RECOVERY OF SPATIAL INFORMATION FOR CROP STATISTICS FROM HYPERTEMPORAL REMOTE SENSING

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Outline

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- Material and Methods
- Results and Discussion
- Conclusions

Introduction

- Conventional methods of land use and land cover mapping and monitoring are laborious and expensive
- Time series of NDVI used to discriminate between vegetation and other land uses, and between different vegetation types
- Crop statistics not informing about the spatial extent within administrative units

Objective

adding spatial information to crop statistics using hypertemporal RS data (temporal NDVI profiles).

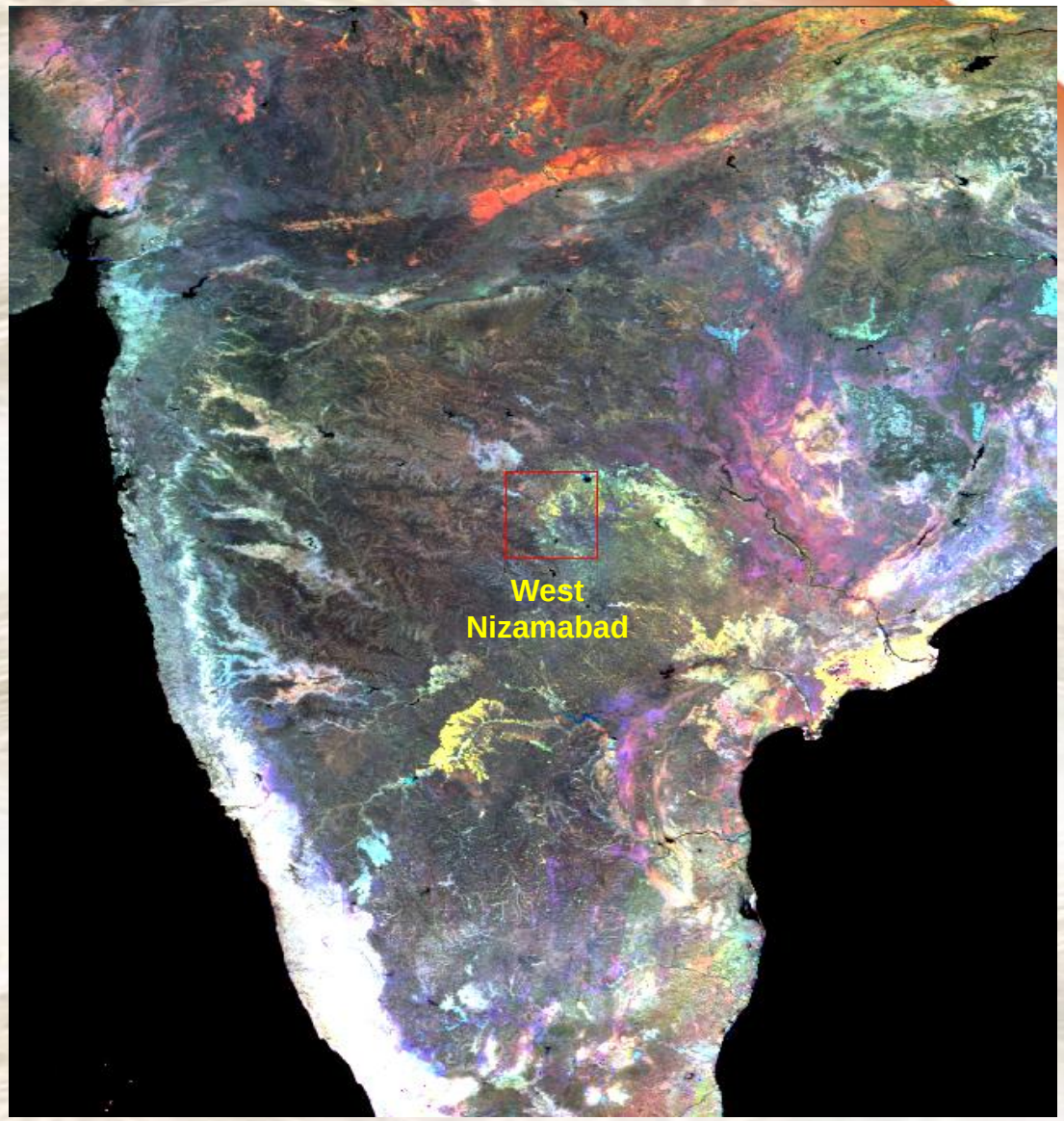
Material and Methods

Study area

6 Mandals or sub-districts

Total area: 1300 km^2

Cropland: 90000 Ha



Data

- NDVI: 147 Spot Vegetation composite images
  - * spatial resolution: 1 km^2
  - * decadal
  - * period: April 1998 - April 2002
- Land cover map at 1/50000 scale
  - * images acquired in 1994/1995
  - * IRS-C (Liss-III sensor, spatial resolution: 23 m)
  - * original 18 legend entries reduced to 7
- Crop statistics: cropped areas by administrative units

Methods

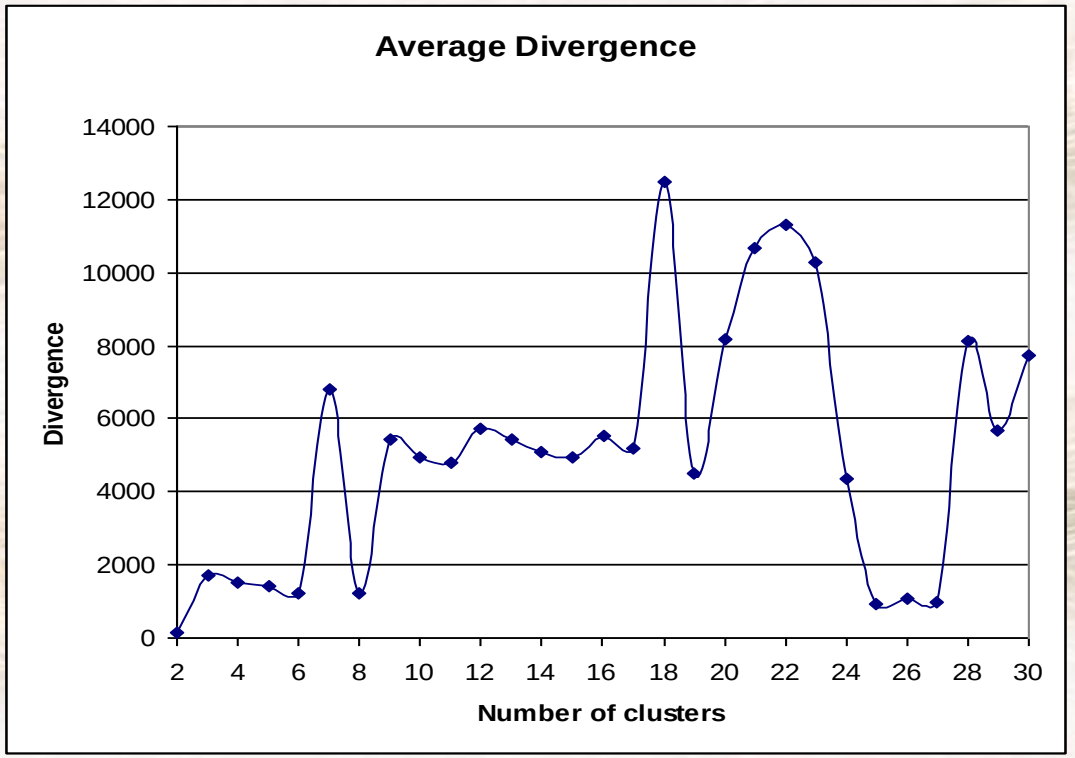
- ✓ *NDVI = (IR- R) / (IR + R)*
- ✓ *DN = (NDVI + 0.1) / 0.004*
- ✓ Unsupervised classification: ISODATA algorithm (2 to 30 clusters)
- ✓ Cropland areas masked using land cover map
- ✓ Stepwise multiple linear regression:

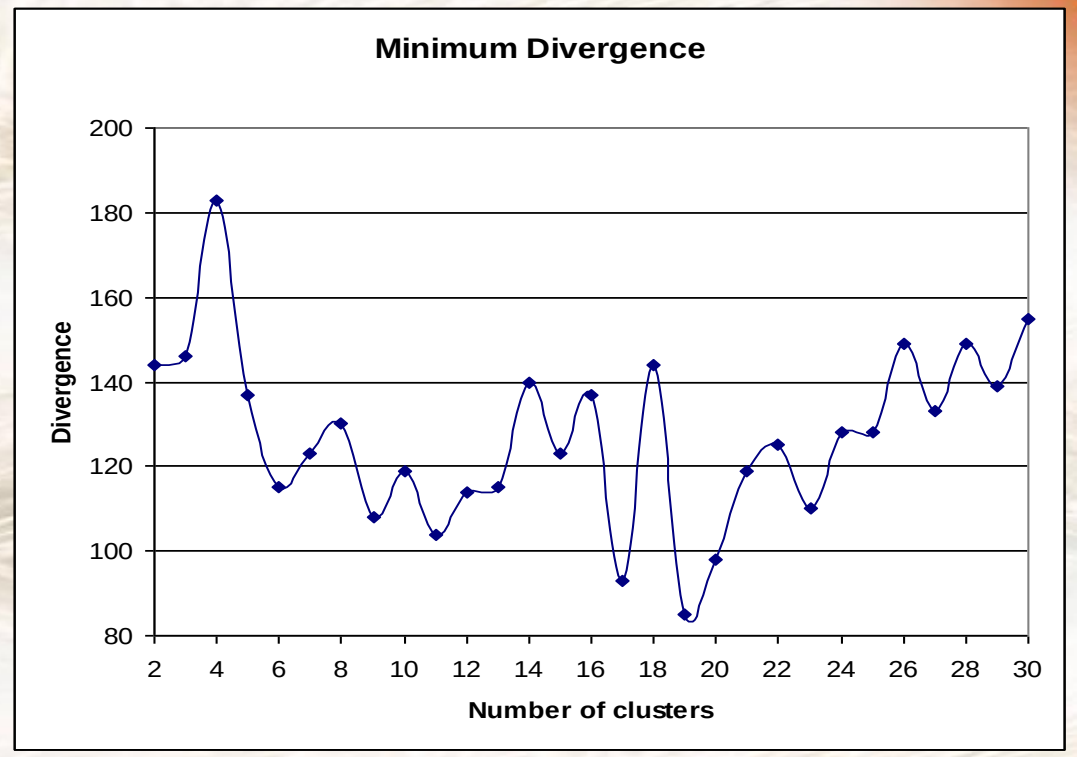
$$CA = \sum_{i=1}^{n} c_i * NDVIcluster_i$$

- ✓ Generating maps showing cropped fractions by map units
- ✓ Softwares: ArcGIS, ERDAS Imagine and SPSS

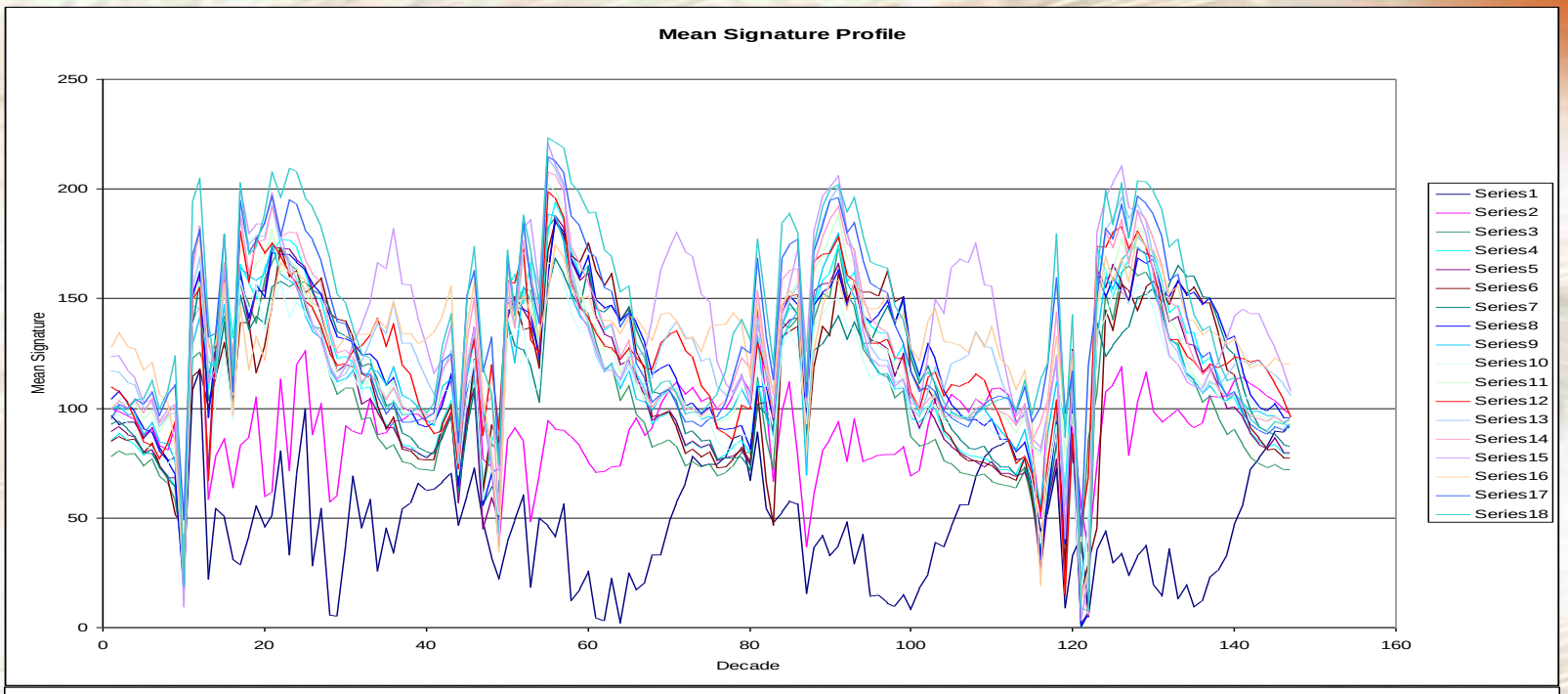
Results and Discussion

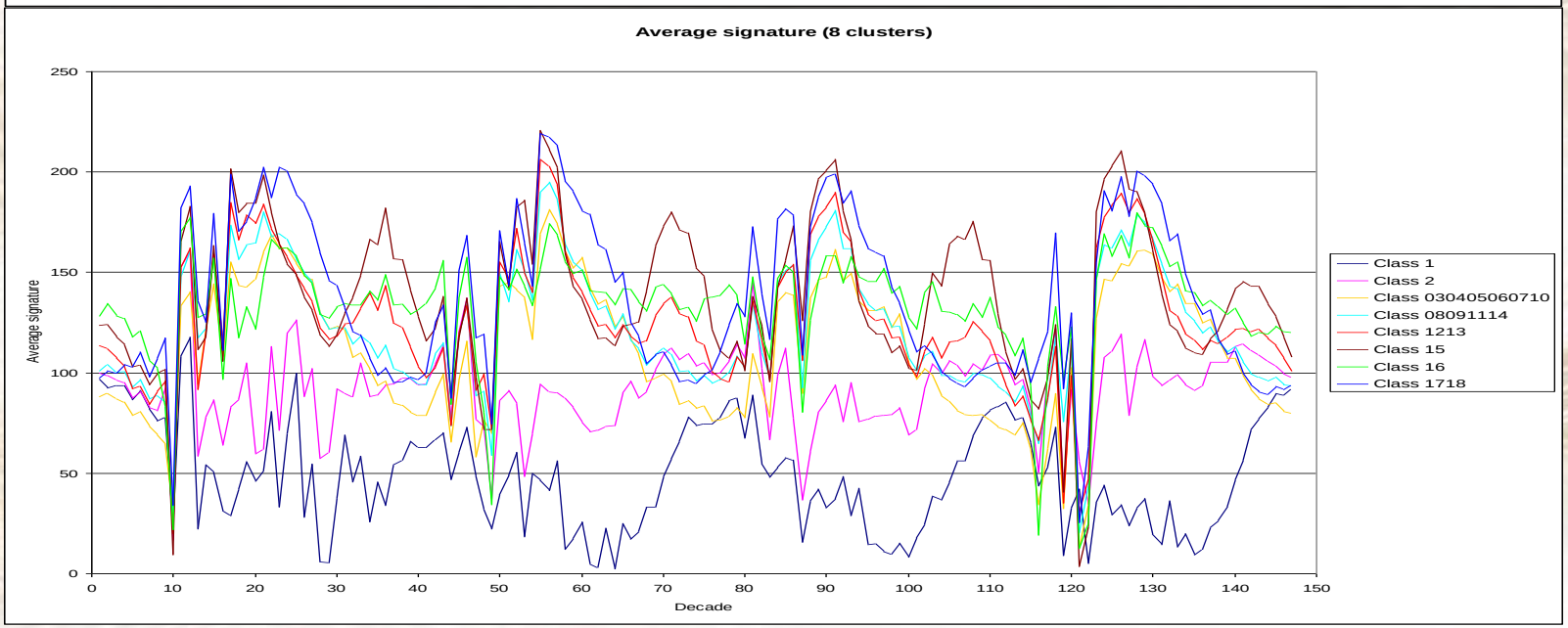
Number of clusters



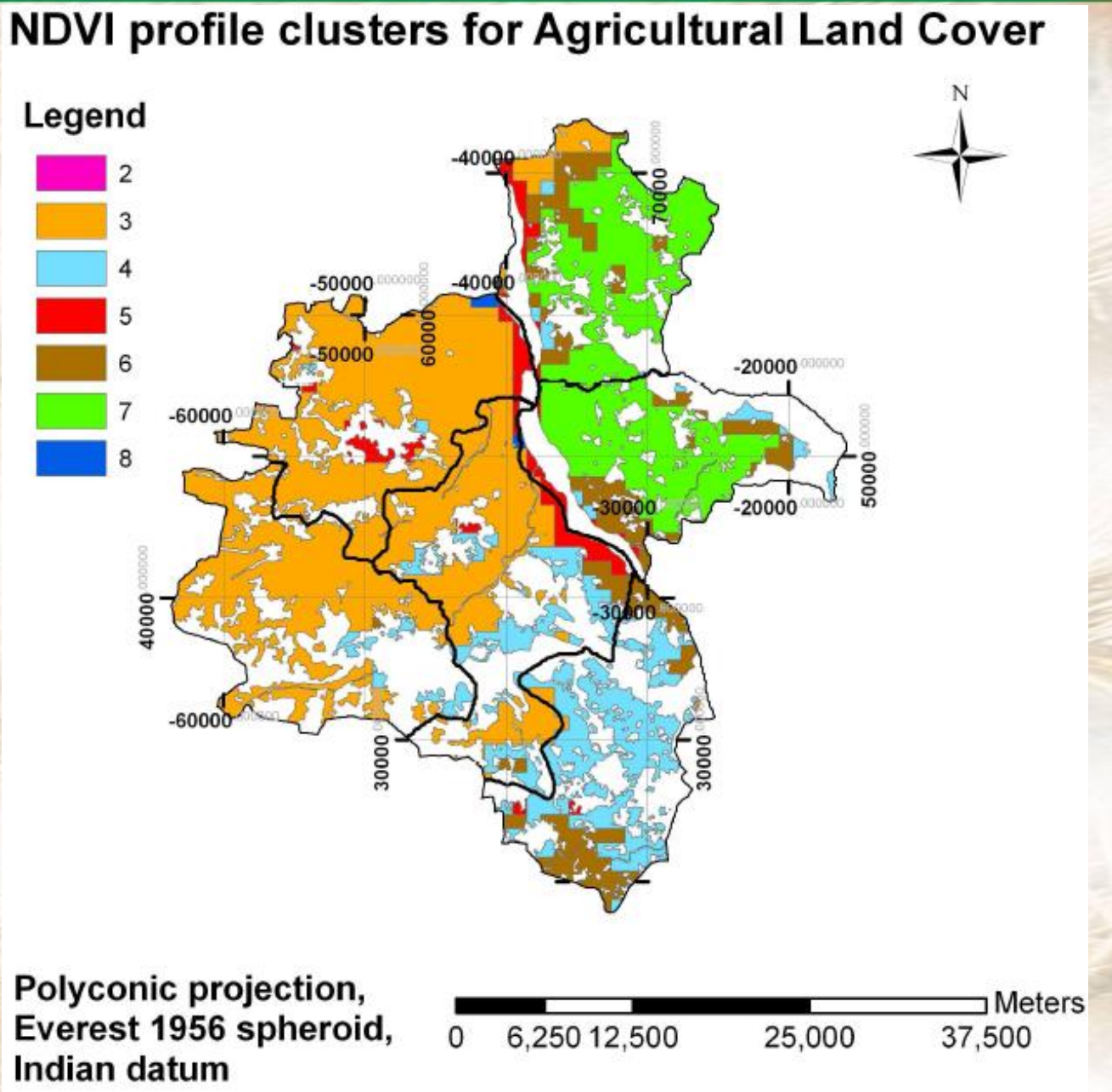


Average spectral signatures





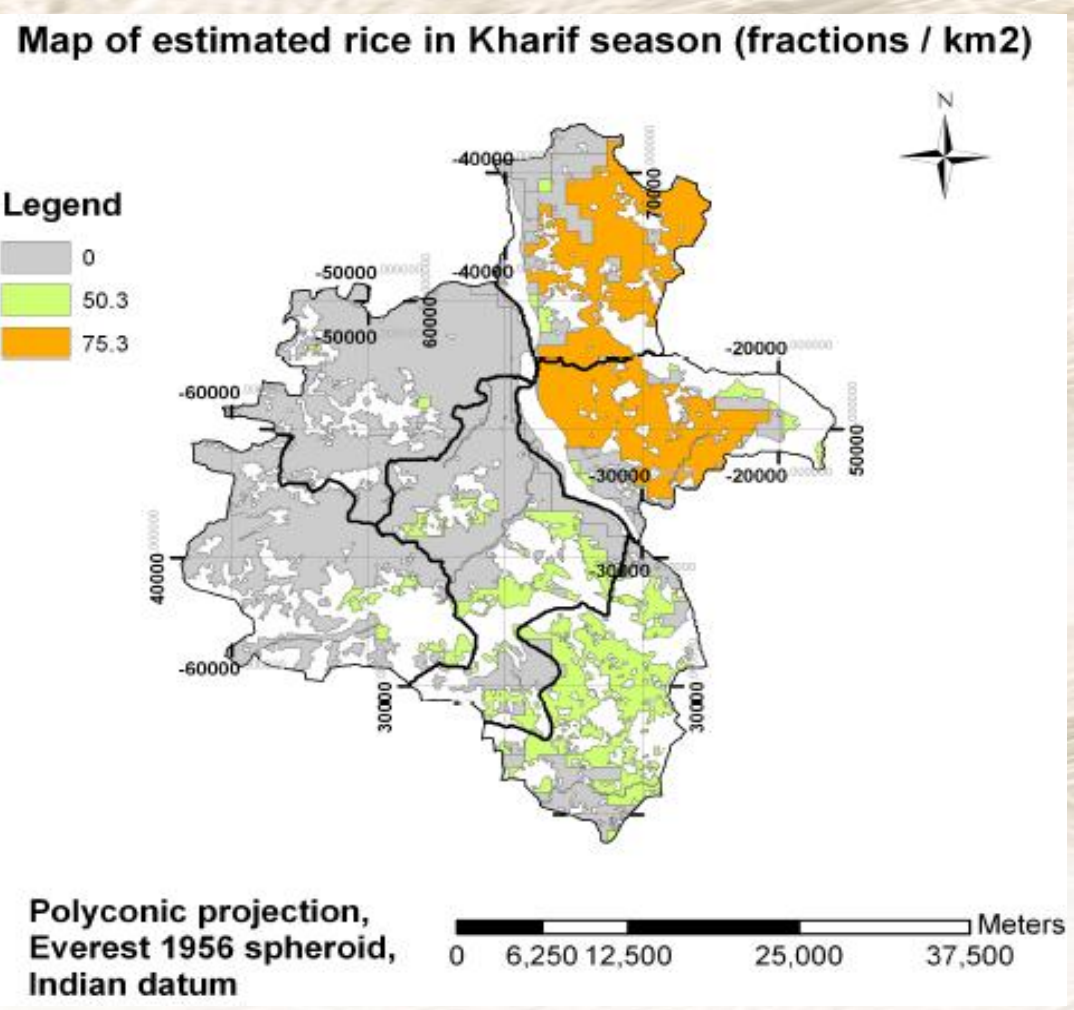
NDVI-unit map

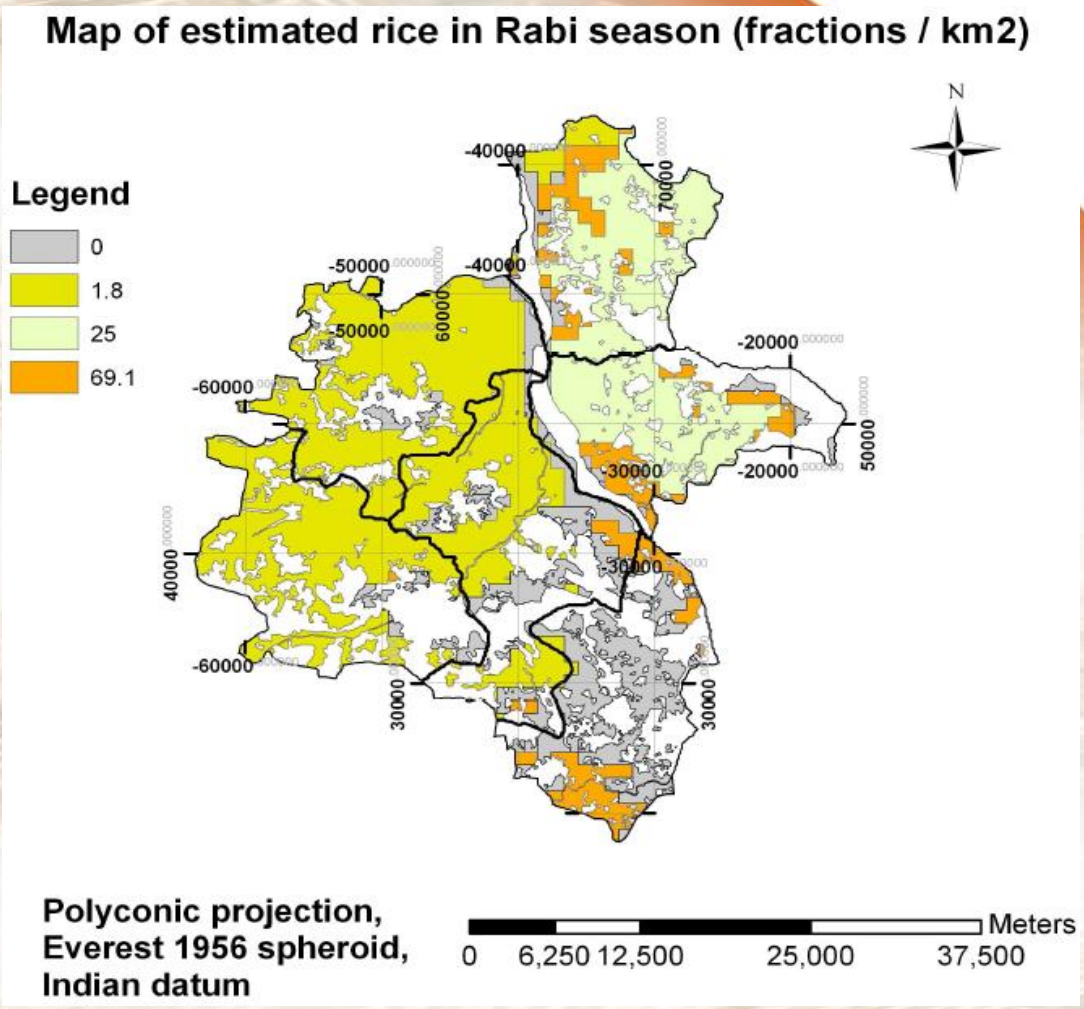


Stepwise multiple linear regression

		NDVI units				
Kharif	**Adjusted R^2**	**3**	**4**	**6**	**7**	**Area (Ha)**
Cotton	87.5	15.6				**6860**
Maize	81.3		4.1			**482**
Pulses	96.9	48.0	64.1			**29121**
Rice	95.0		50.3		75.3	**22774**
Sugarcane	89.9			26.0		**2395**
Rabi						
Groundnut	80.3			53.2		**5942**
Pulses	80.9	5.5				**2824**
Rice	99.8	1.8		69.1	25.0	**11481**
Sorghum	86.1	32.5				**15454**
Sugarcane	85.9			21.6		**1960**
Total Area (Ha) both seasons		**42409**	**13488**	**8920**	**18216**	

Estimated maps for rice





Conclusion

- Benefit of integrating hypertemporal remote sensing data with crop statistics to:

  * delineate NDVI profile clusters with their land cover map units
  * link these statistics to geographical locations

- These map units used for future monitoring of natural resources (crop growth, forecasting crop production, risk awareness like drought, etc.)

Thank You For Your Kind Attention