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Abstract

The need to calibrate physical process-based models of flood inundation gives rise to uncertainties, particularly due to the often scarce nature and questionable quality of calibration data. Approaches to the calibration problem are usually cast in probabilistic or fuzzy terms, whereas here we demonstrate how info-gap decision-theory can be used to identify flood management options that are robust to model uncertainties. Uncertainty is represented by a family of nested convex sets in a transformation of the calibrated parameter space, characterised by a hyper-parameter, a. Such an approach avoids the need to impose any form of normalised measure function across parameter space, a feature particularly useful when considering severe uncertainties and extreme events. An illustrative example of info-gap analysis of a 2D flood inundation model is presented. Uncertainty is represented by limiting deviation in unexplained channel energy losses, within an unknown horizon of uncertainty about a nominal value. It is clear from this example that whilst a particular option may be optimal under assumed conditions, because of uncertainties its actual performance may be less, or greater, than the nominal expected outcomes. Info-gap theory provides a quantified approach to analysing robustness.