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.

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.

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

Weather hazards of British Columbia and the Yukon.
Environment Canada, Kelowna, BC.