Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-346-RC1, 2017

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Complementary Relationship for Estimating Evapotranspiration Using the Granger-Gray Model: Improvements and Comparison with a Remote Sensing Method" *by* Homin Kim and Jagath J. Kaluarachchi

Szilagyi (Referee)

jszilagyi1@unl.edu

Received and published: 28 August 2017

Review of "Complementary relationship for estimating evapotranspiration using the Granger-Gray model" by H. Kim and J. J. Kaluarachchi

The authors use an outdated formulation (Granger and Gray, 1989) of the Complementary Relationship (CR) of evaporation (Bouchet, 1963) with complete disregard of the recent developments in the area (Brutsaert, 2015; Crago et al., 2016; Szilagyi et al., 2017). They use vegetation indexes taken in sunny days to derive parameters of their

model to predict monthly ET rates and validate it with another model (SEBBop) which is absolutely irrelevant plus with Ameriflux data.

The question of symmetry or not of the CR is outdated too in the light of the above recent developments of CR research.

Beside the three original model parameters (alpha, a, b) they introduce additional ones, k, beta to improve the prediction capacity of their model, when there exists a calibration-free version of the CR (i.e., Szilagyi et al., 2017), perhaps performing even better.

The most problematic however is the validation of their modelled fluxes with Ameriflux data. For example I happen to know the Nebraska Ameriflux sites, which are made up of different crop fields. Probably a great number of other Ameriflux sites are similar in horizontal extent. The CR is valid for regional evaporation studies not for ET rates over plot-sized areas in a heterogeneous setting, so this way the authors are comparing apples and oranges. No wonder they can never get the largest measured ET rates with their model in spite of the artificial tuning of the parameters.

This scale issue is so important that I cannot recommend the work for publication due to its mismatched validation effort and the complete disregard of recent very important developments in CR studies.

New references:

Brutsaert, W. 2015 A generalized complementary principle with physical constraints for land-surface evaporation. Water Resources Research, 51, doi:10.1002/2015WR017720.

Crago, R., Szilagyi, J., Qualls, R. J. & Huntington, J. 2016 Rescaling the complementary relationship for land surface evaporation. Water Resources Research, 52, doi:10.1002/2016WR019753.

Szilagyi, J., Crago, R. & Qualls, R. J. 2017 A calibration-free formulation of the complementary relationship of evaporation for continental-scale hydrology. Journal of Geo-

physical Research Atmospheres, 122, doi: 10.1002/2016JD025611.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-346, 2017.