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IHL: Wiki Overview

A page where NCAR collaborators and science partner stakeholders can view the latest IHL and NIRSS analysis. The purpose of this page is to facilitate collaboration and make the project findings readily accessible.

IHL: Program Background

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Case Studies

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The following show the number of MOG "Moderate or Greater" (top) and Null (bottom) PIREPs and matches to PIREP icing classification for four icing algorithms with resulting PODY and PODn.

# of MOG matched by algorithm...				
Weather Scenario	PIREPs	IH _{SP-n}	IH _{SP-y}	IH _{DP}
Dev. low/upslope	25	2	7	21
shortwave trough	3	0	1	3
stationary front	0	0	0	0
ahead warm front	5	3	3	5
behind cold front	8	2	5	8
lake effect	8	0	4	7
hurricane/ext. Trop.	<u>1</u>	<u>0</u>	<u>0</u>	<u>1</u>
TOTAL CASES	50	7	20	45
POD _y		0.14	0.40	0.90

# of Null matched by algorithm...				
	PIREPs	IH _{SP-n}	IH _{SP-y}	IH _{DP}
TOTAL CASES	25	22	13	15
POD _n		0.88	0.52	0.60

The resulting statistics for the 75 MOG and Null categories are shown in the table above. Categories for atmospheric SLW production mechanism (left column) are loosely based on work done by Bernstein et al., (1997), which related aircraft icing to synoptic-scale weather conditions. The center block of columns shows total PIREPs for each mechanism and the corresponding number of cases matched correctly by each IH algorithm, followed by a summation row. PODY and PODN are calculated on these summed case numbers. The right hand block of columns is the same but for NIRSS cases at Cleveland, Ohio. The PING network was utilized to provide surface precipitation type for each case.

Sorted by Type:

- Moderate or Greater PIREP cases
- Null PIREPS

Summary

In-flight icing can be a significant hazard to aircraft and detecting and warning on its existence is a priority for the FAA. NCAR has been working since 2009 on an algorithm using polarized S-band NEXRAD weather radars, as well as continuing development with NASA of NIRSS. In this study, it was found that where there was detectable S-band signal above the noise threshold, operational NEXRADs had a very high icing detection rate over a wide variety of forcing mechanisms and surface precipitation types compared to icing PIREPs. There still remains a whole category of icing cases that may not be detectable by S-band weather radars, whose relative frequency should be determined in future studies. The National Severe Storms Laboratory, in collaboration with NCAR, is testing a new noise filter based on HV which aims to retain more of the low signal reflectivity areas. This product could significantly boost the IH ability to detect small-drop cases, at least in airport terminal areas within 15 km of the radar. Modules to detect high Zdr bands within precipitation and to detect negative Zdr in graupel will be tested and implemented in the upcoming year. There is also the possibility of a research flight campaign in 2014-2015 in the Great Lakes Region to further test the ground based remote sensing algorithms discussed within. Geographic diversity of icing across the US should also be pursued further.

Scott's To Do List:

IHL Project References

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Attachments

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