
Greetings from
QuasarVille
"The Town That Never Moves!"

1
00:00:00,020 --> 00:00:04,000
[music] Narrator: To most people, there are exactly 24 hours in a day, the ground only

2
00:00:04,020 --> 00:00:08,010
moves during an earthquake, and the Earth rotates just like it does on a globe.

3
00:00:08,030 --> 00:00:12,010
And generally speaking, that makes sense! But scientists, who like to find out

4
00:00:12,030 --> 00:00:16,020
exactly what's going on, know the ground actually moves around quite a bit,

5
00:00:16,040 --> 00:00:20,020
days are never quite 24 hours, and the Earth actually wobbles on its axis

6
00:00:20,040 --> 00:00:24,040
in a very particular way as it revolves around the sun. Scientists know

7
00:00:24,060 --> 00:00:28,050
all this by using a technique called Very Long Baseline Interferometry,

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00:00:28,070 --> 00:00:32,050
which is basically a fancy term for using radio dishes to very precisely measure

9
00:00:32,070 --> 00:00:36,060
the Earth's orientation. VLBI was originally developed

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00:00:36,080 --> 00:00:40,060
back in the 60s to take pictures of quasars. Early on, though,

11
00:00:40,080 --> 00:00:44,070
someone realized that because quasars never really move, you could use them as reference

12
00:00:44,090 --> 00:00:48,070
points, throw the whole process in reverse, and figure out how all the telescopes

13
00:00:48,090 --> 00:00:52,070

were moving relative to one another. Basically, when a quasar emits a radio

14
00:00:52,090 --> 00:00:56,080
wave, that wave reaches different telescopes at different times. For

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00:00:56,100 --> 00:01:00,080
astronomy, you'd use a computer to imitate a giant telescope and get a good picture

16
00:01:00,100 --> 00:01:04,080
of the quasar, but if you instead pay close attention to the time differences,

17
00:01:04,100 --> 00:01:08,090
you can use geometry to figure out how far apart the telescopes are. And

18
00:01:08,110 --> 00:01:12,090
by making lots of those measurements, you can start to see how the ground beneath the telescopes

19
00:01:12,110 --> 00:01:16,090
moves around, when you have to adjust your clock, and that the Earth wobbles on its axis

20
00:01:16,110 --> 00:01:20,100
as it moseys around the sun. So, the next time you feel like you've had a long

21
00:01:20,120 --> 00:01:24,110
day, or that your house is a few millimeters from where you last left it, you can

22
00:01:24,130 --> 00:01:28,110
switch on a bunch of radio telescopes, point them at quasars, and find out just how

23
00:01:28,130 --> 00:01:32,130
right you are. [music]