Soils characteristics used to delineate Management Zones

1. Soil survey information
   - Erosion control
   - Soil productivity
   - Identify natural fertility

2. Soil survey information and SSM
   - Texture
   - Slope length
   - Slope steepness
   - Drainage
   - Acidity

Identify GENERAL soil problems

Soil survey by the USDA-NRCS
Information available for the producers...

County soil survey (Order 2)

Soil survey (2nd order) shows the field as homogeneous with respect to soil type

Tift county (GA)

Source: SSURGO soil database (USDA-NRSC)
Differences between Order 2 and 1 soil surveys

1. Order 2
- County soil surveys
- Scales of 1:12,000 to 1:31,680
- Min. size delineation: 1.5 - 10 acres
- NA for SSM if not complementary info. Too coarse for N management
- Generalize the, often highly variable, nature of soils at farm field scale

2. Order 1
- Farm or field soil survey
- Scale >1:15,840, finer than Order 2.
- Min. size delineation: 2.5 acres
- Useful for SSM (VRA of inputs).
- Soil units are closely related to crop yield and nutrient variability.

Source: Franzen et al., 2002
Order 1, provides a better discrimination and corresponding with yield variability.

Order 2, provides a better discrimination than no sub-field delineation *
On-the-Go sensing & MZ delineation

Spatial information used to delineate Management Zones

Soil survey (2\textsuperscript{nd} Order)

Soil \( EC_a \) (VERIS 3100)

High \( EC_a \) values

Low \( EC_a \) values

(Tifton Loamy Sand, 2\% to 5\% slope)
Soil ECa measurement methods

**Electrical Resistivity (ER)**
It requires good contact between the soil and the four electrodes inserted in the soil.

**Electromagnetic Induction (EM)**
It does not require physical contact with the soil.
Electrical Resistivity (ER) ≈ VERIS 3100

- Shallow (0-12 inches)
- EC\textsubscript{a}-shallow, the instrument uses the discs 2, 3, 4 & 5.
- The voltage is measured between discs 3 and 4.

- Deep (0-36 inches)
- EC\textsubscript{a}-deep, the instrument uses the discs 1, 2, 5 & 6.
- The voltage is measured between discs 2 and 5.
Soil ECa maps from VERIS sensor

South Georgia (Loamy Sand)

Northeast Louisiana (Alluvial soil area)

Electromagnetic Induction (EM) ≈ Geonics EM 38

- The sensor is made up of two coils:
  - The Transmitter: induces current loops into the soil
  - The Receiver: measures the resulting electromagnetic field from these current loops.
- EM 38 in a Horizontal orientation measures ≈ EC_a up to 30 inches
- EM 38 in a Vertical orientation measures ≈ ECa up to 60 inches
In South Georgia, areas with the lowest values of EC$_{a}$-Deep are at risk of having high population of RKN.
Where to find this type of data on Internet

http://websoilsurvey.nrcs.usda.gov/app/
1. Search data by:

Field boundary delineated by the user

Spatial information used to delineate Management Zones
2. Soil series

3. Soil properties
3. Download Soils data