**Interpolation with N-Tracking Measured Data:**

At each location of the six (or twelve next year) N tracking trial fields, an empirical equation may be built based on the measured data with several different treatments. This equation can estimate the soil N level on a specific date given N application practices at the location. After a farmer inputs the field location, N application practice, and the current date, we can plug the N application practice data and the date into all the six (or twelve) empirical equations and obtain six (or twelve) soil NO3 and six (or twelve) soil NH4 concentration data. Then we use these NO3 and NH4 data and their location information to predict the soil NO3 and NH4 concentrations at the farmer’s location with the kriging interpolation method.

**Neural Network with N Watch Data:**

Using Neural Network Tool (MatLab) to predict the soil N level at a specific location on a specific day:

Longitude

Latitude

Date

NO3

NH4

We can use the N Watch data to train this network. After being trained, this network can predict the soil N level given a location and a date. Then we may draw a contour map of N level across the whole Illinois cornfield land using the data generated from this neural network.

**Prediction with DSSAT Model:**

With the input data from a user, the DSSAT system is used to calculate the N concentrations on each of the days from the planting date to the current date (see “Running DSSAT Maize”). Then the calculated values will be compared with the N Watch data or N Tracking measured data. If there is a difference, the DSSAT predicted N values for a user input location will be corrected with the averaged values. For example, 6 sites in the N Watch and N Tracking projects have the measured data on a specific date:

NO3site1, NO3site2, …, NO3site6

NH4site1, NH4site2, …, NH4site6

The outputs of the DSSAT model at the same 6 sites on the same day are:

NO31, NO32, …, NO36

NH41, NH42, …, NH46

Then we have the averages:

 $∆NO3=\frac{1}{6}\sum\_{i=1}^{6}(NO3\_{sitei}-NO3\_{i})$

$∆NH4=\frac{1}{6}\sum\_{i=1}^{6}(NH4\_{sitei}-NH4\_{i})$

For a specific farm location (different from the N Tracking or N Watch measurement sites) on the same date as (or near the date of) those 6 site measurements, the outputs of the DSSAT will be NO3 and NH4. Then the results will be corrected as

$NO3\_{prediction}=NO3+∆NO3$

$NH4\_{prediction}=NH4+∆NH4$