aquarius

1026
00:39:51,910 --> 00:39:50,160
mission uh we share we have shared

1027
00:39:53,349 --> 00:39:51,920
information we've worked on each other's

1028
00:39:55,430 --> 00:39:53,359
working groups it's been a strong

1029
00:39:57,589 --> 00:39:55,440
cooperative effort uh what

1030
00:39:59,990 --> 00:39:57,599
differentiates the two satellites is

1031
00:40:02,550 --> 00:40:00,000
partly purpose and partly design the

1032
00:40:05,750 --> 00:40:02,560
european mission smosh stands for soil

1033
00:40:07,750 --> 00:40:05,760
moisture ocean salinity smos

1034
00:40:10,230 --> 00:40:07,760
so it is a dual purpose mission and its

1035
00:40:12,470 --> 00:40:10,240
primary function is actually for ocean

1036
00:40:14,230 --> 00:40:12,480
ocean for soil moisture rather

1037
00:40:16,230 --> 00:40:14,240
and so there's some compromises in the

1038
00:40:18,069 --> 00:40:16,240

design with regard to salinity

1039
00:40:20,630 --> 00:40:18,079
measurement it's a very complex

1040
00:40:22,790 --> 00:40:20,640
instrument it's an interferometer

1041
00:40:25,430 --> 00:40:22,800
that makes retrievals of salinity over

1042
00:40:28,150 --> 00:40:25,440
the ocean a much more difficult problem

1043
00:40:30,390 --> 00:40:28,160
and aquarius was designed

1044
00:40:32,630 --> 00:40:30,400
for measuring salinity as its primary

1045
00:40:34,790 --> 00:40:32,640
measurement objective so we chose a very

1046
00:40:36,390 --> 00:40:34,800
different design path

1047
00:40:38,309 --> 00:40:36,400
with these very sensitive microwave

1048
00:40:39,670 --> 00:40:38,319
radiometers that i've explained to you

1049
00:40:41,190 --> 00:40:39,680
before

1050
00:40:43,270 --> 00:40:41,200
so those are some of the differences in

1051
00:40:45,589 --> 00:40:43,280
the capabilities of the two measurements

1052
00:40:47,270 --> 00:40:45,599
you asked how they will work together

1053
00:40:49,270 --> 00:40:47,280
once we have both of these missions in

1054
00:40:51,030 --> 00:40:49,280
orbit we will compare results we'll

1055
00:40:52,950 --> 00:40:51,040
intercalibrate them we'll combine the

1056
00:40:55,030 --> 00:40:52,960
measurements together we'll do a lot of

1057
00:40:57,190 --> 00:40:55,040
things cooperatively to provide the best

1058
00:40:59,190 --> 00:40:57,200
information about ocean surface salinity

1059
00:41:00,870 --> 00:40:59,200
to the scientific community that we

1060
00:41:02,790 --> 00:41:00,880
possibly can

1061
00:41:04,790 --> 00:41:02,800
your last question dealt with radio

1062
00:41:06,470 --> 00:41:04,800
interference

1063
00:41:08,630 --> 00:41:06,480

one thing that's important about making

1064
00:41:11,270 --> 00:41:08,640
these measurements we use a portion of

1065
00:41:13,510 --> 00:41:11,280
the microwave spectrum that's protected

1066
00:41:15,829 --> 00:41:13,520
from extraneous radiation for radio

1067
00:41:17,190 --> 00:41:15,839
astronomy purposes and the only reason

1068
00:41:19,109 --> 00:41:17,200
we can make these measurements from

1069
00:41:21,109 --> 00:41:19,119
space is because this is supposed to be

1070
00:41:23,109 --> 00:41:21,119
a clean part of the spectrum however

1071
00:41:24,950 --> 00:41:23,119
it's not perfectly clean and there are a

1072
00:41:26,710 --> 00:41:24,960
lot of straight uh emissions

1073
00:41:28,710 --> 00:41:26,720
particularly from radars and so forth

1074
00:41:31,270 --> 00:41:28,720
that leak into this band and that's been

1075
00:41:32,790 --> 00:41:31,280
very confounding for the smosh mission

1076
00:41:35,670 --> 00:41:32,800
and their engineers have been doing a

1077
00:41:37,829 --> 00:41:35,680
lot of work to to try and resolve that

1078
00:41:39,670 --> 00:41:37,839
aquarius was designed actually in

1079
00:41:42,470 --> 00:41:39,680
anticipation that this would happen so

1080
00:41:45,349 --> 00:41:42,480
we have actually built in some filters

1081
00:41:47,670 --> 00:41:45,359
within our processing system to track

1082
00:41:49,349 --> 00:41:47,680
these radio interfering signals and take

1083
00:41:51,349 --> 00:41:49,359
them out of the data

1084
00:41:53,349 --> 00:41:51,359
we've tested this with some some ground

1085
00:41:54,550 --> 00:41:53,359
simulations we'll see how well it works

1086
00:41:56,470 --> 00:41:54,560
on orbit

1087
00:41:58,630 --> 00:41:56,480
we're anticipating that at least over

1088
00:42:00,309 --> 00:41:58,640

the open ocean which is our primary area

1089
00:42:02,069 --> 00:42:00,319
for measurement we were not going to

1090
00:42:03,349 --> 00:42:02,079
experience too much radio frequency

1091
00:42:07,190 --> 00:42:03,359
interference

1092
00:42:07,200 --> 00:42:10,390
does that answer your questions

1093
00:42:15,349 --> 00:42:12,069
all right the next question on the phone

1094
00:42:17,190 --> 00:42:15,359
lines is from denise ciao at space.com

1095
00:42:20,150 --> 00:42:17,200
go ahead denise i have one science

1096
00:42:22,950 --> 00:42:20,160
follow-up and that is

1097
00:42:25,430 --> 00:42:22,960
meteorological operational missions uh

1098
00:42:26,870 --> 00:42:25,440
in this respect

1099
00:42:31,430 --> 00:42:26,880
uh jonathan could you repeat your

1100
00:42:35,829 --> 00:42:34,230
well if not i think we uh we'll have

1101
00:42:39,190 --> 00:42:35,839
jonathan come back in a minute let's go

1102
00:42:42,870 --> 00:42:39,200
to denise ciao at space.com

1103
00:42:47,589 --> 00:42:44,950
hi thanks for taking my question um just

1104
00:42:49,829 --> 00:42:47,599
a quick science one from me um in terms

1105
00:42:52,230 --> 00:42:49,839
of the science objectives for aquarius

1106
00:42:53,910 --> 00:42:52,240
um are there areas that are particular

1107
00:42:55,829 --> 00:42:53,920
interests i know that it'll be

1108
00:42:57,270 --> 00:42:55,839
collecting global measurements but are

1109
00:42:59,349 --> 00:42:57,280
you particularly interested in the high

1110
00:43:00,550 --> 00:42:59,359
salinity areas or the low selenity areas

1111
00:43:05,910 --> 00:43:00,560
or is it just mostly getting a big

1112
00:43:12,710 --> 00:43:08,550
i think i would say our our first

1113
00:43:16,950 --> 00:43:12,720

objective is global uh in our field

1114
00:43:20,069 --> 00:43:16,960
program in 2012 we're focusing on

1115
00:43:23,510 --> 00:43:20,079
processes in the high salinity

1116
00:43:25,430 --> 00:43:23,520
region of the subtropical north atlantic

1117
00:43:27,190 --> 00:43:25,440
to begin processes

1118
00:43:29,270 --> 00:43:27,200
studies there

1119
00:43:31,349 --> 00:43:29,280
the program is called the salinity

1120
00:43:35,910 --> 00:43:31,359
processes in the upper ocean regional

1121
00:43:37,589 --> 00:43:35,920
study spurs and the idea spurs come in

1122
00:43:39,910 --> 00:43:37,599
pairs and we're going to do another

1123
00:43:43,510 --> 00:43:39,920
experiment in a low salinity high

1124
00:43:46,470 --> 00:43:43,520
precipitation region uh down the line so

1125
00:43:49,910 --> 00:43:46,480
uh the uh we're focusing in on

1126
00:43:51,109 --> 00:43:49,920
different uh regions in sequence

1127
00:43:54,950 --> 00:43:51,119
but

1128
00:43:57,589 --> 00:43:54,960
the idea is to get the global picture

1129
00:44:00,150 --> 00:43:57,599
gary would you like to well i think uh

1130
00:44:03,030 --> 00:44:00,160
to to add to what eric has said

1131
00:44:04,950 --> 00:44:03,040
we have a a large science team already

1132
00:44:06,710 --> 00:44:04,960
working on various

1133
00:44:08,309 --> 00:44:06,720
areas that are interested with this data

1134
00:44:10,230 --> 00:44:08,319
there's a group of investigators from

1135
00:44:12,069 --> 00:44:10,240
argentina for example who are focusing

1136
00:44:14,870 --> 00:44:12,079
on the south atlantic which is an

1137
00:44:16,630 --> 00:44:14,880
important uh ocean for for climate

1138
00:44:19,109 --> 00:44:16,640

variability

1139
00:44:21,589 --> 00:44:19,119
el nino in the tropical pacific is an

1140
00:44:23,109 --> 00:44:21,599
important area there's a lot of

1141
00:44:25,190 --> 00:44:23,119
freshwater

1142
00:44:26,870 --> 00:44:25,200
interaction with regard to the dynamics

1143
00:44:28,790 --> 00:44:26,880
of el nino and we believe that these

1144
00:44:30,950 --> 00:44:28,800
measurements will be ver will be make

1145
00:44:33,030 --> 00:44:30,960
very important contributions to there as

1146
00:44:35,109 --> 00:44:33,040
the scientific community broadens who

1147
00:44:36,870 --> 00:44:35,119
starts to work with this data we'll find

1148
00:44:39,349 --> 00:44:36,880
many other applications that we haven't

1149
00:44:41,109 --> 00:44:39,359
even thought of yet that because this is

1150
00:44:43,349 --> 00:44:41,119
really a discovery and exploratory

1151
00:44:44,790 --> 00:44:43,359
mission uh that we'll we will find some

1152
00:44:46,790 --> 00:44:44,800
things we're very excited about

1153
00:44:50,309 --> 00:44:46,800
anticipating right now that we just

1154
00:44:53,270 --> 00:44:50,319
didn't expect to find

1155
00:44:55,270 --> 00:44:53,280
any follow-up denise

1156
00:45:02,950 --> 00:44:55,280
okay then we'll go uh back to jonathan

1157
00:45:07,190 --> 00:45:04,870
i hope well maybe perhaps we lost

1158
00:45:09,030 --> 00:45:07,200
jonathan um let's see if we have anybody

1159
00:45:10,230 --> 00:45:09,040
else any other questions in the audience

1160
00:45:11,829 --> 00:45:10,240
while we

1161
00:45:13,430 --> 00:45:11,839
wait to see if anybody comes back on the

1162
00:45:14,630 --> 00:45:13,440
phone lines

1163
00:45:19,190 --> 00:45:14,640

no

1164
00:45:20,870 --> 00:45:19,200
one else on the phone lines uh thank you

1165
00:45:22,309 --> 00:45:20,880
all for attending i wanted to point out

1166
00:45:24,870 --> 00:45:22,319
that there we have a lot more

1167
00:45:28,069 --> 00:45:24,880
information about this mission online

1168
00:45:30,950 --> 00:45:28,079
at www.nasa.gov

1169
00:45:33,190 --> 00:45:30,960
aquarius and as we get uh move towards

1170
00:45:36,230 --> 00:45:33,200
the june 9th launch we'll be updating

1171
00:45:37,190 --> 00:45:36,240
this website and posting new information

1172
00:45:39,430 --> 00:45:37,200
updates

1173
00:45:41,510 --> 00:45:39,440
on twitter and facebook all the way up