A GIS Model for Predicting the Real-Time Risk of Arboviral Transmission in FL – Jon Day

a) System
   i) Arbovirus - SLE
   ii) Primary vector – *Cx nigripalpus*
   iii) Amplification
      (1) Mosquitoes
      (2) Birds
   iv) Vector
      (1) Extreme drought will shut down breeding
      (2) Extreme flooding will as well
      (3) Floodwater Culex
      (4) Oviposition sites are in low-lying areas where periodic flooding occurs
b) Setup
   i) 589 MWTD data recording stations across peninsular FL
   ii) Can measure rise and fall of ground water as well as other parameters
   iii) See a lot of variability in water table depth
c) Historic data
   i) 1977 – SLE outbreak
      (1) Water table showed a typical dry season dry down
      (2) Mid May – June initial wetting
      (3) Secondary dry down
      (4) Wet season increase
   ii) 1990 – SLE outbreak
      (1) Similar profile
      (2) Defined dry and wet seasons
   iii) Particular interest in the initial wetting period
d) Data Modeling
   i) Model water table depth
   ii) Look at how typical the water table data are for epidemic transmission
   iii) Turn data into a risk map
      (1) Take daily values at each MWTD site
      (2) Graph how closely data match risk model
      (3) Map data to risk map
e) Pinellas County Case Study – 2005
   i) 3 of 5 major SLE epidemics began in this county
   ii) 2005
      (1) 18 cases
      (2) Onset dates – 1 June to 22 Aug
      (3) 6/3/05 risk map showed high risk in Pinellas County area
      (4) 8/12/05 risk map showed decreasing risk in area
   iii) County Mosquito Control tracked virus in mosquito pools and birds
   iv) WNV
      (1) Mapped cases against the risk graphs
      (2) Human cases occurred when data matched model
      (3) Mosquito populations

(a) High in year prior to epidemic
(b) Populations skewed to older mosquitoes during epidemic year
(4) Sentinels showed positives to match human cases

f) What is the effect of human populations density?