

Interactive comment on “Parameterization of atmospheric long-wave emissivity in a mountainous site for all sky conditions” by J. Herrero and M. J. Polo

Anonymous Referee #2

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Review on “Parameterization of atmospheric long-wave emissivity in a mountainous site for all sky conditions” by Herrero and Polo

The paper presents a new parameterization and a modified Brutsaert (1982) parameterization for the relationship between the atmospheric long-wave emissivity and screen-level meteorological parameters (air temperature, relative humidity, and solar radiation), based on high-resolution observations at a mountainous site. Some results presented are valuable. For instance, it was found in this study that most of longwave parameterizations cannot produce the observed low values of the emissivity. Nevertheless, the significance of this study is limited, as presented below, and I suggest major

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revisions.

(1) The new parameterization was calibrated and validated at an identical site. Although the authors separated the validation period from the calibration period, the data for the two periods are from the same site and may have similar characteristics, and thus, a more strict validation is needed. Moreover, as the parameterization does not have a robust physical basis, such a local calibration usually has a limited applicability and is not favorable. I suggest the authors testing the parameterization at different sites, in order to justify that “they may be applied to other mountainous areas with a Mediterranean climate similar to that of the study site”.

(2) There is a lack of inter-comparisons between the two parameterizations and other ones. Crawford and Duchon (1999), quoted by this study, presented a simple parameterization for the longwave emissivity, based on the input parameters same as in the present study. Their scheme has been evaluated as a reliable scheme in many cases (Agricultural and Forest Meteorology 143, 49–63; Theoretical and Applied Climatology 102, 227–241), and a recent study showed it works well for high-elevation sites (Agricultural and Forest Meteorology, 150, 38–46). I suggest the authors considering a comparison of the parameterizations presented in this study with Crawford and Duchon (1999) parameterization and others.

Minor comments

(1) The equations (4–7) were regressed for three cases, respectively. Does the transitions from one case to another are mathematically continuous.

(2) Suggest replacing “ W_a ” with “ rh ” for relative humidity.

(3) The authors classified sky conditions into three types: clear-sky, completely overcast, partial cloud cover. Is this classification according to solar radiation or according to the emissivity itself? It would be a self-circle if it is the latter case.