



# **Evaluation of High Resolution Data for LCLUC Science**

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**Project Title: High Spatial Resolution, Commercial Satellite Data Applied to the Study of LCLUC on Islands**

# Objectives

- Assess LCLUC of Island Ecosystems through Image Time-Series Analysis
- Linear & Non-Linear Mixture Modeling of LCLU Fractions from Landsat Data to Better Assess the Social-Ecological Threats to Island Sustainability
- Calibrate & Validate LCLUC Patterns for our Dynamic Systems Models of Islands and their Global Typologies
- Characterize the Human Dimension, particularly, Small-Scale Agriculture and the Rural-Urban Transition for Islands with Limited Geographic Extents

# Data Requested and Status

- Study Region: Global Islands – Emphasis on Galapagos & Puerto Rico
- Data Download: Galapagos (completed); Puerto Rico (in progress)
  - *Digital Globe* (WV-2 & 3): VNIR; 4-image dates; Mapped at 5-m Spatial Resolution
  - *Planet Labs* (PlanetScope/Dove Constellation: B-G-R-NIR); 6-image dates; 3.9-m Spatial Resolution
- Issues/Challenges: Small Image Footprints & High Data Volumes; Pronounced Affinity for Mapping Agriculture and Associated LCLU types for Human Use Zones; High Temporal Resolution (daily) Affords Capture of Nearly Cloud-Free Images in the Tropics

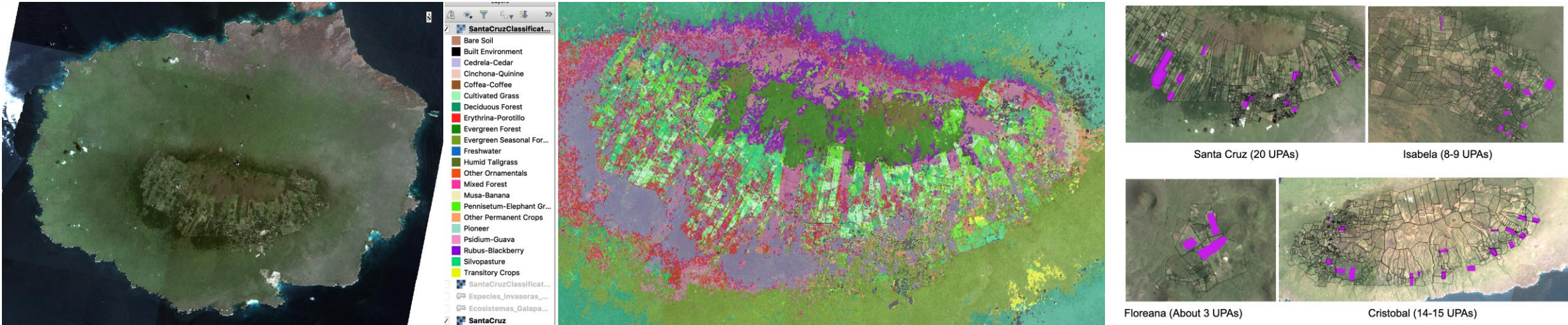
# Data Downloads

- Planet Data
  - Downloaded 19 PlanetScope, 4-band images for Galapagos; Plans to download SkySat and RapidEye for Galapagos and for Puerto Rico
- WorldView-2
  - Downloaded 2 images for Galapagos; Downloaded 4 images for Puerto Rico; Requested data for PR arrived as 164 zip files totaling 12.6 GB of data
- WorldView-3
  - Downloaded 1 image for Galapagos; Downloaded 3 images for PR; Requested data for PR arrived as 364 zip files totaling over 115 GB of data – Intensive Study Areas still being defined by project team for data editing)
- IKONOS
  - Downloaded 10 images for PR
- QuickBird
  - Downloaded two images for PR
- GeoEye-1
  - Downloaded two images for PR



# Preliminary Results

- Image Quality Characteristics: High Image Quality – Orthorectified, Scaled Top of Atmosphere Radiance, Radiometric & Sensor Corrections Applied
- Visual Interpretation Results: Suitably Compared to Unmanned Aerial Vehicles for Control Farms
- Pre-Processing Issues: Image Fusion; Surface Reflectance
- Preliminary Data Evaluation – PlanetScope/Dove Constellation



# Next Steps

- Data Analysis: Mixture Modeling, Landsat & Sentinel Data for LCLU Fractions
- Validation: Comparison to UAV Data for Control Farms in the Human Use Zone in the Galapagos
- Algorithms: Use of High Resolution Imagery to Decompose Landsat Data to LCLU Fractions for Application to Global Islands
- Enhancing LCLUC Science: Improved Characterization of the Human Dimension, particularly, for Small-Scale Agriculture and the Rural-Urban Transition

