1
00:00:04,070 --> 00:00:02,710
operation icebridge

2
00:00:06,470 --> 00:00:04,080
you may know it from the beautiful

3
00:00:08,390 --> 00:00:06,480
photos that pop up in your feed but did

4
00:00:10,709 --> 00:00:08,400
you know that icebridge is the largest

5
00:00:12,789 --> 00:00:10,719
polar airborne survey of its kind

6
00:00:14,789 --> 00:00:12,799
icebridge was designed to study annual

7
00:00:16,790 --> 00:00:14,799
changes in the thickness of sea ice

8
00:00:18,550 --> 00:00:16,800
glaciers and ice sheets

9
00:00:21,029 --> 00:00:18,560
as well as bridge the data gap between

10
00:00:22,470 --> 00:00:21,039
the isat and icesat-2 polar observing

11
00:00:26,310 --> 00:00:22,480
satellites

12
00:00:28,710 --> 00:00:26,320
between 2009 and 2019 icebridge flew

13
00:00:31,109 --> 00:00:28,720

over a thousand scientific missions

14
00:00:33,350 --> 00:00:31,119
gathering data that has redefined our

15
00:00:34,950 --> 00:00:33,360
understanding of the cryosphere

16
00:00:39,030 --> 00:00:34,960
so let's take a look back at some of the

17
00:00:42,630 --> 00:00:40,709
one of the first steps to measure sea

18
00:00:44,389 --> 00:00:42,640
ice thickness is to get a handle on the

19
00:00:45,590 --> 00:00:44,399
amount of snow that accumulates on top

20
00:00:47,830 --> 00:00:45,600
of it

21
00:00:50,150 --> 00:00:47,840
the icebridge team pioneered the use of

22
00:00:52,069 --> 00:00:50,160
a snow radar instrument to gather the

23
00:00:54,069 --> 00:00:52,079
first widespread data set of snow

24
00:00:58,150 --> 00:00:54,079
thickness on top of both arctic and

25
00:01:01,910 --> 00:00:59,990
to land the point at which a glacier

26
00:01:03,990 --> 00:01:01,920
begins to float is called a grounding

27
00:01:05,830 --> 00:01:04,000
line and it's a very challenging place

28
00:01:08,630 --> 00:01:05,840
to measure ice thickness

29
00:01:11,190 --> 00:01:08,640
using two instruments a radar sounder

30
00:01:13,510 --> 00:01:11,200
and a gravimeter the icebridge team was

31
00:01:14,950 --> 00:01:13,520
able to survey hundreds of these complex

32
00:01:16,950 --> 00:01:14,960
transition zones

33
00:01:20,630 --> 00:01:16,960
enhancing scientists understanding of

34
00:01:24,149 --> 00:01:20,640
the rapid changes in glacier behavior

35
00:01:26,390 --> 00:01:24,159
in 2011 nasa scientists discovered a 19

36
00:01:28,630 --> 00:01:26,400
mile long crack across the pine island

37
00:01:30,950 --> 00:01:28,640
glacier one of the fastest retreating

38
00:01:35,109 --> 00:01:30,960

glaciers in antarctica

39
00:01:37,109 --> 00:01:35,119
the crack measured 260 feet wide and 195

40
00:01:39,030 --> 00:01:37,119
feet deep when it was observed

41
00:01:41,270 --> 00:01:39,040
throughout the mission icebridge was

42
00:01:43,510 --> 00:01:41,280
able to map rifts in ice shelves prior

43
00:01:44,950 --> 00:01:43,520
to major calving events

44
00:01:46,389 --> 00:01:44,960
and while these events are part of a

45
00:01:48,069 --> 00:01:46,399
natural cycle

46
00:01:50,149 --> 00:01:48,079
icebridge's observations helped

47
00:01:52,550 --> 00:01:50,159
scientists better record the changes in

48
00:01:57,590 --> 00:01:52,560
calving frequency and model how they may

49
00:02:01,910 --> 00:01:59,749
the motion of the antarctic ice sheet

50
00:02:04,069 --> 00:02:01,920
the largest ice sheet in the world is

51
00:02:06,789 --> 00:02:04,079
heavily influenced by the topography of

52
00:02:08,389 --> 00:02:06,799
the bedrock underneath

53
00:02:10,710 --> 00:02:08,399
in 2013

54
00:02:13,030 --> 00:02:10,720
the british antarctic survey used over

55
00:02:15,830 --> 00:02:13,040
25 million measurements collected by

56
00:02:18,229 --> 00:02:15,840
icebridge and other projects to develop

57
00:02:19,750 --> 00:02:18,239
a 3d map of antarctica's bedrock

58
00:02:23,110 --> 00:02:19,760
topography

59
00:02:25,030 --> 00:02:23,120
called bedmap2 it provided unprecedented

60
00:02:28,869 --> 00:02:25,040
detail of how the continent's bedrock

61
00:02:34,390 --> 00:02:31,110
data collected by icebridge enabled many

62
00:02:36,150 --> 00:02:34,400
discoveries in the arctic as well

63
00:02:38,470 --> 00:02:36,160

a team from the university of bristol

64
00:02:41,270 --> 00:02:38,480
used icebridge's radar data along with

65
00:02:43,190 --> 00:02:41,280
other data sets to uncover a 400 mile

66
00:02:44,710 --> 00:02:43,200
long canyon buried under nearly two

67
00:02:46,630 --> 00:02:44,720
miles of ice

68
00:02:48,790 --> 00:02:46,640
this hidden canyon is longer than any

69
00:02:50,790 --> 00:02:48,800
other known on earth it provides a

70
00:02:55,350 --> 00:02:50,800
critical clue to modeling how melting

71
00:02:59,589 --> 00:02:57,270
using ice penetrating radar data

72
00:03:01,910 --> 00:02:59,599
collected by icebridge scientists were

73
00:03:04,149 --> 00:03:01,920
able to build the first ever age map of

74
00:03:06,390 --> 00:03:04,159
the layers deep inside the greenland ice

75
00:03:08,390 --> 00:03:06,400
sheet

76
00:03:10,309 --> 00:03:08,400
for the first time scientists can

77
00:03:12,790 --> 00:03:10,319
navigate the history of greenland's ice

78
00:03:14,869 --> 00:03:12,800
layers extending previously collected

79
00:03:17,110 --> 00:03:14,879
ice cores to better understand the ice

80
00:03:20,550 --> 00:03:17,120
sheets history and help build models of

81
00:03:25,670 --> 00:03:23,110
an international team of scientists used

82
00:03:27,830 --> 00:03:25,680
decades of nasa data to uncover a

83
00:03:31,509 --> 00:03:27,840
massive impact crater hiding beneath the

84
00:03:33,670 --> 00:03:31,519
hiawatha glacier in northwest greenland

85
00:03:36,309 --> 00:03:33,680
at roughly a thousand feet deep and more

86
00:03:38,390 --> 00:03:36,319
than 19 miles wide it is potentially one

87
00:03:46,789 --> 00:03:38,400
of the youngest large impact craters on

88
00:03:48,869 --> 00:03:47,830

two

89
00:03:50,789 --> 00:03:48,879
one

90
00:03:53,030 --> 00:03:50,799
mark on the overpass zero four three

91
00:03:56,710 --> 00:03:53,040
five three five zero

92
00:03:58,869 --> 00:03:56,720
ice was bridged on april 8 2019 with a

93
00:04:02,149 --> 00:03:58,879
direct under flight of the isat2

94
00:04:04,710 --> 00:04:02,159
satellite over arctic sea ice

95
00:04:06,789 --> 00:04:04,720
for the first time both isat-2 and

96
00:04:10,149 --> 00:04:06,799
icebridge would be taking the same

97
00:04:11,830 --> 00:04:10,159
elevation measurements over the same ice

98
00:04:13,750 --> 00:04:11,840
these mirrored measurements were

99
00:04:15,990 --> 00:04:13,760
critical in validating the satellite's

100
00:04:17,590 --> 00:04:16,000
instruments and continue the legacy of

101
00:04:23,189 --> 00:04:17,600
icebridge after the mission was

102
00:04:28,390 --> 00:04:25,590
over the course of its 11-year mission

103
00:04:30,469 --> 00:04:28,400
icebridge completed 1056 scientific

104
00:04:32,469 --> 00:04:30,479
flights and provided a wellspring of

105
00:04:37,110 --> 00:04:32,479
data that fueled the publication of more

106
00:04:39,110 --> 00:04:37,120
than 660 papers and counting

107
00:04:41,189 --> 00:04:39,120
the mission provided new insight into

108
00:04:42,469 --> 00:04:41,199
the processes driving the changes in the

109
00:04:44,230 --> 00:04:42,479
cryosphere