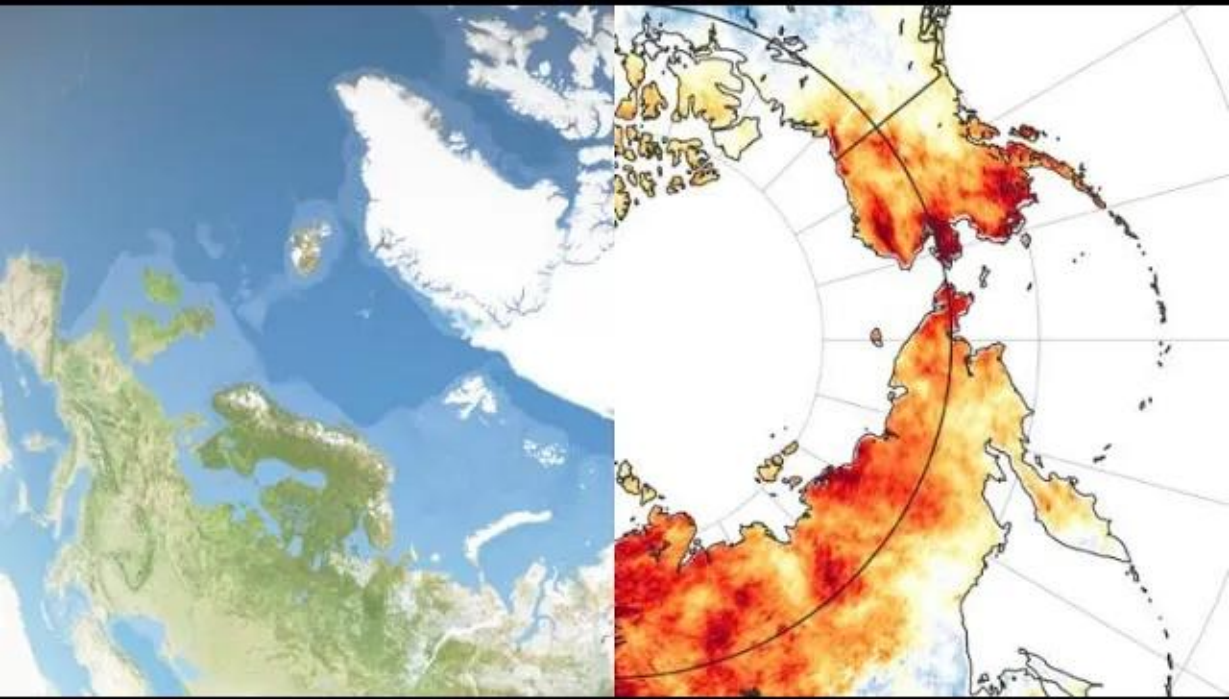

1
00:00:13,589 --> 00:00:11,270
the arctic is one of the most rapidly

2
00:00:15,829 --> 00:00:13,599
changing regions on the planet and it's

3
00:00:17,670 --> 00:00:15,839
warming about two to three times faster

4
00:00:19,590 --> 00:00:17,680
than the rest of the globe

5
00:00:21,349 --> 00:00:19,600
there is a lot going on in the arctic

6
00:00:23,509 --> 00:00:21,359
there are some really significant

7
00:00:25,750 --> 00:00:23,519
wildfires happening right now many of

8
00:00:27,509 --> 00:00:25,760
them in siberia and we're seeing

9
00:00:29,669 --> 00:00:27,519
tremendous amount of carbon emissions in

10
00:00:31,349 --> 00:00:29,679
the region each year essentially we keep

11
00:00:33,430 --> 00:00:31,359
seeing new record high temperatures

12
00:00:34,870 --> 00:00:33,440
being set and new record low sea ice

13
00:00:37,270 --> 00:00:34,880

extents there's been this kind of

14
00:00:39,750 --> 00:00:37,280
long-term decline in the sea ice extent

15
00:00:42,470 --> 00:00:39,760
over the last four decades sea ice is

16
00:00:44,869 --> 00:00:42,480
this really dynamic type of ice it's the

17
00:00:47,430 --> 00:00:44,879
ice that forms and melts in the arctic

18
00:00:49,270 --> 00:00:47,440
ocean so you get new ice forming and

19
00:00:51,910 --> 00:00:49,280
melting each year

20
00:00:53,270 --> 00:00:51,920
for about 40 years now we've been able

21
00:00:55,750 --> 00:00:53,280
to actually

22
00:00:58,069 --> 00:00:55,760
use satellites to look at the area of

23
00:00:59,750 --> 00:00:58,079
the ice on the arctic ocean and one of

24
00:01:02,470 --> 00:00:59,760
the things we're noticing from that is

25
00:01:05,109 --> 00:01:02,480
when we get to the summer each year you

26
00:01:08,070 --> 00:01:05,119
get this minimum of sea ice so it covers

27
00:01:10,310 --> 00:01:08,080
the least area of the arctic ocean

28
00:01:12,550 --> 00:01:10,320
what we're seeing is that that minimum

29
00:01:15,270 --> 00:01:12,560
is getting increasingly less over the

30
00:01:17,190 --> 00:01:15,280
last four decades and we are losing a

31
00:01:18,710 --> 00:01:17,200
large amount of sea ice every year if

32
00:01:28,380 --> 00:01:18,720
you look at the trends

33
00:01:31,510 --> 00:01:29,990
[Music]

34
00:01:34,069 --> 00:01:31,520
and what we saw this year there's kind

35
00:01:35,830 --> 00:01:34,079
of been a heat wave essentially in the

36
00:01:37,510 --> 00:01:35,840
arctic so

37
00:01:41,030 --> 00:01:37,520
temperatures at the north pole were

38
00:01:42,950 --> 00:01:41,040

about 10 to 15 degrees fahrenheit higher

39
00:01:45,109 --> 00:01:42,960
than the average since the 1980s for

40
00:01:47,109 --> 00:01:45,119
that time of year

41
00:01:48,710 --> 00:01:47,119
something that i kind of think about

42
00:01:51,990 --> 00:01:48,720
every year now whenever the sea ice

43
00:01:54,069 --> 00:01:52,000
minimum happens is that the 13 lowest

44
00:01:59,590 --> 00:01:54,079
sea ice extents on record have occurred

45
00:02:03,749 --> 00:02:01,910
sea ice is kind of this big protective

46
00:02:05,990 --> 00:02:03,759
blanket of bright ice that sits on the

47
00:02:08,790 --> 00:02:06,000
arctic ocean and it reflects the sun's

48
00:02:10,630 --> 00:02:08,800
heat it insulates the cool atmosphere

49
00:02:13,110 --> 00:02:10,640
from the warmer ocean

50
00:02:14,550 --> 00:02:13,120
and if you start melting away that sea

51
00:02:16,150 --> 00:02:14,560
ice you're going to warm the atmosphere

52
00:02:18,309 --> 00:02:16,160
more and it's going to affect

53
00:02:20,630 --> 00:02:18,319
temperature winds and weather not just

54
00:02:23,190 --> 00:02:20,640
in the arctic but globally as well

55
00:02:24,869 --> 00:02:23,200
the way i kind of think about it is

56
00:02:26,630 --> 00:02:24,879
if you're taking away this big

57
00:02:29,110 --> 00:02:26,640
protective blanket from the arctic

58
00:02:31,990 --> 00:02:29,120
you're essentially doing a massive

59
00:02:34,470 --> 00:02:32,000
science experiment almost on the planet

60
00:02:41,270 --> 00:02:34,480
and it's not necessarily an experiment

61
00:02:45,670 --> 00:02:43,350
we are seeing more melt in the arctic we

62
00:02:47,589 --> 00:02:45,680
are seeing earlier melt and

63
00:02:49,750 --> 00:02:47,599

later freeze up

64
00:02:50,869 --> 00:02:49,760
we're combining those with the models

65
00:02:53,110 --> 00:02:50,879
that can predict what's going to happen

66
00:02:54,710 --> 00:02:53,120
in the future and seeing that perhaps

67
00:02:59,750 --> 00:02:54,720
the arctic is going to become sea ice

68
00:03:04,630 --> 00:03:01,990
there's a lot of talk for example about

69
00:03:06,790 --> 00:03:04,640
kind of the temperatures in siberia and

70
00:03:09,030 --> 00:03:06,800
permafrost melting and

71
00:03:11,350 --> 00:03:09,040
fires in siberia and that's really

72
00:03:13,030 --> 00:03:11,360
unusual and that's because it was so

73
00:03:19,110 --> 00:03:13,040
much warmer this year than it has been

74
00:03:22,949 --> 00:03:21,030
temperatures in the arctic are

75
00:03:25,110 --> 00:03:22,959
increasing three times as much as

76
00:03:27,910 --> 00:03:25,120
elsewhere in the world so temperature

77
00:03:29,910 --> 00:03:27,920
definitely can play a role in the

78
00:03:32,229 --> 00:03:29,920
wildfires that we're seeing there this

79
00:03:36,390 --> 00:03:32,239
year especially has been significant for

80
00:03:38,630 --> 00:03:36,400
siberia in the russian arctic uh where

81
00:03:40,789 --> 00:03:38,640
there's a town up there that's gone over

82
00:03:42,949 --> 00:03:40,799
100 degrees fahrenheit and which they

83
00:03:44,470 --> 00:03:42,959
never see happen and also that's the

84
00:03:46,869 --> 00:03:44,480
same region where there's there have

85
00:03:48,630 --> 00:03:46,879
been some really significant wildfires

86
00:03:49,910 --> 00:03:48,640
and the smoke from those wildfires can

87
00:03:52,070 --> 00:03:49,920
be seen for

88
00:03:53,830 --> 00:03:52,080

many miles but the problem that we're

89
00:03:55,750 --> 00:03:53,840
starting to see is that these fires are

90
00:03:57,750 --> 00:03:55,760
happening more frequently and they're

91
00:03:59,270 --> 00:03:57,760
more severe than they have been in past

92
00:04:02,630 --> 00:03:59,280
decades we're getting warmer

93
00:04:05,110 --> 00:04:02,640
temperatures drier fuels and more

94
00:04:08,470 --> 00:04:05,120
lightning which is causing more fires

95
00:04:10,550 --> 00:04:08,480
generally in the arctic year by year

96
00:04:12,630 --> 00:04:10,560
arctic wildfires

97
00:04:14,630 --> 00:04:12,640
happen in these regions that have really

98
00:04:16,229 --> 00:04:14,640
thick organic soils and you say wait

99
00:04:18,629 --> 00:04:16,239
soil burns what

100
00:04:21,110 --> 00:04:18,639
well it's soil but it's organic material

101
00:04:23,270 --> 00:04:21,120
juice it's like old leaves and old moss

102
00:04:24,710 --> 00:04:23,280
and it kind of gets compacted and it can

103
00:04:26,870 --> 00:04:24,720
really burn

104
00:04:29,430 --> 00:04:26,880
but it's taken tens of thousands years

105
00:04:31,590 --> 00:04:29,440
to develop that soil and so when it

106
00:04:33,909 --> 00:04:31,600
burns you're releasing a huge amount of

107
00:04:35,749 --> 00:04:33,919
carbon into the atmosphere all at once

108
00:04:38,469 --> 00:04:35,759
as a scientist when i look at these

109
00:04:41,030 --> 00:04:38,479
trends i am concerned uh where are we

110
00:04:43,189 --> 00:04:41,040
gonna go from here that is why we keep

111
00:04:44,790 --> 00:04:43,199
studying this so nasa has a number of

112
00:04:47,350 --> 00:04:44,800
field campaigns that are trying to

113
00:04:48,629 --> 00:04:47,360

understand arctic processes

114
00:04:51,030 --> 00:04:48,639
and i think that it's really important

115
00:04:53,189 --> 00:04:51,040
that we keep up the study and

116
00:04:55,110 --> 00:04:53,199
try to better understand what is