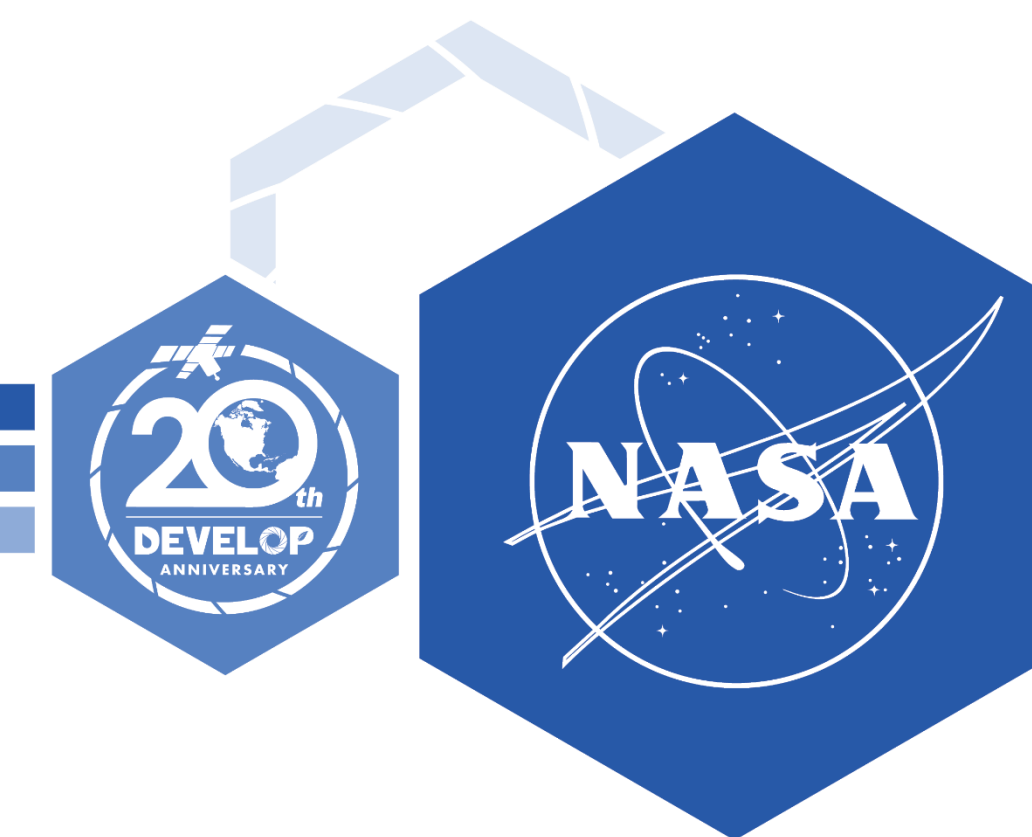# Using NASA Earth Observations to Assess Vegetation Resiliency and Water Quality Concerns to Enhance Green Infrastructure Plans in Light of Extreme Weather Events

Abstract

In response to projected sea level rise and extreme weather events, Miami Beach and other urban areas surrounding Biscayne Bay are developing adaptive strategies to mitigate the effects of changing environmental conditions. City officials are involved with ongoing efforts to reduce storm damage and monitor water quality with the goal of protecting coastal resources. Some important considerations for these adaptive strategies include identifying resilient plant species and gaining a better understanding of water quality patterns. This NASA DEVELOP project employed Earth observations to assess post-Hurricane Irma canopy loss and recovery, in addition to water quality changes of the surrounding bay. These analyses will assist the Miami Beach Public Works Department in evaluating changing conditions across the Biscayne Bay area and provide decision makers with additional predictive insights from deep learning models to enhance restoration plans and undertake proactive countermeasures. The results of the vegetation damage and water quality analyses will aid the ecological management, hurricane preparedness, and land use planning efforts led by the city of Miami Beach to improve coastal resiliency.
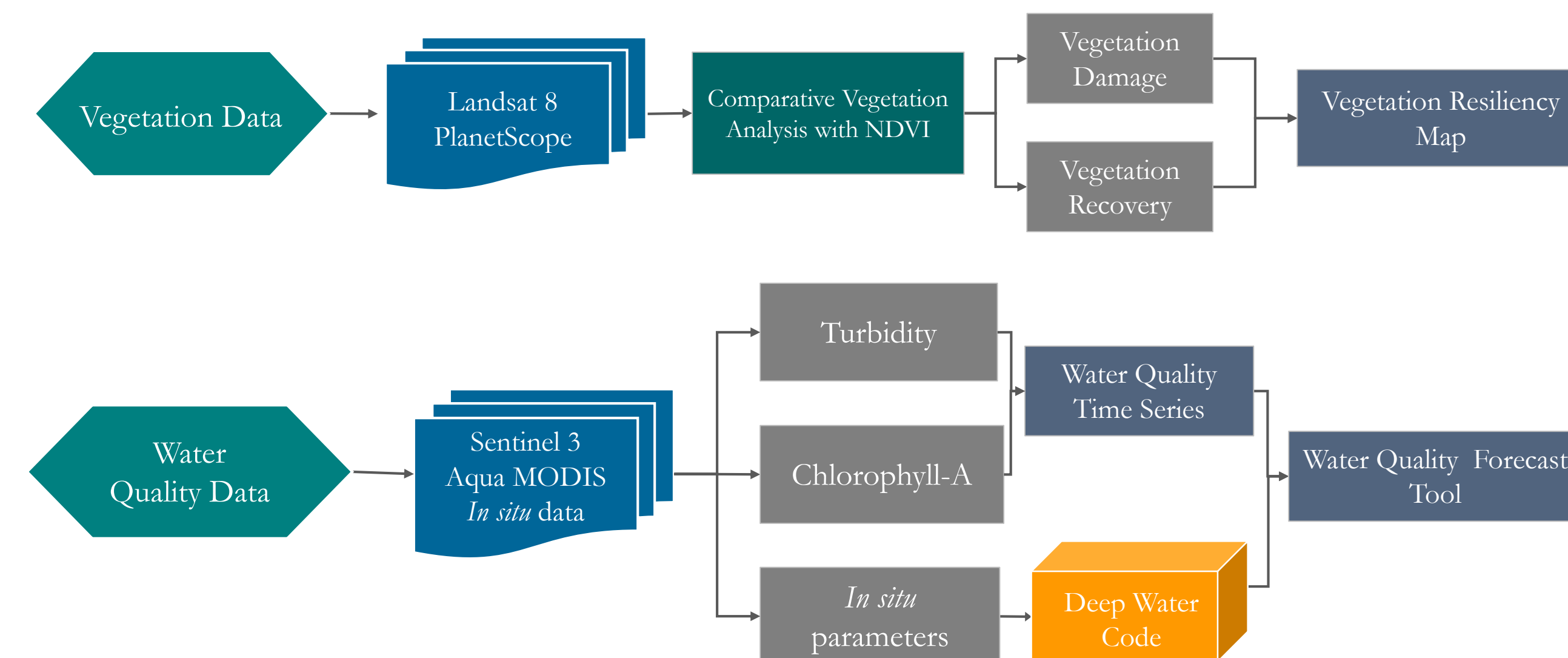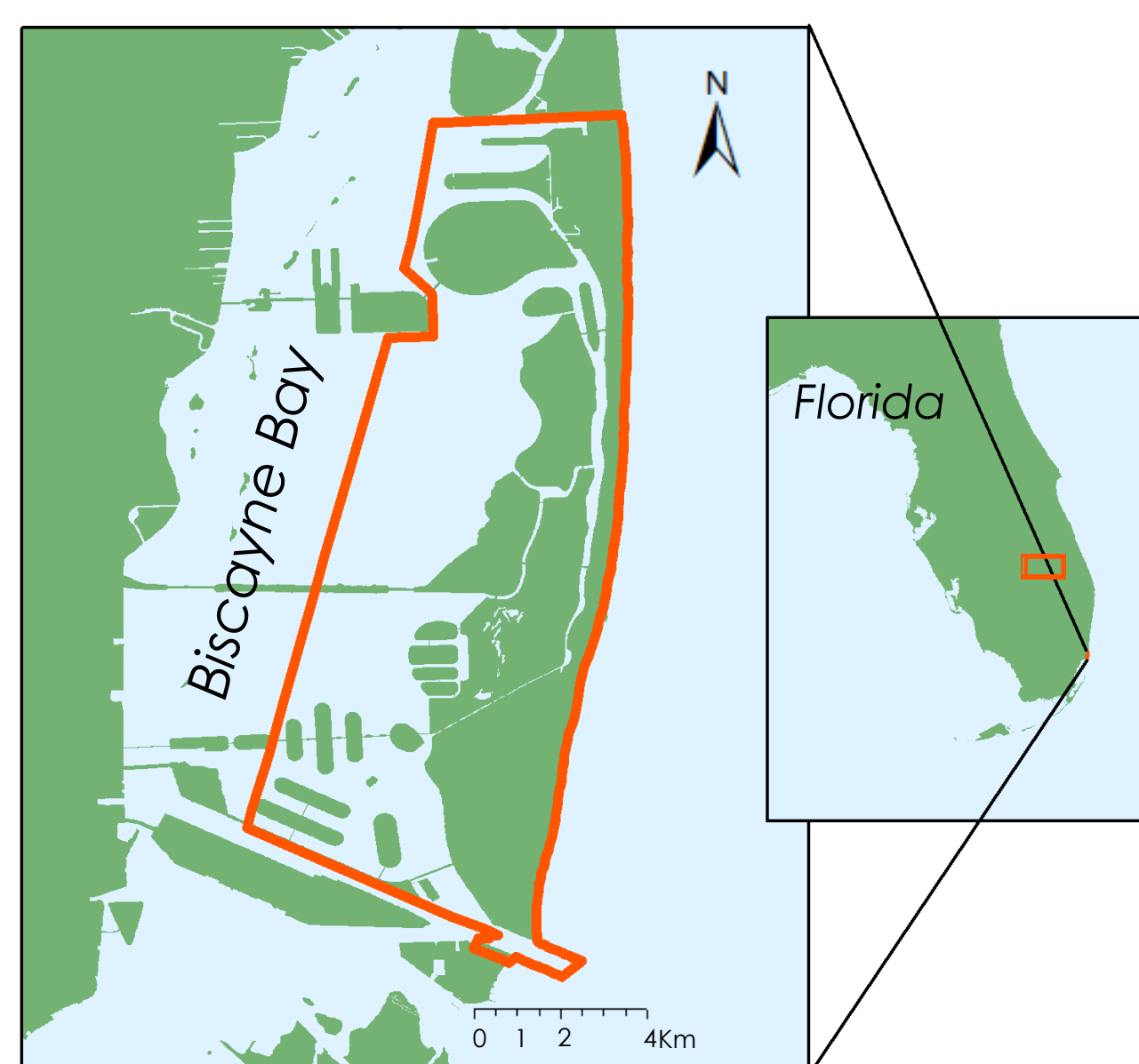
Objectives

▸ **Assess** resiliency of coastal and urban vegetation in response to Hurricane Irma

▸ **Analyze** water quality patterns in the Biscayne Bay area from 1990 to present

▸ **Communicate** the relevance of NASA Earth observing satellites to the city of Miami Beach and how the project's methods can be applied to geographically similar locations

Study Area

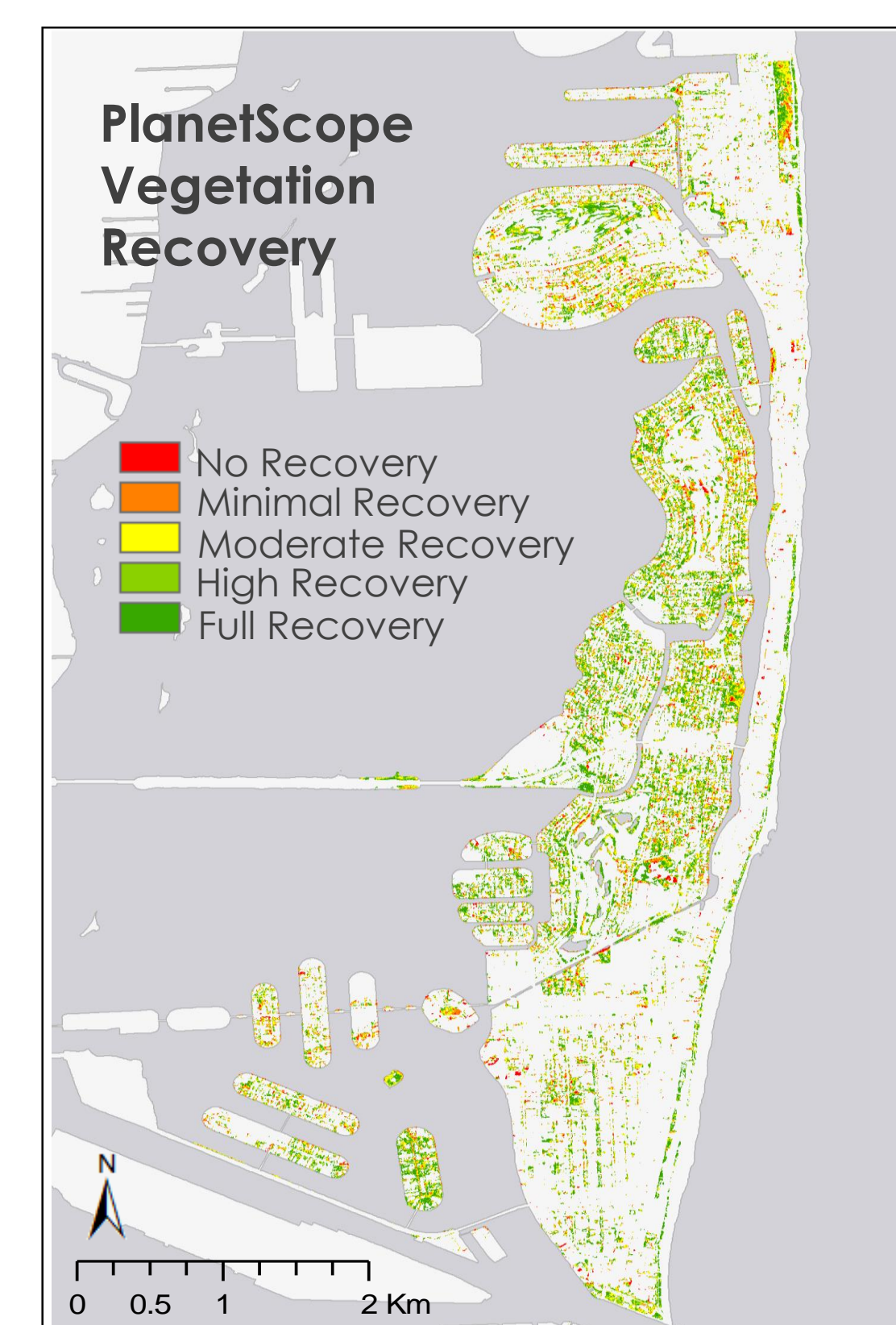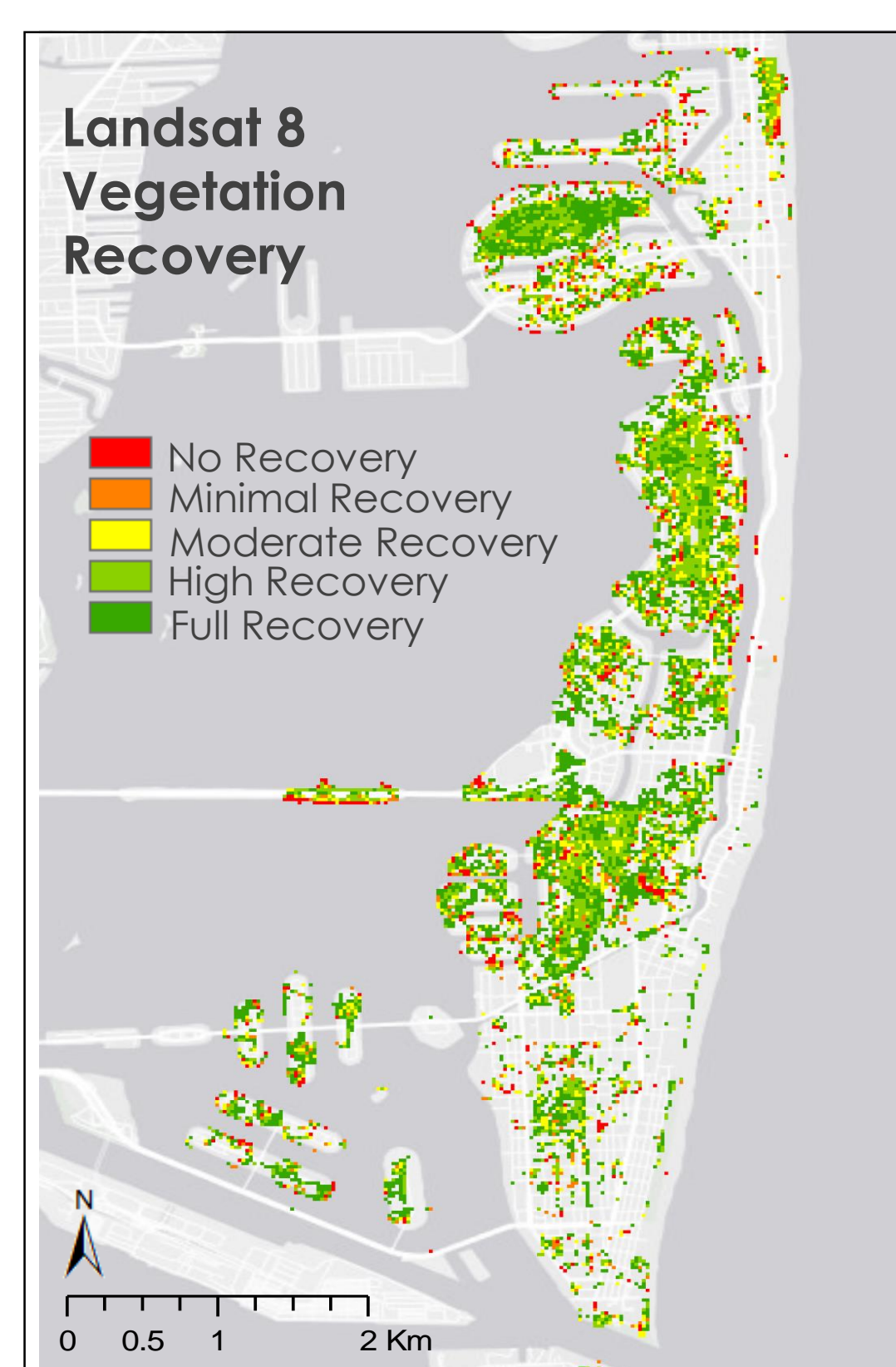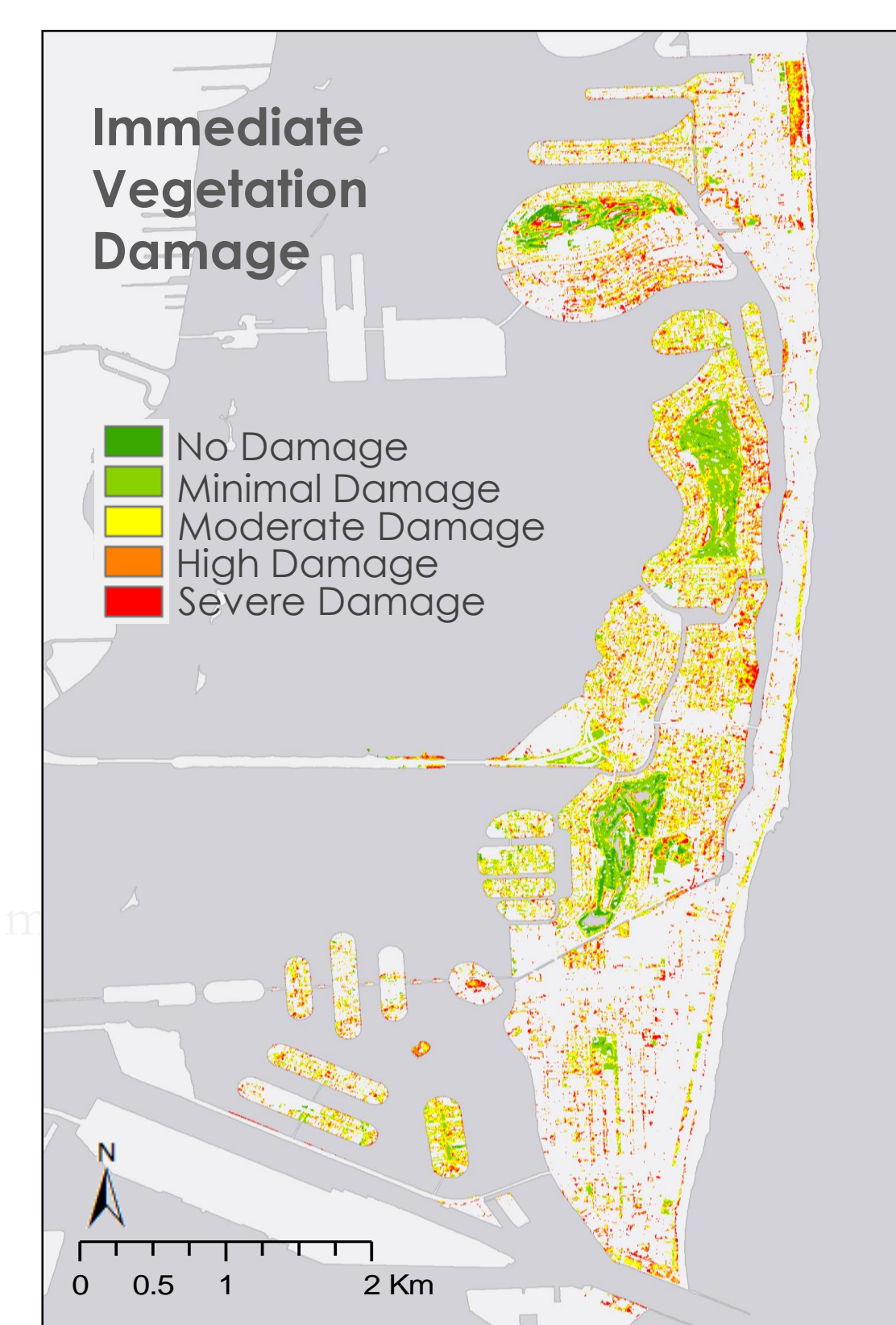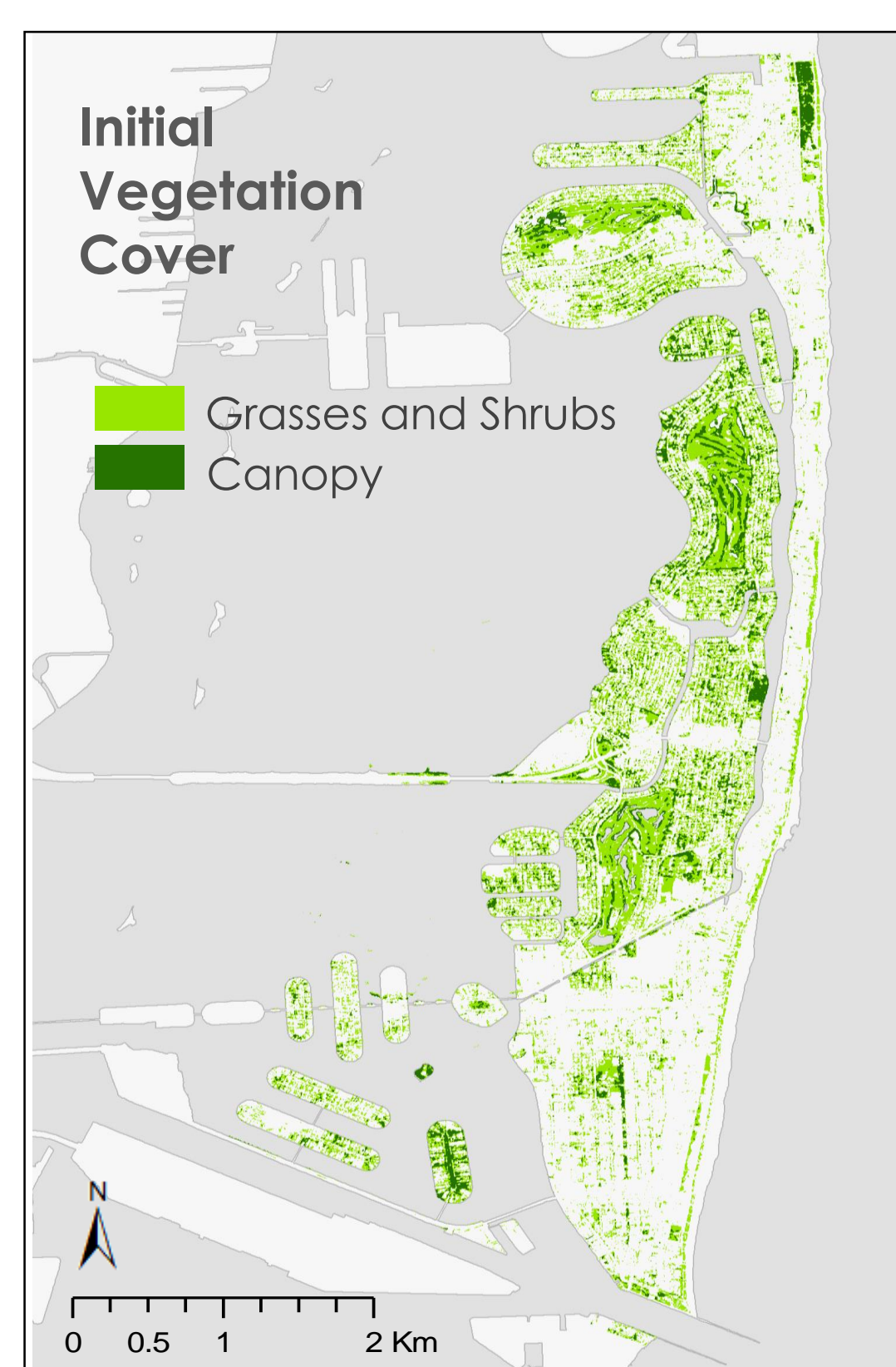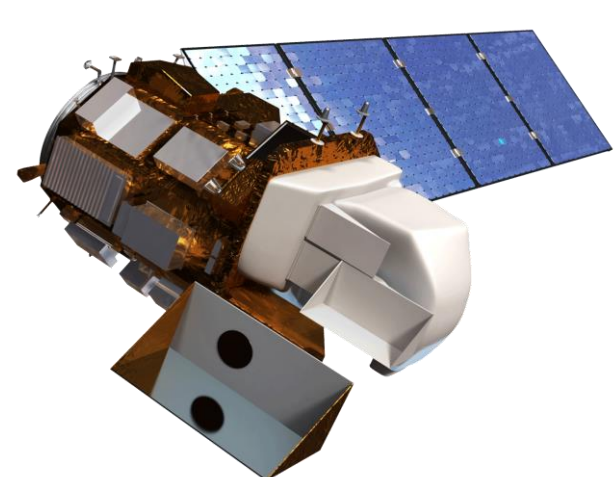
Miami-Dade County
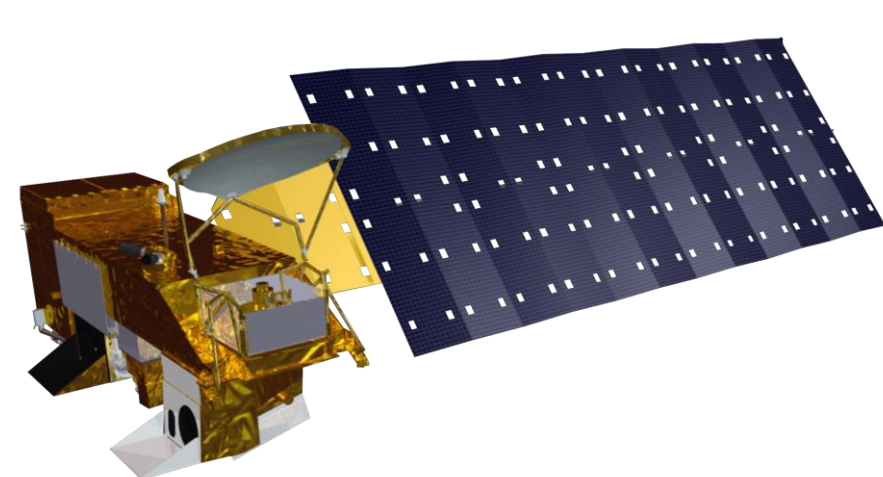Biscayne Bay Area
City of Miami Beach
1990-2017

Earth Observations

Landsat 8 OLI   Aqua MODIS

Conclusions

▸ The PlanetScope analysis indicated that small vegetation such as grasses and shrubs recovered earlier than larger vegetation with canopy cover..

▸ The Landsat 8 analysis identified areas where vegetation recovered the most and least throughout the city of Miami Beach.

▸ *In situ* water quality measurements in the Biscayne Bay area can help validate Aqua MODIS chlorophyll-a products.

Acknowledgements

Methodology

Project Partners

City of Miami Beach, Public Works Department

Results

Initial Vegetation Cover
- Grasses and Shrubs
- Canopy

Immediate Vegetation Damage
- No Damage
- Minimal Damage
- Moderate Damage
- High Damage
- Severe Damage

Landsat 8 Vegetation Recovery
- No Recovery
- Minimal Recovery
- Moderate Recovery
- High Recovery
- Full Recovery

PlanetScope Vegetation Recovery
- No Recovery
- Minimal Recovery
- Moderate Recovery
- High Recovery
- Full Recovery

Team Members

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