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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: 5.2.4

Original: ENGLISH

Geneva, Switzerland, 10-13 September, 2013

STATUS & PROGRESS ON ET-ABO WORK PLAN TASKS 2013-14

Training & Outreach

Impact of ABO Data

(Submitted by the Secretariat)

SUMMARY AND PURPOSE OF DOCUMENT

To provide the Session with an update on the status of the work underway related to assessment of AMDAR and Aircraft-based Observations data impact on data users and applications.

ACTION PROPOSED

The Session is invited to note and discuss the information contained in the document.

References

1. [Document 4.4.9\(1\), AMDAR Panel Session 15, Boulder, Colorado, USA \(Nov 2012\)](#)
 2. [Document 4.4.9\(2\), AMDAR Panel Session 15, Boulder, Colorado, USA \(Nov 2012\)](#)
 3. [Document INF.3, CBS Expert Team on Aircraft-Based Observing systems Work Plan, 2013-2014](#)
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IMPACT OF AIRCRAFT-BASED OBSERVATIONS DATA

Background

1. For background information on recent studies and work on aircraft-based observations data impact, the Session is referred to documents 4.4.9(1) and 4.4.9(2) from the AMDAR Panel 15th Session (Nov 2012), References 1 and 2 respectively.
2. This document will provide a brief update on the status of work underway in this area.

Papers on Impact of AMDAR Data (Work Plan Task 18)

3. From Document 4.4.9(1), AMDAR Panel 15th Session (Reference 1):

16. The AMDAR Panel (Session 14, 2011) determined that the Panel should support and fund the commissioning of a paper summarizing the historical and current status of AMDAR data on meteorological applications or applications areas. During late 2011 through the first quarter of 2012, a Statement of Work was developed for this task and the Secretariat developed a Special Services Agreement (SSA) contracting Dr Ralph Petersen from the University of Wisconsin in May 2012. An extract from the SSA, which describes the scope of the work is provided in Appendix I.

17. Associated with this task, Dr Petersen also agreed to contribute to the Fifth WMO Workshop on the Impact of Various Observing Systems on NWP, Sedona, May 2012, under Session 2, Regional Forecast Impact Studies on Impact of AMDAR Aircraft Observations. The abstract for the presentation made is provided below:

S3 AMDAR, Dr Ralph Petersen from the University of Wisconsin.

ABSTRACT

Over the past two decades the Aircraft Meteorological Data Relay (AMDAR) Programme has rapidly and consistently grown as it has expanded from producing several thousands observations of wind and air temperature over a limited coverage, to one that now produces nearly three hundred thousand observations per day with considerably enhanced and expanded global coverage and includes a growing number of moisture observations. Such a growth in the output of a particular observing system has had a significant and evolving impact on NWP systems and operational forecasting applications that has been tested and gauged at various times over this period. This talk will present a summary of the results and conclusions of the observing systems tests and applications assessments of AMDAR data and make recommendations for future work in this area.

4. It was originally expected that this work would be concluded in the first half of 2013, however, because of a couple of issues, the contract for the WMO Special Services Agreement (SSA) with Dr Petersen has been updated and extended, so that the work is now expected to be concluded in the 4th quarter of 2013.
5. The reasons for the extension are two-fold. Firstly, Dr Petersen has had both some personal health and family issues that have impacted temporarily but significantly on his availability at work. Secondly, Dr Petersen has identified, and both the AMDAR Panel (15th Session) and the ET-ABO leadership has agreed, that the body of work undertaken is beyond the scope of a single paper and that the work should be extended and the scope adjusted so as to incorporate the production of two papers on AMDAR data impact: One on the impact of AMDAR temperature and wind data; and a second on the impact of water vapour data. This adjustment in scope has increased the cost of the SSA remuneration by \$4200 USD to a total cost of \$34,700 USD.

6. The progress report by Dr Petersen for the period May – June 2013 is provided as Annex I below.

Impact Assessment of TAMDAR Data

7. EUMETNET aims at conducting Observing System Experiments (OSE) with several NWP models in order to assess the impact of additional aircraft based humidity observations (WVSS-II and TAMDAR) on numerical weather prediction skill. Experiments with and without assimilation of these new humidity observations will be conducted. It is expected that additional humidity observations will help to improve numerical weather prediction and hence the accuracy of weather hazards analyses and predictions. A summary of the results of the different OSEs will be provided in order to build the business case for further investment in new airborne humidity sensors. The main objective for the proposed study is to try to find answers to the following three questions:
 - Does it make sense to further invest money into procurement of more WVSS-II humidity sensors to be installed on commercial aircraft which belong to the E-AMDAR programme?
 - Is TAMDAR an alternative to E-AMDAR observations or is it complementary to E-AMDAR?
 - In case WVSS-II or TAMDAR sensors prove to have a beneficial impact on NWP forecast skill, how many sensors should be installed?
8. Agreement has been reached with ECMWF and DWD to both run a set of OSE over the US (chosen as only the US has sufficient coverage of both TAMDAR and AMDAR humidity data available for such studies.) Dates agreed for the OSE periods are spring/summer 2011 and winter 2011/2012. Datasets have been obtained for both periods.
9. DWD has started experimentation. The Control runs (i.e. without AMDAR & TAMDAR humidity in data assimilation) with GME (global model) and COSMO-US (limited area model) has been started. Also, for the scenario using AMDAR humidity data, two experiments with GME and COSMO-US have commenced. Experiments for scenarios with TAMDAR data and with both AMDAR and TAMDAR humidity data will follow.
10. ECMWF has started preparing the data assimilation system for using the additional aircraft humidity observations and expects commencing experiments September 2013. While it is recognised the ECMWF contribution is delayed by six months, interim results from DWD are expected to be available mid-October 2013.
11. When sufficient TAMDAR data over UK/Europe (from Flybe fleet) becomes available the Met Office UK will run similar OSE impact studies using its high resolution UK model, including any of the E-AMDAR humidity data that should begin to be available from early 2014 .

Annex I Progress Report – Ralph Petersen – AMDAR Impact Documentation

Period: 1 May – 30 June 2013

During these past months, the PI has continued preparation, assembly and organization of materials on the history of AMDAR and the impact of AMDAR data on. He continued integrating new information with NOAA, NWS, ECMWF and UPS personnel on AMDAR impacts into various sections of the draft, as well as additional information for a continuing literature review.

Substantial effort has also been expended working with NWS and CIMSS personnel on both the structure and opportunities available for global expansion of AMDAR and WVSS-II through the NOAA "Hurricane Sandy Supplement" and on determining ways that CIMSS can work with NWS to use its expertise and experience with AMDAR data and the NCEP Global Data Assimilation System not only to improve the impact of the expanded data sets and allow ADMAR data (with WVSS-II moisture observations) to be used as a substitute for radiosonde data at some locations, but also to provide a vehicle for 'ground-truthing' TAMDAR data before NOAA commits to a contract to access that data set.

Revised documentation supporting extension of this project has been returned to WMO. A draft of the impacts paper is expected by the end of September, with a revision of the WVSS paper to follow soon thereafter.