

Appendix. WinBUGS code for spatial model. Based on the lip cancer example in the GeoBUGS manual. Lines beginning with '#' are not executed by the program.

```
model {

# Likelihood
for (i in 1 : N) {
  casos[i] <- casos03[i] + casos04[i] + casos05[i] + casos06[i] +
  casos07[i]
  casos[i] ~ dpois(mu[i])
  mu[i] <- rate[i] * pop[i]^5

  PopDen[i] <- pop[i] / AreaKm2[i]
  PopDenNorm[i] <- PopDen[i] - mean(PopDen[])

  # those variables not in the model have regression
  coefficients equal to zero
  log(rate[i]) <- alpha0 + (0 * MalePropNorm[i]) +
  (bTemp * TempNorm[i]) + (bTemp2 * TempNorm[i] *
  TempNorm[i]) + b[i] + (0 * PptNorm[i]) + (0 * Temq
  Norm[i]) + (0 * PptWetNorm[i]) + (0 * PptDryNorm[i]) +
  (0 * TemWetNorm[i]) + (0 * TemDryNorm[i]) + (0 * Alt
  Norm[i]) + (0 * CultNorm07[i]) + (0 * GrassNorm07[i]) +
  (bForShr * ForShrNorm07[i]) + (bPopDen * PopDen
  Norm[i])

  # trivial inclusion of remaining layers, to avoid an error
  when loading the data
  nullvars[i] <- (0 * BIO02Norm[i]) + (0 * BIO03Norm[i]) +
  (0 * BIO04Norm[i]) + (0 * BIO05Norm[i]) + (0 * BIO06
  Norm[i]) + (0 * BIO07Norm[i]) + (0 * BIO11Norm[i]) +
  (0 * BIO13Norm[i]) + (0 * BIO14Norm[i]) + (0 * BIO15
  Norm[i]) + (0 * BIO18Norm[i]) + (0 * BIO19Norm[i])

  rawRate03[i] <- casos03[i] / pop[i]
  rawRate04[i] <- casos04[i] / pop[i]
  rawRate05[i] <- casos05[i] / pop[i]
  rawRate06[i] <- casos06[i] / pop[i]
  rawRate07[i] <- casos07[i] / pop[i]
  # to plot the above in Map Tool, choose 3 cut points at
  0.0000001, 0.2 and 0.4
  rawRate[i] <- casos[i] / (pop[i]^5)
}
}
```

**# CAR prior distribution for random effects:**

```
b[1:N] ~ car.normal(adj[], weights[], num[], tau)
for(k in 1:sumNumNeigh) {
  weights[k] <- 1
}
```

```
# temperature for peak incidence. Need to add back the
mean to undo normalization
TempPeak <- (-bTemp / (2 * bTemp2)) + 223.6287
```

**# Other priors:**

```
alpha0 ~ dflat()
# alpha0 ~ dnorm(0.0, 1.0E-5)
# following is original prior on precision
tau ~ dgamma(0.5, 0.0005)
# following is alternative
# tau ~ dgamma(0.01, 0.01)
sigma <- sqrt(1 / tau) # standard deviation
```

```
# bMale ~ dnorm(0.0, 1.0E-5)
# bTemp <- 0
# bTemp2 <- 0
bTemp ~ dnorm(0.0, 1.0E-5)
bTemp2 ~ dnorm(0.0, 1.0E-5)
# bAlt ~ dnorm(0.0, 1.0E-5)
# bAlt2 ~ dnorm(0.0, 1.0E-5)
# bCult ~ dnorm(0.0, 1.0E-5)
bForShr ~ dnorm(0.0, 1.0E-5)
# bGrass ~ dnorm(0.0, 1.0E-5)
# bShrub ~ dnorm(0.0, 1.0E-5)
# bTemq ~ dnorm(0.0, 1.0E-5)
# bTemq2 ~ dnorm(0.0, 1.0E-5)
# bPpt ~ dnorm(0.0, 1.0E-5)
# bPptTemp ~ dnorm(0.0, 1.0E-5)
bPopDen ~ dnorm(0.0, 1.0E-5)
# bPopWood ~ dnorm(0.0, 1.0E-5)
```