Parameter estimation in a simple stochastic differential equation for phytoplankton modelling - DTU Orbit (03/01/2019)

The use of stochastic differential equations (SDEs) for simulation of aquatic ecosystems has attracted increasing attention in recent years. The SDE setting also provides the opportunity for statistical estimation of ecosystem parameters. We present an estimation procedure, based on Kalman filtering and likelihood estimation, which has proven useful in other fields of application. The estimation procedure is presented and the development from ordinary differential equations (ODEs) to SDEs is discussed with emphasis on autocorrelated residuals, commonly encountered with ODEs. The estimation procedure is applied to a simple nitrogen-phytoplankton model, with data from a Danish estuary (1988-2006). The resulting SDE is simple enough to have a well-known stationary distribution and this distribution is presented.

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