5.7 LOCAL AVIATION WEATHER HAZARDS OF ATLANTIC CANADA

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1. INTRODUCTION

In early 2001, the Meteorological Service of Canada was contracted by NAV CANADA to study and compile local aviation weather hazards and effects across all of Canada, from the Atlantic to the Pacific to the Arctic Oceans. These manuals were to be similar in format to the publication "Aviation Weather Hazards of British Columbia and the Yukon" (Johnson and Mullock, 1996). When completed, the project will have produced six aviation weather manuals, corresponding to the Canadian Graphic Area Forecast (GFA) regions. These manuals provide insight on specific weather effects and patterns within each GFA area. The first of these manuals was completed for Atlantic Canada in the autumn of 2001.

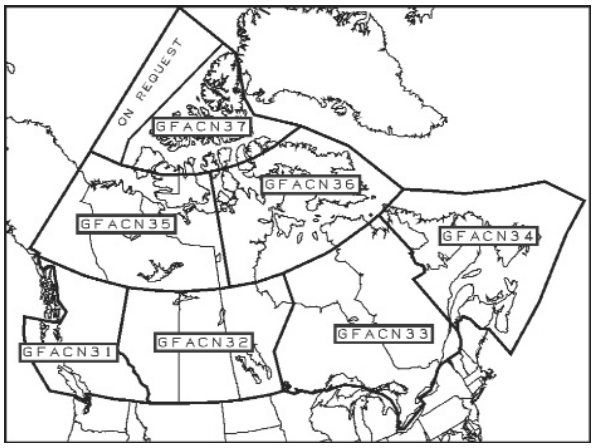

Fig. 1 Graphic Area Forecast regions for which manuals are being produced.

2. BACKGROUND

In April 2000, NAV CANADA, who manage the air navigation system in Canada, announced the creation of a new approach to delivering aviation weather briefings in Canada. This concept involved centralizing flight briefing services in six centres called Flight Information Centres (FIC). One of the concerns in centralizing such services was the loss of local area knowledge by individual flight service specialists working in the FIC and being responsible for a much larger geographical area. In order to minimize the loss of this type of information, NAV CANADA began a project to build a database of local area knowledge within each FIC area of responsibility. As NAV CANADA embarked on building the database of local aeronautical information, the Meteorological Service of Canada, who is contracted to provide aviation weather services to NAV CANADA, began the process of researching, developing and producing a series of weather manuals for each Graphic Forecast Area. These manuals illustrate the effects of topography and geography on local aviation weather phenomena.

By understanding the weather and hazards in these areas, FSS will be better able to assist pilots to plan their flights in a safe and efficient manner. While this is the fundamental purpose, NAV CANADA recognizes the value of the information collected for the pilots themselves. More and better information on weather in the hands of pilots will always contribute to aviation safety. For that reason, the manuals will also be made available to pilots.

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3. MANUAL PRODUCTION PROCESS

The process of producing the aviation weather manuals can generally be divided into four major steps: i) research on the local topography and major weather patterns of the region; the ii) interview process; iii) data validation; and iv) the final review.

3.1 Initial Research

In order to develop a detailed picture of the geography of the region, considerable research was necessary before any interviews were conducted. The surrounding topography of various airports and select topographical features were examined using Geographical Information System software. A broader examination of the geography was also performed using aviation navigation charts of different scales. Once enough data on local topography were gathered, the focus switched to studying the different weather patterns in all four seasons. From this data several hypotheses were made on possible local effects to be verified by pilots who fly in these areas.

3.2 Interview Process

The most critical component of the development was the information obtained through interviewing pilots, flight service specialists and airline dispatchers. The purpose of the interviews was to collect unique, small – scale weather information which may not be readily apparent to forecasters, but which is known to pilots who regularly fly in the area. During the interview process, a meteorologist

traveled to virtually every airport in the region and sat down with pilots and other aviation professionals to discuss local weather. The forecaster would ask the pilots to indicate where they would routinely encounter elements such as low cloud, restricted visibility, turbulence, icing, strong winds and other aviation hazards. Reference was made to different times of the year and under various types of synoptic weather situations. To supplement the forecasters notes, pilots were urged to actually draw on the navigation charts to pinpoint geographical areas where hazards were encountered.

3.3 Validation and Writing Process

Upon completion of the pilot interviews the validation process commenced. All the information gathered during the interviews was examined closely and verified for scientific validity. Research was also conducted by talking to other forecasters and reviewing many technical notes to substantiate the data and results. Once all the data were verified, the actual writing of the manual began and continued for several weeks.

3.4 Final Review

The final review of the manual began once the last chapter was completed. This process included meticulous review by other forecasters and vetting through aviation professionals in the field. The final version of the manual was completed by late fall 2001.

4. FINAL ATLANTIC AVIATION WEATHER MANUAL

Although the main focus was local weather effects and hazards, several other sections were added to supplement the manual. A chapter containing the basics of meteorology was included to serve as a review, which leads into a general description of aviation weather hazards. While chapter 3 deals with regional weather patterns and geography, chapter 4 discusses the actual local effects and aviation weather hazards with the help of maps and symbols. In order to examine aviation climatology more closely, twelve airports were selected and their aviation climatology presented. A glossary and appendix was added at the end of the manual for reference purposes. The manual layout is as follows:

1) Basics of Meteorology
2) Weather Hazards to Aviation
3) Weather Patterns and Geography
4) Regional Weather and Local Effects
5) Airport Climatology

The level of detail of the information presented in chapter 4, the local effects chapter, could only be obtained through the direct conversations with those who are affected by local weather hazards on a day to day basis. Some interesting and potentially dangerous effects were revealed during the interview process. For instance, pilots flying over Cape Breton Island in Nova Scotia often experience some of the worst turbulence encountered in Atlantic Canada. Southeast winds ahead of low pressure systems will be quite violent here due to mountain waves. They occur near Chéticamp and extend out to about 3 nautical miles from the mountain peak. Here severe turbulence, downdrafts (as much as 1,000 feet/min) and wind speeds as much as double of those of surrounding areas can be expected. The downdrafts on the northwest side of the mountains will hit the water and flow outward, much like microbursts, producing patterns on the water that are readily seen from the air. Local pilots call these patterns “cat tracks” or “cat paws”. The vertical extent of the turbulence depends on the wind speed, but pilots will typically be out of the worst conditions above 4,000 ft.

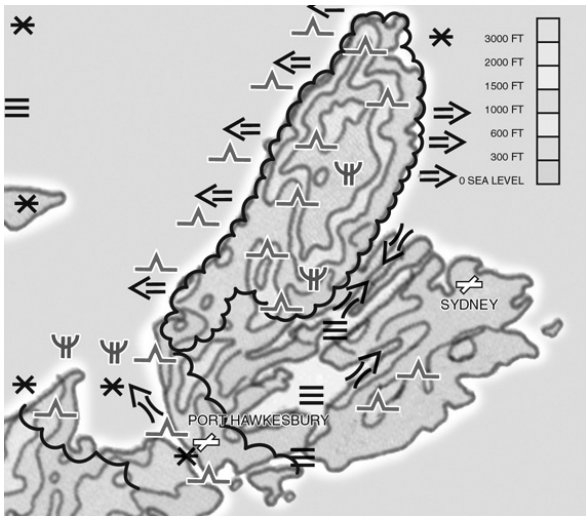

Fig. 2. Example of aviation weather hazards over Cape Breton Island as depicted in the Atlantic Aviation Weather Manual.

5. CONCLUSIONS

The production of the aviation weather manual for Atlantic Canada should prove to be beneficial to pilots, flight service specialists and flight dispatchers alike. The pilot interviews served to confirm some known weather effects as well as to reveal some unknown weather hazards. The series of manuals will also be used as a training tool for new forecasters and as a reference for local effects, which will ultimately result in better forecasts and contribute to overall aviation safety.

6. REFERENCE

Johnson, K.A. & Mullock, J.E. (1996). Aviation Weather hazards of British Columbia and the Yukon. Environment Canada, Kelowna, BC.