

## CHAPTER 10

# Forecasting and Uncertainty Analysis

### COMMON MODELING ERRORS

- A model forecast is presented without discussion or reporting of representative uncertainty.
- A type of forecast is chosen (e.g., absolute model output, extreme ranges in future conditions) that has relatively higher uncertainty than other types of forecasts (e.g., relative model outputs, average conditions—Section 10.3) that would have also addressed the modeling objective effectively.
- Uncertainty analysis is performed as an afterthought and is focused only on those factors easiest to analyze. For example, an uncertainty analysis that only includes uncertainty associated with the base model, when uncertainty in future events is also a significant contributor to total forecast uncertainty, underestimates expected uncertainty.
- Parameter simplification error is not considered in the uncertainty analysis. Simplification error is especially important in sparsely parameterized models where it is typically the largest component of uncertainty.
- The model forecast and resulting uncertainty are reported with more precision (e.g., significant figures) than is warranted by the modeling assumptions and observation. Presenting overly precise results undermines confidence in the modeling effort.
- Uncertainty analysis is reported in a way that stakeholders cannot understand.
- Uncertainty results are provided to decision-makers in ways that are easy for the modeler to report, but not easy to apply to the decision of interest.
- Reported forecasts and uncertainty are overestimated or underestimated to yield a result that advances a stakeholder's preference.
- Uncertainty analysis is performed by changing one parameter at a time when the decision-making requires a best- or worst-case scenario that relies on combinations of factors.
- Forecasts and uncertainty are not discussed in terms of probabilities when it is possible to do so. Estimates of uncertainty expressed as a probability are best for translating model uncertainty to cost-benefit analyses.