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| Submitted by: M. Garcia  19.03.2018 |

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# Report on progress, recommendations and future activities of Theme leader ON RADIOSONDE PERFOMANCE MONITORING

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| **Summary and purpose of document**  This document provides information on the status of TL-RPM after the unfortunate loss of Alexander Kats on 22.05.2017 |

**Action proposed**

The Meeting is invited to discuss the content of this document, advise on further activity and consider necessary actions

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

**EXECUTIVE SUMMARY**

* The role of the CIMO Theme Leader on Radiosonde Perfomance Monitoring (TL-RPM) is to monitor the information contained in WMO No. 9, Volume A, Observing Stations and WMO Catalogue of Radiosondes, and to interact with Members to request updates as required. TL-RPM is also responsible for compiling quarterly tables of performance statistics for all radiosonde stations, following up performance issues with radiosonde operators, and for liaising with Members, HMEI and CBS IPET-DRMM regarding coding issues that arise.
* The fact that there is currently no one doing this work.

The continuity of this activity is important because this information still relevant for users.

Otherwise there are several logistic and operational problems in the radiosonde stations network world wide more critical in developing countries. Maybe we would be needed to think in create in parallel one consultant linked point into the CIMO web page where the users who need assistance can ask about the special radiosonde problematic.

* For continue with the TL.RPM the action to be taken by MG is looking for the right persons or group that can proposed like Theme Leader.

Ref the monthly reports was made by CAO, comments received from Arkadi Koldaiev, who asked in Roshydromet ref if there are possibilities that somebody who works in the CAO can do it, has been received in positive way. Only needs the official request note of WMO to Russian Federation PR.

Another possibility is to ask into radiosonde community for voluntary experts to do it or suggest another proposal who can continue with the update of the CIMO web page.

Also contact with OSCAR are important.

**REPORT ON ACHIEVEMENTS, RECOMMENDATIONS AND FUTURE ACTIVITIES OF CIMO THEME LEADER ON RADIOSONDE PERFOMANCE MONITORING**

1. ***Major achievements with respect to Workplan***
   1. Global yearly statistics on upper-air instrumentation from GTS reports have been compiled for the period up to 14.01.2016. The official launch of OSCAR/Surface on 2 May 2016, which will replace WMO No.  9,  Volume  A,  Observing  Stations  and  WMO  Catalogue  of Radiosondes, is anticipated to greatly reduce the work involved in future in representing these statistics. The advent of OSCAR/Surface will also facilitate the representation of historical performance metadata. On the other hand, the biggest challenge accompanying this change, apart from many technical reasons, will involve tying new WIGOS station IDs with traditional WMO Index Numbers. Communication with the Project Lead on OSCAR/Surface has been established and discussions in this regard have been commenced. (See Appendix II for details.)
   2. ECMWF upper-air performance monitoring geopotential statistics, displayed as maps and vertical plots, is routinely posted on a quarterly basis on the WMO Volume A webpage. Contour lines of sun elevation have been added to the bias maps. Similar presentation for temperature and wind performance statistics is in test phase, with some samples ready for demonstration. It is planned to add the presentation of maps of day-night temperature biases and to develop tools for analysing the performance of particular radiosonde types in simultaneous use at the same station. (See Appendix II for details.)
   3. In addition to regular publication of monthly sounding height statistics, time series of these data are now available at <http://cao-ntcr.mipt.ru/all_doc/c4/caostn/caoptop.htm>, in response to a suggestion by Mr. Ercan Büyükbaş.
   4. TL-RPM was included to the recently established CBS Task Team on representing upper air information in BUFR, to contribute on issues associated with the operation of radiosonde systems on behalf of CIMO. TL-RPM has submitted a proposal to the task team on liaison with manufacturers and Members on respective issues.
   5. TL-RPM has co-authored with B. Ingleby (ECMWF) et al., a paper entitled “Progress towards high-resolution, real-time radiosonde reports” which has been accepted for publication in Bulletin of the American Meteorological Society. The paper directly addresses Work Plan Task 3 Action 3 and promotes the production and use of native upper-air BUFR reports instead of TEMP and PILOT.
   6. Requests for code entries for new radiosondes/systems for China, Japan, Republic of Korea, Russian Federation and Switzerland were agreed with IPET-DRMM following approval of respective amendments. Code entries for new Switzerland radiosondes and NOAA/Vaisala dropsondes are under discussion. Thus, only India and South Africa still have outdated code entries for their radiosondes in Common Code Table C-2.
2. ***Problems encountered***

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

2.1. A discrepancy between Hp in WMO No. 9, Volume A, and surface pressure reported in TEMP messages by USA upper-air stations was identified by a data user (See Appendix II for an example). Investigation revealed that US upper-air reporting practice assumes reduction of pressure taken from the station barometer to launch elevation (so called “radiosonde release point pressure correction”). Similar practice was also identified in some other countries. Although it may have minor impact (if any) on sounding results, this discrepancy may lead to errors in data assimilation of upper-air data reported using traditional codes (there is no problem with this in correctly coded BUFR messages where height is reported for all levels) . Unfortunately, there are no regulations found either in the WMO Manual on Codes nor in the CIMO Guide regarding the definition of “the surface level” for upper-air data. So far the only solution foreseen is to request USA (and possibly other countries) to provide respective clarifications to the WMO Manual on Codes, No 306, Vol. II (Regional Codes and National Coding Practices), to add a remark to WMO No. 9, Volume C1, and **to include a note in the CIMO Guide**. In the meanwhile, there is a need to inform data users about this issue. There is a paper "Determination of Radiosonde Station Elevation from Observational Data" by Aldukhov and Eskridge (Journal of Applied Meteorology, Vol 41 No. 4, April 2002) which describes a method of derivation of actual surface level elevation from sounding data. Dr. O. Aldukhov (RIHMI-WDC, Obninsk) has informed TL-RPM that he is continuing this work and, upon completion, further discussion will be warranted on how to make them public.

2.2 A case is under investigation wherein a station is demonstrating noticeable geopotential bias just above the surface. It appears that the bias results from using GPS height referred to the reference ellipsoid instead of a “well-defined geoid” as recommended by the CIMO Guide. **Therefore, it may be useful to add a note about this to CIMO Guide, Part I, §12.3.6 ‘Use of geometric height observations instead of pressure sensor observations’.**

2.3 To address the needs of the climate community, TL-RPM has commenced dialogue on reporting practice with respect to upper-air humidity outside the 1-100%RH range. This has received positive feedback from Mr. T. Oakley, GCOS Implementation Officer (See Appendix II for details).

2.4 Communication with ECMWF has served to remind TL-RPM of the importance of the ECMWF consolidated 6-monthly list of suspect upper air stations in providing feedback to help to motivate Members to maintain their upper air observation performance. For many years the WMO WWW Operational Newsletter published these lists, so **this practice may need to be renewed**.

1. ***Recommendations***

* 3.1. That CIMO-MG consider whether small changes may be warranted to the CIMO Guide to resolve ambiguous practices in regard to reporting of surface pressure and of GPS height in radiosonde messages and request the TL-RPM to draft appropriate changes if required;
* 3.2. That CIMO-MG consider reviving the periodical WMO Operational Newsletter, or equivalent, to regularly publish and distribute to Members the 6 monthly ECMWF lists of suspect upper air stations.

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

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**APPENDIX I**

**APPENDIX I: Updated workplan (2014-2018)**(Version: as approved by CIMO-MG-13 in Dec. 2014, updated on 20 Feb 2016)

| **No.** | **Task description** | **Person responsible** | **Action** | **Deliverable** | **Deadline for deliv.** | **Status**  **[%]** | **Comments** |
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| 1. | **Catalogue of radiosondes and upper-air wind systems** | A. Kats | 1. Update annually the catalogue compiling global yearly statistics of BUFR, TEMP and PILOT messages and srrarasasa code figures arriving along with section 7 of TEMP messages and respective descriptors (002011,002013,002014,002003) of BUFR messages, using operational databases of the Hydrometcentre of Russia 2. Verifying abovementioned information versus WMO Publication No. 9, Volume A and drafting the list of operational upper-air stations. 3. Identifying inconsistencies (silent stations, unknown stations, invalid rara figures) in the list above and resolving them in liaison with NHMSs and compiling the Catalogue. 4. Liaising with ICG-WIGOS on facilitating migration of Radiosonde Catalogue information towards OSCAR/Surface representation | 1. New version of catalogue for posting on CIMO website 2. Suggestion for catalogue migration to OSCAR/Surface | Annually  06/2015 | 100%  75%  50%  10% | CIMO-XV, para 5.5  To be done by TECO-2016  (depending from OSCAR/Surface prospects)  To be developed further along with maturing of OSCAR/Surface |
| 2. | **Performance monitoring statistics** | A. Kats | 1. Compile the quarterly upper-air performance monitoring statistics and graphical plots 2. Analyzing upper-air monitoring statistics and graphical plots, identify problems with certain stations/radiosonde types, and prepare a respective report | 1. New version of files for posting on CIMO website 2. Report with list of identified problems | 1. Annually  2. Annually | 100%  (ongoing)  50% | CIMO-XV, para 5.5  To be done by TECO-2016 |
| 3. | **Follow-up on identified performance issues** | A. Kats | 1. Contact individual Members and HMEI on performance issues identified above 2. Identify and assist on remedy actions in respect to BUFR reporting software issues 3. Promote high-resolution native upper-air BUFR production instead of TEMP->BUFR conversion | 1. Correspondence to relevant Members (e.g., NMHS) and HMEI 2. Report to CIMO-MG | 1. As Req  2. Annually | Ongoing  100%  50%  (ongoing) | CIMO-XV, para 5.5 |
| 4. | **Follow-up on coding issues** | A. Kats | 1. Liaise with Members, HMEI and CBS IPET-DRMM on allocation of new entries for radiosonde/sounding system used in TDCF | 1. Correspondence to relevant Members, HMEI and IPET-DRMM chair 2. Report to CIMO-MG | 1. As req  2. Annually | 100%  (ongoing)  100% | CIMO-16, 8.9 |

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