

Introduction:

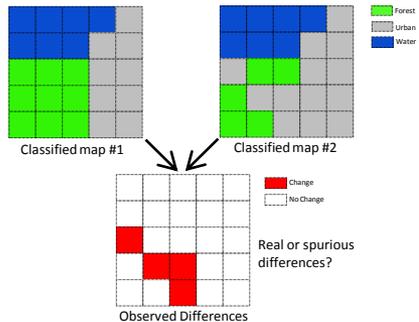
Land-cover monitoring programs today use medium spatial resolution remote sensing data operationally primarily relying on the suite of Landsat data to meet a wide range of goals. Many different land change algorithms and methods have been developed to be used with remotely sensed data. Post-classification analysis, which involves independent land-cover classification for two different time periods, is the most commonly applied method.

Several challenges arise with the use of post-classification including time and cost demands and difficulties in separating real change from spurious differences. Due to differences in image registration and image classification post-classification will only be as accurate as the product of the independently classified images (e.g. $0.85 \times 0.85 = 0.70$).

The methodology presented here seeks avoid the independent classification by pre- and post-dating an existing land-cover map using Landsat and ASTER imagery and a Kauth Thomas Change Index. Areas of true land-cover transition are integrated into an existing land-cover map to represent a different time period. This methodology reduces the introduction of new errors common in post-classification.



Two examples of land-cover conversion in Massachusetts; logging and residential development.

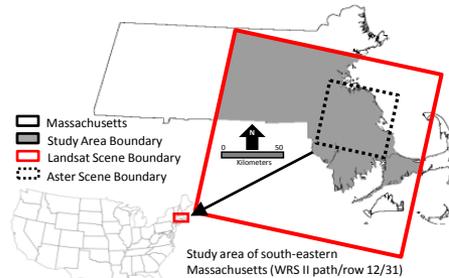


Post-classification example with two classified maps and a difference image. It is difficult to determine if the change image shows real or spurious differences

References:

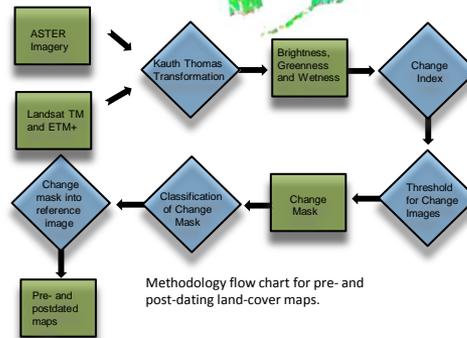
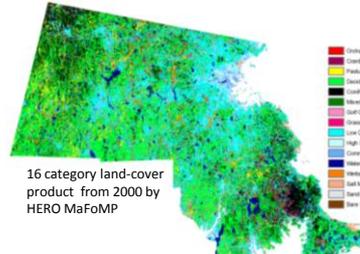
- Collins, J.B., and C.E. Woodcock, 1996. An assessment of several linear change detection techniques for mapping forest mortality using Multitemporal Landsat TM data. *Remote Sensing of Environment*, 56(1): 66-67.
- Huang, C., B. Wylie, L. Yang, C. Homer, and G. Zylstra (2000). Derivation of a tasseled cap transformation based on Landsat 7 at-satellite reflectance. *USGS EROS Data Center*

Study Area:



Data and Methods:

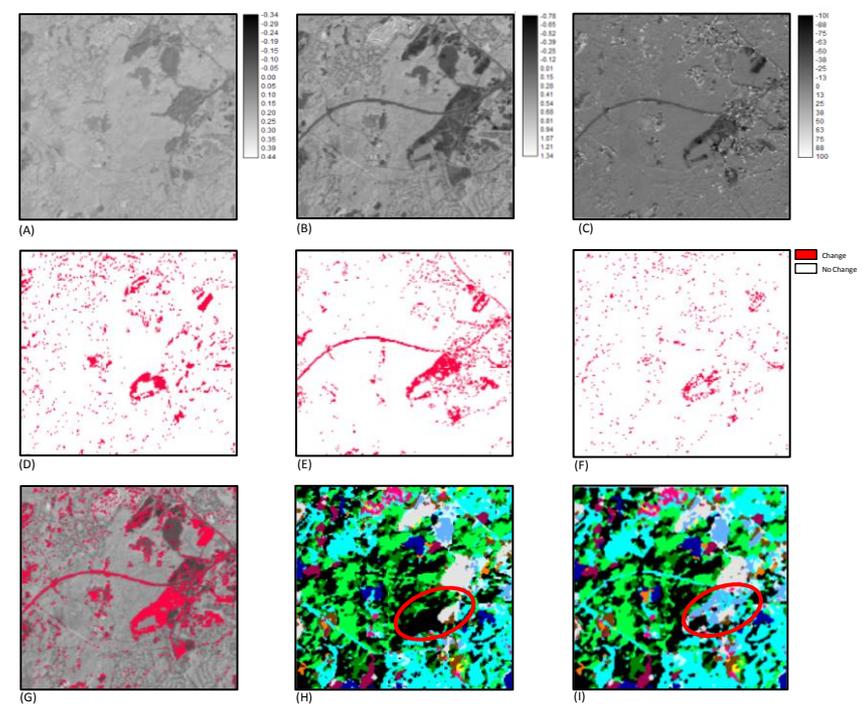
Landsat-5 TM acquired on September 16, 1987, Landsat-7 ETM+ acquired on September, 27 2000 and ASTER images acquired August 2007



ASTER Bands	Kauth Thomas Coefficients for ASTER		
	Brightness	Greenness	Wetness
1	0.3972	-0.3544	0.2141
2	0.3904	-0.4556	0.0926
3	0.6966	0.6966	0.0656
4	0.2286	-0.0242	-0.7629
5	0.1596	-0.2630	-0.5388

ASTER Kauth Thomas coefficients derived from Huang et al., (2000)

Results:



This section presents results for post-dating the 2000 land-cover map to 2007 land-cover conditions.

- The first row details the Kauth Thomas transformation and change index.
- The second row details change index thresholding.
- The third row details the classification of change areas and the post-dated 2007 product.

Conclusion and future work:

This methodology provides a cost-effective and more time efficient approach to creating a series of land-cover maps for change analysis compared to conventional approaches. This method involves the identification of change with a Kauth Thomas change index and classification of change areas with a Classification Tree Algorithm (CTA). Between 1987 and 2000 ~8% of the study area was classified as change and ~9 between 2000 and 2007. Overall accuracies for change classifications were 84% for 1987 and 83% for 2007. Future work will complete map post-dating with ASTER for the rest of the study area.

Acknowledgements:

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