

## Review ESSD-2019-97, urban surfaces hydrological properties

Overall: The authors have provided an interesting data product from carefully-conducted measurements in urban settings. I applaud their intention to share these data openly; I hope these data have impact and use as the authors list (e.g. p3|20). However, this potential user would need additional information and has some questions. Understanding that, at this point, the authors probably can not 'go back' to remedy some of these issues, this reviewer expects a more overt mention and discussion of uncertainties and weaknesses, partly to assist users of these data but also - to emphasize a good point made by the other reviewer - to guide future observations of similar properties in other urban settings.

The specific language seems quite awkward and potentially distracting in places. I itemize some of those errors below but I have no doubt that I missed many of them. These arise at least in part from German-to-English mis-translations. The journal / publisher will pick up some of these errors at the proof-reading step but I think that responsibility for these corrections lies with authors, not the journal. I strongly recommend that the authors engage a scientific technical editor to read and revise this text.

ESSD, according to its guidelines (<https://www.earth-syst-sci-data.net/10/2275/2018/>) requires explicit detailed description of uncertainty factors plus careful validation. I understand that, due to the unique nature and scale of these urban measurements, validation may prove difficult. However, the manuscript as presented remains woefully deficient on uncertainties.

These authors seem to assign uncertainty solely to sensor performance. For example, at page 10 lines 10 to 12, the authors merely recite manufacturer's performance data. But in fact they have a whole cascade of uncertainties among which manufacturer sensor performance may prove small. The climate source data (from WBI) must have substantial uncertainties. At a quick glance one sees many RH values near or at 100%, values in the highly-uncertain range for most humidity sensors.

(One often finds in this text file as well as in several others, very strange formatting errors, e.g. air temperatures of 4.0489999999999995 or, in the metaPlot.txt file, GPS values of 7.8509169190999994. These easy-to-fix errors, not fixed in these cases, have the effect of eroding our confidence in the data generally. If the authors failed to find and fix these errors, what else have they missed?)

In addition to sensor imprecisions, one needs to add uncertainties in the source climate data, variability in specific locations and PP types, uncertainties in the infiltration measurements, uncertainties in application of the CRIM equation, etc. Some of these might cancel or offset, but a rigorous uncertainty analysis necessitates careful accounting of the full range of uncertainty factors. I do not contend that users should consider any of these data as 'wrong' but neither should we consider them - as these authors apparently do - as absolute. Soil moisture, soil temperature, saturated water content, etc. all have associated uncertainties. Readers need to know those uncertainties, need to know that the data providers recognize those uncertainties, and need to know - as we currently can not - how large an impact those uncertainties might or might not have on the validity of these data. Figures 6 through 9, which ought to help us understand the value of these data, have no indications of uncertainty. Files of permittivity, soil moisture, soil temperature, etc., have no indications of uncertainty. Several times the authors mention "means" of all locations or all depths, but we never read nor see anything about standard deviations, standard errors, etc. The authors hope to see these data useful in the context of model calibration or validation, but most models require quantified uncertainty ranges. At the top of page 19 (lines 2 thru 4), the authors write "The plots E1 and E2 are equal in terms of joint properties and proportions, which leads to the assumption that infiltration measured at E1 might be applied as representative for E2." I appreciate that the

authors used the cautionary word 'might' but this reader find no basis elsewhere in the text, particularly assurances on uncertainties, that would allow me to accept similarity of E1 and E2.

A large uncertainty factor, at least for this user/reviewer, relates to solar exposure. How much direct solar radiation or shading by buildings or vegetation occurred at any site? For these latitudes, shade can influence soil temperatures by 10C or more, e.g. 50% or more of total diurnal ranges described here. Intensity of shade, diurnal pattern of shade, seasonal pattern of shade - we get none of this information and - apparently - no hints about how we might retrieve such data. Clearly the authors know more about solar radiation and local exposure factors than any users will ever know, but we get nothing?

On page 17 line 12 one reads about station D as located "an east-west orientated urban canyon within the city center." Using lat lon coordinates from metaPlots.txt file to locate the stations in Google Earth, and then applying the GE 'street view' function, I confirm the narrow streets and tall-ish buildings around station D, but I also find more dispersed but taller (5 or 6 stories?) buildings around station H, albeit with different E-W N-S orientations. From those two explorations (which I might have done wrongly, see note about lat lon below), this reader remains just as concerned and perhaps more concerned about insolation and shading effects. Authors must have recognized insolation effects, must have assessed and selected locations with solar exposure in mind, but they have shared none of that information with readers? They offer readers neither tools nor information needed to assess such a large uncertainty factor?

Again note errors in metaPlots.txt file: latitude and longitude apparently erroneously reversed for stations G and H. If authors did not recognize nor correct such an obvious error, what else have they missed? Another warning to users: data quality not assured?

Although this review seems harsh, I believe the authors have provided a potentially valuable data set that deserves publication and exposure through ESSD. To merit that publication, however, the authors need to provide a much better, more-thorough and confidence-building assessment of uncertainties.

Text errors:

Page 2 line 9: "alternated" should be 'altered'.

Page 6 line 7: "Thereby" ???

Page 7 line 2: "(see chapter data availability", 'chapter' as used here refers to a book or thesis, not to this paper?

Page 7 line 14: Authors mention evapotranspiration here (and provide two data files, one daily and one hourly) but then make no further mention or use of the term or the data. Again, a residual remaining from a separate publication or thesis?

Page 11 lines 6 thru 12: Here the authors describe uncertainties related to freezing conditions and possible salt applied as anti-freeze, e.g. reasons for not using winter-time data, but we never find any cautions about uses of the data they do provide!

Page 11 line 20: "flashy" ???

Page 11 lines 25, 26: characterization as vegetated, restricted or free. But, according to Table 2, they only analyzed 3 vegetated sites and 4 restricted drainage sites. Given many other sources of spatial variability and uncertainty, can the authors provide any quantitative basis that we should accept these categorizations?

Etc. Frankly, this review got tired of identifying and commented on all these errors. I repeat a recommendation from above: "engage a scientific technical editor to read and revise this text".