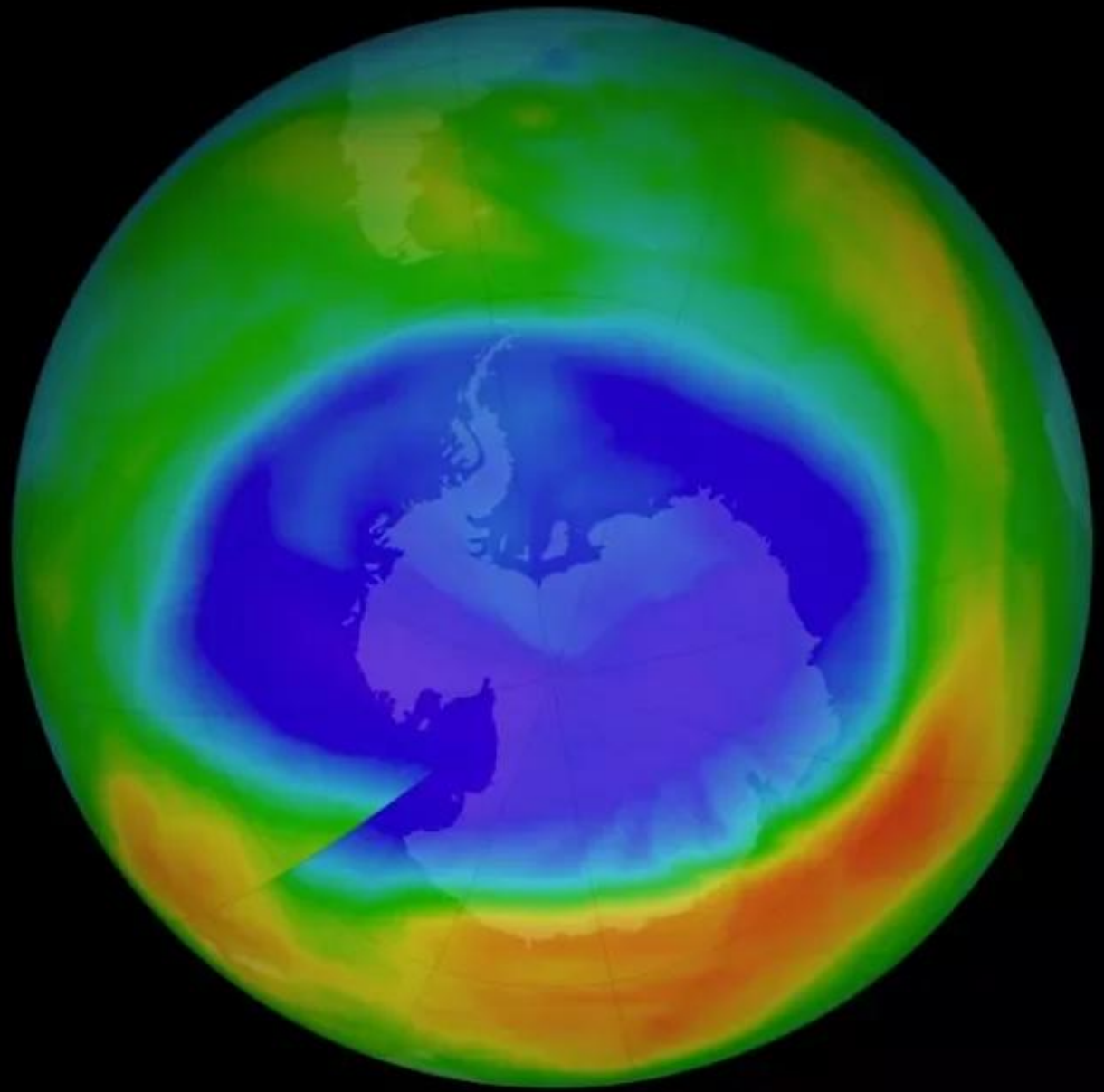

1
00:00:00,010 --> 00:00:04,200
The Montreal Protocol has been a great success at banning

2
00:00:04,200 --> 00:00:08,270
the production of ozone-depleting substances.

3
00:00:08,270 --> 00:00:12,380
And we know this because we've been measuring those substances at the Earth's surface since

4
00:00:12,380 --> 00:00:16,520
the 1980s or even before, in some cases. So before the Montreal Protocol,

5
00:00:16,520 --> 00:00:20,700
ozone-depleting substances at the surface were going up rapidly.

6
00:00:20,700 --> 00:00:24,910
Once the Protocol was signed and the regulations went into effect,

7
00:00:24,910 --> 00:00:29,090
we saw at the surface, levels of ozone-depleting substances going down.

8
00:00:29,090 --> 00:00:33,460
And so that's great. But those substances have to

9
00:00:33,460 --> 00:00:37,630
get high up into the stratosphere before they can destroy ozone, and they have to break down

10
00:00:37,630 --> 00:00:41,810
high up in the stratosphere, and the chlorine that gets released from the chlorofluorocarbons

11
00:00:41,810 --> 00:00:45,990
that's what actually destroys ozone. What we haven't had up until

12
00:00:45,990 --> 00:00:50,170
now is any measurement inside the Antarctic ozone hole

13
00:00:50,170 --> 00:00:54,220

that the chlorine levels there is actually going down. What I've shown

14
00:00:54,220 --> 00:00:58,300
is that if you're very careful about when you measure

15
00:00:58,300 --> 00:01:02,340
hydrogen chloride, that's HCl, in the atmosphere, and you measure it over time,

16
00:01:02,340 --> 00:01:06,390
you can see that HCl, so that reactive chlorine that destroys

17
00:01:06,390 --> 00:01:10,460
ozone, those levels are actually going down inside the Antarctic

18
00:01:10,460 --> 00:01:14,580
ozone hole. So that's great, so that's part of saying,

19
00:01:14,580 --> 00:01:18,760
"Hey, the ozone hole's recovering, it's getting smaller and it's because of declining chlorine."

20
00:01:18,760 --> 00:01:22,930
But the other part is to also look at how much ozone depletion

21
00:01:22,930 --> 00:01:27,110
is going on at the same time, because ozone levels can vary

22
00:01:27,110 --> 00:01:31,290
for a lot of different reasons, mostly because of temperature. If one year it's warm,

23
00:01:31,290 --> 00:01:35,330
you don't have as much ozone depletion. One year's really cold, you have more ozone depletion.

24
00:01:35,330 --> 00:01:39,430
So it makes it really hard to see the signal that the atmosphere's showing

25
00:01:39,430 --> 00:01:43,610
us, is the ozone hole really recovering? So what we did

26
00:01:43,610 --> 00:01:47,640
in this study, we were able to look at ozone changes during

27
00:01:47,640 --> 00:01:51,830
a period of time, in the winter, when most of that ozone change

28
00:01:51,830 --> 00:01:56,010
is coming just from chemical changes, so that temperatures aren't really affecting it very much.

29
00:01:56,010 --> 00:02:00,050
And we're able to do this because of measurements from the NASA Aura

30
00:02:00,050 --> 00:02:04,170
instrument called the Microwave Limb Sounder, so what we've seen by using the MLS

31
00:02:04,170 --> 00:02:08,330
data is that ozone depletion has declined.

32
00:02:08,330 --> 00:02:12,510
It does vary a lot still, but it declines and it's declining

33
00:02:12,510 --> 00:02:16,690
sort of in step with the chlorine changes, and so that's what we're