Precision Agriculture for Increased Productivity using Continuously Operating Reference Stations (CORS) Network

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Introduction

Increasing World Population

Diminishing Resources for Agriculture

Economic Pressure due to World Trade Organization Policy

Environmental Protection

Sustainable Development

Precision Agriculture using GNSS
Global Navigation Satellite System (GNSS)

- Set of navigation satellites orbiting the earth and transmitting timing signals
- A small GNSS receiver decodes timing signals and provides position
- Over the last two decades the applications of GNSS has become enormous and contributing toward the socioeconomic development of countries
Current Available GNSS

As of Dec 2013

**Total Satellites: 32**
- Operational: 31
- Since: 90s

**Total Satellites: 31**
- Operational: 23
- Since: 2011

**Total Satellites: 30**
- Operational: 4
- Expected: 20
- Completion: 2019

**Total Satellites: 35**
- Operational: 15
- Expected: 22
- Completion: 2020
Requirements of PA

- Strip tillage
- Precision fertilizer placement
- Automated Planting/Harvesting
- Environmental protection
- Efficiency

Real Time Homogeneous Positional Accuracy of +/- 1 inch
Real Time Kinematic (RTK)

• One reference GNSS receiver (base station) is located at a point whose coordinates are known, while the second GNSS receiver’s (rover) coordinates are determined relative to this reference receiver.

• Accuracy of the rover improves up to centimeter level in real time and millimeter level in post processing.

• Coverage area is within 10km with line of sight to rover.
Continuously Operating Reference Stations (CORS) Network
Applications of CORS Network

- Mapping & Resource Positioning
- Land use Planning and Management
- Precision Agriculture
- Mining & Quarrying
- Aviation
- Hydrography
- Construction and Civil Works
- E-maritime Information
- Plate Tectonics
Precision Agriculture (PA)

Precision Agriculture techniques involve doing more with less resources and reducing harmful applications to the soil or crop.

Minimizing the use of water, fuel, fertilizers, pesticides and maximizing farm profitability.
Precision Agriculture using CORS Network
Advantages

• More reliable and accurate
• High accuracy with higher speed
• Easy to use
• Effective guidance over growing crops
• Allows operations when visibility is poor
• Less effected by weather

• Lower recurring cost
• Reduces operator fatigue and eye strain
• Lower setup time
• Reduces pesticides by reducing overlaps
• Reduces the human resource
• Follow particular pattern according to field
Countries utilizing PA
Pakistan Agriculture Sector

• Agriculture sector is an essential part of economy
• It contributes 21% of GDP
• It generates productive employment opportunities for 45% of labor force
• Fertilizers is Pakistan’s most important and expensive input in agriculture production
• All of Pakistan soil are deficient in Nitrogen (N), 80% to 90% are deficient in Phosphorous (P) and 30% are lacking in Potassium (K)
• The wide spread deficiency of micronutrient is also disappearing in different areas
• Water availability for the irrigation has also been decreasing for last 10 years.

Note: According to Economic Survey of Pakistan 2011-12
Conclusion

- CORS Network is an important infrastructure for PA
- PA can effectively improve the efficient utilization of fertilizers and water in Pakistan
- Crop productivity can be increased substantially