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Agenda Item 14: Regional preparations for the MET Divisional Meeting (2002)

UPLINK/DOWNLINK OF OPMET INFORMATION

(Presented by New Zealand)

SUMMARY

This paper summarises the current status in New Zealand of downlink of automated aircraft observations. It also provides some New Zealand perspectives on the future direction of uplink of meteorological information to aircraft and the likely issues involved.

1. Introduction

1.1 Given New Zealand's location in an area which is sparsely covered by conventional observations, and on the edge of a vast ocean with many long-haul and long duration flights, the issues of both downlink of aircraft-based observations and uplink of meteorological information are of importance to us.

1.2 This document will consider separately the issues of downlink and uplink.

2. Downlink of Aircraft Observations

2.1 For many years, voice reports from aircraft of meteorological observations (AIREPs) have provided an important supplement to conventional data in the vicinity of New Zealand. Automated aircraft observations are becoming increasingly important, and an acceleration of their provision and communication is strongly supported. Automated aircraft reports are important for improving the accuracy of forecasts of en-route wind, temperature, and turbulence. Humidity sensors should be developed and implemented, which will assist (inter alia) with forecasts of icing. (Consideration should also be given to onboard sensing of volcanic ash and $SO_{2)}$. Profiles into and out of airports are proving to be of value for TAFs and SIGMETs; and would also benefit from the addition of humidity sensing.

2.2 New Zealand is a founding Member of the WMO AMDAR Panel, which has worked to actively promote, facilitate and coordinate the global gathering of automated aircraft reports.

2.3 Under a formal agreement between Meteorological Service of New Zealand (MetService) and Air New Zealand, AMDAR reports from four selected Air NZ B737-300 series aircraft are delivered to MetService and relayed to the WMO Global Telecommunication System (GTS). Three aircraft fly trans-Tasman routes between NZ and Australia, and one flies domestic NZ routes. Some 27,000 AMDAR observations per month are provided this way.

2.4 MetService also has a cost-sharing arrangement with the Australian Bureau of Meteorology for Qantas AMDAR generated in the box Equator to 50ºS and longitude 160ºE through 180º to 160ºW. This New Zealand contribution enables around 14,000 observations per month to be made available to the international community via the GTS.

2.5 Automatic Dependent Surveillance (ADS) observations from the Auckland Oceanic FIR have been received from Airways Corporation of New Zealand since around December 1999, during their testing of CNS/ATM. The ADS reports are being distributed in international bulletins of aircraft reports (in AIREP code as received). Currently around 9,500 reports per month are transmitted on the GTS from this source.

2.6 New Zealand would like to see:

- Faster progress on the global implementation of operational ADS reporting
- Continued and strengthened support for the important work of the WMO AMDAR Panel
- Support for further research and development into, and eventual operational implementation of, onboard sensing of humidity and of icing conditions.

3. Uplink of OPMET Data and Forecast Information

3.1 Many trans-Pacific flights into and out of New Zealand exceed 12 hours duration. There is a clear need for updated meteorological information to be transmitted to such flights, particularly products such as METARs, TAFs and SIGMETs. Such transmissions can currently be achieved either by voice from ATS units, or via datalink including CPDLC, D-ATIS and D-VOLMET and through ACARS. Products such as updated SIGWX charts are a little harder to convey by voice. Data link is obviously the direction that should be taken.

3.2 This immediately raises issues of standardisation, text versus graphical or digital products, formats and protocols, and equipment needs on the flight deck. It also creates opportunities for new products, and for delivery.

3.3 Without the constraints of paper formatting, or even perhaps of the need to convey information in plain text, there could be many new ways of communicating meteorological information before and during flight. New products could include (where available) information on wake vortex, information on microbursts and low level wind shear, graphical versions of SIGMETs and volcanic ash advisories, access to ground-based radar information, access to real-time satellite imagery, and frequently updated fields of observed and forecast turbulence and icing.

3.4 If datalink is used to provide all the required meteorological information to the flight deck this could also be done on the ground prior to departure, perhaps for the next sector as the inbound aircraft crosses the airport fence, assisting with faster turnaround of aircraft and reducing the need for paper-based documentation packages. Compatible and consistent information also needs to continue to be provided to flight operations.

3.5 The most important first steps are to establish user requirements and expectations for uplinked information. This could cover how existing information is actually used; anecdotal information suggests that some current upper wind and temperature and significant weather charts are barely looked at. It is unlikely that in future a large package of paper provided pre-flight is the best option.

3.6 Experience in New Zealand, and feedback from some of the customers of MetService, suggests the following points:

- Operators will prefer and stick to mainstream systems, whatever they may be
- OPMET products such as METARs, TAFs, and SIGMETs (perhaps in new forms) will definitely be required

- Graphical products should be uplinked in some standard coded form to reduce costs

- Modern technology allows many options, but cost must be contained

- Pre-flight documentation of some sort (perhaps soft copy onboard) will still be needed to acquaint crews of the meteorological situation for the flight

- In-flight updates must be fast – aircraft are travelling at 15 kilometres per minute

- With increasing use of flexible tracks and the future application of free flight (random routes) there will be a need for updated forecast wind and temperature information to be uplinked into the Flight Management System (FMS) to fine tune the flight plan

- Uplinked information must be encrypted and secure, and compressed to save on communications costs

- There need to be clear benefits in terms of improved safety and more efficient operations

- Transitional arrangements will be essential to allow for older aircraft which are not able to be upgraded for new datalink systems

- Global OPMET exchange requirements will need to be re-examined

4. **Action by the meeting**

4.1 The meeting is invited to

(a) Note the content, and
(b) Exchange views on the various matters discussed in this paper.