

Statistical methods for non-linear ecological dynamic models.

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Abstract: Highly non-linear, process based dynamic models are commonly used to describe pest insect populations and disease dynamics, but present challenges when used for statistical purposes. Naive application of standard Bayesian or frequentist methods fails as the dynamics of the system get close to the chaotic regime. In that case likelihoods, or the target distributions for Bayesian simulation, become highly multimodal or completely irregular. At the same time, the data from which to estimate such models is usually quite limited, so that efficient use of information is at a premium. Two main lines of attack are through controlled information reduction, such as ABC or Synthetic likelihood, or via working directly on the system state variables via filtering, for example. This talk compares and contrasts these strategies.