Uncertainty Analysis of Digital Soil-Terrain Models. (S05-bishop042412-Oral)

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Abstract:

Carrier phase GPS technology was used to map the elevation of a 74 ha agricultural field in the eastern wheat belt of Australia, with each measurement of elevation an associated uncertainty was recorded in terms of RMSE. Both the elevation and uncertainty were interpolated onto a 5 m grid to create a DEM, and a map of the DEM uncertainty. The soil attribute used in this study was clay content sampled from a depth of 30-90 cm at 113 sites. To assess the effect of uncertainty in the DEM on soil-terrain modelling, Monte Carlo simulation was performed by sampling from a Gaussian random field, where the mean was equal to the elevation, and the standard deviation was approximated by the RMSE. Latin hypercube sampling, a stratified random sampling technique, which considers the spatial correlation of the elevation was performed to sample the entire distribution of elevation values. For each realisation of the DEM: a) slope, aspect, plan, profile and tangential curvature were calculated, b) a soil-terrain model was created using MLR, where clay content was the target variable with primary terrain attributes as the secondary variables; c) the soil-terrain model was used to create a clay content for the entire field.

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