

DISTINGUISHING UNCERTAINTY, DIVERSITY AND INSIGHT

LEONARD SMITH

Department of Statistics, London School of Economics

NCAR Uncertainty Colloquium, Boulder, 30 July 2014

Abstract

The aims, means, and outputs of forecasting for decision support vary with the nature of the system, our level of understanding, and the nature of the decisions being made. Good practice in one case may be disadvantageous (indeed irrational, if not impossible) in another. In many cases one has an insightful prior probability distribution on the likely outcomes (the relevant climatology) and a large archive of forecast/outcome pairs. In these "weather-like" cases the lifetime of a model is very long compared to the decision-relevant lead-time of a forecast. Contrast that with a "climate-like" case in which the forecast/outcome archive is at best small, the lifetime of a model is much less than the lead-time of the forecast, and it is questionable whether past observations provide a relevant prior. While probabilistic weather and climate forecasts will be used for concreteness, the weather-like/climate-like distinction is useful outside of the Earth sciences. Clarifying this distinction sheds some light on the friction commonly observed between advocates of "physical insight" and advocates of "statistical good practice" when forecasting the real world. The roles both of model inadequacy and different "kinds" of probability are discussed, following JJ

of not confusing them with each other is stressed. The diversity of our
has different information in weather prediction than in climate projection,
quantify the uncertainty in our future. How then are we to judge,
and improve operational forecasting and the models which underpin it?

