GeoCover Technical Guide

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Introduction

This guide provides users the details they need to employ GeoCover imagery downloaded from the GLCF. This is not intended as a seminal instruction on this topic, but rather a first step toward practical utilization. *Note: If the reader is unfamiliar with Landsat imagery, please read our technical document on GLCF Landsat holdings.*

Data Set Overview

Geocover data is Landsat data which has been orthorectified and processed to a higher quality standard. The GLCF GeoCover collection was produced under contract from NASA by EarthSat Inc. with locational information provided by NGA and USGS. The collection provides global, high resolution, multi-temporal imagery with corrections for distortions resulting from terrain. The data has been reviewed for geolocational and metadata accuracy through NASA Stennis and is free to redistribute. Users can take this imagery and use it to determine vegetation dynamics, urban sprawl, agricultural conversion, or apply it for numerous other uses.

Processing Characteristics

The GeoCover data set is designed to provide global Landsat imagery at three temporal intervals. Acquisition dates are circa 1970-80, 1990 and 2000 utilizing, respectively, the Landsat MSS, TM and ETM+ sensors.[1] All data is orthorectified or, in other words, corrected for terrain displacement and errors in image geometry. The GeoCover production followed the following processing steps:

1) Scenes selection: criteria were cloud haze (usually 10% or less), image quality, seasonality (growing season preferable) and same-day successive acquisitions.
2a) Orthorectification (TM only): Landsat images were "tied" together into "blocks" using the EarthSat mospoly[2] application. NGA geolocational points were applied and associated with an elevation model (accurate between 30m and 1km). The resulting "3D" space allowed for resampling of pixels within the otherwise 2D Landsat image and increased the end geodetic accuracy.
2b) Co-registration (MSS, ETM+): the MSS and ETM+ GeoCover data were orthorectified to the TM series data and DEM.
3) Validation: NASA Stennis Space Center reviewed EarthSat's metadata accuracy and conducted and a geolocational accuracy assessment of the data. Due to a lack of control points, certain areas of the world were not able to be assessed for accuracy, including southern South America and northeastern Asia.

Table 1, below, describes the end product validated by Stennis. Pixels are usually accurate within 50 meters or less. Radiometric characteristics correspond to those on the original Landsat satellites, although the thermal channel on the TM satellite was resampled to a 114 meter resolution.

Table 1: GeoCover Characteristics

Satellite	Sensor	Pixel Size (in meters for visible, thermal, pan bands)	RMSe
C. 1970	MSS	57, N/A, N/A	100m
C. 1990	TM	28.5, 114, N/A	50m
C. 2000	ETM+	28.5, 57, 14.25	50m

Data Format Properties

The GeoCover data set is provided in a standard GeoTIFF format with a UTM projection, using the WGS-84 datum. Each scene is provided with bands as separate files. Users need only download the files/bands they want. Image files are compressed using **gzip**, so that files have a ".gz" extension. The first step a user must follow after download is to 'gunzip' the file. This opens the Landsat image band in its native **GeoTIFF** file format. A GeoTIFF file can be used as a TIFF file in any graphical software, or, if the user has spatial software, the GeoTIFF header will provide georeferencing information. In addition to this georeferencing information, GeoCover image file from the GLCF will have been processed using a nearest-neighbor **resampling**

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[1] Please consult our Landsat tutorial for details on the Landsat program itself
[2] EarthSat patent 6125329

technique (although no interpolation was used). These characteristics are listed in the metadata file accompanying the scene. Most of these characteristics can be converted to other format options, depending on need and software. Contact the **GLCF** or visit the **Landsat program** for further details.

Primary Links

- *Compton J. Tucker, Denelle M. Grant, and Jon D. Dykstra*, [NASA's Global Orthorectified Landsat Data Set](#) (PDF).

- GLCF Landsat Technical Guide: http://glcf.umiacs.umd.edu/data/guide/technical/landsat.shtml

- NASA Landsat Program: http://geo.arc.nasa.gov/sge/landsat/landsat.html

- EarthSat Inc.: http://www.earthsat.com

- The EarthSat GeoCover project: http://www.geocover.com

- USGS Landsat Project: http://landsat7.usgs.gov/index.php

- National Geospatial-Intelligence Agency: http://www.nima.mil/portal/site/nga01/