Sioux Falls High Resolution Geometric Test Range

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Introduction

The USGS Remote Sensing Technologies Project (RST) is establishing control ranges across the United States to use in assessing satellite and aerial sensor performance. The first of these ranges, around Sioux Falls, SD, is nearing completion.

Figure 1 – South Dakota, USA from the *Tri Decadal Global Landsat Orthorectified States* collection.
http://eros.usgs.gov/imagegallery/index.php/collection/landsat_states

Figure 2 – Sioux Falls South Dakota Business Aviation Aerial Imagery.

Satellite and Aerial Assessments

The control imagery and lidar over this test range provides a high resolution control base against which lower resolution satellite and aerial imagery can be measured. The 12 inch (30 cm) imagery will work well to assess the performance of satellite data from 0.5 m to 5 m and more, while the 3 inch (7.5 cm) imagery provides high resolution control for imagery down to 6 inch (15 cm) resolution.

Elevation data from the lidar coverage will provide excellent control for elevation models derived from stereo imagery as well as provide control to assess the performance of other lidar collections.

Future Developments

- Additional surveying in the Summer of 2009 will validate the accuracy of the control imagery and lidar as well as increase the density of measured control across the area.
- Targets will be developed and emplaced to use in quantifying spatial (MTF) performance of sensors.
- Terrestrial lidar collects will be made to build a complete three dimensional model of the City Center as control for lidar and other sensors.
- Additional ranges, similar to the Sioux Falls range, will be developed at multiple locations around the United States.

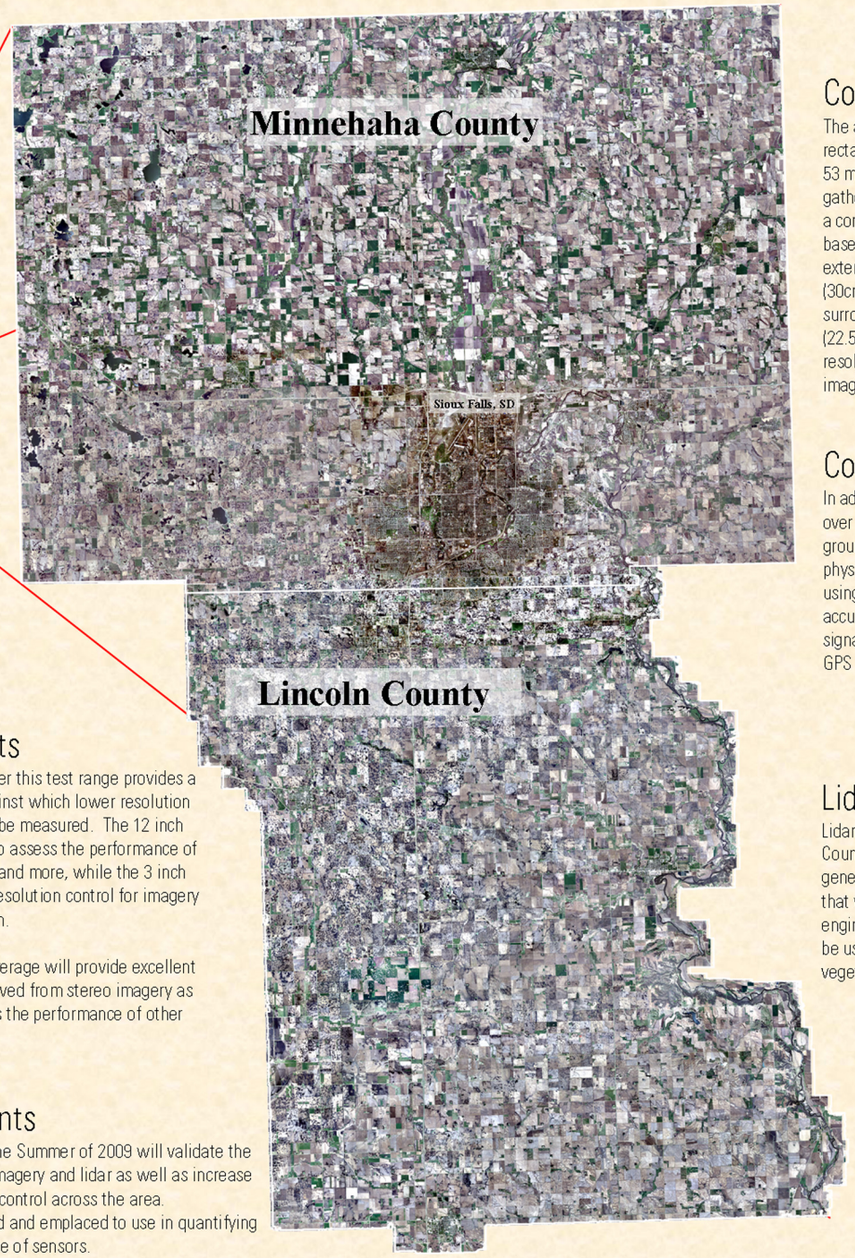

Figure 3 – Minnehaha and Lincoln County Geometric Test Range Aerial Dataset.

Control Imagery (figure 3)

The area, extending over two counties, nearly fills a rectangular area 34 mi (54.7 km) by 53 miles (85.3 km). Precision aerial imagery was gathered over the entire area in May 2008 to provide a control base against which data from other space based or aerial sensors can be assessed. The full extent of both counties was gathered in 12 inch (30cm) imagery while the city of Sioux Falls and its surroundings, an area slightly larger than 14 miles (22.5 km) square, has been imaged at 6 inch (15 cm) resolution. Finally, the central core of the City was imaged at 3 inch (7.5 cm) resolution.

Control Markers (figure 4)

In addition to the highly accurate reference imagery over the two counties, the site contains extensive ground control markers. These signalized, or physically painted markers have been surveyed using precision GPS surveying equipment to an accuracy of ~3 cm or less. Additional non signalized ground control is being developed using GPS measurement of the aerial imagery.

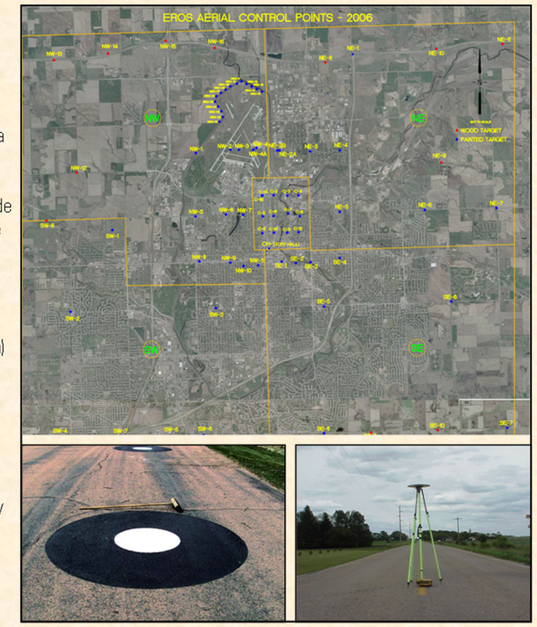

Figure 4 – Sioux Falls, South Dakota Geometric Test Range Aerial Targets.

Lidar (figure 5)

Lidar was collected over Minnehaha and Lincoln County in South Dakota with the primary purpose of generating current, high resolution elevation data that will be used for floodplain characterization and engineering planning purposes. This data will also be used to automatically extract features and vegetation information from this 3-D data.

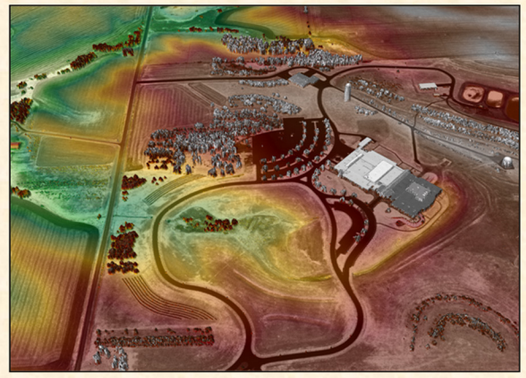

Figure 5 – USGS EROS Lidar derived 3D image map.

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