

WORLD METEOROLOGICAL ORGANIZATION

Workshop on Aircraft Observing System Data
Management/Doc. 3.4

**WMO AMDAR PANEL WORKSHOP ON AIRCRAFT
OBSERVING SYSTEM DATA MANAGEMENT**

(30.V.2012)

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ITEM: 3.4

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USER REQUIREMENTS FOR THE AO DM FRAMEWORK

Data Policy aspects for Aircraft Observing System Data

(Submitted by The Secretariat)

SUMMARY AND PURPOSE OF DOCUMENT

To provide background information and highlight any issues related to data policy and WMO Resolution 40 that might have implications for the Aircraft Observing System and its Data Management Framework.

ACTION PROPOSED

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

References:

1. WMO Resolution 40 (Cg-XII), http://www.wmo.int/pages/about/Resolution40_en.html
 2. Aircraft Observations Data Statistics: <http://www.wmo.int/amdar/AMDARStatistics.html>
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BACKGROUND

1. When designing a data management framework, it is critical to take into account intellectual property rights so as to ensure that neither Data Providers nor Data Users are infringing on, or illegally making use of the property rights of other parties. This is of particular concern for consideration of Aircraft Observations because the data always originates from the property of airlines or the aviation industry.
2. In the early years of AMDAR Program development and implementation, the area of data policy was largely ignored and generally based only on an understanding or a loose arrangement with the partner airlines whereby the National Meteorological and Hydrological Service (NMS) was entitled to receive and make use of aircraft observations for its mandated purposes as a meteorological agency. This arrangement was certainly based on an understanding that provision of the data by the airline was of mutual benefit as it contributed to improvement to weather forecasting services to aviation, whilst also contributing to the improvement to other application areas of meteorology.
3. From the earliest commencement of operational AMDAR Programmes in the early 1990s, data has been exchanged on the Global Telecommunications System (GTS) in WMO FM42 text format and later, and now most widely, in the table driven binary format, BUFR. WMO policy for all aircraft observations data is encapsulated within Annex I to WMO Resolution 40 as provided in Appendix I. Resolution 40 suggests a data requirement for data at a horizontal resolution of 200km and a temporal resolution of 6 hours, however many meteorological applications have requirement for data of considerably higher resolution and the requirement for aircraft data in particular is to submit "All available aircraft reports, e.g. data in AMDAR, AIREP codes, etc.;".
4. Over the past decade or so, both the airlines and NMHSs have tended towards the activation of more formal arrangements for operation of AMDAR Programmes ranging from the Memorandum of Understanding to the full Service Agreement or Contract. Rather than being precipitated by any specific concern or incident, it appears as if the issue of intellectual and other property rights are tending to be addressed as a result of such agreements being put in place.
5. All operational AMDAR Programmes currently provide AMDAR data on the GTS in support of WMO Resolution 40. Currently, the global programme is comprised of 10 Programmes, 36 (or more) airlines and around 2700 aircraft. The programme provides between 250,000 and 300,000 observations per day on the GTS.
6. In addition to the data generated by the AMDAR Programme, ICAO Automatic Dependent Surveillance (ADS) data, contributes around 14,000 aircraft observations per day.

Data Policy Status of AMDAR Programmes

7. In the lead-up to compilation of this document, WMO Aircraft Observations Focal Points were contacted to survey the status of AMDAR Programme data policy from both a national and global data rights perspective. The questions posed and the responses made are provided in Appendix II. A response was not received in relation to the programmes of Japan, the Republic of Korea and South Africa.
8. The following points are made in relation to the survey and with respect to AMDAR Programme Data Policy:

- The survey represents feedback from programmes covering 7 of 10 programmes, 31 of 35 airlines, the majority of participating aircraft and data derived.
- 27 of 31 airlines are covered by an agreement or contract under the programme operation.
- 26 of the 27 agreements specifically deal with the issue of data ownership or data use.
- All programmes are able to comply with the requirements of WMO Resolution 40; however 5 of the 7 programmes do not currently specifically address this issue in the agreement or do not have an agreement. The two largest programmes, the USA and E-AMDAR, which contribute around 80% of all AMDAR data are contractually compliant with WMO Resolution 40.
- Responses to Question 10, relating to the issue of contribution of AMDAR data to a long-term archive with unrestricted public access, suggest that this matter is not specifically dealt with in existing agreements and would require clarification possibly negotiation between NMHSs and airlines.
- Release of data for this purpose may also be subject to NMHS standards and requirements for quality control of such data, which are likely to be more stringent and lead to longer latencies than for data provided for real- or near-real-time use.

ICAO Data Sources

9. There are 3 major sources or potential sources of automated aircraft observations arising from ICAO data sources, namely Automatic Dependent Surveillance Contract (ADS-C), ADS Broadcast (ADS-B) and Mode S.

For definitions of ADS, see:

http://www.skybrary.aero/index.php/Automatic_Dependent_Surveillance#Automatic_Dependent_Surveillance-Contract_.28ADS-C.29

For definition of Mode S, see: http://www.skybrary.aero/index.php/Mode_S

10. ICAO data sources can optionally be configured to transmit meteorological data (air temperature and wind).

11. At the current time ADS-C data only is being transmitted on the GTS in AIREP format. It is not a source of vertical profile data, see:

http://www.wmo.int/amdar/programs/data/statistics/aircraft_obs_cmc_mthly_ave_daily_reports_geog_701_AIREP.png

12. It is expected that ADS-B and Mode S data, being integral to plans for airspace management in the future under NextGen in the USA and SESAR (Single European Sky ATM Research Programme) in Europe, will become the dominant source of ICAO aircraft observations data in the future.

13. Generally, there are no envisaged or evident issues associated with Data Policy for ICAO data but it is important that WMO maintains contacts in ICAO that represent the interests of Members in maintaining and extending access to this supplementary aircraft observations data source.

Other Data Sources

AirDat TAMDAR

See: <http://www.airdat.com/technology/tamdar-sensor-network/>

14. TAMDAR is a sensor and communications package developed by AirDat LLC for smaller General Aviation (GA) aircraft to provide meteorological data for NMHSs and an aircraft condition and position monitoring status functionality for airlines and the aviation industry. The WMO AMDAR Panel has interacted with AirDat since the early stages of its development, which culminated in the collaboration with NOAA for the Great Lakes Fleet Experiment (GLFE), commencing in 2004. Based on this collaboration, they claim that: *“Independent studies of AirDat’s TAMDAR Data conducted by NASA, National Oceanic and Atmospheric Administration (NOAA) and Federal Aviation Administration (FAA) scientists have found TAMDAR data quality and precision to equal or surpass the accuracy and biases of radiosonde data.”*

See: <http://amdar.noaa.gov/>

15. AirDat also provides a 12km 3DVar numerical weather forecast modeling system service that they are marketing to government agencies and aviation. They claim that *“The AirDat Tropical 3DVAR-WRF model performed extremely well during the 2011 Atlantic Basic hurricane season, consistently outperforming forecast guidance from other government and private-sector weather models (see case study).”*

16. In 2007, the NOAA/NWS contract with AirDat was down-scaled with only a limited amount of GLFE data available to the NWS and no data available on the GTS. AirDat have recently (2012) approached NOAA with a proposal for access to TAMDAR data but no agreement was reached.

17. With their current expansion of their TAMDAR network into Europe through the agreement with Flybe (see: <http://www.businesswire.com/news/home/20111207006255/en/Flybe-Partners-AirDat-Provide-Real-Time-Data-Improved>), there is interest from EUMETNET and EUCOS regarding possible data access and collaboration.

18. While the TAMDAR network offers an additional source of aircraft observations from several aircraft fleets in the Americas and now Europe, there are concerns and issues regarding the rights over the data that NMHSs have or might have under agreements with AirDat and, in particular, the ability and right to comply with WMO Resolution 40. This certainly should not prevent NMHSs from negotiating with AirDat but should be taken into consideration in the design and implementation of a Data Management Framework (DMF) for aircraft observations.

Data Policy Issues for the Aircraft Observations Data Management Framework

19. The following are put forward as issues that may affect the design and strategy for development of the Aircraft Observations Data Management Framework:

- 1) While Data Policies of current AMDAR Programmes generally allow compliance with WMO Resolution 40, it is important that future new and updated agreements are more carefully negotiated so as to ensure compliance with Resolution 40. Ideally, such agreements should also take into account the contribution of AMDAR data to longer-term, public data archive in support of climate application area requirements. WMO should ensure that Members are aware of the issue and seek to put in place agreements that ensure the ability of programmes to comply with WMO Resolution 40.
- 2) Varying Data Policies among AMDAR Programmes will need to be taken into account in the design and establishment of any online public archive of AMDAR data and it may be necessary to facilitate delayed release of some data so as to comply with specific programme policies.

- 3) Varying Quality Control or Quality Assurance practices and requirements among NMHSs will also require handling, which might be accomplished by delaying the release or access to AMDAR data until appropriate QA flags are set. This has implications for database or archive design.
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APPENDIX I

ANNEX I TO WMO RESOLUTION 40

Annex I to Resolution 40 (Cg-XII)

Data and products to be exchanged without charge and with no conditions on use

Purpose

The purpose of this listing of meteorological and related data and products is to identify a minimum set of data and products which are essential to support WMO Programmes and which Members shall exchange without charge and with no conditions on use. The meteorological and related data and products which are essential to support WMO Programmes include, in general, the data from the RBSNs and as many data as possible that will assist in defining the state of the atmosphere at least on a scale of the order of 200 km in the horizontal and six to 12 hours in time.

Contents

- (1) Six-hourly surface synoptic data from RBSNs, e.g. data in SYNOP, BUFR or other general purpose WMO Code;
- (2) All available in situ observations from the marine environment, e.g. data in SHIP, BUOY, BATHY, TESAC codes, etc.;
- (3) All available aircraft reports, e.g. data in AMDAR, AIREP codes, etc.;
- (4) All available data from upper air sounding networks, e.g. data in TEMP, PILOT, TEMP SHIP, PILOT SHIP codes etc.;
- (5) All reports from the network of stations recommended by the regional associations as necessary to provide a good representation of climate, e.g. data in CLIMAT/CLIMAT TEMP and CLIMAT SHIP/CLIMAT TEMP SHIP codes, etc.;
- (6) Products distributed by WMCs and RSMCs to meet their WMO obligations;
- (7) Severe weather warnings and advisories for the protection of life and property targeted upon end-users;
- (8) Those data and products from operational meteorological satellites that are agreed between WMO and satellite operators. (These should include data and products necessary for operations regarding severe weather warnings and tropical cyclone warnings).

APPENDIX II

Results on Survey of AMDAR Programme Data Policy

Questions

1. How many airlines are participating in your AMDAR Programme?
2. With how many of these airlines do you have a formal contract or agreement with for the operation of the programme?
3. How many of these contracts or agreements specifically address the issue of data ownership or data use?
4. How many of the airlines in your programme do NOT allow or provide compliance* with WMO Resolution 40 (See below for Res. 40 details)?
5. With how many of the airlines in your programme does the contract or agreement formally establish compliance with WMO Resolution 40 (See below for Res. 40 details)?
6. For those airlines for which data derived does not comply with Resolution 40, what are the restrictions?
7. Estimate the daily volume (number of observations) and percentage of data produced by your programme that is not compliant with Resolution 40.
8. Estimate the daily volume (number of observations) and percentage of data produced by your programme that is potentially not compliant with Resolution 40 (i.e. not formally established by a formal contract or agreement).
9. Please provide any comments or additional information of relevance to this issue in relation to aircraft observations.
10. Would the current Data Policy of your AMDAR Programme allow archival of Aircraft Observations/AMDAR data in a permanent and publicly available global archive or database? Please explain any issues.

Responses

Question	Australia	New Zealand	Canada	E-AMDAR	USA	China	HK China
1	6	1	1	12	7	3	1
2	Contract for all in place or will be in place.	1	1	12	7 (via ARINC)	0	0
3	6	0	1	No response	7	0	0
4	0	0	0	0	0	0	0
5	6	0	0	12	7	0	0
6	No restrictions imposed.	No restrictions imposed.	No restrictions in terms of use for public purpose except Commercial Exploitation in Competition with the Contractor	No restrictions imposed.	Data to be used in "research mode" or for forecasting use only by government agencies.	No restrictions imposed.	No restrictions imposed.
7	0%	0%	0%	0%	0%	0%	0%
8	40% until agreements activated.	100%	100%	0%	0%	100%	100%

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9	Nil	Contract to be updated in next 12 months.	Liability versus 3rd party user is a significant issue for the airline/contractor. It is a barrier in establishing a contract between government and airlines. There is nothing in international laws we could refer to but it would help if we could reference to a statement from WMO on 3rd party data use. TAMDAR is another case of high concern	Nil	Currently, the wind and temperature reports tied to the WVSS-II data are not available for distribution because a stand-alone file has yet to be established for this purpose.	China AMDAR Programme doesn't have a formal contract or agreement with the airlines that participate in the programme for the operating of the programme, hence there is no formal agreement on the issue of the compliance with WMO Resolution 40.	Currently there is no policy to make AMDAR data available publicly due to cost recovery issue. As we need to pay for data link service in order to obtain AMDAR data, cost recovery should be considered (based on our government policy) if such data has to be released to public.
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10	No response	Yes	No response	<p>I am not sure how to answer. We have discussed in EUCOS(EUMETNET) that Met Office, who is archiving the E-AMDAR data, would serve as a DCPC in WIS. Does this mean they would be publically available? I know that EUMETNET is discussing how to fulfill the requirements the INSPIRE Directive (which means public access) of the European Union, but I am not aware of the details of the discussion.</p>	<p>Only after data is no longer real-time (>48 hrs old)</p>	No response	No response
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