

Change detection of mangrove cover and above-ground biomass in the Ciénaga Grande de Santa Marta, Colombia, using multisource remote sensing data

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Background

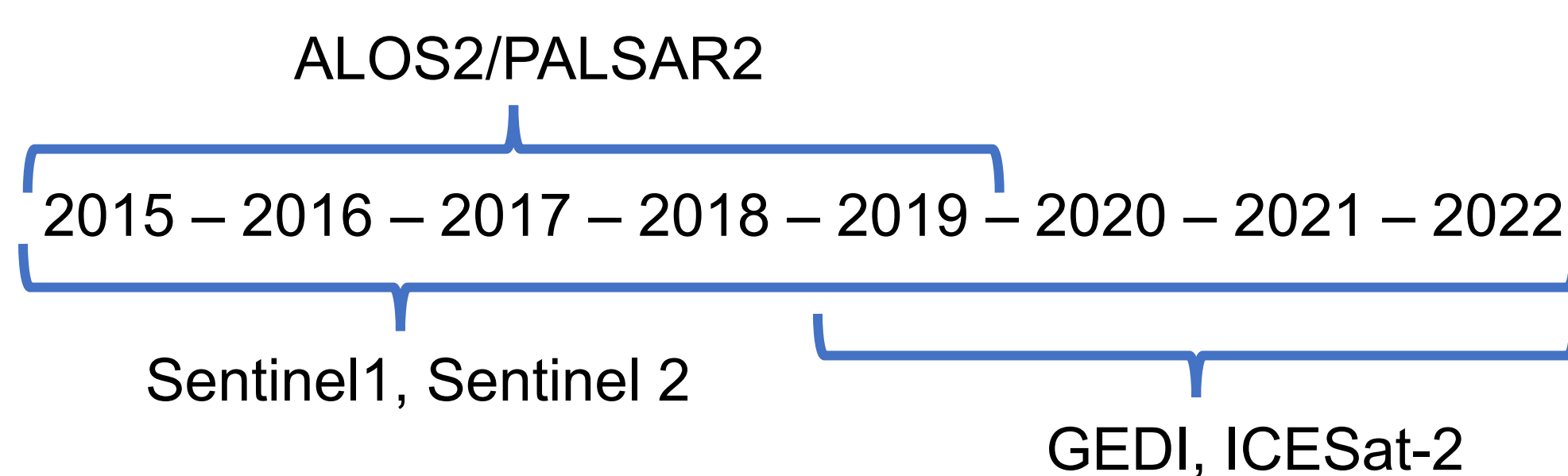
The mangrove forest of the Ciénaga Grande de Santa Marta (CGSM) has experienced severe alterations in extent and structure for the past 60 years, mainly due to human-induced modifications of hydrological fluxes. In recent years, the dynamic of mangrove cover loss and gain has been heavily influenced by climatic events which indicates this system's vulnerability.

Objectives

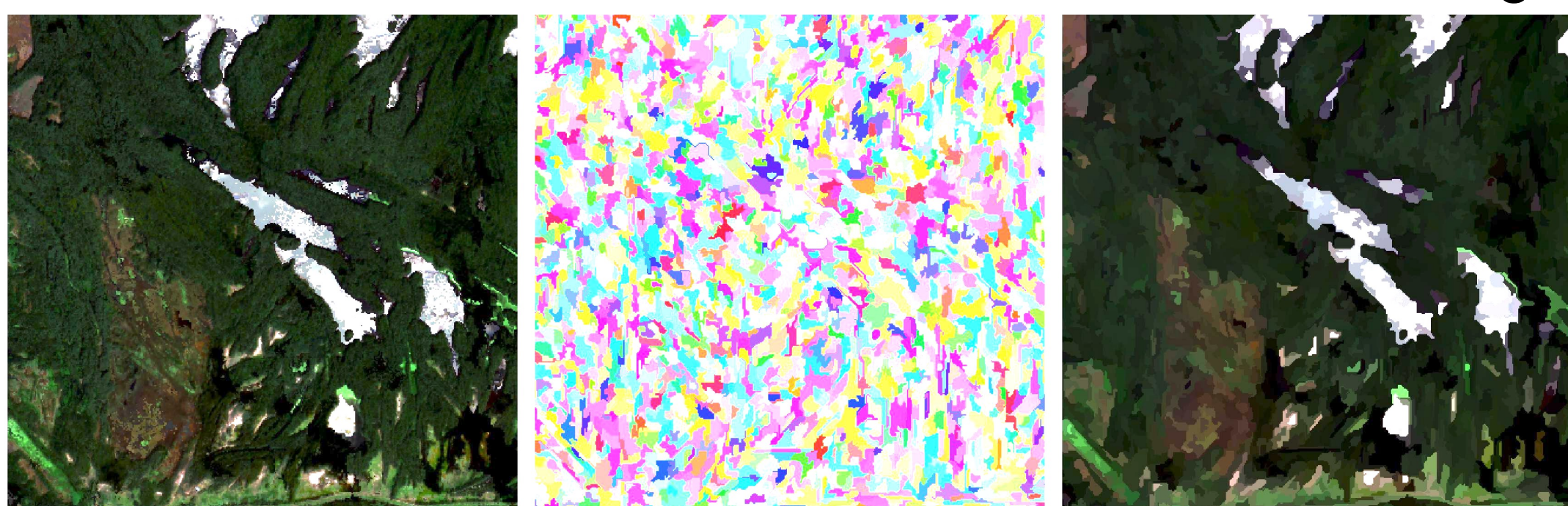
- 1) Evaluate the benefits of using multisource remote sensing data for land cover and structural change detection in the CGSM.
- 2) Identifying areas of mangrove degradation, regeneration, loss, or gain.
- 3) Evaluate changes on the above-ground biomass (AGB) pool of the CGSM.

Input data

- Global Mangrove watch (GMW) map.
- GEDI Level 2A data.
- ICESat-2 ATLAS08 data.
- ALOS2/PALSAR2 Imagery.
- Sentinel1 and Sentinel2 Imagery.



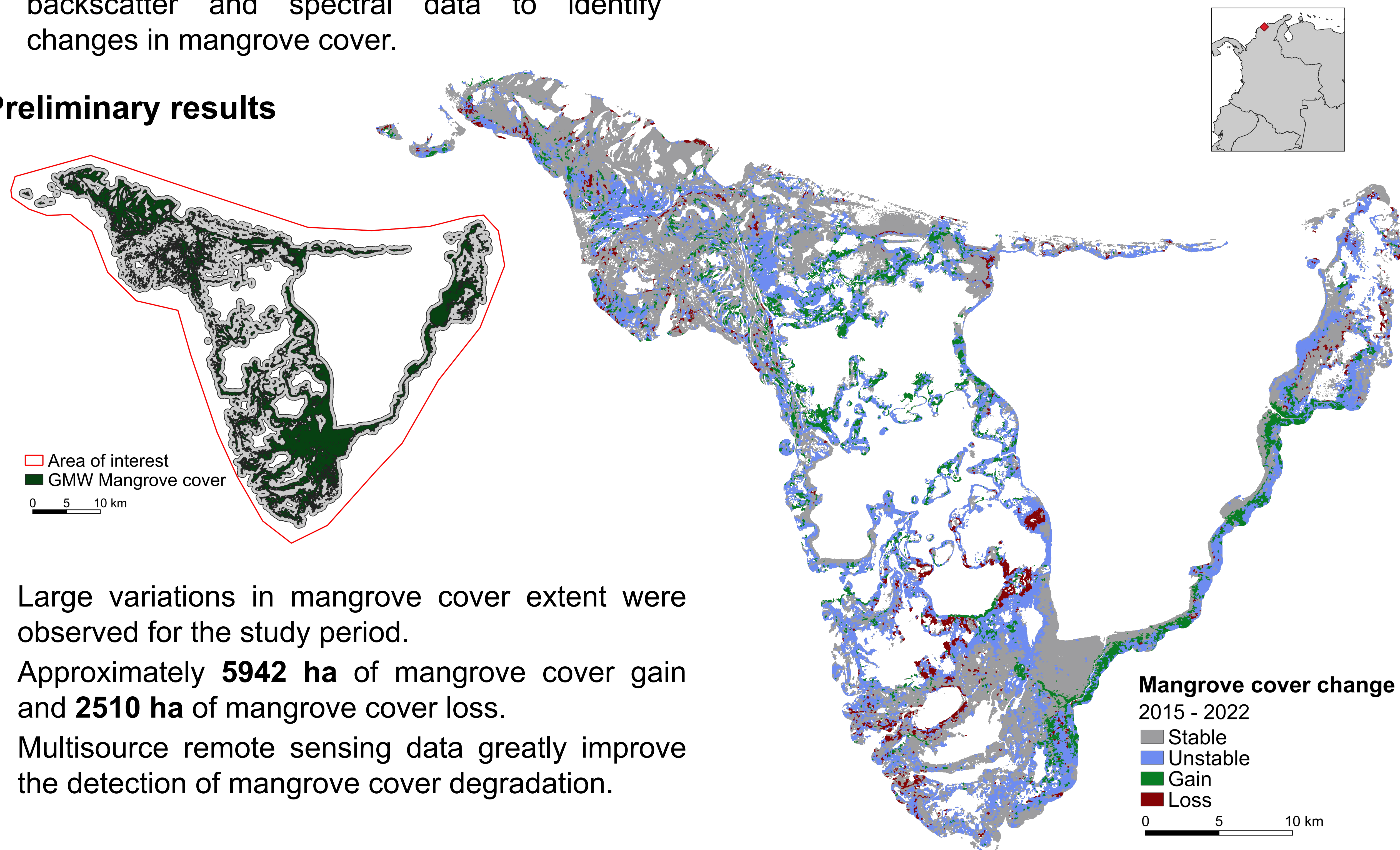
Sentinel 2 Input Segmentation Processed image



Methods

1. Create an image segmentation to define areas of homogeneous mangrove cover.
2. Process the input data using the segmentation polygons.
3. Detect trends and breaks in the time series of backscatter and spectral data to identify changes in mangrove cover.
4. Calculate AGB using GEDI and ICESat-2 canopy height estimates.
5. Establish a regression of AGB as a function of backscatter and spectral reflectance to produce maps of AGB.

Preliminary results



- Large variations in mangrove cover extent were observed for the study period.
- Approximately **5942 ha** of mangrove cover gain and **2510 ha** of mangrove cover loss.
- Multisource remote sensing data greatly improve the detection of mangrove cover degradation.

Next steps

- Calculate mangrove AGB estimates for the complete time series.
- Calculate tree growth rates for the CGSM using the spaceborne LiDAR data.

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Acknowledgments

The project entitled: "Global Hotspots of Change in Mangrove Forest" was funded by NASA's LCLUC program. This work was performed at the Jet Propulsion Laboratory under contract with the National Aeronautics and Space Administration (NASA).