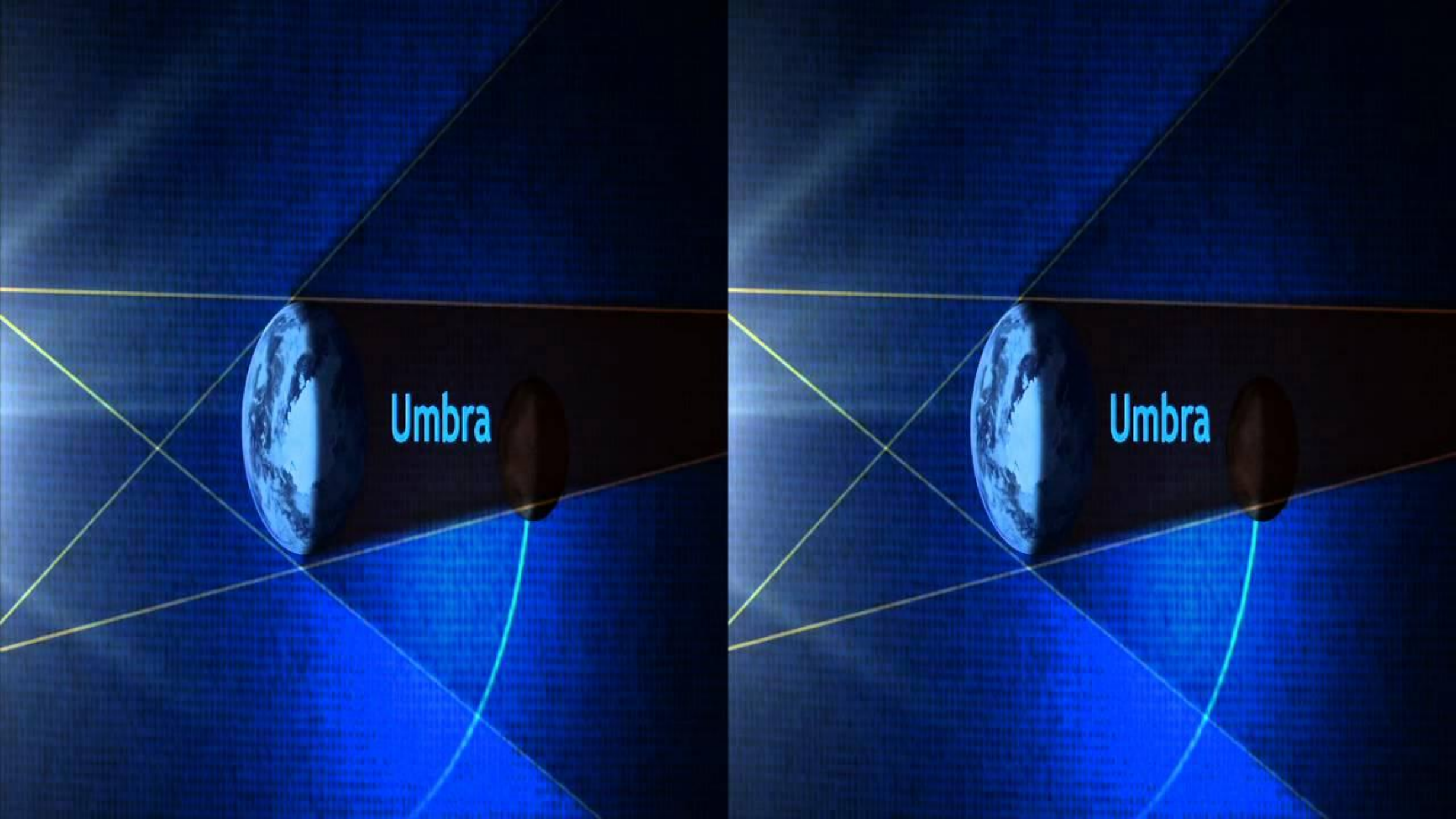
Umbra
Umbra

1
00:00:08,200 --> 00:00:04,100
[music]

2
00:00:08,220 --> 00:00:12,290
notice that it looks slightly different every day. The change in its shadow is based on

3
00:00:12,310 --> 00:00:16,400
where the moon is in its orbit. We call this cycle the phases of the moon, and it occurs

4
00:00:16,420 --> 00:00:20,500
roughly once a month. At least twice a year, however, something quite different

5
00:00:20,520 --> 00:00:24,580
happens. The moon passes through the shadow cast by the Earth, causing it to look extremely

6
00:00:24,600 --> 00:00:28,640
unusual for a short period of time. From the earth, the moon will appear to

7
00:00:28,660 --> 00:00:32,690
darken and turn a deep red before eventually returning to normal. This is called a lunar

8
00:00:32,710 --> 00:00:36,720
eclipse. If we were to look at what happens from space during an eclipse, it would go

9
00:00:36,740 --> 00:00:40,750
something like this. First, the moon passes through what's called the penumbra,

10
00:00:40,770 --> 00:00:44,850
where the sun's light is only partially obscured. This results in only a slight darkening

11
00:00:44,870 --> 00:00:49,000
of the moon. As the moon continues along its path, however, it enters what's

12
00:00:49,020 --> 00:00:53,140
called the umbra, where all direct light from the sun is blocked. But if the sun is blocked,

13
00:00:53,160 --> 00:00:57,250

why does the moon turn red? When light from the sun goes by the side of the Earth,

14
00:00:57,270 --> 00:01:01,350
it passes through a long and thick layer of Earth's atmosphere. Shorter wavelengths

15
00:01:01,370 --> 00:01:05,440
of sunlight, like blue, are scattered by the atmosphere, so by the time the light has finished

16
00:01:05,460 --> 00:01:09,520
its trip to the moon, more of the longer wavelengths, like red, are left over.

17
00:01:09,540 --> 00:01:13,570
On the Earth, the same thing happens at sunset as the ground you stand on gradually passes

18
00:01:13,590 --> 00:01:17,630
into night. As the eclipse ends, the moon leaves the umbra, returns

19
00:01:17,650 --> 00:01:21,660
to its normal color, and then leaves then penumbra, brightening and resuming its original

20
00:01:21,680 --> 00:01:25,690
cycle. Overall, the whole process lasts only from a few minutes to a few hours,

21
00:01:25,710 --> 00:01:29,700
so you'll have to be quick if you want to see it. But, as long as you're willing to stay awake,

22
00:01:29,720 --> 00:01:33,780
you'll catch the moon as you won't see it too often.

23
00:01:41,990 --> 00:01:37,900
[music, beeping]