WORLD METEOROLOGICAL ORGANIZATION

ET-AIR-3 and AMDAR Panel-14/Doc.3.4.1(3)

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JOINT MEETING:
CBS EXPERT TEAM ON AIRCRAFT BASED OBSERVATIONS
(Third Session)
AND
AMDAR PANEL
(Fourteenth Session)

ITEM: 3.4.1

(QUEBEC CITY, CANADA, 2-4 NOVEMBER 2011)

Original: ENGLISH ONLY

AMDAR PROGRAMME STATUS

Status Reports on National and Regional AMDAR Programmes

Established AMDAR Programmes

China AMDAR Progress Report

(Submitted by China)

Summary and purpose of document

This document provides information on the activities for the China AMDAR Programme.

ACTION PROPOSED

1. The Panel is invited to note the information contained in the document.

PROGRESS/ACTIVITY REPORT

Current Status:

1. The China AMDAR Programme has made some progress in the past year under the work and cooperation of the Civil Aviation Administration of China (CAAC) and China Meteorological Administration (CMA).

2. With the effort of CAAC, more airlines have participated in the China AMDAR Programme in the past year: 11 airlines with 111 aircraft, increased from 3 airlines with 22 aircraft during the 2009-2010 period. After being examined and evaluated by the Quality Control System, over 7000 meteorological reports per day are disseminated via GTS.

3. A national regulation document on AMDAR data, ***BUFR codes of aircraft meteorological observation data*****,** has been published by CMA.

4. An AMDAR-WXM report distribution control system has been developed and on trial in the past year by CAAC. To avoid expensive international data flux fees, the system enables: on/off switch of AMDAR relay according to airspace situation or flight number, control of observational time intervals among other functions.

Development and other Activities:

5. CAAC undertook some optimization of the AMDAR quality control system (see fig. 1 and 2), including:

1) a hardware upgrade of the quality control system;

2) monitoring of AMDAR quality control system and dissemination network;

3) regular review of AMDAR quality, update in time while new aircrafts participating in AMDAR programme; and

4) checking statistical information of the AMDAR quality control system.

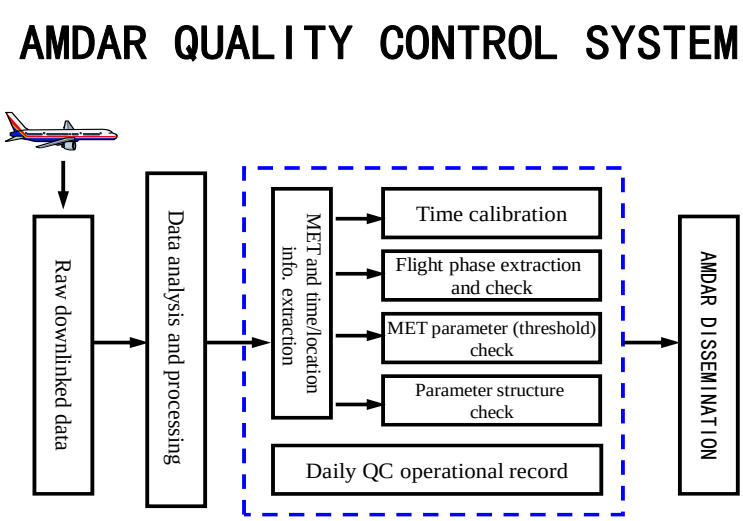

Fig.1 AMDAR QC STRUCTURE

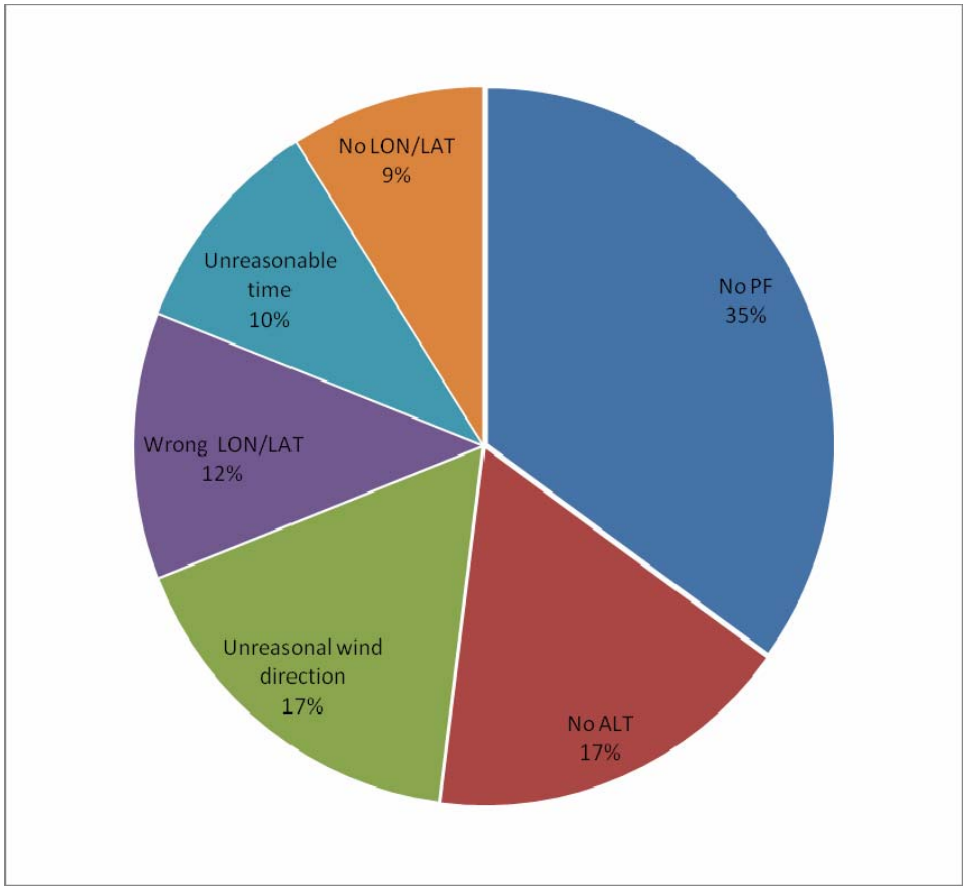

Fig.2 AMDAR QC result

6. The trial AMDAR-WXM report distribution control system has been conducted during the past year.

1) About 52,700 AMDAR-WXM reports have been received since the trial of the AMDAR-WXM report distribution control system in May 2011.

2) Of all these reports, 1,319 are relayed outside of the CAAC datalink coverage, most due to the frequency-hopping of the aircraft.

3) Hence, the efficiency of the system is 97.5%.

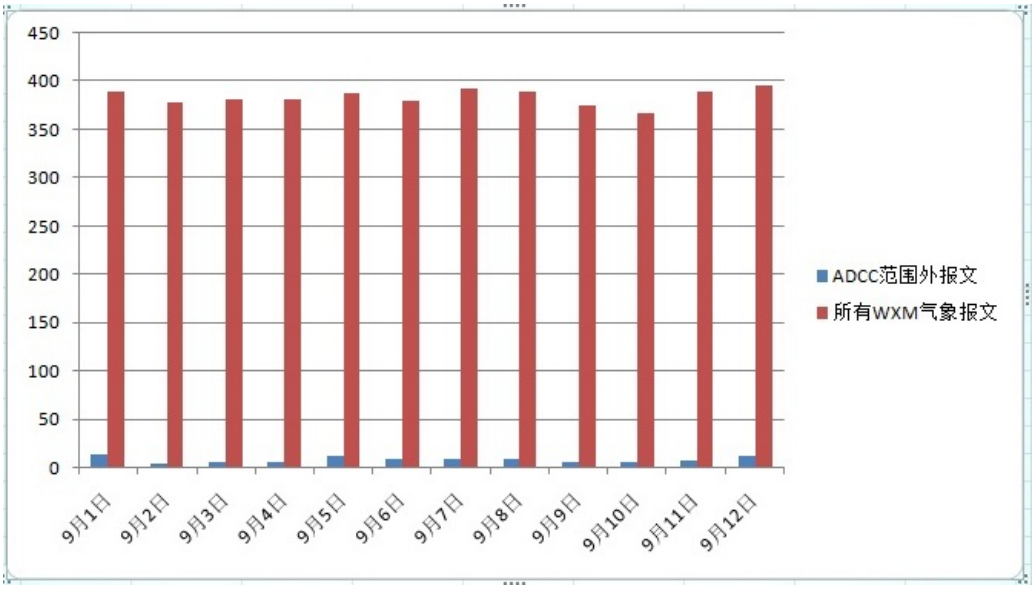

Fig. 3 AMDAR-WXM reports received within the CAAC datalink coverage vs. those outside of the CAAC coverage

7. China continued the work on processing and application of AMDAR.

7.1 CAAC enabled real-time dissemination of AMDAR turbulence reports; developed software that can show AMDAR turbulence in graphic form; and used AMDAR turbulence reports to review the turbulence forecast of SIGWX charts and NWP models.

7.2 Although the amount of weather reports from ADS-B is small, on account of the usefulness of such reports to Air Traffic Controllers, CAAC fulfilled extraction and compilation of weather reports from ADS-B.

7.3 AMDAR data have been operational in the meteorological service for Beijing Capital Airport for several years. Based on their experience, the operational use of AMDAR in meteorological service has been extended to two more airports: Chengdu and Guangzhou airports.

7.4 CMA continued its endeavor on the application of AMDAR data. CMA has worked on integrating AMDAR data to different NWP models, such as T213, WRF and MM5. Assimilation of AMDAR Data to CMA NWP model has been conducted and result shows for the first time that AMDAR data has remarkable positive impact on NWP forecast in China region.

7.4.1 The assimilation of AMDAR Data to CMA GRAPES NWP model (GFS) compared with the result of NCEP model (FNL) has been conducted during 1-25 September 2011. The coverage is China region (15-65N，70-145E).

Fig. 4 and 5 show the RMSE and bias of geopotential height derived from CMA GRAPES model with/without AMDAR data respectively. Analysis shows that the assimilation of AMDAR data has remarkable positive impacts, especially on upper levels

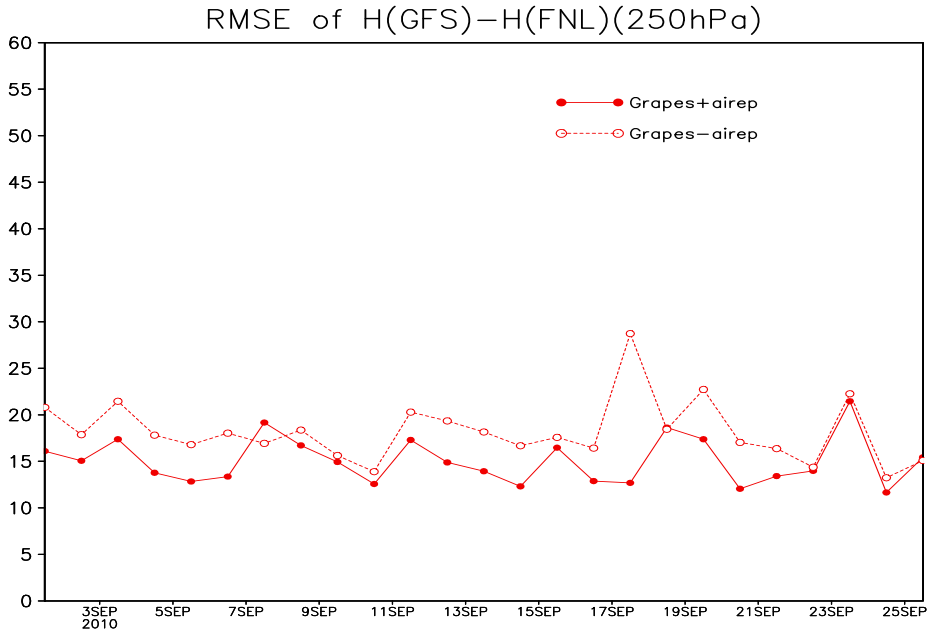

Fig.4 RMSE of H(GFS) - H(FNL) (250hPa) in China region

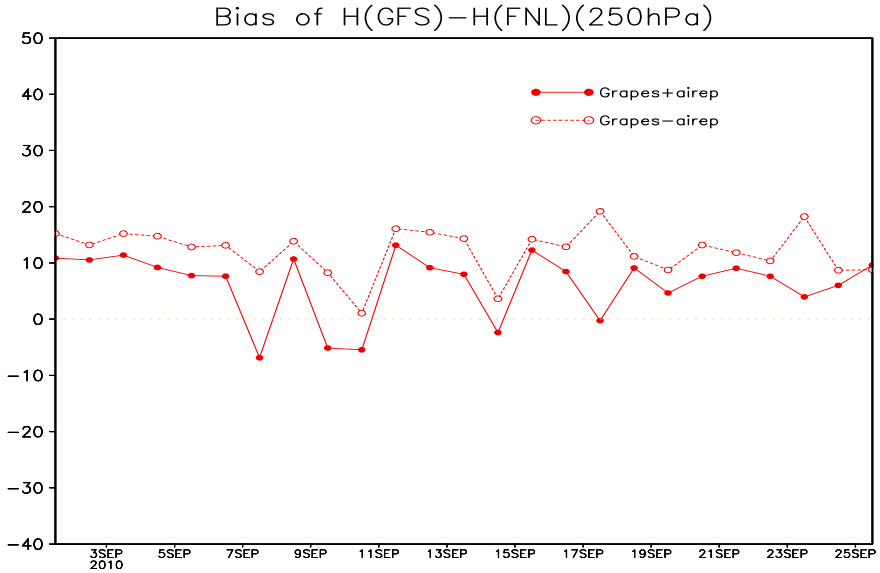

Fig.5 Bias of H(GFS) - H(FNL) (250hPa) in China region

7.4.2 During the same period, experiments with and without AMDAR data were conducted to study the impact of AMDAR data on 72-hour NWP forecast output.

The anomaly correlation coefficient and forecast RMSE with/without AMDAR data (on 250 hPa and 500hPa) are shown in Fig. 6-9, respectively. The range of anomaly correlation coefficient: 0-1, with 1 is the best. The result shows that AMDAR data has remarkable positive impacts on NWP forecast. It is the first time that we get such good result in China region, which means that the quality and quantity of China AMDAR data have improved greatly.

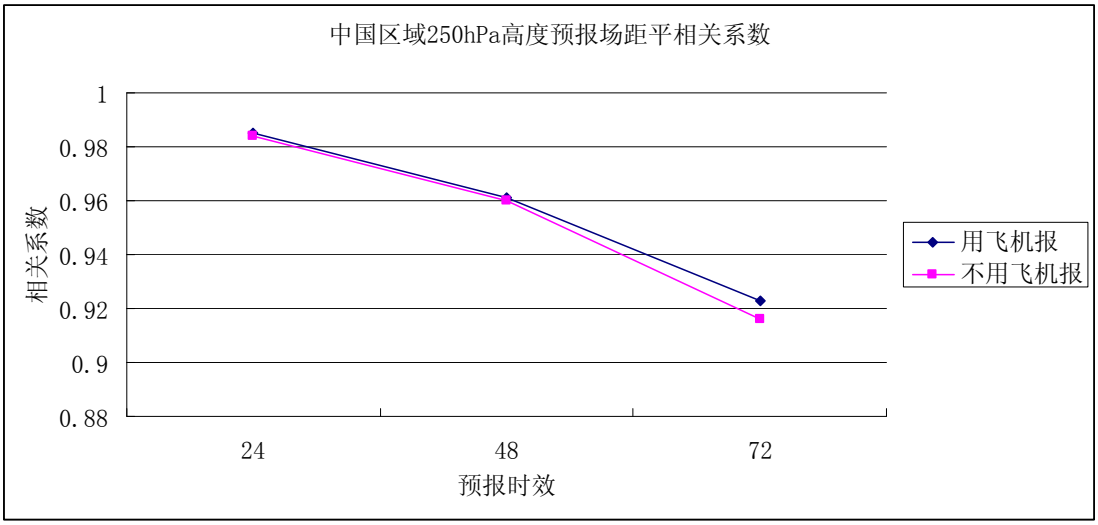

Fig. 6 Anomaly correlation coefficient of geopotential height forecast (250hPa) in China region

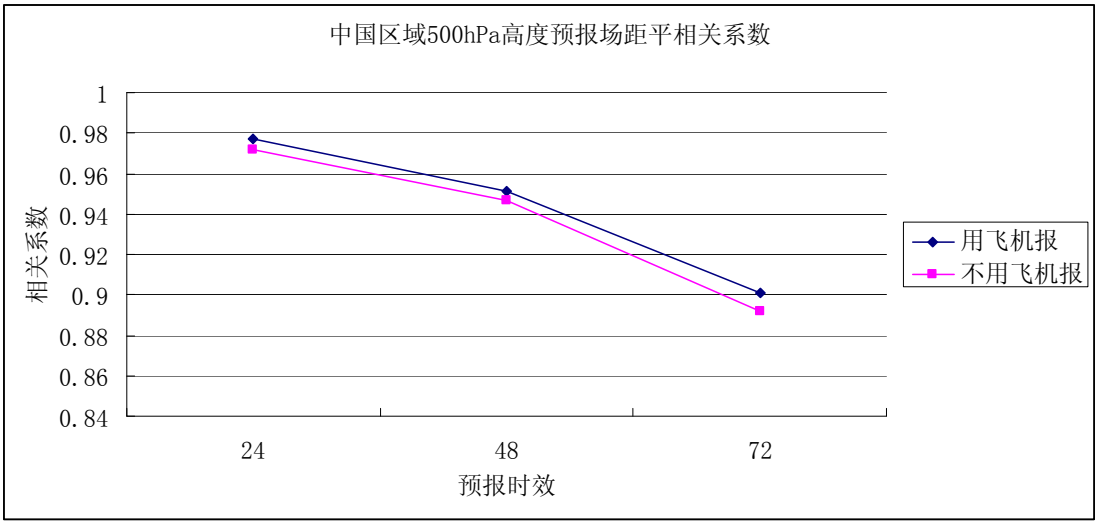

Fig. 7 Anomaly correlation coefficient of geopotential height forecast (500hPa) in China region

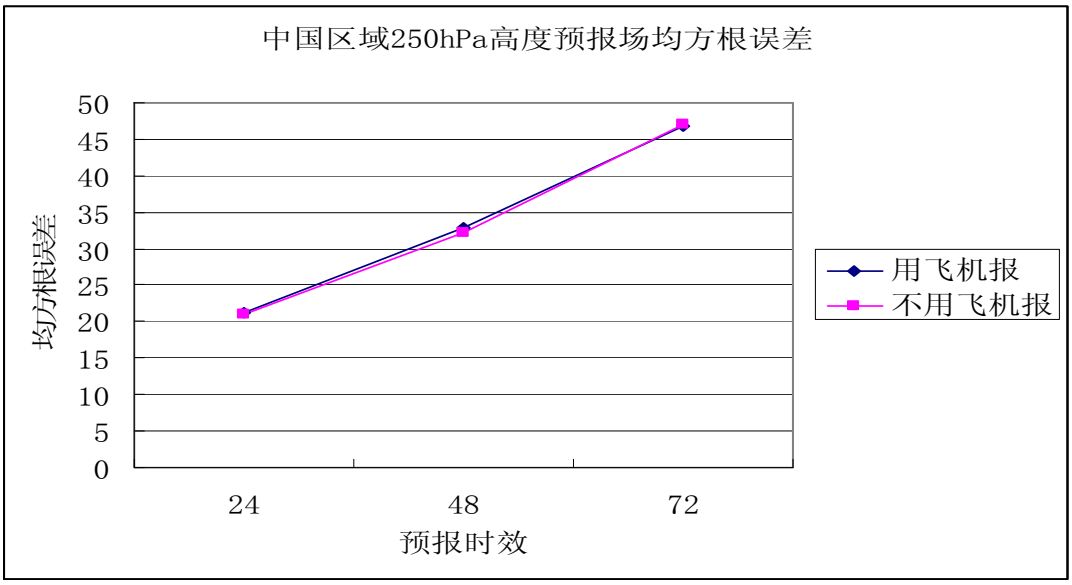

Fig. 8 RMSE of geopotential height forecast (250hPa) in China region

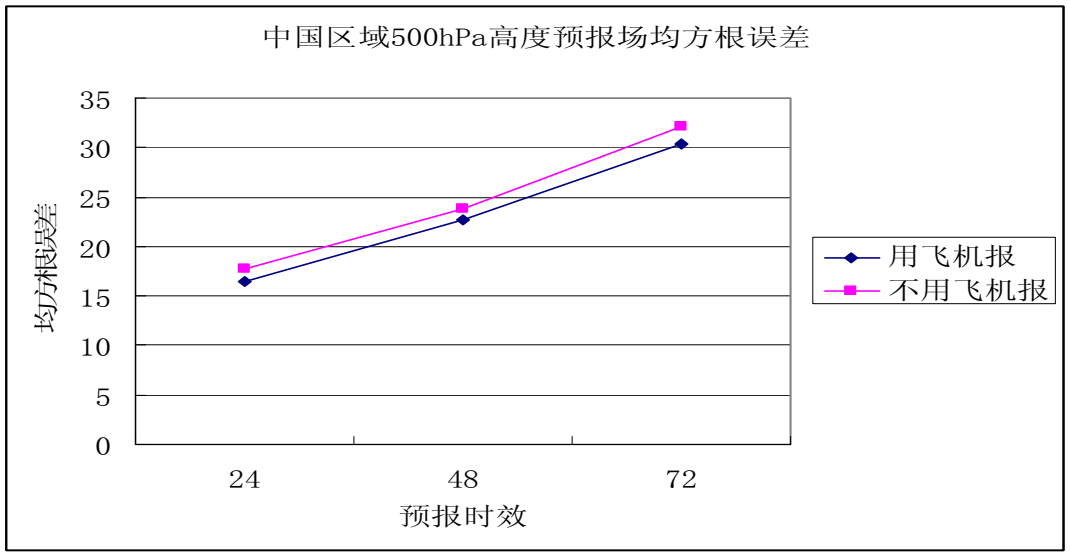

Fig. 9 RMSE of geopotential height forecast (500hPa) in China region