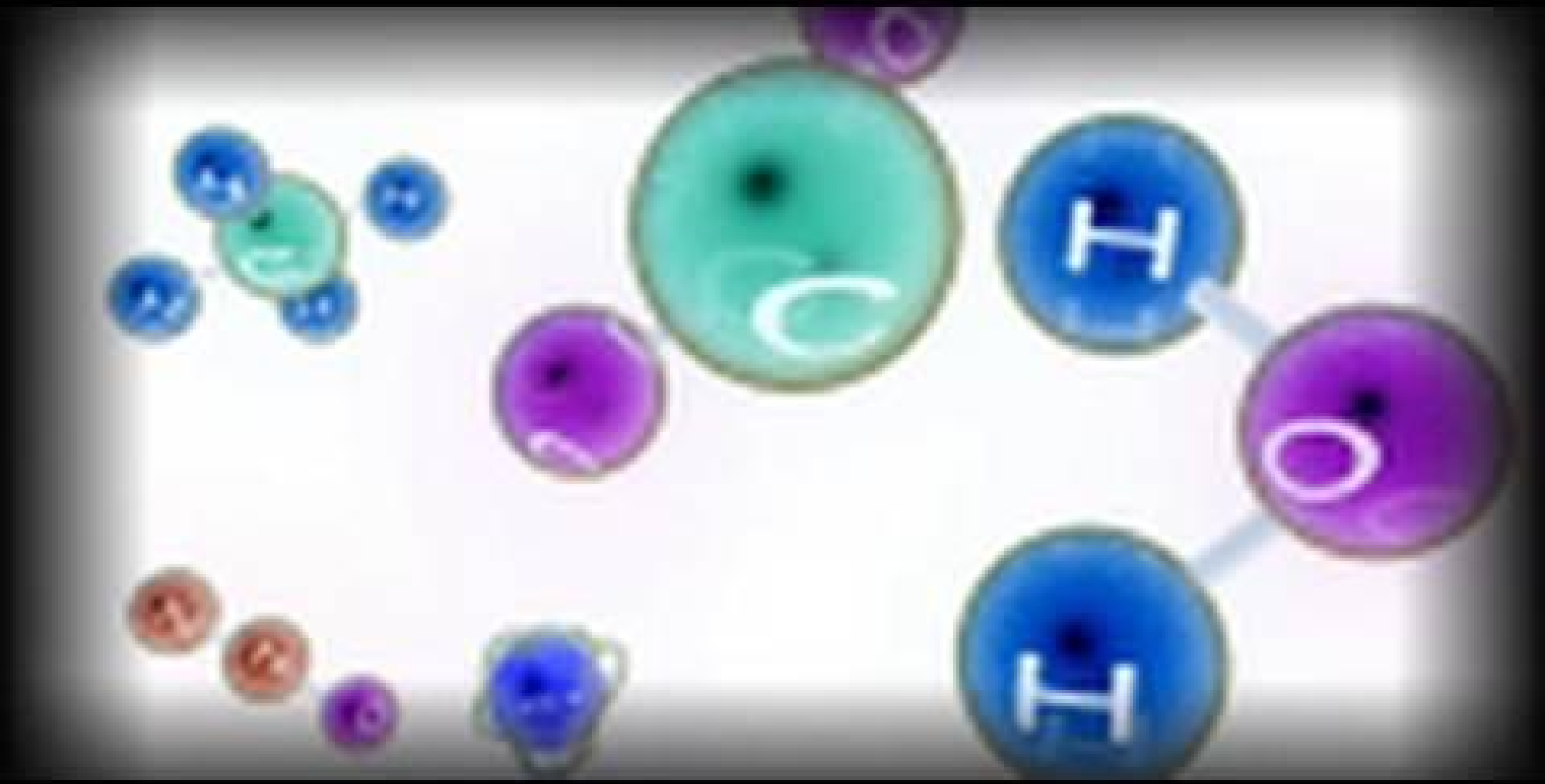
C
H
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H

1
00:00:20,689 --> 00:00:18,429
[Music]

2
00:00:23,179 --> 00:00:20,699
carbon is the basic building block of

3
00:00:26,120 --> 00:00:23,189
life and these unique atoms are found

4
00:00:28,460 --> 00:00:26,130
everywhere on earth carbon makes up the

5
00:00:30,230 --> 00:00:28,470
Earth's plants and animals and carbon is

6
00:00:34,910 --> 00:00:30,240
also stored in the ocean the atmosphere

7
00:00:36,650 --> 00:00:34,920
and the crust of the planet a carbon

8
00:00:38,540 --> 00:00:36,660
atom could spend millions of years

9
00:00:42,200 --> 00:00:38,550
moving through the earth and a complex

10
00:00:44,060 --> 00:00:42,210
cycle understanding the carbon cycle and

11
00:00:47,140 --> 00:00:44,070
how it is changing is key to

12
00:00:50,930 --> 00:00:47,150
understanding Earth's changing climate

13
00:00:52,810 --> 00:00:50,940

on land plants remove carbon from the

14
00:00:55,100 --> 00:00:52,820
atmosphere through photosynthesis

15
00:00:57,380 --> 00:00:55,110
animals eat plants and either breathe

16
00:00:59,720 --> 00:00:57,390
out carbon or it moves up the food chain

17
00:01:03,880 --> 00:00:59,730
when plants and animals die and decay

18
00:01:06,980 --> 00:01:03,890
they transfer carbons back to the soil

19
00:01:09,410 --> 00:01:06,990
moving offshore the ocean holds huge

20
00:01:11,780 --> 00:01:09,420
amounts of carbon about 50 times the

21
00:01:13,400 --> 00:01:11,790
amount we find in the atmosphere the

22
00:01:15,350 --> 00:01:13,410
ocean sometimes called a carbon sink

23
00:01:17,870 --> 00:01:15,360
meaning that it absorbs or takes up

24
00:01:19,810 --> 00:01:17,880
carbon from the atmosphere it takes up

25
00:01:27,470 --> 00:01:19,820
carbon through physical and biological

26
00:01:29,120 --> 00:01:27,480
processes at the ocean's surface carbon

27
00:01:32,060 --> 00:01:29,130
dioxide from the atmosphere dissolves

28
00:01:34,610 --> 00:01:32,070
into the water tiny marine plants called

29
00:01:37,969 --> 00:01:34,620
phytoplankton use this carbon dioxide

30
00:01:40,760 --> 00:01:37,979
for photosynthesis phytoplankton are the

31
00:01:42,800 --> 00:01:40,770
base of the marine food web after

32
00:01:45,850 --> 00:01:42,810
animals eat the plants they breathe out

33
00:01:53,560 --> 00:01:45,860
the carbon or pass it up the food chain

34
00:01:56,569 --> 00:01:53,570
[Music]

35
00:01:58,960 --> 00:01:56,579
sometimes phytoplankton die decompose

36
00:02:01,609 --> 00:01:58,970
and are recycled in the surface waters

37
00:02:02,240 --> 00:02:01,619
phytoplankton can also sink to the ocean

38
00:02:05,779 --> 00:02:02,250

floor

39
00:02:08,270 --> 00:02:05,789
carrying carbon as they descend over

40
00:02:10,820 --> 00:02:08,280
long timescales this process has made

41
00:02:14,870 --> 00:02:10,830
the ocean floor the largest reservoir of

42
00:02:17,660 --> 00:02:14,880
carbon on the planet most of the oceans

43
00:02:19,940 --> 00:02:17,670
nutrients are in cold deep water in a

44
00:02:22,090 --> 00:02:19,950
process called upwelling currents bring

45
00:02:24,440 --> 00:02:22,100
nutrients and carbon up to the surface

46
00:02:26,059 --> 00:02:24,450
carbon can then be released as a gas

47
00:02:29,780 --> 00:02:26,069
back into the atmosphere

48
00:02:32,120 --> 00:02:29,790
continuing the carbon cycle by cycling

49
00:02:34,820 --> 00:02:32,130
huge amounts of carbon the ocean helps

50
00:02:36,440 --> 00:02:34,830
regulate climate so when you think of

51
00:02:38,900 --> 00:02:36,450
climate you don't often think of the

52
00:02:40,339 --> 00:02:38,910
ocean climate you think of isn't going

53
00:02:42,920 --> 00:02:40,349
to be hotter this year is gonna be

54
00:02:45,530 --> 00:02:42,930
colder this year but the oceans are

55
00:02:47,949 --> 00:02:45,540
actually a great regulator a controller

56
00:02:50,180 --> 00:02:47,959
of the Earth's climate and they even are

57
00:02:53,030 --> 00:02:50,190
controlling how much carbon is in the

58
00:02:57,080 --> 00:02:53,040
atmosphere which can slow down how

59
00:02:59,090 --> 00:02:57,090
quickly climate change is occurring at

60
00:03:01,729 --> 00:02:59,100
the most basic level the balance between

61
00:03:04,320 --> 00:03:01,739
incoming sunlight and outgoing heat

62
00:03:06,990 --> 00:03:04,330
determines the Earth's climate

63
00:03:09,540 --> 00:03:07,000

greenhouse gases act like a blanket and

64
00:03:14,640 --> 00:03:09,550
trap heat in the atmosphere carbon

65
00:03:16,590 --> 00:03:14,650
dioxide is a greenhouse gas in the past

66
00:03:19,080 --> 00:03:16,600
two centuries humans have increased

67
00:03:21,690 --> 00:03:19,090
atmospheric carbon dioxide by more than

68
00:03:24,330 --> 00:03:21,700
30 percent by burning fossil fuels and

69
00:03:26,550 --> 00:03:24,340
cutting down forests the earth has not

70
00:03:29,960 --> 00:03:26,560
experienced carbon dioxide levels this

71
00:03:31,770 --> 00:03:29,970
high for the past several million years

72
00:03:33,900 --> 00:03:31,780
researchers are learning that future

73
00:03:36,000 --> 00:03:33,910
climate change will depend on carbon

74
00:03:38,670 --> 00:03:36,010
levels in the land in the atmosphere and

75
00:03:42,720 --> 00:03:38,680
in the sea and how these levels respond

76
00:03:45,000 --> 00:03:42,730
to human disturbance about one third of

77
00:03:47,460 --> 00:03:45,010
all human generated carbon emissions has

78
00:03:49,680 --> 00:03:47,470
dissolved in the ocean more than 80

79
00:03:52,740 --> 00:03:49,690
percent of Earth's added heat is now

80
00:03:55,320 --> 00:03:52,750
stored in the ocean in the future as the

81
00:03:57,960 --> 00:03:55,330
planet gets warmer the water is going to

82
00:04:00,780 --> 00:03:57,970
warm up and warm water can hold less

83
00:04:03,240 --> 00:04:00,790
carbon than cold water the other thing

84
00:04:05,070 --> 00:04:03,250
is on a warmer planet some of the

85
00:04:06,930 --> 00:04:05,080
currents are going to slow down and so

86
00:04:09,420 --> 00:04:06,940
we might not be forming as much of this

87
00:04:12,510 --> 00:04:09,430
cold deep water so we won't be able to

88
00:04:14,430 --> 00:04:12,520

transport carbon into the deep sea so on

89
00:04:16,920 --> 00:04:14,440
the whole the ocean is going to become

90
00:04:18,650 --> 00:04:16,930
less effective at removing carbon from

91
00:04:21,199 --> 00:04:18,660
the atmosphere

92
00:04:23,570 --> 00:04:21,209
throughout most of Earth's ocean the

93
00:04:25,220 --> 00:04:23,580
warmer water weaker circulation and new

94
00:04:27,620 --> 00:04:25,230
temperature gradients that result from

95
00:04:34,010 --> 00:04:27,630
climate change will impact marine life

96
00:04:37,190 --> 00:04:34,020
and ecosystems these changes affect the

97
00:04:39,710 --> 00:04:37,200
oceans ability to store carbon increased

98
00:04:42,500 --> 00:04:39,720
carbon dioxide in the atmosphere impacts

99
00:04:44,570 --> 00:04:42,510
marine life in other ways as the ocean

100
00:04:46,700 --> 00:04:44,580
absorbs more carbon dioxide it becomes

101
00:04:48,350 --> 00:04:46,710
more acidic and this can be a threat to

102
00:04:52,340 --> 00:04:48,360
some of the organisms that live inside

103
00:04:53,180 --> 00:04:52,350
the ocean as Earth's climate continues

104
00:04:55,580 --> 00:04:53,190
to change

105
00:04:57,950 --> 00:04:55,590
how will researchers monitor something

106
00:05:02,570 --> 00:04:57,960
as big as the ocean and something as

107
00:05:04,970 --> 00:05:02,580
complex as the carbon cycle NASA Earth

108
00:05:07,600 --> 00:05:04,980
observing satellites give scientists the

109
00:05:09,920 --> 00:05:07,610
big-picture view of our home planet

110
00:05:11,870 --> 00:05:09,930
varied satellites help researchers

111
00:05:14,750 --> 00:05:11,880
detect changes in ocean climate and

112
00:05:16,790 --> 00:05:14,760
ecology over time providing vital

113
00:05:17,890 --> 00:05:16,800

insight into the health of our home

114
00:05:36,270 --> 00:05:17,900
planet

115
00:05:36,400 --> 00:05:36,280
[Music]