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Scaling of river depth data from mesoscale to macroscale using geostatistical techniques

M. Rivas-Casado (1), P. Bellamy (2), S. White (1) and V. Merwade (4)

(1) Institute of Water and Environment. Cranfield University, Silsoe, UK (2) National Soil Resources Institute, Cranfield University at Silsoe, Silsoe, UK (3) Center for Research in Water Resources, University of Texas at Austin (m.rivas-casado.s03@cranfield.ac.uk / Fax: +44 1525 863344)

Detailed hydro-morphological surveys are often carried out to describe the physical habitat characteristics for hydro-ecological investigations. Fieldwork for these surveys is time consuming and expensive, and so it is necessary to explore the spatial and temporal distribution of hydro-morphological variables to facilitate scaling in data. This poster describes a methodology for up-scaling of river depth data from a mesoscale level up to a macroscale level. The methodology uses depth data collected using a single beam depth-sounder along a 7.5 km reach of the Brazos River site in Texas. The total length of the surveyed river has been divided into equally spaced segments. Data included in the defined segments have been consecutively classified into two groups: (a) data to create the up-scaling model and (b) data to validate the created model. Geostatistical techniques were applied to predict depth values at non-measured points for each flow and for each sampling strategy. Eight different indicators (variogram, mean squared error, mean error, R-squared, residual plots, frequency distributions, cross-sections, mapping resolution, standard error maps) have been analysed to identify the accuracy of the predictions.

The results show that the variogram for the up-scaling processes is divided into two parts: the first defines the spatial behaviour of variance for distances smaller than 300m, whilst the second considers the spatial behaviour of depth variance for distances higher than 500m. The first part of the variogram defines the variance at mesoscale level, and it can be described by a simple spherical or exponential model (predictions at mesoscale and even microscale are easy to obtain with high accuracy). The second part of the variogram is defined by a more complex equation that describes the

behaviour of variance at a macroscale level.

Errors are higher in the central areas of the predicted segments when predicting with the first variogram (mesoscale variogram) whilst they are located at the edges of the segments when predicting with the second variogram (macroscale variogram). Further work will be developed to obtain and validate a semivariogram model that combines both variograms into one.