Geospatial Technology for Farmers

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ISRS, ISG, OSGeo, IEEE GRSS-CIS,
ISPRS-WG V/8, CSI-SIG-BDA, FSMI, Geo4All, ISSE

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Key terms for today

- Agriculture
  - Crop Yield
- Land related aspects
  - Soil Fertility
  - Water
  - Climate – Rain and temperature
- Agricultural Practices
  - Season based Land Preparation
  - Crop Monitoring
  - Harvest
- Natural forces
  - Floods
  - Droughts
  - Climatic Changes
- Economic Aspects
  - Input Sources
  - Market, Distance, Shelf Life
  - Labour availability

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Characteristics of Land

- Location specific
- Complex phenomenon that links biophysical factors with socio-economic issues
- Decision Making at different levels/scales
  - National food policy → Intensive agriculture use
  - Water resources management → Watershed boundaries
  - Changes in Life Style → Consumption patterns → New or Intensive Land uses
  - Profit Maximization vs. Cultural Relevance
- Multi-dimensional – spatial, temporal

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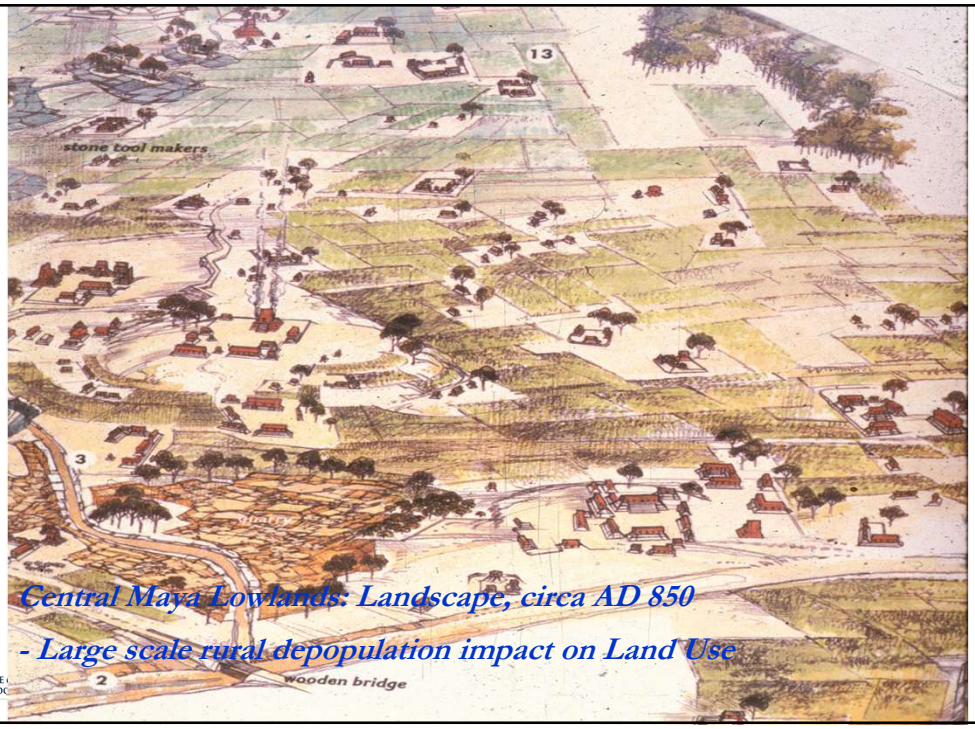

Central Maya Lowlands: Landscape, circa AD 850

- Large scale rural depopulation impact on Land Use

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- Forest Returns
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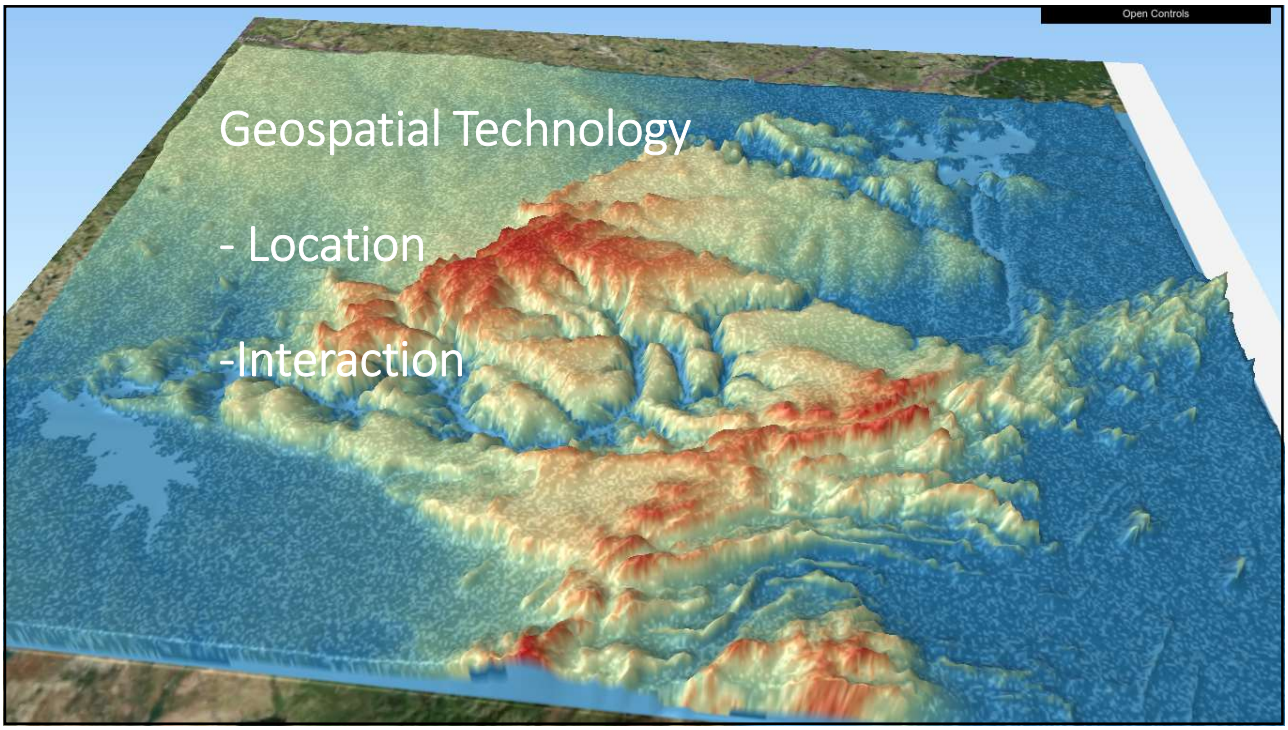
Open Controls
Geospatial Technology
- Location
-Interaction

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Geospatial Technology

- POTENTIAL : What it has ?
- Resource UTILISATION: What can I use it for?
- ENABLER : To use, what else do I need?
  - Inputs – Biotic
  - Inputs – Non-biotic
- Outcome – Value
  - Non-Monetary - Sustenance, By Products, Other Support
  - Monetary - Economic/Financial Returns
- Can I "Reuse" the resource → Sustainability

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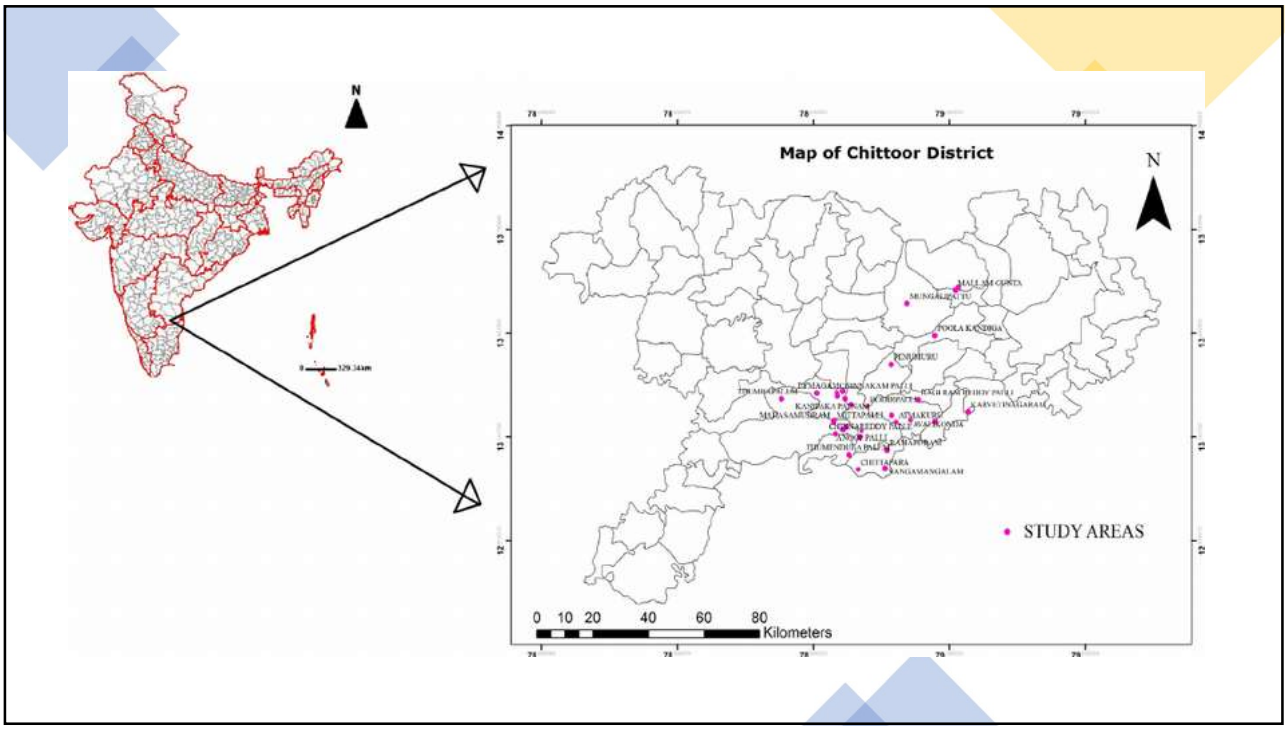

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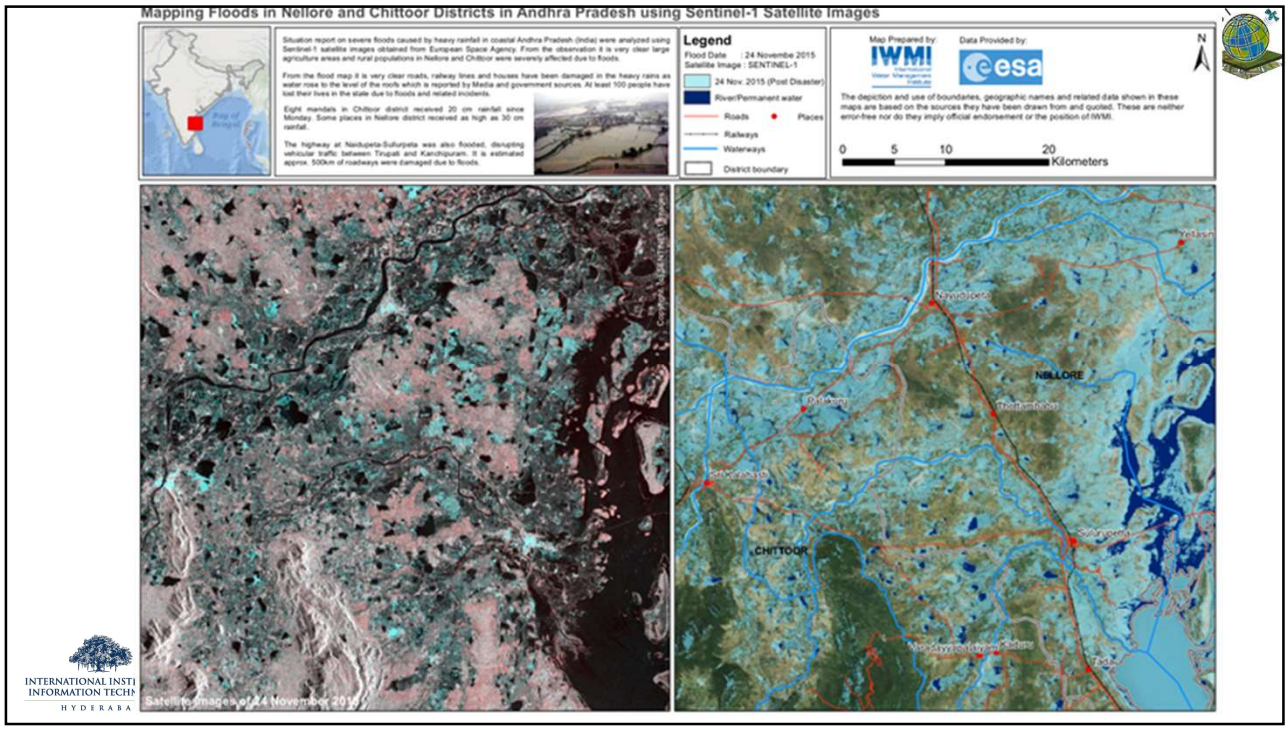

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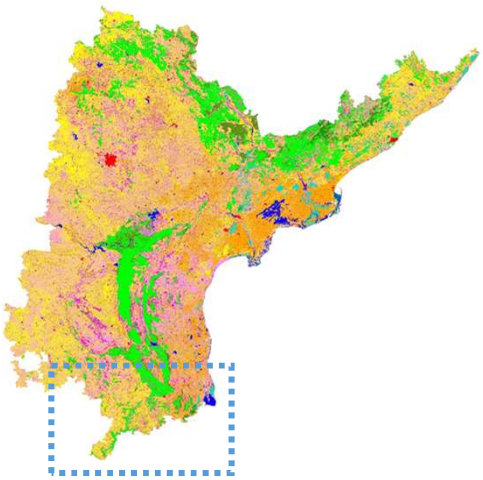
Validation: APLULC Classified Data 2005-06

Lab for Spatial Informatics



Symbol	LU/LC Class
1	Built up land
2	Kharif crop land
3	Rabi crop land
4	Zaid crop land
5	Double / Triple crop land
6	Currently fallow
7	Plantation / orchard
8	Evergreen / Semi-evergreen
9	Deciduous Forest
10	Shrub / degraded forest
11	Littoral / Swamp / Mangrove
12	Grassland & grazing land
13	Other wasteland
14	Gullied / Ravines
15	Scrubland
16	Waterbodies
17	Snow covered
18	Shifting Cultivation

Source: **NRSC, ISRO**

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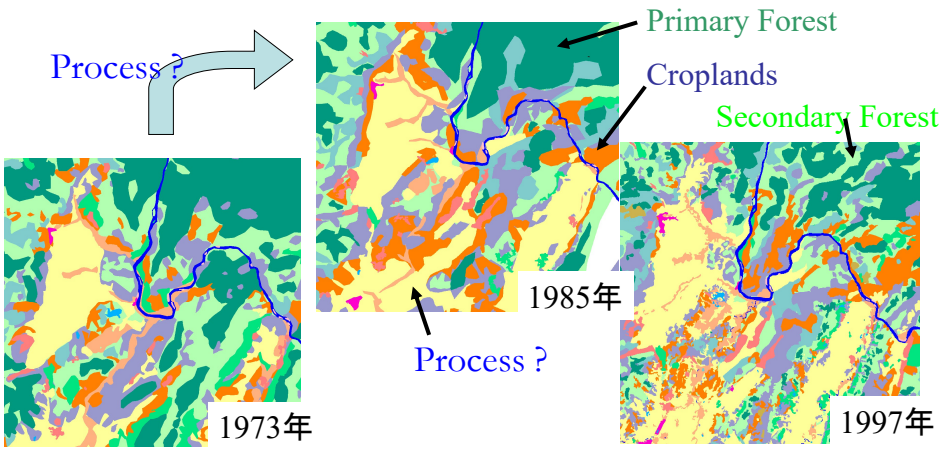
Time series of Land Cover Change - Remote Sensing Imagery



Along Mekong, Near Laos

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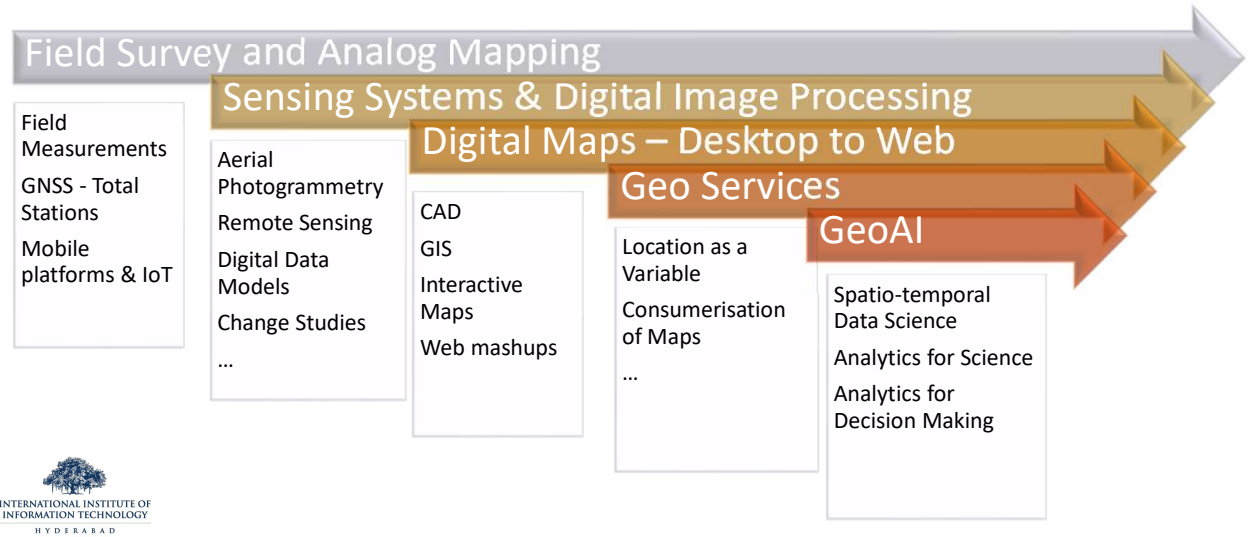
Evolving world of Geospatial Technology



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What is needed for a Good Monitoring System ?

- A good baseline data
  - Coverage, periodic updates, record of causes of changes, if any
- Is Crop-calendar a good baseline?
  - esp. if it is one calendar for the whole district
- What about uncertainties in the crop calendar?
- Can Phenology provide the right clues?

How Events like droughts affect Cropping patterns in a region?

- All are areas affected similarly ?
- Can such analysis help us identify the **Causative and underlying factors**?

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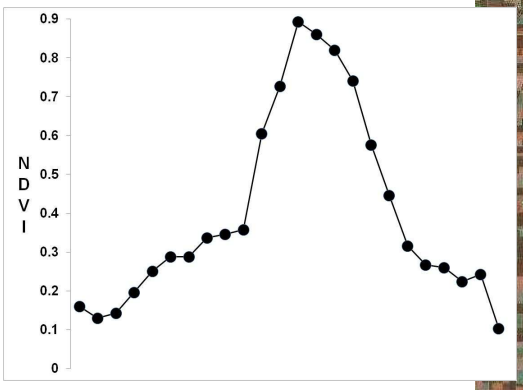
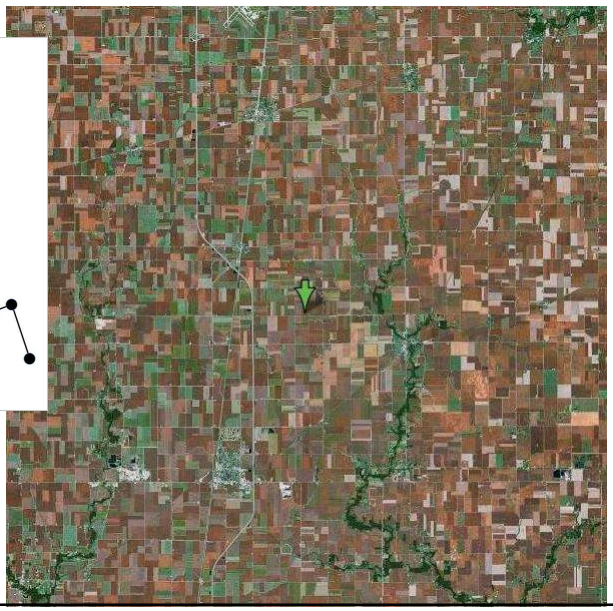
View of a Plot and its Vegetation growth pattern





http://mapseasons.net

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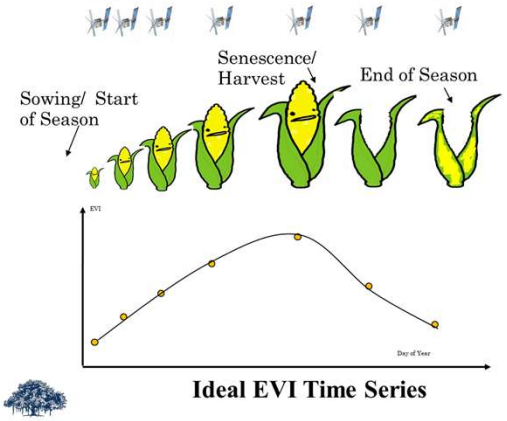
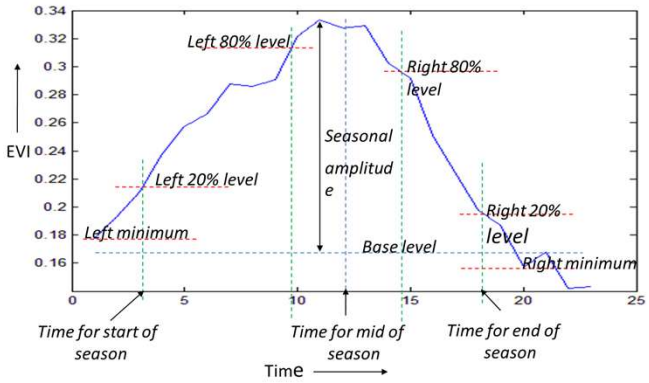
Generation of Location specific Crop Phenology – Pixel wise Crop Calendar

EVI and Vegetation Profile



Ideal EVI Time Series



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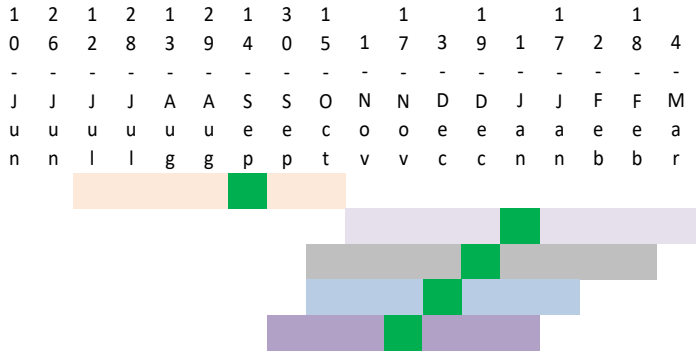
Season calendar results for Chamrajnagar

Type	Start	End	Mid
1	12-Jul	15-Oct	14-Sep
2	1-Nov	4-Mar	1-Jan
3	15-Oct	18-Feb	19-Dec
4	15-Oct	17-Jan	3-Dec
5	30-Sep	1-Jan	17-Nov



Derived season calendar for Chamrajnagar District

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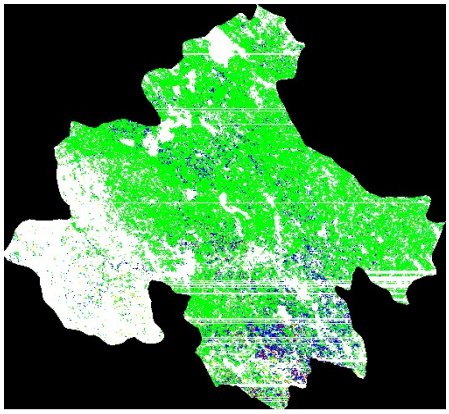
Crop Season Map :
SVM and DTW/CDTW based Time Series Classification



Hassan District in Karnataka

- Kharif + Rabi + Zaid
- Kharif + Rabi
- Kharif + Zaid
- Kharif only
- Rabi + Zaid
- Rabi only
- Zaid only

	Statistics hectares	Our results hectares
Kharif	393481	367010
Rabi	66244	40756

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S Gupta and K.S.Rajan. 2011. Extraction of Training Samples from Time-Series MODIS imagery and its utility for Land Cover Classification. International Journal of Remote Sensing - 32 (24) 9397-9413.
Gupta, S., and K. S. Rajan. 2010. "Temporal Signature Matching for Land Cover Classification." International Society for Photogrammetry and Remote Sensing – Technical Commission VIII Symposium, August 9–12

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