Mapping Wildfires in Ocala National Forest, Florida using Landsat TM and ETM+ Data

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Wildfire in Florida

- Prevalence of lightning
- Ability to burn in high humidity
- Rapid regrowth
- Frequent cloud cover

Can fire-mapping techniques used in western forests be effectively applied here?

Ocala National Forest

- Highly managed
  - clear cuts, tree planting, Rx burns
- Heavy recreation use
  - camping, fishing, proximity to Orlando
- Longleaf pine (*Pinus palustris*) & wiregrass
  - frequent, low-intensity fire regime
- Sand pine (*Pinus clausa*) scrub
  - stand-replacing fire regime

Ocala National Forest ETM+ Full scene 16/40 10/23/1999

Ocala National Forest, Lake George District

Legend
Elevation in meters
- Legend

\[ \text{Legend}\]
Data

- Landsat TM 12/31/1998 16/40
- Landsat ETM+ 10/23/1999 16/40
- Wildfire locations
  - point of origin, estimated size, date
- GIS data for Ocala National Forest
  - roads, prescribed burns, stand data
Methods

• Convert Landsat-5 DNs to Landsat-7 equivalent (USGS, 2001)
• Convert to reflectance using COST model (Chavez, 1996)
• Calculate KT, NBR, SARVI2, PCA with 1999 image
• Calculate MKT and Multitemporal PCA with 1998 and 1999 images (Huang et al., 2002)

Supervised Classification

• Selected inputs using J-M distance
  1999 inputs:
  – PC1, PC2, PC3, PC6
• Multi-temporal inputs:
  – MKT-G, MKT-W, MKT-4, MKT-∆G
• Classifications run using prior probabilities
  – Fires = 0.01, un-cut forest = 0.73

CART

• See5 rule-based classification
• 1999 rules after winnowing included
  – 1999 fires: ETM1, ETM4, ETM7, KT-B
  – 1998 fires: SARVI2, PC1, KT-4
• Multi-temporal rules after winnowing included
  – 1999 fires: MKT-B, ∆W, MPC1, MPC5
  – 1998 fires: ∆B, MPC3

1999 Supervised Classification (kappa = 0.77)

1998/1999 Supervised Classification (kappa = 0.78)
Conclusions

- Little difference in accuracy between multi-temporal & single-date techniques
- Larger, intense, & more recent fires mapped better
- Small fires not mapped as well
- More qualitative accuracy assessment needed
- Need to test with other years

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References