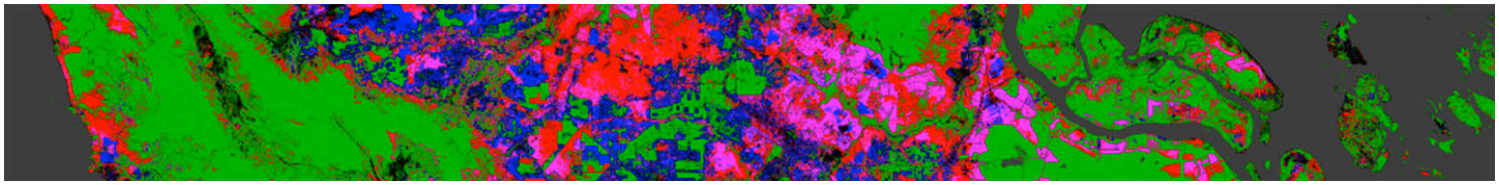

UNIVERSITY OF MARYLAND
DEPARTMENT OF GEOGRAPHICAL SCIENCES

Global Forest Change 2000–2012 Data Download

NOTE: This is version 1.0. A newer version 1.7 including forest loss through 2019 is availalbe.

Results from time-series analysis of 654,178 Landsat 7 ETM+ images in characterizing global forest extent and change from 2000 through 2012. For additional information about these results, please see the associated journal article (Hansen et al., *Science* 2013).

Web-based visualizations of these results are also available at our main site:

> **http://earthenginepartners.appspot.com/science-2013-global-forest**

Please use that URL when linking to this dataset.

We anticipate releasing updated versions of this dataset. To keep up to date with the latest updates, and to help us better understand how these data are used, please **register as a user**. Thanks!

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Use the following credit when these data are displayed:

> **Source: Hansen/UMD/Google/USGS/NASA**

Use the following credit when these data are cited:

> Hansen, M. C., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend. 2013. "High-Resolution Global Maps of 21st-Century Forest Cover Change." Science 342 (15 November): 850–53. Data available on-line from: http://earthenginepartners.appspot.com/science-2013-global-forest.

Dataset Details

This global dataset is divided into 10x10 degree tiles, consisting of seven files per tile. All files contain unsigned 8-bit values and have a spatial resolution of 1 arc-second per pixel, or approximately 30 meters per pixel at the equator.

Tree canopy cover for year 2000 (`treecover2000`)
Tree cover in the year 2000, defined as canopy closure for all vegetation taller than 5m in height. Encoded as a

percentage per output grid cell, in the range 0–100.

Global forest cover loss 2000–2012 (`loss`)
Forest loss during the period 2000–2012, defined as a stand-replacement disturbance, or a change from a forest to non-forest state. Encoded as either 1 (loss) or 0 (no loss).

Global forest cover gain 2000–2012 (`gain`)
Forest gain during the period 2000–2012, defined as the inverse of loss, or a non-forest to forest change entirely within the study period. Encoded as either 1 (gain) or 0 (no gain).

Year of gross forest cover loss event (`lossyear`)
A disaggregation of total forest loss to annual time scales. Encoded as either 0 (no loss) or else a value in the range 1–12, representing loss detected primarily in the year 2001–2012, respectively.

Data mask (`datamask`)
Three values representing areas of no data (0), mapped land surface (1), and permanent water bodies (2).

Circa year 2000 Landsat 7 cloud-free image composite (`first`)
Reference multispectral imagery from the first available year, typically 2000. If no cloud-free observations were available for year 2000, imagery was taken from the closest year with cloud-free data, within the range 1999–2012.

Circa year 2012 Landsat 7 cloud-free image composite (`last`)
Reference multispectral imagery from the last available year, typically 2012. If no cloud-free observations were available for year 2012, imagery was taken from the closest year with cloud-free data, within the range 1999–2012.

Reference composite imagery are median observations from a set of quality assessed growing season observations in four spectral bands, specifically Landsat bands 3, 4, 5, and 7. Normalized top-of-atmosphere (TOA) reflectance values (ϱ) have been scaled to an 8-bit data range using a scale factor (g):

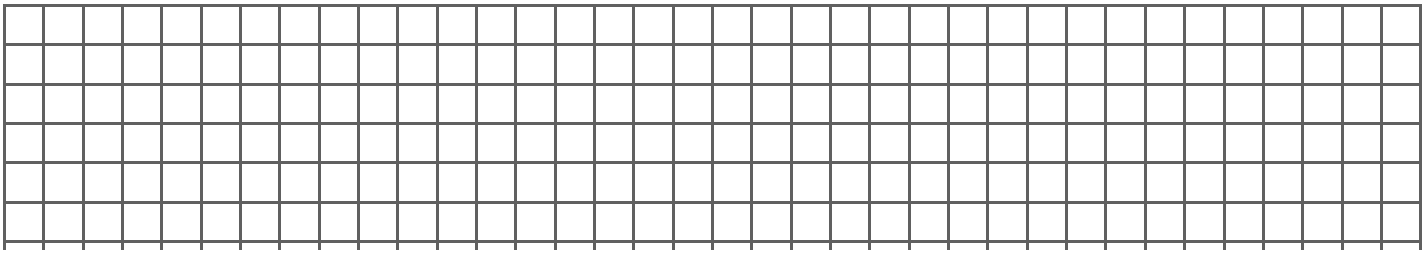
$$\mathrm{DN} = \varrho \cdot g + 1$$

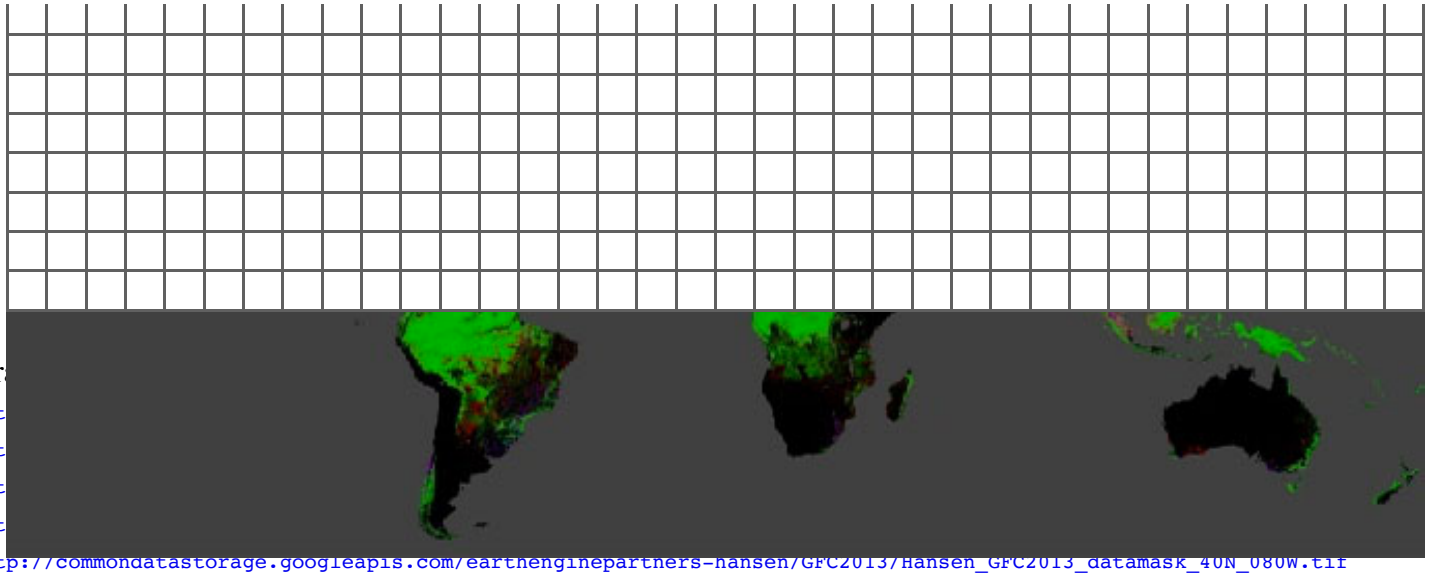
The g factor was chosen independently for each band to preserve the band-specific dynamic range, as shown in the following table:

Landsat Band	g
Band 3 (red)	508
Band 4 (NIR)	254
Band 5 (SWIR)	363
Band 7 (SWIR)	423

Download Instructions

To download individual 10x10 degree granules, click on a region on the map below and then click on the URLs underneath it.





Gr

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http://commondatastorage.googleapis.com/earthenginepartners-hansen/GFC2013/Hansen_GFC2013_datamask_40N_080W.tif

http://commondatastorage.googleapis.com/earthenginepartners-hansen/GFC2013/Hansen_GFC2013_first_40N_080W.tif

http://commondatastorage.googleapis.com/earthenginepartners-hansen/GFC2013/Hansen_GFC2013_last_40N_080W.tif

We have provided a complete set of granules spanning the range 180W–180E and 80N–60S, but the granules over the ocean are provided for completeness only and do not contain any meaningful data. Should you wish to download a complete layer, you may download a text file containing the complete list of URLs for each layer: **`treecover2000`**, **`loss`**, **`gain`**, **`lossyear`**, **`datamask`**, **`first`**, or **`last`**.

Note that the **`loss`**, **`gain`**, **`lossyear`**, and **`datamask`** layers compress extremely well (totalling less than 10GB each globally), and the **`treecover2000`** layer compresses fairly well (less than 50GB), but the **`first`** and **`last`** multispectral layers are much larger (totalling over 600GB each). You may wish to take this into account when selecting which layers to download in their entirety.

Analyzing the Results in Earth Engine

You can also analyze these results directly in Google Earth Engine using the asset ID **`UMD/hansen/global_forest_change_2013`**. If you are not yet an Earth Engine user, you may sign up here. To help you get started we have made an introductory tutorial showing examples of how to use this data to do a variety of things, including generating indices from annual Landsat composites and computing tree loss per year for regions of interest.

Usage Notes

The pixel grid is aligned such that pixel centers (rather than edges) fall on the lines of integer latitude and longitude. As a result, in order for the granules to completely cover each 10x10 degree region, the granules overlap by one pixel on each side. You will need to account for this overlap if you are reassembling multiple granules into a single larger image.

Errata

None as of 9 February 2014.