
National
Science
Foundation

1
00:00:00,010 --> 00:00:03,990
[Aircraft noise, music] Narrator: For the next several weeks

2
00:00:04,010 --> 00:00:08,000
NASA’s Operation IceBridge will have not one but two campaigns surveying polar ice,

3
00:00:08,020 --> 00:00:12,020
one in the Arctic and one in the Antarctic.

4
00:00:12,040 --> 00:00:16,030
Both missions will measure the ice using a laser altimeter and a photographic mapper

5
00:00:16,050 --> 00:00:20,040
and both will be flying on smaller, faster aircraft than usual.

6
00:00:20,060 --> 00:00:24,040
The Antarctic campaign will be timed to provide an annual snapshot of the region

7
00:00:24,060 --> 00:00:28,050
after the winter accumulation of snow and ice.

8
00:00:28,070 --> 00:00:32,240
IceBridge flew a similar Arctic campaign last spring out of Greenland, but for the

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00:00:32,260 --> 00:00:36,250
first time is returning north for a post-melt season campaign as well.

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00:00:36,270 --> 00:00:40,350
Kurtz: So, now that the summer has progressed, the snow has melted

11
00:00:40,370 --> 00:00:44,360
the ice has melted -- we're going back, right at the end of this melt season.

12
00:00:44,380 --> 00:00:48,360
Hopefully before a lot of snow begins to fall. And then by surveying it

13
00:00:48,380 --> 00:00:52,370

again, we see, if we see that the surface lowered a certain amount

14
00:00:52,390 --> 00:00:56,380
that tells us well, how much snow did we lose, how much ice did we lose.

15
00:00:56,400 --> 00:01:00,390
We can tie this in with what are called surface mass balance models.

16
00:01:00,410 --> 00:01:04,570
Narrator: IceBridge will be using a G-V aircraft from the National Center

17
00:01:04,590 --> 00:01:08,580
for Atmospheric Research for the Antarctic campaign and a

18
00:01:08,600 --> 00:01:12,590
Falcon 20 provided by NASA Langley Research Center for the Arctic.

19
00:01:12,610 --> 00:01:16,610
Going with smaller aircraft represents something of a scientific tradeoff,

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00:01:16,630 --> 00:01:20,610
as they can survey more area, but carry less of a payload.

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00:01:20,630 --> 00:01:24,660
Sonntag: With other IceBridge campaigns, which typically use larger aircraft than

22
00:01:24,680 --> 00:01:28,690
the Langley Falcon behind us, we put a lot of instruments on,

23
00:01:28,710 --> 00:01:33,060
a dozen or so instruments. Because this is a smaller platform, a more limited scope of operations,

24
00:01:33,080 --> 00:01:37,070
we're only putting two major instruments on board. That's the Airborne Topographic Mapper

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00:01:37,090 --> 00:01:41,090
and the Digitial Mapping System. Both are optical instruments. The first one, the

26
00:01:41,110 --> 00:01:45,120
Airborne Topographic Mapper, or ATM for short, is a scanning laser altimeter,

27
00:01:45,140 --> 00:01:49,130
And what that does is it fires out several thousand laser shots every second,

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00:01:49,150 --> 00:01:53,140
and we also measure the position and orientation of the aircraft

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00:01:53,160 --> 00:01:57,190
and the direction of which the lasers, laser shots rather, are exiting the aircraft,

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00:01:57,210 --> 00:02:01,200
all those things are measured very accurately very carefully. And that lets us assign

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00:02:01,220 --> 00:02:05,240
once we do all the measurements, that lets us assign a latitude, a longitude,

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00:02:05,260 --> 00:02:09,240
and a height to the spot where each one of those laser shots bounces off

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00:02:09,260 --> 00:02:13,250
the ground, off the ice in our case. And that lets us build up a very very detailed

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00:02:13,270 --> 00:02:17,250
and very accurate topographic map of a swath of measurements beneath the aircraft.

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00:02:17,270 --> 00:02:21,260
The Digital Mapping System supplements that. It does some the same kind of

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00:02:21,280 --> 00:02:25,270
stuff but it does it in a passive manner. It's really a fancy camera is

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00:02:25,290 --> 00:02:29,460
not a bad way to think about it. It's a photogrammetric camera so, in a similar manner

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00:02:29,480 --> 00:02:33,480

to the ATM, you can assign a latitude, a longitude, and an altitude

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00:02:33,500 --> 00:02:37,490
to every pixel within every image that comes back, and the images are shot

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00:02:37,510 --> 00:02:41,500
about once every second. Narrator: The Antarctic campaign will also feature the

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00:02:41,520 --> 00:02:45,700
DMS photographic system, and a laser altimeter, called LVIS.

42
00:02:45,720 --> 00:02:49,720
Hoffton: So LVIS is a high-altitude laser altimeter system.

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00:02:49,740 --> 00:02:53,720
It flies at about 10 kilometers above the surface and we have a

44
00:02:53,740 --> 00:02:57,730
two kilometer wide swath, and we measure the topographic information

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00:02:57,750 --> 00:03:01,730
within that swath, as well as the three-dimensional surface structure.

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00:03:01,750 --> 00:03:05,740
And that's very useful for measuring and monitoring ice sheets where repeated

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00:03:05,760 --> 00:03:09,930
measurements can tell you whether the ice sheet is growing or shrinking over time,

48
00:03:09,950 --> 00:03:14,030
and its contribution to sea level. We have a series of lines

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00:03:14,050 --> 00:03:18,040
that are distributed across the West Antarctic Ice Sheet and the Peninsula, as well as

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00:03:18,060 --> 00:03:22,120
over the sea ice that's in the Weddell Sea and in the Bellingshausen.

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00:03:22,140 --> 00:03:26,140
The flights that we will be doing will be 10 hours long. We take off from Punta Arenas

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00:03:26,160 --> 00:03:30,150
which is in the southern portion of Chile, and then