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Collection and Applications of AMDAR Data in  
Hong Kong, China

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COMMISSION FOR AERONAUTICAL METEOROLOGY

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## **AERONAUTICAL METEOROLOGICAL CODES**

### **Collection and Applications of AMDAR Data in Hong Kong, China**

*(Submitted by Hong Kong, China)*

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#### **Summary and Purpose of Document**

This document discusses the collection and applications of AMDAR data in Hong Kong, China.

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#### **ACTION PROPOSED**

The Commission is invited to:

- (a) Note the information contained in this document;
- (b) Approve the draft text in Appendix for inclusion in the general summary of CAeM-XII.

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**Appendix:** Draft text for inclusion in the general summary of CAeM-XII.

## **1. STATUS OF AMDAR DATA COLLECTION**

1.1 Hong Kong, China started the implementation of an AMDAR programme in September 2000 with a view to increasing the number of upper-air observations in its vicinity. With the kind assistance of the Australian Bureau of Meteorology (BoM) and the U.S. National Oceanic and Atmospheric Administration (NOAA), a number of Australian and U.S. carriers routinely make AMDAR observations while descending at and ascending from the Hong Kong International Airport (HKIA). Some of the AMDAR reports are routed to Hong Kong via the GTS while others are retrieved from the NOAA Forecast Systems Laboratory FTP site.

1.2 Locally, the Hong Kong Observatory (HKO) has made arrangements with Cathay Pacific Airways (CPA) with a view to participating in the AMDAR programme. To prepare for trial testing on a CPA Airbus, technical issues with the on-board AMDAR reporting software (ARINC620) are being pursued with the aircraft avionics manufacturer.

## **2. AMDAR DATA QUALITY**

2.1 The wind and temperature profiles acquired by the AMDAR ascents and descents at HKIA were compared with those obtained from radiosonde ascents at King's Park Meteorological Station, some 25 km east of HKIA. Profiles acquired near the radiosonde ascent times were selected for the comparison. Results so far indicated reasonably good agreement between them. An example of comparison of the temperature profiles is given in Figure 1.

2.2 AMDAR data collected were also studied for their potential in detecting low-level wind shear and turbulence in the vicinity of HKIA. In respect of turbulence, results obtained in early 2002 indicated that there might be over-reporting of "moderate" or "severe" turbulence by AMDAR based on derived equivalent vertical gust (DEVG) during ascent/descent. This was confirmed by pilots of the flights concerned during a week in May 2002. The findings were provided to the relevant parties for further investigation.

## **3. APPLICATIONS OF AMDAR DATA**

3.1 AMDAR reports received by Hong Kong, China are routinely compiled into wind and temperature profiles for reference by the weather forecasters operationally.

3.2 The reports are also routinely ingested into HKO's regional numerical weather prediction (NWP) model. Work is being undertaken to evaluate the impact of the AMDAR reports on model results.

3.3 The potential of using near real-time AMDAR ascent/descent data to support low-level wind shear alerting is being studied. Preliminary results indicate that the AMDAR temperature profiles are able to reveal low-level inversions (see example in Figure 1) and low-level jets. They usefully supplement the radiosonde ascent profiles in the forecasting of wind shear associated with waves trapped by low-level inversions and with low-level jets.

3.4 As regards the potential use of AMDAR wind observations in the detection and warning of low-level wind shear, it is noted that the highest resolution of AMDAR observations is currently about 10 hPa intervals in the lowest 100 hPa (3000 ft) or so. This is equivalent to about 20 seconds of flight time during landing along a typical 3-degree glide path. However, the temporal scale of wind shear (in the context of aviation) may be down to several seconds of flight time. For the enhancement of flight safety, it would be desirable if AMDAR observations could be made at a higher temporal resolution. This possibility will be further explored with relevant parties.

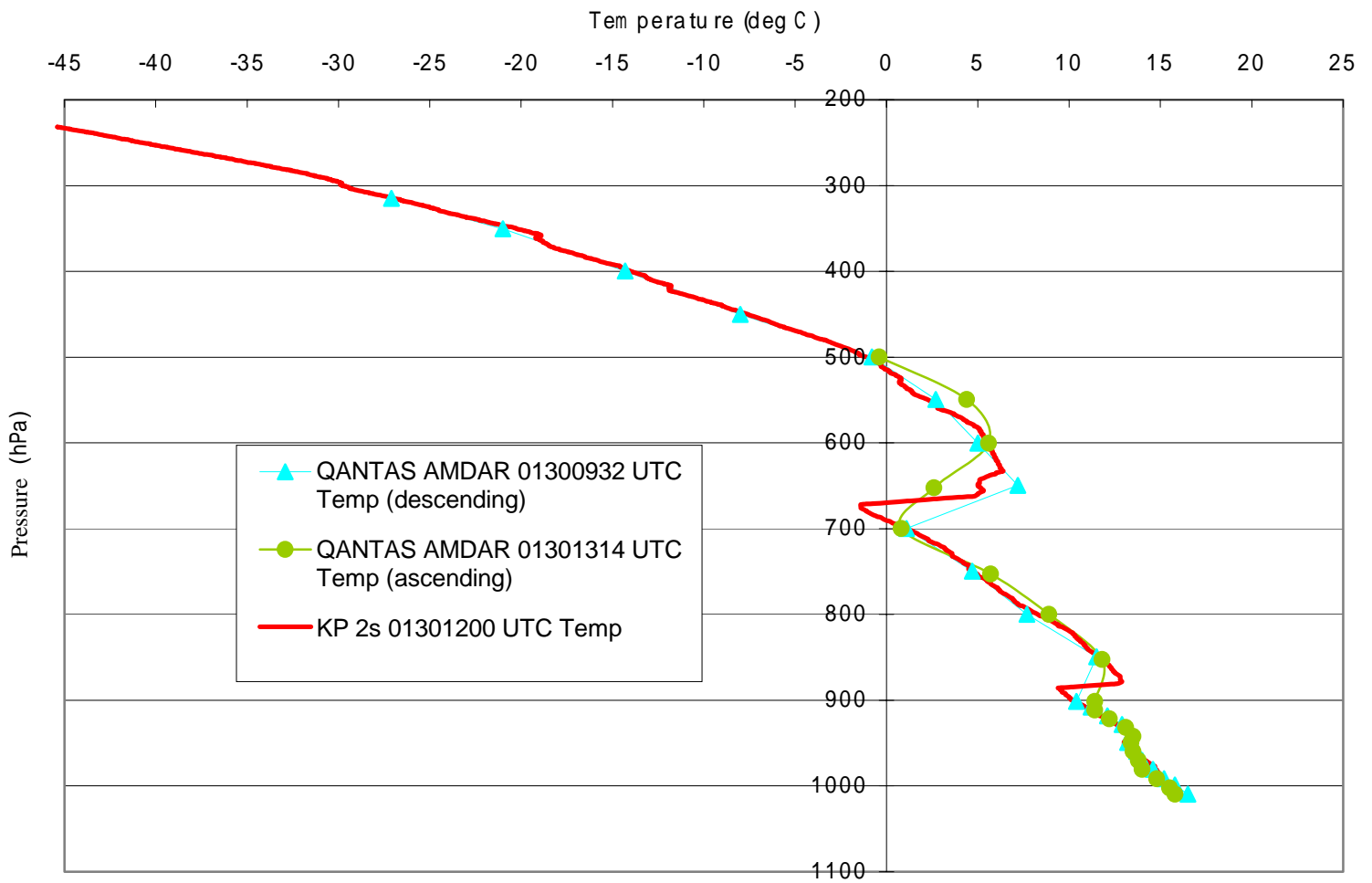


Figure 1. Comparison of AMDAR temperature profiles with King's Park (KP) radiosonde ascent temperature profile