Gulf-wide high resolution automated wetland mapping and hurricane damage assessment CHIMMP 2020

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Large-scale mapping automation

NSF Hub Spoke Big Data Project \$1M USD 3 year timeline 20,000 WorldView Images Map land cover: coast-50 km inland





#!/bin/bash

#SBATCH --partition=bgfsqdr #SBATCH --job-name ="SOALCHI_bgfs" #SBATCH --nodes=1 #SBATCH --ntasks-per-node=4 #SBATCH --mem-per-cpu=20480 #SBATCH --time=10:00:00 #SBATCH --array=0-10000 Pgc_ortho.py

- Written by Polar Geospatial Center
- Steps
 - Ingest Level-1B WorldView NITF
 - Optional georectification using RPCs
 - Project to WGS 1984 (EPSG:4326)
 - Output Level-2B GeoTIFF
- Run time = 5-15 minutes per image



WV_Classify.m

- Written by M McCarthy
- Steps
 - Ingest Level-2B GeoTIFF + metadata XML
 - Convert DN to Radiance
 - Correct for Rayleigh scattering
 - Convert to Rrs
 - Decision Tree preparation
 - Decision Tree
 - Post-processing filter



WV_Classify.m

- Written by M McCarthy
- Steps
 - Ingest Level-2B GeoTIFF + metadata XML
 - Convert DN to Radiance
 - Correct for Rayleigh scattering
 - Convert to Rrs
 - Decision Tree preparation
 - Upland vs Wetland
 - Scene-specific algorithm
 - NDVI
 - Wetland < Average(sum(B3-B5))
 - Decision Tree
 - Post-processing filter



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 - Ingest Level-2B GeoTIFF + metadata XML
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 - Decision Tree
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Results: Texas



NOAA 2010

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Source: Earl, DigitalOlobe, GeoEye, Earlinstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Developed Bare/Soil Water Grass Algae flat Marsh Forested Wetland Forested Upland Scrub/shrub Agriculture

SOALCHI



NOAA 2010





Natural-disaster monitoring



Objective: Hurricane-damage assessment

Background

Hurricane Irma September 2017

Category 3: 120 mph winds

Mangrove damage

- Damaged vs undamaged
- Dead vs recovered

Existing map: 2010 (2 years to create)



Methodology



Habitat Mapping with Satellites



NERRS Science Collaborative

Results: Irma Damage



Results: Recovery





<u>Net Change:</u> <u>Pre-Irma to Recovery</u>

Mangrove to Marsh 7.1 km² ~1,750 acres

Mangrove to Bare Soil 1.6 km² ~395 acres

Total Mangrove Decline 10.6 km² ~2,600 acres



McCarthy et al. (In press; Invited Feature Article) Remote Sensing

Next Steps

Complete Florida mapping

Conduct flood risk mapping

Disseminate results

- SECOORA
- Digital Coast

