USING LANDSAT 8 TO IMPROVE GLOBAL LAND SURVEY GEOMETRIC ACCURACY

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Pecora 19

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ABSTRACT:

The Landsat Global Land Survey (GLS) data sets provide multi-decadal global coverage of Landsat image data registered to a consistent geometric framework, and continue to serve as the geometric reference for all Landsat data products. The GLS geometric framework was established by applying satellite block triangulation techniques to a global network of Landsat 7 ETM+ scenes anchored by a set of approximately 700 scenes that were controlled by the National Geospatial Intelligence Agency (NGA). The NGA-controlled "anchor" scenes were not uniformly distributed around the world, including gaps in north-eastern Asia and most offshore islands. Areas lacking NGA control relied upon the inherent geometric accuracy of Landsat 7 data.

The advent of Landsat 8 and its excellent absolute geolocation accuracy has provided a global assessment of GLS accuracy. GLS-derived ground control points are used to geometrically register Landsat 8 image products to the GLS framework. The magnitude of the adjustment required to perform this registration for each scene provides a measure of the accuracy of the GLS control points. In a number of regions around the world the GLS control has been found to exhibit repeatable large offsets when compared to Landsat 8 data. This is particularly the case in those areas where NGA "anchor" data were not available. The worst of these areas are being retriangulated using Landsat 8 data to improve the absolute geodetic accuracy of the GLS geometric framework. This retriangulation creates updated control point positions that will be used to regenerate the Landsat products, including the GLS, for the affected scenes. These updates are being conducted in three phases: 1) regions that contain at least one scene with geometric errors larger than 75 meters; 2) low latitude regions that contain errors larger than 50 meters; 3) high latitude regions with errors larger than 50 meters.

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