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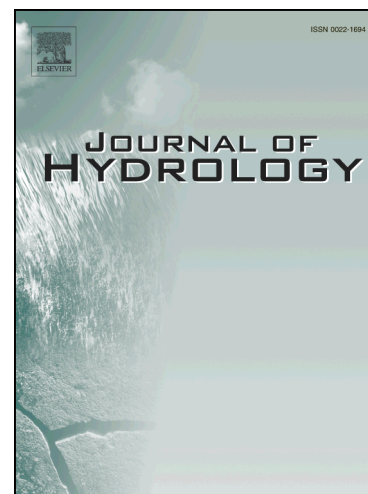
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Temporal stability and variability of soil-water content in a gravel-mulched field in northwestern China

Wenju Zhao^{a,*}, Zhen Cui^b, Jiye Zhang^c, Jian Jin^b

^a Associate Professor, Coll. of Energy and Power Engineering, Lanzhou University of Technology, Lanzhou, 730050, China

^b Graduate Student, Coll. of Energy and Power Engineering, Lanzhou University of Technology, Lanzhou 730050, China

^c Professor, Coll. of Petrochemical Engineering, Lanzhou University of Technology, Lanzhou 730050, China

SUMMARY

Characterizing the spatiotemporal variability of soil-water content (SWC) is of paramount importance in many scientific fields and operational applications. We present a case study of the temporal stability and variability of SWC in a gravel-mulched field, a form of mulching that has been widely used by farmers on the loessial area of China for over 300 years, using Spearman correlation coefficients, frequency distributions and an index of temporal stability. SWC was measured weekly from May to August 2013 in the 0-10, 10-20, 20-30 and 30-50 cm layers. SWC was more variable in the surface soil, due to several environmental factors, and the variability gradually decreased with depth. A large sample size was needed for estimating the mean SWC of the field under dry conditions. High Spearman correlation coefficients between the SWCs measured on different sampling campaigns indicated a high temporal stability. The stability of the SWC spatial patterns over time and along the soil profile allowed us to identify a location representative of the field-mean SWC, with high coefficients of determination ranging between 0.8564 and 0.9325. The large-scale monitoring of SWC from few observations is thus feasible, which will aid the management of soil moisture in gravel-mulched fields in arid regions.

Keywords: Gravel-mulched field; Soil-water content; Spatial variability; Temporal stability; Estimation

* Corresponding author. Tel.: +86 931 2976770; fax: +86 931 2975020.
E-mail address: wenjuzhao@126.com (W.-j. Zhao).

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