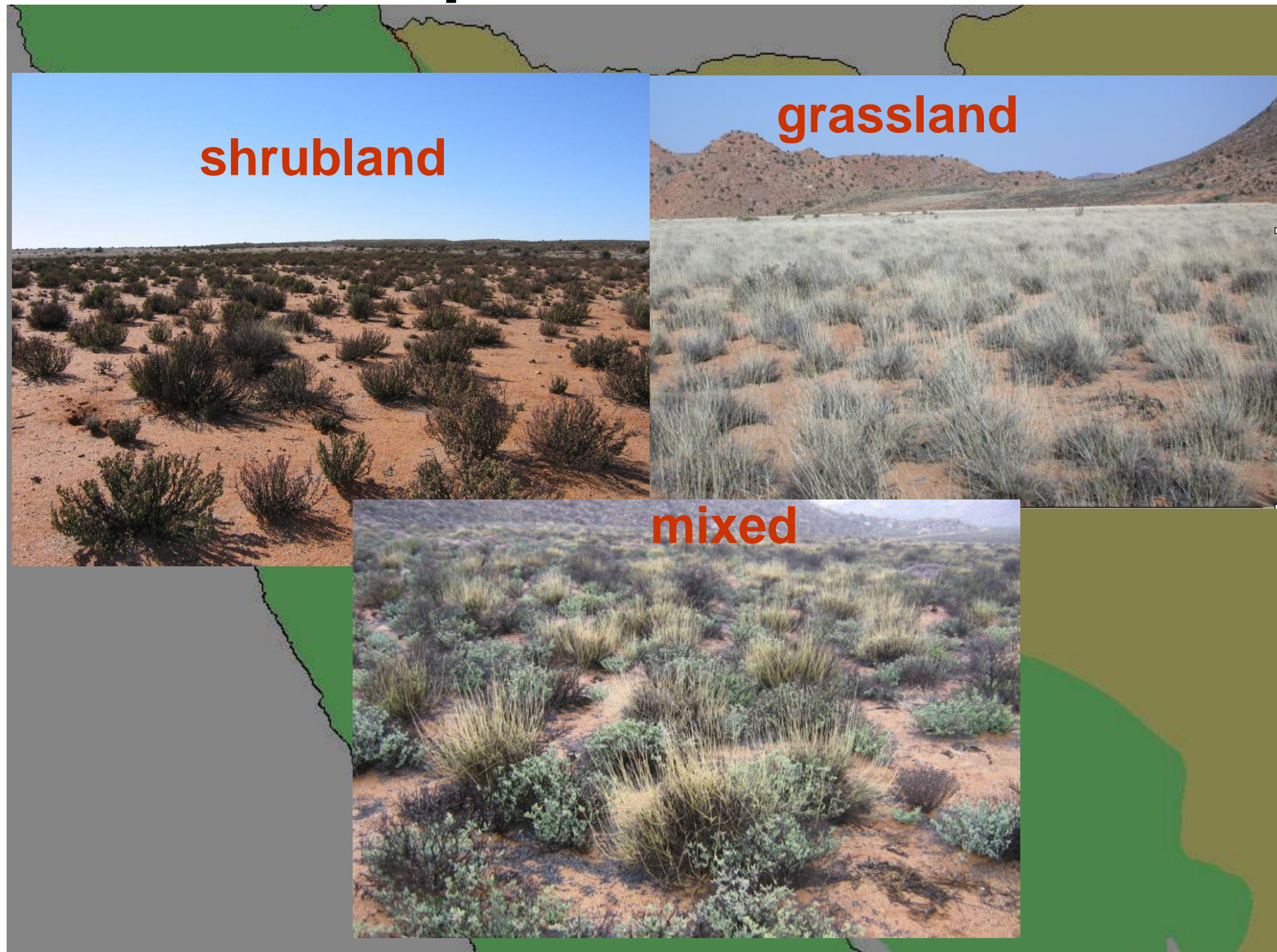


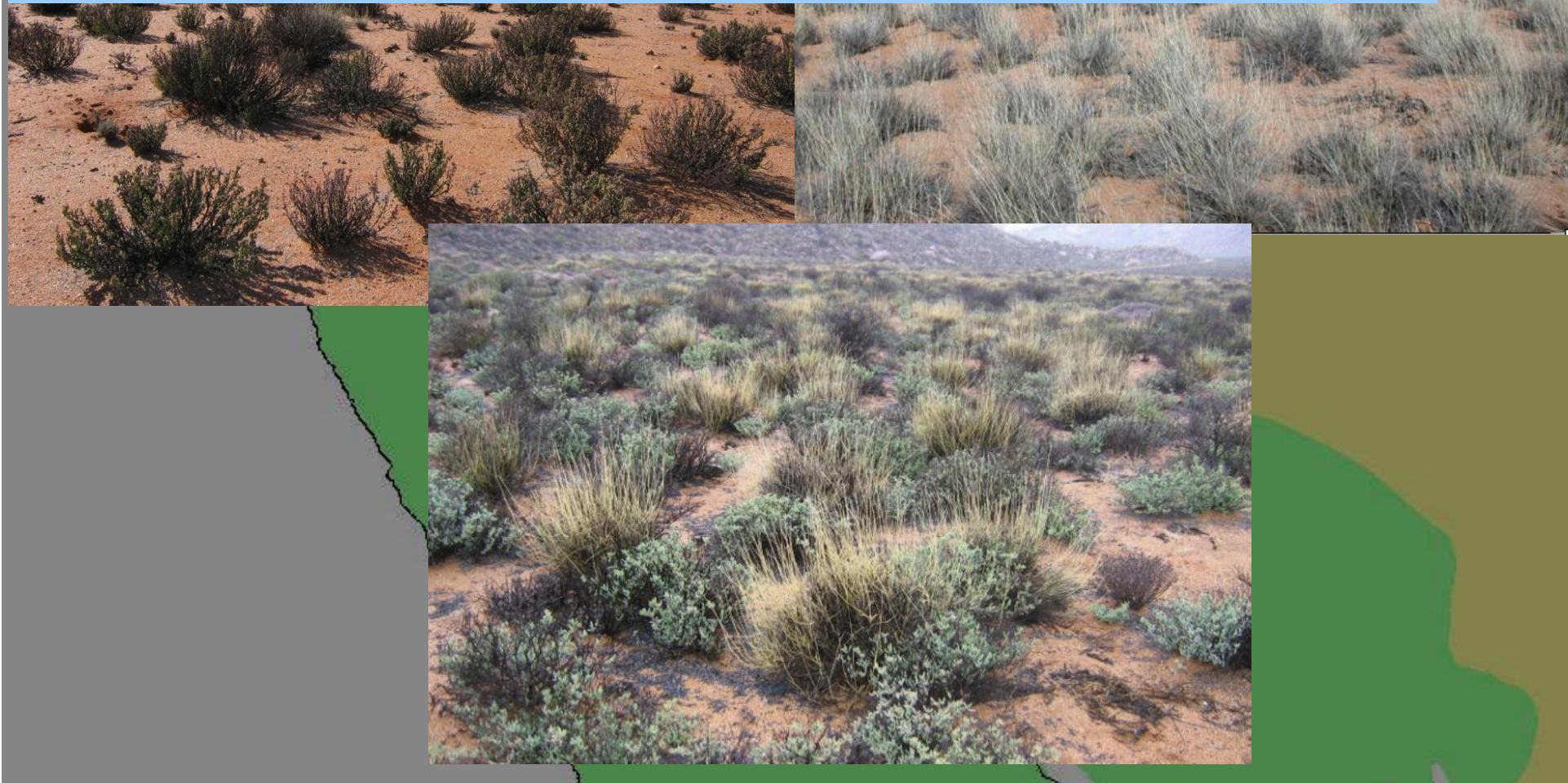
# Vegetation distribution at the climatic ecotone between Bushmanland arid grassland and Namaqualand shrublands



N. Shiponeni, M. Vogel, M. Keil, T. Hoffman & N. Allsopp

# Vegetation distribution at the climatic ecotone between Bushmanland arid grassland and Namaqualand shrublands

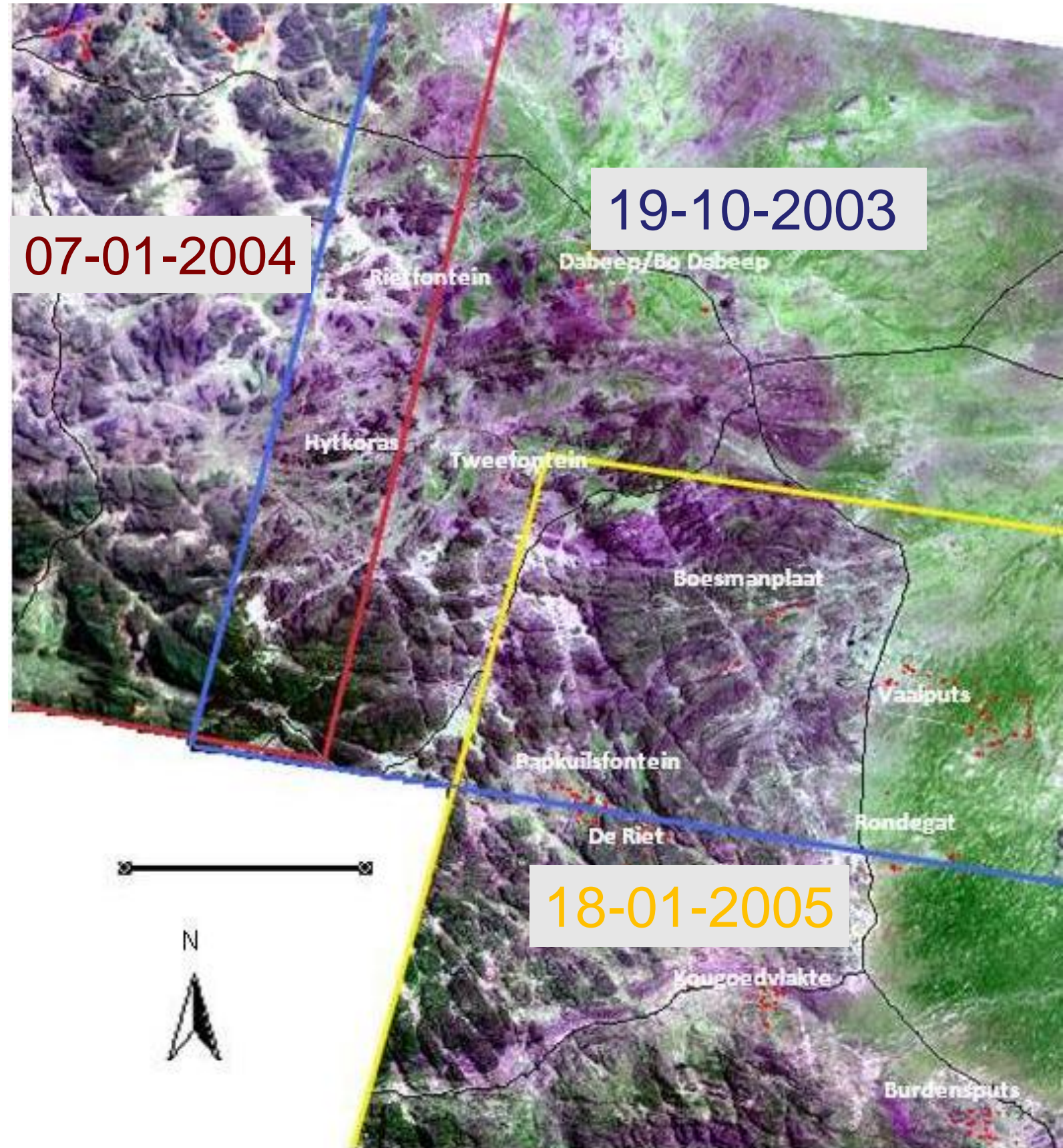
- **Spatial distribution of grass and shrubs**
- **change in distribution over the years**
- **Remote sensing data and technology**



# Vegetation distribution

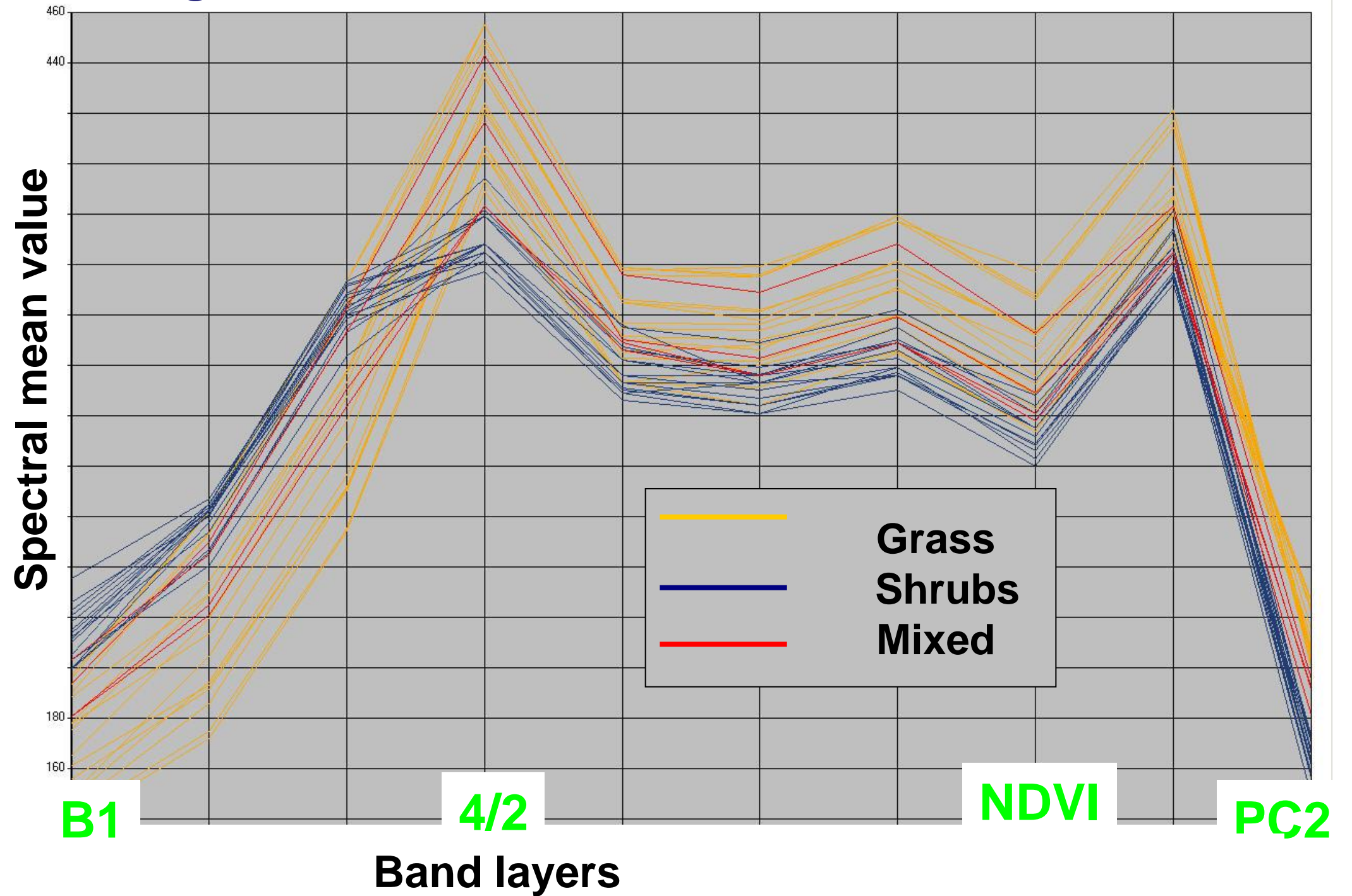
- High spatial resolution  
ASTER satellite data 15 m

- GPS locations from  
different communities



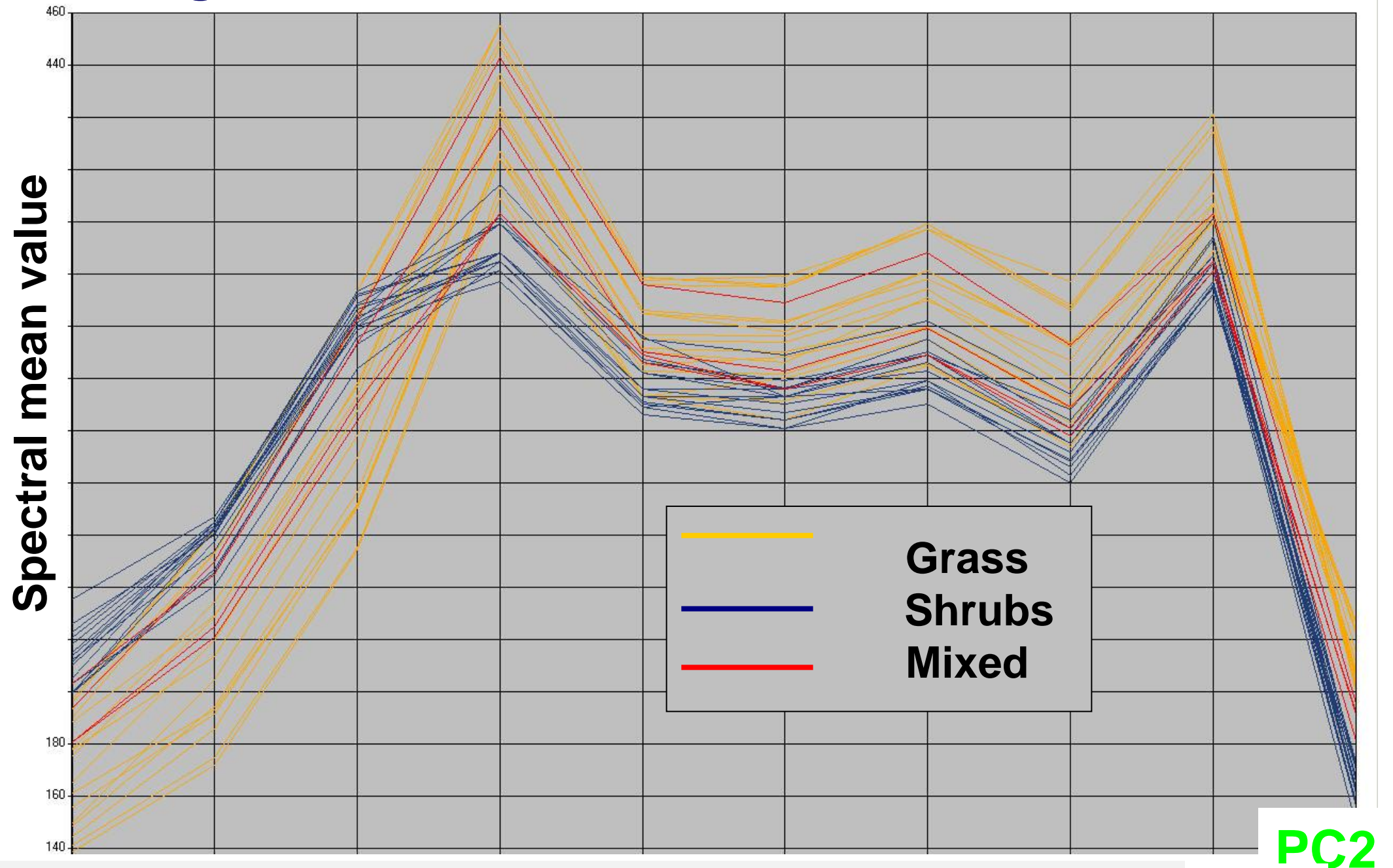
# Decision tree classification

- Uses spectral signatures to define thresholds of classes



# Decision tree classification

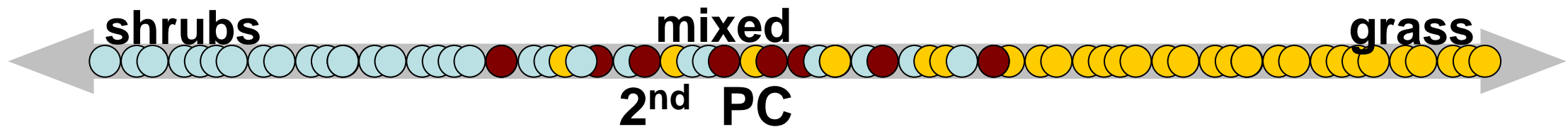
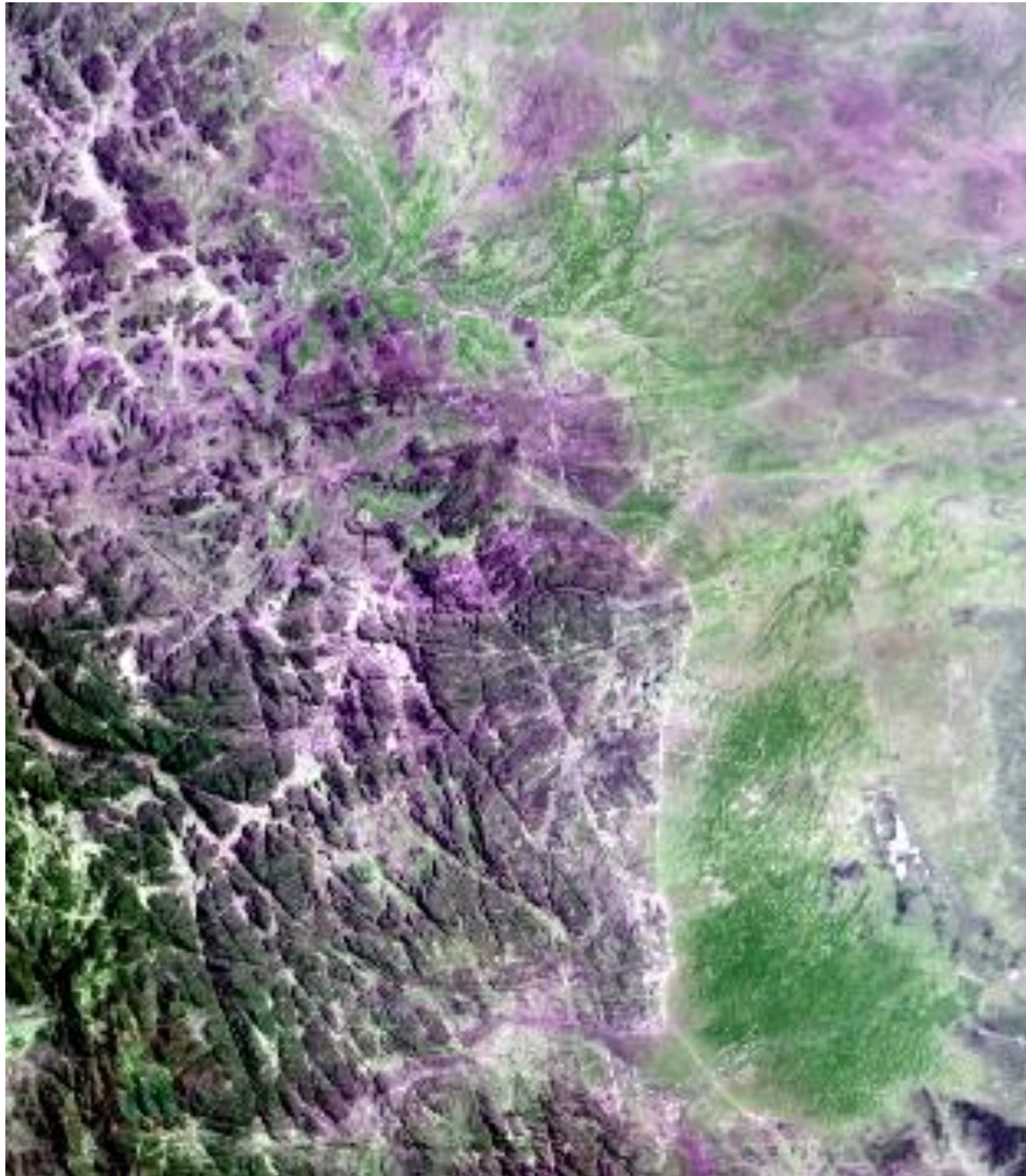
- Uses spectral signatures to define thresholds of classes



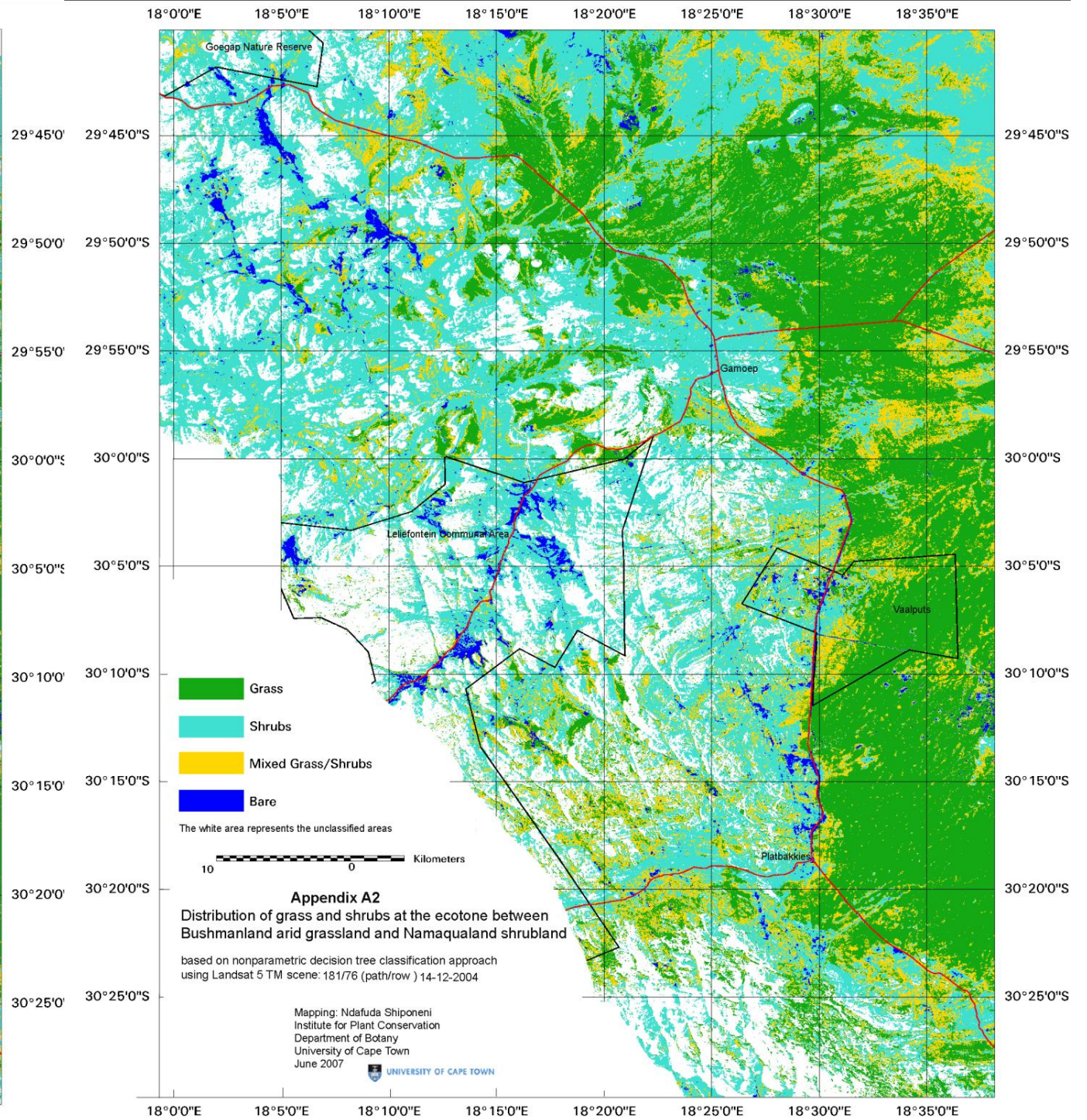
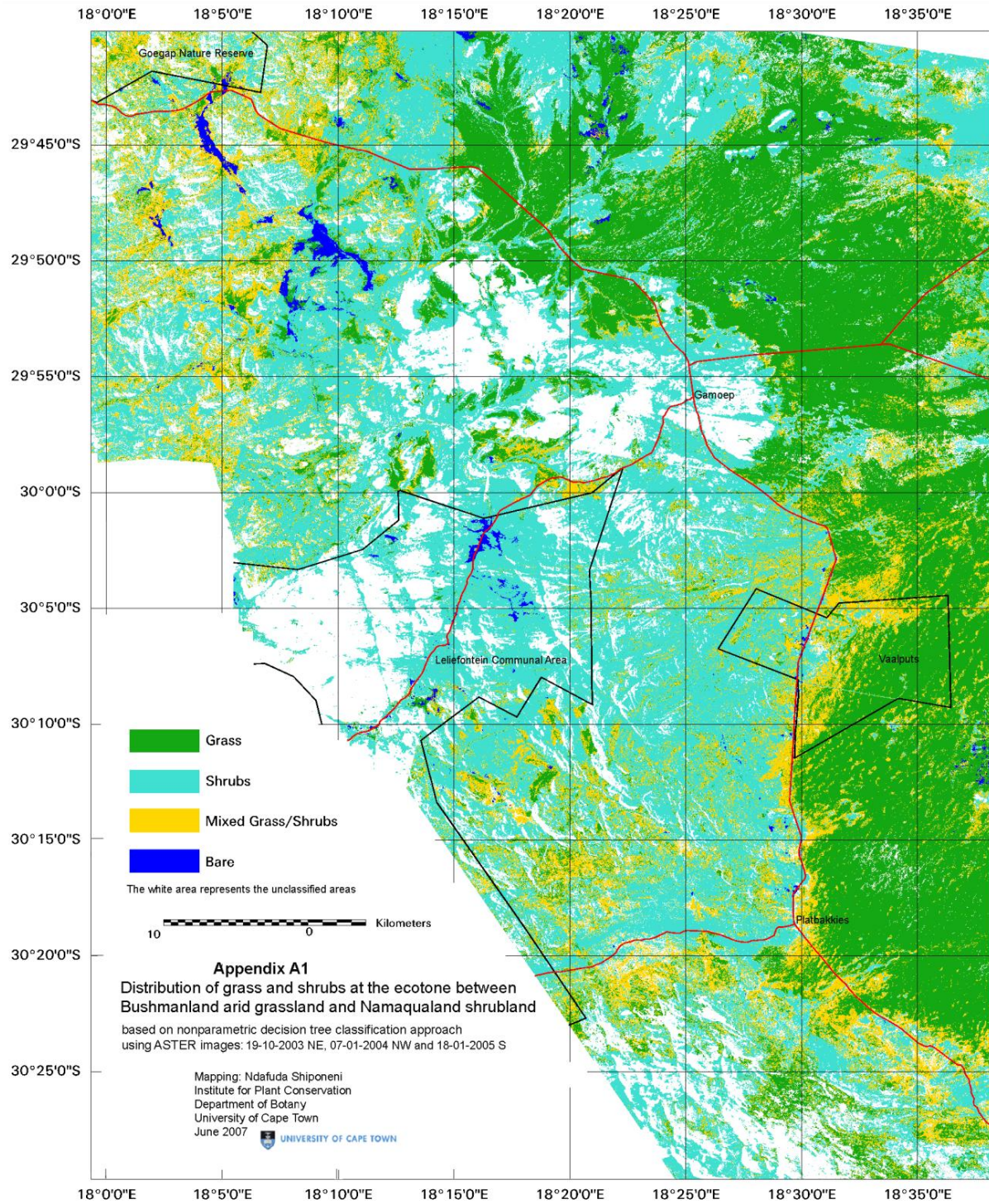
- 2<sup>nd</sup> component best discriminated between grasslands and shrublands - Accuracy > 90%



# Method tested on a Landsat 5 TM image

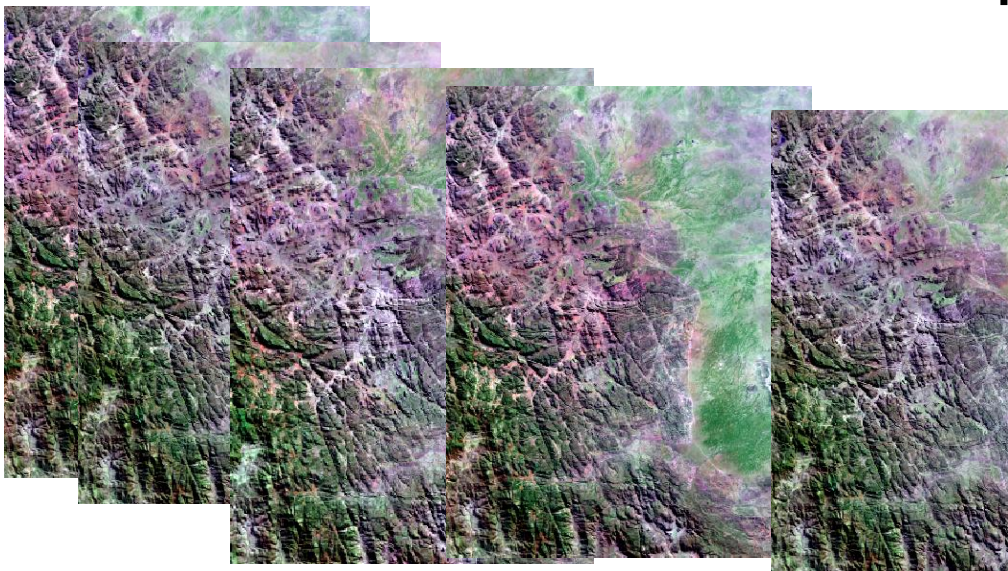


# Grass / shrubs distribution maps



- Strengths
- Challenges

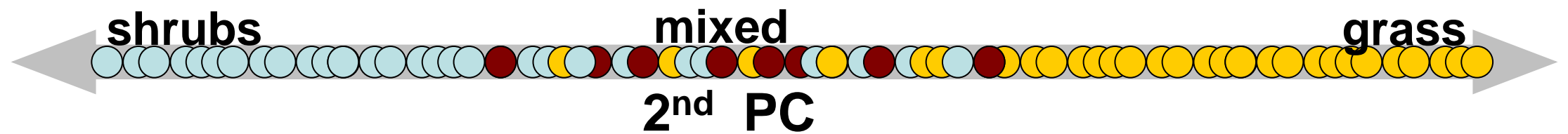
# Transferred to a multi-temporal Landsat TM & ETM series 1986 - 2005



| Date pairs |      |   |          | Time lag |
|------------|------|---|----------|----------|
| Dec        | 1986 | - | Dec 2002 | 16       |
| Dec        | 1986 | - | Nov 2005 | 19       |
| Nov        | 1990 | - | Dec 2002 | 12       |
| Nov        | 1990 | - | Nov 2005 | 15       |
| May        | 1990 | - | May 2000 | 10       |
| May        | 1990 | - | May 2001 | 11       |
| May        | 1990 | - | May 2005 | 15       |

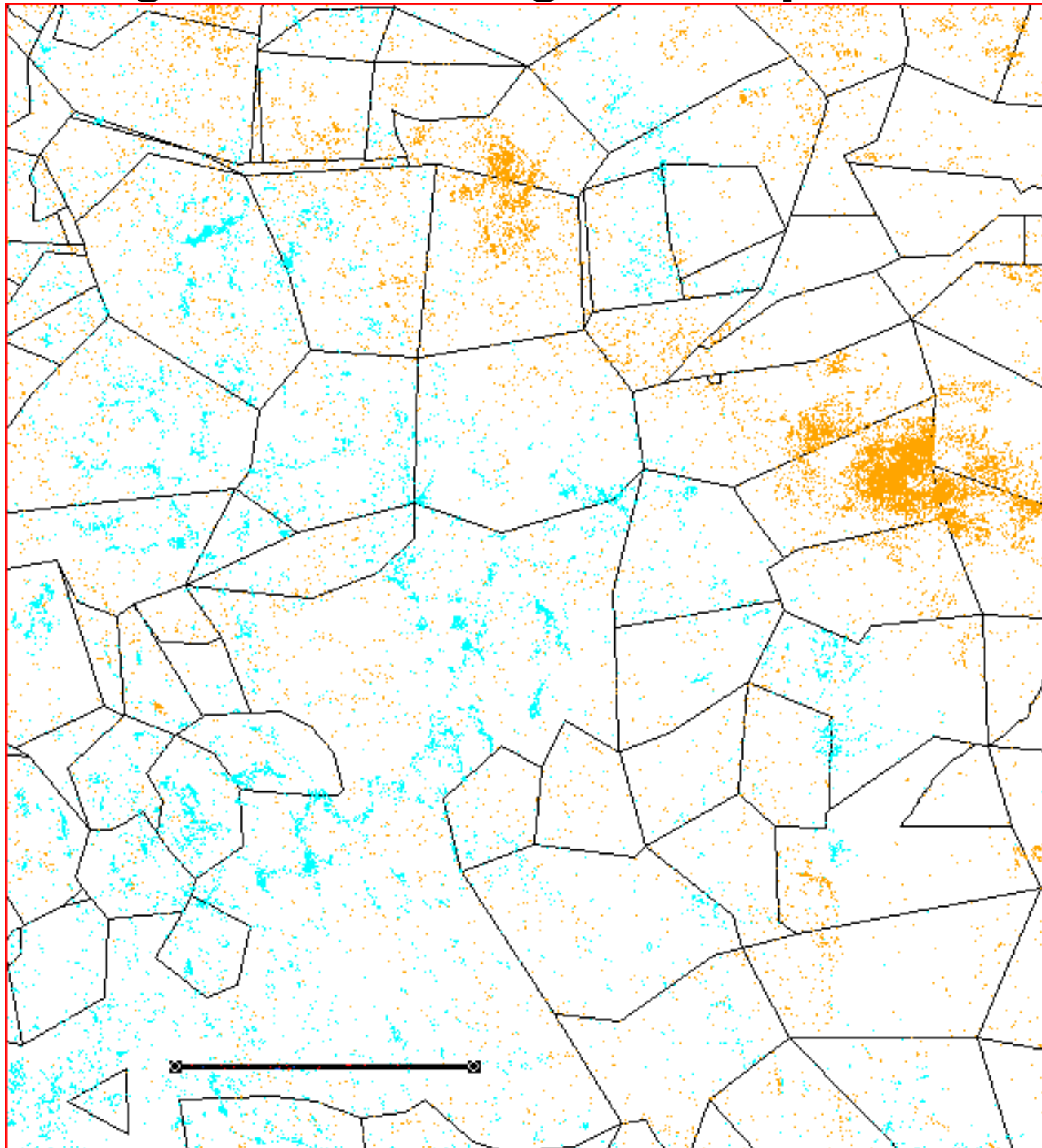
## ■ Differencing based on 2nd PC



- Increase in PC value → change to grassland
- Decrease in PC value → change to shrubland

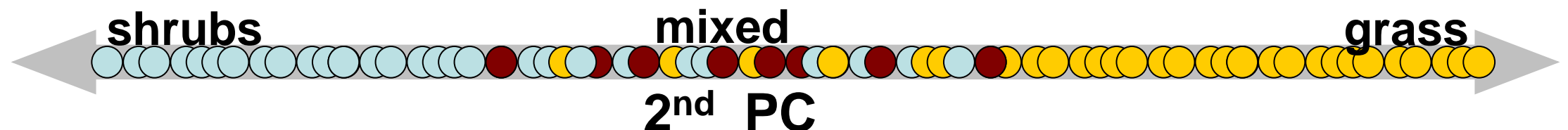




# Image differencing technique: Change maps

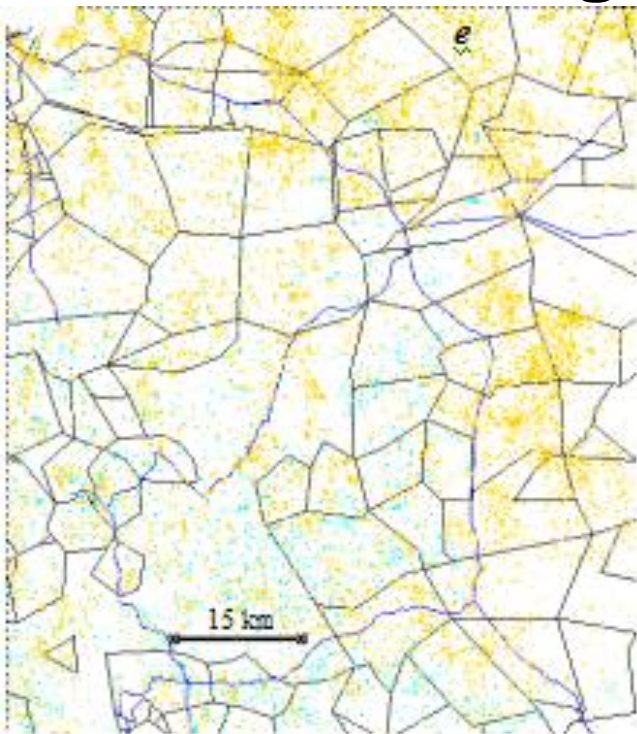


 Change to shrubs       Change to grass

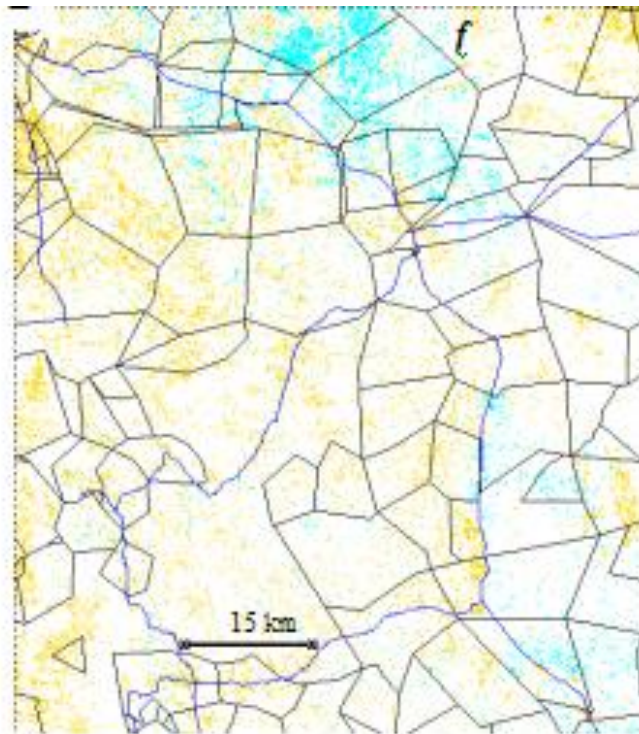


- Selecting appropriate threshold values in the lower and upper tails
- no reference data for areas of known change
- only the end changes were considered,
- conservative approach to minimise the commission error in the interpretation of change classes
- mid-range values are compromised
- Classification-based scheme
  - resulting accuracy

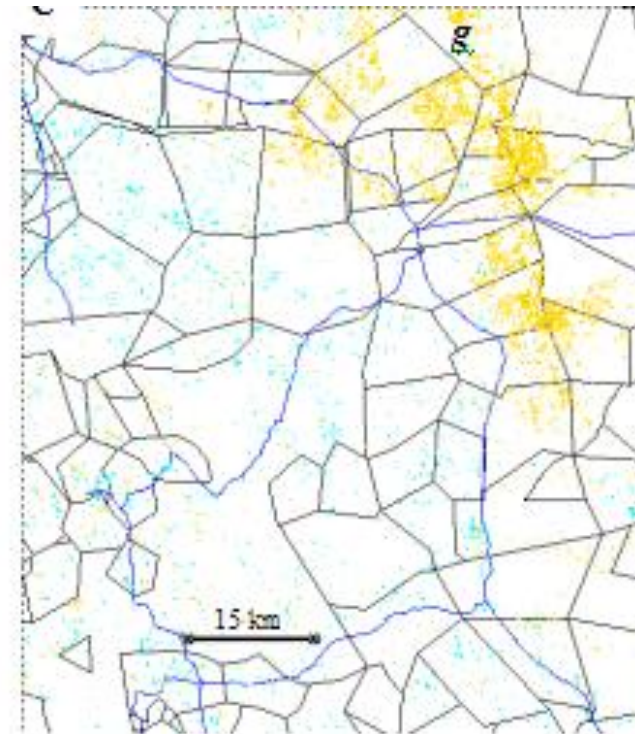
# Overall Change results



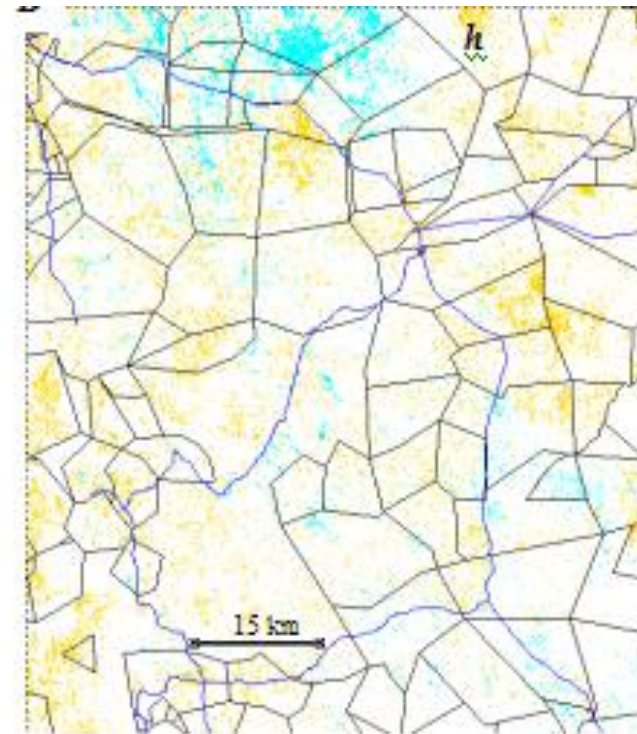
Dec 1986 - Dec 2002



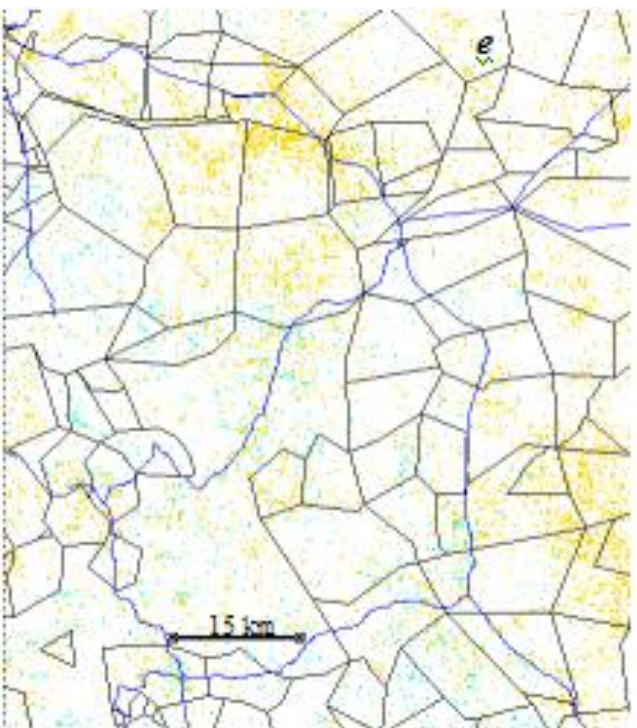
Dec 1986 - Nov 2005



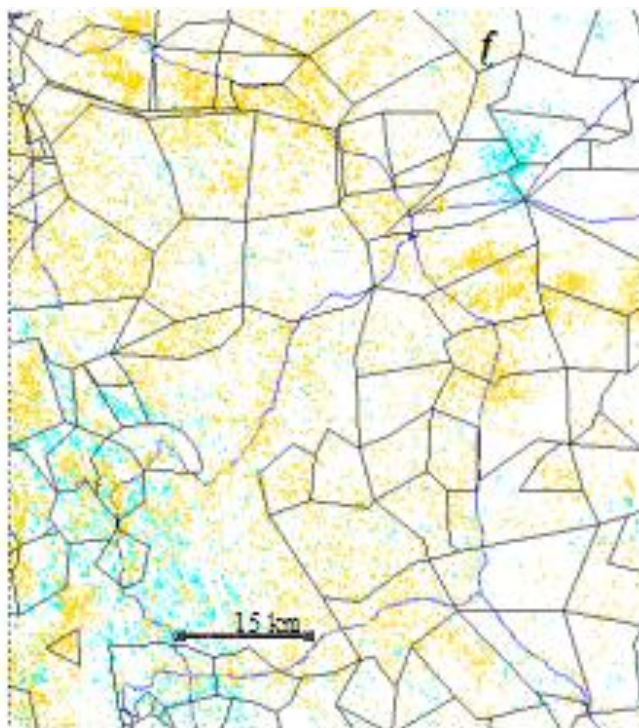
Nov 1990 - Dec 2002



Nov 1990 - Nov 2005



Feb 1993 - Feb 2004



May 1990 - May 2000



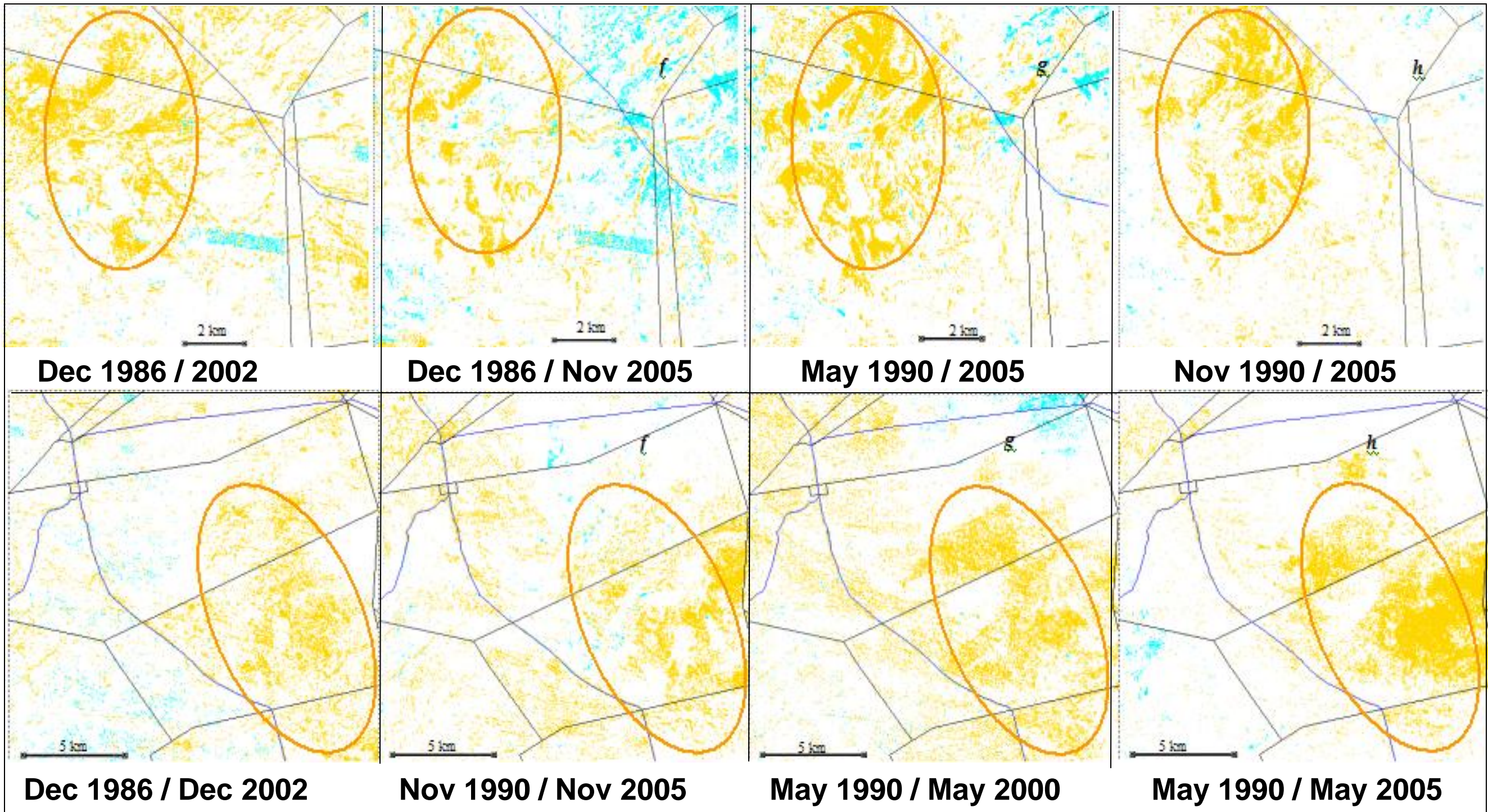
May 1990 - May 2001



May 1990 - May 2005

- **Fluctuations in direction of change over the years**
- **vegetation has been relatively stable**

# Directional changes



 Change to shrubs

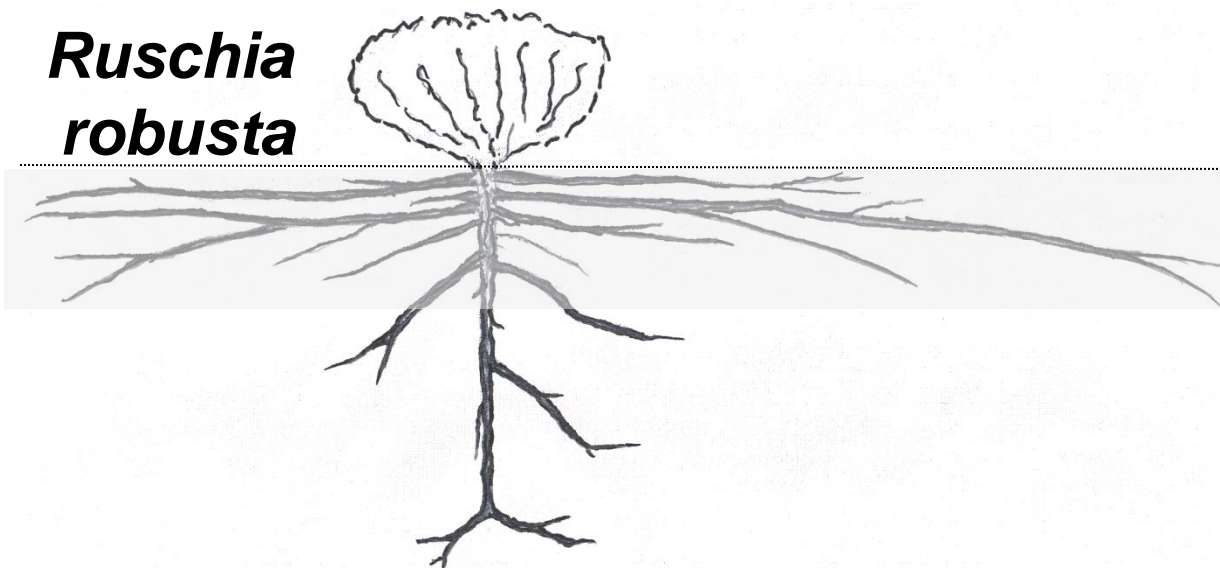
 Change to grass

- were primarily those reflecting an increase in grass vegetation
- significance to ecotone vegetation dynamics

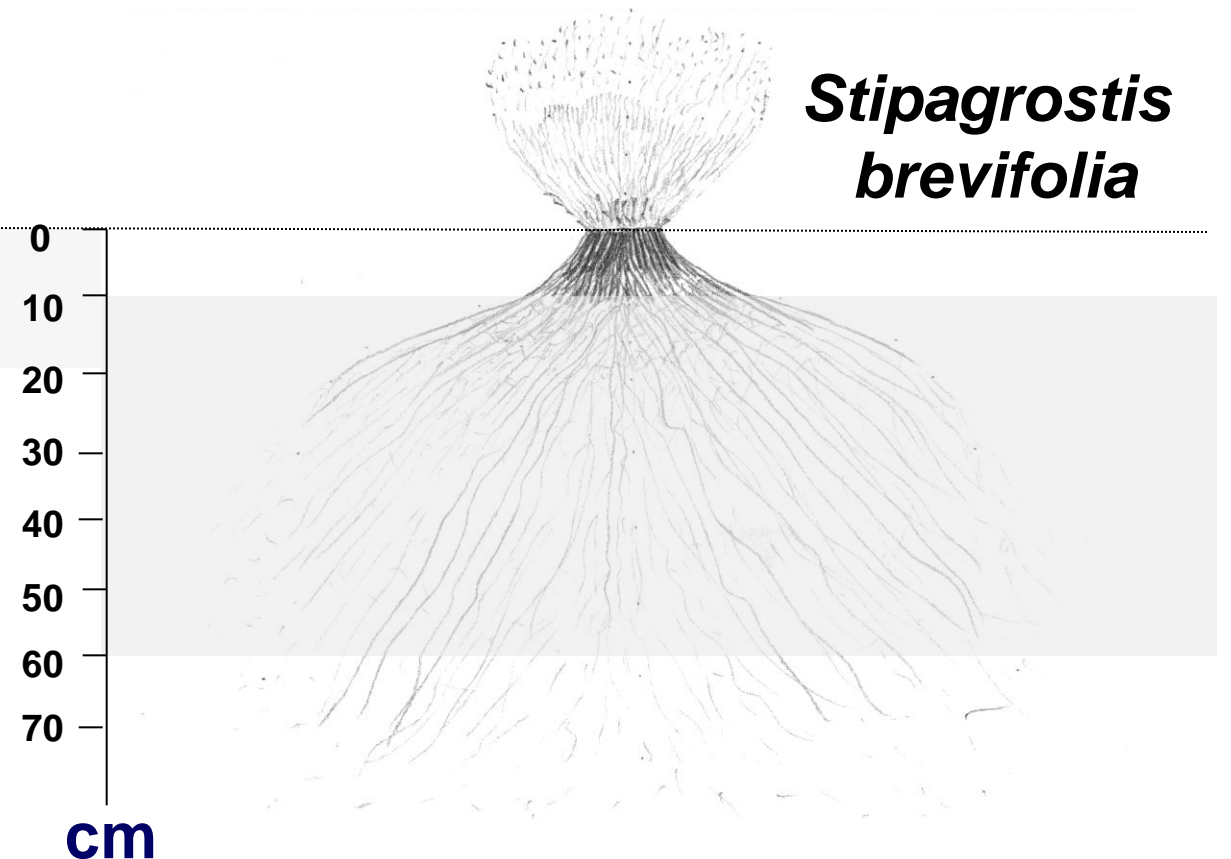
# Discussion

- Interpretation of the observed changes -a complex issue
- changes brought about by perceived shift in rainfall
  - may already be manifest in the vegetation,
  - ascribed to increased grass competition over the shrubs

***Ruschia  
robusta***



***Stipagrostis  
brevifolia***



# Skeletons of shrubs





SAEON



DLR