

Interactive comment on “A database of water and heat observations over grassland in the north-east of Japan” by Wenchao Ma et al.

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“The database comprising 37 years of data from the EDP observational site is impressive. Various parameters are recorded in different soil depth and instruments heights, and various temporal resolutions are also offered. The data page is clear (in the English version) and the download easy. The description should maybe also contain a little paragraph on instrument calibration and maintenance (e.g. cleaning, which is especially relevant for radiation sensors). I recommend the publication of this important database, but have a few remarks as well.”

(Response) We thank the reviewer for the comments. This database is concentrated on the efforts of many researchers. Also, the observation site serves to the hydrological,

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meteorological and ecological researches for decades. We would like to present this database to serve more research activities. And within this study, we submit the daily data that is carefully checked. Regarding the comments on the “description should maybe also contain a little paragraph on instrument calibration and maintenance”, we agree that we should completely describe the instrument calibration and maintenance. About the instrument calibration and maintenance, we have mentioned in Page 6 Line 20-22: “In addition to the missing data, the dates of equipment maintenance, as well as all construction and mowing information, are recorded in the maintenance log accessible at http://www.ied.tsukuba.ac.jp/yosoku/kansoku/hojyo_log/.” We would like to translate them into English version and present a thorough description in the next work. “I recommend the publication of this important database, but have a few remarks as well.” We thank the reviewer for his/her recommendation!

Specific comments 1. Datafiles ==> The headers of the files have to be copied and inserted into the data files, which themselves do not contain headers. As this is probably done for automatic ingest I am fine with it. However, the last data point in the hourly files is always hour 24:00. E.g. hour 24:00 of day 1, whereas I would have given this data point the timestamp hour 00:00 of day 2. Is that Japanese standard maybe? Other than that, the files are in good shape and easily processable.

(Response) We thank the reviewer for pointing this out. Within the database (CRiED, <http://www.ied.tsukuba.ac.jp/yosoku/database-doi/>), the headers were not inserted into each data file. While, the headers were written in the “readme.txt” file, which is saved within the same folder for each database version. For the convenience of the users, we will insert the headers into each data file as reviewer suggested. About the timestamp of the database, the hourly data was recorded from 01:00 to 24:00, because of the hourly value represents the value for one hour before. For example, the data on “24:00” is the average or sum (precipitation) value between “23:00” and “24:00”, which recorded as the “ended value”. In this work, we prepared the daily value, which calculated data from “01:00” to “24:00”. Although the writing format of hourly data is different

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to the standard format, the daily value is the same. And here, we submit the daily value only.

2. P4 Line 17 ff ==> I am not sure about the representativeness of this study area for plant/soil studies. If the site was artificially filled this is not representative of the area nor natural conditions. Also, the area around the site looks more of an agricultural/urban/forest site – how representative is this site of the area? Please comment on that.

(Response) The representativeness of the artificial soil is an essential point for this observation site. As it is well known, disturbed soil profile is not easily recovered or reproduced artificially. However, in 1977, researchers refilled this observation site by referring to soil profile nearby. And, all of the soil filling in were chosen from the wildly distributed “Kanto loam”, which is the highly representative natural product of the Kanto area in Japan. In the other point, soil property and distribution behaves high heterogeneity for all scales: macro-, meso- or microscale even for undistributed soil. Although, the disturbed soil profile does not represent the original soil condition, but it is possible to represent about the Kanto area to some extent. About the area around the site, we checked the land use and land cover data from Ministry of Land, Infrastructure, Transport and Tourism (<http://nlftp.mlit.go.jp/ksj-e/index.html>). We analyzed percentage of the land use in Tsukuba city using shape data based on the investigation carried out in 2014. The resolution of mesh is 100 meter. Due to the limited resolution of the image, we only present the land use of ArcGIS figure in the supplement rather than put into the manuscript. From the statistical analysis: 27.3% is farmland, 24.6% is building, 19.4% is paddy field, 16.8% is forest, 6% is others, 2.3% is river, 1.3% is road, 1.1% is golf course, 1.0% is uncultivated land and 0.1% is railway. Basing on the above information, we generally consider the grassland area is about 47.8% and forest is 16.8%, which means the grassland is nearly half of the area of Tsukuba city. That is why, we believe the CRIED grassland observation site is meaningful and representative for this study area.

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3. P6 Line 17 ff ==> You talk about the averaging process here. I would like to hear more of how you averaged the data for hourly or daily averages, especially for data with large daily courses (shortwave radiation), this is pretty important if serious data gaps exist (or e.g. only nighttime values are available). How is a record marked as incomplete? I did not see any marks in the files I looked at.

(Response) About the averaging process, we followed the method introduced by Asanuma et al., (2004). The 10 sec data is instantaneous value. For precipitation, the 30 mins, 1 hour and 24 hours data are accumulated values. For the other parameters, the 30 mins, 1 hour data and 24 hours data are average values. For shortwave radiation, the missing/incomplete values only refer to day time when receiving radiation. Also, same as the “question 1”, the hourly value, the timestamp value represent the value obtained within 1 hour before. And the same treatment was applied to other time scale frequency. We thank the reviewer for mentioning this database mark. For the datafile we submitted last time, we presented daily data without marking the incomplete data. So, we submit the revised data file in Version 2, the incomplete data are marked with “*”, and missing data is marked with “****”, which is consistent with description within the manuscript [P6 L17-21]. The modification could be found from the newly submitted supplement data file. Text was added to the context as followed: “(marked with “*” in the supplement data file)” [P6 L18-19] “(marked with “****” in the supplement data file)” [P6 L19-20]

4. P6 Line 20 ==> the maintenance log is a good thing, but I only saw the Japanese version – is there an English version available?

(Response) Thank you for pointing this out. We do not have the English version about the maintenance log yet. The full English version will be prepared soon.

5. P7 Chapter 2.2 ==> I did not find the downward longwave data, can you specify where it is included? See also Table 2, where it seems that longwave data is included in the 2002-2007 files, but I checked 2004 and there is no longwave included

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(Response) Thank you for pointing out this important issue in our data. The observation of downward longwave radiation (Ld) is carried out by standard and well calibrated sensor, and regularly maintained by professional meteorological company (Climatec, inc. <http://www.weather.co.jp/>). However, observation of Ld encountered several instrumental problems since 2000. Until now, we are still trying to recover the missing/error data. Therefore, we did not publish all the observed Ld data during our initial submission. As suggest by the reviewer, we newly release the reliable daily observed Ld data from 2002 to 2006 which are included in the CRiED database (Ver. 1.1, <http://www.ied.tsukuba.ac.jp/~hojyo/archives1.1/yearly/>). For the missing/error data, a reliable method established by Kondo and Xu (1997) was employed to estimate the daily Ld. We would like to release both of the reliable observed Ld and calculated Ld data in the supplement data file in section 2.2.

6. P9 Chapter 3 ==> maybe you should also talk about the different available versions here. What is the difference between version 1.0, 1.1 and 2 etc.

(Response) Thank you for your constructive suggestion. It is very important to introduce this database clearly. So, a description of the differences among version 1.0, 1.1 and 2.0 was added to the Chapter 3 according to the reviewer's recommendation to the text. [P9 L18-19, P10 L1-9] "This database includes three versions: Ver. 1.0, 1.1 and 2.0. For Ver. 1.0, the data were collected in integer data format following a former system standard, which applied to the observed data until April 2003. Then, the new system was started from May 2003 and the data set was updated as Ver. 1.1. The data quality is guaranteed by the consistent quality control of all raw observation data. The quality control includes removing error data due to instrumental problems, and missing data caused by observed values out of the specified range (<http://www.ied.tsukuba.ac.jp/yosoku/terc/>). The data format in Ver. 1.1 was established in accordance with Asanuma et al., 2004. The Ver. 2.0 is the newest version, which is a comprehensive version contains both of the Ver. 1.0 and Ver. 1.1, for the purpose of improving data reliability by performing quality evaluation and quality con-

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trol. Ver. 2.0 has two main sections. The first section is composed by the hourly, monthly and annual average values with highly consistent quality control, from August 1981 to December 2005. The other one is composed by the raw data, which include data in time frequency of 30min, 60min, 24hour, and 10sec from 2003 to the present (<http://www.ied.tsukuba.ac.jp/yosoku/kansoku/rawdata/>)." [P9 L18-19, P10 L1-9]

7. P11 Line 16 ==> you talk about daily observed values – please clarify here, that it is daily averages (e.g. temperature) and daily sums (e.g. precipitation?) respectively.

(Response) Thank you for pointing out the important aspect in data treatment. In this study, the daily observed values are estimated from the hourly data. For precipitation, the daily value is the accumulated value based on hourly observation. For the other parameters, the daily value is the average value based on hourly observation. Since the data treatment is consistent and general, we add the description text into P9 L7. Text was added to the context as followed: "For most of the parameters, the daily values are average values from hourly data, except precipitation daily value is the accumulation from hourly data." [P9 L7-8]

8. P12 Line 10 ==> you state here that the average annual precipitation is 3122 mm/a, and in Figure 5 that seems to be true. BUT on page 4 you say that the region has a long-term annual average precipitation of 1200-1600 mm, and in the 2004 file e.g. the sum of all hourly values for that year amounts to around 1520 mm. So the 3122 mm average, and all values in Fig. 5, seem way too high.

(Response) We appreciated reviewer for carefully evaluating our data. As the reviewer mentioned, the statement of L20, Page 12 L20: "The 37-year average value of precipitation is 3122.1 mm per year" is not correct. We carefully checked the data again, the average value is 1183.8 mm per year. Furthermore, we checked the annual average value from JMA (http://www.data.jma.go.jp/obd/stats/etrn/view/annually_s.php?prec_no=40&block_no=4764) the average value from 1981 to 2017 is 1259.139 mm/a (3.4497 mm/day). The regres-

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sion between CRiED and Tateno_JMA was shown in Figure 2. Based on this relation, the daily value could be regressed as: $CRiED = 0.8529 * Tateno_JMA(\text{daily value}) + 0.1794$ (shown as P11, Figure 2.). So the regressed value should be 1139.4 mm/a for CRiED. So, the revised annual precipitation of 1183.8 mm/a is reasonable. To modify this mistake, we rephrase our statement to the following and present the corrected value in the manuscript: "The 37-year average value of precipitation is 1183.8 mm per year," [P12 L20]

9. P15 Description of Figure 4 ==> Why do you mention soil and dew point temperature, but not air temperature, which is also included in Figure 4? Also other parameters are not mentioned here, why?

(Response) The original description was incomplete. We modified the description of Figure 4 and the text was added to the maintext as following: "Daily observed values of the air temperatures for all layers, maximum, minimum and mean air temperature at a height of 1.6 m, soil and dew temperatures for all layers, the precipitation, air pressure, humidity, wind speed, longwave radiation, solar radiation, net radiation, sensible heat flux and the soil heat flux at the EDP site from 1981 to 2017." [P16 Figure 4.]

Technical corrections 1. P1 Line 13 ==> If you write "depth", normally the numbers are not negative. I would remove the "-" [minus] signs when you write "at depths of -0.02 m, . . ."

(Response) We thank the reviewer for pointing this out. The minus signs were removed accordingly. [P1 L13-14]

2. P4 Line 4 ==> in the lat/long the 36.0° can be reduced to 36° (remove ".0")

(Response) We thank the reviewer for pointing this out. We have changed the coordinate "36.0°06'35" N" to "36°06'35" N". [P4 L4]

3. P4 Figure 1 ==> Please enhance the size of the font a bit, as the X and Y axis is not easily readable

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(Response) We thank the reviewer for pointing this out. The font size of X and Y axis were enlarged in the revised Figure 1. [Figure 1. P4]

4. P5 Line 1-3 ==> Please use capital first letter for the genus, e.g. Imperata cylindrica (no I in cylindrica!), Andropogon virginicus (Andropogon, not Audropogon!) etc.; Lespedeza cuneata is with a at the end, not e (probably all automatic spell check errors)

(Response) We thank the reviewer pointing out the mistakes and appreciate his/her broad knowledge in Ecology. We modified the spell and use the first capital letter for the genus. The revised text to the context as following: "The vegetation is naturally grown C3 and C4 vegetation, such as Imperata cylindrica, Andropogon virginicus, Miscanthus sinensis as C4, and Solidago altissima, Artemisia princeps, Lespedeza cuneata, Lespedeza pilosa, Equisetum arvense, Festuca arundinacea, Potentilla freyniana, Lysimachia clethroides as C3." [P5 L1-3]

5. P5 Table 1 ==> The date format is a little weird here. I would maybe use ISO format (2015-12 or 1981-08 etc.)

(Response) According to the reviewer's suggestion, we improved the date format as ISO format. The modified context could be found in Table 1. [Table 1. P5-6]

6. P18 Line 3 ==> as you give units for all parameter, you should also list "%" for relative humidity

(Response) We thank the reviewer for pointing this out. The unit "%" is added to the description of Figure 5. [P19 L3]

7. References ==> you list three references as "in review" (Godsey, Kosmos, Makarieva). All three have been published in the meanwhile, so you should update the references

(Response) We updated the references in the context accordingly: "Godsey, S. E., Marks, D., Kormos, P. R., Seyfried, M. S., Enslin, C. L., Winstral, A. H., McNamara, J. P., and Link, T. E.: Eleven years of mountain weather, snow, soil moisture and stream-

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flow data from the rain–snow transition zone – the Johnston Draw catchment, Reynolds Creek Experimental Watershed and Critical Zone Observatory, USA, Earth Syst. Sci. Data, 10, 1207-1216, <https://doi.org/10.5194/essd-10-1207-2018>, 2018. ” [P20 L22-25] “Kormos, P. R., Marks, D. G., Seyfried, M. S., Havens, S. C., Hedrick, A., Lohse, K. A., and Sandusky, M.: 31 years of hourly spatially distributed air temperature, humidity, and precipitation amount and phase from Reynolds Critical Zone Observatory, Earth Syst. Sci. Data, 10, 1197-1205, <https://doi.org/10.5194/essd-10-1197-2018>, 2018.” [P21 L21-23] “Makarieva, O., Nesterova, N., Lebedeva, L., Sushansky, S.: Water balance and hydrology research in a mountainous permafrost watershed in upland streams of the Kolyma River, Russia: a database from the Kolyma Water-Balance Station, 1948–1997, Earth Syst. Sci. Data, 10, 689-710, <https://doi.org/10.5194/essd-10-689-2018>, 2018.” [P22 L1-3]

Finally, comments from the anonymous reviewer are helpful in improving our manuscript. So, we expressed our gratitude to ACKNOWLEDGEMENT: “We thank anonymous reviewer for the thoughtful and constructive comments, which helped improve the quality of this work.” [P20 L10-11]

Please also note the supplement to this comment:
<https://www.earth-syst-sci-data-discuss.net/essd-2018-58/essd-2018-58-AC1-supplement.zip>

Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2018-58>, 2018.