

## **Evaluation of Ikonos Satellite Imagery for Detecting and Mapping Ice-Storm Damage to Oak Forests in Eastern Kentucky**

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Ice storms are a recurring type of landscape-scale disturbance in the eastern US that result in varying levels of damage to hardwood forests. Commercially available, high-resolution Ikonos imagery offers the possibility of semi-automated mapping of ice storm damage as an alternative to manually interpreted aerial photography. Change-detection methodology (using pre and post scenes of disturbance) utilizing moderate-resolution (30-meter) Landsat imagery has been moderately successfully for this purpose. We evaluated (1-meter) Ikonos imagery for mapping the extent and severity of an ice storm that occurred in February 2003 in the Morehead District of the Daniel Boone National Forest. Within a 100 km<sup>2</sup> study area, four levels of canopy damage were determined from inventory of 120 plots, which were established to provide image "signatures" of disturbance severity. Two methods were used to detect and map crown damage on the Ikonos imagery: (1) change detection by comparison with readily available digital photo orthoquads made before the ice storm and (2) multiple logistic regression analysis of post-disturbance damaged and undamaged sample field plots for development of a prediction model for automated mapping. Data analysis is incomplete but early findings suggest: (1) change-detection analysis indicates significant differences between image pixels classified as damaged compared to non-damaged and (2) a simple prediction model and be applied to the Ikonos imagery to develop a map of the extent of ice damage. Preliminary results of this exploratory study suggest that resource managers can use moderate cost, Ikonos imagery to determine in a semi-automated manner the extent and severity of canopy damage resulting from ice storms in oak dominated forests of the eastern U.S.

*Keywords:* Change detection, digital orthoquads, spectral bands

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