

WORLD METEOROLOGICAL ORGANIZATION

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AMDAR Panel-15/Doc.3.3.-

(17.X.2012)

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**WMO AMDAR PANEL  
(Fifteenth Session)**

(BOULDER, USA, 6-9 NOVEMBER 2012)

ITEM: 3.3

Original: ENGLISH ONLY

**AMDAR PROGRAMME STATUS**

***Status Reports on National and Regional Programmes***

AMDAR Programme Status Report for China

*(Submitted by China)*

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**SUMMARY AND PURPOSE OF DOCUMENT**

Provides a progress and activity report for the China AMDAR Programme.

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**ACTION PROPOSED**

1. The Panel is invited to note the information contained in the document.
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**PROGRESS AND ACTIVITY REPORT**

**Current Status**

<b>Airline</b>	<b>Country of Airline</b>	<b>Aircraft Type (e.g. B737-400)</b>	<b>Number of Aircraft</b>	<b>AMDAR Software</b>	<b>Format On GTS (BUFR / FM42)</b>
China Southern Airlines	China	B737-800	8	ADCC Software	FM42
Shandong Airlines	China	B737-800	14	ADCC Software	FM42

*Note: ADCC: Aviation Data Communication Corporation of CAAC*

1. The China AMDAR Programme has been operational smoothly 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, 2 airlines (Southern Airline and Shandong Airline) with 22 aircraft have participated in the China AMDAR Programme in the past year. After being examined and evaluated by the Quality Control System, about 6100 meteorological reports are disseminated via GTS per day. This differs from the 2011 report, in which we mentioned that 11 airlines with 111 aircraft participated in the AMDAR Programme. The reasons are that:

- 1) Meteorological parameters from some aircraft, especially the Airbus ones, are incorrect, such as one altitude value along the flight path, unreasonable wind direction or speed. Together with the airlines and onboard equipment vendors concerned, we are now trying to reconfigure the onboard meteorological database and fix this problem. After that, we hope there will be more AMDAR data available.
- 2) Some airlines (i.e. Air China) withdrew from the AMDAR program “naturally” after the old aircraft stopped operation or got refurbishment for the onboard equipment.
- 3) And for the new aircraft, the airlines are concerned about the possible additional communication charge out of China and not very keen to join the program.

3. AMDAR data have been operational by CAAC in aviation meteorological service for several airports such as Beijing Capital, Cheng airport and Guangzhou international airports for several years. The main warning or forecast products include frontal weather systems, trough and shear-lines, low level wind shear and etc.

4. In recent years, CMA has developed an AMDAR display capability within its Meteorological Information Comprehensive Analysis and Process System (MICAPS), a processing, display, and telecommunication network which is the standard operational platform of the national-wide weather service. It is used by CMA to analyze AMDAR data more conveniently and efficiently.

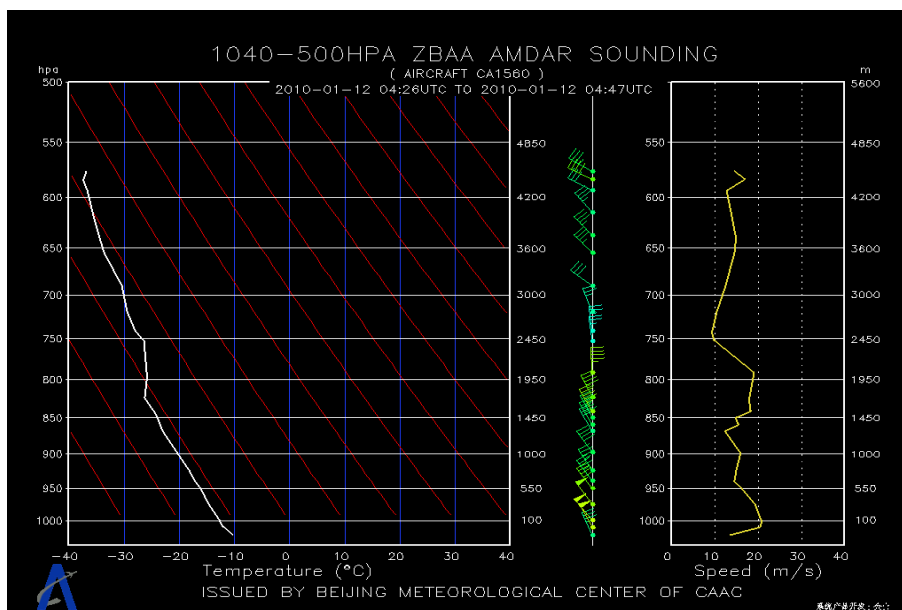
5. CMA continued its endeavor on the application of AMDAR data. CMA has worked on integrating AMDAR data to different NWP models, such as T213, WRF and MM5. Assimilation of AMDAR Data to CMA Global/Regional Assimilation and PrEdiction System (GRAPES) NWP model has been conducted.

### Development & Other Activities

6. China AMDAR quality control system and the AMDAR-WXM report distribution control system maintained by CAAC has been worked well in the past year. However, an error during the shift of the quality control system to the backup equipment caused the daily reports reduced to about 3000 per day.

7. In the aviation meteorological service, CAAC used AMDAR data operationally in several airports to provide warning or forecast products on:

- Frontal weather systems;
- Trough and shear-lines;
- Low-level jets;
- Inversion and stability;
- Temperature advection;
- Low level wind shear;
- Upper and surface-level winds;
- Fog;
- Precipitation type;
- Turbulence and
- Freezing level.



**Fig. 1 Flight CA 1560 taking off or landing, January 12, 2010 the sounding of Beijing Capital airport**

Near the ground level there is significant wind shear, with wind speed change: 12 m/s near the ground → rapidly increasing to 21 m/s at 100-meter level → rapidly reduced to 13 m/s around 550-meter level. Hence, low level wind shear warning can be issued.

8. In addition to producing AMDAR data as a contribution to the global AMDAR programme, CMA uses global AMDAR data received via the GTS, of which over 300,000 observations per day are now available.

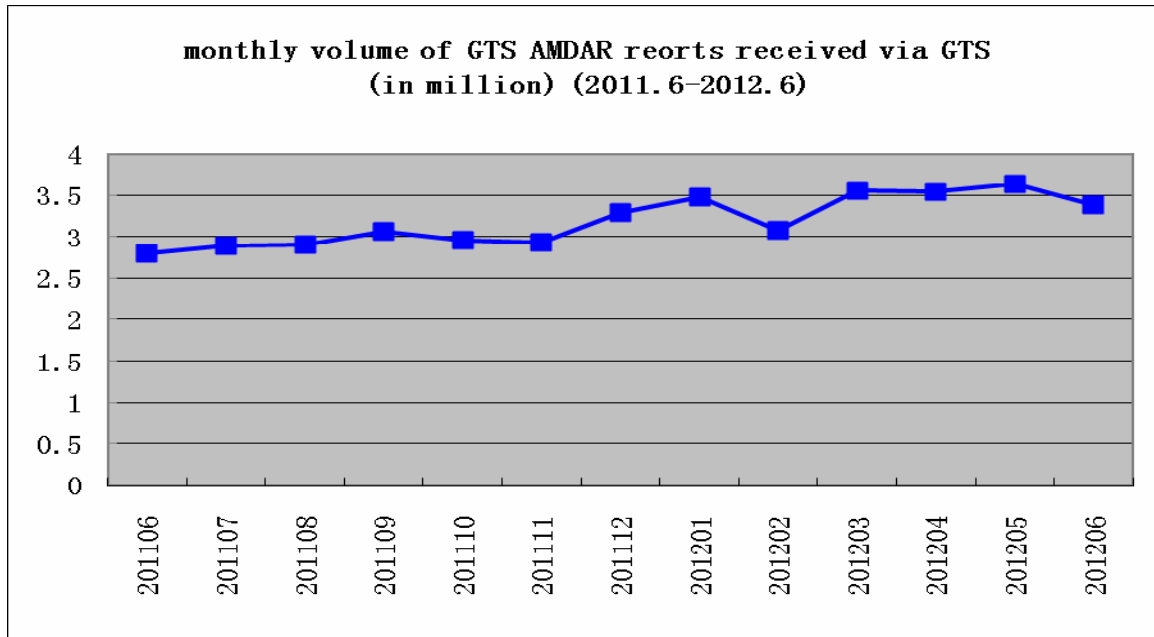


Fig. 2 Monthly volume of AMDAR reports received via GTS

9. On MICAPS, en-route AMDAR data, including wind, temperature and turbulence can be displayed horizontally by level as fig. 3 and 4 shows.

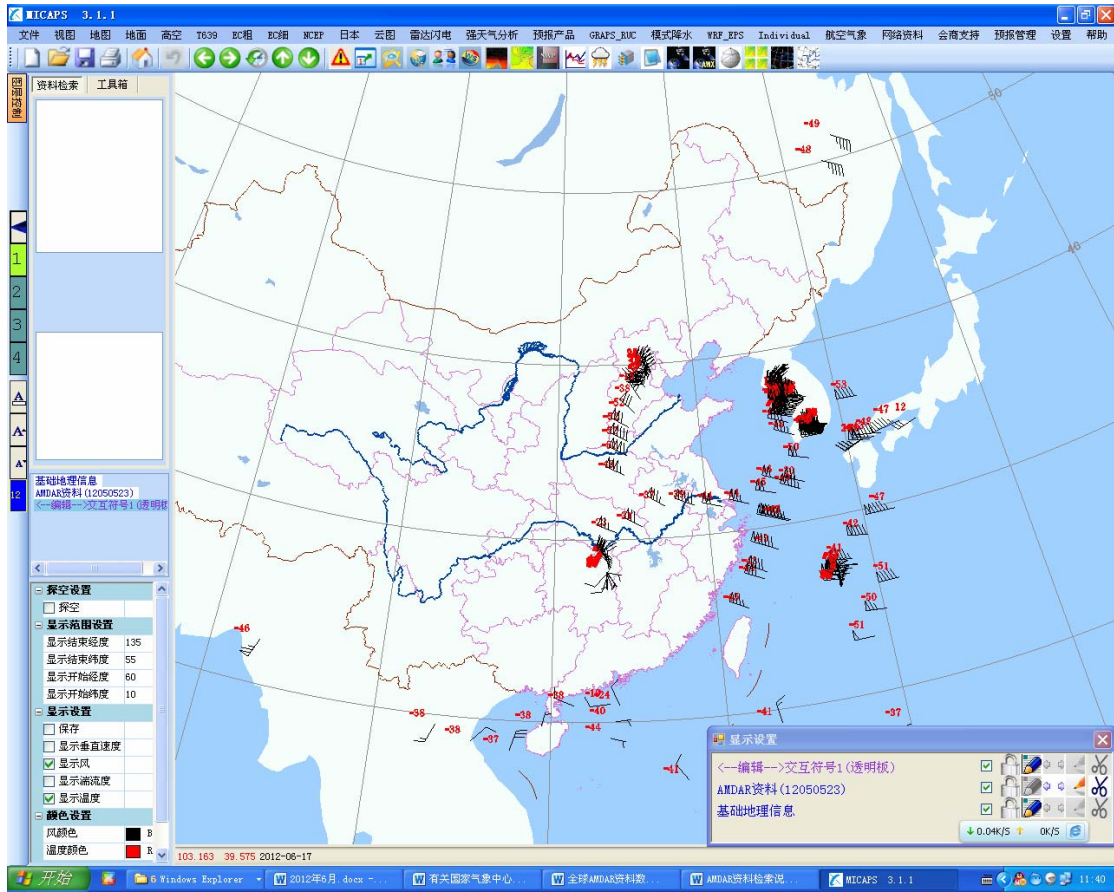


Fig. 3 AMDAR information displayed horizontally



Fig. 4 En-Route Profile of AMDAR information

10. CMA has conducted the assimilation of AMDAR Data to CMA Global/Regional Assimilation and PrEdiction System (GRAPES) NWP model and result shows that AMDAR data has remarkable positive impact on NWP forecast in China region.

10.1 Assimilation of AMDAR Data to GRAPES meso model

Case study shows that the assimilation of AMDAR data has remarkable positive impacts on wind and humidity field when AMDAR data is assimilated to GRAPES meso model. Better forecast can be obtained, especial in the region where the density of AMDAR data is higher (see fig.5).

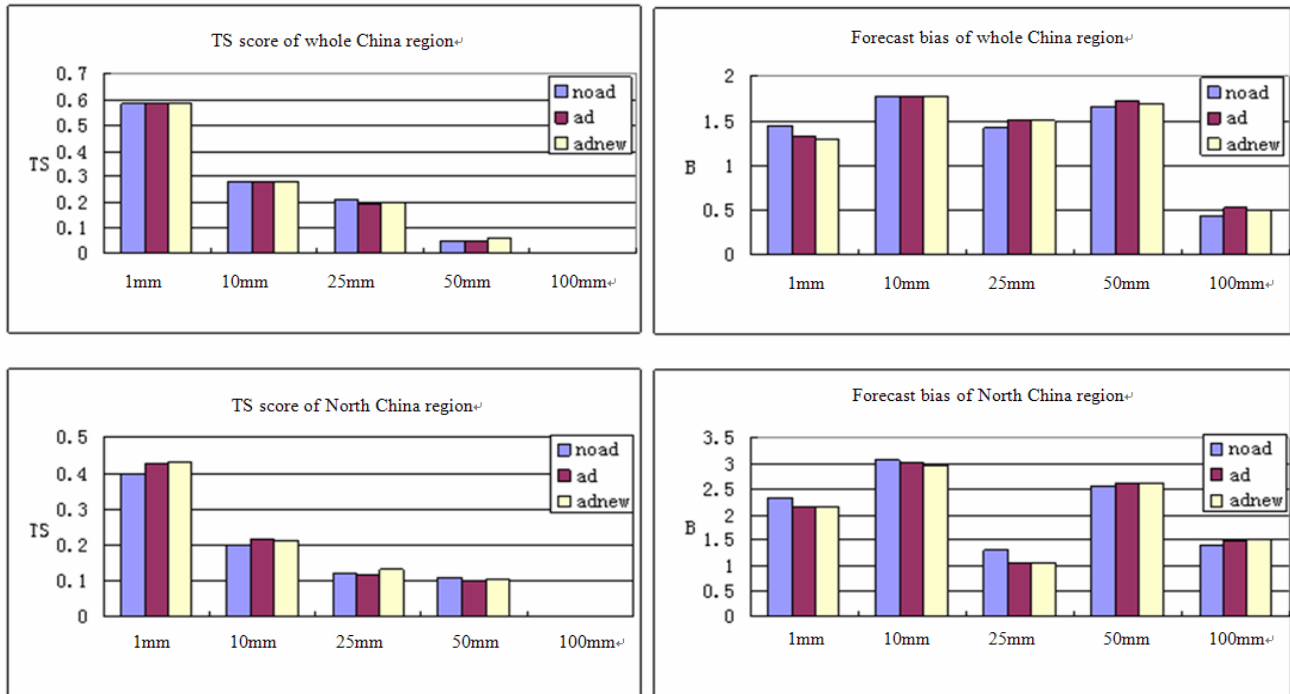


Fig. 5 Accumulated 24 h simulated rainfall verification (X-axis: Rainfall amount)

10.2 Assimilation of AMDAR Data to GRAPES global model

Analysis shows that the assimilation of AMDAR data has remarkable positive impacts, especially on upper levels. The RMSE of 500hPa geopotential height derived from CMA GRAPES model with/without AMDAR data is shown in Fig. 6.

The anomaly correlation coefficient and forecast RMSE with/without AMDAR data (on 500hPa) are shown in Fig. 7 and 8, respectively. The range of anomaly correlation coefficient: 0-1, with 1 is the best. The results show that AMDAR data has remarkable positive impacts on NWP forecast. Better forecast can be obtained when AMDAR data is assimilated in Grapes global mode.

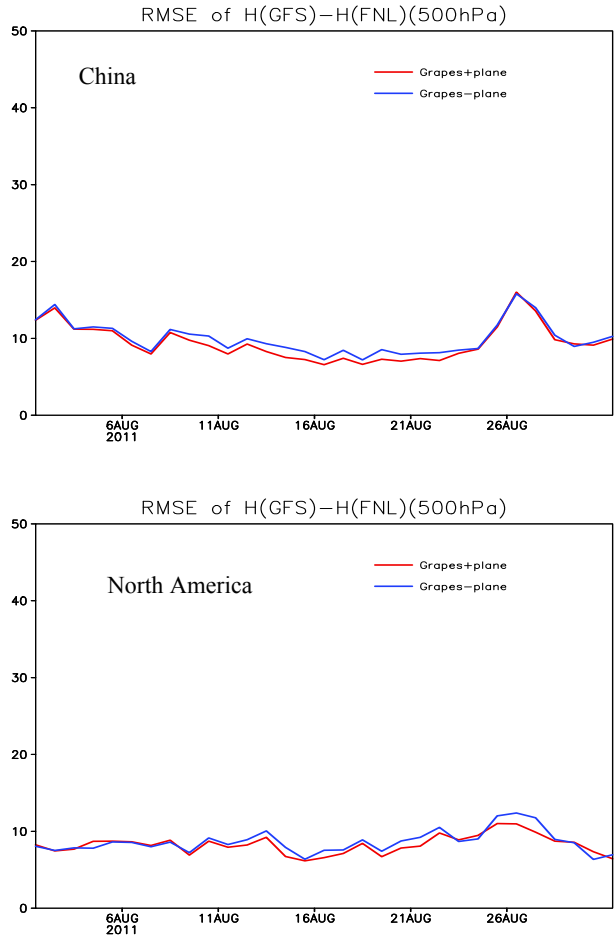
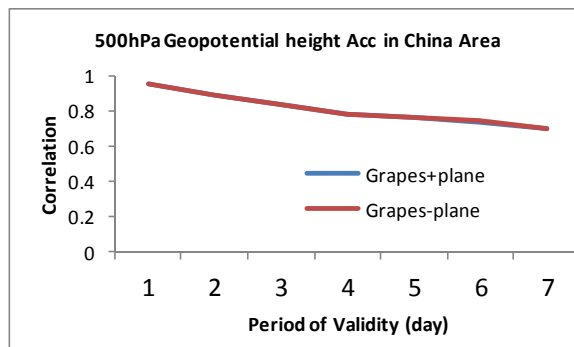


Fig.6 500 hPa geopotential height RMSE of GRAPES (GFS) and NECP (FNL) analysis



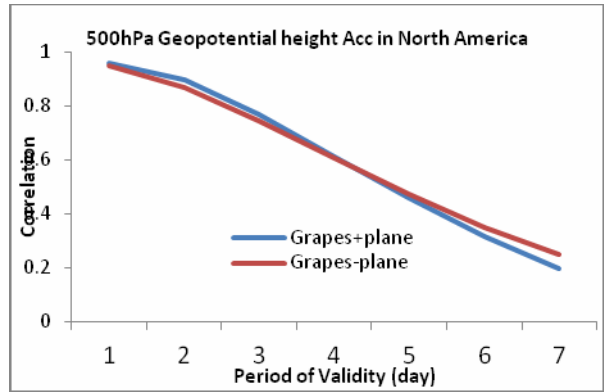


Fig. 7 Anomaly correlation coefficient of geopotential height forecast (500hPa) in China and North America region

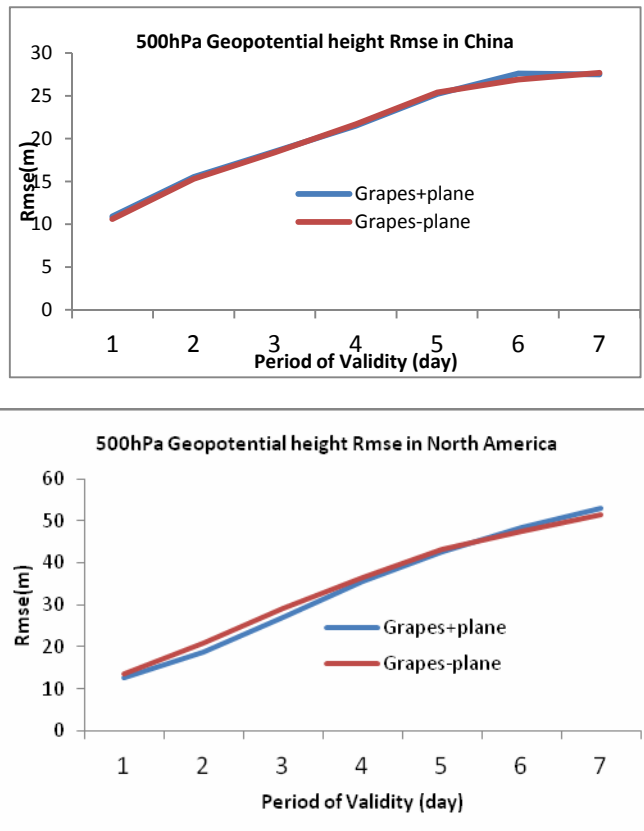


Fig. 8 RMSE of geopotential height forecast (500hPa) in China and North America region

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