D H E C

PROMOTE PROTECT PROSPER

Hazard Vulnerability Assessment (HVA)

SCGS

Governors' South Atlantic Alliance

North Carolina • South Carolina • Georgia • Florida

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South Carolina Department of Health and Environmental Control

Promoting and Protecting the Health of the Public and the Environment *www.scdhec.gov*

What is HVA?

Hazard Vulnerability Assessment Tool

A geospatial tool that allows coastal managers, planners, and researchers to better understand our vulnerabilities to coastal hazards.

- ***Each of the components***
- ***How it works***
- ***Status of South Carolina data***
- ***Publicly available results***
- ***Current users of this tool***

How was it created?

- Created through GSAA.

Governors' South Atlantic Alliance
North Carolina • South Carolina • Georgia • Florida

- GSAA created in 2009 when state (NC, SC, GA, FL) governors signed a regional partnership agreement.
- Federal partners include NOAA, EPA, DOI.
- Funded from a NOAA grant in 2012.
- HVA project had technical and management partners from all 4 states (NC, SC, GA, FL).

What is HVA?

- Open source, stand alone, free geospatial tool.
- Incorporates 4 components in the analysis.
- Produces datasets that rank areas with a vulnerability of 1 -5.
- Does require GIS skills, data downloads, and data creation.
- Produces ESRI ArcGIS compatible products.

Coastal Hazards #1: Storm surge

Hurricane Hugo - Category 4
September 1989

Photo courtesy of Wally Jenkins, SCDNR

McClellanville, SC - Hurricane Hugo - Category 4
September 1989

Photo courtesy of Wally Jenkins, SCDNR

Folly Beach - Hurricane Hugo - Category 4
September 1989

Photo courtesy of Wally Jenkins, SCDNR

Folly Beach, SC
Hurricane Irene
Category 1 - August 2011
Photo courtesy of SCDHEC - OCRM

Folly Beach, SC
Hurricane Irene
Category 1 - August 2011
Photo courtesy of SCDHEC - OCRM

Coastal Hazard #2: Erosion

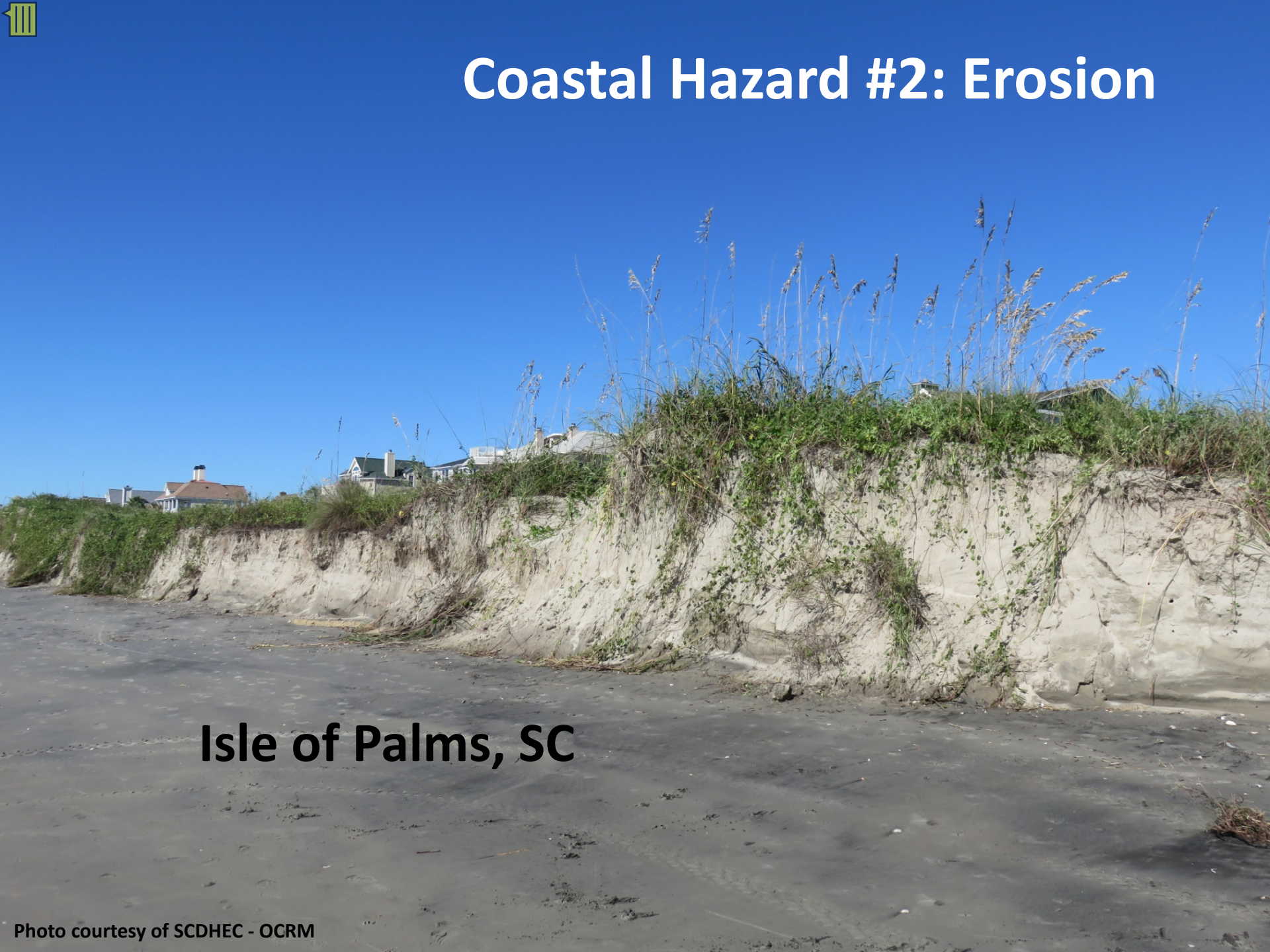

Photo courtesy of SCDHEC - OCRM

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Photo courtesy of SCDHEC - OCRM

Photo courtesy of SCDHEC - OCRM

Myrtle Beach, SC
Photo courtesy of SCDHEC - OCRM

Coastal Hazard #3: Flooding

Photo courtesy of SCDHEC/MyCoast

Photo courtesy of SCDHEC/MyCoast

Photo courtesy of SCDHEC/MyCoast

Coastal Hazard Vulnerability #4: Social and Economic Vulnerability

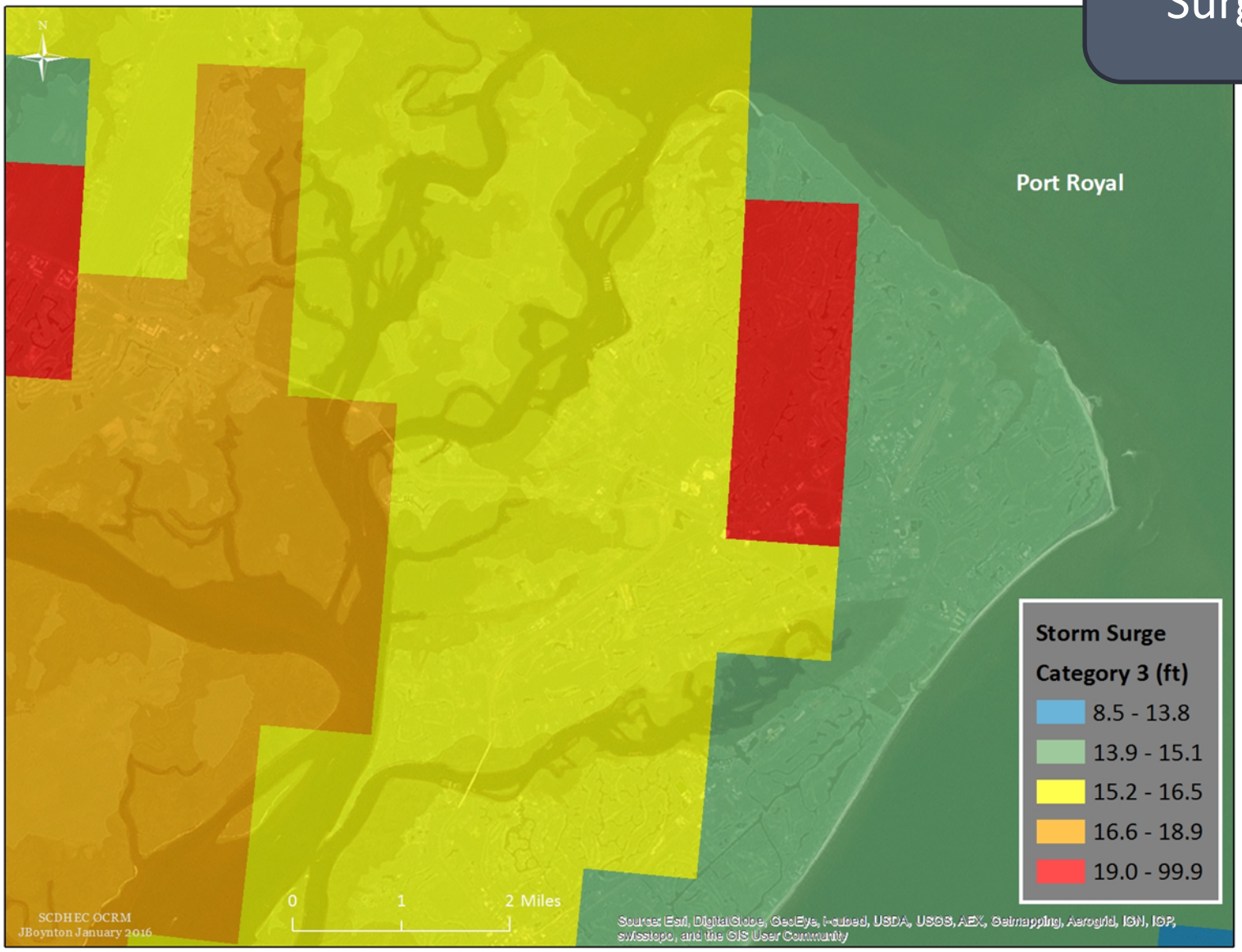
New Orleans – Ninth Ward
Hurricane Katrina ~ Category 3
August 2005

Source Data

- Storm surge
  - Downloadable data: SLOSH from NOAA
- Shoreline Change (erosion/accretion)
  - Must create new data.
- Flooding
  - Downloadable data: FEMA Q3/DFIRM
- Social /economic vulnerability
  - Downloadable data: SoVI® from University of South Carolina, Hazards and Vulnerability Research Institute

Four component datasets

Storm Surge



Four component datasets

Shoreline Change Rate (+/-)

Shoreline Change Rate Calculation

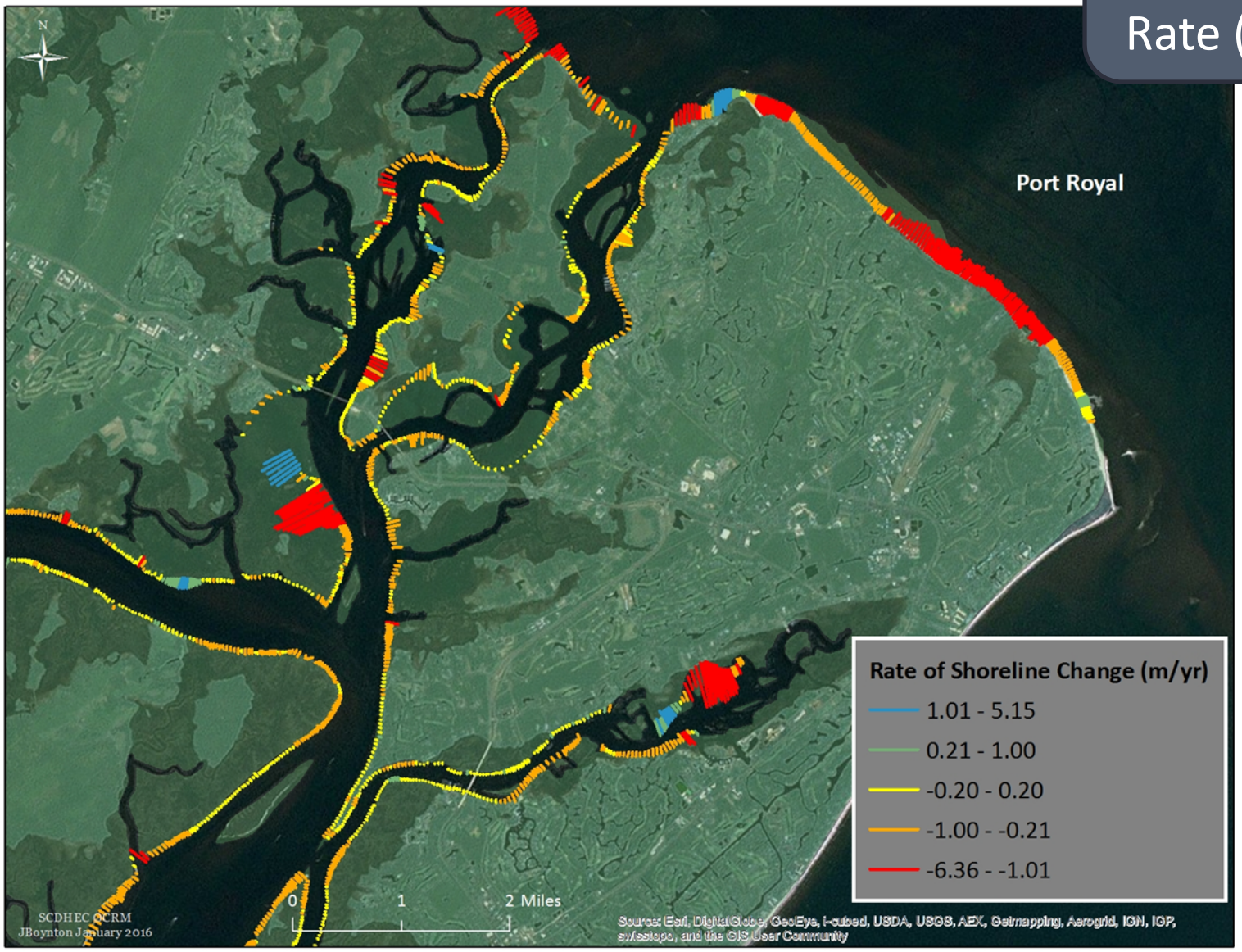
AMBUR

(Analyzing Moving Boundaries Using R)

- Open Source
- Desktop-based
- Handles curving shorelines of estuarine environment

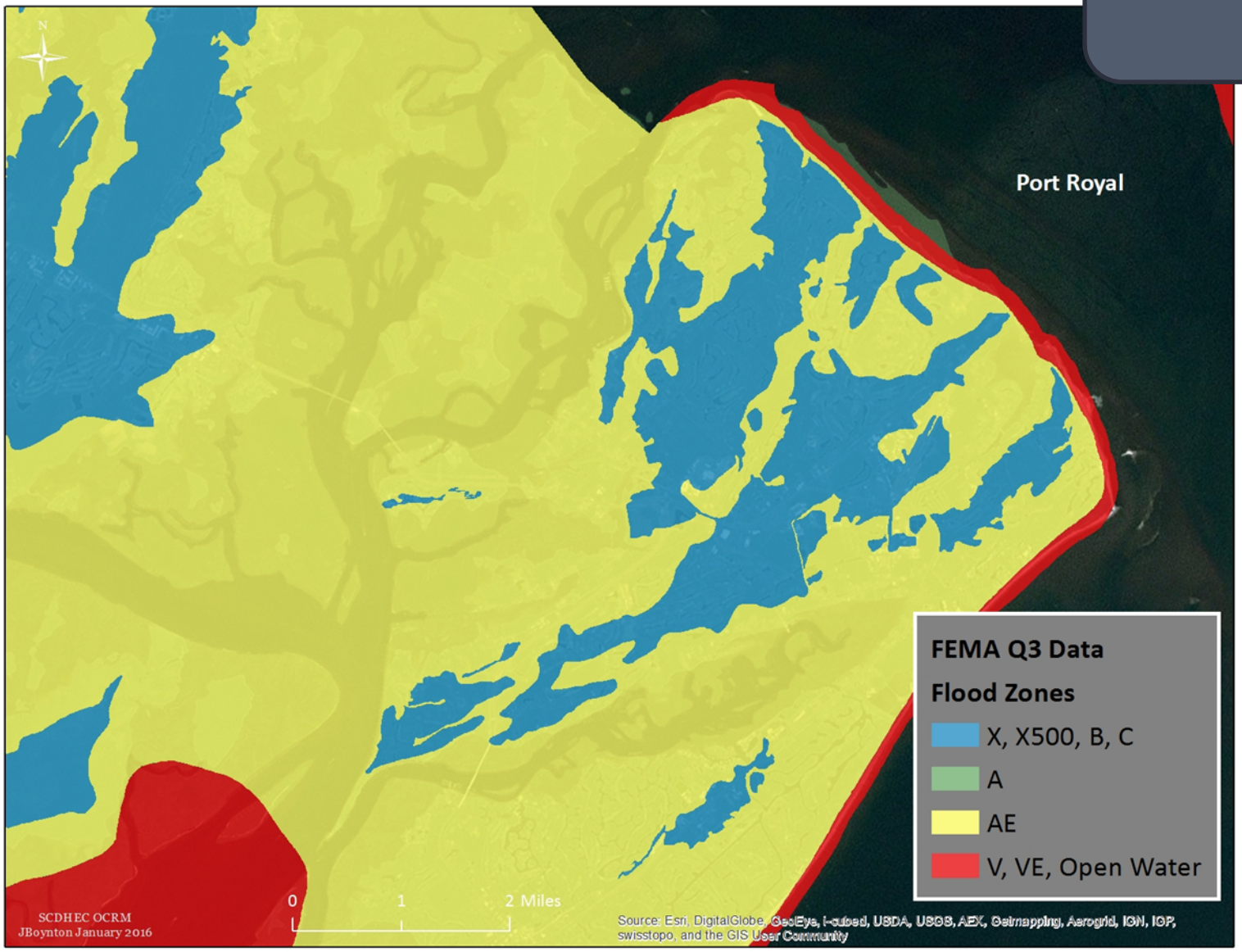
Four component datasets

Shoreline Change Rate (+/-)



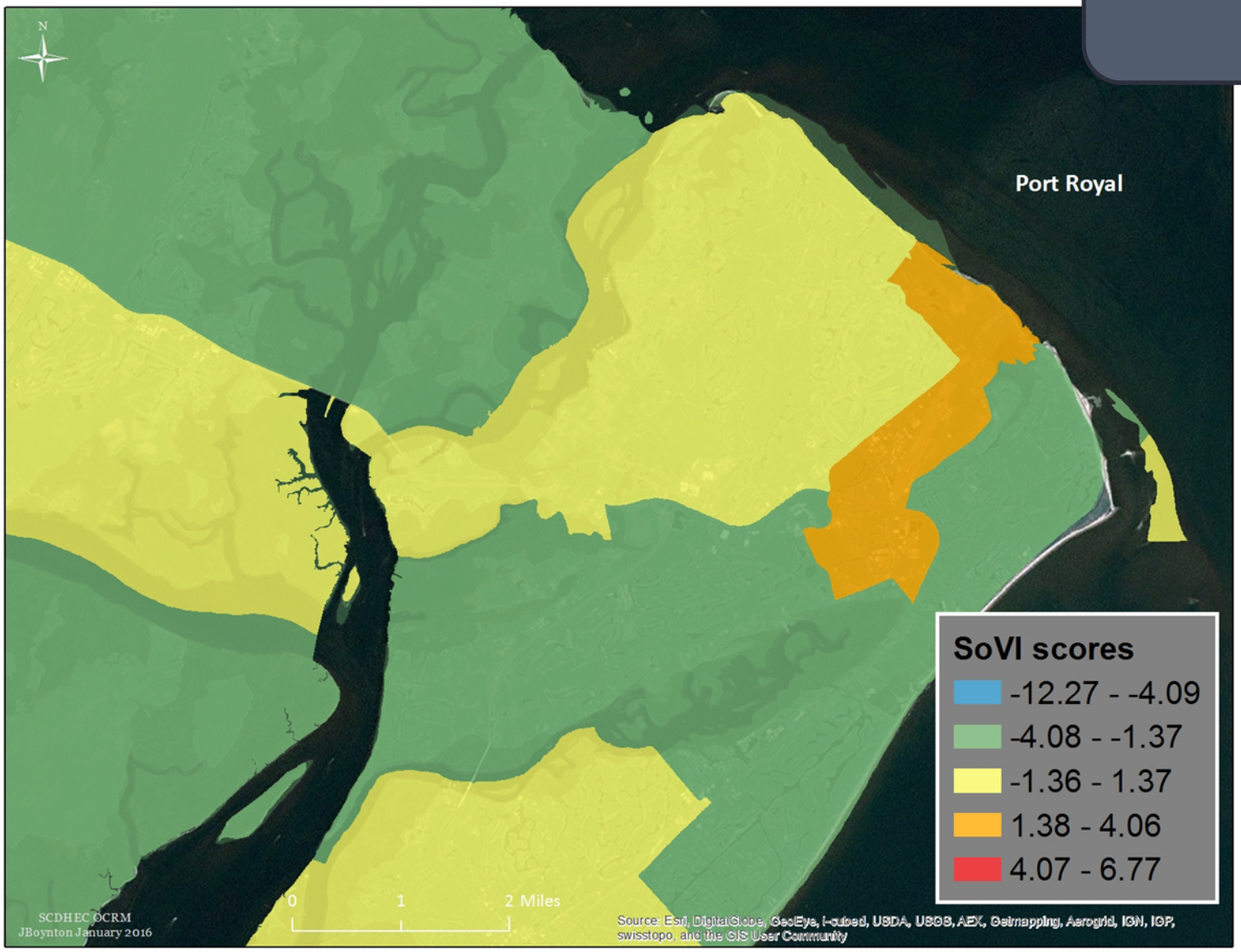
Four component datasets

Flooding



Four component datasets

SoVI®



Tool Process

Download the tools (AMBUR and HVA)

A

- Digitize shorelines on three time steps of imagery.
- Imagery Sources: DNR, USDA, Homeland Security, NOAA Digital Coast
- Follow NC DCM protocols

Run AMBUR tool

B

Gather 4 dataset components

- Storm surge
- **Shoreline Change Rate**
- Flood maps
- Social vulnerability

Run HVA tool using the 4 components

Produce final products

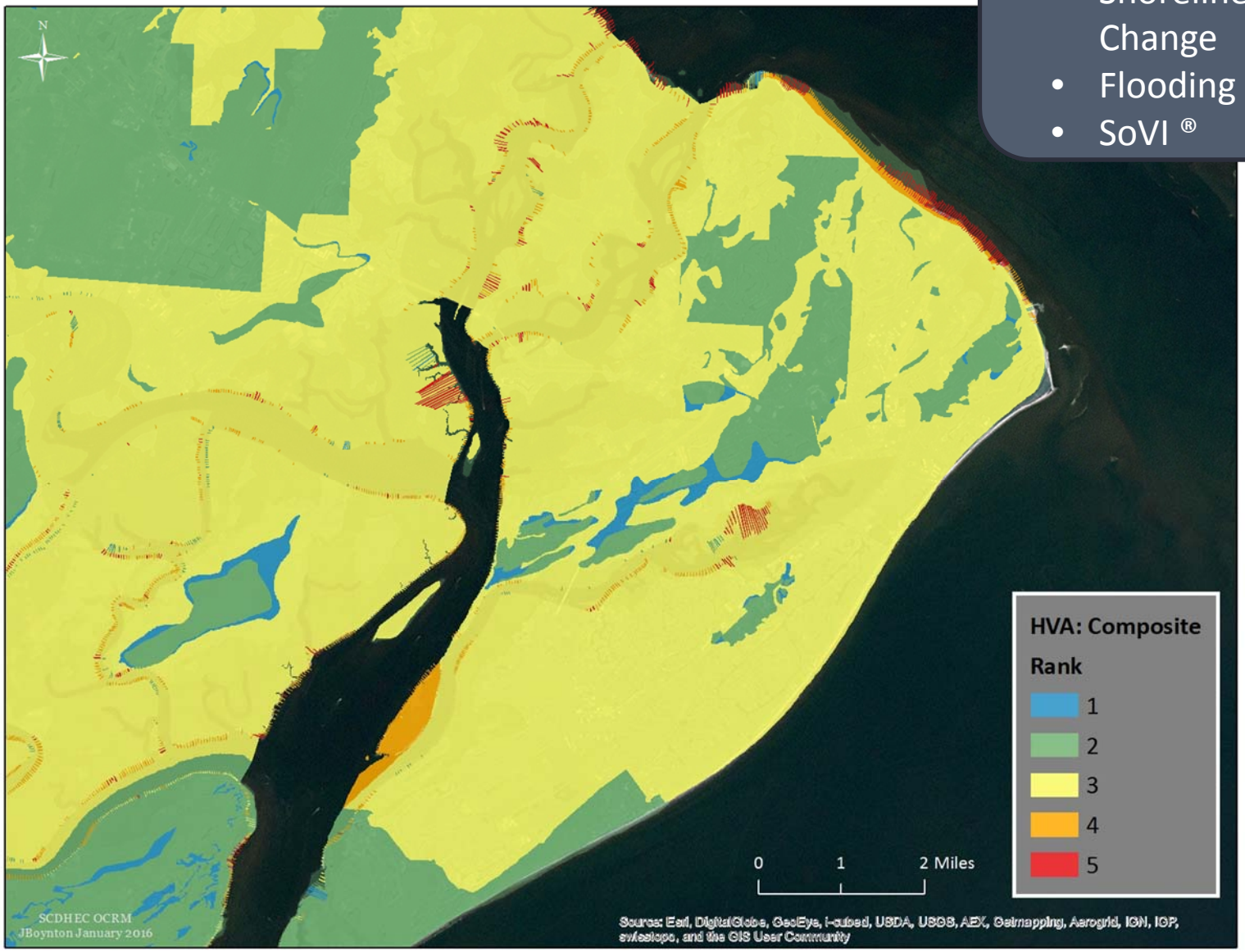
What are the final products ?

- Composite layer (all four datasets) ranked 1 – 5
- Individual layers (Each ranked 1 – 5)
  - Shoreline Change
    - Rate, Temporal, and Spatial variation
  - Inundation (Flood + Storm Surge)
  - Inundation + SoVI®

What are the products ?

Composite

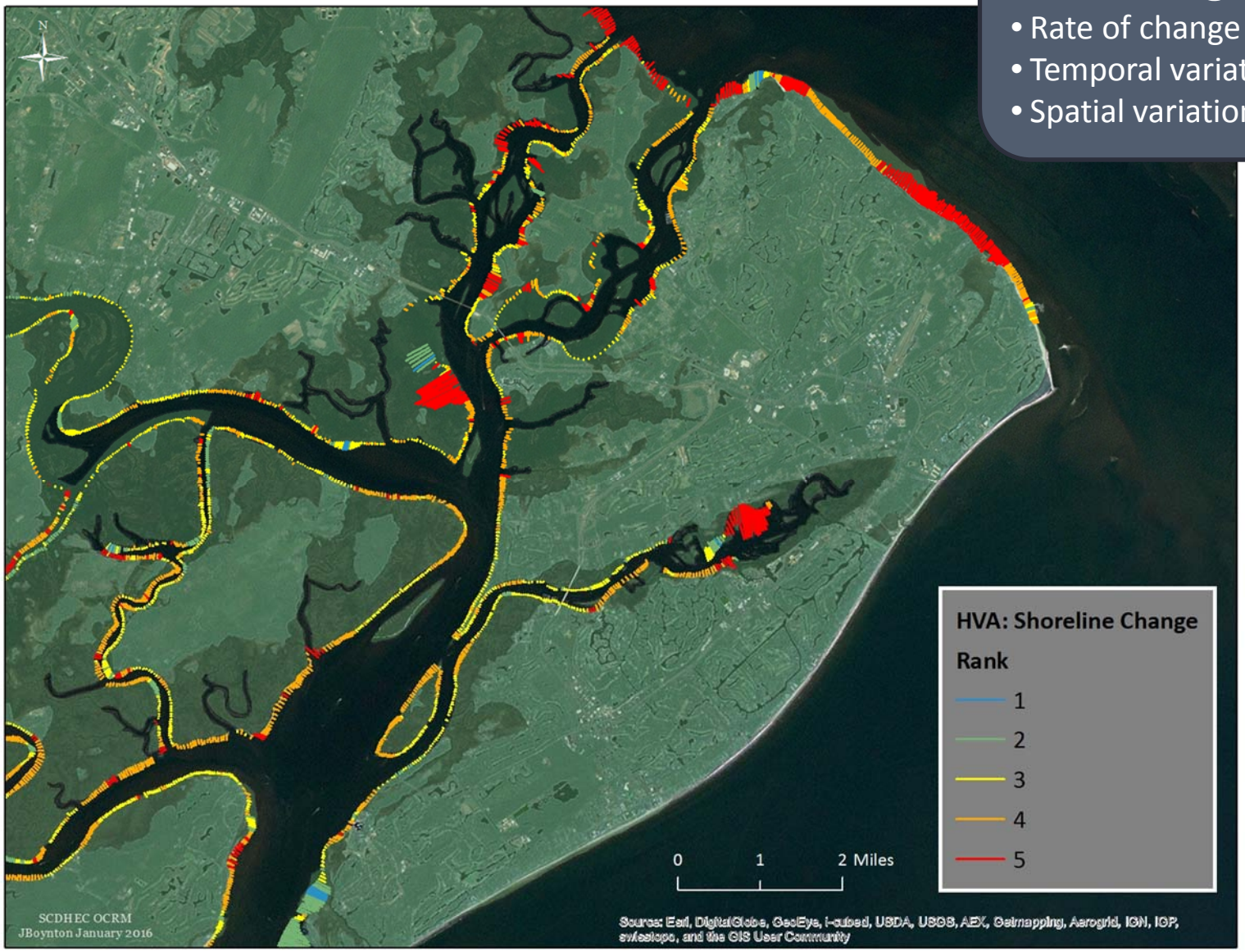
- Storm surge
- Shoreline Change
- Flooding
- SoVI ®



What are the products ?

Shoreline Change

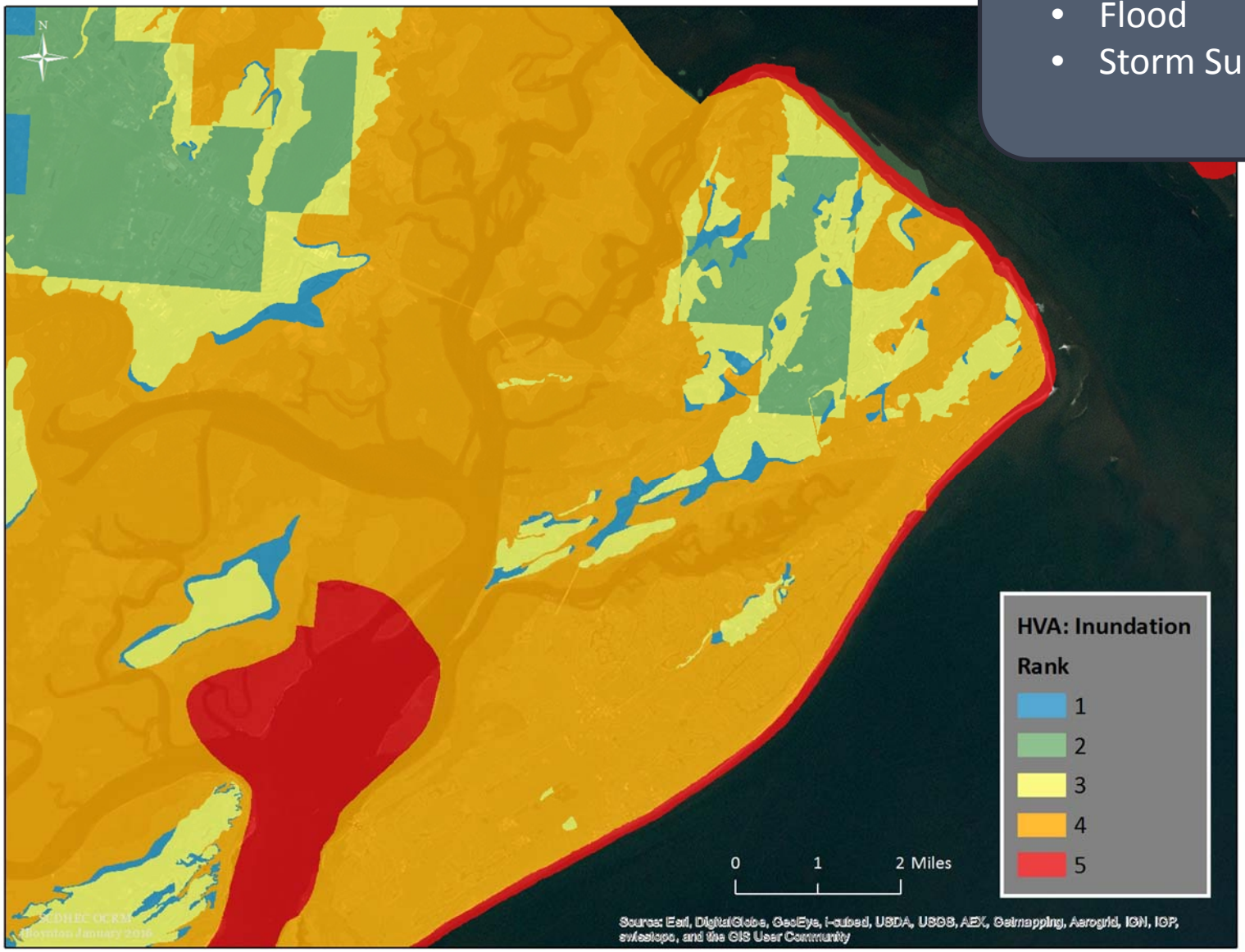
- Rate of change (+/-)
- Temporal variation
- Spatial variation



What are the products ?

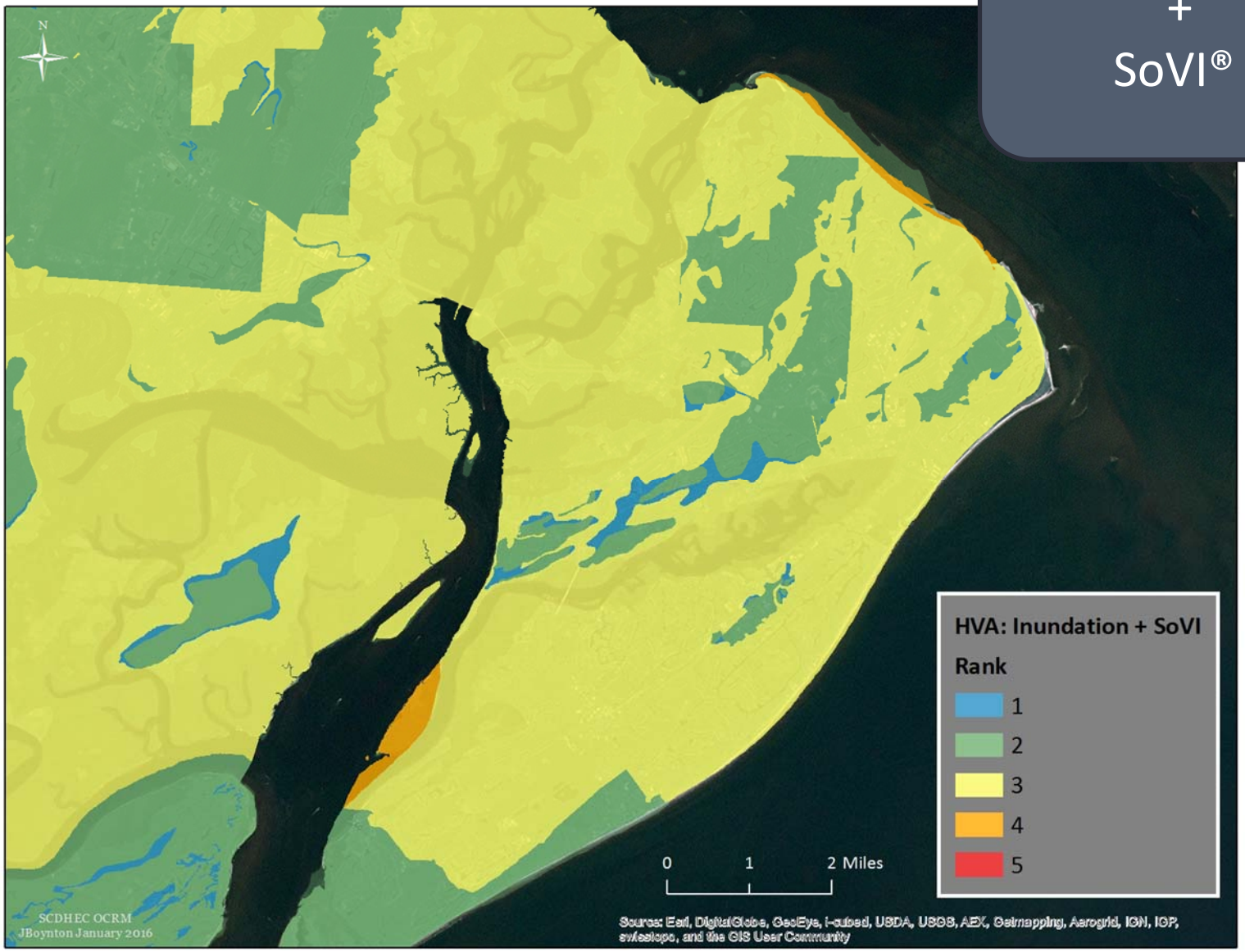
Inundation

- Flood
- Storm Surge

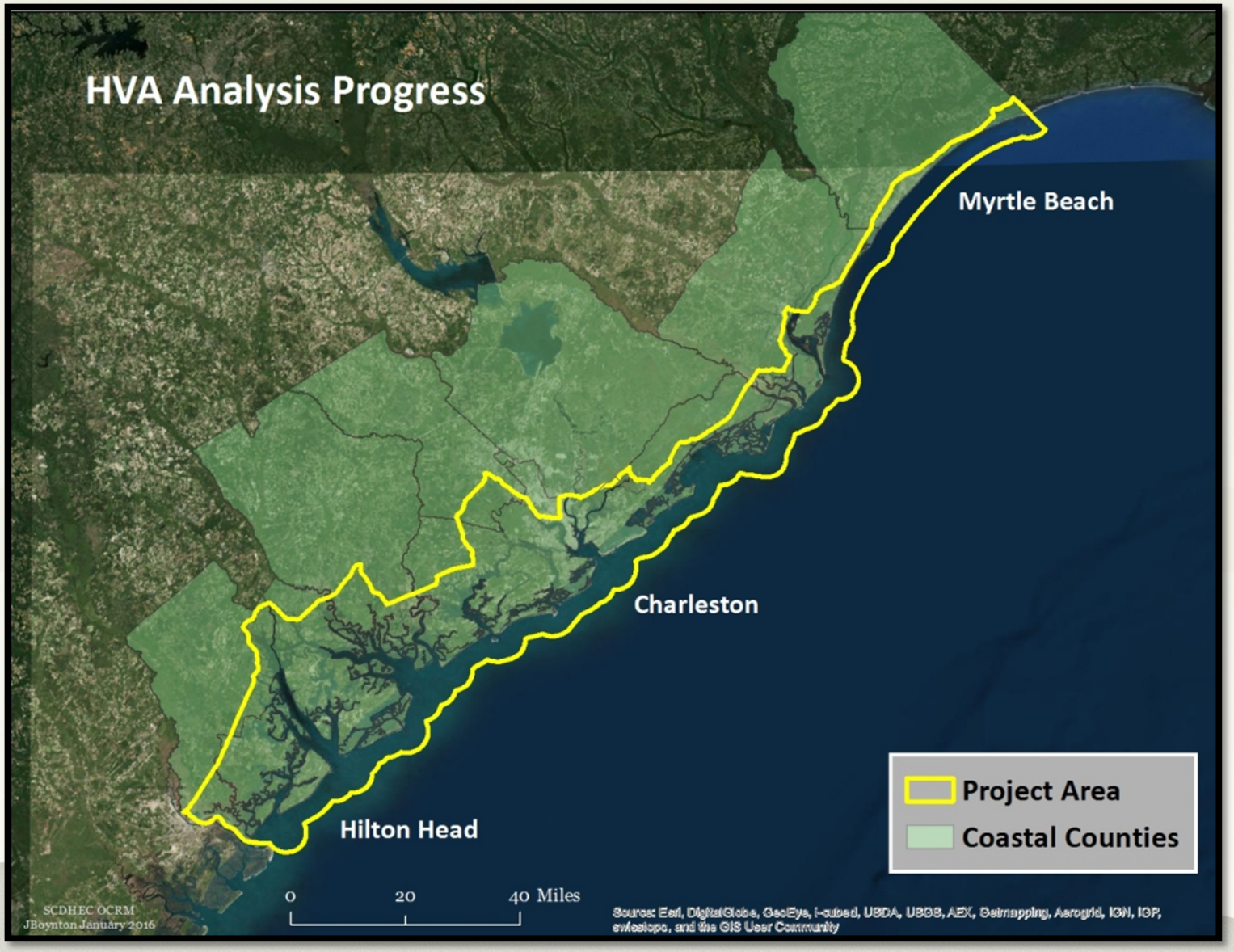


What are the products ?

Inundation
+
SoVI®

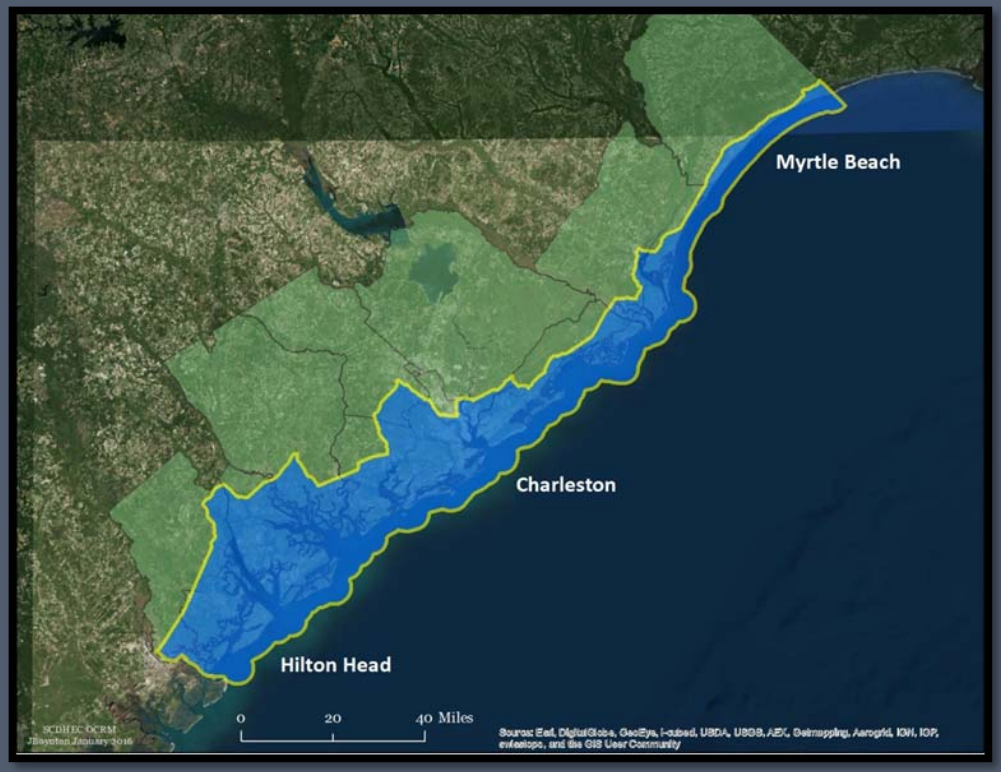


SC Progress: Project Area



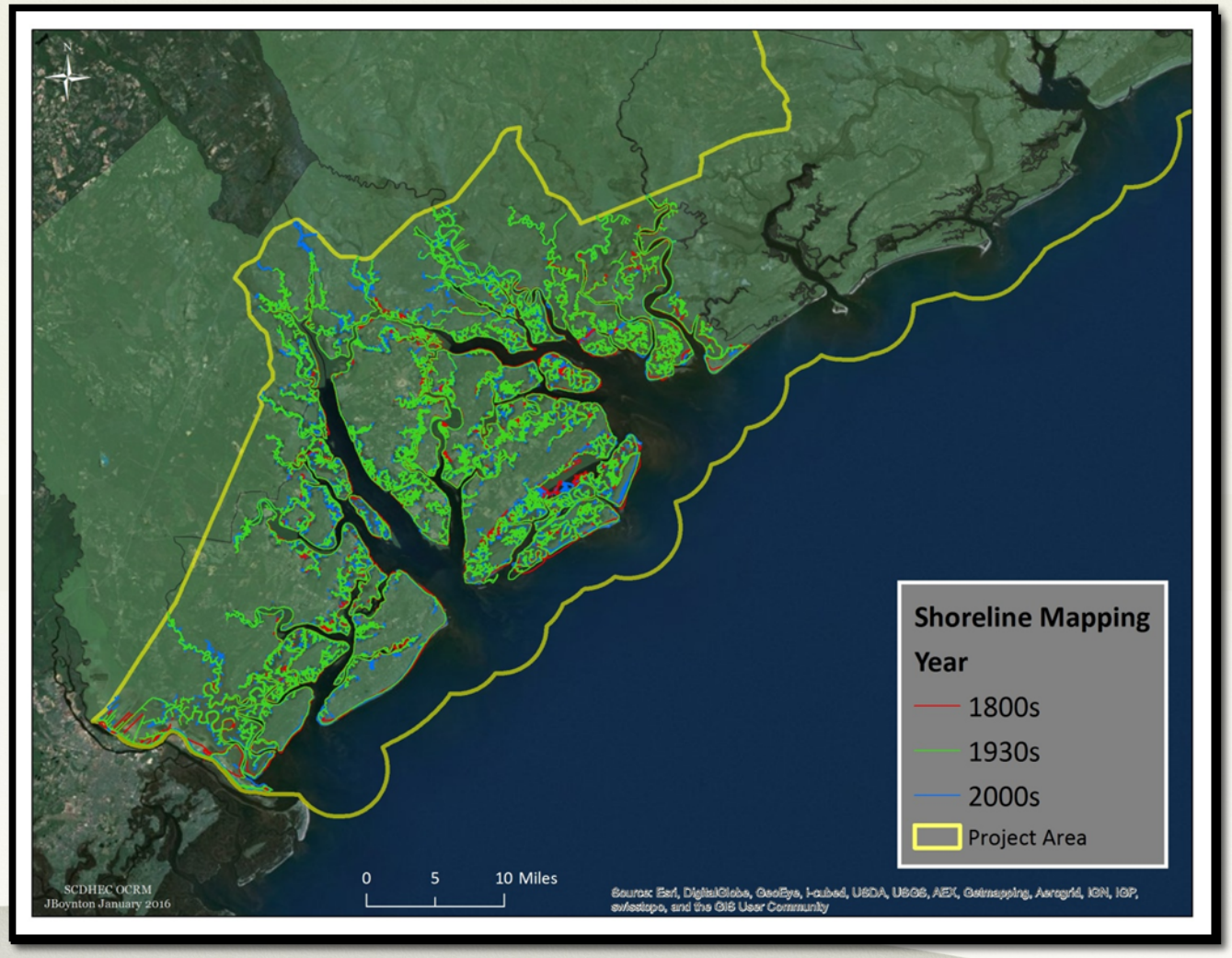
SC Progress

- Publically available HVA components downloaded
  - Storm surge
    - SLOSH
  - Flooding
    - Q3
  - Social vulnerability
    - SoVI®



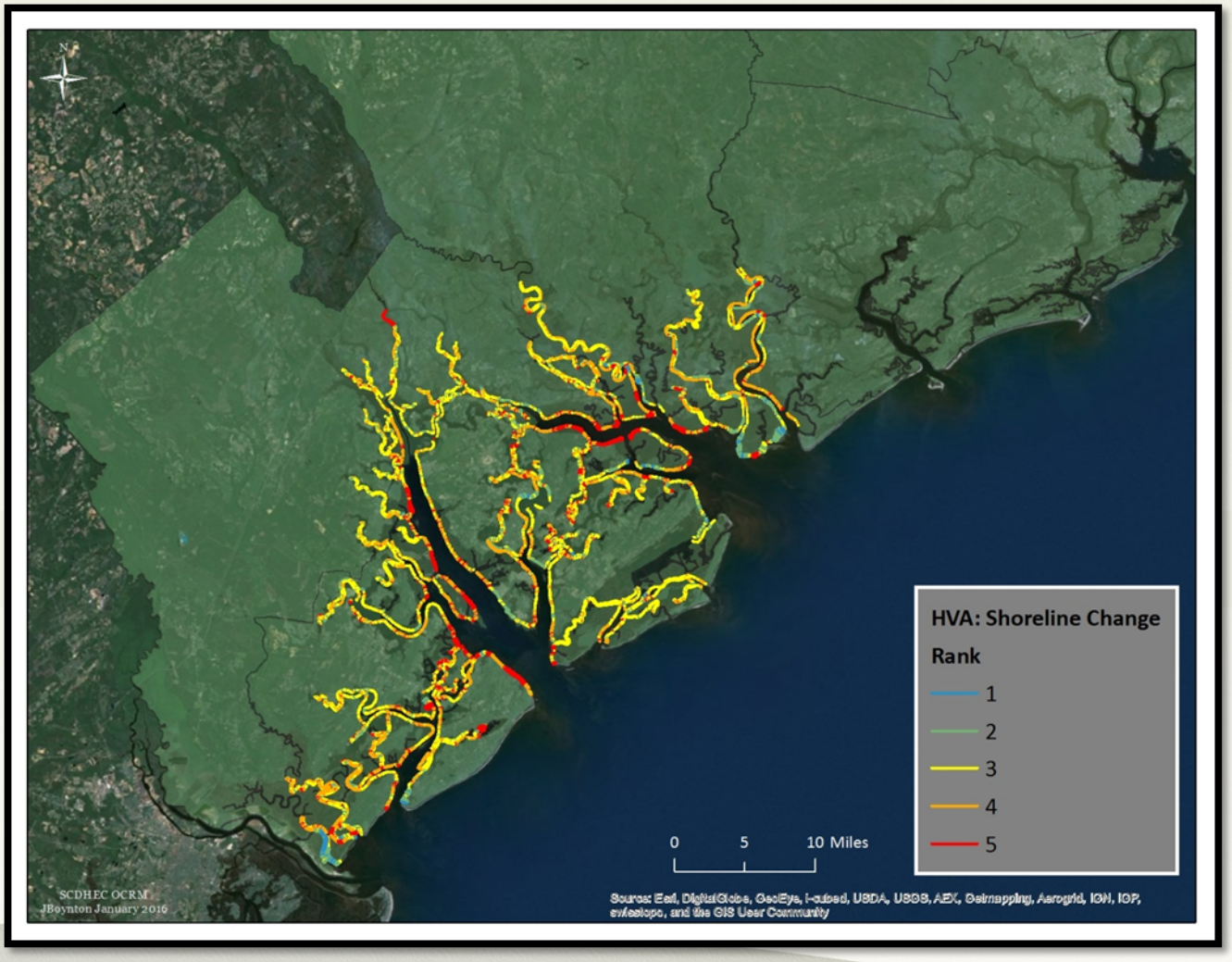
SC Progress: Shoreline Change

- Shorelines digitized
  - 1800s
  - 1930s
  - 2000s
- Shoreline example
- Shoreline Change Component
- HVA tool



SC Progress: Shoreline Change

- Shorelines digitized
  - 1800s
  - 1930s
  - 2000s
- Shoreline example
- Ran AMBUR to create Shoreline Change Component
- HVA tool



SC Progress: Shoreline Change

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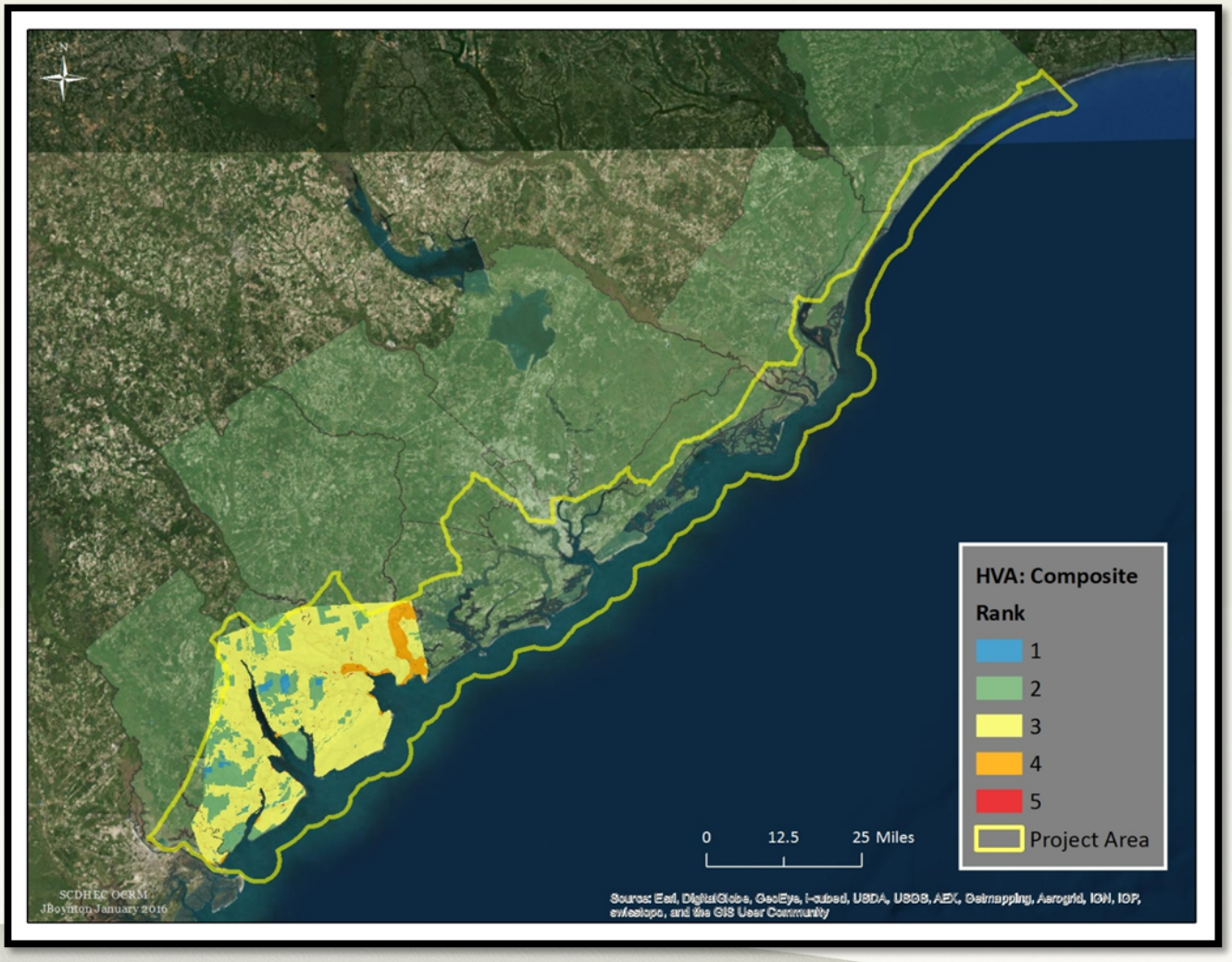


SC Progress: Next Steps

Spring 2016

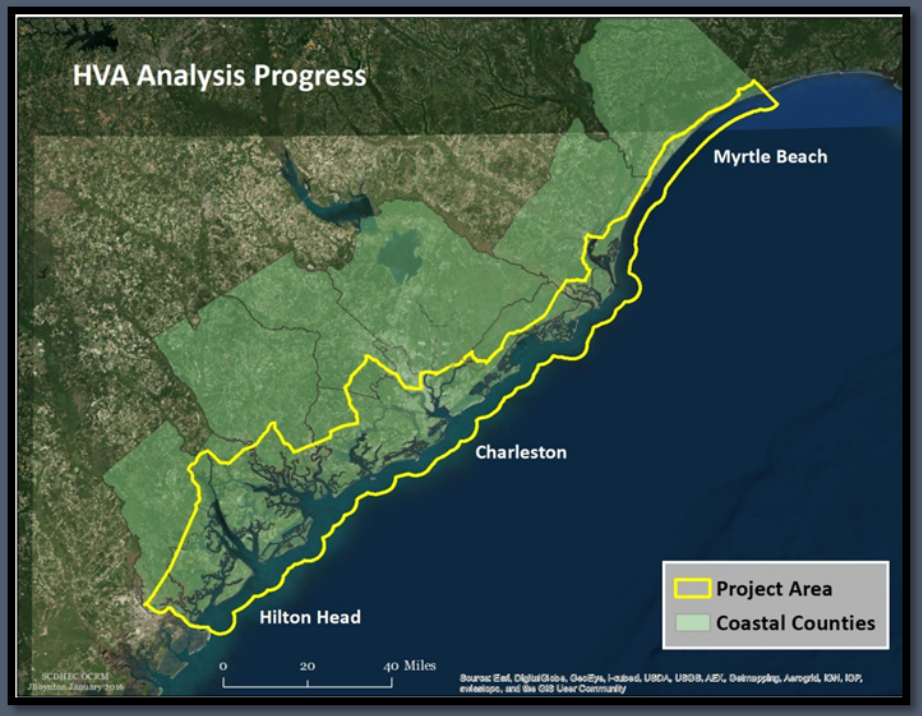
- Complete digitizing
- Run AMBUR coastwide
- Run HVA coastwide

Summer 2016

- Build HVA web app

Fall 2016

- Release HVA web app



How is this tool useful?

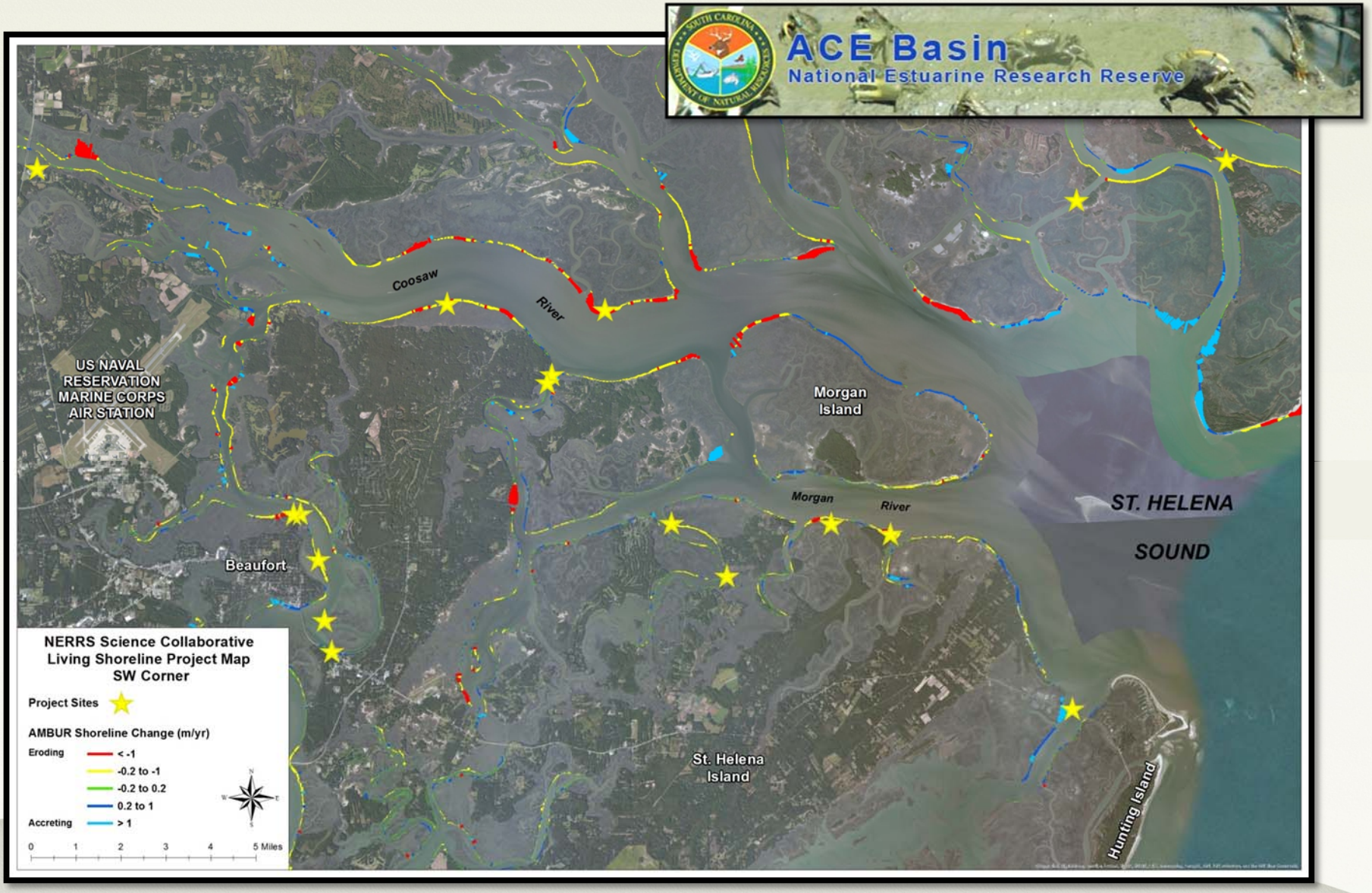
1. **Pre-disaster planning**
   - Emergency routes, shelters
   - Predict areas likely to be most susceptible to hazards
2. **Redevelopment planning**
   - Predict areas likely to need assistance with recovery
3. **Community Rating System (CRS)**
4. **More informed planning**
   - Identify areas best suited for restoration
     - Shellfish, Wetlands
   - Identify areas for alternative shoreline stabilizations
   - Guide development siting

Applied use: HVA tool

1) Puerto Rico DNR, USFWS, Georgia Southern University
   - Customizing the HVA tool to examine habitat vulnerability

2) Charleston Resilience Network (CRN)
   - Volunteer-based effort of public and private sector stakeholders focused on the resilience of communities, critical infrastructure, and socio-economic continuity in the face of episodic and chronic coastal hazards.
   - HVA will be used a base dataset from which to organize efforts.

Applied use:
Shoreline Change Rate (HVA component)



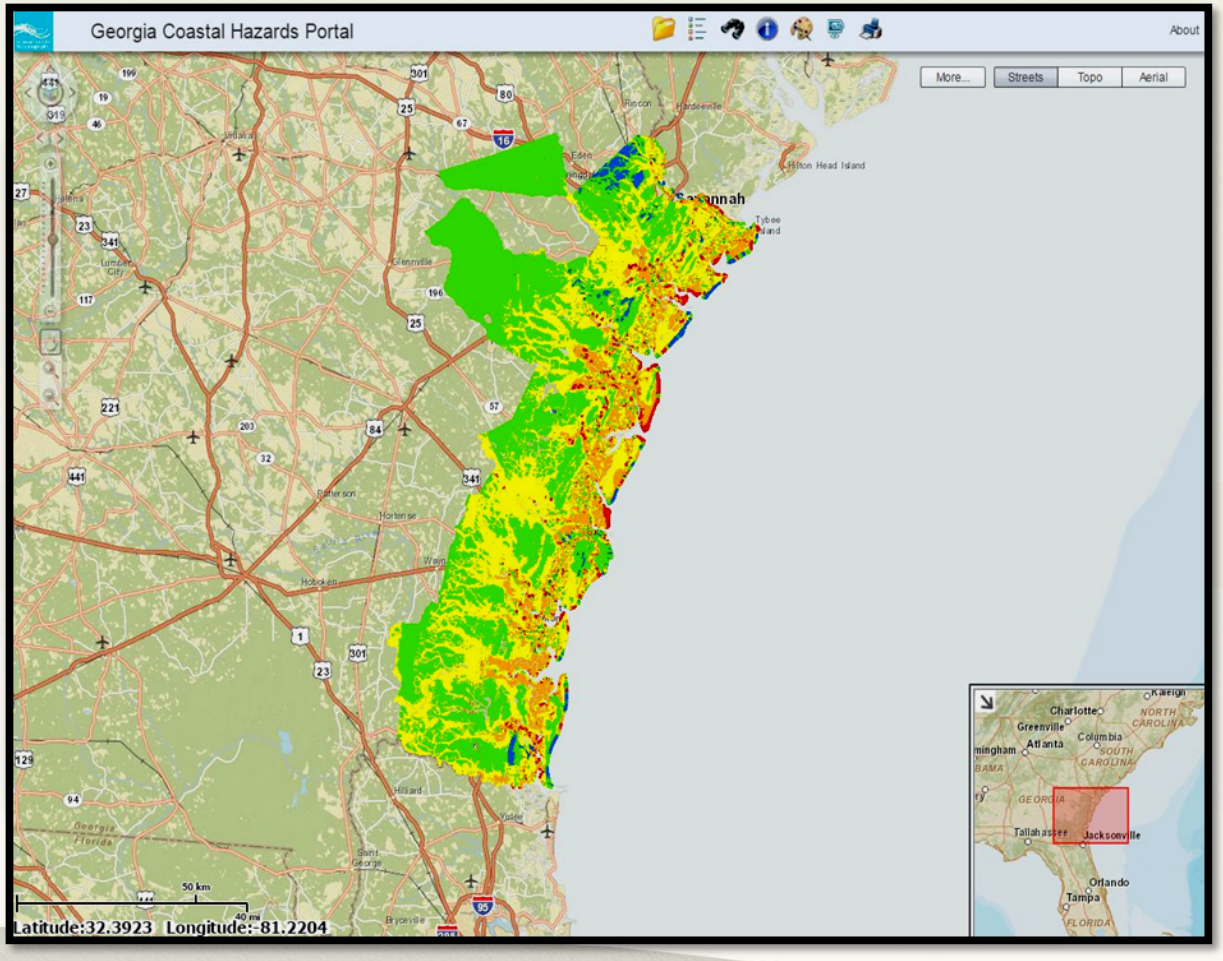
Publicly available HVA products

http://www.scdhec.gov/HomeAndEnvironment/maps/GIS/Applications/

1) Go to GSAA data portal to see pilot area results.

2) SCDHEC – OCRM will release web app in Fall 2016.

3) In GA, the Georgia DNR had HVA run for the coastal counties.



Acknowledgements and contact

- NOAA (funding source)
- Governor's South Atlantic Alliance
- Clark Alexander (Skidaway Institute of Oceanography)
  - GSAA Overall Lead for HVA Project
- Chester Jackson (Georgia Southern University)
  - AMBUR and HVA Builder
- Josh Boulware (SCDHEC – OCRM)
  - GIS Manager, HVA web app
- Jessica Boynton (SCDHEC – OCRM): boyntojb@dhec.sc.gov; 843-952-2033
  - SC Management Lead on HVA Project

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South Carolina Department of Health and Environmental Control

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