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COMMISSION FOR BASIC SYSTEMS  
OPEN PROGRAMME AREA GROUP  
ON INTEGRATED OBSERVING SYSTEMS

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EXPERT TEAM ON AIRCRAFT-BASED OBSERVING SYSTEMS  
FIRST SESSION

ITEM: 5.2

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### **Aircraft-based Observations Data Centre**

*(Submitted by Frank Grooters)*

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### **SUMMARY AND PURPOSE OF DOCUMENT**

One of the main tasks of ET-ABO is to maintain and develop the Quality Management System (QMS) for global aircraft-based observations, including Data Management, Metadata management, Quality Control and Data Monitoring, based on WMO standards.

As part of the QMS for ABO, the ABOP has the aim of establishing and maintaining the Aircraft-based Observations Global Data Centre.

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### **ACTION PROPOSED**

The meeting will be invited to note of the requirements for an Aircraft-based Observations Data Centre and to discuss the way followed in approaching potential centres for requesting a response through an Expression of Interest (Eoi).

#### References

1. [ET-ABO Work Plan 2013-2014](#)
  2. [Workshop on Aircraft Observing System Data Management \(Geneva, 5-8 June 2012\), Final Report](#)
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## DISCUSSION

1. At the Workshop on Aircraft Observing System Data Management (Geneva, 5-8 June 2012) the current and future Aircraft Observations Data Management Framework was reviewed and discussed;
  2. As a result of the discussions, it was recommended that “a data management framework, in line with WMO’s Quality Management Framework (QMF) and the WMO Infrastructure System (WIS) policies and in line with the AMDAR Reference Manual. Shall be further developed to such extent that implementation in national and regional bodies can be carried out. Such a framework may have a generic structure”;
  3. One of the recommended implementations would be related to the establishment of an AMDAR Data Centre for monitoring and archiving AMDAR data;
  4. With the transfer of AMDAR to the WMO WWW/GOS it is reasonable to extend the Data Centre requirement to the more generic Aircraft-based Observations Program (ABOP) including AMDAR and other aircraft-related data;
  5. This recommendation was included as Task 4 (Establish AO Data Centre) in the ET-ABO Work Plan 2013-2014 and requirements of such Data Centre were defined;
  6. The ET-ABO management decided to request those national/regional data centres already receiving and (partly) archiving aircraft data to express their interest in extend their functionality with the establishment of an Aircraft-based Observations Data Centre in accordance with the defined requirements.
  7. Four potential candidates (CMC, EUMETNET, NCDC, NCEP) were, in an informal way, requested to express their interest in becoming the future ABO Data Centre.
  8. Responses might be expected by 1 October 2013 after which the ET-ABO will decide on further actions, depending on the nature of these responses.
  9. The requirements, together with a short description on the Aircraft-based Observing System, as being sent to the potential candidates, are contained in the appendix.
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## Appendix

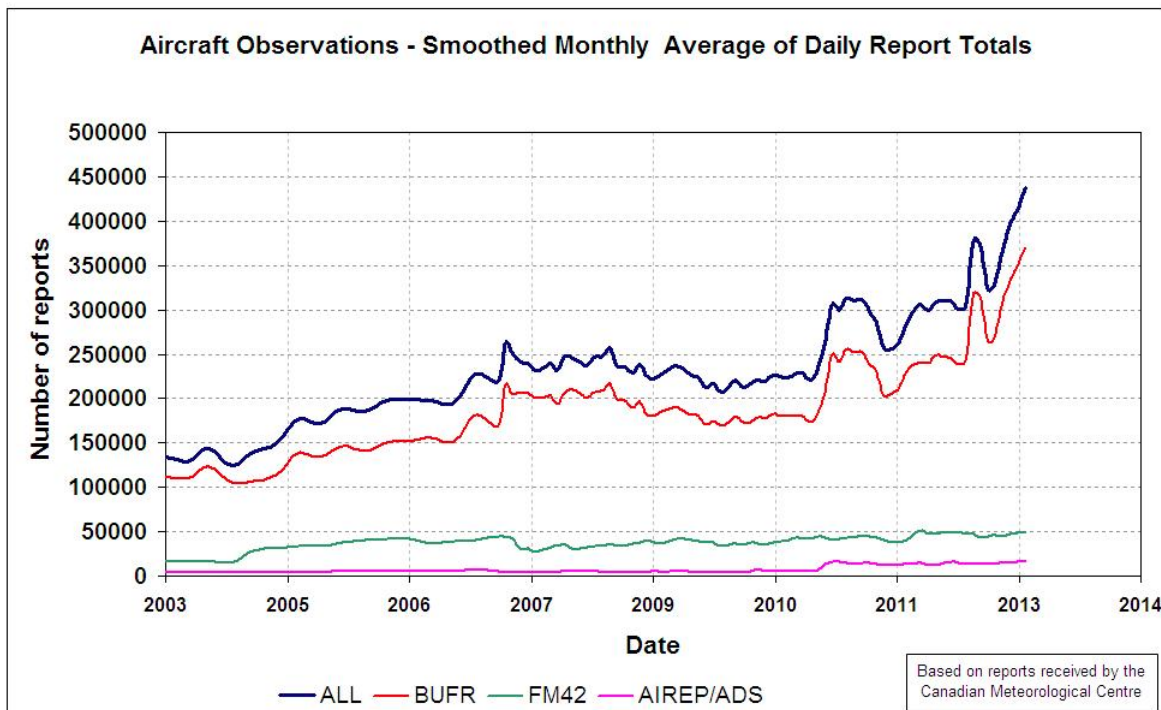
### Requirements for the establishment of an Aircraft-based Observations Data Centre

#### Aircraft Meteorological Data relay (AMDAR)

Modern methods of weather prediction are based on analysing vast amounts of weather observations by means of advanced mathematical models and using very high capacity super computers. The observations are collected with a wide variety of methods. Although some observations are still manually collected, the majority of the meteorological observations are collected through the use of automated systems e.g. ground based weather stations, radiosondes, radars, wind profilers, satellites and many other systems.

A more recent way of collecting operational data from the upper air in support of NWP started around 1990 by the Global AMDAR System using commercial aircraft as the data collection platform. AMDAR (Aircraft Meteorological Data Relay) is a program integrated into the WMO World Weather Watch Global Observing System and is implemented through national and regional AMDAR Programs in various parts of the world.

The number of AMDAR observations has since then progressively increased from a few thousand to, currently, more than 400,000 observations per day. Further, considerable growth is planned and expected in the future.



The benefit of AMDAR is the automatic collection meteorological data as atmospheric profiles associated with airports and also the data at cruise level. Profile data near airports provide updated and specific information about weather conditions specifically relevant to aviation. These profiles are recorded in order to supplement the data collected by the more traditional balloon borne radiosondes.

Furthermore, AMDAR contributes in a unique way to the (sometimes very few) number of observations from data sparse areas.

Instead of building and installing expensive dedicated hardware on aircraft, today's AMDAR relies entirely on existing onboard sensors, (flight) computers and the aircraft communication system (the aviation industry standard Aircraft Communication Addressing and Reporting System, ACARS). Only special developed AMDAR software is added to the aircraft's avionics for the collection of the relevant meteorological information, initial data processing and formatting and the connection to the aircraft communication system.

Stakeholders in AMDAR include National Meteorological and Hydrological Centres, aircraft operators, air traffic controllers, research institutions and other national and international (semi)governmental agencies.

For more information about the AMDAR observing system, see: <http://www.wmo.int/pages/prog/www/GOS/ABO/AMDAR/>

### **Aircraft-based Observations Program (ABOP)**

AMDAR started as an activity of WMO, implemented as regional or national programs, and financed entirely by the participating countries in the various regions. International co-ordination and collaboration between the programs was achieved through the WMO AMDAR Panel, which operated from 1998 through to 2012. In 2010 the WMO Commission for Basic Systems (CBS) declared that AMDAR is a fully operational program concerning air temperature and wind observations and, at its 15<sup>th</sup> Session in 2012, the AMDAR Panel handed over programmatic responsibility to WMO under the World Weather Watch Programme and ceased operations. The AMDAR observing system is now internationally maintained under the Aircraft-based Observations Program (ABOP), and jointly coordinated by the Expert Team for Aircraft-based Observations (ET-ABO) under CBS and the Task Team on Aircraft-based Observations (TT-ABO) under the WMO Commission for Instruments and Methods of Observation (CIMO). In addition to AMDAR, the ABOP includes supplementary meteorological aircraft-based observations like ADS-C, AFIRS and TAMDAR.

### **Aircraft-based Observations Data and Quality Management**

One of the main tasks of ET-ABO is to maintain and develop the Quality Management System (QMS) for global aircraft-based observations, including Data Management, Metadata management, Quality Control and Data Monitoring, based on WMO standards.

ABO (e.g. AMDAR) data monitoring and archiving will be an essential element in the ABOP QMS and the Program has recently developed a proposed Data Management Framework that incorporates the objective of establishing an international data centre.

Currently AMDAR data is monitored at several national and international data centres, with the formal responsibility for monitoring fulfilled by the NOAA/NWS National Centres for Environmental Prediction (NCEP) on behalf of the designated WMO Lead Centre for Aircraft Data, Washington World Meteorological Center.

### **ABO Global Data Centre**

As is the case for some other WMO observing systems, the ABOP has the aim of establishing and maintaining the Aircraft-based Observations Global Data Centre.

The high level and highest priority requirements for the ABO Data Centre would be to:

1. Receive, quality control and maintain an archive of ABO data (which includes AMDAR, ADS (ICAO Automatic Dependent Surveillance), AIREP and PIREP data);
2. Receive, QC and maintain an archive of ABO metadata;
3. Provide an interface for provision of archived ABO data and metadata to Data Users;

4. Develop and maintain a historical record of data quality issues associated with ABO data.

The ABO Data Centre would further be requested to consider as a lower priority undertaking:

5. Retrieval and retro-filling the database with globally available historical ABO data;
6. Reception and archival of Quality Monitoring and Quality Assessment reports.

A more detailed specification of requirements of the ABO Global Data Centre task would be discussed and agreed between the candidate Data Centre and WMO through CBS and the ET-ABO. It is expected that, if required, resources and support would be provided for the establishment of the Data Centre and possibly some contribution to annual running costs.

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