

**WORLD METEOROLOGICAL ORGANIZATION**

**WMO AMDAR Panel Management Group  
(3rd Session)**

**Silver Spring, United States, 27 February - 2 March 2012**

FINAL REPORT



## **EXECUTIVE SUMMARY**

The AMDAR Panel Management Group (APMG) is authorized to meet under the Purpose and Terms of Reference for the WMO Panel on AMDAR. The AMDAR Panel Session 14, held in conjunction with the WMO CBS Expert Team on Aircraft-based Observations, ET-AIR Session 3, Quebec City 2011, requested that the APMG meet twice in 2012 in order to finalize and coordinate the Work Programme associated with the implementation and operation of the WMO World Weather Watch Aircraft Observing System. Session 3 of the AMDAR Panel Meeting Group was held in at the NOAA National Weather Service headquarters in Silver Spring, Maryland, USA over 27 February to March 2, 2012 at the kind invitation of the USA Permanent Representative to WMO.

This successful and important meeting discussed a number of critical issues relating to the operation of the programme that supports the Aircraft Observing System and made good progress in determining a strategy for finalizing the transition of the AMDAR system into WMO under the WWW Programme. This progress was greatly assisted by the input of CBS President, Dr Branski and CBS/ICT-IOS Chair, Dr Riishojgaard who both urged the APMG and the Panel to work towards a shorter time line for the transition process and to take advantage of the flexibility of the WWW Technical Commissions (CBS and CIMO) framework to recommend a new structure that can ensure the continued successful development of the AMDAR System as a component of the WMO Integrated Global Observing System, WIGOS.

The APMG finalized the Work Programme and AMDAR Trust Fund budget for the 2012 period that is based upon both a medium and long term planning framework addressing the recommendations made in the CBS Vision of the Global Observing System and the Implementation Plan for the Evolution of Global Observing Systems and based upon the Terms of Reference of the AMDAR Panel. This is one of the key tools that will be used to ensure continuity of the AMDAR programme based on responsible and efficient use of the AMDAR Trust Fund.

The Work Programme addresses many important developmental aspects of the Aircraft Observing System and the AMDAR system, including: strategic expansion and enhancement of the global AMDAR coverage, the validation of a water vapor sensor for the AMDAR system and the coordination of its operational implementation, the wider implementation of a standard turbulence metric, the coordination of technical workshops on aircraft observations data management and turbulence, AMDAR software development and the management of several short-term projects for the development of AMDAR manuals, guides and specifications.

## **ADOPTED AGENDA**

### **1 OPENING, LOGISTICS AND AGENDA**

### **2 FINAL REPORT AMDAR PANEL-14/ET-AIR-3**

2.1 Status of Action Items and subsequent actions needed

### **3 PLAN AND WORK PROGRAMME FOR AIRCRAFT OBSERVATIONS**

Focus:

1. Status WIGOS AMDAR Pilot Project tasks and next steps
2. Status contracted activities; plans and agreement for new contracts.
3. 2012 Work Programme tasks;
4. Allocation of tasks to ET-AIR, leaders/coordinators;
5. Data Management Workshop ToR, coordination and organization;
6. Agenda and other preparations for AMDAR-15

3.1 Specific Items for decision: Resource Issue, AMDAR Panel representation in other International Groups

### **4 PROPOSED BUDGET, APPENDIX FROM FINAL REPORT**

4.1 Assessment of spending estimates;

4.2 Final approval.

### **5 PURPOSE AND TERMS OF REFERENCE FOR THE WMO PANEL ON AIRCRAFT METEOROLOGICAL DATA RELAY (AMDAR PANEL)**

5.1 Review proposed amendments

### **6 AIRCRAFT OBSERVATIONS PROGRAMME GOVERNANCE ISSUES**

Focus:

1. TC resources;
2. Frequency of Panel meetings;
3. Transition of the Panel to WWW TC ETs;
4. Future existence of the Panel;
5. Operation of the Trust Fund;
6. Meetings of the Management Group.

### **7 SCIENCE AND TECHNICAL ACTIVITIES**

Focus:

1. AMDAR BUFR Template Validation process
2. Status and follow-up ARINC 620, version 5
3. Humidity
4. Preparation of Turbulence discussion

## **8 TRAINING AND OUTREACH ACTIVITIES**

8.1 Potential development of COMET Training Module:

8.2 Newsletter

1. Assessment of 1st volume.
2. Explanation of compilation process.
3. News and events Google site.

8.3 Review Mexico AMDAR Regional Workshop

1. Status recommendations made for Mexican AMDAR Programme
2. Lessons learned
3. Future AMDAR workshop(s)

## **9 USE OF GOOGLE SITES ON WMO.INT AS FOCUS FOR COLLABORATIVE WORK AND PROJECT/TASK DOCUMENTATION**

## **10 ET-AIR BUSINESS**

1. Work Plan
2. Support for and contribution to the WIGOS Implementation Plan.
3. Capabilities of the Aircraft Observing System for the CBS Rolling Review of Requirements
4. EGOS-IP (briefing on reported amendments to Aircraft Meteorological Stations paragraph [ET-EGOS-7, 7-11 May])
5. ToR
6. ICT-IOS-7, 18-22 June
7. Report to CBS

## **11 ANY OTHER BUSINESS**

1. Agenda items for MG4 (De Bilt)
2. Collaboration with SITA via the SITA Cloud
3. DLUF review
4. AMS Washignton Forum

## **12 CLOSURE OF THE SESSION**

## **GENERAL SUMMARY OF THE WORK OF THE SESSION**

### **1 OPENING, LOGISTICS AND AGENDA**

- 1.1 The AMDAR Panel Management Group Meeting was opened by the Chairman of the AMDAR Panel, Mr Frank Grooters at 9am, on February 27 at the National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS), Silver Spring, USA. The Provisional Agenda was adopted with some minor alterations and additions under item 11 and is provided above. The Chairman thanked Mr Carl Weiss for his work in requesting and organizing the meeting facilities and the NWS for the kind provision of them. The list of participants of the meeting is provided within Appendix I.

### **2 FINAL REPORT AMDAR PANEL-14 AND ET-AIR-3**

#### **2.1 Status of Action Items and subsequent actions needed**

- 2.1.1. The Management Group (APMG) reviewed the actions from the Joint Meeting of the AMDAR Panel (Session 14) and the CBS Expert Team on Aircraft-based Observations (Session 3), Quebec City, November 2011. The original actions from the Joint Meeting are provided in the table within Appendix II along with the additional Progress & Further Action from this APMG Meeting. All actions have been transferred to the 2012 Work Programme that is provided within Appendix III.

#### **Targeted Data for Africa**

- 2.1.2. It was discussed that, whilst targeted data was already being provided to Africa by the E-AMDAR Programme, it was likely that more data could potentially be made available, although it was pointed out that, in addition to the cost of the data itself, there were overheads associated with the administration of such arrangements and it was important that any funding sources should accommodate all costs. Previous activity relating to this had included E-AMDAR approaching Brussels Airlines regarding AMDAR Programme participation of their long-haul fleet, which provides services into many locations within Africa.
- 2.1.3. The APMG agreed that the Chairman should seek to have the issue of targeted data for Africa from the E-AMDAR Programme addressed at the upcoming E-AMDAR Technical Advisory Group (E-TAG) meeting in De Bilt (March 2012). It was also agreed that the Chairman should write to the President of Regional Association I and request feedback on how the Panel might work with the Regional Association to develop AMDAR Programmes within the region.

#### **B777 Software Development**

- 2.1.4. The Chairman advised that the issue of the joint initiative to develop AMDAR software for Boeing B777 aircraft would be further advanced at the next E-TAG meeting where the issue of software ownership would be discussed. The APMG agreed that, given the Panel's agreement to jointly fund the initiative with E-AMDAR and Météo France, it would be appropriate for WMO to take ownership upon delivery.

### **3 PLAN AND WORK PROGRAMME FOR AIRCRAFT OBSERVATIONS**

- 3.1 The APMG revised the draft Aircraft Observing System Work Programme that had been compiled at the Joint Meeting, Quebec City, 2011. Specific items discussed and decisions made in relation to the programme are outlined below and the approved programme is provided with Appendix III.

#### **Development of the Global AMDAR Programme**

- 3.2 The APMG discussed activities and plans associated with development of new AMDAR Programmes for data-sparse areas and it was agreed that, in addition to the development of AMDAR Programmes for these areas, a high priority was to investigate the ability of the current Global AMDAR Programme to provide more data and better coverage for data-sparse areas, particularly focusing on Regions I and III. The APMG agreed that this could best be achieved in a strategic approach to provision of data and a process should be initiated by the Panel for collecting information on the operational national programmes, in support of potential provision of targeted data. This information should also include the costs and requirements associated with making this data available and would be followed by an analysis of the information and an investigation into how its delivery might be funded.
- 3.3 It was agreed that focal points for operational AMDAR Programmes should be requested by the Secretariat to quantify and provide a report on the existing potential for targeted data within their respective programmes. This information would then be compiled into a report to be submitted to the next Panel Meeting.
- 3.4 The APMG requested that the Secretariat compile a Description of Work for a document to describe the development of the Guide on AMDAR Programme Development, which might be submitted either as a CIMO Instruments and Observing Methods Report (IOM) or a new component of the Guide to the GOS.

#### **Development of Optimization Systems**

- 3.5 The Meeting discussed the various approaches to AMDAR Optimisation System development that were either underway or being contemplated, which include or potentially include: integration of an optimization module within the ARINC network systems; integration of an optimization module with the SITA network systems; integration into the EUMETNET E-AMDAR system; and, utilization of the Australian AMDAR Data Optimization System (A-ADOS) through sub-licensing by the Bureau of Meteorology (Bureau).
- 3.6 The Secretariat was requested to contact the Bureau to inquire if the Bureau had or was able to compile a summary report on A-ADOS that provides details on capabilities and limitations, resource requirements, and possibilities for sub-licensing.
- 3.7 The Secretariat was requested to contact SITA to seek a proposal for SITA's participation in a Pilot Project to demonstrate the concept of their AMDAR solution, with the possibility of utilizing an existing operational programme in parallel incorporating optimization. Further detail is provided under agenda item 11.

### **The WIGOS Pilot Project for AMDAR - Development of BUFR Template**

- 3.8 The Secretariat reported that Dr Eva Červená had advised that AMDAR BUFR Template, v.7 had been validated and consequently included into the list of "fast track" amendments to the Manual on Codes to be considered for approval. Under this process, it is expected that the BUFR template could be used operationally by the 2<sup>nd</sup> half of 2012.

### **The WIGOS Pilot Project for AMDAR - Metadata Development**

- 3.9 No further progress had been made on the development of a specification for AMDAR metadata and the APMG requested that Mr David Helms and Mr Stewart Taylor review the current draft metadata set with a view to categorizing metadata according to responsibility for maintenance and criticality. The issue of aircraft observations metadata management and maintenance will also be an issue taken up at the upcoming Data Management Workshop in 2012.

### **The WIGOS Pilot Project for AMDAR - Develop AMDAR Data Management Procedures**

- 3.10 The Chairman presented the Draft Terms of Reference for the AMDAR Data Management Workshop (See Appendix V) proposed to be held in Geneva over 5 to 8 June 2012. The APMG approved the ToR and requested that the Chairman and the Secretariat work towards finalizing arrangements for the workshop and to proceed with the proposed list of participants ensuring they receive their invitation as soon as possible.

### **The WIGOS Pilot Project for AMDAR - Validation and Inter-comparison of WVSS-II**

- 3.11 The issue of water vapor measurement and implementation is discussed under agenda item 7.

### **The WIGOS Pilot Project for AMDAR - Update of AMDAR Reference Manual**

- 3.12 The APMG expected that, whilst the Description of Work for this work could be compiled during 2012, it would be unlikely that this work could commence until 2013 due to commitment to other activities.

### **The WIGOS Pilot Project for AMDAR - Generic Software Specification**

- 3.13 The Secretariat reported that the contract for this work was awarded, work was underway and that the contractor, Mr Frank Tamis (AirDatec) had provided the first deliverable, a skeleton outline of the specification, which had been reviewed by the Panel review team.

### **Aircraft Observing System Training and Outreach**

- 3.14 Whilst the WMO Aircraft Observations website review had commenced, the APMG agreed that, given the commitment to other higher priority activities it was unlikely that the update process would be commenced in 2012 and the Work Programme and budget should be updated to reflect this.

- 3.15 Mr Carl Weiss reported that he had contacted various USA AMDAR/MDCRS airline contacts regarding interest in the Impacts and Benefits Document for Aviation but, generally due to working commitments of the contacts, had not found a candidate for the work. The APMG discussed the possibility of commencing the process of gathering information relevant to the document, including case studies and anecdotal evidence through various AMDAR Programme airline contacts. To this end, the Chairman agreed to write to airline contacts in the USA, particularly in relation to the impact of humidity measurement, and the Secretariat would pursue a similar process with airline contacts in Australia on the impact of AMDAR.
- 3.16 The Secretariat reported that work had progressed on the production of an AMDAR Impact Studies Assessment Project with a view to the production of two chief outcomes or deliverables, namely, the presentation of a paper at The Fifth WMO Workshop on the Impact of Various Observing Systems on NWP, Sedona, AZ, United States, 22 to 25 May 2012; and, the compilation and publication of a paper summarizing the known impacts of AMDAR data on NWP and other meteorological areas. A suitable candidate for this work had already been identified and it was expected that a WMO Special Services Agreement (SSA) would be in place in the 2<sup>nd</sup> quarter of 2012, subject to assessment and due WMO process.

#### **4 PROPOSED BUDGET, APPENDIX FROM FINAL REPORT**

- 4.1 The APMG reviewed the Draft AMDAR Trust Fund (TF) Budget Projection that had been compiled at the Joint Meeting, Quebec City (2011) under agreement of review and approval by the APMG (Session 3). The draft Budget Projection was adjusted with respect to the final and full AMDAR Trust Fund Statement of Income and Expenditure (see Appendix VI) and in accordance with the changes made to the Aircraft Observing System Work Programme by the APMG and approved as provided within Appendix IV.

#### **5 PURPOSE AND TERMS OF REFERENCE FOR THE WMO PANEL ON AIRCRAFT METEOROLOGICAL DATA RELAY (AMDAR PANEL)**

- 5.1 The APMG reviewed and approved several minor changes to the AMDAR Panel Terms of Reference and agreed to again review the document at the next APMG Meeting in preparation for presentation to the next AMDAR Panel Meeting in November 2012 for approval.

#### **6 AIRCRAFT OBSERVATIONS PROGRAMME GOVERNANCE ISSUES**

- 6.1 The issue of the completion of the Aircraft Observing System transition to WMO under the World Weather Watch Programme and its governance therein was discussed at length by the APMG with significant input and advice from Dr Lars-Peter Riishojgaard (Chair ICT-IOS) and Dr Frederick Branski (President CBS). Dr Branski reiterated that both the Executive Council and Congress had endorsed the full transition process that had also been endorsed and approved by the Panel and it was clear that the only issues left to be determined were the new governance and work team structures within the WWW Technical Commissions and the time line for completion of the transition.

- 6.2 The Secretariat presented a paper to the APMG that suggested a process and time frame of several years with completion of transition to be complete and in place for the next inter-sessional period of Congress. However, Dr Branski suggested that this time frame was too long and there was no need for the process to be so protracted given that all the necessary approvals were in place. On the issue of a governance structure for the Aircraft Observing System and the utilization of the AMDAR Trust Fund for implementation and operation of the programme, Dr Branski and Dr Riishojgaard both assured the APMG that the functions and roles that had been successfully employed under the AMDAR Panel governance could be readily and well accommodated within the existing structures and work teams of the WWW Technical Commissions.
- 6.3 The APMG agreed that a more rapid transition had the benefit of removing the issue as a distraction from the Work Programme and the goals and aspirations of the Members in extending and enhancing the AMDAR Programme. It was also acknowledged that completion of the transition would relieve the burden on the Secretariat to support the administrative overheads associated with the maintenance of the AMDAR Panel. However, in proposing the new governance and working structure, the APMG would need to take into account the wishes of the Panel Members in ensuring that the functions and roles within the programme and the established relationships with the Aviation Industry and related bodies and organizations were maintained and replicated where necessary. The governance structure should also ensure that Panel Members retain the ability to contribute to the AMDAR Trust Fund and have input to the defining of the Work Programme that the TF currently supports and will support in the future.
- 6.4 The APMG agreed to work through a process that might allow a proposal for completion of the transition and a new governance structure under the WWW to be presented to the AMDAR Panel 15<sup>th</sup> Session in November 2012 and to possibly come into effect immediately following this meeting. In order to achieve this and ensure a viable proposal is made, the APMG would, under advice from the Secretariat and the Technical Commissions management, make recommendations and proposals as appropriate to ICT-IO5 (May 2012) and CBS-XV (Sep 2012). The APMG would work with Secretariat in ensuring that Panel Members were advised and consulted regarding the transition process in advance of the next Panel Meeting.

## **7 SCIENCE AND TECHNICAL ACTIVITIES**

### **AMDAR BUFR Template Validation Process**

- 7.1 See agenda item 3.

### **ARINC 620 Meteorological Report Version 5**

- 7.2 Mr Dean Lockett reported that, on behalf of the Panel, he attended the AEEC DataLink Sub-Systems Committee (DLK SSC) held in Luxembourg over 14-16 February, 2012. Mr Lockett presented to the DLK SSC, the latest draft of the AMDAR Panel's update of the Meteorological Report (to version 5) contained within the ARINC 620 specification. The APMG was advised that there were a few minor edits and also consideration of an additional requirement recently provided by Mr Hans-Rudi Sonnabend (IATA) required to complete the update requirements and Mr Lockett would be advised shortly by ARINC as

to the next step in the process, which is expected to be completed by the end of 2012 under the standard ARINC process for updating such specifications.

### **Water Vapor Sensor Validation and Implementation**

- 7.3 The Panel's approach to the trial and validation of the WVSS-II sensor and the wider implementation of a water vapour measurement programme within the AMDAR system were discussed at length by the APMG.
- 7.4 Dr Axel Hoff provided a presentation on and summary of the outcomes and findings of the *Final Report on the WVSS-II Sensors fitted to the FAAM BAe 146*. This report details the results of comparisons made between two WVSS-II v3 sensors installed on the BAe with standard water vapor measurement sensors (General Eastern 1011B ('GE') and Buck CR2 ('Buck') chilled mirror hygrometers and the Total Water Content ('TWC') probe) during 4 field trials conducted over 2011. The two WVSS-II v3 sensors were installed with two different inlet devices, one with the standard SpectraSensors Incorporated (SSI) "flush mounting" inlet (WVSS-f) and the other with a TAT inlet (Rosemount Total-Air-Temperature housing: "WVSS-r") to achieve an impact effect with increased pressure and temperature. The following summarises the key results and outcomes from the report:
- "Analysis of data from twenty-six research flights around the United Kingdom, north Africa, the Aegean and eastern Canada show that, within the limits of this study, the WVSS-II hygrometer agrees well with the GE and the Buck in most situations".
  - In the conditions of the upper troposphere, the WVSS-f unit tended to show a wet bias.
  - Generally the WVSS-r compared to the WVSS-f shows closer agreement to the standard sensors although it appears to have a slower response to rapid changes in humidity. Both generally demonstrate response times adequate for the sampling rates used in AMDAR.
  - No significant degradation in the performance of either sensor was noticed throughout the trial.
  - When exposed to liquid water the WVSS-II v3 units show some limited but noticeable degradation in performance. When water particles emerge, an over-reading of WVSS-r can be interpreted as physically reasonable. The adiabatic heating of the impact air leads to a partial evaporation of the particles before the air enters the absorption chamber. However, the presence of water or ice particles always presents difficulties for all types of humidity sensors.
  - "In summary, the performance of the WVSS-II in these flights was very encouraging; the WVSS-II hygrometer appears to perform well in all conditions encountered, but there are significant shortcomings in the performance of both the inlets used. The standard, flush inlet appears unable to cope with very dry conditions and is likely to produce data with a serious wet bias in the upper tropopause/lower stratosphere (UTLS). There remains concern that the flush inlet may be susceptible to run-off in heavy rain. Flights are planned over the next month which should address this issue and confirm concerns about UTLS data. The Rosemount inlet, by contrast, appears to work well in very dry conditions but can be susceptible to liquid water under certain circumstances and, for operational use, WVSS-r data in the presence of liquid water should be removed. There are also some grounds to suspect a susceptibility to mineral aerosol but this requires further investigation. Investigation of an inlet capable

of providing reliable data both in the presence of liquid water and in the UTLS should be carried out”.

- 7.5 Whilst it is clear that there are still some performance issues with the WVSS-II v3 sensor, and in particular the mounting inlet system, the APMG believes that the following statements define the Panel’s current position in relation to the performance of the sensor:

*The WMO AMDAR Panel has, through its Members, been undertaking a scientific assessment and validation process of the method and operational suitability of the WVSS-II system designed for humidity measurement from an aircraft platform over a number of years and has extensively (on the technical level) contributed through its various developmental phases*

*In its third and current significant design update (WVSS-II Version 3), the scientific evidence, based on testing carried out in the laboratory and comparison with standard humidity measuring instruments during flight trials on research aircraft and the assessment of data derived from deployment on operational commercial aircraft, suggests that the sensor and the methodology employed are currently the best able to approach the measurement and data quality standards and also meet operational requirements specified by WMO Technical Commissions and the AMDAR Panel.*

*The WMO AMDAR Panel is currently working towards incorporating this information and position into WMO guidance and regulatory material.*

*At the current time, the WMO AMDAR Panel is not aware of any other sensor, either being developed or manufactured, that is able to adequately meet the required performance standards for this specialized meteorological measurement application.*

- 7.6 In the light of these results and the previous laboratory and comparative field tests that have been completed, the APMG agreed that the Panel can have sufficient confidence in the WVSS-II v3 system’s performance to recommend that Members should seek to implement water vapor measurement within their operational AMDAR programmes.

- 7.7 Additionally, the APMG agreed that there are significant efficiencies and advantages to be derived for and on behalf of Members, if the process of AMDAR water vapor measurement implementation is carried out under the umbrella of an international project approach including:

- Presentation to the airline industry of a united and global approach and increased potential for promotion to aviation;
- Promotion of an idea about a direct use of the humidity information in the cockpit for:
  - an improved icing warning or switching before the real deicing emerges;
  - an economic shut-down of the de-icing during dry conditions;
- A serial integration of the humidity measurement on commercial aircraft could be achieved;
- A strategic, international approach to the obtaining of Supplemental Type Certificates (STC) for the sensor so as to minimize costs and maximize the potential for transferal and utilization;

- Sharing of results, procedures, documentation, information on benefits and impacts, approaches and input to business cases, etc;
  - Potential for costs reduction of sensors.
- 7.8 The APMG reaffirmed the need, as requested by the Panel, for the Secretariat to write to PRs of operational AMDAR Programmes and ascertain their interest in participating in such a project. The APMG suggested that, in addition to requesting information on existing plans for WVSS-II installation, this should include a request for information regarding the composition of operational fleets, the composition of projected operational fleets in the future and current and potential future requirements for STCs.
- 7.9 The APMG requested The Secretariat, Dr Hoff and Mr Helms work together towards the compilation of a draft strategic plan for water vapor measurement implementation that might be considered for endorsement and participation by the Panel and its Members.
- 7.10 In light of its importance and the Panel's limited knowledge in relation to the processes, requirements and international variations associated with the obtaining of STCs, the APMG requested the Secretariat to approach the manufacturer regarding the possible compilation of a working document that provides definitive information on these matters, including the current status of STC certification of the WVSS-II.
- 7.11 The APMG also requested that Mr Frank Grooters and Mr Carl Weis approach relevant USA airline contacts for information and statements regarding the impact of water vapor measurement programmes and data on airline operations (see also the relation with item 3.15).

### **Turbulence Activities**

- 7.12 The APMG met with Dr Tammy Farrar from the USA Federal Aviation Authority (FAA) and discussed two key topics. Firstly, the turbulence technical workshop to be held in conjunction with the Joint Meeting in Boulder in November 2012; and secondly, the status of the turbulence monitoring and prediction programme in the USA and its possible extension internationally within the AMDAR system.
- 7.13 It was agreed that a one day workshop on turbulence would be held prior to the AMDAR Panel Meeting on Monday 5 November, with the content to be agreed upon between the Panel and the presenters, which would come mainly from representative experts from the FAA and the National Centre for Atmospheric Research (NCAR). The key topics currently under consideration for focus include:
- History of EDR: motivation for its use and technical/theoretical description.
  - Refresh and update on the FAA/UCAR EDR monitoring and prediction (M&P) program.
  - Plans for extension of the EDR M&P program.
  - The EDR index/categorization system and its use.
  - Modeling application of EDR (both for aviation and meteorology).
  - Benefits and impacts of the M&P program.
  - Airline involvement and testimony of benefits and impacts.

- Scientific work on turbulence elsewhere.
- Possibilities and potential for internationalization of the EDR M&P program.

7.14 The APMG formally requested that the FAA and NCAR provide the Panel with a full specification of EDR that includes all equations and monitoring algorithms necessary to incorporate into existing AMDAR software specifications and, additionally requested that Dr Farrar provide a proposal for delivery of a software package to the Panel that might be utilized for implementation and testing within an airline fleet outside the USA. Dr Farrar explained that such a software package would require some tuning particular to the candidate aircraft and avionics and would likely require some expert consultancy from USA experts to the participating airline in order to ensure correct configuration.

### **Meeting with ARINC**

7.15 The APMG met with Ms Jeannine Hendricks and Mr Daniel Shea from ARINC to discuss various aspects of ARINC's involvement in the AMDAR Programme.

7.16 The Aeromexico programme requirements were discussed and ARINC agreed to progress towards the provision to WMO of a proposal and costing for data service provision. ARINC was requested to investigate what specification of requirements was being adhered in the development of the Aeromexico AMDAR software and the APMG requested that the ARINC 620 Meteorological Report version 4 should be adhered to if possible. There would be an eventual requirement to comply with ARINC 620 Meteorological Report version 5, particularly with the future potential and desirable deployment of water vapor sensors. It was also requested of ARINC that the proposal submitted should incorporate the costed option of optimization of the Aeromexico fleet.

7.17 The APMG informed ARINC of an issue with the ARINC BUFR encoding process, whereby aircraft IDs generated that are sometimes replicating European aircraft IDs, which causes a problem for monitoring systems. It was agreed that when the Aeromexico encoding was added for delivery to NOAA, the ARINC MDCRs encoder needs to have a look up table of "used" identities to ensure that replications do not occur in the future. The APMG suggested that, ideally, Aeromexico identities should be discernible from USA MDCRS identities and conform to a recognizable pattern, e.g. MXxxxxxx.

7.18 The APMG invited ARINC to participate in the next AMDAR Panel session and requested ARINC present a paper on their optimization module and its operation.

7.19 It was agreed that:

- The Secretariat would send to ARINC a list of national aircraft ID formats used by each country.
- ARINC would provide a costed proposal to WMO for provision of AMDAR communication services for Aeromexico;
- ARINC will establish an agreement with participating air carriers to compensate them for their participation and communications costs;
- ARINC will verify the software specification to be implemented by Aeromexico;
- ARINC will investigate how to best handle the aircraft identity replication issue;

- ARINC will look into what bilateral agreements are needed to enable dissemination and use of Aeromexico data to WMO/SMN/ARINC;
- ARINC would liaise with the FAA for use of the ATS Server for adding these additional carriers, including Aeromexico;
- ARINC will carry out some investigations into optimizing opportunities and resources in relation to STCs for WVSS-II.

## **8 TRAINING AND OUTREACH ACTIVITIES**

### **8.1 Potential development of COMET Training Module:**

8.1.1. The APMG met with Dr Tim Spangler, Director of COMET (UCAR) to discuss the concept of and the possibilities approaches to the development of a COMET module for the AMDAR Programme. The APMG explained that such a module might have a focus for potentially three audiences, namely, AMDAR Programme developers, AMDAR data users and airlines and aviation industry representatives wanting to learn about the programme. Dr Spangler suggested that there was certainly potential for addressing these aspects with the development of a module and agreed to provide a draft proposal to the APMG.

### **8.2 WMO AMDAR Panel Newsletter**

8.2.1. The Secretariat reported on the successful production of the first quarterly WMO AMDAR Panel Newsletter that was published online and circulated by email in February 2012. The Secretariat had developed an online site to accommodate the Newsletter, along with facilities to provide notification of ad hoc news and events. The site is currently located at: <https://sites.google.com/a/wmo.int/amdar-news-and-events/> but is likely to be mapped to the AMDAR site within the wmo.int domain. The APMG agreed that the newsletters produced in the future should take advantage of the collaborative aspects of the News and Events website and that the Training and Outreach Sub-Group in cooperation with the Secretariat should be responsible for the coordination of the production and editing.

### **8.3 Review Mexico AMDAR Regional Workshop**

8.3.1. The APMG agreed that the Mexico Regional AMDAR Workshop had been very successful and well organized by the host country. The Secretariat advised that the presentations from the meeting had been made available online via the newly developed AMDAR Projects and Collaboration website hosted by WMO. The Workshop Programme was available at: [http://www.wmo.int/amdar/AMDARMeetings\\_000.html](http://www.wmo.int/amdar/AMDARMeetings_000.html)

8.3.2. The workshop presentation team sought feedback from the workshop participants on the effectiveness and content of the workshop and the following points were made:

- A useful addition to the material available to NMHS managers contemplating AMDAR Programme implementation would be a decision matrix that sets out the benefits of AMDAR as an observing system and how in particular it might benefit their own composite observing system.
- The Workshop was very useful for establishing relevant contacts in other NMHSs and particularly the USA National Weather Service from a Mexican perspective.

- It was particularly useful to have had contact and dialogue with airlines prior to the workshop.
- The input provided to the workshop by airline representatives with experience in AMDAR development and implementation was very welcome and useful and it would be advantageous to have more of this content.
- The timing of the workshop was particularly advantageous to Mexico given its plans for NWP development.
- Ideally, there would have been more participation from Central American and Caribbean NMHSs and Airlines.

8.3.3. The Secretariat has the following points to make in relation to the coordination and content of the workshop:

- There was possibly too much technical content and perhaps delivered at a level that may have overwhelmed some participants.
- There was some repetition within the presentations that might be reduced in the future through a better process of coordination of the content and better adherence to the topics to be covered.
- Future workshops could likely be delivered with fewer presenters, although the participation of representatives of experienced airlines was well received and could be expanded, at least in terms of content.
- The workshop required a greater focus on establishing relationships with airlines and NMHSs, although, in the case of Mexico, this was already well-established.
- Better and more advanced knowledge of the participants involved would have been preferred so as to be able to have greater fore-knowledge of the status of relationships of airlines and NHMSs and the existing potential for development.
- Having made the presentations available online, it might be possible for presenters to be requested to add voice content to the material, thus making available to those with an interest in AMDAR, a complete online package.
- The Panel should in the future consider the input and advice of the WMO Education and Training Office.

8.3.4. An important outcome from the workshop was that a plan had been put in place to advance the Aeromexico AMDAR Programme and, subsequently, discussions between the Secretariat, ARINC and Servicio Meteorológico Nacional (SMN) had taken place in relation to software development and the contractual requirements for the programme. It was agreed that the Panel would provide the financial support necessary to ensure start up of the programme utilizing funds provided by the USA through the Voluntary Cooperation Programme. Support for the development and implementation of this programme will continue to be provided by the Panel and the Secretariat.

8.3.5. The Panel currently has no plans and has received no specific requests for future workshops.

## **9 USE OF GOOGLE SITES ON WMO.INT AS FOCUS FOR COLLABORATIVE WORK AND PROJECT/TASK DOCUMENTATION**

- 9.1 The Secretariat reported on the construction of an online facility that might be utilized by the Panel as a collaborative and documentation tool for the purposes of the work of the Panel and the sharing of information between Members. The site, which, like the News and Events site is based on the Google Sites framework and hosted within the WMO internet domain, has features and functions from the “wiki” concept and has already been populated with some AMDAR related information to demonstrate its capabilities. The site has multi-editor functionality and a user system that allows both limited sharing of information or full World Wide Web publication on a page-by-page basis. The Secretariat will provide more information to Members regarding location and access when WMO authorization and some IT details are finalized.

## **10 ET-AIR BUSINESS**

### **Work Plan, Terms of Reference and Reporting to ICT-IOS and CBS**

- 10.1 Given the discussions and the associated implications noted within agenda item 6, the APMG elected to leave further work on the division of work between the Panel and ET-AIR until the new structure of the Aircraft Observing System programme is more evolved. In the lead up to the ICT-IOS meeting in May 2012, the APMG will endeavor to develop recommended Work Plans and Terms of Reference for the relevant WWW Technical Commission teams that are recommended to be formed under the proposed structure. Based on the outcomes of ICT-IOS, the next meeting of the APMG will assist the ET-AIR and ICT-IOS Chairs in compilation of input to the ICT-IOS report to CBS.

### **Support and Contribution to the WIGOS Implementation Plan**

- 10.2 The APMG will seek to ensure that all future work plans incorporate a contribution to the WIGOS Implementation Plan.

### **Capabilities of the Aircraft Observing System for the CBS Rolling Review of Requirements**

- 10.3 The consolidated work plan of the Panel and ET-AIR now includes a task to provide input and assistance to ET-EGOS in the relevant aspects of the RRR process and to define the capabilities of the Aircraft Observations System for input into the Database of Observing Systems Capabilities.

## **EGOS-IP**

- 10.4 The Secretariat reported to the APMG that the review made by the Panel, of the Evolution of Global Observing Systems Implementation had been consolidated by the Secretariat and further reviewed by the APMG subsequently to the Joint Meeting (2011). The review has now been provided to ET-EGOS via the Secretariat and will be presented to ET-EGOS-7 by the ET-AIR Chair.

## **11 ANY OTHER BUSINESS**

### **AMDAR Panel Management Group Session 4**

- 11.1 The APMG decided that, given the importance of issues relating the transition of AMDAR to WMO and programme governance, it would be necessary to hold an AMDAR Panel Management Group meeting in the 3<sup>rd</sup> quarter of 2012. The meeting was scheduled for 27 to 29 August 2012 to take place in De Bilt, Netherlands. In addition to the transition and governance issues and the status of the Work Programme, other high priority agenda items would be the AMDAR Panel Meeting Session 15, turbulence and water vapor sensing.

### **Collaboration with SITA**

- 11.2 The Secretariat reported on two recent meetings with aviation service provider, SITA and the company's approach to WMO and the Panel regarding possible applications for AMDAR under their new business model of a remote IT platform structure for service delivery and applications access by customers. A presentation provided by SITA was presented to the APMG by the Secretariat and the proposal contained therein was discussed. The APMG agreed that the suggested solution for wider SITA involvement in the AMDAR Programme had advantages, including: the possibility of a largely "turn-key" solution for AMDAR data optimization, delivery and display; an opportunity to take advantage of SITA's established and respected relationship with their aviation clients; a likely reduction in the requirements for NMHS and airline liaison in the establishment of new AMDAR Programmes; a reduction in the requirement for NMHS computing infrastructure to support data communications; and, an opportunity to more firmly establish AMDAR as a standard aviation product. However, it was pointed out that such a model would be required to take into account the requirements of NMHSs to ensure that both software and data continued to meet prescribed quality standards and functionality.
- 11.3 The APMG requested that the Secretariat approach SITA to obtain a more formal proposal for a Pilot Project that would demonstrate the business model and concept for AMDAR. Such a project should ideally include demonstration of the data delivery, optimization and data display functions and possibly be accomplished by working with an existing programme and paralleling its operation. In addition, the project might possibly include the end-to-end inclusion of a new programme with a partner airline and NMHS.

### **AEEC DataLink User Forum**

- 11.4 The APMG discussed the need for the Panel to continue to engage with aviation industry groups and organizations in the interests of AMDAR promotion and standardization and, in particular, the need to be represented at the AEEC Data Link Users Forum (DLUF) meetings that generally occurred twice a year, once in Europe and another in the USA. It was agreed that the Panel should establish a group of USA and European AMDAR Members that might be called upon to represent the Panel and the AMDAR community's interests at these meetings. The Secretariat agreed to maintain a list of meetings and dates and to coordinate attendance.

### **AMS Washington Forum**

- 11.5 The Panel had been requested by ET-AIR Associate Member HMEI representative, Bryce Ford for input into the "Economic Benefits of the Weather and Climate Enterprise" Panel for the upcoming American Meteorological Society (AMS) Washington Forum

(AWF). The APMG was informed that Dr Axel Hoff had provided two slides promoting the advantages of humidity measurements on commercial aircraft platforms.

## **12 CLOSURE OF THE SESSION**

The Meeting closed at 3pm on 2 March 2012.

---

## APPENDIX I

### LIST OF PARTICIPANTS

<b>NETHERLANDS</b> <b>Frank GROOTERS</b> <b>(Chair)</b>	Prunuslaan 17 NL-3723 WC Bilthoven The Netherlands Tel : +31 30 229 3250 Mob : +31 6 1122 5867 Email : <a href="mailto:fgrooters@gmail.com">fgrooters@gmail.com</a>
<b>USA</b> <b>Carl WEISS</b> <b>(Vice-chair)</b>	NOAA - National Weather Service 1325 East-West Highway 20910 SILVER SPRING MD United States of America Fax: +1 301 713 1520 Tel: +1 301 713 1726-149 Email: <a href="mailto:carl.weiss@noaa.gov">carl.weiss@noaa.gov</a>
<b>GERMANY</b> <b>Axel HOFF</b>	Deutscher Wetterdienst Frankfurter Strasse 135 D-63067 OFFENBACH AM MAIN Germany Fax: +49 69 8062 3827 Tel: +49 69 8062 2852 Email: <a href="mailto:axel.hoff@dwd.de">axel.hoff@dwd.de</a>
<b>SWEDEN</b> <b>Stig CARLBERG</b>	Swedish Meteorological and Hydrological Institute (SMHI) SE-601 76 NORRKOEPING Sweden Tel: +46-31-7518976 Email: <a href="mailto:Stig.Carlberg@smhi.se">Stig.Carlberg@smhi.se</a>
<b>USA</b> <b>David HELMS</b>	National Weather Service International Activities SSMC2, Room 11104 20910 SILVER SPRING MD United States of America Fax: Tel: Email: <a href="mailto:david.helms@noaa.gov">david.helms@noaa.gov</a>
<b>USA</b> <b>Lars-Peter RIISHOGJAARD</b>	JSCDA, Joint Center for Satellite Data Assimilation 5200 Auth Road 20746 Camp Springs Maryland United States of America Fax: +(1 301) 763 8149 Tel: +(1 301) 763 8172, ext. 191 Email: <a href="mailto:lars.p.riishojgaard@nasa.gov">lars.p.riishojgaard@nasa.gov</a>

## APPENDIX I

### LIST OF PARTICIPANTS

<b>WMO</b> <b>Dean LOCKETT</b>	World Meteorological Organization 7 bis, avenue de la Paix Case postale No. 2300 CH-1211 2 GENEVA Switzerland Fax: +41-22-7308021 Tel: +41-22-7308323 Email: <a href="mailto:dlockett@wmo.int">dlockett@wmo.int</a>
-----------------------------------	--

---

## APPENDIX II

### AMDAR Panel Session 14 and ET-AIR Session 3 Actions with progress and Action from APMG-3

Agenda Item	Action	Responsibility	Deadline	Progress & Further Action (APMG-3)	Updated Deadline
3.4	<ol style="list-style-type: none"> <li>1. Consult with appropriate managers on the future support of the ESRL/GSD AMDAR Display system;</li> <li>2. Ascertain the possibility of an update to the system to allow national aircraft IDs to be used.</li> </ol>	Mr David Helms	Q3 2012 (AMDAR Management Group Session 4)	<p>No progress.</p> <ol style="list-style-type: none"> <li>1. David Helms to progress existing actions.</li> <li>2. Chairman to seek to progress these actions at the AMDAR Panel Data Management Workshop.</li> <li>3. The AMDAR Panel to consider the derivation of a policy on the specification and use of aircraft IDs.</li> </ol>	<p>Q3 2012</p> <p>See Work Programme (4.2.1)</p>
4.2	<ol style="list-style-type: none"> <li>1. Emirates Airline to be approached regarding the development of an AMDAR Programme.</li> <li>2. Investigate the possibility of Bahrain or Oman taking responsibility for Middle East AMDAR Programme development</li> </ol>	Chairman	Q4 2012	<p>No progress.</p> <ol style="list-style-type: none"> <li>1. Chairman to write generic letter to appropriate PRs and contacts through the Secretariat.</li> </ol>	<p>Q4 2012</p> <p>See Work Programme (1.1.2)</p>
4.2	<ol style="list-style-type: none"> <li>1. Investigate methods for determining the potential for targeted data provision.</li> <li>2. Investigate resource options for funding targeted data programmes.</li> </ol>	AMDAR Panel Management Group	Q4 2012	<p>No progress.</p> <ol style="list-style-type: none"> <li>1. SO/ARO to request AMDAR Programme Managers to provide their potential for provision of targeted data.</li> <li>2. SO/ARO to compile a report for the Joint Meeting.</li> </ol>	<p>Q4 2012</p> <p>See Work Programme (1.1.2)</p>

## APPENDIX II

### AMDAR Panel Session 14 and ET-AIR Session 3 Actions with progress and Action from APMG-3

Agenda Item	Action	Responsibility	Deadline	Progress & Further Action (APMG-3)	Updated Deadline
4.2	Update the ToR to reflect closure of High Priority Pilot Projects.	Chairman	Q1 2012	Completed. No changes were required. 1. Chairman to present ToR (for other changes approved by APMG-3) to Joint Meeting 2012.	Q4 2012  See Work Programme (6.1)
4.3	Letter to Météo France and E-AMDAR requesting financial support for B777 software development.	Chairman	Q4 2012	1. Chairman and SO/ARO to discuss the development and cost-sharing with E-AMDAR and Météo France representatives at the E-TAG meeting in De Bilt (March 2012); 2. Chairman to take appropriate action to advance the software development and report to APMG-4.	Q3 2012  See Work Programme (4.3.3)
4.3	Address issue of B777 software ownership and ensure that Panel has all necessary rights to make use of it (ownership).	AMDAR Panel Management Group	Q1 2012	1. Chairman and SO/ARO to discuss ownership issue at E-TAG (March 2012); 2. Chairman to report to Joint Meeting 2012.	Q4 2012  See Work Programme (4.3.3)
4.5	Approach COMET re possibility of development of training modules for AMDAR.	SO/ARO	Q1 2012	This action was addressed at the APMG-3 meeting where the APMG met with Mr Tim Spangler of COMET to discuss potential for development of COMET AMDAR training modules.  1. SO/ARO to receive proposal from COMET and report to APMG-4.	Q3 2012  See Work Programme (5.1.3)

## APPENDIX II

### AMDAR Panel Session 14 and ET-AIR Session 3 Actions with progress and Action from APMG-3

Agenda Item	Action	Responsibility	Deadline	Progress & Further Action (APMG-3)	Updated Deadline
4.5	<ol style="list-style-type: none"> <li>1. Newsletter Template and Submissions Form to be sent to Coordinator TOSG;</li> <li>2. Investigate editorial expertise and assistance that might be available to the Panel from within WMO.</li> </ol>	SO/ARO	Q1 2012	<p>Completed.</p> <p>No further action.</p>	NFA
4.6	Review the status of WMO guidance material relating to water vapour sensing on Aircraft Meteorological Stations	AMDAR Panel Management Group	Q4 2012	<p>Dr Axel Hoff has completed an update of the CIMO guide on water vapor sensing and submitted to WMO/OBS/OSD/Isabelle Reudi for review.</p> <ol style="list-style-type: none"> <li>1. Dr Hoff to present the update to the Joint Meeting and report on progress.</li> </ol>	<p>Q4 2012</p> <p>See Work Programme (4.1.1.5)</p>
4.6	Consider case and processes necessary for an international collaborative approach to water vapor sensing implementation	AMDAR Panel Management Group	Q1 2012	See item 7 and Work Programme.	See Work Programme (2.1.1)
4.6	Formal approach to FAA to be made through Dr Tammy Farrar for provision to the Panel of the standard EDR algorithm and, if possible a software package or specification.	SO/ARO	Q2 2012	<p>The APMG met with Dr Farrar during APMG-3 and the APMG requested that Tammy Farrar provide a proposal for the provision of the algorithms and software.</p> <p>For further actions, see Work Programme item 2.2.1.</p>	See Work Programme (2.2.1)

## APPENDIX II

### AMDAR Panel Session 14 and ET-AIR Session 3 Actions with progress and Action from APMG-3

Agenda Item	Action	Responsibility	Deadline	Progress & Further Action (APMG-3)	Updated Deadline
4.7	Incorporate suggested and discussed changes to the EGOS-IP and submit to the APMG for review.	SO/ARO	Q1 2012	Completed.	NFA
4.7	Review and finalise update to EGOS-IP and submit to ET-EGOS.	APMG	Q1 2012	Completed. 1. Chairman to present EGOS-IP review to ET-EGOS-7, May 2012.	Q2 2012
4.7	Review and finalise Aircraft Observations Programme Work Plan	APMG	Q1 2012	Completed. See Appendix III No further action.	NFA
4.7	Review and finalise 2012 Budget	APMG	Q1 2012	Completed. See Appendix IV No further action.	NFA
5.3	Contact CBS to determine options and issues associated with the amalgamation of the Panel with the ET, particularly taking into account maintenance of the Panel work programme and the authority for use of the Trust Fund.	AMDAR Panel Chairman	Q4 2012	See item 6 and Work Programme.	See Work Programme (6.2)

## APPENDIX III

### WMO AMDAR PANEL AND CBS/ET-AIR AIRCRAFT OBSERVING SYSTEM PROGRAMME PLAN

#### 2012 Work Programme and Medium-term Plan

#### Long-term Plan to 2025

<b>VERSION</b>	1.0
<b>DATE</b>	8 March 2012
<b>STATUS</b>	Approved (APMG-3)

**APPENDIX III**  
**WMO AIRCRAFT OBSERVING SYSTEM WORK PROGRAMME 2012 AND MEDIUM-TERM PLAN**

Core and L-T Activity	M-T Activity	Description	Pty (1-3)	2012 Activities	Responsibility	Commence	Complete	Status	Outputs / Deliverables	2012 Budget Estimate	2013 Budget Estimate
1.1 (Enhancement of AMDAR Observing System Coverage - Extend global AMDAR coverage)	1.1.1	Study on data coverage and airline capabilities	1	1. Award SSA	1. APMG	Q1 2012	Q4 2012	Commenced	SSA in place	40K	
				2. Manage SSA	2. SO/ARO	Q4 2011	Q4 2012	TBC	Nil		
				3. Review deliverables.	3. SO/ARO, A-FPs, (APMG)	Q1 2012	Q4 2012	TBC	1. Study on Coverage; 2. Study on airlines; 3. Report.		
	1.1.2	Development of AMDAR Programmes for: <ul style="list-style-type: none"> <li>• Northern Africa;</li> <li>• South and Central America;</li> <li>• Southwest Pacific</li> <li>• Eastern Europe;</li> <li>• Middle East</li> <li>• Central Africa.</li> </ul>	1	1. Organise finance for AeroMexico programme.	1. APMG, SO/ARO	Q4 2011	Q2 2012	Commenced	1. Contract with AeroMexico	50K	
			2	2. Determine potential for data targeting over Africa	2. APMG	Q1 2012	Q3 2012	TBC	1. Report to APMG-4		
			2	3. Determine what capacity there is to use targeted data in Africa	3. APMG	Q1 2012	Q3 2012	TBC	1. Report to APMG-4		
			2	4. 1 or 2 members of the Panel to undertake fact-finding mission to Africa re programme potential	4. APMG	Q1 2012	2013	TBC	1. Report to Panel-15		10K
			3	5. Investigate approach for Emirates AMDAR Programme commencement – assess possibilities for Bahrain, Oman: <ul style="list-style-type: none"> <li>• Write generic letter to appropriate PRs and contacts through the Secretariat.</li> </ul>	5. F.Grooters	Q1 2012	Q4 2012	TBC	1. Report to APMG-4		
				6. Write to WMO Regional Association I	6. F.Grooters				2. Letter to 3. Report to APMG-4		

### APPENDIX III

Core and L-T Activity	M-T Activity	Description	Pty (1-3)	2012 Activities	Responsibility	Commence	Complete	Status	Outputs / Deliverables	2012 Budget Estimate	2013 Budget Estimate
	1.1.3	Improve and extend Targeted Data Activities	2	All programmes to identify potential for data targeting within their programs. 1. Request info from A-FPs 2. Submit information 3. Analyse data 4. Report to APMG-4	1. SO/ARO 2. A-FPs (Operational) 3. SO/ARO 4. SO/ARO	Q1 2012	Q3 2012	TBC	1. Report to APMG-4		
	1.1.4	Develop guidelines for programme development	2	1. Write DoW 2. Review and approval 3. Compilation of Guidelines	1. SO/ARO 2. APMG 3. SSA or A-FPs?	Q1 2012	Q3 2012	TBC	1. DoW		
	1.1.5	Contribute to the WMO/CBS RRR Process	1	Develop a methodology for defining the required capabilities for inclusion in the RRR database. Provide data for input to the RRR Obs Systems Capabilities database	SO/ARO	Q3 2011	Q2 2012 2013	TBC	1. Input in the RRR Database SoR document. 2. Input in the RRR OSC Database		
1.2 (Enhancement of AMDAR Observing System Coverage - Address the requirement for national, regional and global optimization)	1.2.1	Develop optimization systems for: • United States AMDAR Programme; • Asia; • Africa; • South America.	2	1. Study on optimization for Sth Africa AMDAR Programme 2. Study on optimization for US AMDAR Programme (MDCRS) 3. Report on Australian Data Optimisation System 4. SITA Optimisation Development	1. SO/ARO, G.Khambule 2. SO/ARO, D. Helms 3. SO/ARO, A-FP-Australia 4. SO/ARO seek Pilot Project proposal from SITA.	Q2 2012	Q3 2012	TBC	1. Report to APMG-4 2. Report to Panel-15 3. Report to APMG-4 4. Report to APMG-4		
2.1 (Extension of the AMDAR System - Implement water	2.1.1	Implement water vapour sensing measurement	1	1. Investigate Panel ownership of general STC for Airbus 320 family.	1. A.Hoff	Q1 2012	Q3 2012	TBC	1. Report to APMG-4		

**APPENDIX III**

Core and L-T Activity	M-T Activity	Description	Pty (1-3)	2012 Activities	Responsibility	Commence	Complete	Status	Outputs / Deliverables	2012 Budget Estimate	2013 Budget Estimate
vapour sensing measurement)			1	2. Investigate Panel ownership of general FAA STCs for Boeing 737 types and conversion to European EU/EASA certification.	2. A.Hoff/Y. Lemaitre	Q1 2012	Q3 2012	TBC	1. Report to APMG-4		
			1	3. Write a letter to PRs seeking interest in international project for WV implementation	3. SO/ARO	Q1 2012	Q2 2012	TBC	1. Letters to PRs		
			2	4. Request SSI to provide a "dynamic" document on STC status, issues and processes	4. SO/ARO	Q2 2012 (APMG-3)	Q4 2012	TBC	1. Document on STCs		
			1	5. Draft a strategic plan for WV implementation	5. SO/ARO, A.Hoff, D.Helms	Q2 2012 (APMG-3)	Q3 2012	TBC	1. Draft Strategic Plan.		
			2	6. Obtain statements of impact of WVSS-II on airline operations from USA airlines.	6. F. Grooters	Q2 2012 (APMG-3)	Q3 2012	Commenced	1. WVSS-II airline impact statements		
2.2 (Extension of the AMDAR System - Implement turbulence measurement)	2.2.1	Implement turbulence measurement	1	1. Obtain specification for EDR from FAA	1. SO/ARO	Q1 2012	Q3 2012	TBC	1. EDR Specification	10K	
			1	2. Obtain EDR software package from FAA for use in E-AMDAR	2. SO/ARO	Q1 2012	Q3 2012	TBC	2. EDR Software		
4.1 (Development and Maintenance of the Aircraft Observing System Quality Management System - Implement a Quality	4.1.1	WIGOS Pilot Project for AMDAR	1	1. WIGOS-PP-AMDAR-1 Development of BUFR Template: <ul style="list-style-type: none"> <li>• Coordinate validation;</li> <li>• Report to Code Group</li> <li>• Report to APMG-3;</li> <li>• Report to JM-4</li> </ul>	1. SO/ARO ECMWF/Met Office	Q4 2011	Q1 2012	Commenced	1. Validated template		

**APPENDIX III**

Core and L-T Activity	M-T Activity	Description	Pty (1-3)	2012 Activities	Responsibility	Commence	Complete	Status	Outputs / Deliverables	2012 Budget Estimate	2013 Budget Estimate
Management Framework for AMDAR)			1	2. WIGOS-PP-AMDAR-2 Metadata Development: <ul style="list-style-type: none"> <li>• AP-FPs and Review Group to review Metadata sets;</li> <li>• D..Helms to review and define metadata categories;</li> <li>• AP-FPs and Review Group to Review in preparation for AMDAR DM Workshop</li> </ul>	2. PL-IDEQC, SO/ARO, AP-FPs  Review Group: SO/ARO, N.Halsey, D.Helms, J.v.d.Meulen,	Q4 2011	Q3 2012	Commenced	1. Refined metadata set; 2. Categorised metadata set. 3. PL-IDEQC report to APMG-4		
			1	3. WIGOS-PP-AMDAR-3 Develop AMDAR Data Management Procedures: <ul style="list-style-type: none"> <li>• Hold a workshop of AMDAR data management experts in Q2 2012 (Geneva);</li> <li>• Develop a strategy for global AMDAR data management;</li> <li>• Address data display issues;</li> </ul>	3. J.v.d.Meulen, APMG	Q1 2012	Q4 2012	TBC	1. AMDAR Data Management Workshop; 2. Global AMDAR Data Management Strategy.	15K	

**APPENDIX III**

Core and L-T Activity	M-T Activity	Description	Pty (1-3)	2012 Activities	Responsibility	Commence	Complete	Status	Outputs / Deliverables	2012 Budget Estimate	2013 Budget Estimate
			1	4. WIGOS-PP-AMDAR-4 Validation and Inter-comparison of WVSS-II: <ul style="list-style-type: none"> <li>• Paper on summary of results and conclusions:                             <ul style="list-style-type: none"> <li>• DoW</li> <li>• Award SSA</li> <li>• Manage SSA</li> </ul> </li> <li>• Seek endorsement by CIMO and CBS as a candidate system for operational deployment by Members;</li> <li>• Technique employed by the WVSS-II sensor should be appropriately integrated into the CIMO Guide and CBS guides.</li> <li>• Development of AMDAR Panel Statement of Support for WV implementation leading to WMO endorsement.</li> </ul>	4. APMG	Q1 2012	Q4 2012	TBC	1. DoW 2. SSA 3. Paper 4. Statement of Support	30K	

**APPENDIX III**

Core and L-T Activity	M-T Activity	Description	Pty (1-3)	2012 Activities	Responsibility	Commence	Complete	Status	Outputs / Deliverables	2012 Budget Estimate	2013 Budget Estimate
			1	5. WIGOS-PP-AMDAR-5: Update of AMDAR Reference Manual: 1. SSA to be compiled for: i) Review of WMO and AMDAR regulatory material ii). Integrate AMDAR RM into WMO regulatory material. I iii). Conduct a regulatory material review process as necessary to finalise item ii. 2. Review and update the CIMO Guide for water vapor sensing developments.	5. 1. APMG, SO/ARO 2. APMG 3. A.Hoff	Q1 2012	2005	TBC	1. DoW for SSA. 2. AMDAR System reviewed in WMO reg. material. 3. Draft AMDAR Implementation Manual 4. Update to CIMO Guide for water vapor sensing developments		40K
			1	6. WIGOS-PP-AMDAR-6 Generic Software Spec: 1. Manage SSA; 2. Review deliverables.	6. 1. SO/ARO; 2. Review group: SO/ARO, D.Helms, HR.Sonnabend, A.Hoff.	Q4 2011	Q3 2012	Commenced	1. Generic software specification.	40K	
4.1 (Development and Maintenance of the Aircraft Observing System Quality Management System - Implement a Quality Management Framework for AMDAR)	4.1.2	Establishment of National and International Metadata	2	1. Collection of metadata on AMDAR software to be completed	1. PL-IDEQC, SO/ARO, AP-FPs	Q1 2012	Q4 2012	TBC	1. Software metadata set		

**APPENDIX III**

Core and L-T Activity	M-T Activity	Description	Pty (1-3)	2012 Activities	Responsibility	Commence	Complete	Status	Outputs / Deliverables	2012 Budget Estimate	2013 Budget Estimate
4.2 (Development and Maintenance of the Aircraft Observing System QMS - Develop a National and Global Aircraft Observations Data Management Framework)	4.2.1	Develop a National and Global Aircraft Observations Data Management Framework	2	<ol style="list-style-type: none"> <li>1. Re NOAA/ESRL/GSD AMDAR data display determine: <ul style="list-style-type: none"> <li>• Future maintenance of and for this system</li> <li>• Possible change to use of national aircraft IDs</li> </ul> </li> </ol>	1. D.Helms	Q1 2012	Q3 2012	TBC	1. Report to APMG-4		
4.3 (Development and Maintenance of the Aircraft Observing System QMS - Standardise AMDAR software function across avionics systems and optional sensors across aircraft)	4.3.1	Update of ARINC 620 Meteorological Report to Version 5	1	1. Finalise ARINC 620 Met. Report Version 5	1. SO/ARO, A.Hoff, HR.Sonnabend, D.Helms	Q4 2011	Q3 2012	Commenced	1. ARINC 620 V5		
	4.3.2	Standardisation of AMDAR within Aviation	3	<ol style="list-style-type: none"> <li>1. Commence planning for an Aviation Industry event for 2013 re software implementation in new aircraft.</li> <li>2. Attend the Airlines Association of South Africa AGM, South Africa</li> </ol>	<ol style="list-style-type: none"> <li>1. APMG</li> <li>2. APMG</li> <li>3. G.Khambule, APMG</li> </ol>	Q1 2012	Q4 2012	TBC	<ol style="list-style-type: none"> <li>1. Report to Panel-15</li> <li>2. Report to Panel-15</li> <li>3. Report to Panel-15</li> </ol>		
	4.3.3	AMDAR Software Development	2	<p>B777 Software Development:</p> <ol style="list-style-type: none"> <li>1. Proposal of B777 software development to be made to Meteo-France and E-AMDAR at E-TAG (March 2012)</li> <li>2. Ownership issues to be addressed at E-TAG (March 2012)</li> <li>3. Chairman to report to Panel-15 (Q4)</li> </ol>	<ol style="list-style-type: none"> <li>1. F.Grooters</li> <li>2. APMG</li> </ol>	Q1 2012	Q4 2012	TBC	Letter to M-France and E-AMDAR	20K	

**APPENDIX III**

Core and L-T Activity	M-T Activity	Description	Pty (1-3)	2012 Activities	Responsibility	Commence	Complete	Status	Outputs / Deliverables	2012 Budget Estimate	2013 Budget Estimate
4.4 (Development and Maintenance of the Aircraft Observing System QMS - Manage the data processing and quality assurance for other sources of aircraft data)	4.4.1	Develop strategies for the management of ADS and Mode S data	2	Ensure item is addressed under 4.1.1(3): AMDAR Data Management Workshop	SO/ARO, J.v.d.Meulen	Q1 2012	Q3 2012	TBC	Report to APMG-4		
5.1 (Aircraft Observing System Training and Outreach - Develop methods and material for promoting Aircraft Observations)	5.1.1	Aircraft Observations System Website Maintenance	2	1. Review website.	2. C.Weiss, SO/ARO, Y.Lemaitre, J.v.d.Meulen	Q1 2012	Q3 2012	Commenced	1. Review report to APMG-3		
			3	2. Technical contractor to update website.	3. SO/ARO	Q2 2012	2013	TBC	1. SSA Website update plan 2. Website update commenced		40K
	5.1.2	Impacts and Benefits Document for Aviation	2	1. Identify contractors and obtain Eols and quotations 2. Award and manage SSA 3. Review deliverables 4. Write to USA and Australian airline contacts seeking evidence of AMDAR impacts and benefits.	1. APMG 2. SO/ARO, B.Ford 3. APMG 4. F.Grooters, SO/ARO	Q1 2012	2013	Commenced	1. SSA 2. Aviation Impacts and Benefits document 3. Nil 4. Examples of impacts and benefits.		40K
	5.1.3	AMDAR COMET Training Module	3	Contact COMET re development of a AMDAR course.	APMG(C. Weiss), SO/ARO	Q1 2012	Q1 2012	Commenced	Report to APMG-3		
	5.1.4	Impact Studies Assessment	3	Commission a paper summarizing results of AMDAR Impact studies including NWP and other Data Users	APMG, (ESRL, ECMWF, ABoM, MF, CMA,SAWS)	(Q2 2012)	(Q4 2012)	TBC	Commenced	30K	
	5.1.5	Attend Aviation Meetings	2	Panel to attend AEEC DLUF Meetings in Europe and USA	APMG	Q1 2012	Q42012	TBC	Report to Panel-15	4K	

**APPENDIX III**

Core and L-T Activity	M-T Activity	Description	Pty (1-3)	2012 Activities	Responsibility	Commence	Complete	Status	Outputs / Deliverables	2012 Budget Estimate	2013 Budget Estimate
5.2 (Aircraft Observing System Training and Outreach - Conduct training and outreach activities)	5.2.1	Aircraft Observations Newsletter production	2	Newsletters Q1, Q2, Q3, Q4	C-TOSG, SO/ARO, APMG, AP-FPs.	Q1 2012	Q4 2012	Commenced  Volume 1 published.	Newsletters Q1, Q2, Q3, Q4		
6	N/A	AMDAR Panel Admin	1	1. Update of AMDAR Panel ToR	APMG	Q1 2012	Q4 2012	Commenced	Updated ToR		
6	N/A	AMDAR Panel Admin	1	2. Manage and finalise the transition of the AMDAR Observing System to WMO	APMG	Q1 2012	Q4 2012	Commenced	Manage and complete the transition process of the AMDAR System to WMO.		
6.1 (Management and administration of the Aircraft Observing System Programme - Conduct meetings of members)	6.1.1	Organization of Panel Meetings	1	1. Confirm meeting location and date	APMG	Q1 2012	Q1 2012	Commenced	Location, dates	5K	
				2. Venue and meeting logistics	Host	Q2 2012	Q2 2012	TBC	Venue		
				3. Info for participants	Host	Q3 2012	Q3 2012	TBC	Info for participants		
				4. Doc Plan draft	APMG	Q3 2012	Q3 2012	TBC	Doc Plan Draft		
				5. Doc Plan	APMG, SO/ARO, A-FPs	Q3 2012	Q3 2012	TBC	Doc Plan		
				6. 2012 Panel Meeting	SO/ARO, (APMG)	Q4 2012	Q4 2012	TBC	2012 Meeting Report		
	6.1.2	Organization of AMDAR Panel Management Group Meetings	1	Organise and hold APMG Session 3	APMG, SO/ARO	Q1 2012	Q1 2012	TBC	APMG-3 Report	10K	
				Organise and hold APMG Session 4	APMG, SO/ARO	Q2 2012	Q3 2012	TBC	APMG-4 Report	5K	
6.2 (Management and administration of the Aircraft Observing System Programme - Coordinate planning activities)	6.2.1	Reporting and planning associated with ICT-IOS, CBS and ET-AIR	1	1. Finalisation of ET-Work Plan 2013 - 2016 2. ET-AIR Report to CBS	1. APMG 2. ET-AIR Chair	Q1 2012	Q3 2012	TBC	1. ET-AIR Work Plan Report to CBS 2.		
			1	3. Review of EGOS IP	3. APMG	Q4 2011	Q4 2011	TBC	3. Revision provided to ET-EGOS Chair-		

## APPENDIX III

### WMO AIRCRAFT OBSERVING SYSTEM CORE AND LONG-TERM ACTIVITIES

- 1 Enhancement of AMDAR Observing System Coverage.
  - 1.1 Extend global AMDAR coverage, particularly over upper air data sparse and developing areas.
  - 1.2 Address the requirement for national, regional and global optimization
  - 1.3 Extend AMDAR Programme to GA aircraft and coverage of regional airports.
- 2 Extension of the AMDAR System.
  - 2.1 Implement water vapour sensing measurement.
  - 2.2 Implement turbulence measurement.
  - 2.3 Implement icing indication.
- 3 Research and Development of New Aircraft Observations Technologies.
  - 3.1 Manage risks and opportunities associated with new and developing technologies in avionics, communications and metrology.
- 4 Development and Maintenance of the Aircraft Observing System Quality Management System.
  - 4.1 Implement a Quality Management Framework for AMDAR that incorporates standardization across national programmes, taking into account:
    - 1) Data management;
    - 2) Metadata management;
    - 3) Quality control for metrological systems;
    - 4) Systems and data monitoring and evaluation.
  - 4.2 Develop a National and Global Aircraft Observations Data Management Framework.
  - 4.3 Standardise AMDAR software function across avionics systems and optional sensors (e.g. water vapour) across aircraft.
  - 4.4 Manage the data processing and quality assurance for other sources of aircraft data transmitted on the GTS including data provided through ICAO.
- 5 Aircraft Observing System Training and Outreach.
  - 5.1 Develop methods and material for promoting Aircraft Observations and the AMDAR Programme.
  - 5.2 Conduct training and outreach activities in support of Core Activities.
- 6 Management and administration of the Aircraft Observing System Programme
  - 6.1 Conduct meetings of members and stakeholders.
  - 6.2 Coordinate planning activities.
  - 6.3 Monitor and evaluate the Aircraft Observations Programme.

**WMO AIRCRAFT OBSERVING SYSTEM CORE AND LONG-TERM ACTIVITIES**

<b>Core Activity</b>	<b>Long-term Activity</b>	<b>Description</b>	<b>Activities</b>	<b>Outputs</b>	<b>Outcomes/Impacts</b>	<b>Justification</b>	<b>Priority (1-3)</b>	<b>Timeframe</b>
1	1.1	Extend global AMDAR coverage, particularly over upper air data sparse and developing areas.	<ol style="list-style-type: none"> <li>1. Regional and national workshops;</li> <li>2. Training and Outreach;</li> <li>3. Liaison with NMHSS, Airlines and Avionics service providers;</li> <li>4. Liaison with stakeholders and data users;</li> <li>5. Studies on data coverage and airline capabilities;</li> <li>6. Assessment and use of impact studies;</li> <li>7. Facilitate, coordinate and promote data provision among and outside AMDAR programmes.</li> </ol>	<ol style="list-style-type: none"> <li>1. AMDAR Workshops;</li> <li>2. AMDAR training materials;</li> <li>3. Extension of AMDAR expertise;</li> <li>4. Results and reports of studies;</li> <li>5. AMDAR data provided beyond national AMDAR Programme requirements.</li> </ol>	<ol style="list-style-type: none"> <li>1. More airlines recruited;</li> <li>2. More national AMDAR programmes;</li> <li>3. Better AMDAR global data coverage;</li> <li>4. Significant, positive impact on applications and for Data Users.</li> </ol>	WMO-ER-4	1	Ongoing to 2025
1	1.2	Address the requirement for national, regional and global optimization	<ol style="list-style-type: none"> <li>1. Promote the implementation and use of AMDAR Data Optimisation Systems;</li> <li>2. Specification of AMDAR data requirements;</li> <li>3. Specification of optimization requirements;</li> <li>4. Liaison with WMO/CBS/E-EGOS.</li> </ol>	<ol style="list-style-type: none"> <li>1. Studies and reports</li> <li>2. Specifications</li> <li>3. Optimised AMDAR Programmes</li> </ol>	<ol style="list-style-type: none"> <li>1. More efficient use of Member resources</li> <li>2. Improved AMDAR data coverage</li> </ol>	WMO-ER-4	1	Ongoing to 2025
1	1.3	Extend AMDAR Programme to GA aircraft and coverage of regional airports.	<ol style="list-style-type: none"> <li>1. Research, trial and study of new and developing aircraft observing systems, avionics systems, communications systems and sensors appropriate for GA aircraft application</li> <li>2. Develop standards associated with new aircraft observing systems for GA aircraft</li> <li>3. Assist Members in the implementation of proven and approved aircraft observing systems for GA aircraft.</li> </ol>	<ol style="list-style-type: none"> <li>1. Studies and reports</li> <li>2. Manuals and guides</li> <li>3. Programmes incorporating GA aircraft</li> </ol>	<ol style="list-style-type: none"> <li>1. More airlines recruited</li> <li>2. Better AMDAR global data coverage</li> <li>3. Significant, positive impact on applications and for Data Users.</li> </ol>	WMO-ER-4	3	Ongoing to 2025

## WMO AIRCRAFT OBSERVING SYSTEM CORE AND LONG-TERM ACTIVITIES

Core Activity	Long-term Activity	Description	Activities	Outputs	Outcomes/Impacts	Justification	Priority (1-3)	Timeframe
2	2.1	Implement water vapour measurement	<ol style="list-style-type: none"> <li>1. Undertake planning and project coordination in the implementation by Members of WV measurement within the AMDAR Observing System</li> <li>2. Coordinate negotiations and interactions with sensor manufacturers</li> <li>3. Coordinate negotiations and develop agreements for standardization with aircraft and avionics manufacturers and aviation standards authorities.</li> <li>4. Promote the standardization of aircraft equipment by merging the interests of meteorology pilots, airlines, ATM, NMHSs, Environmental control for                             <ul style="list-style-type: none"> <li>- better deicing warning,</li> <li>- deicing efficiency,</li> <li>- NWP,</li> <li>- contrail warning.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Studies and reports</li> <li>2. Business cases for NMHSs and Airlines</li> <li>3. International WV Project</li> <li>4. Certificates (STCs) for aircraft</li> <li>5. Agreements between the relevant stakeholders.</li> </ol>	<ol style="list-style-type: none"> <li>1. WV capability for AMDAR Programme</li> <li>2. Significant, positive impact on applications and for Data Users.</li> <li>3. Ex-works availability AMDAR + humidity + particles.</li> </ol>	WMO-ER-4	1	Ongoing to 2025
2	2.2	Implement turbulence measurement.	<ol style="list-style-type: none"> <li>1. Undertake planning and project coordination in the implementation by Members of turbulence measurement within the AMDAR Observing System;</li> <li>2. Coordinate negotiations and interactions with algorithm developers;</li> <li>3. Coordinate negotiations for standardisation with aircraft and avionics manufacturers and aviation standards authorities.</li> </ol>			WMO-ER-4	1	Ongoing to 2015

## WMO AIRCRAFT OBSERVING SYSTEM CORE AND LONG-TERM ACTIVITIES

Core Activity	Long-term Activity	Description	Activities	Outputs	Outcomes/Impacts	Justification	Priority (1-3)	Timeframe
2	2.3	Implement icing indication.	<ol style="list-style-type: none"> <li>1. Undertake planning and project coordination in the implementation by Members of icing measurement within the AMDAR Observing System;</li> <li>2. Coordinate negotiations for standardisation with aircraft and avionics manufacturers and aviation standards authorities.</li> </ol>			WMO-ER-4	2	Ongoing to 2020
3	3.1	Manage risks and opportunities associated with new and developing technologies in avionics, communications and metrology.	<ol style="list-style-type: none"> <li>1. Research, trial and study of new and developing aircraft observing systems, avionics systems, communications systems and sensors appropriate for aircraft application;</li> <li>2. Attend and report on appropriate aviation meetings and forums that develop and define standards relating to avionics and communications</li> <li>3. Develop standards associated with new aircraft observing system technologies;</li> <li>4. Assist Members in the implementation of proven and approved technologies for aircraft observing systems.</li> </ol>			WMO-ER-4	1	Ongoing to 2025
4	4.1	Implement a Quality Management Framework for AMDAR that incorporates standardization across national programmes, taking into account: <ol style="list-style-type: none"> <li>1. Data management;</li> <li>2. Metadata management;</li> <li>3. Quality control for metrological systems;</li> <li>4. Systems and data monitoring and evaluation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Coordinate (expert) meetings, projects and tasks related to the development of standards;</li> <li>2. Approve and document standards;</li> <li>3. Coordinate the implementation of standards by Members.</li> </ol>			WMO-ER-4	1	Ongoing to 2025

## WMO AIRCRAFT OBSERVING SYSTEM CORE AND LONG-TERM ACTIVITIES

Core Activity	Long-term Activity	Description	Activities	Outputs	Outcomes/Impacts	Justification	Priority (1-3)	Timeframe
4	4.2	Develop a National and Global Aircraft Observations Data Management Framework.	<ol style="list-style-type: none"> <li>1. Coordinate (expert) meetings, projects and tasks related to the development of a DMF;</li> <li>2. Approve and document the DMF;</li> <li>3. Coordinate the implementation of the DMF by Members.</li> </ol>			WMO-ER-4	1	Ongoing to 2015
4	4.3	Standardise AMDAR software function across avionics systems and optional sensors (e.g. water vapour) across aircraft.	<ol style="list-style-type: none"> <li>1. Coordinate with and attend meetings with representatives of airlines, avionics manufacturers, and other aviation bodies as appropriate;</li> <li>2. Coordinate implementation of the establishment of software and sensor standards.</li> </ol>			WMO-ER-4	2	Ongoing to 2020
4	4.4	Manage the data processing and quality assurance for other sources of aircraft data transmitted on the GTS including data provided through ICAO.	<ol style="list-style-type: none"> <li>1. Coordinate with and attend meetings with representatives of data providers (e.g. ICAO);</li> <li>2. Coordinate the establishment of standards for aircraft data other than AMDAR (ADS, Mode-S).</li> </ol>			WMO-ER-4	2	Ongoing to 2025
5	5.1	Develop methods and material for promoting and developing Aircraft Observations and the AMDAR Programme.	<ol style="list-style-type: none"> <li>1. Define, develop and manage the content of the Aircraft Observing System WMO website;</li> <li>2. Specify and coordinate the development of promotional material, e.g. flyers, papers, posters, etc;</li> <li>3. Specify and coordinate the development of training material for Members.</li> </ol>			WMO-ER-4	2	Ongoing to 2025
5	5.2	Conduct training and outreach activities in support of Core Activities.	<ol style="list-style-type: none"> <li>1. Conduct technical workshops for Members;</li> <li>2. Coordinate and conduct meetings, workshops and conferences with appropriate stakeholders.</li> </ol>			WMO-ER-4	2	Ongoing to 2025

**WMO AIRCRAFT OBSERVING SYSTEM CORE AND LONG-TERM ACTIVITIES**

<b>Core Activity</b>	<b>Long-term Activity</b>	<b>Description</b>	<b>Activities</b>	<b>Outputs</b>	<b>Outcomes/Impacts</b>	<b>Justification</b>	<b>Priority (1-3)</b>	<b>Timeframe</b>
6	6.1	Conduct meetings of members and stakeholders.	<ol style="list-style-type: none"> <li>1. Coordinate meetings of the AMDAR Panel;</li> <li>2. Coordinate meetings of ET-AIR;</li> <li>3. Coordinate meetings of the Aircraft Observations Programme Management Group (APMG).</li> </ol>			WMO-ER-4	1	Ongoing to 2025
6	6.2	Coordinate planning activities.	<ol style="list-style-type: none"> <li>1. Develop plans for extension and enhancement of the AMDAR Observing System.</li> </ol>			WMO-ER-4	1	Ongoing to 2025
6	6.3	Monitor and evaluate the Aircraft Observations Programme.	<ol style="list-style-type: none"> <li>1. Develop and maintain diagnostics and tools for monitoring and evaluating progress of the development of the Aircraft Observations Programme.</li> </ol>			WMO-ER-4	2	Ongoing to 2025

### APPENDIX III

Version	Date	Author	Changes
0.1	21 December 2011	Dean Lockett	Original draft incorporating plans made at AMDAR Panel Session 14, December 2011.
0.2	16 January 2012	Dean Lockett	Update to draft 0.2: 1. Incorporate comments for review carried out by APMG and AMDAR Focal points 2. Added Version Control section.
0.3	5 March 2012	Dean Lockett	1. Incorporate changes to 2012 Work Programme arising out of APMG-3. 2. Incorporate progress since AMDAR Panel-14. 3. Actions from 2011 Joint Meeting and APMG-3 incorporated into 2012 Work Programme.
1.0	8 March 2012	Dean Lockett	1. Version 1.0 containing 2012 Work Programme as approved by APMG-3.

## APPENDIX IV

### AMDAR Panel Trust Fund Draft Budget Projection for 2012

Item	Specific Item	Swiss Francs
<b>Balance of fund at 31 December 2012</b>		1,089,297.03
<b>Projected Expenditure</b>		
<b>Consultancy</b>	1.1.1 Study on data coverage and airline capabilities SSA	40,000.00
	4.1.1 Paper on WVSS Validation Results Summary SSA	30,000.00
	4.1.1 Generic Software Specification SSA	40,000.00
	5.1.2 Impacts and Benefits document for aviation SSA	40,000.00
	5.1.4 Impact of AMDAR Study SSA	30,000.00
<b>Travel</b>	6.1.1 AMDAR Panel Meeting	5,000.00
	6.1.2 AMDAR MG-3	10,000.00
	6.1.2 AMDAR MG-4	5,000.00
	4.1.1 Aircraft Observations Data Management Workshop	15,000.00
	5.1.5 Attend Aviation Meetings	4,000.00
<b>Projects &amp; Activities</b>	1.1.2 Finance for AeroMexico programme.	50,000.00
	2.2.1 Obtain EDR Specification and Software	10,000.00
	ARINC Membership	500.00
<b>Software Development</b>	4.3.3 B777 Software Development	20,000.00
<b>Workshops &amp; Training</b>	4.1.1 Data Management Workshop	15,000.00
<b>Projected Expenditure Total</b>		314,500.00
<b>Projected Contributions</b>		
<b>Contributions Direct</b>	Australia	12,800.00
	Austria	3,500.00
	France	26,000.00
	Hong Kong, China	3,000.00
	Netherlands	1,200.00
	New Zealand	2,500.00
	Norway	15,000.00
	Sweden	5,000.00
	Switzerland	50,000.00
	United Kingdom	10,000.00
	Canada	10,000.00
	Germany	30,000.00
	South Africa	3,600.00
<b>Contributions VCP</b>	United States	25,000.00
<b>Projected Contributions Total</b>		197,600.00
<b>Projected Balance at 31 Dec 2012</b>		972,594.63

## APPENDIX V

### **Workshop on Aircraft Observing System Data Management (DRAFT 22/02/12)**

#### **Workshop Terms of Reference**

The Workshop on Aircraft Observing System Data Management shall

- (a) Review, propose and report on the current data management standards and practices employed for the WMO Aircraft Observing System, taking into account:
  - i. National aspects;
  - ii. Global aspects;
  - iii. AMDAR data;
  - iv. ICAO-generated data;
- (b) Devise and recommend a national and global framework for the reporting, monitoring and management of Aircraft Observing System data; (AMDAR and ICAO) taking into account:
  - i. Data archival;
  - ii. Data access and display (data and monitoring diagnostics);
  - iii. WIS structure and requirements.
- (c) Data Quality Assessment:
  - i. Review and make recommendations on the requirements for Aircraft Observing System Data Quality Assessment (taking into account the status of the activities concerning the WIGIS AMDAR Pilot Project and the Quality Management Framework).
- (d) Metadata:
  - i. Devise and recommend a national and global framework for the reporting and management of Aircraft Observing System metadata; (AMDAR and ICAO), taking into account WIS structure and requirements;
  - ii. Review and make recommendations on the requirements for Aircraft Observing System metadata (taking into account the status of the activities concerning the WIGOS AMDAR Pilot Project and the Inter-programme on Metadata and Data Interoperability);
- (e) Propose ways of integration into the governance for the AMDAR Programme in line with item (a) above;
- (f) Consider and recommend Data Policy aspects for Aircraft Observing System data;
- (g) Provide advice on the implementation of Aircraft Data Management into the WIGOS concept;
- (h) Identify and recommend on the establishment of (a) Lead Centre(s) and Participating Centres for:
  - i. Data management and archival;
  - ii. Metadata management;
  - iii. Data quality monitoring;

## APPENDIX V

- (i) Make an assessment and report on the current state of WMO guidance material in relation to Aircraft Observing System data management and determine requirements for improvement and update;
- (j) Prepare a report to be submitted to the Chairperson of OPAG-ISS on the progress made on Aircraft meta-data.

### **Deliverables (Expected Results) of the Workshop on AMDAR Data Management**

1. Final Report reflecting the discussions, decisions, proposals and recommendations as the result of the Workshop;
2. Draft recommendations to be submitted by the AMDAR Panel to CBS;
3. Draft covering documentation to the recommendations for inclusion into the WMO Regulatory Material.

### **Proposed Workshop Participants**

Brad Ballish	NOAA(QA, modelling)	USA
Jitze van der Meulen	E-AMDAR QEvC (QA)	The Netherlands
Stewart Taylor	E-AMDAR TC (Metadata, QC)	UK
Erik Anderson	ECMWF (QC, global modelling)	UK
Gilles Vernier	CMC (Data Monitoring, modelling)	Canada
Xiaohua Yang	HIRLAM/Harmonie (Local Area Modelling, monitoring)	
Denmark		
Bill Moninger	NOAA/ESRL/GSD (AMDAR Data Display)	USA
David Thomas/	WMO/WIS	
Switzerland		
Steve Foreman		

**Workshop Support** Dean Lockett (AMDAR Panel TC, WMO Secretariat);  
Frank Grooters (Workshop Chairperson)

**Venue** Geneva (WMO Secretariat)

**Dates** TBD (3 day-Workshop + 1 day for drafting Final Report)

## APPENDIX V

### Basic Reference Material

- Aircraft Meteorological Data Relay (AMDAR) Reference Manual, WMO-No. 958 (2003)
- Manual on the Global Data-Processing System, WMO-No. 485, VOL. 1 (2010)
- WMO Guide to Meteorological Instruments and Methods of Observation, WMO-No. 8 (2008), Part III

**Other references, related to WMO activities on data management, quality assessment and meta data can be found on the following URLs (web links)**

- WMO interlinks, *functioning on 2012-02-01*:

### Data Management

WWW Data Management

<http://www.wmo.int/pages/prog/www/WDM/wdm.html>

### Quality Assessment

Quality Management Framework

[http://www.bom.gov.au/wmo/quality\\_management/index.shtml](http://www.bom.gov.au/wmo/quality_management/index.shtml) (restricted access)

currently not available !: <http://www.wmo.int/pages/prog/amp/QMF-Web/home.html>

Final Draft edition of WMO-No.49 - WMO Technical Regulations, Volume IV - Quality Management

currently not available !: [http://www.wmo.int/pages/prog/amp/QMF-Web/documents/Tech\\_Reg\\_Volume\\_IV\\_FinalDraft\\_March2010.pdf](http://www.wmo.int/pages/prog/amp/QMF-Web/documents/Tech_Reg_Volume_IV_FinalDraft_March2010.pdf)

The Global Data-Processing and Forecasting System

<http://www.wmo.int/pages/prog/www/DPS/gdps.html>

WWW Monitoring

[http://www.wmo.int/pages/prog/www/WDM/wdm\\_monitoring.html](http://www.wmo.int/pages/prog/www/WDM/wdm_monitoring.html)

Data Quality monitoring

<http://www.wmo.int/pages/prog/www/DPS/Monitoring-home/mon-index.htm>

with links to Participating Centres, Lead Centre Monitoring, Procedures and Formats, Report Types and Focal Points:

- Participating Centres:  
<http://www.wmo.int/pages/prog/www/DPS/Monitoring-home/mon-participating-centres.htm>

## APPENDIX V

- Lead Centre Monitoring:  
<http://www.wmo.int/pages/prog/www/DPS/Monitoring-home/mon-leadcentre.htm>
- Report Types:  
<http://www.wmo.int/pages/prog/www/DPS/Monitoring-home/mon-report-types.htm>

### **Metadata**

Data and metadata representation

[http://www.wmo.int/pages/prog/www/WDM/wdm\\_representation.html](http://www.wmo.int/pages/prog/www/WDM/wdm_representation.html)

Development of the WMO Core Profile of the ISO Metadata standard

<http://www.wmo.int/pages/prog/www/WDM/Metadata/documents.html>

### **Regulatory and Authoritative Documents**

Aircraft Meteorological Data Relay (AMDAR) Reference Manual, WMO-No. 958, 2003; Par. 5 and App. IV

[http://www.wmo.int/amdar/Publications/AMDAR\\_Reference\\_Manual\\_2003.pdf](http://www.wmo.int/amdar/Publications/AMDAR_Reference_Manual_2003.pdf)

and other links on the WMO AMDAR website

[http://www.wmo.int/amdar/index\\_en.html](http://www.wmo.int/amdar/index_en.html)

MANUAL ON THE GLOBAL DATA-PROCESSING SYSTEM, WMO-NO. 485, VOL. 1 (2010)

ATTACHMENT II.9, PROCEDURES AND FORMATS FOR EXCHANGE OF MONITORING RESULTS

<http://www.wmo.int/pages/prog/www/DPS/Monitoring-home/mon-procedures.htm#Aircraft%20Data>

MANUAL ON THE GLOBAL DATA-PROCESSING SYSTEM, WMO-NO. 485, VOL. 1 (2010) PART III, DATA MANAGEMENT ASPECTS

[http://www.wmo.int/pages/prog/www/DPFS/Manual\\_GDPFS.html](http://www.wmo.int/pages/prog/www/DPFS/Manual_GDPFS.html)

WMO GUIDE TO METEOROLOGICAL INSTRUMENTS AND METHODS OF OBSERVATION, WMO-No. 8 (Seventh edition, 2008), Part III, QUALITY ASSURANCE AND MANAGEMENT OF OBSERVING SYSTEMS

<http://www.wmo.int/pages/prog/www/IMOP/publications/CIMO-Guide/CIMO%20Guide%207th%20Edition,%202008/Part%20III/Part%20III.pdf>

WMO GUIDE TO METEOROLOGICAL INSTRUMENTS AND METHODS OF OBSERVATION, WMO-No. 8 (Seventh edition, 2008), , PART II, OBSERVING SYSTEMS, Chap. 3 Aircraft observations

<http://www.wmo.int/pages/prog/www/IMOP/publications/CIMO-Guide/CIMO%20Guide%207th%20Edition,%202008/Part%20II/Chapter%203.pdf>

## APPENDIX V

***Relevant WWW components:***

WDM = WMO data management

WWWDM = WWW data management

AMDARDM = AMDAR data management

DPS = Data Processing System

## APPENDIX VI



**World Meteorological Organization  
Organisation météorologique mondiale**

**Secrétariat**  
7 bis, avenue de la Paix – Case postale 2300 – CH 1211 Genève 2 – Suisse  
Tél.: +41 (0) 22 730 81 11 – Fax: +41 (0) 22 730 81 81  
wmo@wmo.int – www.wmo.int

Document communiqué en vertu de la Loi sur l'accès à l'information

**AMDAR TRUST FUND**  
Interim Statement of Income and Expenditure  
For the period 1 January to 31 December 2011  
Amounts in Swiss Francs

1.	Balance brought forward, 1 January 2011	918,693.88
2.	Income	
	2.1 Voluntary contributions	167,135.31
	2.2 Voluntary contributions-Accrued (Pledges)	43,600.33
	2.3 Voluntary contributions from other funds	65,920.46
	2.4 Interest credited	4,647.03
	2.5 Total income	<u>281,303.13</u>
3.	Total available funds during reporting period	1,199,997.01
4.	Expenditure	
	4.1 Direct project costs	
	4.1.1 Regular staff salary	50,429.19
	4.1.2 Institutional consultants (honorarium)	9,267.98
	4.1.3 Travel -Other representatives to attend other WMO meetir	22,965.03
	4.1.4 Travel -Other representatives ad hoc travel	1,183.17
	4.1.5 Travel of staff to other WMO meetings	21,310.77
	4.1.6 Grants and contributions	5,089.00
	4.1.7 Total project direct costs	<u>110,245.14</u>
	4.2 Indirect project costs	
	4.2.1 Bank charges	16.25
	4.2.2 Unrealized loss on differences on exchange	438.59
	4.2.3 Total indirect project costs	<u>454.84</u>
	4.3 Total project expenditure	<u>110,699.98</u>
5.	Balance of fund at 31 December 2011	<u>1,089,297.03</u>

**Contributions received**

Austria	3,500.00
Canada	10,000.00
France	26,826.93
Germany	30,790.23
Hong Kong, China	3,000.00
Korea, Rep. of	3,612.00
Netherlands	1,277.47
New Zealand	2,500.00
Norway	15,700.00
Sweden	5,000.00
Switzerland	50,000.00
United Kingdom	14,928.68
	<u>167,135.31</u>

**Contributions pledged**

Canada	40,000.00
South Africa	3,600.33
	<u>43,600.33</u>

Certified correct:

Luckson Ngwira  
Chief, Finance Division  
20 February 2012