



Satellite-based post-storm disaster monitoring with high-resolution SAR data

Demo Day Handout
October 19, 2021



ACCELERATOR

Jared Green / Mike Leyland / Scott Hixson / Travis Herman / Dennis Schmargon

EPRI / FortisBC / Ameren / LiveEO

jgreen@epri.com

michael.leyland@fortisbc.com

shixson@ameren.com

therman@ameren.com

dennis@live-eo.com



www.epri.com

© 2021 Electric Power Research Institute, Inc. All rights reserved.

incubateenergy labs

About the Need/Opportunity



The project with **Live-EO** provides an opportunity to demo the use of imagery from a growing number of satellites for quick insights into the extent of the damage from a tornado or windstorm at **Ameren** and **FortisBC**.

A Picture is Worth a Thousand Words (Data points)!

About the Technology

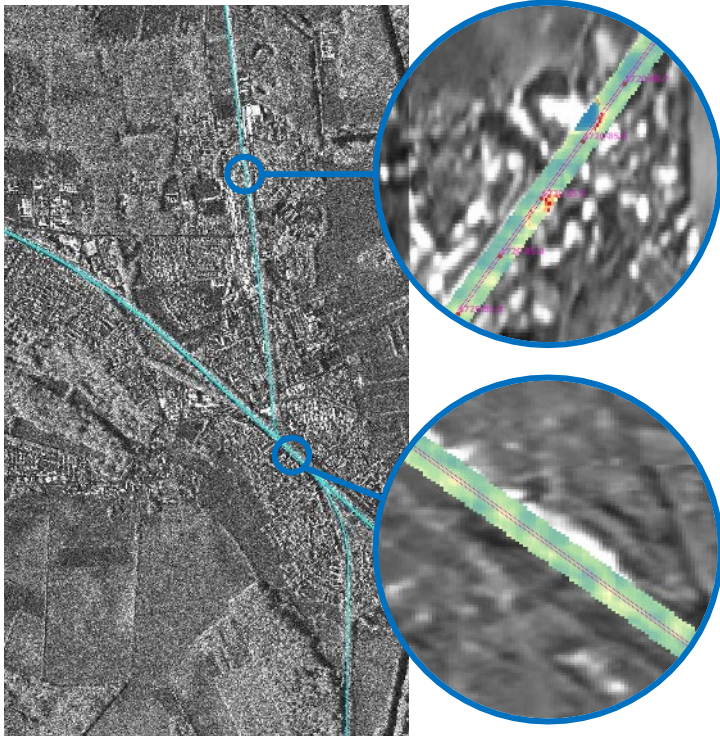


- LiveEO identifies storm damages to the grid in near real time using AI-based change detection
- High-resolution synthetic aperture radar (SAR) data in 3 m and 0.5 m resolutions is used for this purpose, because it is not affected by cloud cover
- Individual detections and heatmaps of damage extent are provided shortly after the event

Project Scope

Questions:

1. How long does it take to task and capture synthetic-aperture radar (SAR) satellite imagery?
2. What is the time period required to acquire and analyze the imagery?
3. How accurate are the analytics used to detect changes in the ROW, such as downed trees and damaged utility assets?



When notified about a storm, LiveEO acquires satellite imagery



LiveEO performs rapid AI-based change detection and delivers results



Utility acquires ground truth data in the analyzed location



LiveEO performs comparison and provides accuracy report

Proof of speed

Proof of accuracy

After successful project:

- Automation of storm notification
- Large-scale coverage
- Integrating results in damage cleanup processes

Learnings to Date

Current main challenge: pre-storm image timing

Options for timing of before-storm image capture:

- **Immediately before storm**

Pro: Few issues with different directions / viewing angles

Con: Potential delays in non-automated process

- **Set point in time in advance**

Pro: Only post-storm image needs to be captured in time

Con: Restrictions on post-storm imagery that can be used, higher likelihood of false positive detections

- **In advance with option to acquire additional image before storm**

Pro: Highest reduction of uncertainty

Con: Potentially higher imagery costs

Scope Changes

- Larger number of AOIs and imagery acquisitions for FortisBC

Other challenges

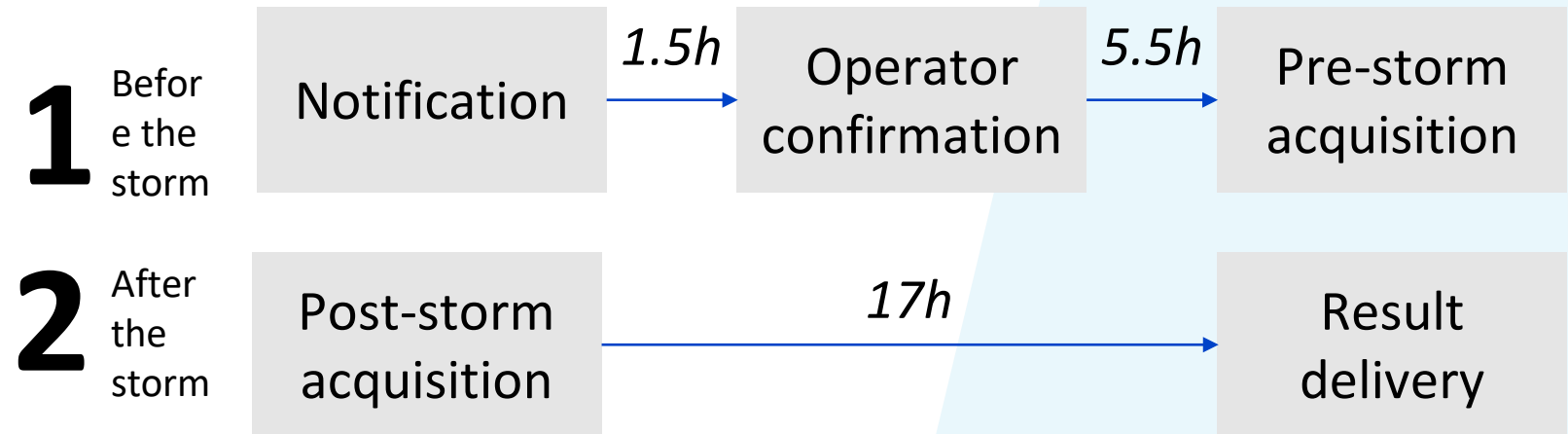
- Missed one storm because of delays in data sharing

Learnings to Date

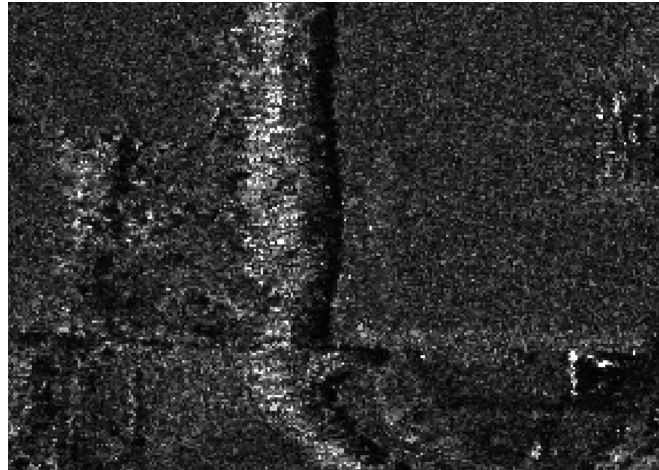
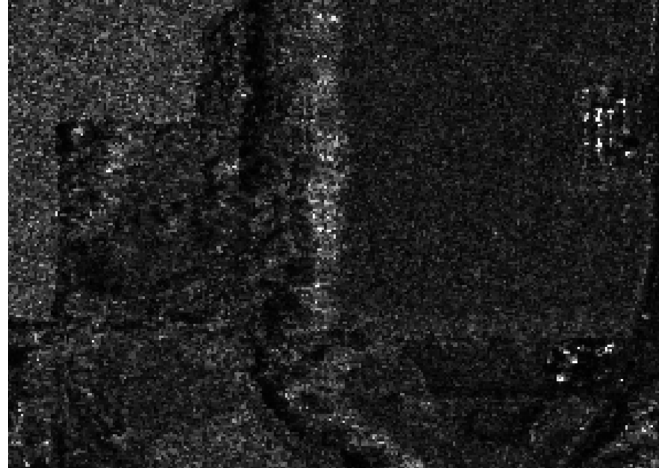
- Ameren notified LiveEO of a storm in the Peoria area in mid-August
- The proof of speed has been successfully performed



Peoria AOI (Ameren)



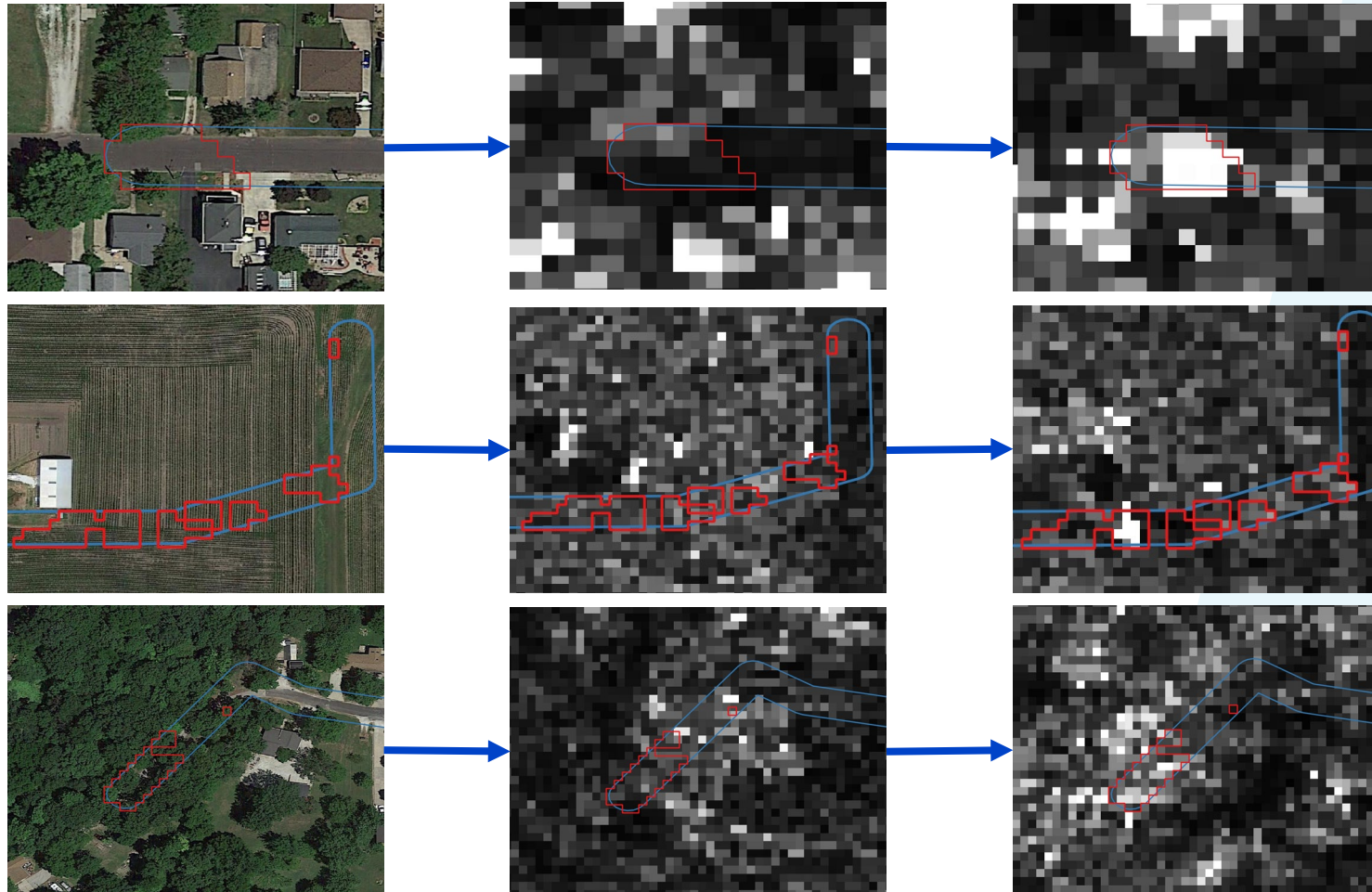
Learnings to Date



- Pre-storm and post-storm images were taken in opposing orbits, resulting in viewing angle and direction differences
- This led to an increase in false positives
- 32% of AOI has been detected as changes

Learnings to Date

Examples for plausible changes:



Adjustments and next steps

- LiveEO will perform an additional analysis for Ameren, in which imagery with matching directions and angles will be used
- Pre-storm imagery for the next analyses has been acquired for both Ameren and FortisBC
- We are currently waiting for suitable storm events to occur
- The project team has agreed to make accuracy the priority for the next analyses if there is a trade off with speed (e.g. where it comes to acquisition times)

Our Team

Ameren Representatives:

Scott Hixson, Grid of the Future and Analytics Solutions Manager

Travis Herman, Contractor Services Supervisor

FortisBC Representative:

Mike Leyland, Manager, Innovative Initiatives

LiveEO Representative:

Dennis Schmargon, Head of Business Development

EPRI Representative:

Jared Green, Sr. Technical Leader

Our Team Meetings

Biweekly, Thursday 10:30 AM EDT

To get added to meeting, contact Jared Green (jgreen@epri.com)