BACKGROUND

• Hurricane Katrina was one of the most powerful and deadliest storms ever to make landfall in the United States.
• It was also the costliest in U.S. history, causing estimated damages in excess of $108 billion.1
• Survivors spent 700+ days living in tents and mobile homes.
• Widespread destruction to property and over $300 billion affected.

The immediate post-storm change product shows evident regional impacts to forests (Figure 3) with the greatest negative NDVI changes in coastal and bottomland hardwood forests. Seventy percent changes were noted in storm surge impacted forests. As expected, the areas closest to the coast tended to show more severe NDVI changes than those further from the shoreline. NDVI changes occurred in inland forests where sustained winds were responsible for damage to the canopies of trees as well as low ground clearance and demonstration; these effects are noticeable across the entire Mississippi Inventory District.1

Subsequent annual evaluations through 2008 show a gradual recovery in terms of NDVI values. Although the full extent of forest damage and recovery may only be partially measured by NDVI, it provides a useful tool for measuring forest damage and recovery and estimating the impact of storm events on forest productivity.4

MOSIS time series data products are seen as a low cost alternative to traditional high resolution optical sensors that can provide a high level of detail about forest disturbance.5

Identification of heavily impacted forest areas can precipitate more directed and efficient forest sampling and forest management efforts.6

MOSIS offers a source of high temporal resolution data for monitoring vegetation changes at regional scale.7

Phenological data trending provides rapid identification of dissimilarity between successive time steps in this case analysis.

REFERENCES

3. W. S. F. S. S. D. Anderson, Radiance Technologies, Inc., “Window” defined by the dates August 29 to September 13 composite window data were used to estimate percent NDVI change.
4. MODIS NDVI based normal difference vegetation index (NDVI) 16-day temporal composite products were used to quantify forest disturbance from Hurricane Katrina. These products were originally computed for the August 29 to September 13 composite window.
5. MODIS NDVI based normal difference vegetation index (NDVI) 16-day temporal composite products were used to quantify forest disturbance from Hurricane Katrina. These products were originally computed for the August 29 to September 13 composite window.
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7. MODIS NDVI based normal difference vegetation index (NDVI) 16-day temporal composite products were used to quantify forest disturbance from Hurricane Katrina. These products were originally computed for the August 29 to September 13 composite window.

METHODOLOGY

• MODIS NDVI based normal difference vegetation index (NDVI) 16-day temporal composite products were used to quantify forest disturbance from Hurricane Katrina. These products were originally computed for the August 29 to September 13 composite window.
• NDVI mean compositing provides the benefit of eliminating cloud cover found in daily images as well as mitigating seasonal vegetation patterns.
• Focused on annual comparisons with the specific 16-day “Window” defined by the dates August 29 to September 13 hurricane season. For the hurricane event of interest is referenced to Figure 1 (see Table 1).

Six disturbance/damage products were generated by calculating normalized NDVI change from pre-Katrina dates (based on post-Katrina dates, each time comparing the same annual Window.

• Pre-Katrina MODIS NDVI baseline (refer to Table 1).
• MODIS NDVI based normal difference vegetation index (NDVI) 16-day temporal composite products were used to quantify forest disturbance from Hurricane Katrina. These products were originally computed for the August 29 to September 13 composite window.

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CONCLUSIONS

Evaluation efforts support the technique of using MODIS-based NDVI percent change products to quantify the effect of Hurricane Katrina on coastal forests. Furthermore, this technique is extend to evaluation of other natural events to forest damage such as wildfires. While the spatial resolution of MODIS may be too coarse for such applications, the reported approach can be extended to more spatially directed timber inventories with ground sampling. Since ground sampling inventory activities can be costly, this MODIS-based approach can significantly reduce costs by reducing man power and labor.

Figure 2: MODIS NDVI Change Validation

Figure 3: Side-by-side comparison of Window 12/30/2005 NDVI percent change values. Each symbol is a comparison to the percent baseline. This figure uses the same legend as Figure 2.

Figure 4: Measured vs. MODIS NDVI percent change values for Hurricane Katrina impact area.

Figure 5: Composition of MODIS' Hurricane Katrina inventory District by age and forest type. These products were originally computed for the August 29 to September 13 composite window.

Figure 6: Scatter plot comparing MODIS with Landsat data.