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Demonstration of ISS-Dataset for Image Fusion with New Landsat Imagery

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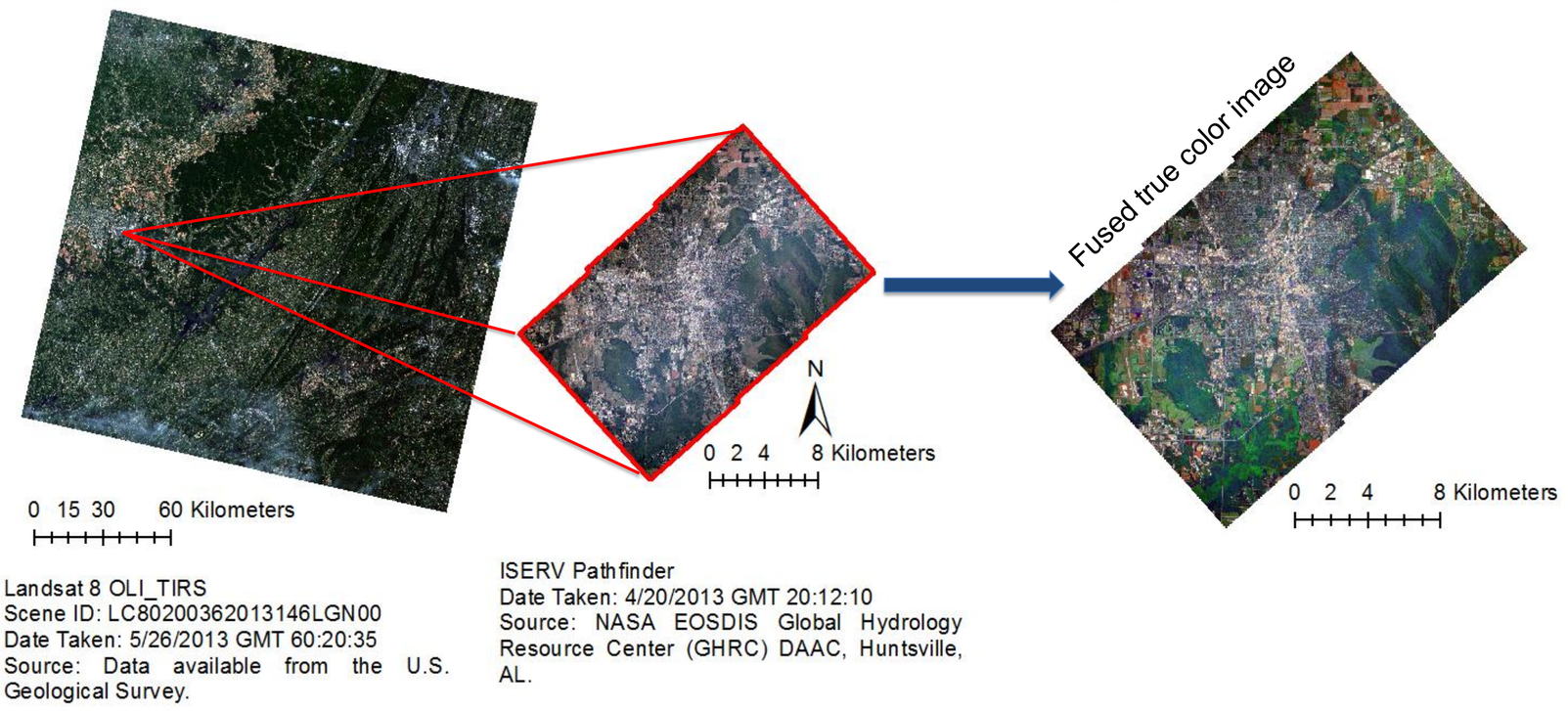
Overview

The ISS SERVIR Environmental Research and Visualization System (ISERV) is a payload on board the International Space Station (ISS). ISERV is a telescopic imager which takes rapid, automated, high-resolution photos of the Earth from space. The purpose of this research was to test the feasibility of fusing lower resolution near-infrared (NIR) data from Landsat 8 with high resolution true color images from ISERV (3-5 m horizontal resolution with a 13 km by 9 km footprint). A normalized difference vegetation index (NDVI) of a study area over Huntsville, Alabama was performed to extrapolate areas of vegetation in order to test the applicability of this new fused image prototype.

Key Findings

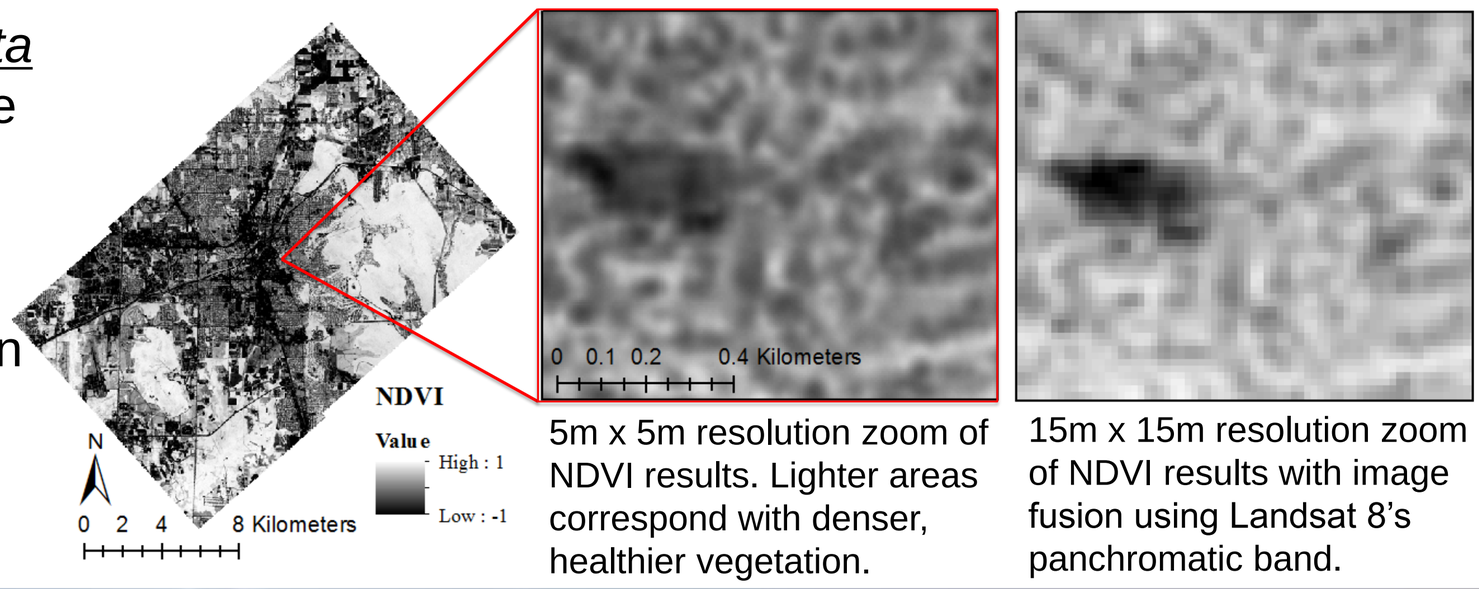


Fusing ISERV & Landsat 8 Imagery

A greyscale ISERV image was fused with red, green, and blue bands from Landsat 8 to test the feasibility of combining the two datasets. The image to the far right shows the result: a 5m x 5m resolution image over Huntsville with spectral data from Landsat 8.

NDVI of ISERV Fused with Landsat 8 NIR Data

Since fusing the 2 datasets yielded a desirable result, the same process was applied to combine a greyscale ISERV image with Landsat 8's NIR band. A NDVI was applied to the resulting image to extrapolate vegetation in the scene. The same process was applied using Landsat 8's readily available panchromatic band for comparison.



5m x 5m resolution zoom of NDVI results. Lighter areas correspond with denser, healthier vegetation.

15m x 15m resolution zoom of NDVI results with image fusion using Landsat 8's panchromatic band.

Impact

- This technique and resulting enhanced images is of interest to SERVIR scientists who use and promote earth observation data to address issues of climate change, environmental events, and natural disasters in developing countries.
- Creates high resolution multi-spectral images from free datasets, while most high resolution multi-spectral data is restricted or expensive to acquire.

Explanation

- The American Astronautical Society is invested in enhancing knowledge of the universe. Datasets used for this research observe the Earth from space through LEO platforms such as the ISS.
- Utilization of ISERV data for baseline research provides valuable feedback for future ISERV counterparts.

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