



1
00:00:00,420 --> 00:00:05,880

[Music]

2
00:00:14,520 --> 00:00:18,020

[Airplane taking off]

3
00:00:20,800 --> 00:00:25,360

>>Cockpit weather radar measures reflectivity,
which is the strength of a radar signal's

4
00:00:25,360 --> 00:00:28,480

return off of precipitation within a cloud.

5
00:00:28,480 --> 00:00:31,530

Pilots avoid highly reflective areas like
storm centers.

6
00:00:31,530 --> 00:00:36,560

However, high reflectivity is not always correlated
with the condition known as High Ice Water

7
00:00:36,560 --> 00:00:37,560

Content.

8
00:00:37,560 --> 00:00:42,610

These conditions are characterized by tiny
ice and water particles suspended in a cloud.

9
00:00:42,610 --> 00:00:47,480

These particles are too small to influence
reflectivity, but they can still cause engine

10
00:00:47,480 --> 00:00:52,240

problems and clog up pitot tubes and instruments.

11
00:00:52,600 --> 00:00:57,260

[Music/Background noise]

12

00:00:58,060 --> 00:01:04,360

>>The primary goal here is to be able to develop a radar capability to look ahead of the aircraft

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00:01:04,370 --> 00:01:10,580

and identify areas of High Ice Water Content so that pilots on today's transport aircraft

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00:01:10,580 --> 00:01:13,200

can see and avoid those sorts of conditions.

15

00:01:13,960 --> 00:01:19,500

>>In 2015 we boarded this aircraft, took it through the Bahamas and Caribbean to collect

16

00:01:19,500 --> 00:01:23,100

radar signatures of High Ice Water Content conditions.

17

00:01:23,100 --> 00:01:26,750

Using those radar signatures, we developed an algorithm that would both detect those

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00:01:26,750 --> 00:01:30,560

conditions and reject benign cloud conditions.

19

00:01:30,560 --> 00:01:34,200

During this flight campaign we're actually going and testing that algorithm, both its

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00:01:34,200 --> 00:01:37,980

performance in range, as well as its performance in accuracy.

21

00:01:37,980 --> 00:01:42,880

>>We're seeing if we have good correlation between the radar predicted ice water content and

22

00:01:42,880 --> 00:01:45,530

then the in-situ measurements with our icing

instruments.

23

00:01:45,530 --> 00:01:46,530

>>Tom, Steve-.

24

00:01:46,530 --> 00:01:47,530

>>Yep?

25

00:01:47,530 --> 00:01:52,880

>>We've got a cell to the left and right of track, about five degrees each, I'd suggest

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00:01:52,880 --> 00:01:55,920

we pick one of the two and steer towards it.

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00:01:55,920 --> 00:01:59,560

>>One of the biggest challenges for the HIWC missions is just that basically, it's always

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00:01:59,560 --> 00:02:00,560

constantly changing.

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00:02:00,560 --> 00:02:03,720

You go out with a plan, but you don't follow your plan.

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00:02:03,720 --> 00:02:08,800

You are expected to change and be on the go with the weather itself.

31

00:02:08,800 --> 00:02:11,460

>>I think we might want to be at the southwesterly part of the storm.

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00:02:11,460 --> 00:02:16,360

>>Ok, we have another ice water content spike, right before you get to the waypoint.

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00:02:16,380 --> 00:02:19,500

>>Just went through a peak of about two grams per cubic meter on that.

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00:02:19,500 --> 00:02:22,500

>>Cool, I was saying one point five plus or minus one.

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00:02:23,220 --> 00:02:26,840

>>I think we may have a pitot anomaly on ADC 2.

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00:02:26,840 --> 00:02:31,380

>>We do have sometimes that the pitot tubes get overwhelmed by the water content or the

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00:02:31,380 --> 00:02:35,760

ice content and our air speeds go to zero for a short period of time.

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00:02:35,760 --> 00:02:39,360

While we're doing that, we just leave the throttles set where they are and continue

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00:02:39,360 --> 00:02:43,860

on the line that we're flying and fly the specific ground speed.

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00:02:43,860 --> 00:02:49,100

>>So pilots, what they will see in the future will be, in addition to the reflectivity that

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00:02:49,100 --> 00:02:54,400

they normally see on their displays, they'll see additional parameters, additional information,

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00:02:54,400 --> 00:03:00,620

a color or symbol, something of that sort, that will indicate high concentration levels

43

00:03:00,620 --> 00:03:04,340

of ice in front of them, and so they'll be

able to fly around that.