Feasibility of Planet data for Rapid Disaster Response

Batuhan Osmanoglu, Goddard Space Flight Center

Purpose: Improve NASA's ability to accurately detect and estimate the extent of flooding within urban areas

Study Objective: Produce and evaluate flood extent product using commercial imagery and compare against products derived from medium resolution optical and radar imagery. Three cases: Houston, August 2017; Guerneville, February 2019; Davenport, May 2019)

Imagery: PlanetScope, Sentinel-1, Landsat-8

Findings: Flood extent products were produced successfully using commercial imagery. Omission errors in the Synthetic Aperture Radar (SAR) derived product are noticeable when compared with imagery from PlanetScope. Compared to Landsat-8, PlanetScope imagery provided more precise delineation due to higher spatial and temporal resolution.
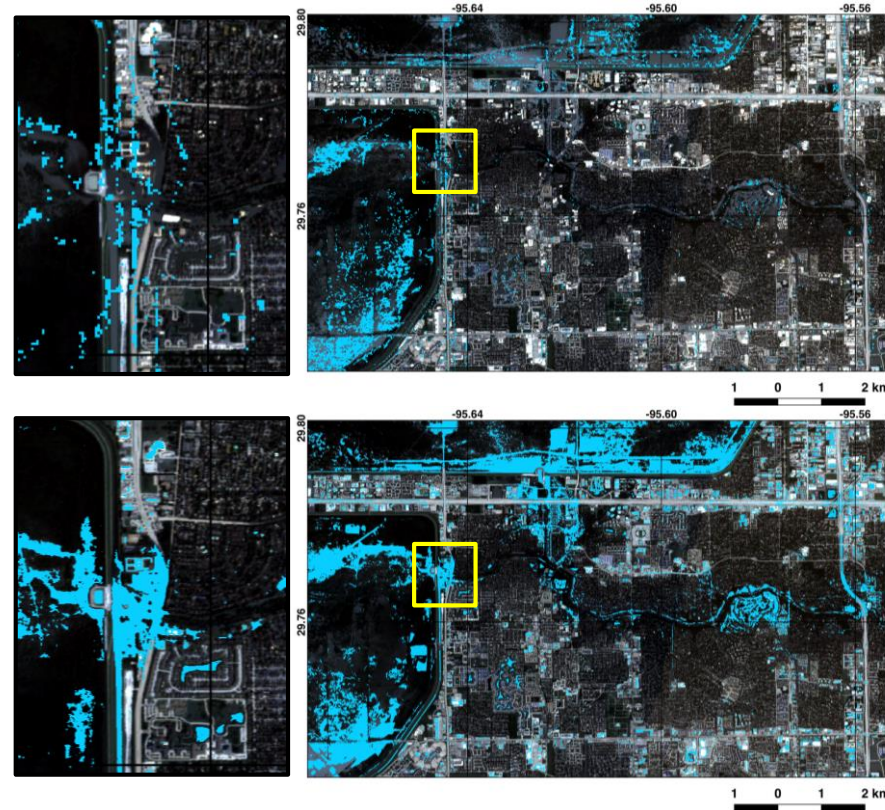
Comparison of flood extent derived from Sentinel-1 (top) and PlanetScope (bottom) over Houston, TX post *Hurricane Harvey*

Planet NDWI   **Landsat-8 NDWI**   **Sentinel-1** σ°
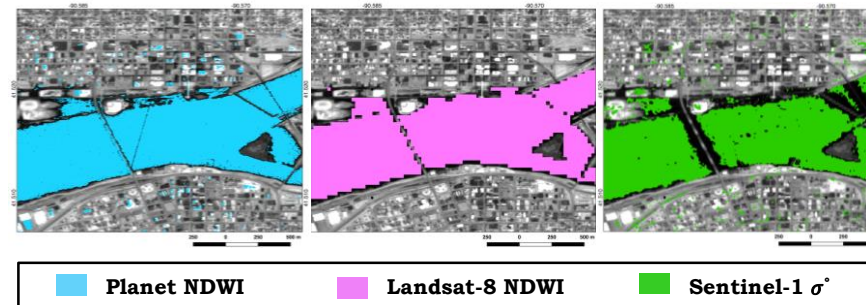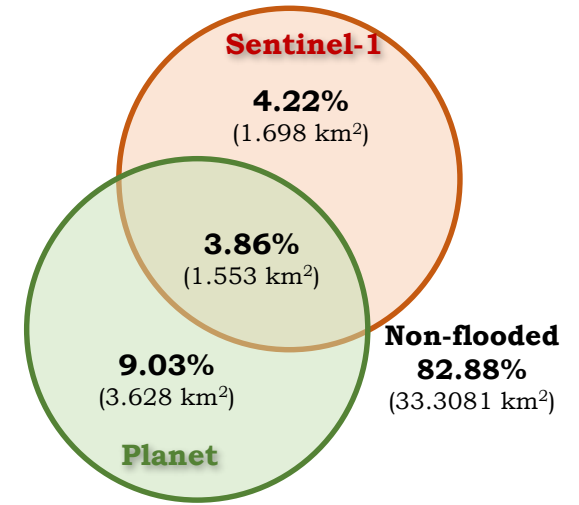
Flooded area detection based on the amplitude change of NDWI map of PlanetScope imagery (left), NDWI map from Landsat-8 (middle), and Sentinel-1 SAR imagery (right). Case study over Davenport, IA.

Sentinel-1
4.22%
(1.698 km^2)

3.86%
(1.553 km^2)

9.03%
(3.628 km^2)

Non-flooded
82.88%
(33.3081 km^2)

Planet

Sentinel-1
2.49%
(0.993 km^2)

Non-flooded
77.65%
(30.989 km^2)

0.34%
(0.135 km^2)

0.57%
(0.226 km^2)

15.16%
(6.032 km^2)

1.42%
(0.568 km^2)

0.92%
(0.367 km^2)

1.50%
(0.598 km^2)

Planet

Landsat-8