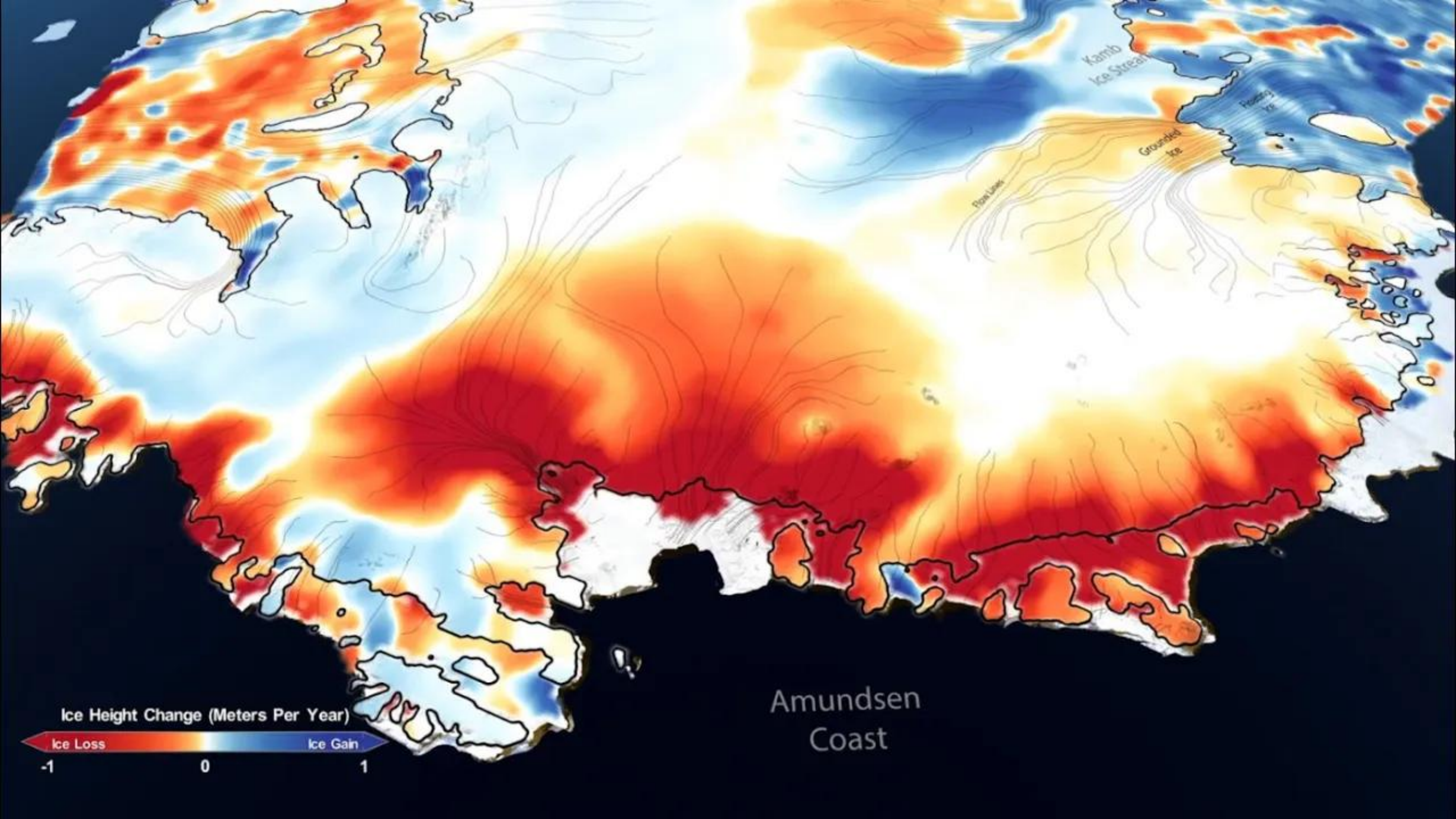
Kamb
Ice Stream
Grounded
Ice
Flow Lines
Ice Height Change (Meters Per Year)
Ice Loss
Ice Gain
-1
0
1
Amundsen
Coast

1
00:00:04,470 --> 00:00:02,310
using the most advanced earth observing

2
00:00:06,950 --> 00:00:04,480
laser instrument nasa has ever flown in

3
00:00:08,390 --> 00:00:06,960
space scientists have made precise

4
00:00:10,870 --> 00:00:08,400
detailed measurements of how the

5
00:00:14,070 --> 00:00:10,880
elevation of ice sheets in greenland and

6
00:00:15,910 --> 00:00:14,080
antarctica have changed over 16 years

7
00:00:18,150 --> 00:00:15,920
we can actually see some processes at a

8
00:00:20,230 --> 00:00:18,160
scale that's almost long enough to tell

9
00:00:21,990 --> 00:00:20,240
us about the climate in those two places

10
00:00:24,870 --> 00:00:22,000
scientists took ice sheet elevation

11
00:00:26,710 --> 00:00:24,880
measurements from 2003 overlaid data

12
00:00:28,550 --> 00:00:26,720
from 2019

13
00:00:30,550 --> 00:00:28,560

and analyzed where the data sets

14
00:00:33,750 --> 00:00:30,560
intersected in order to see where ice

15
00:00:35,350 --> 00:00:33,760
was lost or gained for example the study

16
00:00:37,670 --> 00:00:35,360
definitively shows that the east

17
00:00:40,229 --> 00:00:37,680
antarctic ice sheet the largest of all

18
00:00:42,790 --> 00:00:40,239
the ice sheets is growing but more

19
00:00:45,270 --> 00:00:42,800
importantly what we find is that growing

20
00:00:47,190 --> 00:00:45,280
is more than offset by increased losses

21
00:00:49,430 --> 00:00:47,200
coming from the west antarctic ice sheet

22
00:00:51,670 --> 00:00:49,440
which is thinning very rapidly as it

23
00:00:53,350 --> 00:00:51,680
responds to warmer ocean temperatures

24
00:00:56,389 --> 00:00:53,360
specifically in the amundsen sea in

25
00:00:58,709 --> 00:00:56,399
bayman area the west antarctic side

26
00:01:01,750 --> 00:00:58,719
we're seeing strong thinning on the ice

27
00:01:04,149 --> 00:01:01,760
shelves which is causing draw down on

28
00:01:06,789 --> 00:01:04,159
the inland ice um on the grounded ice

29
00:01:09,350 --> 00:01:06,799
upstream most of that is being caused

30
00:01:10,550 --> 00:01:09,360
because of changes in ocean heat flux

31
00:01:12,230 --> 00:01:10,560
underneath the ice shelves which is

32
00:01:14,789 --> 00:01:12,240
causing them to thin and then

33
00:01:17,429 --> 00:01:14,799
consequently the buttressing force is

34
00:01:19,670 --> 00:01:17,439
being lost against the grounded ice and

35
00:01:21,350 --> 00:01:19,680
the graded ice is then flowing faster

36
00:01:22,710 --> 00:01:21,360
into the ocean and causing sea level

37
00:01:24,710 --> 00:01:22,720
rise

38
00:01:26,870 --> 00:01:24,720

in greenland we're seeing different

39
00:01:28,469 --> 00:01:26,880
signatures again in the center of the

40
00:01:30,310 --> 00:01:28,479
ice sheet in the plateau we're seeing

41
00:01:32,630 --> 00:01:30,320
increased accumulation so there is a

42
00:01:34,870 --> 00:01:32,640
slight increase in mass in the center

43
00:01:37,429 --> 00:01:34,880
but the overall signal for greenland is

44
00:01:40,469 --> 00:01:37,439
one of thinning and that is being caused

45
00:01:42,469 --> 00:01:40,479
by ocean and atmospheric signals acting

46
00:01:45,190 --> 00:01:42,479
all around the edges of greenland so

47
00:01:47,510 --> 00:01:45,200
we're seeing 200 gigatons per year of

48
00:01:49,590 --> 00:01:47,520
ice flowing into the oceans which is

49
00:01:51,670 --> 00:01:49,600
enough to raise sea level by about

50
00:01:54,069 --> 00:01:51,680
two-thirds of a millimeter per year

51
00:01:56,630 --> 00:01:54,079
combine that with the almost 118

52
00:01:58,469 --> 00:01:56,640
gigatons lost in antarctica and sea

53
00:02:00,870 --> 00:01:58,479
level has risen a total of 14

54
00:02:02,550 --> 00:02:00,880
millimeters over the 16-year period due

55
00:02:05,109 --> 00:02:02,560
to ice sheet melt

56
00:02:07,990 --> 00:02:05,119
it may seem small but the small changes

57
00:02:10,869 --> 00:02:08,000
add up what we expect by the end of the

58
00:02:13,589 --> 00:02:10,879
century is you know on the order of two

59
00:02:15,190 --> 00:02:13,599
three maybe four feet of sea level rise

60
00:02:17,589 --> 00:02:15,200
and because we have all of our

61
00:02:19,830 --> 00:02:17,599
infrastructure that is

62
00:02:22,070 --> 00:02:19,840
built around the coast we have a lot of

63
00:02:23,510 --> 00:02:22,080

vulnerability to a meter change in sea

64
00:02:27,670 --> 00:02:23,520
level rise

65
00:02:29,910 --> 00:02:27,680
is one critical motivation for the

66
00:02:32,390 --> 00:02:29,920
continued study of the mechanics driving

67
00:02:33,750 --> 00:02:32,400
the changes in the ice sheets if we can

68
00:02:35,430 --> 00:02:33,760
understand those mechanisms and how

69
00:02:38,150 --> 00:02:35,440
they've played out over the last 30

70
00:02:39,830 --> 00:02:38,160
years well then we can start to look and

71
00:02:41,589 --> 00:02:39,840
and think about how will those ice

72
00:02:43,980 --> 00:02:41,599
sheets respond to what we project the