



1  
00:00:05,450 --> 00:00:03,889  
there's a few UFO videos that are shot

2  
00:00:07,010 --> 00:00:05,460  
from a moving helicopter where the

3  
00:00:09,589 --> 00:00:07,020  
camera tracks what seems to be a very

4  
00:00:12,140 --> 00:00:09,599  
fast-moving object there's this one from

5  
00:00:16,039 --> 00:00:12,150  
Aguadilla in Puerto Rico and there's the

6  
00:00:17,390 --> 00:00:16,049  
go-fast video from the US Navy a simple

7  
00:00:19,429 --> 00:00:17,400  
explanation for these is that the

8  
00:00:21,859 --> 00:00:19,439  
apparent high speed comes from parallax

9  
00:00:23,929 --> 00:00:21,869  
the object is closer to the camera than

10  
00:00:25,429 --> 00:00:23,939  
the background so changes in angle

11  
00:00:28,130 --> 00:00:25,439  
result in what looks like high speed

12  
00:00:29,509 --> 00:00:28,140  
relative to their background you can see

13  
00:00:31,099 --> 00:00:29,519

this with this hawk that looks like it's

14

00:00:35,030 --> 00:00:31,109  
going 200 miles per hour over the ground

15

00:00:36,740 --> 00:00:35,040  
a little bit diagonally I did a little

16

00:00:38,420 --> 00:00:36,750  
experiment to try to demonstrate this

17

00:00:40,729 --> 00:00:38,430  
effect with a ping-pong ball suspended

18

00:00:42,319 --> 00:00:40,739  
from a tree but the best demonstration

19

00:00:44,150 --> 00:00:42,329  
of this effect now comes from Tom

20

00:00:46,279 --> 00:00:44,160  
Churchill of Churchill navigation with

21

00:00:48,979 --> 00:00:46,289  
this video of a mylar balloon film from

22

00:00:50,690 --> 00:00:48,989  
a helicopter after the cameraman starts

23

00:00:52,100 --> 00:00:50,700  
tracking the balloon it looks like it's

24

00:00:54,560 --> 00:00:52,110  
moving incredibly fast over the

25

00:00:56,299 --> 00:00:54,570  
background but we can see it's just a

26

00:00:57,709 --> 00:00:56,309

balloon drifting in the wind and the

27

00:00:59,689 --> 00:00:57,719

apparent motion comes from a combination

28

00:01:01,369 --> 00:00:59,699

of the helicopter motion and the

29

00:01:04,609 --> 00:01:01,379

magnified movement due to the zoom

30

00:01:08,600 --> 00:01:04,619

factor so the video we're looking at

31

00:01:12,740 --> 00:01:08,610

here is in the earthscape viewer from

32

00:01:14,719 --> 00:01:12,750

church on navigation this is a great

33

00:01:17,330 --> 00:01:14,729

viewer not only does it show you the

34

00:01:19,310 --> 00:01:17,340

video but it shows you a lot of data

35

00:01:21,740 --> 00:01:19,320

that has been collected along with the

36

00:01:23,780 --> 00:01:21,750

video and a simple level that shows you

37

00:01:26,480 --> 00:01:23,790

where the camera is the helicopter right

38

00:01:28,160 --> 00:01:26,490

here and it shows you where the camera

39

00:01:31,880 --> 00:01:28,170

is pointing this red line shows you

40

00:01:35,480 --> 00:01:31,890

where the camera is pointing and we can

41

00:01:38,780 --> 00:01:35,490

move around in the video and you can see

42

00:01:41,990 --> 00:01:38,790

at any point what the field of view is

43

00:01:44,330 --> 00:01:42,000

which is this red region here which

44

00:01:47,359 --> 00:01:44,340

corresponds to what you see in the video

45

00:01:50,030 --> 00:01:47,369

you see here the front edge of the field

46

00:01:52,340 --> 00:01:50,040

of view is the bottom edge of the video

47

00:01:54,889 --> 00:01:52,350

here in the middle of the river and then

48

00:01:56,330 --> 00:01:54,899

the far edge is the the far end and then

49

00:01:58,670 --> 00:01:56,340

these are the sides so you can see

50

00:02:01,130 --> 00:01:58,680

exactly what you're looking at in the

51  
00:02:05,649 --> 00:02:01,140  
map like we could see for example that

52  
00:02:08,029 --> 00:02:05,659  
these these storage tankers here are

53  
00:02:10,669 --> 00:02:08,039  
going to be right here on the edge of

54  
00:02:12,510 --> 00:02:10,679  
the river and we can probably change to

55  
00:02:15,660 --> 00:02:12,520  
aerial imagery

56  
00:02:18,270 --> 00:02:15,670  
and we'll see zooming in there we are

57  
00:02:19,830 --> 00:02:18,280  
the these storage tankers here so it's

58  
00:02:22,700 --> 00:02:19,840  
very accurate and telling you exactly

59  
00:02:26,490 --> 00:02:22,710  
what you're looking at and in terms of

60  
00:02:31,770 --> 00:02:26,500  
this the this balloon that we're looking

61  
00:02:33,230 --> 00:02:31,780  
at here the computer here is thinks

62  
00:02:37,890 --> 00:02:33,240  
we're tracking something on the ground

63  
00:02:41,670 --> 00:02:37,900

so if we open this up and add in the

64

00:02:44,910 --> 00:02:41,680

speed and the target speed we'll see the

65

00:02:48,810 --> 00:02:44,920

speed of the helicopter here is being

66

00:02:51,690 --> 00:02:48,820

shown as around 20 to 25 meters per

67

00:02:57,540 --> 00:02:51,700

second and the target speed if we add

68

00:03:01,440 --> 00:02:57,550

that in target speed is a hundred to 150

69

00:03:03,810 --> 00:03:01,450

or 200 or 300 plus meters per second and

70

00:03:05,790 --> 00:03:03,820

that's because it thinks the targets on

71

00:03:08,400 --> 00:03:05,800

the ground so it's calculating it as if

72

00:03:11,160 --> 00:03:08,410

it's a ground-based target because it's

73

00:03:12,570 --> 00:03:11,170

in the air now if it was moving on the

74

00:03:13,860 --> 00:03:12,580

ground it would be moving at those

75

00:03:16,380 --> 00:03:13,870

speeds so that would be perfectly

76  
00:03:18,480 --> 00:03:16,390  
accurate so what we've got to do is try

77  
00:03:22,170 --> 00:03:18,490  
to figure out where the balloon actually

78  
00:03:28,230 --> 00:03:22,180  
is relative to the camera and then we

79  
00:03:29,880 --> 00:03:28,240  
could figure out where the where the how

80  
00:03:33,030 --> 00:03:29,890  
far it actually is and how fast it is

81  
00:03:36,290 --> 00:03:33,040  
actually moving and I think what I'll do

82  
00:03:41,570 --> 00:03:36,300  
is I'll try using this building here

83  
00:03:45,060 --> 00:03:41,580  
which I believe we can see over here and

84  
00:03:48,300 --> 00:03:45,070  
seeing how big this building edge here

85  
00:03:51,330 --> 00:03:48,310  
is relative to this balloon and hence

86  
00:03:53,670 --> 00:03:51,340  
wish you were to figure out how far away

87  
00:03:55,260 --> 00:03:53,680  
the balloon is if we know the size of

88  
00:03:58,590 --> 00:03:55,270

the balloon which I'm going to assume as

89

00:04:00,780 --> 00:03:58,600

a standard say 18 inches maybe 2 feet

90

00:04:03,180 --> 00:04:00,790

probably 18 inches wide mylar balloon

91

00:04:07,440 --> 00:04:03,190

and this building I will find the size

92

00:04:09,900 --> 00:04:07,450

of in Google Earth all right I found

93

00:04:12,120 --> 00:04:09,910

this building in Google Earth so let's

94

00:04:17,610 --> 00:04:12,130

measure some things let's zoom this up

95

00:04:19,410 --> 00:04:17,620

and zoom out this is the position of the

96

00:04:21,659 --> 00:04:19,420

helicopter the position of this building

97

00:04:24,590 --> 00:04:21,669

and I've drawn a line between the two so

98

00:04:29,330 --> 00:04:24,600

we can use that to measure how

99

00:04:31,880 --> 00:04:29,340

it is it is 1751 meters so about 1750

100

00:04:33,770 --> 00:04:31,890

meters from the helicopter to that

101  
00:04:35,840 --> 00:04:33,780  
building this is you know approximate

102  
00:04:38,810 --> 00:04:35,850  
but it's pretty good so now how long is

103  
00:04:39,860 --> 00:04:38,820  
the roofline now we're a bit of an angle

104  
00:04:42,260 --> 00:04:39,870  
so what I've done is I've drawn this

105  
00:04:45,980 --> 00:04:42,270  
line from here to here just to show how

106  
00:04:51,800 --> 00:04:45,990  
long the roofline would be at that angle

107  
00:04:56,890 --> 00:04:51,810  
and we can measure that that is 33

108  
00:05:01,610 --> 00:04:56,900  
metres so what is the apparent size of

109  
00:05:07,610 --> 00:05:01,620  
this balloon at that distance well if

110  
00:05:12,290 --> 00:05:07,620  
the roofline is 33 metres the balloon is

111  
00:05:15,440 --> 00:05:12,300  
about one-sixth of that roofline so

112  
00:05:17,870 --> 00:05:15,450  
one-sixth of 33 is about 5.5 let's call

113  
00:05:21,950 --> 00:05:17,880

it around 5 meters and the balloon size

114

00:05:25,730 --> 00:05:21,960

is 18 inches let's say that's around 1/2

115

00:05:27,920 --> 00:05:25,740

a meter so if it looks like it's 5.2 if

116

00:05:30,230 --> 00:05:27,930

it looks like it's 5 meters in size but

117

00:05:32,330 --> 00:05:30,240

it's actually half a meter in size that

118

00:05:34,970 --> 00:05:32,340

means it's appearing 10 times as big as

119

00:05:37,340 --> 00:05:34,980

it actually should be at that distance

120

00:05:40,100 --> 00:05:37,350

which means the actual distance is 1/10

121

00:05:42,740 --> 00:05:40,110

of that and we can put that in on the

122

00:05:44,600 --> 00:05:42,750

map here this is one tenth of the

123

00:05:47,050 --> 00:05:44,610

distance from the helicopter to that

124

00:05:51,490 --> 00:05:47,060

building so approximately somewhere

125

00:05:55,280 --> 00:05:51,500

around here and that means that we can

126  
00:05:58,130 --> 00:05:55,290  
if we go back to the earth scape viewer

127  
00:06:00,380 --> 00:05:58,140  
and we look at the actual path here we

128  
00:06:02,000 --> 00:06:00,390  
know that it's going to be about one

129  
00:06:05,270 --> 00:06:02,010  
tenth of this distance here and again

130  
00:06:06,530 --> 00:06:05,280  
that's going to be around here so now we

131  
00:06:08,480 --> 00:06:06,540  
know that the balloon was somewhere

132  
00:06:10,040 --> 00:06:08,490  
around this region it makes a lot more

133  
00:06:12,260 --> 00:06:10,050  
sense if we look at the actual movement

134  
00:06:13,960 --> 00:06:12,270  
of the helicopter I'm going to zoom in

135  
00:06:20,440 --> 00:06:13,970  
here

136  
00:06:22,420 --> 00:06:20,450  
helicopter is you can see the helicopter

137  
00:06:24,400 --> 00:06:22,430  
look at the red line coming out of the

138  
00:06:26,710 --> 00:06:24,410

helicopter II it focuses around this

139

00:06:28,180 --> 00:06:26,720

area here and you go through the entire

140

00:06:30,730 --> 00:06:28,190

movement any kind of pivots

141

00:06:33,340 --> 00:06:30,740

around that region there's a red line

142

00:06:37,450 --> 00:06:33,350

here and if you go down and here there's

143

00:06:39,370 --> 00:06:37,460

another red line the red line here red

144

00:06:41,980 --> 00:06:39,380

line here and they're all focusing

145

00:06:43,930 --> 00:06:41,990

around this region and even down here is

146

00:06:46,390 --> 00:06:43,940

looking up it's all around this region

147

00:06:48,400 --> 00:06:46,400

so I think what's actually happening is

148

00:06:51,430 --> 00:06:48,410

the helicopter view for a flew from up

149

00:06:55,180 --> 00:06:51,440

here to down here it's sort of balloon

150

00:06:56,530 --> 00:06:55,190

around here and as it went through that

151

00:07:00,010 --> 00:06:56,540

movement

152

00:07:02,500 --> 00:07:00,020

it basically pivoted around this balloon

153

00:07:04,300 --> 00:07:02,510

here which was hardly moving at all and

154

00:07:06,460 --> 00:07:04,310

it looked like it was a balloon moving