1
00:00:08,950 --> 00:00:06,389
we've been watching greenland melt for

2
00:00:11,270 --> 00:00:08,960
25 or 30 years now and you can see the

3
00:00:13,190 --> 00:00:11,280
surface melt every year from satellite

4
00:00:14,549 --> 00:00:13,200
data we know the weather pretty well we

5
00:00:17,189 --> 00:00:14,559
know when it gets warm enough to melt

6
00:00:19,990 --> 00:00:17,199
the ice but looking at the glaciers

7
00:00:22,310 --> 00:00:20,000
around the edges these fast-moving

8
00:00:24,950 --> 00:00:22,320
rivers of ice that dump ice into the

9
00:00:26,390 --> 00:00:24,960
ocean it started to become clear oceans

10
00:00:29,029 --> 00:00:26,400
could actually play a role in

11
00:00:31,669 --> 00:00:29,039
controlling those glaciers and so

12
00:00:34,389 --> 00:00:31,679
ocean's melting greenland or omg for

13
00:00:35,750 --> 00:00:34,399

short was born as a way to try and

14
00:00:38,310 --> 00:00:35,760
answer the question

15
00:00:40,229 --> 00:00:38,320
how much are the oceans controlling the

16
00:00:42,549 --> 00:00:40,239
glaciers how much are they causing them

17
00:00:44,420 --> 00:00:42,559
to dump extra ice and what does this

18
00:00:49,990 --> 00:00:44,430
mean for the future of the ice sheet

19
00:00:56,709 --> 00:00:52,389
greenland has enough ice to raise sea

20
00:00:59,110 --> 00:00:56,719
levels by 25 feet if it all melted today

21
00:01:01,349 --> 00:00:59,120
the ice sheet is ten thousand feet tall

22
00:01:03,590 --> 00:01:01,359
in the middle and you fly over it in a

23
00:01:05,030 --> 00:01:03,600
jet for two hours and you're still on

24
00:01:05,830 --> 00:01:05,040
top of it so

25
00:01:06,469 --> 00:01:05,840
it's

26
00:01:14,469 --> 00:01:06,479
an

27
00:01:18,230 --> 00:01:16,149
so by 8 o'clock we'll figure out if

28
00:01:19,990 --> 00:01:18,240
we're going to go north

29
00:01:21,270 --> 00:01:20,000
if we don't go north today then we have

30
00:01:23,190 --> 00:01:21,280
to hit it hard

31
00:01:25,510 --> 00:01:23,200
wednesday to go north and then leave for

32
00:01:27,910 --> 00:01:25,520
too late on thursday because the weather

33
00:01:30,870 --> 00:01:27,920
is not looking good it's always an

34
00:01:33,350 --> 00:01:30,880
adventure doing work in greenland and

35
00:01:35,590 --> 00:01:33,360
it's uh it never works out exactly like

36
00:01:37,670 --> 00:01:35,600
you planned it you really have to pick

37
00:01:39,429 --> 00:01:37,680
your places very carefully where you're

38
00:01:42,310 --> 00:01:39,439

going to be able to land stay a couple

39
00:01:43,990 --> 00:01:42,320
of nights get fuel for the airplane of

40
00:01:45,590 --> 00:01:44,000
course the schedule almost immediately

41
00:01:48,069 --> 00:01:45,600
gets thrown out the window because the

42
00:01:50,149 --> 00:01:48,079
weather's bad or you know one of a

43
00:01:52,230 --> 00:01:50,159
hundred other things could go wrong and

44
00:01:55,270 --> 00:01:52,240
the last two years we also had to deal

45
00:01:57,190 --> 00:01:55,280
with covid it was just one more of a

46
00:02:00,469 --> 00:01:57,200
hundred other challenges

47
00:02:03,590 --> 00:02:00,479
of getting this crew in this airplane to

48
00:02:06,069 --> 00:02:03,600
measure the ocean temperatures really

49
00:02:08,949 --> 00:02:06,079
all along greenland's coastline once a

50
00:02:11,350 --> 00:02:08,959
year for six years

51
00:02:13,910 --> 00:02:11,360
we started with a ship the ship drove

52
00:02:16,550 --> 00:02:13,920
around the edges of greenland and mapped

53
00:02:18,790 --> 00:02:16,560
the sea floor the water there remember

54
00:02:21,430 --> 00:02:18,800
is upside down you've got the cold water

55
00:02:23,030 --> 00:02:21,440
at the top and the warm water down below

56
00:02:25,670 --> 00:02:23,040
so if the warm water is going to reach

57
00:02:27,270 --> 00:02:25,680
the glaciers and interact with them the

58
00:02:30,710 --> 00:02:27,280
glaciers have to be sitting in warm

59
00:02:33,430 --> 00:02:30,720
water and there has to be some deep

60
00:02:35,509 --> 00:02:33,440
water that connects the glacier with the

61
00:02:38,229 --> 00:02:35,519
water offshore so the first couple of

62
00:02:40,949 --> 00:02:38,239
years we really just mapped the sea

63
00:02:43,750 --> 00:02:40,959

floor and we revolutionized our

64
00:02:46,630 --> 00:02:43,760
knowledge of the seafloor depth around

65
00:02:48,790 --> 00:02:46,640
the island huge areas had just never

66
00:02:50,949 --> 00:02:48,800
been mapped and we had no idea how deep

67
00:02:55,190 --> 00:02:50,959
they were so with the data collected by

68
00:02:57,509 --> 00:02:55,200
omg we now know not just which glaciers

69
00:02:59,670 --> 00:02:57,519
are reacting to the ocean but why

70
00:03:01,830 --> 00:02:59,680
they're reacting and it's almost always

71
00:03:03,830 --> 00:03:01,840
because they're sitting in deep water

72
00:03:08,470 --> 00:03:03,840
and there's a deep channel connecting

73
00:03:14,070 --> 00:03:10,630
when we were flying around measuring the

74
00:03:17,030 --> 00:03:14,080
oceans you drop this cylinder out of the

75
00:03:19,350 --> 00:03:17,040
airplane it falls on a little parachute

76
00:03:21,990 --> 00:03:19,360
and when it hits the water it separates

77
00:03:24,949 --> 00:03:22,000
into two parts and one part stays at the

78
00:03:28,070 --> 00:03:24,959
surface and it radios data back to the

79
00:03:31,190 --> 00:03:28,080
plane and another part sinks and we get

80
00:03:34,070 --> 00:03:31,200
one profile of the temperature and the

81
00:03:35,830 --> 00:03:34,080
saltiness of the ocean from the surface

82
00:03:37,750 --> 00:03:35,840
all the way down to the seafloor because

83
00:03:39,589 --> 00:03:37,760
we really want to know what that deep

84
00:03:42,869 --> 00:03:39,599
water is doing because that's the water

85
00:03:47,509 --> 00:03:44,470
we dropped those things

86
00:03:50,149 --> 00:03:47,519
about 200 times a year covering the

87
00:03:52,229 --> 00:03:50,159
entire area around greenland so we have

88
00:03:53,750 --> 00:03:52,239

a snapshot of what the oceans looked

89
00:03:55,910 --> 00:03:53,760
like

90
00:03:58,470 --> 00:03:55,920
what we've shown during the course of

91
00:04:00,390 --> 00:03:58,480
omg is that the glaciers are paying a

92
00:04:04,229 --> 00:04:00,400
lot of attention to the oceans

93
00:04:06,710 --> 00:04:04,239
these are magnificent enormous rivers of

94
00:04:08,550 --> 00:04:06,720
ice that empty into the sea water but

95
00:04:10,630 --> 00:04:08,560
they're not disconnected from what's

96
00:04:13,589 --> 00:04:10,640
happening in the oceans when the oceans

97
00:04:16,469 --> 00:04:13,599
warm they retreat more quickly when they

98
00:04:18,870 --> 00:04:16,479
cool sometimes they even grow and these

99
00:04:20,949 --> 00:04:18,880
glaciers are often sitting in a lot

100
00:04:22,790 --> 00:04:20,959
deeper water than we've realized

101
00:04:25,350 --> 00:04:22,800
previously that means they're a lot more

102
00:04:27,830 --> 00:04:25,360
threatened by the water and greenland

103
00:04:31,430 --> 00:04:27,840
has the potential to raise sea levels

104
00:04:33,110 --> 00:04:31,440
much higher than we previously knew so

105
00:04:34,870 --> 00:04:33,120
basically every time we made a big

106
00:04:36,870 --> 00:04:34,880
discovery on omg

107
00:04:38,390 --> 00:04:36,880
we had to raise the bar on our

108
00:04:41,590 --> 00:04:38,400
predictions of sea level rise from

109
00:04:43,909 --> 00:04:41,600
greenland without the ocean's role in

110
00:04:46,150 --> 00:04:43,919
melting away the ice you're you're only

111
00:04:49,909 --> 00:04:46,160
getting half the story

112
00:04:52,950 --> 00:04:49,919
i started working on omg in 2012 almost

113
00:04:55,430 --> 00:04:52,960

10 years of my life and i've definitely

114
00:04:57,189 --> 00:04:55,440
grown as a scientist i started with one

115
00:04:59,749 --> 00:04:57,199
idea of greenland as a

116
00:05:02,469 --> 00:04:59,759
pretty simple block of ice of course

117
00:05:04,950 --> 00:05:02,479
it's a fantastically complicated and

118
00:05:07,110 --> 00:05:04,960
interesting you see these sharp mountain

119
00:05:09,590 --> 00:05:07,120
ridges where the ice has just

120
00:05:11,350 --> 00:05:09,600
cut a channel right through it there's

121
00:05:12,870 --> 00:05:11,360
giant icebergs

122
00:05:15,110 --> 00:05:12,880
the glaciers are

123
00:05:16,790 --> 00:05:15,120
literally moving so you can't see them

124
00:05:18,629 --> 00:05:16,800
with your naked eye but if you go back

125
00:05:20,629 --> 00:05:18,639
from one year to the next you can see

126
00:05:22,790 --> 00:05:20,639
how they've changed it's really a

127
00:05:24,469 --> 00:05:22,800
dynamic place and that's part of the

128
00:05:26,469 --> 00:05:24,479
reason it's so scientifically

129
00:05:29,830 --> 00:05:26,479
interesting but of course it's just

130
00:05:33,990 --> 00:05:32,070
if you talk to greenlandic folks who

131
00:05:35,590 --> 00:05:34,000
have been living near these glaciers and

132
00:05:37,510 --> 00:05:35,600
whose families have been watching these

133
00:05:40,070 --> 00:05:37,520
glaciers for generations they know that

134
00:05:41,830 --> 00:05:40,080
the glaciers are shrinking we found that

135
00:05:44,070 --> 00:05:41,840
they wanted to know about the science

136
00:05:46,070 --> 00:05:44,080
and what we were finding almost as much

137
00:05:47,990 --> 00:05:46,080
as we did they're living in a landscape

138
00:05:50,230 --> 00:05:48,000

that's that's changing probably more

139
00:05:51,909 --> 00:05:50,240
dramatically than anywhere else on earth

140
00:05:54,070 --> 00:05:51,919
this is an important place it's

141
00:05:56,710 --> 00:05:54,080
important for the entire world

142
00:05:59,189 --> 00:05:56,720
as ice is lost in greenland sea level

143
00:06:00,790 --> 00:05:59,199
goes up everywhere it's literally all

144
00:06:02,870 --> 00:06:00,800
around the planet is affected by what

145
00:06:05,110 --> 00:06:02,880
happens in greenland and so it's going