Supporting Material For

Assessing a threshold for eutrophication management using Bayesian method in Yuqiao Reservoir, North China

WinBUGs

WinBUGs is a computer package for Markov Chain Monte Carlo (MCMC) sampling from posterior distributions. It can be downloadable from http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/contents.shtml

WBDiff

WBDiff is an interface for embedding a numerical solution of ordinary differential equations within a WinBUGs program. It can be downloadable from http://www.winbugs-development.org.uk/wbdiff.html.

WinBugs code for the paper:

model
{
    #Priors
    k ~ dnorm (0, 0.01) I (0,)
    #r ~ dnorm (1, 0.01)
    s ~ dnorm (2, 0.01) I (0, 6)
m ~ dnorm (8, 0.01) I (0, 15)

tosig ~ dgamma (0.01, 0.01)

# Differential equation using WBDiff

Solution [1:n.grid, 1: dim] <-
ode(init[1:dim], grid[1:n.grid], D(C[1:dim], t), origin, tol)

# Define equations and initial conditions

for (i in 1:dim)
{
  D(C[i], t) <- k*Q[i]/(V[i]*B[i]) - s*C[i] + m/O[i]
  init[i] <- P0[i]
}

For (i in 1: dim)
{
  P1[i] ~ dnorm(solution[2, i], tosig)
}

Tau <- 1/sqrt(tosig)

# Inits
list(k=0.2,m=7,tosig=4,s=0)

#data
List (n.grid=2, dim=15, origin=0, tol=0.001, grid=c (0.4, 1),
P0=c(0.46942875,0.562983333,0.761269375,1.16984625,0.50916875,0.891311429,0.572504375,0.42963355555,0.36014375,0.584883065,0.528825857,0.754032241,0.23868667,1.022477083,0.86339881),
P1=c(0.562983333,0.761269375,1.16984625,0.50916875,0.891311429,0.572504375,0.42963355555,0.36014375,0.584883065,0.528825857,0.754032241,0.23868667,1.022477083,0.86339881,0.6384231),
O=c(10.8,9.6,8.8,10.2,8.6,8.8,8.6,10.5,7.5,7.2,8.3,8.2,7.1),
V=c (3.420561992, 3.315130439, 3.075103632, 3.351239294, 3.461713179, 3.098647646, 3.35577432, 2.956500863, 3.016329426, 2.793100338, 2.727990039, 2.754041026, 2.703692601, 2.673060415, 3.23199352),
B=c(0.3648132,0.50378398,0.338838497,0.827224003,0.797970532,1.144455229,0.509924449,1.295524,1.108181612,1.502172,1.235626457,2.339919339, 1.37103, 2.053233333, 2.048928167),