CATALINA

OBSCURED

1
00:00:04,039 --> 00:00:01,850
hello this is my quest from my

2
00:00:06,639 --> 00:00:04,049
department org so I was recently at a

3
00:00:08,870 --> 00:00:06,649
flat earth conference I was actually

4
00:00:11,240 --> 00:00:08,880
debating Nathan Thompson on whether the

5
00:00:12,980 --> 00:00:11,250
earth is flat or round very interesting

6
00:00:14,600 --> 00:00:12,990
conference and one of the interesting

7
00:00:17,359 --> 00:00:14,610
things that came out of it was that I

8
00:00:19,429 --> 00:00:17,369
met a cool guy called Nathan Gonzales

9
00:00:22,000 --> 00:00:19,439
and he gave me these five photographs

10
00:00:25,160 --> 00:00:22,010
that he'd taken from Huntington Beach

11
00:00:27,920 --> 00:00:25,170
these are photographs of Catalina Island

12
00:00:30,589 --> 00:00:27,930
which is about 32 miles from his

13
00:00:32,810 --> 00:00:30,599

location and he was showing me these and

14
00:00:35,180 --> 00:00:32,820
thinking that they were seeing more of

15
00:00:36,920 --> 00:00:35,190
the island than we should and we see a

16
00:00:39,470 --> 00:00:36,930
little bit of refraction here down in

17
00:00:41,900 --> 00:00:39,480
the corner from from the atmosphere the

18
00:00:45,020 --> 00:00:41,910
photographs are pink because they are

19
00:00:46,819 --> 00:00:45,030
from a p900 which has been converted so

20
00:00:48,740 --> 00:00:46,829
it can take full-spectrum meaning it

21
00:00:51,080 --> 00:00:48,750
includes infrared this means you get

22
00:00:52,400 --> 00:00:51,090
much clearer images if used a filter you

23
00:00:54,260 --> 00:00:52,410
get even sharper but it allows you to

24
00:00:56,479 --> 00:00:54,270
see details when zoomed in of the

25
00:00:58,250 --> 00:00:56,489
vegetation and the shape this Ridge here

26
00:01:00,860 --> 00:00:58,260
I think is especially important you'll

27
00:01:02,599 --> 00:01:00,870
see you later and he took five

28
00:01:06,200 --> 00:01:02,609
photographs they're all from about the

29
00:01:08,240 --> 00:01:06,210
same location and they all have GPS data

30
00:01:09,560 --> 00:01:08,250
in them you can go through them and they

31
00:01:12,380 --> 00:01:09,570
all have at the same

32
00:01:14,480 --> 00:01:12,390
GPS location down here just on the beach

33
00:01:16,580 --> 00:01:14,490
and that allowed me to go into Google

34
00:01:22,760 --> 00:01:16,590
Earth and find this viewpoint and set up

35
00:01:25,670 --> 00:01:22,770
a view that's the same so let's say this

36
00:01:27,260 --> 00:01:25,680
is me taking a photograph from Vegas

37
00:01:29,330 --> 00:01:27,270
just shouts there using my infrared

38
00:01:32,120 --> 00:01:29,340

camera you see you get very very clear

39
00:01:39,210 --> 00:01:32,130
shots with an infrared camera with the

40
00:01:46,120 --> 00:01:44,130
over here on the left is where he is on

41
00:01:51,670 --> 00:01:46,130
Huntington Beach you see it's the same

42
00:01:54,940 --> 00:01:51,680
location as in here and in this GPS yeah

43
00:01:56,499 --> 00:01:54,950
you can see this this waterway here just

44
00:01:59,200 --> 00:01:56,509
right here same place and I just

45
00:02:00,999 --> 00:01:59,210
actually copied and pasted it the GPS

46
00:02:04,690 --> 00:02:01,009
locations and then what we're looking at

47
00:02:07,570 --> 00:02:04,700
over here is twin harbours twin harbours

48
00:02:10,240 --> 00:02:07,580
is this little town here but from this

49
00:02:12,400 --> 00:02:10,250
position we're looking at it like this

50
00:02:15,009 --> 00:02:12,410
and it looks like a bit of a dip in the

51
00:02:16,120 --> 00:02:15,019
island from far away over here and what

52
00:02:18,130 --> 00:02:16,130
we actually see is just like a fairly

53
00:02:19,930 --> 00:02:18,140
small bit because we're zoomed in a long

54
00:02:22,210 --> 00:02:19,940
way doesn't mean we have to get closer

55
00:02:24,520 --> 00:02:22,220
just me as the camera zoomed in let me

56
00:02:27,220 --> 00:02:24,530
show you what the field of view is on

57
00:02:32,020 --> 00:02:27,230
this I did a little feel the view thingy

58
00:02:34,330 --> 00:02:32,030
and these green lines here gonna show

59
00:02:35,800 --> 00:02:34,340
you what the field of view is it's a

60
00:02:39,640 --> 00:02:35,810
little kind of pyramid called a frost

61
00:02:41,860 --> 00:02:39,650
bump which shows you what you're

62
00:02:43,000 --> 00:02:41,870
actually looking at now I try to

63
00:02:44,620 --> 00:02:43,010

replicate his photograph and an

64
00:02:46,420 --> 00:02:44,630
interesting thing about Catalina is it's

65
00:02:48,490 --> 00:02:46,430
got very very steep sides in a Gerber to

66
00:02:49,750 --> 00:02:48,500
Catalina but all these markets and I'll

67
00:02:52,240 --> 00:02:49,760
show those will show you what those are

68
00:02:54,490 --> 00:02:52,250
for later it's got very very Street

69
00:02:57,190 --> 00:02:54,500
steep sides they're almost like 45

70
00:02:59,949 --> 00:02:57,200
degrees or more so it's it's an

71
00:03:01,569 --> 00:02:59,959
excellent opportunity to see how much is

72
00:03:03,250 --> 00:03:01,579
hidden because you often get this long

73
00:03:04,569 --> 00:03:03,260
slope in front of mountains in other

74
00:03:08,020 --> 00:03:04,579
places and it kind of confuses the issue

75
00:03:09,250 --> 00:03:08,030
of it here it's straight up and this I

76
00:03:11,860 --> 00:03:09,260
think is about quarter of a mile from

77
00:03:14,740 --> 00:03:11,870
this peak here to here and this this is

78
00:03:18,190 --> 00:03:14,750
what we're seeing this is the top of the

79
00:03:21,400 --> 00:03:18,200
image and it's nearly 700 feet high 211

80
00:03:24,250 --> 00:03:21,410
meters 692 feet and we're actually gonna

81
00:03:27,069 --> 00:03:24,260
be looking at that let me show you from

82
00:03:32,470 --> 00:03:27,079
the Nathans point of view here so go

83
00:03:36,069 --> 00:03:32,480
over to Nathan's viewpoint here and we

84
00:03:38,800 --> 00:03:36,079
look down here and this is what he sees

85
00:03:42,310 --> 00:03:38,810
is this little bit here and this will be

86
00:03:45,580 --> 00:03:42,320
the same as in his images at this one

87
00:03:48,070 --> 00:03:45,590
here but get into the comparisons more

88
00:03:50,470 --> 00:03:48,080

in a minute all right

89
00:03:52,330 --> 00:03:50,480
and let's do the actual view if we go

90
00:03:56,470 --> 00:03:52,340
down to two meters above sea level and

91
00:04:00,130 --> 00:03:56,480
go down here and zoom in

92
00:04:04,240 --> 00:04:00,140
you actually see what Nathan is seeing

93
00:04:07,960 --> 00:04:04,250
and what I can do in this instance is

94
00:04:10,320 --> 00:04:07,970
turn off the water in Google Earth if

95
00:04:13,330 --> 00:04:10,330
it's in of the water the water surface

96
00:04:14,680 --> 00:04:13,340
because the ocean dips down in between

97
00:04:16,810 --> 00:04:14,690
nothing is actually obscured you can

98
00:04:18,940 --> 00:04:16,820
actually see pretty much all the way to

99
00:04:22,330 --> 00:04:18,950
the the bottom of the mountain over

100
00:04:25,440 --> 00:04:22,340
there and then we can actually overlay a

101
00:04:29,260 --> 00:04:25,450
photograph into this view and we can see

102
00:04:30,909 --> 00:04:29,270
how much of this is actually visible now

103
00:04:32,740 --> 00:04:30,919
I did that by taking a screenshot of

104
00:04:35,140 --> 00:04:32,750
this particular image this is from

105
00:04:37,210 --> 00:04:35,150
Nathan's location water switched off you

106
00:04:39,400 --> 00:04:37,220
can see that if I turn the water on its

107
00:04:41,520 --> 00:04:39,410
gonna give you a pretty good clue as to

108
00:04:44,050 --> 00:04:41,530
where it's gonna be goes right up here

109
00:04:45,159 --> 00:04:44,060
is where the water surface would be on a

110
00:04:47,110 --> 00:04:45,169
globe earth because we've got it

111
00:04:49,270 --> 00:04:47,120
rational and whatnot to deal with but

112
00:04:50,650 --> 00:04:49,280
you know this is gonna give you a pretty

113
00:04:53,710 --> 00:04:50,660

good flow of what we're actually gonna

114
00:04:59,830 --> 00:04:53,720
see so I just took this screenshot went

115
00:05:02,980 --> 00:04:59,840
into Photoshop and here is that

116
00:05:06,370 --> 00:05:02,990
screenshot I think we've got down here I

117
00:05:07,990 --> 00:05:06,380
asked you 12 feet 12 feet above the

118
00:05:09,790 --> 00:05:08,000
water level which is kind of like the

119
00:05:12,250 --> 00:05:09,800
beach a little ways not very very far

120
00:05:14,529 --> 00:05:12,260
and standing up and this is what you see

121
00:05:16,060 --> 00:05:14,539
on 12 12 feet away with the water

122
00:05:18,460 --> 00:05:16,070
switched off so you can see all the way

123
00:05:20,770 --> 00:05:18,470
to the bottom this is the actual water

124
00:05:25,960 --> 00:05:20,780
line here and I took Nations photographs

125
00:05:27,969 --> 00:05:25,970
and I try to match them so here is you

126
00:05:30,430 --> 00:05:27,979
think I've got that down and there we go

127
00:05:34,300 --> 00:05:30,440
here's one of them you can see it here's

128
00:05:37,060 --> 00:05:34,310
the contour and it matches the actual

129
00:05:40,089 --> 00:05:37,070
console you can good web checking that

130
00:05:42,640 --> 00:05:40,099
out is - I just move it around and you

131
00:05:44,230 --> 00:05:42,650
can see it matches exactly so this is

132
00:05:45,940 --> 00:05:44,240
the actual contour and there's the

133
00:05:47,500 --> 00:05:45,950
contour on the other side it's slightly

134
00:05:49,180 --> 00:05:47,510
distorted because it's a bit further

135
00:05:51,310 --> 00:05:49,190
away but this one you know I could say

136
00:05:52,510 --> 00:05:51,320
it's very close to the water so you get

137
00:05:56,350 --> 00:05:52,520
a very straight up and down very

138
00:05:58,089 --> 00:05:56,360

straight on view and we just don't do

139
00:06:01,409 --> 00:05:58,099
that so it moves back into position

140
00:06:05,170 --> 00:06:01,419
so this is this particular photograph

141
00:06:07,990 --> 00:06:05,180
here's the water line that we're seeing

142
00:06:09,430 --> 00:06:08,000
way up here of the hill and here's all

143
00:06:12,090 --> 00:06:09,440
the stuff that's missing all the way

144
00:06:15,340 --> 00:06:12,100
down to I guess around her here so about

145
00:06:17,950 --> 00:06:15,350
two-thirds or so of the hill is missing

146
00:06:19,450 --> 00:06:17,960
now I put some markers on this in Google

147
00:06:21,550 --> 00:06:19,460
Earth let me just show you the other

148
00:06:24,490 --> 00:06:21,560
photographs here is another one just

149
00:06:26,530 --> 00:06:24,500
basically the same thing again this this

150
00:06:29,620 --> 00:06:26,540
Hills slightly off because it's further

151
00:06:31,660 --> 00:06:29,630
away and refraction actually raises up

152
00:06:33,640 --> 00:06:31,670
the hill very slightly so it's it's

153
00:06:35,200 --> 00:06:33,650
further back you get this a tiny little

154
00:06:37,630 --> 00:06:35,210
correction that you need here because of

155
00:06:39,670 --> 00:06:37,640
refraction standard refraction and of

156
00:06:41,290 --> 00:06:39,680
spirit refraction raising it up and then

157
00:06:43,630 --> 00:06:41,300
one more which was one where he's oom

158
00:06:47,340 --> 00:06:43,640
din a lot now we can zoom in let me turn

159
00:06:50,800 --> 00:06:47,350
off the other two it's not right yeah

160
00:06:53,860 --> 00:06:50,810
there we go hey zoom in on this you can

161
00:06:56,080 --> 00:06:53,870
see again it matches just fine it's more

162
00:06:57,340 --> 00:06:56,090
distortion here you can kind of II know

163
00:06:58,750 --> 00:06:57,350

this stuff here down here because it's

164
00:07:01,210 --> 00:06:58,760
just atmospheric distortion because of

165
00:07:02,650 --> 00:07:01,220
being very close to the water surface if

166
00:07:04,390 --> 00:07:02,660
you have a line of sight as close to the

167
00:07:06,370 --> 00:07:04,400
water surface it misses up anyway here's

168
00:07:08,320 --> 00:07:06,380
the horizon up here all this is missing

169
00:07:10,180 --> 00:07:08,330
down here and a similar type of thing

170
00:07:12,280 --> 00:07:10,190
from all the others Nathan was actually

171
00:07:13,750 --> 00:07:12,290
kind of crouching down and standing up

172
00:07:14,830 --> 00:07:13,760
trying to take this photos and that does

173
00:07:17,410 --> 00:07:14,840
actually make a significant distance

174
00:07:19,810 --> 00:07:17,420
difference to this region because your

175
00:07:22,570 --> 00:07:19,820
position within the your line of sight

176
00:07:24,040 --> 00:07:22,580
in the close to the water is changing

177
00:07:25,600 --> 00:07:24,050
quite a bit by standing up and down but

178
00:07:27,670 --> 00:07:25,610
the tops of the mountains really don't

179
00:07:31,150 --> 00:07:27,680
move very much air back into Google

180
00:07:33,520 --> 00:07:31,160
Earth keep this image in mind this

181
00:07:36,270 --> 00:07:33,530
filter here is just a contrast filter

182
00:07:38,550 --> 00:07:36,280
doesn't change anything

183
00:07:40,050 --> 00:07:38,560
keep this image in mind about 2/3 of the

184
00:07:42,540 --> 00:07:40,060
way up just below this Ridge there's

185
00:07:47,870 --> 00:07:42,550
this Ridge here and I'm gonna go back in

186
00:07:52,230 --> 00:07:47,880
to Google Earth and let me just turn off

187
00:07:56,280 --> 00:07:52,240
some things so that we you get mister

188
00:07:58,350 --> 00:07:56,290

I'm just gonna go at C over to p1 p1 is

189
00:08:02,159 --> 00:07:58,360
the point that's on top of the ridge

190
00:08:03,930 --> 00:08:02,169
that we were looking at so this is the

191
00:08:09,120 --> 00:08:03,940
ridge this is the top of the photograph

192
00:08:11,310 --> 00:08:09,130
it is this point here is this rich and

193
00:08:13,680 --> 00:08:11,320
you can kind of zoom back and go down

194
00:08:16,950 --> 00:08:13,690
and you can kind of see that from lower

195
00:08:18,750 --> 00:08:16,960
down and there's a whole bunch of other

196
00:08:20,520 --> 00:08:18,760
points that I've marked off just so we

197
00:08:23,790 --> 00:08:20,530
can figure out how much of the mountain

198
00:08:27,000 --> 00:08:23,800
is obscured so 700 feet the top of this

199
00:08:28,560 --> 00:08:27,010
Ridge and if you remember there was this

200
00:08:31,380 --> 00:08:28,570
Ridge which is in front of it

201
00:08:36,779 --> 00:08:31,390
and our line of sight was around about

202
00:08:40,380 --> 00:08:36,789
here so if we go to this point here

203
00:08:42,570 --> 00:08:40,390
directly below it that's 475 feet and

204
00:08:45,380 --> 00:08:42,580
what I actually did is I put in a plane

205
00:08:49,410 --> 00:08:45,390
which skims the surface of the water

206
00:08:50,790 --> 00:08:49,420
this horizon plane here and it kind of

207
00:08:55,410 --> 00:08:50,800
shows you what you'd expect on a

208
00:08:57,720 --> 00:08:55,420
geometric earth with no no atmosphere

209
00:08:59,250 --> 00:08:57,730
that's still having an ocean and you

210
00:09:00,690 --> 00:08:59,260
would expect it to be about here because

211
00:09:02,040 --> 00:09:00,700
of refraction it's a bit lower than that

212
00:09:05,010 --> 00:09:02,050
you see a little bit more but this can

213
00:09:09,870 --> 00:09:05,020

you see a good idea as to what what to

214
00:09:17,610 --> 00:09:09,880
expect so here's our multiple points p1

215
00:09:22,670 --> 00:09:17,620
is a 692 feet p2 is at 100 475 feet and

216
00:09:25,230 --> 00:09:22,680
p3 is a 328 feet and our actual

217
00:09:27,270 --> 00:09:25,240
photographs show that all we can see is

218
00:09:29,910 --> 00:09:27,280
like about two up here all of this is

219
00:09:31,350 --> 00:09:29,920
missing and we know for sure that at

220
00:09:33,390 --> 00:09:31,360
least 300 when you get features missing

221
00:09:37,320 --> 00:09:33,400
because this bit here this point here is

222
00:09:40,380 --> 00:09:37,330
not visible in these images and so you

223
00:09:41,940 --> 00:09:40,390
can't assume in on one of them is just

224
00:09:44,310 --> 00:09:41,950
probably the best one like you can see

225
00:09:47,220 --> 00:09:44,320
this whole Ridge here and this bit here

226
00:09:49,079 --> 00:09:47,230
so this whole Ridge here and so we're

227
00:09:49,980 --> 00:09:49,089
about at this level that were probably a

228
00:09:53,010 --> 00:09:49,990
bit above that

229
00:09:54,510 --> 00:09:53,020
for 328 feet mark and what about level

230
00:09:57,570 --> 00:09:54,520
with this but that's on your point of

231
00:09:58,949 --> 00:09:57,580
view I think yeah good thing about going

232
00:10:00,930 --> 00:09:58,959
leaner again is that you can actually

233
00:10:02,790 --> 00:10:00,940
just take a boat out of there you could

234
00:10:04,590 --> 00:10:02,800
actually go over here you can drive up

235
00:10:07,440 --> 00:10:04,600
to this region here this is a heliport

236
00:10:08,880 --> 00:10:07,450
on Catalina Island and you can go there

237
00:10:10,699 --> 00:10:08,890
and you can see just how high this this

238
00:10:13,290 --> 00:10:10,709

hill is it is actually 700 feet high

239
00:10:15,810 --> 00:10:13,300
it's very good very straightforward and

240
00:10:17,730 --> 00:10:15,820
you know here's the the cliffs over here

241
00:10:20,070 --> 00:10:17,740
you could probably walk up this cliff

242
00:10:21,900 --> 00:10:20,080
here it looks like there's some paths I

243
00:10:23,070 --> 00:10:21,910
just being guilty paths but you could

244
00:10:26,100 --> 00:10:23,080
probably hike up there if you already

245
00:10:27,329 --> 00:10:26,110
wanted and you could do verify this is

246
00:10:29,340 --> 00:10:27,339
the actual height and you could verify

247
00:10:30,510 --> 00:10:29,350
this is what you can see - and if you

248
00:10:32,400 --> 00:10:30,520
were really ambitious you could go up

249
00:10:34,470 --> 00:10:32,410
here with a laser and start flashing

250
00:10:35,910 --> 00:10:34,480
your laser towards the other side you

251
00:10:38,610 --> 00:10:35,920
probably could be able to see it with a

252
00:10:40,290 --> 00:10:38,620
powerful enough laser in the evening and

253
00:10:41,730 --> 00:10:40,300
you better see about where you were here

254
00:10:44,820 --> 00:10:41,740
be careful you don't fall down the cliff

255
00:10:48,180 --> 00:10:44,830
obviously I've actually this is an

256
00:10:51,150 --> 00:10:48,190
excellent demonstration of the curve of

257
00:10:53,579 --> 00:10:51,160
the earth because we're we're missing

258
00:10:55,530 --> 00:10:53,589
the whole bottom part of this island and

259
00:10:57,510 --> 00:10:55,540
if you do the math for how much you'd

260
00:11:01,139 --> 00:10:57,520
expect to be missing with the curve

261
00:11:03,000 --> 00:11:01,149
calculator 32 miles away

262
00:11:04,440 --> 00:11:03,010
I put the viewer height here in feet

263
00:11:05,579 --> 00:11:04,450

here just three feet which is a bit

264
00:11:06,030 --> 00:11:05,589
lowest program much lower than it

265
00:11:08,639 --> 00:11:06,040
actually is

266
00:11:12,600 --> 00:11:08,649
yeah you'd expect to see refracted

267
00:11:16,769 --> 00:11:12,610
hidden 500 feet and what was the top

268
00:11:18,810 --> 00:11:16,779
here it was nearly 700 feet 692 feet to

269
00:11:22,050 --> 00:11:18,820
the top so refracted hidden would be

270
00:11:25,410 --> 00:11:22,060
somewhere down here from 3 feet at this

271
00:11:27,060 --> 00:11:25,420
level but I think Nathan's probably more

272
00:11:30,180 --> 00:11:27,070
about 6 to 10 feet but there's little

273
00:11:33,300 --> 00:11:30,190
ways up the beach 6 feet gives a hidden

274
00:11:36,900 --> 00:11:33,310
of 472 which is more like you know what

275
00:11:38,430 --> 00:11:36,910
we see right here this area chopping off

276
00:11:39,889 --> 00:11:38,440
the top so I think you pretty much

277
00:11:42,510 --> 00:11:39,899
almost exactly what you'd expect

278
00:11:43,710 --> 00:11:42,520
refraction does vary a lot that's one

279
00:11:45,269 --> 00:11:43,720
thing I said at the conference was you

280
00:11:47,550 --> 00:11:45,279
got to rise above refraction you've got

281
00:11:49,230 --> 00:11:47,560
to make your line of sight to things be

282
00:11:51,360 --> 00:11:49,240
above refraction because as you can see

283
00:11:53,310 --> 00:11:51,370
when you look at the line of sight of

284
00:11:54,960 --> 00:11:53,320
things that are very close to the water

285
00:11:56,430 --> 00:11:54,970
surface you get all this refraction but

286
00:11:58,890 --> 00:11:56,440
looking up higher like this Ridge here

287
00:12:00,840 --> 00:11:58,900
and it's top of this mountain here in

288
00:12:02,160 --> 00:12:00,850

the Southern Ridge you can you're not

289
00:12:03,690 --> 00:12:02,170
really getting anything other than

290
00:12:06,380 --> 00:12:03,700
standard atmospheric River

291
00:12:13,890 --> 00:12:06,390
refraction from the changing gradient

292
00:12:20,260 --> 00:12:13,900
there you go a good demonstration of the