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| **World Meteorological Organization**  **Commission for Instruments and Methods of Observation**  **CIMO Management Group**  **Fifteenth Session** Geneva, Switzerland, 26– 29 March 2018 | **CIMO/MG-15/Doc. 2.2(4)** |
| Submitted by: J.P. van der Meulen  23.03.2018 |

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# REPORT ON PROGRESS, RECOMMENDATIONS AND FUTURE ACTIVITIES OF EXPERT TEAM AIRCRAFT-BASED OBSERVATIONS, ET-AO (A4)

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| **Summary and purpose of document**  This document provides information on the progress made by the ET, the status of the Work Plan and proposals for future actions. |

**Action proposed**

The Meeting is invited to consider this report, to comment and approve the updated Work Plan.

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**Appendices:** I [Updated Workplan](#Appendix1)

II [Additional Information](#Appendix2)

III [Topics and deliverables for after CIMO-17](#Appendix3)

**EXECUTIVE SUMMARY**

* The activities of the ET AO are ongoing activities to facilitate further implementation of aircraft observations (or derived data) in terms of improvement of technologies. Focus is on the implementation and improvement of new technologies, like humidity observations. Also implementation of derived variables, like turbulence are investigated and proposed.
* A specific activity is the improvement and implementation of on board software for reporting using AMDAR.
* New technologies are introduced recently based on the capabilities to derive data, like temperature and wind, from Radar Surveillance broadcast. Also new UAV technologies (drones) are in focus to be further evaluated as potential sources for upper air observations. These new developments should be further investigated and validated.

**REPORT ON ACHIEVEMENTS, RECOMMENDATIONS AND FUTURE ACTIVITIES OF CIMO EXPERT TEAM** **AIRCRAFT-BASED OBSERVATIONS, ET-AO (A4)**

**TO BE UPDATED NEXT ET-AO IN APRIL 2018**

1. ***Major achievements with respect to Workplan***

*Progress made in period mid 2016 (previous MC meeting) - spring 2018:*

* 1. Investigate AMDAR Temperature Bias (and other deviations from required performances): Significant progress made in advanced research; paper available in draft. Further research recommended.
  2. Water vapor measurement (WVM) - Integration into existing avionics and airframes, implementation in operational practices: Implementation ongoing, but in phases due to limited finances, software implementation and negotiations with airliners
  3. AMDAR Software Development, Improvement, documentation & Availability: ongoing activities in negotiation with airlines and industry.
  4. New ABO derived data technologies: Implementation phase of mode-S into operational practice reported.
  5. Turbulence (EDR ) - Implementation in AMDAR: Implementation ongoing but in phases, due to costs of software upgrade, negotiations with airlines to implement software

1. ***Problems encountered***

*[If any, detailed information can be provided in Appendix II, if needed]*

* 1. Implementation depends on willingness with external parties (airlines) and NMHSs.

1. ***Recommendations***

*[Include here recommendations that require actions or decisions from CIMO-MG and/or CIMO-17]*

* 1. Text.
  2. Text, etc.

1. ***Major topics for future work with expected associated deliverables***

*[Include here brief description of proposed future activities. Associated workplan with actions and deliverables can be provided in Appendix III]*

* 1. Current terms of reference o be continued, with focus new or alternative data delivery facilities.
  2. Validation and report on the performances of humidity and turbulence observations.

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**APPENDIX I**

**UPDATED WORKPLAN**

**TO BE UPDATED NEXT ET-AO IN APRIL 2018**

| **No.** | **ToR** | **Task**  **Description** | **Person(s) Responsible** | **Action(s)** | **Deliverables / Outcome** | **Comm.** | **Deadline for Delivery** | **Status (%)** | **Comments** | **2017 Budget Expend.** | **2018 Budget Estimate** | **2019 Budget Estimate** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1) | Coordinate with CBS ET-ABO on Work Plan & Budget | Ch-ET-AO, SO/ARO | 1. Representative of ETattended ET-ABO-2 (2015) and ET-ABO-3 (2017); 2. Co-ordinate with CBS ET-ABO on Work Plans& Budgets. To be compiled & approved on at least an annual basis. 3. Regular Work Plan WebEx sessions to be held. 4. Plan 2017 and 2018webex sessions. 5. Status report of all Work Plan Tasks to be updated Q1/2018 | 1. Harmonised Work Plan & Budget for the ABO Program. 2. Report to ET-AO 3. Chair ET-AO will provide feedback on Work plan to ET-ABO and CIMO MG. | Q4 2014 | Ongoing | N/A | * Chair attended ET-ABO-1 * ET-AO-1 held jointly with ET-ABO-2 Dec 2015 * Chair attended ET-ABO-3, May 2017 (as well as RA II Workshop) * Chair to attend WMO AMDAR Workshop RA VI, Budapest Dec 2017 * WebEx Session with ET-AO Members to be arranged Dec 2017. * Chair to attend AMDAR Workshops planned for 2018. |  |  |  |
| 2 | 2) | Meeting of ET-AO | Ch-ET-AO, SO/ARO | 1. Meeting of ET-AO, Q1 2015 2. Plan and hold meeting of ET-AO-2April 2018 (prior to CIMO Session). 3. Prepare Report to CIMO Q1/2018 | 1. Work Program advancements; 2. Report with recommendations to CIMO 3. Report provided to CIMO Q1 2016 ahead of CIMO MG Meeting Apr 2016. 4. Report to CIMO Q1/2018 | Q4 2014 | Q1 2018 | 5 | * Meeting of TT-AO-1 held 18-20 Feb 2014. * ET-AO-1 held Dec 2015 * Webex sessions to review Workplan planned during 2017. * Schedule WebEx sessions Q1/2018 (prior to CIMO Session). |  | (15 WMO RB) |  |
| 3 | 3) | Investigate AMDAR Temperature Bias | S.d.Haan | 1. Review of relevant reference material 2. Consultation with avionics/sensor experts 3. Provide update to ET-AO Q1/2017 4. Status Report due Q1/2018 | 1. Report to ET-AO and CIMO 2. CIMO IOM Report 3. Meeting to be arranged with avionics vendors 2017/18 – as required. 4. Draft paper to be available to ET-AO for presentation at ET-ABO-3 (May 2017) 5. Report for CIMO MG for next Session | Q1 2014 | Q1 2018 | 40 | * May require funding to complete a study on onboard issues, such as deicing. Ref: [WMO AMDAR Panel Aircraft Observing System Data Management Workshop, Section 5.1](http://www.wmo.int/pages/prog/www/GOS/ABO/AMDAR/panel/reports/other/Aircraft_Observations_Data_Management_Workshop_June_2012_Final_Report.pdf) * , |  | Via 10 |  |
| 4 | 3) | AMDAR and water vapor measurement (WVM) integration into existing avionics and airframes | A.Hoff, G.Meymaris, S.Stringer, B.Ford, SO/ARO | 1. Drafting and review of plan. 2. Finalise plan as part of the ABOP Strategy & Implementation Plan (A-SIP) 3. Issue to ET-AO/ABO for final comments. 4. Co-ordinate with SO/ARO dissemination of Plan | Strategic Plan | 2012 | Q4 2017 | 95 | This needs to be harmonized with the A‑SIP.  Ref: WMO AMDAR Panel Session 15 [Fin. Rep](http://www.wmo.int/pages/prog/www/GOS/ABO/AMDAR/panel/reports/AMDAR_Panel_XV_Final_Report.pdf). 4.2.1.  Incorporate:   * Ownership of STCs * Collaboration on STC costs * Integration into airframes   AMDAR Software requirements. Some elements of the IP will be delivered during 2016/17 – thus delaying completion of deliverable. |  |  |  |
| 5 | 3) | AMDAR and water vapor measurement (WVM) as standard accessory on commercial aircraft | A.Hoff, G.Meymaris, S.Stringer, B.Ford, SO/ARO | 1. Drafting and review of plan. 2. Finalise plan as part of the ABOP Strategy & Implementation Plan (A-SiP) 3. Issue to ET-AO for comment 4. Co-ordination with ET-ABO with regards IATA collaboration. | Strategic Plan | 2012 | Q1 2017 | 95 | Incorporate:   * Formulation of IP into WMO Project, perhaps in collaboration with ICAO. Discussions with ET-ABO/ICAO ongoing   Ref: WMO AMDAR Panel Session 15 [Fin. Rep](http://www.wmo.int/pages/prog/www/GOS/ABO/AMDAR/panel/reports/AMDAR_Panel_XV_Final_Report.pdf) 4.2.1.  Some elements of the IP will be delivered during 2016/17 – thus delaying completion of deliverable. |  |  |  |
| WVM Implementation | A.Hoff | 1. Report on WVSS-II air intake assessment (FAAM)  2. | IOM Report | Q1 2016 | Q2 2017 | 0 | * Awaiting report information from Met Office/FAAM – ET-AO to contact MO for update. |  |  |  |
| A.Hoff, B.Ford | Compile document on WVSS STC and candidate fleets for implementation. | WIGOS TR | Q1 2016 | Q1 2017 | 0 |  |  |  |  |
| SO/ARO | WMO Letter to PRs of Operational Programs re participation in AMDAR/WVM and AMDAR/EDR. | Letter to PRs | Q2 2016 | Q1 2017 | 0 | ***Dependent on publishing of IOM under Task 16.***  This should also have a focus on requesting participating airlines to consider WVM and also to request WVM capability on future ordered aircraft. |  |  |  |
|  |  |  | D.Body, A.Hoff, B.Ford | Undertake study on use of AMDAR/WVM for aircraft icing prediction & management. | Report to ET-AO | Q1 2016 | Q4 2017 | 0 | * ET-AO to ask AMDAR participating airlines if this could be a beneficial tool for operations. |  |  |  |
|  |  |  | D.Body, A.Hoff, B. Ford | Reinvigorate interaction with airframe manufacturers re integration of WVM from factory floor. | Manufacturers aware of requirement for integration of WVM. | Q1 2016 | Q4 2018 | 0 | Considerations:   * Letter from WMO to key aircraft manufacturers. * Letter from WMO to IATA and/or airlines. * Meetings with aircraft manufacturers – as required. * Discussions with Airbus (facilitated by E-AMDAR) have renewed interest in the WVSS as part of sensor suite for aircraft orders. |  | Via 10 |  |
| 6 | 3) | Turbulence (EDR ) Implementation in AMDAR - Develop IP for EDR | G Meymaris, S.Taylor, T.Farrar, SO/ARO | 1. Drafting and review of plan. 2. Teleconferencing of collaborators. Liaise with NCAR on software requirements; 3. Identify possible airline partner for trial. 4. Follow up with Boeing and Air France on EDR implementation costs – also look at EDR Package available from NCAR 5. Investigate EDR reporting capability using IFE (e.g. GoGo). | EDR IP | Q3 2013 | Q2 2017 | 95 | Possibly include:   * A trial program with a European airline. The E-AMDAR Team discussing possibility with Air France. Delay in discussing with airline. Discussions in 2016/17 with Air France and Boeing proved cost prohibitive. * Need to revisit Boeing cost to implement EDR on European airline. * New possibilities using IFE and EFB – to be followed up.   Ref: WMO AMDAR Panel Session 15 [Fin. Rep](http://www.wmo.int/pages/prog/www/GOS/ABO/AMDAR/panel/reports/AMDAR_Panel_XV_Final_Report.pdf) 4.2.2. |  |  |  |
| 7 | 3) | Turbulence (EDR) Implementation | G Meymaris | In collaboration with ET-ABO, undertake activities as required to facilitate AMDAR EDR monitoring program. | EDR monitoring program operational | Q2 2015 | Q4 2018 | 25 | ***This Task will follow on from Task 6.***  Sub-tasks below. |  |  |  |
| G.Meymaris | Develop&MaintainImplementation Plan documents:   * List of compatible avionics systems. * List of compatible aircraft types. * List of target participating programmes/airlines. | IP Documents | Q1 2016 | Q4 2017 | 40 |  |  |  |  |
| SO/ARO | Based on IP documents, contact PMs re participation in AMDAR/EDR. | PMs aware of IP and feedback received and reported to ET-AO | Q3 2016 | Q3 2016 | 100 | * Sub Task completed |  |  |  |
| G.Meymaris | Develop a plan & strategy for extension of EDR software availability. | Wider availability of EDR software for different aircraft models. | Q3 2016 | Q2 2017 | 10 | * This aligns with sub task above reference IP Documents * ET-AO will follow up with airlines with IFE capabilities |  |  |  |
| G.Meymaris | 1. Participate in Avionics Vendors Conference for promotion of EDR applications dev. 2. Identify meetings to target during 2017. 3. Proactive contact with avionics vendors 2018 | Avionics vendors aware of requirements for EDR applications integration.  Addition of an airline (outside of US) to implement EDR reporting | Q3 2016 | Q4 2017 | 0 |  |  | Via 10 |  |
| G.Meymaris, S.Taylor, SO/ARO | 1. Participate in RTCA/SG4, EDR MOPS for EDR Standardisation.  2. Active in EDR discussions within RTCA | 1. Contrib. to FAA EDR MOPS  2. Documentation input provided to RTCA | Q1 2016 | Aligned with EDR MOPS schedule | Ongoing |  |  | Via 18 |  |
|  |  |  | S.Taylor, G.Meymaris | Develop Strategy & Imp. Plan for E-AMDAR participation in EDR IP | Plan produced. | Q1 2016 | Q4 2018 | 25 | * Development of AFR B777 also includes implementation of EDR (note AFR currently reporting DEVG). * Airline /Boeing will collaborate to achieve during 2016. Discussions during 2016 with AFR/Boeing. * Continuing discussion with Boeing and also with Airbus since Q2 2017. * Lufthansa and DWD (TeFiS Project) are collaborating on installing EDR on ~30 aircraft (all fleet types). This project “stalled” for time being, to be revisited during 2017. * Investigate Ife possibilities |  | Via 18 |  |
| 8 | 3) | Study on Current & Future Comms& Technology Impact on AMDAR | SO/ARO, S.Taylor, D. Arodi. | 1. Write Statement of Work 2. Identify consultants 3. SSA in place   Monitor progress   1. Study to be published as a IOM report. | 1. Kick off webex with consultant (Sep 2014). 2. Study and recommendations produced. Two sections to cover Executive Summary and Technical terminology. | Q3 2013 | Q1 2015 | 100 | * Monthly status reports received. * Regular Webex sessions held with consultant during 2014. * Webex held Jan 2015. * SSA consultancy completed. * IOM with WMO Publications for Final approval * IOM published |  |  |  |
| 9 | (4) | Update and maintain the AOSFRS | D.Body | 1. Develop Version 1.1A as markup to version 1.1 for publication on the WMO Website. | AOSFRS Maintained | Q4 2014 | N/A | Ongoing | * No current requirement for updates identified * Version 1.1 issued. Record of amendments included in document. |  |  |  |
| 10 | 4) | AMDAR Software Development & Availability | S.Taylor, SO/ARO | 1. Approach Teledyne Controls re AOSFRS implementation; 2. Approach other avionics vendors 3. Follow up during Q1/2017 4. Continue discussions with vendors | Integration of AMDAR into avionics systems. | Q3 2013 | N/A | Ongoing | Work towards availability of AMDAR software as a catalogue item of delivery for avionics systems.  ET-AO agreed on more proactive approach possibly involving face to face meetings necessitating travel of Members.  Promotion of concept at aviation meetings (e.g. AEEC DLUF 2016/2017) |  | Via 18 |  |
| ET-AO, SO/ARO | Development of Generic AMDAR Onboard Software Modules:   1. Determine viability of project. 2. Develop Description of Work and requirements. 3. WMO Tender for job. 4. Initiate contact with Avionics Vendors on this topic. | Suite of generic AOSFRS-compliant modules for deployment with participating airlines and avionics vendors. | Q3 2014 | Q4 2018 | 10 | * Initial discussions with vendors. * Honeywell and Teledyne contacted. * Other vendors and aircraft manufacturers to be contacted (Q1 2015). * After discussions throughout 2015 the concept has been put on hold pending further contact with vendors. * Revisit during 2017 * Chair discussed this again with Honeywell at AEEC DLUF Sep 2017 |  | *Via 18* |  |
| Ch-ET-AO, SO/ARO | Avionics Vendors Conference with AEEC in Q4 2016   1. Ch-ET-AO to approach meeting and conference organisers in AEEC to make request. 2. LoA with AEEC required? 3. New strategy to be investigated with a view to meeting or individual approach to vendors. | Conference/Meeting with Avionics Vendors to be Held | Q1 2016 | Q4 2018 | 0 | * Fallback will be to arrange alternative event staged at appropriate vendor venue in Q4. * Not realized during 2016 * Look at Avionics meeting during latter half of 2017. Look to extend attendees to airlines as well * This has not been realized in 2017 – look to hold in 2018 possibly in collaboration with ET-ABO & IATA. | ~~0 (15K)15K~~ | 15K |  |
| 11 | 4) | Boeing 777 AMDR Software Dev. | Ch-ET-AO, Ch/ET-ABO, SO/ARO, | 1. Finalise negotiations with AFR and KLM in consult. with E-AMDAR &Meteo-France 2. Review quotation; 3. Provide advice on specifications and requirements. 4. Finalise agreement with stakeholders on costs. 5. Finaliseimplentation and software roll out. 6. Look to provide software to other airlines. | B777 AMDAR Software application | 2012 | Q4 2016 | 100 | * Combined action with ET-ABO * Agreement signed with AFR for S/W develop. Dec 2014 * AFR, LSY and E-AMDAR coord. Integ. of B777 to optimizer Jan 2015. * Project imp. delayed – expect completion in 2016 * AFR data available from 1st Feb 2016. * KLM B777 schedule may not provide cost/benefit in data coverage – E-AMDAR may look at A340 family * RA II contact informs Cathay Pacific interested in the B777 software Q3 2017.   Ref: WMO AMDAR Panel Session 15 [Fin. Rep](http://www.wmo.int/pages/prog/www/GOS/ABO/AMDAR/panel/reports/AMDAR_Panel_XV_Final_Report.pdf) 4.4.7. |  |  |  |
| 12 | 4) | Develop and specify standard for AMDAR Data Optimisation System | D.Body | 1. Determine requirements (consult with FPs); 2. Draft specification; 3. Conduct review; 4. Publish spec. | Addition to WMO guidance material. | Q4 2014 | Q4 2016 | 100 | * Develop a functional specification that can be included in the Manual on WIGOS or in CIMO Guide. * Guidance has been developed. * Will be added to the Guide to GOS.   COMPLETED |  |  |  |
| 13 | 5) | Monitor & Review reports from WVSS testing | A.Hoff | 1. Review reports. 2. Report to TT-AO-1 3. Provide summary report on DENCHAR test results. 4. Provide ET-AO and ET-ABO with updates. | 1. Report to CIMO. 2. Updates to ETs. | Q3 2013 | N/A | Ongoing | Ref: WMO AMDAR Panel Session 15 [Fin. Rep](http://www.wmo.int/pages/prog/www/GOS/ABO/AMDAR/panel/reports/AMDAR_Panel_XV_Final_Report.pdf) 4.2.1. |  |  |  |
| 14 | 5) | Monitor & report on impact assessment results of TAMDAR humidity & other parameters by MetOffice | ET-AO | 1. Review reports and analyse results. 2. Report to ET-AO-1. 3. Provide updates to ET | Report to CIMO | Q3 2013 | Q4 2017 | 40 | * Delay to installation of TAMDAR on FAAM aircraft, now scheduled for Oct 2014. * TAMDAR sensor installed and Panasonic completing onboard calib. Data will be collected from campaigns from March 2015. * Awaiting results from Met Office |  |  |  |
| A.Hoff | Determine status of reporting of DWD & ECMWF on WVM Impact studies & compile a brief summary report for publication. | Newsletter Article or WIGOS TR | Q1 2016 | Q4 2017 | 0 | * Newsletter Article produced |  |  |  |
| 15 | 3) | Develop & Implement plans for AMDAR & WVSS inter-comparison | S.d.Haan | 1. Determine requirements; 2. Analyse options; 3. Draft Plan; 4. Implement & report (IOM). 5. Assess data from DLH WVSS aircraft 1 year data | AMDAR & WVSS Inter-comparisons Plan | Q4 2013 | Q2 2017 | 30 | * This task was delayed whilst awaiting WVSS installation on DLH aircraft. All 9 aircraft will be operational Q1 2016. * Dataset of DLH aircraft now available |  |  |  |
| 16 | 6) | Prepare a paper on the status of WVSS-II validation | B. Ford & Collaborators | 1. Prepare outline and scope 2. Identify contributors 3. Research and draft 4. Review 5. Publish | IOM Report | Q3 2013 | Q3 2017 | 70 | * Provide a summary on all scientific and operational aspects of the WVSS-II sensor and prepare a paper to be published as an IOM report. * Upon review by CIMO requires some changes and additional material. * After further iteration, document will be reviewed by ET-AO Q2 2016 |  |  |  |
| 17 | 6) | Review & Update Aircraft-based Obs Reg. Mat. In CIMO Guide | ET-AO | 1. Review current status of material and identify requirements for update; 2. Coordinate & undertake update; 3. Review and complete; 4. Provide to CIMO Editorial Board. | CIMO Guide on Aircraft-based Observations updated. | Q1 2014 | Q4 2018 | 50 | * Need to plan for review of current chapter to be completed (if necessary) by Q4 2017 for input to process to have approved by CIMO-2018 * Minor updated made by A.Hoff. * S. Taylor to provide input to new section on UAVs. * Final iteration Dec 2017 |  |  |  |
| 18 | 7) | Attend meetings of relevance to AMDAR Technical Dev. | ET-AO, SO/ARO | 1. Develop list of aviation committees and reps on P&C wiki. 2. Membership of RTCA | Meetings attended.  Reports produced for CIMO and Secretariat | Q2 2013 | N/A | Ongoing | This may include:   * Meeting with avionics vendors; * SO/ARO &S.Taylor met with A.Hoff in Dec 2013 in Offenbach for Task 19. * Met Expo (Madrid September 16) * AEEC led meetings 2017 (DLUF and AMC) * Attendance at DLUF in US Feb 2018 and Europe Sep 2018. | 3.1 (10K) | 5K |  |
| Ch-ET-AO, SO/ARO | Undertake a review of AEEC, RTCA, SESAR and other bodies to determine critical committees and work groups requiring ET-AO representation | 1. Nomination of members to key committees and work groups. 2. Update of list on wiki. | Q1 2016 | Q2 2017 | 20 | * List commenced on WMO ABOP wiki. |  |  |  |
| 19 | 4) | Maintenance of AEEC ARINC 620 Specification | S.Taylor, SO/ARO, A. Hoff | 1. As necessary, work with AEEC DataLink Systems Sub-Committee to maintain the Met. Report in the ARINC 620 standard. | Met. Report V6 defined in the AEEC ARINC 620 spec. | Q4 2013 | Q4 2014 | 100 | * Will require travel support for work team and to attend AEEC meetings * D.Lockett attended AEEC DLK SSC, June 2014 (1.2K) * Met Rep. v6 incorp. into ARINC620-8 (published Dec 2014). * AEEC led meetings 2017 |  | Via 18 |  |
| 20 | 4) | Interaction with AEEC AOC | ET-AO, SO/ARO | 1. Review existing documents and reports to determine requirements for ET-AO 2. Seek membership of AOC and attend meetings | Liaison with Aviation Industries.  Report to ETs where appropriate. | Q2 2014 | N/A | Ongoing | * SSC and AOC are trying to harmonize requirements for data link in A633 and A620. * ET-AO should determine any implications for AMDAR. * This Task is related to Task 18 and any funding is captured there. * Chair tried to add ABO to AMC Session (1-4 May). May be useful to attend as networking opportunity. * Possible attendance at AMC and other AEEC Meetings |  | Via 18 |  |
| 21 | 3) | Study of UAV technologies. | Ch-ET-AO | 1. Investigate possible applications of UAV/UAS developments for reporting of meteorological parameters. 2. Attend meetings of relevance 3. Chair will follow up with vendors Q2/2017 4. Keep up to date with Aviation developments (FAA/EASA)regarding UAV and shared airspace 5. Possible CIMO Workshop on UAV use for met. Reporting in 2018. | 1. Reports to ET-AO and CIMO. 2. Mission Report from UAV Conference (Oct 2014). 3. Prepare report for ET-ABO-3 4. Mission Report from IATA Drones Lab (Oct 2017) | Q3 2014 | N/A | Ongoing | * Ch-ET-AO attended UAV Conference Oct 2014. (1.4K) * UK Met Office are investigating UAV technology for meteorological research. * Ch-ET-AO invited to visit UAV vendors – to be arranged during first half of 2015. * Visit to UAV vendors delayed to 2016 * UAV meeting identified (Brussels March 16) * Met expo (Madrid September 16). Obtain feedback from MO attendee * Chair attended IATA 1st Drones Lab Conference, Barcelona Oct 2017. Possible invitation to present ABO at the 2nd Conference 2018 |  | 20K |  |
| 22 | 4) | Reporting and Encoding Requirements | A.Hoff | Make assessment of whether there is a requirement for reporting of True Heading within the AMDAR BUFR Template | Report to ET-AO and ET-ABO | Q1 2016 | Q2 2017 | 95 | * Requires analysis of the BUFR template. J.v.d.Meulen can assist. |  |  |  |
| S.de.Haan | Investigate any additional metadata requirements to support heading derivation for ADD | Report to ET-AO and ET-ABO | Q1 2016 | Q2 2016 | 50 | * Needs to be completed so that requirements can be met in the new guidance for the GttG. Being compiled by ET-ABO. |  |  |  |

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**APPENDIX II**

**ADDITIONAL INFORMATION (if needed)**

The next meeting of ET AO is foreseen to take place in April 2018.

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**APPENDIX III**

**APPENDIX III: Draft workplan for after CIMO-17**(Note: do not fill in colums Person Responsible/Deadline/Status)

**SUBJECT TO CHANGE AFTER NEXT ET-AO IN APRIL 2018**

| **No.** | **Task description** | **Person responsible** | **Action** | **Deliverable** | **Deadline for deliv.** | **Status**  **[%]** | **Comments** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | **Investigate ABO systems performances and propose improvements** |  |  |  |  |  |  |
| 2. | **Promote implementation of humidity measurements** |  |  |  |  |  |  |
| 3. | **Implementation of Turbulence observations in data delivery programme** |  |  |  |  |  |  |
| 4. | **Investigate new ABO derived data technologies.** |  |  |  |  |  |  |
| 5. |  |  |  |  |  |  |  |
| 6. |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |
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