



1

00:00:03,430 --> 00:00:06,990

From an observational stand point we're at a sweet spot

2

00:00:07,010 --> 00:00:12,460

where we can see many different aspects of the changing ice cover

3

00:00:12,480 --> 00:00:15,860

and so that the problems are then

4

00:00:15,880 --> 00:00:20,620

moving toward understanding what we see changing.

5

00:00:20,640 --> 00:00:25,300

It is pretty clear that we're gonna understand what the ice is doing.

6

00:00:27,890 --> 00:00:32,570

I think that observational glaciology in terms of remote sensing

7

00:00:32,590 --> 00:00:34,870

is a very data rich field now

8

00:00:34,890 --> 00:00:38,570

compared to 1972 when you had a few images.

9

00:00:38,590 --> 00:00:44,250

So we are beginning to get a historical record of the speeds of glaciers

10

00:00:44,270 --> 00:00:48,260

and so we can watch how rapidly that surface is lowering

11

00:00:48,280 --> 00:00:51,060

as things speed up or where it's thickening

12

00:00:51,080 --> 00:00:53,330

and where the surface is actually coming up

13

00:00:53,350 --> 00:00:57,290

or where ice is actually thickening on land.

14

00:00:57,310 --> 00:01:03,110

With this record we can go in and look at the speeds of ice flow

15

00:01:03,130 --> 00:01:07,340

over decades and how it's been changing

16

00:01:09,430 --> 00:01:13,300

The reaction I get from other people that study glaciers

17

00:01:13,320 --> 00:01:16,520

is that I watch these videos too fast.

18

00:01:16,540 --> 00:01:19,980

I like to see the fluid nature of the ice.

19

00:01:21,110 --> 00:01:23,830

It lets you see the ice on the land

20

00:01:23,850 --> 00:01:27,960

as sort of this very active participant in what's going on.

21

00:01:28,940 --> 00:01:33,870

One of the places that I like to look at in this particular video of Hubbard

22

00:01:33,890 --> 00:01:38,480

is if you look just to the upper-left off the five kilometer scale bar

23

00:01:38,500 --> 00:01:44,600

you can watch the edge of the glacier just spread across the the river bed

24

00:01:44,620 --> 00:01:46,940

that's coming out of the glacier that's adjacent to it.

25

00:01:46,960 --> 00:01:50,210

And it just moves, it moves trees,

26

00:01:50,230 --> 00:01:55,990

it moves all sorts of material every single year, just advancing.

27

00:01:59,340 --> 00:02:02,590

So this video that shows the Walsh glacier on the top

28

00:02:02,610 --> 00:02:05,010

and the Logan glacier on the bottom,

29

00:02:05,030 --> 00:02:11,980

these are huge glaciers. They're the order of four kilometers wide or so.

30

00:02:12,000 --> 00:02:16,480

What we see as we loop through it is that the flow in both of these

31

00:02:16,500 --> 00:02:20,270

sits there for years and then it will undergo

32

00:02:20,290 --> 00:02:24,990

a pulse of faster motion and then sit there again.

33

00:02:29,070 --> 00:02:31,700

What strikes me about this image of the Malaspina

34

00:02:31,720 --> 00:02:33,060

is that you can really see its nature,

35

00:02:33,080 --> 00:02:36,030

which is that it's a large puddle of ice.

36

00:02:36,050 --> 00:02:38,810

You've got huge glaciers that are flowing down

37

00:02:38,830 --> 00:02:41,240

out of a really high mountain range.

38

00:02:41,260 --> 00:02:43,810

And these big glaciers reach the coastal plain

39
00:02:43,830 --> 00:02:46,980
and the ice just spreads out in this big puddle,

40
00:02:47,000 --> 00:02:48,650
like you've taken a bottle of syrup,

41
00:02:48,670 --> 00:02:51,010
and just dumped it in the middle of a plate.

42
00:02:51,030 --> 00:02:54,550
The Malaspina is sort of that big pile of syrup.

43
00:02:54,570 --> 00:02:56,720
The other thing that you see is that

44
00:02:56,740 --> 00:03:01,690
the ice coming in will head either to the left or the right of center,

45
00:03:01,710 --> 00:03:04,530
for a while, and it will string out those moraines

46
00:03:04,550 --> 00:03:07,490
so that they get bent into these loop shapes.

47
00:03:07,510 --> 00:03:09,350
And you know it wasn't until I saw this video

48
00:03:09,370 --> 00:03:12,900
that I felt like I had a good understanding of just

49
00:03:12,920 --> 00:03:17,980
what was producing these amazing loops in the moraines.

50
00:03:21,360 --> 00:03:23,540
In compiling this Landsat record,

51
00:03:23,560 --> 00:03:29,220
from Landsat 1 in 1972 up through today,

52
00:03:29,240 --> 00:03:31,560
I've gone through year by year and I've tried

53
00:03:31,580 --> 00:03:34,460
to pick out the latest melt season image I can.

54
00:03:34,480 --> 00:03:37,760
So the white snow of winter is gone and you can see the detail

55
00:03:37,780 --> 00:03:40,670
and the flow stripes and the crevasses in the ice.

56
00:03:40,690 --> 00:03:43,800
And build annual mosaics that give us an

57
00:03:43,820 --> 00:03:47,340
image of all of the ice in Alaska and the Yukon.

58
00:03:47,360 --> 00:03:50,140
And when those are all lined up - all 48 of them are lined up

59
00:03:50,160 --> 00:03:53,110
and played as a movie - we can see the behavior

60
00:03:53,130 --> 00:03:55,780
of the ice over nearly half a century.

61
00:03:55,800 --> 00:04:00,320
Having such a long record allows us to discern long-term trends

62
00:04:00,340 --> 00:04:03,640
and separate them from the kind of behavior you might get

63
00:04:03,660 --> 00:04:07,190

with a couple warm or a couple of cold years.

64

00:04:07,210 --> 00:04:10,530

To have a persistent observational capability

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00:04:10,550 --> 00:04:13,930

that's been in place ever since the first Landsat was launched,

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00:04:13,950 --> 00:04:16,980

it really gives us a much better view of this