

## ***Interactive comment on “Use of automatic radiosonde launchers to measure temperature and humidity profiles from the GRUAN perspective” by Fabio Madonna et al.***

**Fabio Madonna et al.**

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The authors of the manuscript gratefully acknowledge the positive opinion on the manuscript and the helpful comments provided by the anonymous reviewer #1, which aim at increasing clarity and readability of the manuscript itself. In the new version of the manuscript, which shall be uploaded once the AMT discussion stage will be closed, all the technical suggestions provided by the reviewer will be included.

In particular, the authors want to provide an immediate feedback to reply to the most interesting points raised by the reviewer. The latter are reported in the following with the authors' replies (preceded by the letter "R").

C1

Line 30: 'Sondakyla'. Please spell the station name the same ('Sodankylä') throughout the manuscript.

R: This is an unexpected mistake due the conversion of the manuscript in pdf.

Lines 271-272: Trappes station latitude, longitude is listed as '48.46N,0.20E, 168 m asl'. This is inconsistent with the manuscript table A1 entry for 07145: '48.770, 2.020 ' and with WMO OSCAR/Surface for Trappes reporting '48.774444 N, 2.0097222222 E, 167 m asl. Please correct or explain clearly if the manual and automated Trappes stations have different positions.

R: The coordinates reported for Trappes station are those declared by the station operators for GRUAN, please check also <https://www.gruan.org/network/sites>.

Line 312-450 The reviewer commented that: "A suggestion: Insert a table defining the terms 'effective flights', 'successful launches' and 'successful flights' according to MeteoSwiss and MeteoFrance respectively. And be clear in the text when which is referred to."

R: In the new version of the manuscript, two footnotes with the definition of 'successful flights' have been included in the considered page.

383 Figure 5: Please replace with a mature figure without confusing red text and red error marks.

R: The authors apologize for the confusing text and marks: the mistakes have been removed in the new version of the manuscript.

421 Please clear up this apparent inconsistency regarding the number of scheduled and/or successful flights at Trappes in 2018: After the period the text reads: 'For the 578 flights performed during 2018'. But the reader expects Trappes to have made at least 723 successful launches in 2018 (99,1% of 'two launches per day (line 394) for 365 days') and at least 716 successful flights (99% of 723). Why was only 578 flights performed in 2018?

C2

R: Yes, the reviewer is right and “578 flights” is a mistake. In the new version of the manuscript, the number of flights has been correctly reported (716).

404-407 Please rewrite, to make the sentences easy to understand, unambiguous and consistent with the rest of the paper. I.e. How should this sentence in line 404-406 be understood: ‘the Meteomodem ARL Robotsonde in Trappes has realized 1908 successful flights, out of a total of 1956 successful flights according to MeteoFrance standards’? Who ‘realized’ the remaining 48 ‘flights’ out of the ‘total of 1956 successful flights’? Manned personnel? If so, please mention in the text the existence of ‘some flights after manual launch’ at Trappes during the 2016-2018, automated period. Or, should the sentence rather be understood as the ‘1908 successful flights’ being successful according to MeteoSwiss standards? If so, please write it out, to avoid confusion like mine :-)

R: Yes, the reviewer is right and the paragraph has been re-elaborated to clarify as follows: “the Meteomodem ARL Robotsonde in Trappes has realized 1908 successful flights, according to MeteoFrance standards, out of a total of 1956. For each of the remaining 48 flights, a spare automatic launch was performed which fulfilled the requirements of MeteoFrance.”

428 Table 4 caption: Please add text clarifying if ‘percentage of successful flights’ is defined as ‘percentage of successful flights out of scheduled flights’ or ‘percentage of successful flights out of successful launches’ or if it is not necessarily specified precisely how the respondents defined this.”

R: The reported percentage is the percentage “of successful flights out of successful launches”. This is now clearly reported in the text using a footnote in the considered page.

Lines 642-643 I suggest for clarity, please repeat/insert here more details on ‘the operational organization’ as it might not be clear to every reader, that they should recall the potential beneficial switch to Totex balloons as well as other things mentioned in line

C3

410-415.

R: As suggested by the reviewer, the authors added a few more details in this paragraph about the operational organization, which is carried out under a joint effort between Meteomodem and MeteoFrance the overall management of the site (including loading and type of balloon, balloon inflation without human contact, preparation of radiosonde before flights for calibration, both with ground-check, meteorological shelter and saturated chamber, system check-up, etc).

648 I suggest to ask MeteoFrance for their own explanation of the apparent difference in burst height distributions (Figure 14 right panel) of the old manned and the new automated station and include it in the analysis.

R: Figure 14 shows (1) a thinner and sharper data frequency distribution for the automatic system than for the manual that can be related with a more homogeneous balloon inflation (automatic inflation, same method, constant gas flow, more stable temperature), and (2) a higher peak occurrence frequency that can be related with the use of better balloon and with less human contact. The text reported in the new version of the manuscript is the following: “The comparison reveals that the burst altitude (Figure 14, right panel) is generally higher for the ARL than for the manual launches, likely due to use of different balloons and the more limited human contact with balloon itself. ARL frequency distribution has also a more peaked distribution that can be related with a more homogeneous balloon inflation (automatic inflation, same method, constant gas flow, more stable temperature).”

722 Please correct station position for Faa'a so that it is consistent and easy to identify ('French Polynesia, 28.34S, 16.32E' is inconsistent). Is the stations referred to as 'Faa'a' the same as table A1 entry WMO id 91938 having coordinates -17.55, -149.6? If so it would be helpful to readers to confirm this in the text by saying so or by mentioning the WMO station name 'TAHITI-FAAA' or the WIGOS station id 0-20000-0-91938 along with the correct position.

C4

R: Yes, the reviewer is right. The correct position of Faa'a site is Latitude: 17°33.298' S, Longitude: 149°36.876' W (17.63S, 149.84W in decimal degrees). The WIGOS station ID is 0-20000-0-91938. All this information has been reported in the new version of the manuscript ensuring consistency across the sections.

732-751 I suggest to move this to 'section 3 Technical performance' to highlight this, because this information on very misleading observations in the lower 50-100 m is very important, interesting and general (e.g. it's not only Faa'a since ECMWF notes 'some reports' from 'stations') including how one of the suppliers recently implemented remedying software at some stations.

R: According to the reviewer's suggestion, the paragraph at lines 732-751 has been moved to the section 3, where the Technical performance of the ARL systems are discussed.

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