

Remote Sensing Classification of Hurricane Storm Surge Structural Damage

Corresponding Author:

Carol J. Friedland
LSU Hurricane Center
Louisiana State University
Suite 3221 CEBA Building
Baton Rouge, LA 70803
Ph: (225) 773-5701
Fax: (225) 578-7646
chill21@lsu.edu
ASCE No. 459656

Beverley J. Adams
ImageCat, Inc. European Operations

Marc L. Levitan
LSU Hurricane Center
Louisiana State University
ASCE No. 248062

Hurricane Katrina demonstrated the vulnerability of coastal structures to the forces of storm surge along the US Gulf Coast. Katrina's surge damaged engineered and non-engineered structures alike, highlighting the need for engineers to better understand and design for the effects of hurricane storm surge. Part of this process of incorporating storm surge considerations in design involves quantification of the magnitude and severity of structural damage from past events.

Current structural damage assessment techniques require systematic field collection processes where each building is evaluated and classified. The abundance of publicly available satellite and aerial imagery in the aftermath of Hurricane Katrina has provided a unique opportunity to develop methodologies for the use of optical remote sensing in detecting and classifying hurricane storm surge damage. Although remote sensing procedures have been developed for earthquake and windstorm damage classification, each hazard presents unique damage mechanisms, resulting in differing indicators of structural damage or failure. These remote sensing damage indicators must be calibrated against field observations to correlate aerial and ground-based damage signatures.

The present research demonstrates methodologies that have been developed to detect and categorize structural damage caused by hurricane storm surge using remote sensing imagery. Areas of coastal Mississippi impacted by Hurricane Katrina's storm surge are used in the creation and validation of these methods. The VIEWS™ system was deployed to collect and record damage within two weeks after the landfall of Hurricane Katrina and was used to classify ground-based damage states for study area buildings based upon a developed five-category damage scale. Known damage states for a portion of the study area were used to calibrate the remote sensing damage classification scale, with the remainder of structures used to validate the developed procedures.