Uncertainty Analysis for Landscape Models Used for Coastal Planning

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Abstract:

In long-term coastal planning efforts, it is important to consider the effects of uncertainties on predicted outcomes. The approach proposed here provides a framework to perform uncertainty analysis for landscape models used for planning-level efforts. The approach is presented through an ecosystem Integrated Compartment Model (ICM) applied to Coastal Louisiana, USA. The model includes hydrology, water quality, morphology, vegetation, barrier islands, and habitat suitability indices. The intent is to present a methodology to quantify the magnitude of the uncertainty in key model output driven by uncertainties in critical model variables. Perturbations are applied to model variables that directly influence the model output of interest. The model variables examined include water level, salinity, wetland types, suspended mineral sediment concentration, and organic accretion. The magnitudes of the perturbations were estimated based on the calibration errors.

The perturbations were initially applied individually to identify the most influential model variables on the key model outputs. The uncertainty range resulting from linearly adding the uncertainty of the individual perturbations was compared to the outcome of a set of experiments designed to examine the interdependency among the uncertainty of the model variables. The comparison showed that the uncertainty range resulting from the composite experiments set was wider than the linearly added uncertainty bracket. This outcome demonstrates that interdependency among model variables is important. Overall, this approach provides valuable insights on the uncertainties associated with predictions made by large scale landscape models for coastal and deltaic environments.

Background:

I am gathering a good bit of literature on the subject that I will include here.

Approach:

Methodology

Experimental Design and Results

Discussion

Conclusions

Acknowledgements

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