

Response to Referee #2

Referee comments are in black, responses are in blue.

- Line 31: 'type ob' -> 'types of'

"ob" has been replaced by "of".

- Line 106: move the expansion of ReOBS ("Re" stands for . . .) to line 96.

These precisions L106 have been removed, as it was already explained L97.

- Line 118 and 123: in other part of the text it is about sixty variables, but here is fifty. Please check the consistency.

There are 64 variables in the file. This is now specified in the text: L119 and L124 "fifty" has been replaced by "sixty".

- Line 260: can you elaborate more on how the given weight corresponds to the geometric representativeness? E.g. a geometry map may be overlapped in Figure 3a.

The text has been clarified as follow: "A weight is assigned to each of the three stations based on the following method: the 50 x 50 km² domain is divided into 90.10³ grid-boxes (300x300), the distance between each box and each site is calculated and then each box is linked to its nearest site. Then then percentage number of boxes linked to each site gives the weight of the site within the domain."

- Line 274-283 and Table 3: this part is kind of confusing. Firstly, I don't understand what the authors exactly mean for the first sentence "as the correlation between the adjacent samples increases with the sampling rate". Are you calculating correlation coefficient for different time windows? According to later part, my understanding is that the non-physical jumps are detected by checking the difference (not the correlation) between measurements in two successive time windows (e.g. 5min), is it right? Secondly, In the limits given in Table 3, what do the upper and lower arrows mean? What do the time windows (5min, 15min, 60min) mean? My guess is that the 60min measurements are used to detect the unphysical persistence by calculating the std. dev. of 1min measurements within this 60min window. Does "5min" mean two successive 5-min measurements are used to test the unphysical jumps? How do the two examples in line 281-283 (2 hPa within 1 minute and 0.6C within 1minute) related with the limits given in Table 3?

"as the correlation... rate": this sentence has been removed, as actually, jump detections are not based on correlations. In Table 3, upper arrow means an increase during the time window indicated, and lower arrow means a decrease during the time window indicated. It is now specified in the table caption. All these tests are done with the variables native resolution which is 5 seconds for measurements (1) to (6) and (11) and (12) (Table 1). It is now specified L276.

For the two examples concerning pressure and soil temperature, the measured temporal variability for 1min time resolution is larger than the possible range of variability shown in table 3, i.e. 1hPa and 0.2°C, respectively. In this case the corresponding variables are

not accounted for. The text has been reworked to precise as follow: “In the first example, an unphysical change of 2 hPa within 1 minute is observed in pressure (larger than 5hPa during 5min, see table 3). In the second example several temperature spikes (0.6°C within 1min for ground at -5cm) are detected and we reject the data when the increase reaches +3°C and the decrease -4°C within 15min (i.e +0.2°C and -0.27°C for 1min resolution).”

- Line 288-289: “The value is 0 m/s because of frost deposition on the sensor” -> “The value is 0 m/s after 18 UT because of frost deposition on the sensor (shown by low T and high RH in Figure 4c)”

The sentence has been modified following the reviewer comment.

- Line 312-323: is there any corrections imposed on the EC-based fluxes (e.g. density correction (Webb et al. 1980), coordinate rotation (Wilczak et al., 2001), etc)?

Webb EK, GI Pearman, and R Leuning. 1980. “Correction of Flux Measurements for Density Effects Due to Heat and Water Vapour Transfer.” Quarterly Journal of the Royal Meteorology Society 106(44):85-100, doi:10.1002/qj.49710644707.

Wilczak JM, SP Oncley, and SA Stage. 2001. “Sonic Anemometer Tilt Correction Algorithms.” Boundary-Layer Meteorology 99(1):127-150, doi:10.1023/A:1018966204465.

The reviewer is right, we had some details as follow : “with the open-path InfraRed Gaz Analyser the molar density fluctuations are accounted for in the processing by following the classic formulation of Webb et al. (1980). Moreover, automatic method has been applied to correct wind statistics for any misalignment of the sonic anemometer with respect to the local wind streamlines of the sonic anemometer with respect to the local wind streamlines according to Wilczak et al. (2001).”.

- Line 337: Can you elaborate what kind of profiles are considered noisy? Does <40% are noisy mean >60% profiles are valid?

A bracket has been added at the end of the sentence to precise that actually it means that “i.e. at least 60% of profiles are valid”.

- Line 351: delete “.” After “used”

The dot has been deleted following reviewer comment.

- Line 403: the year might be wrong in “Chepfer et al. 201)”

201 is now replaced by 2010.

- Line 638: timescales -> timescales

timescales has been replaced by timescales.

- Line 653: “at the time t” this sentence may not be completed.

“at the time t” has been replaced by “at a precise time”.

- Table 1: physical bounds and native resolution are not given for “(5) 2-m wind

direction". I think there should be some value, right?

The native resolution is 5 sec, and the physical bounds are 0 and 360 degrees. It is now specified in the table.

- Table 2: some variable short names (e.g. tas_SIR, tas_TRP) are not consistent with the variable names in the downloaded data product.

This is right. It has been corrected in the table and in the text: suffix are actually -sirta, -regional, and -trps.

- Figure 4b: there are a lot of spikes and it is not clear which are rejected and which are kept.

As suggested we had some details as follow : "In the second example several temperature spikes (ground at -5cm) are detected and we reject the data when the increase reach +3°C and the decrease -4°C within 15min."

- Figure 7: "norm. T2" is calculated following the equation (1) -> should be equation (2)
equation (2) is now indicated instead of equation (1).

- Comments related to the data (downloaded from the link provided in the manuscript):

1. The current variables are sorted by alphabet order. This is not convenient to find the variables of site information (lat, lon, time, etc). I would suggest moving those variables to the front or to the end, similar to the ARMBE.

It is true. We make the commitment that it will be done in the next version of the production file, as it is done every 6 months.

2. Since it is a single product with measurements from many instruments, it is important to list the data source (measured from what instrument?) in the attribute of each variable.

As it is explained in the paper, since the sources could be multiple for one single variable, we made the choice to not explain the instrument in the attribute of each variable. To get this information, it is then necessary to refer to the documentation, and to the present paper (Table 1).

3. Some long_names are difficult to understand (e.g., mld, prp, trps, *_l, *_ph). Consider expanding these abbreviations.

It is a good idea: we make the commitment that it will be done in the next version of the production file, as it is done every 6 months.

4. qc flag: some have flag_meanings in their attributes but some don't

The attribute "flag_meaning" has been added to all qc variables.

5. std_*: are all these standard deviations within 1-hour time window? Some don't have the "1-hour" in long name.

All std variables are actually the standard deviation estimated over one hour. It is now precised in all std variables attributes.

6. "1-hour std of std_*variable*" should be "1-hour std of *variable*"

This has been corrected following the reviewer comment.

7. In some long names of u/v: wing -> wind

This has been corrected.

8. In global attributes: there are two titles/sources/locations/institutions... and what does the "gps" mean in title/system/source?

It was a bug, thank you. It has been corrected.