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Editorial

Geospatial technology and agrometeorological research

The main challenge for the agriculture sector is to increase the crop yield and food production to satisfy the increasing demand while maintaining harmony with the environment, the core concept of sustainable agriculture. However, crop yield is affected by environment conditions including biophysical variables and management decisions. Agrometeorology as a science, relies on data acquisition (like field experimentation, observations using ground sensors, airborne sensors and satellites), data transmission (like internet of things) and data analysis (like crop models, geographic information systems (GIS) and machine learning). In the year 1965, the India Meteorological Department (IMD) started satellite meteorology from Television Infrared Observation Satellite (TIROS-8), a US-based meteorological satellite. The launch of the INSAT-1A satellite in the year 1982 and several follow up satellites brought a revolution in space-based meteorology. The data acquired from INSAT series satellites provided an estimate of large-scale precipitation. Moreover, several operational data products with improved weather forecasting accuracy were provided the launch of INSAT 3D in 2013. This satellite offers temperature profiles, humidity, ozone, and atmospheric water vapor at a 1-hour interval. IMD provides short range and medium range weather forecasts that are used for developing agro-meteorological advisories.

Besides weather forecast, satellite data can also be incorporated with crop models that use agro-meteorological parameters to estimate crop health and yield. However, high spatio-temporal resolution of satellite data is required to update the models during a season, which may help in improving the predictions. The spatial version of crop models generally requires surface reflectance of bands and/or spectral indices besides other parameters. Though a few of the freely available imageries (like Landsat and Sentinel) and datasets are suitable for monitoring crop growth at the landscape level, commercially available imagery is crucial to attaining precision at the farm level. Apart from very high-resolution commercial satellite imagery, unmanned aerial vehicles (UAVs), commonly called drones, facilitate a higher level of precision in agricultural data by creating an opportunity for real-time monitoring. Drones can be utilized for detailed analysis of a field for crop and soil nutrient monitoring, soil moisture estimation, crop disease, and health monitoring. This high-resolution satellite data coupled with improved weather forecast may be boost for precision agriculture. However, we need to understand and explore the opportunities to use remote sensing and geo-spatial applications in the field of agrometeorology and answer few of the questions;

1. Can we learn from historical meteorological data and satellite imagery to develop early warning signal for drought?
2. How could the agrometeorology and geospatial technologies be used for identifying and monitoring crop health and forecasting about crop disease and weeds?
3. How can the remote sensing derived biophysical parameters be used to improve crop model predictions?
4. Can we use geospatial technologies (Satellite imageries, GNSS, mobile applications and IOT) in irrigation advisory services?
5. How best we merge the perspective power of geospatial technologies and climate model projections in climate change impact assessment and adaptation measures for agriculture?

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