

INSAT DERIVED BASIC AGRO-MET PRODUCTS

Rainfall (HE)



COVERAGE BEYOND INDIA

Spatial Resolution = 4 Km

(The Combination of INSAT 3D and 3D R provide data in 15 min)

INSAT DERIVED VALUE ADDED PRODUCTS

et Radiation

C GEOPHYSICAL PARAMETER SECTOR

DRYNESS INDEX



f(Potential Evapotranspiration and Rainfall)

4 Km (daily)

COVERAGE INDIA





SPATIAL DISTRIBUTION GRIDDED IMD 0F RAINFALL AND INSAT DERIVED RAINFALL PRODUCTS OVER INDIAN LAND MASS

32N

24N

16N

8N

32N

24N

16N

8N

32N

24N

16N

8N

72E

Monthly rainfall for August





Comparison of weekly accumulated rainfall over *Indian Meteorological Sub-Divisions* from Satellite and IMD gridded data



Sub Divisions

<u>FASAL : Forecasting Agricultural Output using Space, Agrometeorology and Land based Observations</u> Main Goal: <u>Generation of Crop Statistics at Different Spatial scale</u> (Acreage & Production Estimates/Forecast)

Forecasting Agricultural output using Space, Agrometeorology and Land based observations (FASAL)



1. Multiple pre-harvest forecast of acreage and production using multi-date data from space platform and weather-yield models

2. National-scale forecast with state-level disaggregation

3. Spatio-temporal analysis of within and across season crop growth differences

Use of Agro-Meteorology in FASAL programme

- 1. Usage of in situ meteorological measurements
- 2. Generation of weather based crop yield models
- 3. Statistical crop yield model using longterm ground met data and crop yield data

Limitation

1. Yield model based on Sparse in situ weather data and unable to capture spatial variability at finner resolution

Crop Acreage and Production Estimates



STATISTICAL RICE YIELD MODEL BASED ON METEOROLOGICAL VARIABLES

Meteorological variables : Rainfall, Min and Max T, Min and Max Relative Humidity, Bright Sun Shine hours

$$Y = a_0 + \sum_{i=1}^{p} \sum_{j=0}^{1} a_{ij} Z_{ij} + \sum_{i \neq i}^{p} \sum_{j=0}^{1} b_{iij} Z_{iij} + \mathcal{E}$$

In Uttar Pradesh ground based data showed 5 to 10 Mean Absolute Per cent Error at districts scale (Singh et al 2014)

$$Z_{ij} = \sum_{w=n_1}^{n_2} r_{iw}^j X_{iw}$$
$$Z_{ii'j} = \sum_{w=n_1}^{n_2} r_{ii'w}^j X_{iw} X_{iw} X_{i'w}$$

Satellite based spatial rainfall showed 0.5 to 3 Mean Absolute Per cent Error at districts scale (Kumar et al 2021)

Υ	is variable to forecast,
X _{iw}	is value of ith weather variables in wth week
r _{iw}	is correlation coefficient between Y and ith weather variables in wth week
r _{ii'w}	is correlation coefficient between Y and product of X _i and X _i , in wth week,
р	is number of weather variables
n ₁	is initial week for which weather data are included in the model
n ₂	is final week for which weather data are included in the model, and
е	is error term

StepwiseRegressionTechnique was used to selectweather indices

Improvement in Yield Prediction Using INSAT derived Insolation in Crop Simulation Model



Improvement in Spatial wheat yield distribution after integration of leaf area index and INSAT insolation in the crop yield model

ADD ON APPLICATIONS



AGRICULTURAL DROUGHT ASSESSMENT 9

Satellite Agro-met Products for advisories to farmers



Example south west monsoon rainfall anomaly from INSAT derived HEM Rainfall product



Seasonal (July-September) Year 2018

Usage of INSAT derived Rainfall Products for Assessment of Agricultural Drought

Agricultural Drought Assessment using Developed Combined Deficit India (CDI) $\left[\alpha Rain_{d-t} + (1-\alpha) NDVI \right]_{d} \right]$



Early Warning Indicator



To assess the magnitude of drought a Combined Deficit Index (CDI) has been developed using the negative percent (%) departure of rainfall from normal. Rainfall deficiency primarily leads to moisture stress. The stress effect is expected to be visible on NDVI deficit with a time lag.

<u>CONCLUSIONS</u>

- Satellite derived rainfall product is able to capture more spatial variation compared to sparse rain gauges
- Satellite derived rainfall product able to provide better accuracy for rice yield estimates
- Satellite derived rainfall open in new avenues for agromet advisory for the farmer's and assessment of agricultural drought