Abstract for AGU Fall Meeting 2017

Title: Gaussian copula as a post processor for environmental models

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Environmental models always come with associated uncertainties. A faithful quantification of this uncertainty, with accurate error bounds, is important before a model can be meaningfully used for prediction, explanation or design. Several uncertainty estimation methods that are currently being used employ Gaussian processes as an error description because of their favourable analytical properties. Box-Cox transformation is suggested to deal with non-symmetric and heteroscedastic errors e.g. for flow data which are typically more uncertain in high flows than in periods with low flows. Problem with transformations is that their parameters are hard to estimate. In an attempt to address this problem, in this research work we suggest learning the nature of the error distribution from the errors made by the model in the “past” forecasts. We use a Gaussian copula to generate semiparametric error distributions . We demonstrate that the copula captures the predictive uncertainty of the model . Also, heteroscedasticity of errors is captured by the copula, eliminating the need to use transforms. In summary, our findings suggest that copulas are an interesting departure from the usage of fully parametric distributions as error descriptors.

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