Precision Agriculture

Lesson 3, Part B

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Decision-Making Process Using PA

- Gather Data
- Analyze/Compare Data
- Layer the Data
- Make Decisions for Next Year
- Write Prescriptions
- Apply Prescriptions/Determine Management
- Make Observations
- Repeat

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Gather Data

- First step in decision-making
  - All data collected can impact decisions.
    - Year 1 soil temperature and yield
    - Year 2 soil temperature and yield
    - Year 1 moisture and yield
    - Year 2 moisture and yield
    - Year 1 soil sampling data
    - Year 2 soil sampling data
    - Year 1 planting population
    - Year 2 planting population
    - Etc.

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Analyze/Compare the Data

- Once data is collected, it needs to be looked at.
  - Correlations between a piece of data and the resulting yield and/or profitability.
    - Relationships between something done and its direct effect.
      - One field + 2 Hybrids and Hybrid A yielded higher than Hybrid B.
  - Looking for trends
    - Similar outcomes that occur when an individual decision is made.
    - Imperative that multiple years of data are available and compared!
    - Allows the operator to rule out change due to variables such as rainfall, temperature, etc.

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Layer the Data

- Using multiple sources of data together.
- Helps to identify how combinations of decisions affect the overall outcome.
- User aims to find the best mix of decisions.
- Goal is to find the most profitable combination.

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Data Layering Example - Beginning with a Soil Map

Soil type map created years ago by survey of the USDA and obtained from USDA website.

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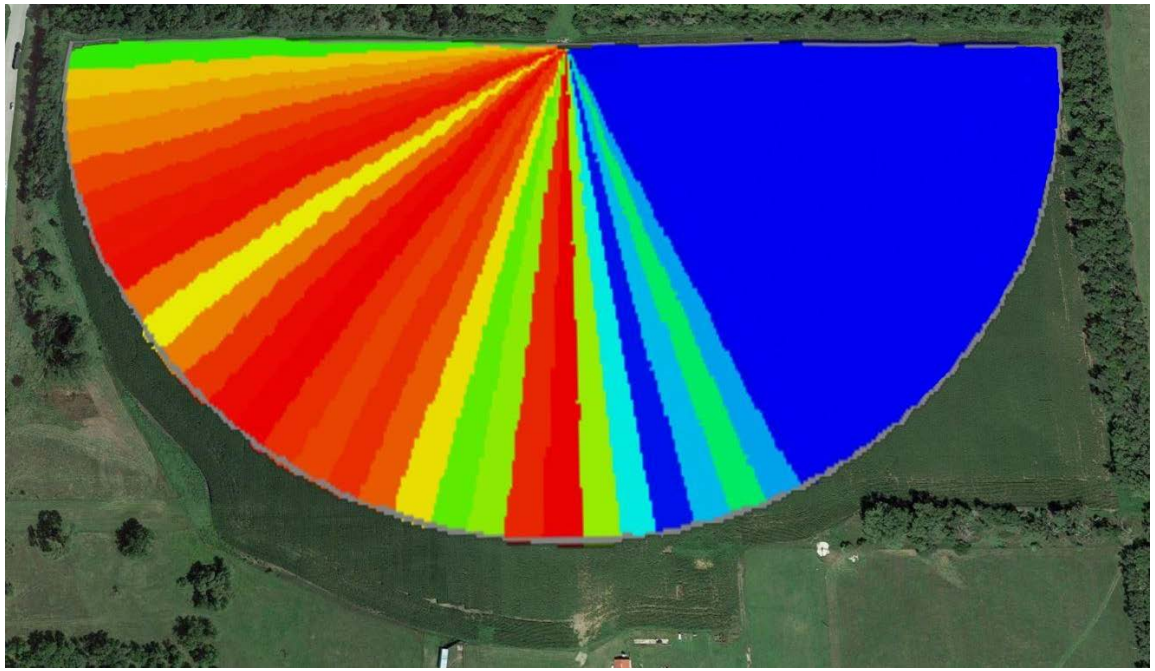
Data Layering - Adding a Variable Irrigation Map



Data gathered using a specially equipped pivot that varies the amount of water supplied.

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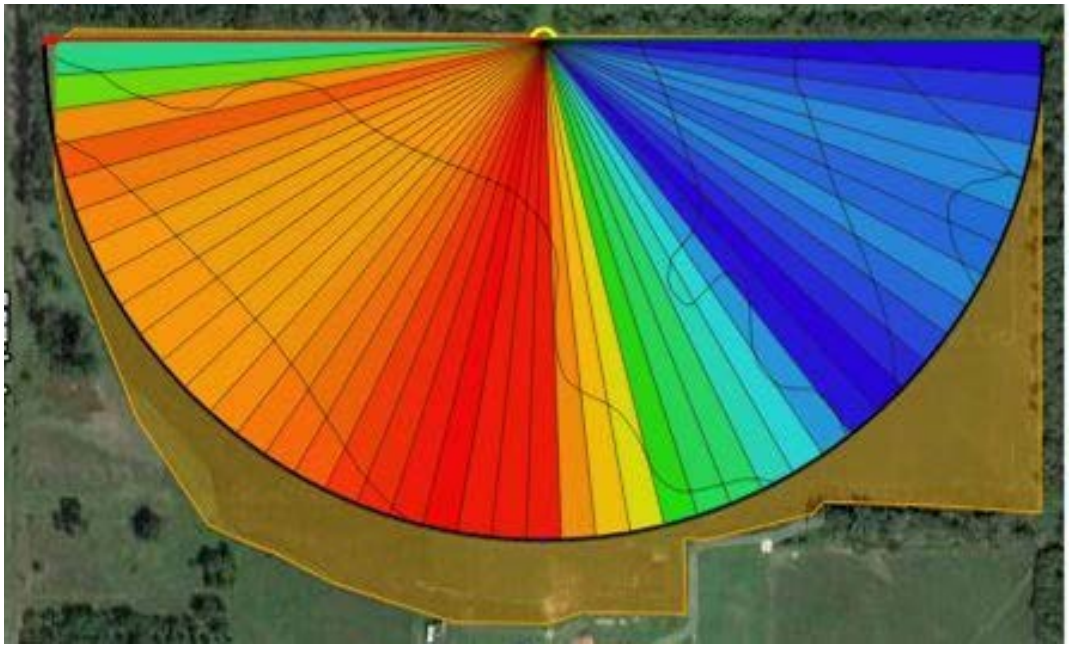
Data Layering - Soil and Variable Irrigation Maps Layered



Layering allows the operator to see how much water was delivered to each soil type.

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Make Decisions for Next Year

- After data is thoroughly analyzed decisions need to be made for next year's planting season.
  - hybrids or varieties of seed
  - which fields
  - planting population
  - fertilizer
  - weed, insect, disease control
  - observations
  - data collection
  - etc.
- Aids in ***prescription writing***.

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Writing Prescriptions

- Prescription - a program or script that precision equipment uses to apply a specific amount of something at a specific place in the field.
    - Using maps and data, the operator makes decisions such as the following:
        - Hybrid A on “Green“and “Red” soil and Hybrid B on “Yellow” and “Orange” soil
        - 34,000 seeds per acre on “Green”, 27,000 on “Yellow”, 20,000 on “Red”, etc.
    - Software is used to create a prescription to tell the planter what it should do.

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Apply Prescriptions

- Management is still critical even with all of the technology being used!
- Operator must configure equipment to enable it to do what the prescription calls for.
  - Example: Add Hybrids A and B to the proper bins according to the prescription written.
- If done improperly, the planter will not know and profitability may be affected.

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Make Observations

- After all applications of seed, fertilizer, chemical, etc. have been made; it's time to observe.
    - Take note of what happens.
    - Keep accurate records and continue to gather data.
        - cost of seed, fertilizer, chemicals, labor, equipment costs, yield, price received per unit, etc.
    - Data will help determine if good decisions were made.

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Repeat for Next Year

- Repeat the cycle.
- Use what was learned.
- Make even better decisions for next year.
- Hopefully make more profit.

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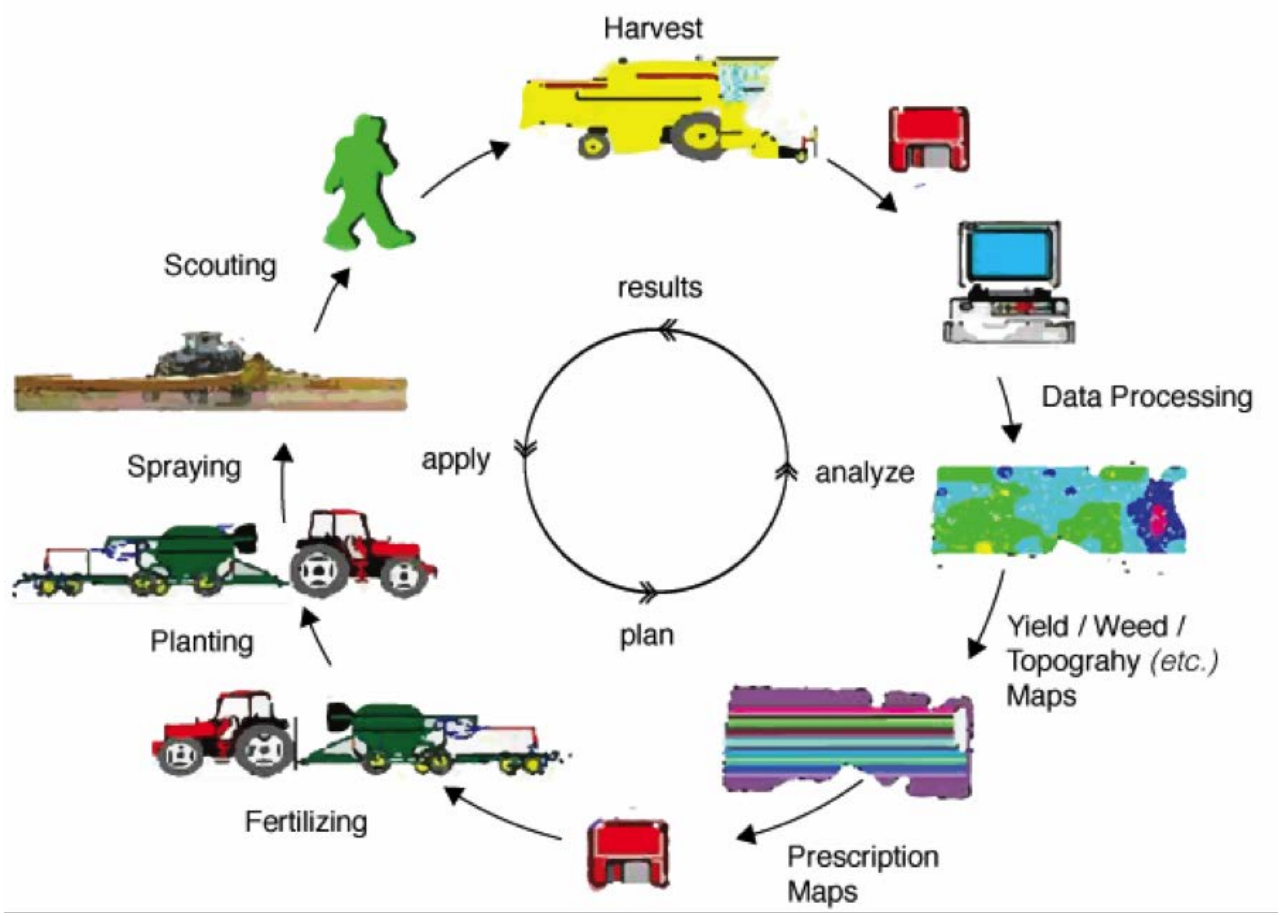
The Process of Making Decisions Using Precision Agriculture Data



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