IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Integrated Applications End-to-End Solutions (2)

Author: Mr. Manjunath C B
Vikram Sarabhai Space Centre, Trivandrum, India, India

Dr. Gnanappazham L
Indian Institute of Space Science and Technology (IIST), India
Mr. Neeraj Varma
Indian Institute of Space Science and Technology (IIST), India
Dr. Vijaya Kumar
India

GEOSPATIAL ANALYSIS OF HIGH-RESOLUTION IMAGE DERIVATIVES FOR OPTIMIZING SUSTAINABLE CROP PRODUCTION AND NATURAL RESOURCES MANAGEMENT IN THENI DISTRICT, TAMIL NADU

Abstract

Indian agriculture's complexity becomes a function of factors such as crops produced, soils, land quality, water availability, elevation and weather. Climate change has tremendously altered the intensity and quantum of rainfall over Indian subcontinent thus affecting the irrigation practices. Intensive agriculture is predominant in Theni district dependent on canal irrigation and groundwater sources. Optimal utilization of the available natural resources is a prerequisite for sustainable agriculture systems in the region. Remote sensing(RS)/Geographic information systems(GIS) enables continuous monitoring of variations in cropped areas. The information/data in form of tangible output facilitates better-informed and more precise management of these crop production systems. Analysis of high resolution / hyper spectral satellite imagery can generate critical information to identify crop types, moisture deficiency or surplus, nutrient deficit areas, pest/disease infestations and crop damage due to natural causes like floods, hail, cyclone etc. Constraint of application of remote sensing in agriculture crop management is timely availability of datasets for analysis. A constellation of CubeSats has revolutionized the data constraints by imaging globe daily. The lack of suitable information to develop a decision support system highlights the potential demand for processes that generate, deliver and apply spatial information based on image analytics. The study aims to analyze series of available high-resolution datasets over the entire growing cycle of crops in Theni district. Planet Scope's multispectral data offer data on continuing basis for studying phenological changes of crops. The major crops like Banana, Paddy(rice), coconut and grapes will be addressed. In this context image classification techniques like Maximum Likelihood Classification (MLC), Support Vector Machine(SVM), Artificial Neural Networks (ANNs) and Object-based image analysis (OBIA) can be deployed. Pre and post analysis GPS points will be collated to assess the accuracy and derive crop land information. The study involves crop acreage estimation, assessment of crop phenology changes (e.g. critical stages of development), crop intensification factors, biomass and yield forecasting, identify variables for accurate crop monitoring, models to reduce environmental loads of crop production (e.g. drainage orientation to reduce soil erosion) and cropping system analysis. The thematic data generated will assist farmers in adopting better crop management practices for better yields and economic returns.