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Hydrology and Earth System Sciences Discussions

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 #3

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General comments

Using the registered data of a weather station situated at an altitude of 2500 m a.s.l. in the Sierra Nevada (Spain), the authors perform statistical analyses to relate the apparent long-wave emissivity of the atmosphere (defined by Eq 1) to the screen level values of temperature (Ta), relative humidity (Wa) and clearness index CI (ratio of measured solar radiation to its extraterrestrial value). Two kinds of parameterization are proposed. The first one distinguishes between three sky conditions (clear sky, partly covered sky and completely covered sky) with a specific parametric (polynomial) function for each state. The second parameterization is a modification of Brutsaert's equation for cloudy

skies: the cloud index N has been parameterized by a polynomial function of Wa and CI (with 9 coefficients). Both methods yield fairly accurate results, but it is not really surprising given the complexity of the fitted functions. Moreover, the modified Brutsaert's formula, which is much simpler than the new 3-state parametric expressions, gives almost as good estimates and therefore could be preferred. My main concern, however, is about the general value of these parameterizations, which were obtained from the data set of a specific site. The final statement of the authors ("one might assume that [these relations] may be applied to other mountainous areas with a Mediterranean climate similar to that of the study site") is not really proven.

Specific comments

1. The authors use the relative humidity (instead of the water vapor pressure) to characterize the effect of the presence of water on sky emissivity. The reason for this choice is not clear given that relative humidity involves both vapor pressure and air temperature.

2. There is a problem with Fig. 6 and its corresponding comment (P3798, L18): according to the figure the lowest measured values are overestimated and not "underestimated ".

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 3789, 2012.