GEOSPATIAL TECHNOLOGY FOR SUSTAINABLE AGRICULTURE

Geospatial data helps gain insights on how different factors and attributes relate to space and time.

by Dr. Surender Varma Gadhiraju

Consistent knowledge driven policies will enable quick development and adoption of advances in geo spatial technologies, benefitting global farming community at large.

Field scouting and data collection by Dupont Pioneer Agronomist's

Farmers face variety of challenges and uncertainties from changing weather, land degradation, water and nutrient requirements, labor availability, seed suitability, pest insurgence to market demand. Interplay of too many variables have made agriculture very complex and necessitated the intervention of technology that can assist farmers in management and taking timely decisions. ISO Bulletin in 2000 has estimated that around 80% of all data collected involves positional information. Such spatial information can be leveraged adding a valuable component for data driven decisions.

The availability of reliable and timely geospatial information on land, water and environmental conditions and their changes is one of the key prerequisites for sustainable agriculture and food security. Geospatial data helps gain insights on how different factors and attributes relate over space and time.

Geospatial data gives information about an incident/phenomena occurring in a particular location in a structured layer format enabling easier quantitative and qualitative analysis. Geospatial technology in agriculture is essentially geared towards planting the right seed, at the right location, using the right proportion of inputs and for timely

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intervention when needed. Precise spatial control over farm inputs helps reduce expenses and produces a higher yield environmentally friendly farm. The need for accurate geospatial data has become evident to both Industry and government organizations.

Geospatial technology essentially comprises of three components, data collection (via platforms like uav's/satellites/sensor networks), GIS (for visualization and analytics), and GPS (for recording positional information). Geospatial data cover a broad range of locational attributes that include administrative, environmental, economic, transportation, and many other thematic categories, such as weather and soil types. All these data are collated to make sense using data analytics.

Technology platforms like UAVs (or drones) are gaining popularity to quickly scout fields in search of disease and deficiencies, reducing the time it takes to identify problem areas that may impact the health of the entire farm. New systems approach using such UAV's are being developed all over the world. It comprises of flight planning, imager used (RGB/IR/Thermal), platforms (Precision Hawk, Asctec Falcon 8, DJI Inspire, 3d Robotics Solo etc.) and appropriate processing software.

Below are few use cases of UAS in agriculture:

- Plant stand count
- Nitrogen deficiency
- Disease occurrence and Damage Estimations
- Soil studies
- Fertilizer/Pesticide prescription maps

Though the role of advanced technology and analytics are well establised in research community, they are still looked down with a measure of skepticism. The long-term trend of declining numbers of farms and increase in average age of farmers along with changing weather patterns threaten the state of food security, if farming is not predictable and profitable.

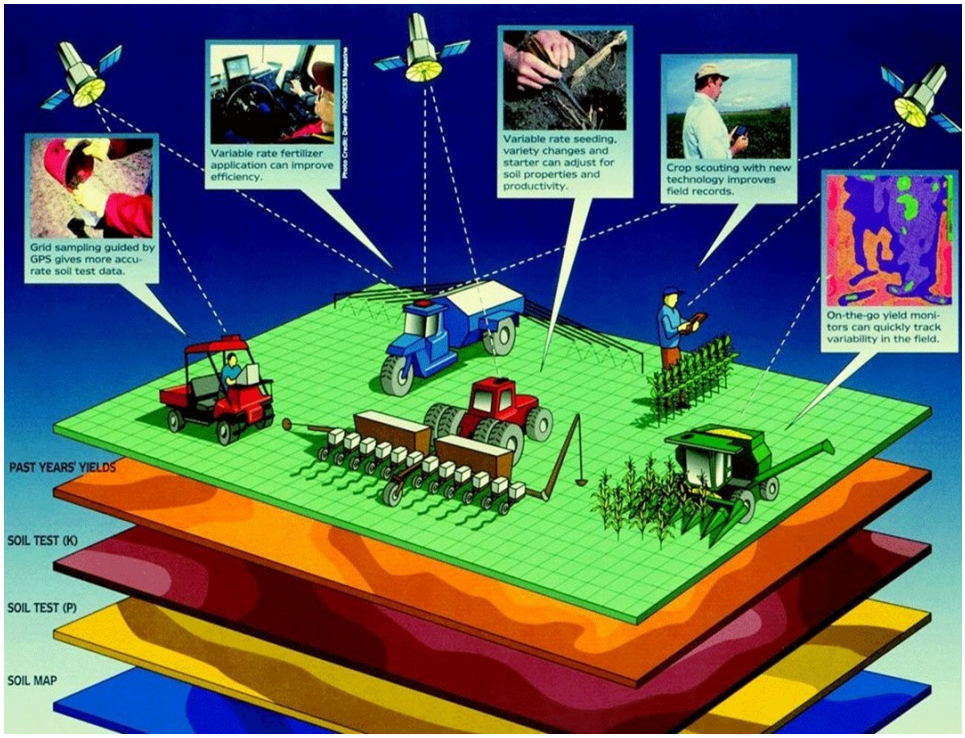


Figure 1. Integration of diverse data and analytics for precision agriculture
(Image source: GPS4US)

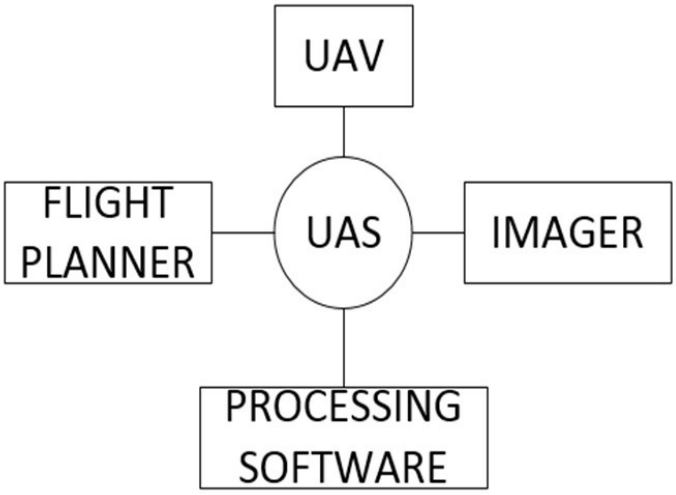
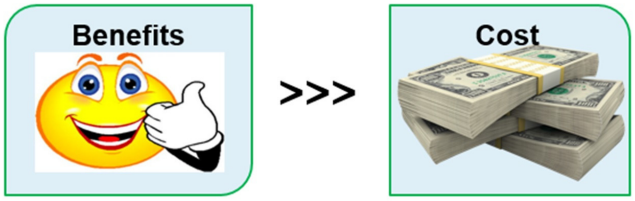


Figure 2. Components of Unmanned Aerial System

Geospatial technologies offer very valuable tools and are essential for sustainable development and management of agriculture. Policy makers, academicians and industry should proactively engage in devising standards for different data types and ensure quality data is easily accessible in public domain. Consistent knowledge driven policies will enable quick development and adoption of advances in geospatial technologies, benefiting global farming community at large.



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