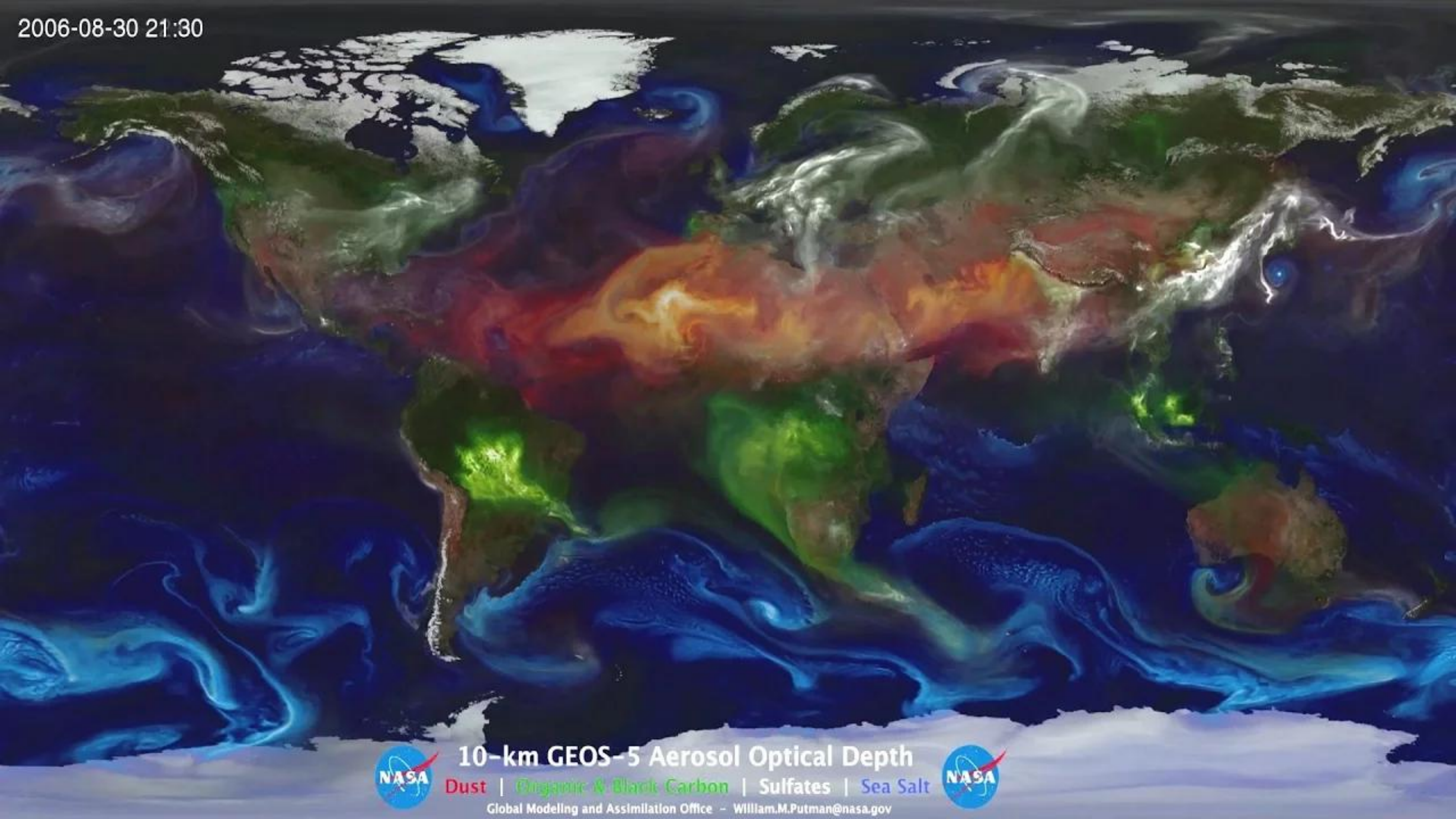
2006-08-30 21:30
10-km GEOS-5 Aerosol Optical Depth
Dust | Organic & Black Carbon | Sulfates | Sea Salt
Global Modeling and Assimilation Office - William.M.Putman@nasa.gov

1
00:00:02,080 --> 00:00:07,320
■

2
00:00:07,320 --> 00:00:09,760
>>One of the difficulties in
understanding air quality

3
00:00:09,760 --> 00:00:12,440
is that the pollution that
affects your health the most,

4
00:00:12,440 --> 00:00:15,800
is not the initial component
put into the atmosphere.

5
00:00:19,400 --> 00:00:21,560
>>Under certain
atmospheric conditions,

6
00:00:21,560 --> 00:00:23,960
some of these pollutants
react with each other

7
00:00:23,960 --> 00:00:27,040
and produce new harmful
agents like Ozone.

8
00:00:29,200 --> 00:00:31,520
>>There's three key ingredients
to make ozone.

9
00:00:31,520 --> 00:00:34,960
NOx, hydrocarbons and sunlight.

10
00:00:35,080 --> 00:00:36,760
>>So think of ozone
as an important

11
00:00:36,760 --> 00:00:38,400

cleansing agent from
the atmosphere.

12
00:00:38,600 --> 00:00:41,560
When you have a big stain to
clean you use a lot of cleanser.

13
00:00:41,560 --> 00:00:43,280
And when you create
a lot of pollution,

14
00:00:43,280 --> 00:00:46,240
a lot of ozone becomes evident
in the atmosphere.

15
00:00:46,400 --> 00:00:47,760
That's helping to clean
the atmosphere

16
00:00:47,760 --> 00:00:50,040
but it's also
impacting our health.

17
00:00:57,840 --> 00:00:59,120
>>We have primary pollutants.

18
00:00:59,360 --> 00:01:00,960
Nitrogen oxides and

19
00:01:00,960 --> 00:01:02,040
reactive hydrocarbons

20
00:01:02,040 --> 00:01:02,920
are most important

21
00:01:02,920 --> 00:01:03,920
in the formation of ozone.

22
00:01:04,000 --> 00:01:05,640

>>Your car emits both

23
00:01:05,640 --> 00:01:07,400
NOx and hydrocarbons

24
00:01:07,400 --> 00:01:08,680
with the unburned fuel

25
00:01:08,840 --> 00:01:10,920
>>But the ozone itself comes
from the chemistry,

26
00:01:10,920 --> 00:01:12,760
so we call it a
secondary pollutant,

27
00:01:12,760 --> 00:01:15,720
because it results from the
chemistry that occurs after

28
00:01:15,720 --> 00:01:17,600
the emission of the
nitrogen oxides

29
00:01:17,600 --> 00:01:19,240
and the reactive hydrocarbons.

30
00:01:20,120 --> 00:01:23,560
>>When nitrogen oxides and
hydrocarbons react with sunlight,

31
00:01:23,800 --> 00:01:27,720
they produce a harmful
secondary pollutant: Ozone.

32
00:01:29,240 --> 00:01:32,160
But wait!
Isn't ozone good for us?

33

00:01:32,640 --> 00:01:34,320
Well... it depends!

34
00:01:35,600 --> 00:01:37,840
>>The role of ozone in the
atmosphere is quite complex

35
00:01:37,960 --> 00:01:40,000
In the stratosphere ozone
is a great benefit

36
00:01:40,000 --> 00:01:42,040
because it protects us
from UV radiation.

37
00:01:42,280 --> 00:01:44,760
In the lower atmosphere,
ozone is also a benefit

38
00:01:44,760 --> 00:01:47,200
because it's responsible
for initiating

39
00:01:47,200 --> 00:01:49,920
the chemistry that cleanses
the pollution out.

40
00:01:50,320 --> 00:01:52,160
But when pollution levels
are very high,

41
00:01:52,160 --> 00:01:53,240
the chemistry runs the muck

42
00:01:53,240 --> 00:01:55,240
and you create very
high levels of ozone.

43
00:01:55,400 --> 00:01:57,600
And those ozone levels

can become so high,

44
00:01:57,880 --> 00:02:00,600
that they become reactive
with our own body tissues

45
00:02:00,600 --> 00:02:02,760
and become a problem
in terms of health.

46
00:02:04,600 --> 00:02:06,840
>>Photochemical smog
is considered to be

47
00:02:06,840 --> 00:02:09,360
a problem of modern
industrialization.

48
00:02:10,160 --> 00:02:12,480
It is present in all
modern cities,

49
00:02:12,480 --> 00:02:16,440
but it is more common in cities
with sunny, warm, dry climates

50
00:02:16,440 --> 00:02:18,840
and a large number
of motor vehicles.

51
00:02:20,840 --> 00:02:22,840
It can also affect rural areas

52
00:02:23,040 --> 00:02:26,400
where agriculture, trees and
forest fires can release

53
00:02:26,400 --> 00:02:29,920
a considerable amount of
volatile organic compounds

54
00:02:29,920 --> 00:02:31,600
or VOCs.

55
00:02:33,000 --> 00:02:34,880
>>What are the sources of VOCs...?

56
00:02:35,080 --> 00:02:37,480
We have the evaporation
of gasoline

57
00:02:37,480 --> 00:02:38,920
when you're filling your tank

58
00:02:39,440 --> 00:02:40,800
Petrochemical plants...

59
00:02:40,800 --> 00:02:45,120
The refineries that are making
gasoline for us from oil

60
00:02:45,120 --> 00:02:47,560
and also the plastics companies

61
00:02:47,560 --> 00:02:51,160
that are making plastics,
polyethylene, polypropylene...

62
00:02:51,320 --> 00:02:53,160
>>In terms of reactive nitrogen,

63
00:02:53,400 --> 00:02:56,320
man activity far outpaces
the natural sources

64
00:02:56,320 --> 00:02:57,520
and so we can say that,

65

00:02:57,520 --> 00:02:58,920
when nitrogen oxides
are present...

66
00:02:59,080 --> 00:03:00,240
that's man!.

67
00:03:00,480 --> 00:03:02,760
When you talk about
reactive hydrocarbons,

68
00:03:02,760 --> 00:03:05,040
actually vegetation plays
a major global role

69
00:03:05,040 --> 00:03:06,560
in creating them!

70
00:03:07,880 --> 00:03:11,520
>>Trees can emit that pine
tree smell that you smell...

71
00:03:11,520 --> 00:03:14,680
But also, a lot of the
deciduous trees

72
00:03:14,680 --> 00:03:16,560
are emitting isoprene.

73
00:03:16,560 --> 00:03:18,000
Isoprene is very reactive

74
00:03:18,000 --> 00:03:21,920
and very good at making
both particles and ozone.

75
00:03:22,280 --> 00:03:25,080
>>But, fortunately, they create
very specific molecules.

76
00:03:25,080 --> 00:03:26,640
And when man creates pollution,

77
00:03:26,640 --> 00:03:28,600
it creates a different
chemical mix.

78
00:03:28,800 --> 00:03:31,600
And so we can look at
the constituents

79
00:03:31,600 --> 00:03:33,880
of the reactive hydrocarbons
to determine

80
00:03:33,880 --> 00:03:35,960
whether is nature
or whether is man.

81
00:03:36,640 --> 00:03:39,280
>>But because these compounds
travel with the wind,

82
00:03:39,480 --> 00:03:42,320
they can affect different
parts of the world.

83
00:03:44,680 --> 00:03:47,880
Recently, scientists from
other airborne campaigns,

84
00:03:47,880 --> 00:03:52,080
were able to trace the origin of
unusual high levels of ozone

85
00:03:52,080 --> 00:03:54,600
in the air above the
western Pacific Ocean.

86

00:03:55,720 --> 00:03:57,480
They found that they were linked

87
00:03:57,480 --> 00:04:00,320
to the organic compounds
released by forest fires

88
00:04:00,320 --> 00:04:02,680
in Southeast Asia and Africa...

89
00:04:02,960 --> 00:04:04,520
Half a world away!.

90
00:04:05,320 --> 00:04:07,080
>>The atmosphere is a
shared resource

91
00:04:07,240 --> 00:04:08,960
and we're seeing more
and more that the entire

92
00:04:08,960 --> 00:04:12,560
northern hemisphere is suffering
from pollution background levels

93
00:04:12,560 --> 00:04:14,800
that are due to all of us,
not just one.

94
00:04:14,960 --> 00:04:16,840
>>Everyone living in a big city
around the world

95
00:04:16,840 --> 00:04:18,920
is breathing polluted air...

96
00:04:18,920 --> 00:04:20,320
and it's having an impact.

97

00:04:20,480 --> 00:04:22,880
>>It's part of the tug of war
between progress

98
00:04:22,880 --> 00:04:25,680
and the price that we
pay for that progress.

99
00:04:25,960 --> 00:04:28,720
And so that balance needs to be
maintained into the future

100
00:04:28,720 --> 00:04:31,000
as we continue to
develop economically,

101
00:04:31,000 --> 00:04:32,520
develop technologically...

102
00:04:32,520 --> 00:04:35,360
We have to pay attention to how
that's impacting the air quality

103
00:04:36,640 --> 00:04:39,200
>>Our world is an
interconnected system

104
00:04:39,480 --> 00:04:43,080
and the impact of air pollution
goes beyond the air we breath

105
00:04:44,440 --> 00:04:46,760
>>All of the processes
that are emitting

106
00:04:46,760 --> 00:04:48,040
and causing air pollution,

107
00:04:48,040 --> 00:04:51,080
are also putting CO2

into the atmosphere,

108
00:04:51,280 --> 00:04:53,720
causing climate change...
global warming...

109
00:04:53,960 --> 00:04:59,000
>>It also affects our soils,
our glaciers, our oceans...

110
00:04:59,320 --> 00:05:00,840
Our climate!

111
00:05:02,160 --> 00:05:03,680
>>And this is a problem

112
00:05:03,680 --> 00:05:06,320
that is going to affect our
children and our grandchildren.

113
00:05:07,160 --> 00:05:09,960
So it's very selfish
of us to ignore