
NASA

1
00:00:01,400 --> 00:00:04,730
Nitrogen oxides and ozone measurement.

2
00:00:04,750 --> 00:00:06,410
It's built for this aircraft,

3
00:00:06,430 --> 00:00:07,240
recently,

4
00:00:07,260 --> 00:00:09,350
so these are its maiden flights.

5
00:00:09,370 --> 00:00:11,510
And we're measuring four different things

6
00:00:11,530 --> 00:00:13,880
simultaneously every 10th of a second

7
00:00:13,900 --> 00:00:14,830
in the atmosphere,

8
00:00:14,850 --> 00:00:18,980
so about every 100 feet as the aircraft travels.

9
00:00:19,000 --> 00:00:20,490
The things we emit,

10
00:00:20,510 --> 00:00:22,060
including these things down here

11
00:00:22,080 --> 00:00:23,310
that we're measuring,

12
00:00:23,330 --> 00:00:24,760
drive ozone photochemistry

13
00:00:24,780 --> 00:00:26,230

in the atmosphere.

14
00:00:26,250 --> 00:00:29,060
So power plants, tailpipes of cars,

15
00:00:29,080 --> 00:00:31,670
your backyard bar-b-que, forest fires,

16
00:00:31,690 --> 00:00:33,040
make these nitrogen oxides.

17
00:00:33,060 --> 00:00:34,470
They're reactive,

18
00:00:34,490 --> 00:00:36,340
and they cook along in the sunlight

19
00:00:36,360 --> 00:00:38,080
in the atmosphere to make ozone,

20
00:00:38,100 --> 00:00:39,620
as part of the ozone recipe.

21
00:00:39,640 --> 00:00:40,830
It's a pollutant

22
00:00:40,850 --> 00:00:42,250
and it affects people's health

23
00:00:42,270 --> 00:00:45,330
and it affects the viability of plants,

24
00:00:45,350 --> 00:00:49,250
and it's also a substantial greenhouse gas.

25
00:00:49,270 --> 00:00:52,110
It couples to both air quality and to climate.

26
00:00:52,130 --> 00:00:54,650
So this is how we try to look at our data.

27
00:00:54,670 --> 00:00:56,280
We flew up and down and up and down

28
00:00:56,300 --> 00:00:57,800
on this black trace.

29
00:00:57,820 --> 00:00:59,980
And the ozone has a vertical structure

30
00:01:00,000 --> 00:01:01,870
shown here in blue,

31
00:01:01,890 --> 00:01:03,780
and the nitrogen oxides we're measuring

32
00:01:03,800 --> 00:01:05,330
are shown here in red.

33
00:01:05,350 --> 00:01:07,880
You can see that very similarly,

34
00:01:07,900 --> 00:01:08,980
as we're heading south,

35
00:01:09,000 --> 00:01:11,030
going up and down,

36
00:01:11,050 --> 00:01:12,930
you kind of get this decrease

37
00:01:12,950 --> 00:01:14,680
as you get closer to the equator,

38
00:01:14,700 --> 00:01:15,830

and all of a sudden

39
00:01:17,410 --> 00:01:16,680
the ozone you see here

40
00:01:17,430 --> 00:01:19,770
is missing at the highest altitudes

41
00:01:19,790 --> 00:01:21,180
very close to the equator.

42
00:01:21,200 --> 00:01:23,320
The contrast between north and south

43
00:01:23,340 --> 00:01:24,930
is going to tell us a lot about

44
00:01:24,950 --> 00:01:27,330
how the large sources in the north,

45
00:01:27,350 --> 00:01:29,390
of human pollution,

46
00:01:29,410 --> 00:01:30,640
affect the global atmosphere

47
00:01:30,660 --> 00:01:33,780
differently in the south, with fewer sources,

48
00:01:33,800 --> 00:01:35,250
and different hemispheres

49
00:01:35,270 --> 00:01:37,250
will have different seasons as well.

50
00:01:37,270 --> 00:01:39,710
You see this really boring stretch down here,

51
00:01:39,730 --> 00:01:41,480
down south, close to the equator

52
00:01:41,500 --> 00:01:43,470
in Southern Hemispheric air.

53
00:01:43,490 --> 00:01:45,050
And that little line looks really flat,

54
00:01:45,070 --> 00:01:46,600
but if you zoom in,

55
00:01:46,620 --> 00:01:48,970
one of the many many things we're going to

56
00:01:48,990 --> 00:01:50,930
hope to be able to do with these data

57
00:01:50,950 --> 00:01:53,480
is to say how fast does this gas,

58
00:01:53,500 --> 00:01:56,310
this greenhouse gas, this pollutant gas, ozone,

59
00:01:56,330 --> 00:01:58,230
stick to the ocean surface

60
00:01:58,250 --> 00:01:59,690
and go away from the atmosphere.

61
00:01:59,710 --> 00:02:01,420
And that's a really key thing

62
00:02:01,440 --> 00:02:03,280
to get right in the global climate