Interactive comment on "Soil Moisture Sensor Network Design for Hydrological Applications" *by* Lu Zhuo et al.

Anonymous Referee #2

Received and published: 6 March 2020

This manuscript address an important problem in hydrology, the optimal design of soil moisture monitoring networks. The approach utilizes principal components analysis and cluster analysis informed by gridded data from the WRF weather forecasting model. The general approach shows good potential, although no observed data were available for testing, only the WRF soil moisture outputs. I have two primary concerns with the manuscript.

First, the approach is unclear. In particular, the relationships between the number of principal components, the number of clusters, and the number of station locations need to be more explicitly described. The assumptions related to these relationships need to be stated and justified.

Second, a major source of uncertainty about the success of the method needs to be

added to the text. The method implicitly assumes that a soil moisture station placed inside a 5-km grid cell will perfectly represent the mean soil moisture condition for that grid cell. Of course, in reality it will not do so. The scale mismatch between the footprint of an in situ soil moisture station and the 5-km data set used here would be expected to degrade the performance of the resulting network. The uncertainty introduced by this scale mismatch may be quite large and cannot be quantified by the data in the manuscript. This issue needs to be discussed in the text.

I have included 55 specific comments, edits, and questions in a pdf version of the manuscript attached with this review.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2020-24/hess-2020-24-RC2-supplement.pdf

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2020-24, 2020.