Review of hess-2020-493.R1

The authors have done a rigorous revision of the paper and provided a thorough response to the reviewer remarks. The manuscript reads much better now and is more accessible to a wider audience. There are a number of minor remaining aspects that need to be addressed before the manuscript can be published.

Remarks:

Ln 10: ...the soil....

Ln 179: add a period after (2008)

Ln 196: Still I think the formula used here is incomplete. Although I know the books by Stull and Garratt, a more recent book by Moene and Van Dam mentions to include the upwelling component that acts as reflecting part of the downwelling radiation in their formula 2.28:

> Typical values for the surface emissivity can be found in Table 2.1. For most surface types ε_s is between 0.9 and 0.99. This implies that there is *some* reflection of longwave radiation.[2] Hence, the total upwelling longwave radiation is the sum of the emitted radiation, $L_e^{\uparrow}$ (see earlier) and the reflected radiation:
>
> $$L^{\uparrow} = L_e^{\uparrow} + (1-\varepsilon_s)L^{\downarrow} \qquad (2.28)$$

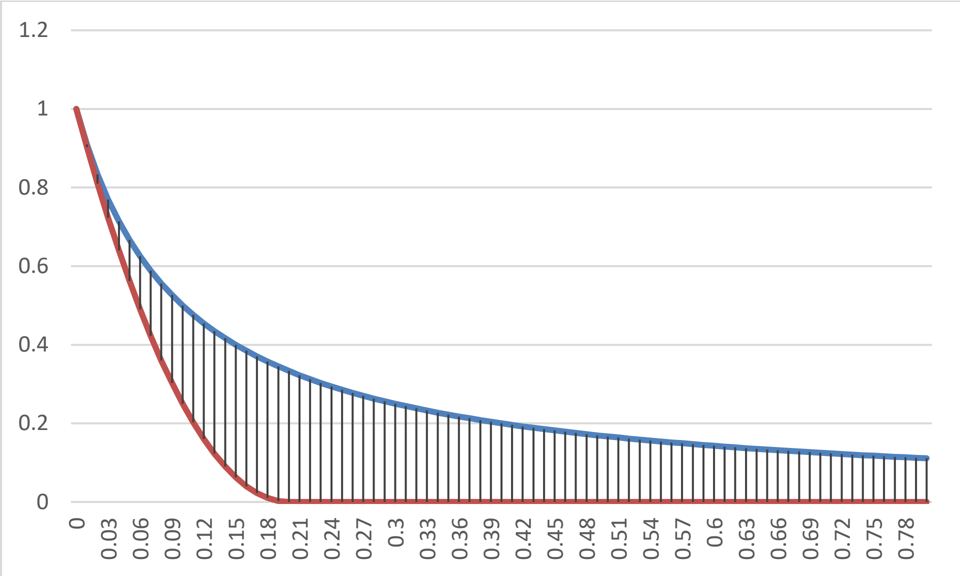
Your conclusions will not necessarily change, but I think it would be good to have insight in the impact of the reflecting part.

Ln 313: I think the approach using COSMO is a good alternative compared to ECMWF data. Nevertheless all models do have difficulties with representing nocturnal boundary layer (depth)s, so perhaps a few words mentioning this uncertainty would be meaningful here. Also a few words of discussion about whether a different definition of the nocturnal PBL height would have affected your results would be illustrative and may help to defend the robustness of your results.

Ln 361: following as follows (Monteith, 1957). Reword to “as follows” or “following M57”

Ln 363: horizontal wind speed gradient => reword, it is the vertical gradient of the horizontal wind.

Equation 22: The exchange function 1/(1+10*Ri) is rather under debate in the field of stable boundary layer research. I would say the used function is very effective in transport, more than is traditionally used in micrometeorology, where (1-5*Ri)^2 is used (without diffusion for Ri>0.2). With that function much less diffusion occurs (see red line, blue line is your function). Please provide an assessment whether this affects your results.



Equation 23: Maybe I missed it, but how did you calculate or measure the partial derivatives du/dz and dT/dz? As you do not have tower measurements you cannot measure them. In case you would have a tower, then you can only use the bulk richardson number.

Figure 3: Since COSMO is now used the reference to Hersbach et al., 2020 is not relevant anymore?

Figures: I thick it is good for the readability to list in the captions also what P1a,b, and P2a,b are. Now the reader has to go back to the start of the paper to rediscover.