

Estimating Soil Water Content Using Cokriging¹

S. R. YATES AND A. W. WARRICK²

ABSTRACT

Using cokriging estimates, and estimation variances of the gravimetric moisture content (GMC) were made using one and two additional random functions: the bare soil surface temperature and the percent sand content. The semivariograms and cross-semivariograms were obtained as well as the sample correlation between the GMC and the auxiliary functions. Various measures of the differences and quality of the estimates for kriging and cokriging were calculated and compared on the basis of the sample correlation and whether the auxiliary random functions were over-sampled with respect to the GMC. The average estimation variance for cokriging compared to kriging was reduced for all levels of absolute sample correlation considered (i.e., 0.15-0.83). The mean sum of squares error between the actual and estimated values obtained by the jack-knifing technique was found to be lower for cokriging when compared to ordinary kriging when highly correlated auxiliary random variables were used but could be greater than that of ordinary kriging for less correlated auxiliary variables. It was found that the additional complexity of cokriging may be justified when the magnitude of the sample correlation exceeded 0.5 and the auxiliary functions were over-sampled with respect to the GMC.

Additional Index Words: cokriging, kriging, estimation, random functions, spatial variability.