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Hydrology and Earth System Sciences Discussions

Interactive comment on "A multitemporal remote sensing approach to parsimonious streamflow modeling in a southcentral Texas watershed, USA" *by* B. P. Weissling et al.

Anonymous Referee #1

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This manuscript describes the creation of a regression equation for modeling 8-day streamflow from MODIS data and ground-based precipitation and soil data. The main contribution is the development of a simple, operational model that can be used with minimal data. In my opinion, the work presented by this manuscript is an interesting first step toward a simple modeling approach based on remote sensing, but it is not sufficiently developed for publication. The presence of a correlation between variables is of course interesting, but can only be considered a useful result when its general applicability can be assessed. This new method would not be directly useful in practice because of the lack of development, and the work gives no new insights to hydrological processes because of the lack of any physical interpretation of the regression.

The manuscript reads like a laboratory logbook and is not concise. Minor details are presented painstakingly (e.g. Table 1 and pg 16), but little attention is given to the watershed modeling literature.

The selection of SCS CN modeling as a standard for comparison with the new model is disappointing because it too is a “quick and dirty” method. It is true that the regression model developed in this paper might be more useful in undeveloped countries than SCS CN because of a lack of soil data, but conversely, it would not be possible to develop the present model in an ungauged basin because regression with observed streamflow is required.

There is a major conceptual flaw with the paper, in that aims to develop a model useful in a region characterized by high-intensity, convective rainfall, yet models flow on an 8-day timestep. Such a long timestep makes the model useless for predicting peak flows, and really just describes water balances. I would be interested to know how daily streamflow relates to the predictor variables. Do the relationships degrade with increasing lag after the remote sensing data?

The authors never explore the physical link between the temperature and vegetation index EVI and streamflow except to posit (without citation) that the significant correlation serves to “confirm the results of other studies that both vegetation and ambient surface temperature retain a “memory” of antecedent moisture.” What is responsible for this effect? How does it relate to the general applicability of the modeling? It is also disappointing that the investigation of the relationship between MODIS data and hydrology was so cursory. There are many more spatiotemporal aspects to time series of reflectance than simply prepackaged vegetation indices. Some of those characteristics are likely to be highly correlated to streamflow, and would likely be more physically linked to the processes of interest than are vegetation indices that are responses to (not drivers of) water balances.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 1, 2007.