

Quick Guide for Accessing Harmonized Landsat-8 and Sentinel-2 (HLS) Data in NASA's Earthdata Search

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Introduction

The Harmonized Landsat-8 and Sentinel-2 (HLS) project is a NASA initiative aiming to produce a Virtual Constellation (VC) of surface reflectance (SR) data from the Operational Land Imager (OLI) and MultiSpectral Instrument (MSI) onboard the Landsat 8 and Sentinel-2 remote sensing satellites, respectively. The combined SR archive measurement enables global observations of the land every 2-3 days at 30 m spatial resolution. The HLS project uses a set of algorithms to provide atmospheric correction, cloud and cloud-shadowing masking, spatial co-registration and common gridding, illumination and view angle normalization, and spectral bandpass adjustment to obtain seamless products from both sensors (OLI and MSI). The HLS data products can be regarded as the building blocks for a “data cube” such that a user may examine any given pixel through time and treat the near-daily surface reflectance time series as though it came from a single sensor.

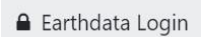
The S30 product provides 30 m Nadir BRDF-Adjusted Reflectance (NBAR) derived from MSI data. The S30 product is resampled as needed to a common 30-meter resolution UTM projection and tiled using the Sentinel-2 Military Grid Reference System (MGRS) UTM grid. It is then BRDF normalized using a locally fixed, latitude-dependent solar angle and nadir view, and spectrally adjusted to match Landsat 8/OLI spectral bandpasses. Each band is stored as an individual Cloud Optimized GeoTIFF (COG).

The L30 product provides 30 m Nadir BRDF-Adjusted Reflectance derived from OLI data. The L30 products are derived from Landsat 8/OLI SR products and resampled and gridded to the same reference images and MGRS grid used for S30. The BRDF is normalized in the same way as S30 as well.

Instructions on how to find HLS S30 and L30 granules that contain data for a region of interest (ROI) from NASA’s Earthdata Search are provided below. Earthdata Login credentials are required to download HLS data products.

How to search and download HLS data in NASA’s Earthdata Search

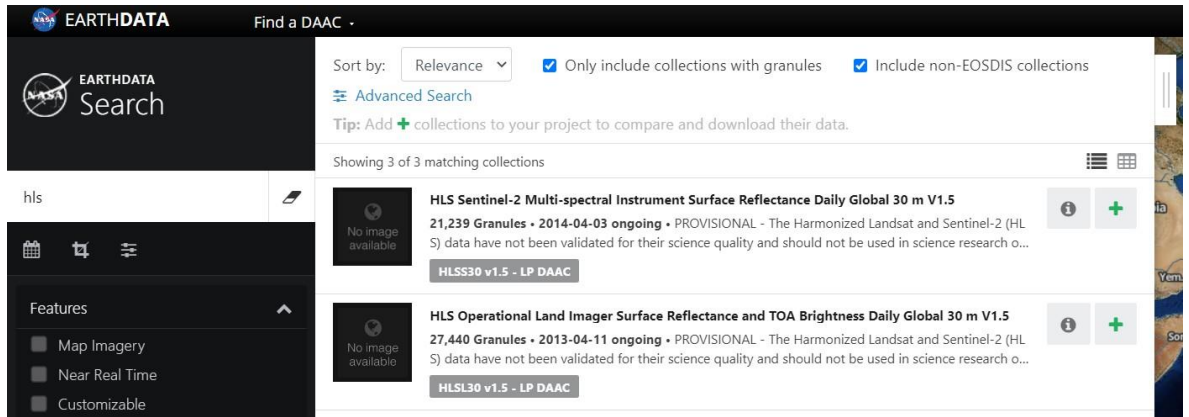
Step 1: Go to <https://search.earthdata.nasa.gov/>



- Click the  button in the upper right hand corner to sign in using an Earthdata Login account or [register](#) for a new account.



Step 2: In the search engine  in the upper left, simply search for “HLS”.

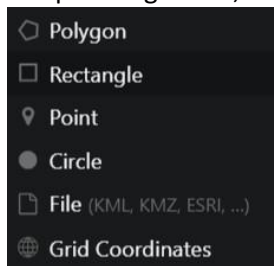
- The HLS Sentinel-2 Multi-spectral Instrument Surface Reflectance Daily Global 30 m V1.5 (S30) and HLS Operational Land Imager Surface Reflectance and TOA Daily Brightness Daily Global 30 m V1.5 (L30) data products should appear. *(Note: The user can also search individually for ‘HLSS30’ or ‘HLSL30’. Processes for searching, filtering, and downloading data are identical for S30 and L30 data products.)*



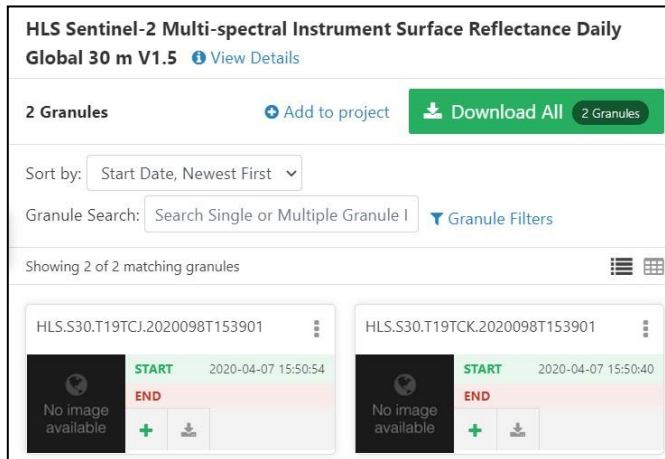
Step 3: Apply a search filter using temporal and/or spatial boundaries using the   tools below the search bar in the search engine. *(Note: There is only limited spatial coverage at this time)*




- The temporal filter allows for user-provided start and end date/time and will return any granules acquired between those dates.

- The spatial filter allows the user to draw a polygon, circle, or rectangle region of interest to filter granules by location. Other spatial options include submitting a lat/long point location or uploading a kmz, shapefile, or GeoJSON.

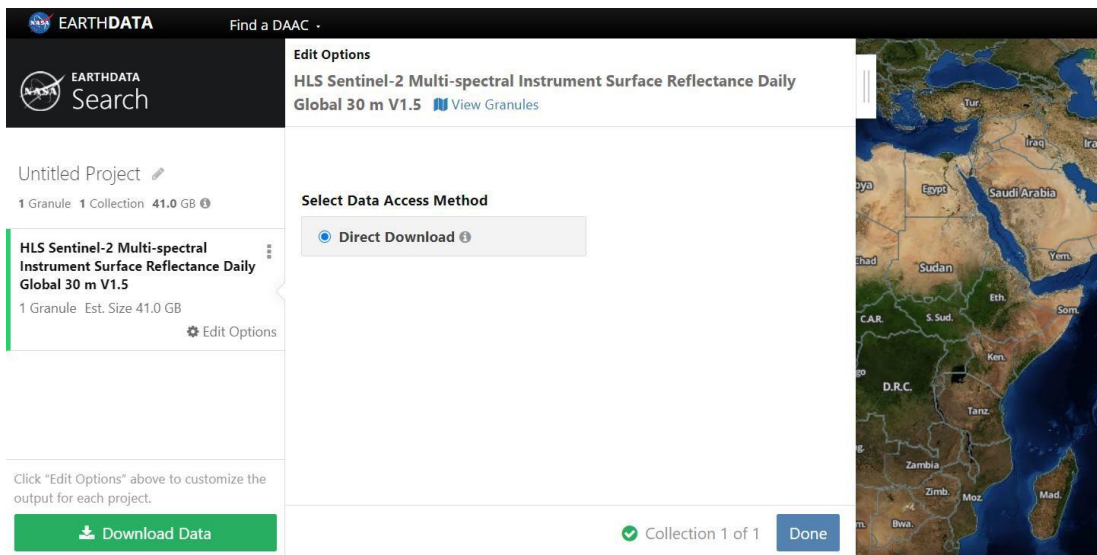


Step 4: Click anywhere in the rectangular box of a matching collection to view a list of available granules.




Step 5: Download all granules associated with the selected collection using the tool located in the right-hand corner . Select specific granules to add to an order using the  button, or directly download the individual bands of a granule using the  icon.

Step 6: After you have clicked on the green download button, review your order to ensure the correct number of granules were selected and to preview the size estimate for your order. You will then be prompted to “Download Data” in the bottom left of the page.



Step 7: The “Download Status” page provides options for downloading the data.


- The “View/Download Data Links” button  brings up a listing of direct links to download the .tif file for each HLS band. Please note that the bands are in no particular order.

Example of S30 granule contents:

- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B10.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B11.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B02.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.VZA.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B08.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B04.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.SZA.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B01.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.SAA.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.Fmask.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B06.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B8A.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B03.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B09.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B05.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B07.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.VAA.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSS30.015/HLS.S30.T53SQC.2020273T012701.v1.5.B12.tif>


Example of L30 granule contents:

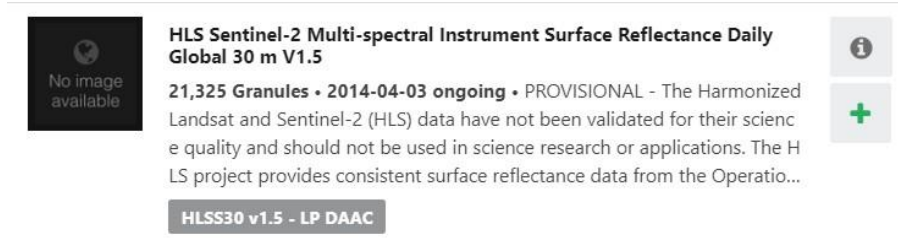
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B11.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B04.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B01.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B02.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B03.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B09.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.ACmask.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B06.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.Fmask.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B07.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B10.tif>
- <https://lpdaac.earthdata.nasa.gov/lp-prod-protected/HLSL30.015/HLS.L30.T59KLT.2020266T224447.v1.5.B05.tif>

- The “Download Access Script” button  provides the user with a shell script file that can be executed to bulk download all the files.

Please contact LP DAAC User Services at lpdaac@usgs.gov with any questions or issues with accessing HLS data. Be sure to reference the request ID in any correspondence.

Accessing Collection Metadata

Step 1: To access the metadata for an HLS collection, click on the information button  in the upper right of the collection after it appears in a search.

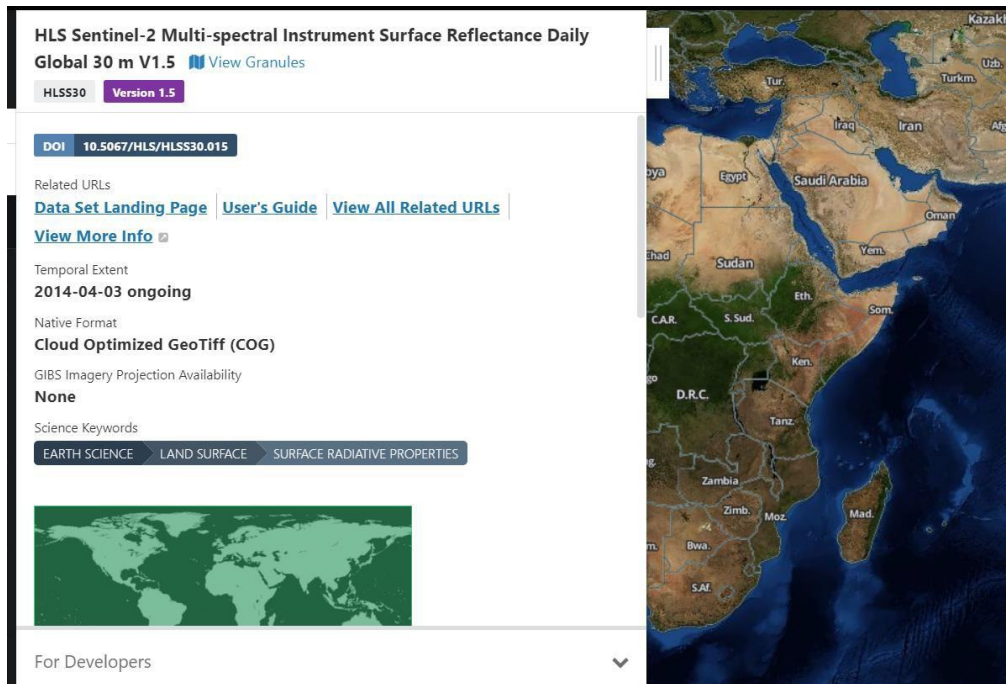


HLS Sentinel-2 Multi-spectral Instrument Surface Reflectance Daily Global 30 m V1.5

21,325 Granules • 2014-04-03 ongoing • PROVISIONAL - The Harmonized Landsat and Sentinel-2 (HLS) data have not been validated for their science quality and should not be used in science research or applications. The HLS project provides consistent surface reflectance data from the Operatio...

HLSS30 v1.5 - LP DAAC

Step 2: Scroll to the bottom of the new view and expand the “For Developers” tab.



HLS Sentinel-2 Multi-spectral Instrument Surface Reflectance Daily Global 30 m V1.5 [View Granules](#)

HLSS30 Version 1.5

DOI 10.5067/HLS/HLSS30.015

Related URLs
[Data Set Landing Page](#) [User's Guide](#) [View All Related URLs](#)
[View More Info](#)

Temporal Extent
2014-04-03 ongoing

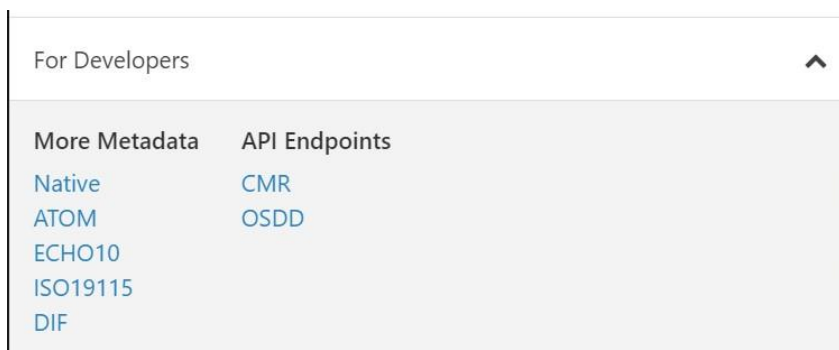
Native Format
Cloud Optimized GeoTiff (COG)

GIBS Imagery Projection Availability
None

Science Keywords
EARTH SCIENCE LAND SURFACE SURFACE RADIATIVE PROPERTIES

For Developers

Step 3: Select “Native” metadata and save as an .xml file.

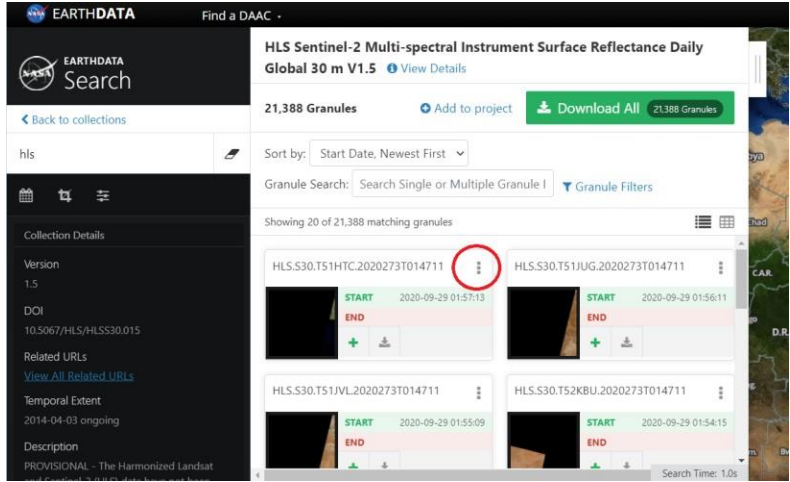


For Developers

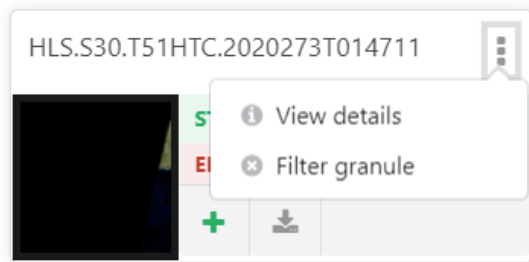
More Metadata	API Endpoints
Native	CMR
ATOM	OSDD
ECHO10	
ISO19115	
DIF	

Accessing Granule Metadata

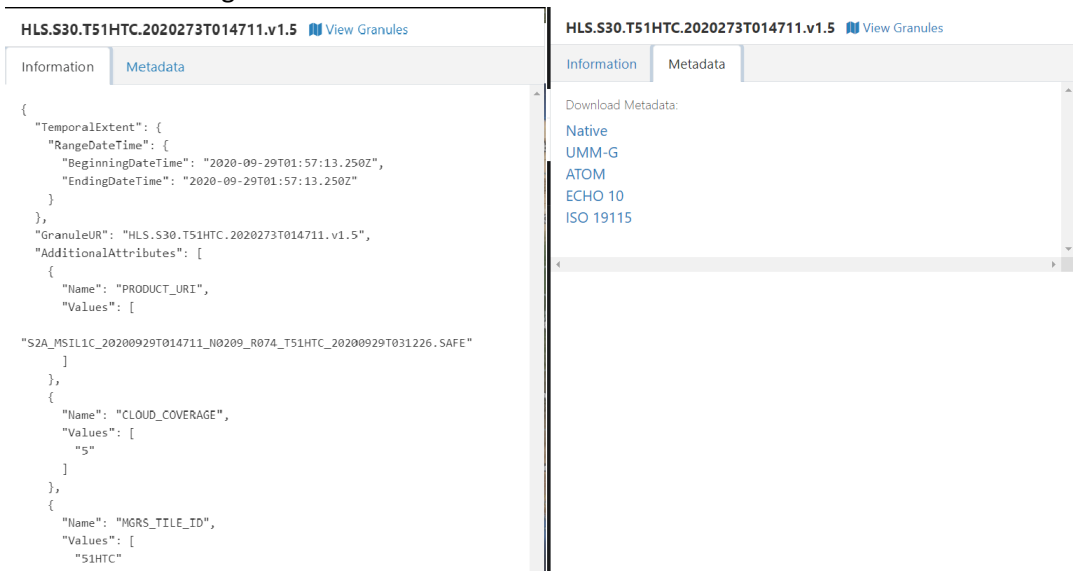
Step 1: To access the metadata for a granule, select the three dots in the upper right of the desired granule.



Step 2: Choose “View details”.



Step 3: View the metadata in the Information tab or select “Native” in the Metadata tab and save as an .xml file to download the granule metadata.



HLS S30 Bands

Please refer to the following table for information on the bands offered in the HLS S30 data product:

Data layer	MSI band number	Units	Data type	Scale	Fill value	Spatial Resolution	Description
B01	1	reflectance	int16	0.0001	-9999	30	NBAR
B02	2	reflectance	int16	0.0001	-9999	30	
B03	3	reflectance	int16	0.0001	-9999	30	
B04	4	reflectance	int16	0.0001	-9999	30	
B05	5	reflectance	int16	0.0001	-9999	30	
B06	6	reflectance	int16	0.0001	-9999	30	
B07	7	reflectance	int16	0.0001	-9999	30	
B08	8	reflectance	int16	0.0001	-9999	30	
B8A	8A	reflectance	int16	0.0001	-9999	30	
B09	9	reflectance	int16	0.0001	-9999	30	TOA Refl.
B10	10	reflectance	int16	0.0001	-9999	30	
B11	11	reflectance	int16	0.0001	-9999	30	NBAR
B12	12	reflectance	int16	0.0001	-9999	30	
FMASK	-	none	uint8	-	255	30	Quality bits

(Note: An RGB image can be created by using bands 4, 3, and 2 in sequence)

HLS L30 Bands

Please refer to the following table for information on the bands offered in the HLS L30 data product:

Data layer	OLI band number	Units	Data type	Scale	Fill value	Spatial Resolution	Description
B01	1	reflectance	int16	0.0001	-9999	30	NBAR
B02	2	reflectance	int16	0.0001	-9999	30	
B03	3	reflectance	int16	0.0001	-9999	30	
B04	4	reflectance	int16	0.0001	-9999	30	
B05	5	reflectance	int16	0.0001	-9999	30	
B06	6	reflectance	int16	0.0001	-9999	30	
B07	7	reflectance	int16	0.0001	-9999	30	
B09	9	reflectance	int16	0.0001	-9999	30	TOA Refl.
B10	10	degree °C	int16	0.01	-9999	30	TOA BT
B11	11	degree °C	int16	0.01	-9999	30	
FMASK	-	none	uint8	-	255	30	Quality bits

(Note: An RGB image can be created by using bands 4, 3, and 2 in sequence)

Interpreting File Names

HLS data are identified by a Tile ID that contains multiple components. They are individually differentiated as 'HLS.S30' and 'HLS.L30'. Tile locations map to sub-grid locations within UTM zone at a specific latitude band. For example, tile 19TCJ is in UTM zone 19, latitude band T (in Northern Hemisphere), and labeled C in the east-west direction and J in the south-north direction within grid zone 19T. In the file name the tile ID is preceded by a 'T' (e.g. T19TCJ). Date and time of acquisition is also represented in the file with a character string of year, Day of Year, and time in HHMMSS. Data version number is also included (v1.5), and the band within the granule is referenced (B06).

[HLS.S30.T19TCJ.2020098T153901.v1.5.B06.tif](#)

HLS.<data product>.<Tile_ID>.<year><julian day><time(HHMMSS)>.v<version number>.<band>.tif