Geophysical Research Abstracts, Vol. 8, 09314, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09314

Space-time soil moisture dynamics: stochastic structure and sampling requirements

S. Manfreda (1) and I. Rodrìguez-Iturbe (2)

(1) Dipartimento di Ingegneria e Fisica dell'Ambiente, Università degli Studi della Basilicata, Potenza 85100, ITA. (Contact Email: manfreda@unibas.it) (2) Department of Civil and Environmental Engineering, Princeton University, Princeton, NJ 08540, USA. (Contact Email: irodrigu@princeton.edu)

Recent work by *Isham et al.* [2005 - *P. Roy. Soc. A-Math. Phy.*] and *Rodrìguez-Iturbe et al.* [2006 - *Water Resour. Res.*] has characterized the space-time variability of soil moisture through its analytically derived covariance function which depends on soil properties, vegetation structure and rainfall patterns typical of a region. This paper uses such characterization to address the strategies and methodologies for the sampling of soil-moisture fields. The focus is on the estimation of the long-term mean soil moisture and the daily soil moisture averaged over a given area as a function of the network geometry, number of stations, number of sampling days and landscape heterogeneity. It is found that the spatial geometry of the network has a significant impact on the sampling of the average soil moisture over an area in any particular day, while it is much less relevant for the sampling of the long-term mean daily soil moisture over the region. In the latter case, the length of the record is a commanding factor in what concerns the variance of estimation, specially for soils with shallow rooted vegetation. Spatial vegetation heterogeneity plays an important role on the variance of estimation of the soil moisture, being particularly critical for the sampling of the average soil moisture over an area for a given day.