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On Assessing Uncertainty, Variability and Feedback

I.K. Tsanis
Department of Civil Engineering, McMaster University, Hamilton, Ontario, Canada

Environmental projects consist of three phases: (a) a fast track phase, (b) an enrichment phase and (c) a synthesis phase. The fast track phase aims at providing quantitative input to the scenario-building process and gaining experience with the data flows between the work packages. The enrichment phase which also includes the scenario-building process, provides new and more detailed trends of the enriched storylines. Sources of feedback information are discussed. This paper studies assessment methods of (a) variability and (b) uncertainty of data to be used for scenario building and modelling and (c) end user feedback information regarding preliminary data and model output. Some of the major sources of uncertainty in environmental variables related to water resources and hydrology science are described. A classification of uncertainty is presented according to the empirical quality of data and its sources of uncertainty. Since there is distinction between attributes of objects depending on their variability in space and time, then there is a need to consider spatial and temporal dependence (autocorrelation) alongside the uncertainty models at individual locations. In addition, uncertainties in environmental data combine with modelling uncertainties leading to uncertain model predictions; that is, uncertainties propagate through models. Sources of modelling uncertainty such as (a) uncertainties in input data (measurement, interpolation/extrapolation and re-scaling errors), (b) uncertainties in models (in model structure -conceptual or logical uncertainties-, in model parameters and in the solution of the model) are discussed. Finally, examples of uncertainty on the variable of measured point and estimated areal precipitation are presented.