



International Civil Aviation Organization

**THE FIFTH MEETING OF ASIA/PACIFIC METEOROLOGICAL
HAZARDS TASK FORCE (MET/H TF/5)**

Seoul, the Republic of Korea, 18 – 20 March 2015

Agenda Item 7-: Any other business

INTRODUCTION OF THE COMS BASED AIRCRAFT ICING DETECTION

(Presented by NMSC/KMA)

SUMMARY

This report introduces the current status of COMS icing detection and validation result compared with pilot icing report, i.e. PIREPs over the Korean Peninsula. The preliminary results show that COMS tends to overestimate the aircraft icing. However, it's hard to estimate the accuracy of COMS icing detection because only 19 icing reports were available during 4 years over the Korean Peninsula. To evaluate and improve the satellite-based icing detection, more in situ measurements of icing are necessary. NMSC/KMA would like to suggest the increasing and exchanging of PIREPs reported over the world.

1. INTRODUCTION

1.1 Icing caused by super-cooled liquid water clouds is a significant hazard that routinely impacts on aviation operations. Accurate icing detection and forecasts are needed but difficult to obtain. Though various data such as radar, satellite, surface observation and model prediction are utilized, diagnosis of aircraft icing is still challenging to forecasters.

1.2 Currently, the NMSC (National Meteorological Satellite Center) in KMA has been providing the results of COMS icing detection for Domestic Aviation Centers. The principle of aircraft icing detection technique is fundamentally based on the thresholds method of 4 spectral channels (0.65, 3.7, 11, 12 μ m) (Ellord, 1996) and classified icing intensity into 4 stages: light, moderate, strong and uncertain, according to cloud LWP (Liquid Water Path) and CTT (Cloud Top Temperature).

1.3 NMSC/KMA also has a plan to launch the follow-on COMS in 2018. It is expected that the monitoring of aircraft icing by satellite will be improved and various aviation information such as icing altitude, turbulence, etc. could be provided due to the increased channels and spatiotemporal resolution.

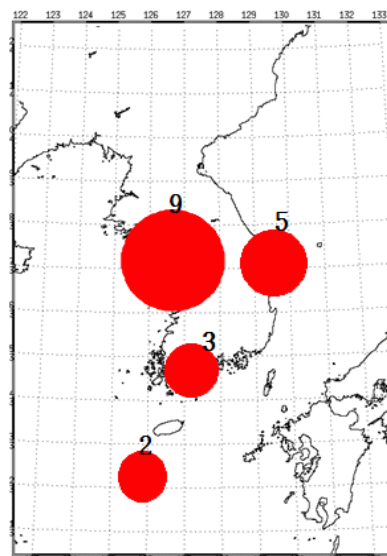
2. DISCUSSION

2.1. COMS-derived aircraft icing has been validated with PIREP during four years from 2011 to 2014. The total number of PIREP icing over the Korean Peninsula is only 19. NMSC/KMA compared the nearest COMS aircraft icing pixels with PIREP icing location. The closest satellite observation data within ± 15 minutes from the PIREPs reports were used. To evaluate the COMS-based aircraft icing detection, statistical values such as PODy, PODn, CSI, FAR and accuracy are calculated.

2.2. Compared to PIREPs, validation result shows that PODy and PODn are about 58% and 72% while CSI and FAR is about 1% and 99%, respectively. It is not meaningful statistics though the accuracy is about 72%, because the number of PIREP icing for validation is only 19. FAR tends to be too large, because icing level is not considered.

< Reported cases (date and time), altitudes and locations of PIREP icing over the Korean Peninsula >

Year		Time(UTC)	Temp.(°C)	Freezing Level(feet)
2014	Case 1	Jun. 6. 0008	-	34100
	Case 2	Apr. 12. 2223	-55	41000
	Case 3	Mar. 12. 0718	-42	27000
2013	Case 4	Nov. 25. 2030	-44	32000
	Case 5	May 18. 0745	-	23000
	Case 6	May 9. 0011	-60	39000
	Case 7	May 9. 0005	-44	35000
	Case 8	Jan. 22. 2300	-	4000
2012	Case 9	Oct.11. 0248	-41	32000
	Case 10	Aug.13. 0513	-29	31000
	Case 11	Jul.10. 0100	-45	37000
	Case 12	Jun. 30. 0625	-17	26000
	Case 13	Mar. 4. 0541	-43	31000
2011	Case 14	Dec. 3. 0920	-42	280
	Case 15	Nov. 4. 0549	-16	29000
	Case 16	Jul. 7. 0610	-	1200
	Case 17	Jul. 5. 2350	-50	39000
	Case 18	Jun. 13. 0656	-	4900
	Case 19	May 5. 2315	-22	22000



<

Accuracy of COMS flight icing compared with PIREP icing from 2011 to 2014>

		Icing Observed by PIREPs			Title	Score(%)		
		Yes (Day + Night)	No (Day + Night)	Total (Day + Night)		All	Day	Night
Icing detected by COMS	Yes (Day + Night)	11 (10+1)	1118 (993+125)	1129 (1003+126)		COMS	COMS	COMS
	No (Day + Night)	8 (6+2)	2951 (1952+989)	2959 (1958+991)	PODy	57.89	62.5	33.33
					PODn	72.52	66.28	88.78
					FAR	99.02	99.00	99.21
Total (Day + Night)		19 (16+3)	4069 (2945+1114)	4088 (2961+1117)	Accuracy	72.46	66.26	88.63

3. ACTION BY THE MEETING

3.1. Validation data are essential in developing and evaluating satellite-derived aircraft icing. NMSC/KMA would like to suggest the following actions

- a) To increase the number of PIREPs and AMDAR and exchange these data internationally; and
- b) To establish global quality control system to improve the accuracy of aircraft observation data.
