

Point-by-point responses to the comments of Anonymous Reviewer #2

Below, we have outlined our responses and the changes we have made in the revised manuscript and the Supplementary Information. In this document, the reviewers' comments are shown in ***bold italic face***, our responses in blue and revisions in red. We have similarly highlighted all the changes in red in the revised Manuscript.

“Paper describes a useful long term dataset and I think the authors have put a great deal of work into data management.”

(Response)

We thank the reviewer for his/her recommendation!

I have slight concerns about the doi'd ‘Asset’ data: <http://www.ied.tsukuba.ac.jp/en/edps/database-doi/> which are available as .dat files because .dat files need processing and do not contain header rows; indeed the headers for this data need to be added separately. Why did the authors not publish the data as MS Excel in the same way that the data available from the ESSD supplement (daily data) - opens with no processing and contains a header row? This may just be my preference and still think it's a valuable dataset.”

(Response)

We thank the reviewer for the comments.

We understand that it is inconvenient for using .dat files. However, this database is used by many individuals and institutes since decades ago, which is still under way. Most of the usage were set as automatically collecting the real-time data dealing with the .dat files. So, it will cause troubles for these existing users if the data format was changed. Although it is our duty to provide convenient for these existing users, we are seriously considering how to provide an easier way to serve more users. For example, we are submitting a clear and carefully checked Excel file in this work for wider application.

Specific comments

I have had to remove ‘the’ in the manuscript where it spoils the flow of words.

(Response)

Thanks very much for your valuable suggestions. Those misused “the” and syntax error were modified according to the reviewer’s guidance.

Please check the following revisions:

Page 1:

Line 10 “...from a well maintained ...” [P1 L10]

Line 11, 12 “...observations include shortwave radiation, net radiation, air and dew point temperatures at three elevations, soil temperature...” [P1 L11-12]

Line 13 “...sensible heat flux,...” [P1 L13]

Line 14 “...includes four temporal resolutions...” [P1 L14]

Line 15 “Monthly and annual...” [P1 L15]

Line 17 “We validated the data by...” [P1 L16-17]

Line 22 “...and percent bias...” [P1 L22]

Line 23 “...annually averaged values show a positive trend in precipitation,...” [P1 L22]

Line 24 “...over the past 37 years,...” [P1 L23]

Line 25 “...detected for wind speed,...” [P1 L24]

Page 2

Line 1 “...recording historical climatic variation...” [P1 L30]

Line 3 “...from a well-maintained grassland...” [P2 L2]

Line 12 “...for estimating actual evapotranspiration...” [P2 L10-11]

Line 13 “...with the effect of stemflow and vegetation...” [P2 L12-13]

Line 26 “...In addition, latent heat flux was assessed...” [P2 L24]

Line 27 “...with flux behavior...” [P2 L24]

Line 28 “...into temporal variation, and an assessment of measurement accuracy...” [P2 L25]

Line 29 “...not only above ground,...” [P2 L26]

Line 31 “...observations of soil...” [P2 L28]

Page 3

Line 1 “A variety of studies on ecology and vegetation were conducted...” [P2 L32]

Line 4 “...to investigate the effect of...” [P3 L1]

Line 6 “Being a well-maintained observation site, the grassland provides...” [P3 L3]

Line 9 “...conducted experiments to investigate the...” [P3 L6]

Page 4

Line 5 “...site consists of a grass covered circular field 160 m in diameter at...” [P4 L2]

Line 7 “...at a height of 30 meters...” [P4 L3]

Page 5

Lines 4, 5 “...similarity of grass species, depth, and leaf-area index (LAI), were confirmed annually by...” [P4 L21-22]

Line 10 “Since 2006, the grass has been mown twice each year (summer and winter); dead plants and grass clippings were redistributed.” [P5 L5-6]

Page 6

Line 14 “Data collected from supersonic anemometer–thermometers was used to obtain heat ...” [P6 L11]

Page 9

Line 2. “...data quality was checked...” [P8 L21]

Line 19 “...including shortwave radiation,...” [P10 L5]

Page 10

Line 9 “...RH differs slightly,...” [P10 L14]

Line 12 “...except wind speed and precipitation.” [P10 L16]

Page 2

Line 19 - 21 By assessing the observed evaporation in 2001, the results estimated from the Penman, energy budget eddy covariance, and energy-balance Bowen ratio methods were presented (Yubasaki et al., 2005), which improved understanding of the variation in evaporation from a conversion in the fraction of pasture at the site into turf. Consider revising sentence. I don't understand what you mean

Line 21 the understanding

(Response)

Thank you for underlining this deficiency. We have re-written this part according to the Reviewer's suggestion. The revised text to the context as following:

“By evaluating the observations in 2001, Yubasaki et al., (2005) tested a reduction factor for pasture can be used to the turf site by comparing the evapotranspiration estimated by Penman, energy-budget eddy covariance, and energy-balance Bowen ratio methods.” [P2 L18-20]

Line 22 Yamanaka et al. ~~performed~~ carried out quality control of the data

(Response)

We are grateful for the suggestion. Because of the reference cited here is the “Saito, M.,

Yamanaka, T.: Analysis of Long-term Evapotranspiration Data Observed by Weighing Lysimeter and Its Quality Control, Bulletin of the TERC, the University of Tsukuba, 6, 53–62, doi: 10.15068/00147122, 2005.” [P22 L17-18], so the revised text to the context as following:

“Saito and Yamanaka (2005) carried out a quality control of the data, and analyzed the evapotranspiration data observed with a weighing Lysimeter between 1981 and 2002, with the results of the data quality summarized.” [P2 L20-22]

Line 23. ~~The~~ Validation of the water budget was

Line 25 where a model for the estimation of the precipitation on the grassland of the EDP department was developed, showing a good adaptability with a model taking into account the canopy, stem and evapotranspiration components based on observations from the EDP database. Consider revising sentence. I don't understand what you mean

(Response)

We thank the reviewer for pointing this out. We reorganized the sentence and revised text to the context as following:

“In 1983, a model was developed by Tase and Majima for estimating precipitation under the influence of interception. This model showed a good adaptability with the canopy, stem and evapotranspiration components.” [P2 L22-23]

Page 4

Figure 1 I can't read the axis titles or legend on (d)

(Response)

Thanks for this thoughtful comment. The font size of X and Y axis were enlarged in the revised Figure 1. [P4]

Line 17 top few metres – can you be more exact here?

(Response)

We thank the reviewer for pointing this out. We take a further literature review about this, and add this literature in the reference. The top 1 or 2 metres was filled by loam and volcanic ash soil. Below the first layer, is a clay layer with thickness of 4 or 5 metres. So, we revised the text as following:

“The observational site was artificially filled with loam and volcanic ash soil in the top of 1 ~

2 meters, and clay layer with thickness of 4 ~ 5 meters underneath (Sakura, 1977).” [P4 L13-14]

We updated the references in the context accordingly:

“Sakura, Y.: Miscellaneous, IV Water balance observation facility, Bulletin of the ERC, the University of Tsukuba, 1, 87–90, 1977.” [P21 L19-20]

Page 5

Line 1, 2, 3 vegetation names need a capital for first word e.g. Imperata cylindrica and please check spellings for accuracy

(Response)

Thank you for this valuable comment. 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.” [P4 L19-21]

Line 4 to 9 – are these the two surveys. This is a bit confusing because it states each year on line 4 and then ‘two years later’ on line 7. Consider revising this whole paragraph to make it clearer.

(Response)

Thank you for pointing out this deficiency. Actually, they are two unrelated surveys, so we deleted the ambiguous ‘two years later’. The revised text to the context as following:

“Another survey was carried out between 2000 and 2002 to directly measure the LAI and height, with similar results found as before,” [P5 L2-3]

Table 1. would be best viewed on one page please

(Response)

Thanks for your suggestion. We have modified the Table 1 within Page 5. [P5]

Page 6

Line 15 ~~These observational data~~ The data are freely available for download from ~~open to the public and are~~ the Center for Research in Isotopes and Environmental Dynamics

(CRiED) website (<http://www.ied.tsukuba.ac.jp/en/edps/database-doi/>) (formerly known as TERC) as hourly, monthly and annual summaries. Since 2003, the temporal resolution is at 10 second, 30 minutes, 60 m and 24 hour intervals. ~~through our website ()~~, ~~which is renewed updated every minute~~

When calculating averaged data (Asanuma et al., 2004) at least 24 records at 30 m were required. Readings with less than 20 records were discarded and data with between 20 and 24 records were annotated as incomplete (Ohba and 20 Yamanaka, 2007). In addition to the missing data, the dates of equipment maintenance, construction and mowing information are recorded in the maintenance log (http://www.ied.tsukuba.ac.jp/yosoku/kansoku/hojyo_log/).

(Response)

We appreciated the reviewer very much for organizing the paragraph more legible and easy to read. The revised text to the context as following:

“The data are freely available download from the Center for Research in Isotopes and Environment Dynamics (CRiED) website (<http://www.ied.tsukuba.ac.jp/en/edps/database-doi/>) (formerly known as TERC) as hourly, monthly and annual summaries. Since 2003, the temporal resolution is at 10-second, 30-minute, 60-minute and 24 hour intervals.

*When calculating averaged data (Asanuma et al., 2004) at least 24 records at 30 minutes were required. Readings with less than 20 records were discarded (marked with “***” in the supplement data file) and data with between 20 and 24 records were annotated as incomplete (Ohba and Yamanaka, 2008; marked with “*” in the supplement data file). In addition to the missing data, the dates of equipment maintenance, construction and mowing information are recorded in the maintenance log (http://www.ied.tsukuba.ac.jp/yosoku/kansoku/hojyo_log/).”*

[P6 L12-20]

Page 10

Differences in shortwave radiation are mainly governed by solar radiation, whereas absorption and reflection may be caused by atmospheric conditions (clouds)

(Response)

We thank the reviewer for pointing this out. We have made correction accordingly. The revised text to the context as following:

“Differences in shortwave radiation between the EDP and Tateno are mainly governed by

solar radiation, whereas absorption and reflection may be caused by atmospheric conditions (clouds).” [P10 L14-16]

In the data provided as ESSD Supplement:

Column heading spelling mistake: Air temperature should be Air_temperature

(Response)

Thank you for this valuable comment. The mistake of the column heading spelling was modified accordingly.

Finally, comments from the anonymous reviewer are helpful in improving our manuscript. So, we expressed our gratitude to ACKNOWLEDGEMENT:

“We thank two anonymous reviewers for their thoughtful and constructive comments, which helped improve the quality of this work.” [P19 L10-11]