Checksums Help

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Overview

A checksum helps verify the integrity of a downloaded file. When files are transferred from one location to another, small glitches might introduce corruption to a file. (One way to check whether a file transferred correctly is to compare the file's size against the expected size, but this is not reliable.)

A good checksum algorithm uses a cryptographic hash function to generate a string of numbers and letters, often called a hash. If you know the checksum hash for the original file and you run the same algorithm on your local file and get the same result, you can have very high confidence that your local file is an exact copy of the original.

How do I use checksums with Machine-to-Machine (M2M) scripts?

Summary:

- Obtain the checksum for the product when obtaining the download URL from **download-retrieve**
- Download the file
- Perform the same type of checksum locally and compare

For example scripts, see Examples - Machine-to-Machine (M2M) API

If you previously downloaded files and would like to confirm their checksums, create a script that uses the **download-options** function for the entityIds and products. The download-options endpoint lists checksums but does not add download requests to your queue as download-request does. (If you add requests to your queue but do not download those files, you may eventually receive a rate limit error.)

The **download-options**, **download-request**, and **download-retrieve** endpoints provide checksums for requested products (when checksums are available).

What types of checksums are there on USGS EROS datasets?

There are three types of checksums that may be provided for USGS EROS datasets: **SHA-512**, **SHA-256**, and **cksum**.

SHA-512

The SHA-512 algorithm is available on UNIX-like systems, Windows, and many language libraries. Examples:

- UNIX and Linux: sha512sum (note the "sum" at the end of the command name)
- Windows: CertUtil (commonly but not always installed), with the SHA512 argument
- Windows PowerShell: Get-Filehash command, with argument: -Algorithm SHA512
- PHP: hash_file() function with the algorithm sha512
- Python: hashlib library, sha512() function

Refer to the documentation for each command or function for usage details. This is not an exhaustive list; refer to your platform or language's documentation for other tools.

SHA-256

Commands/arguments are identical to SHA-512 but with 256 instead of 512. SHA-256 produces a shorter hash.

Cksum

The cksum command is available on UNIX and Linux operating systems and determines the file's 32-bit Cyclic Redundancy Check (CRC) in decimal format. (This is an older algorithm and is different than the CRC-32 algorithm used in zip, PNG, and zlib.) Windows systems do not have a cksum program unless UNIX-like utilities such as GNU Coreutils are installed.

Which datasets and products have checksum information available?

Checksums are being added to dataset products. For some datasets, some products have checksums, but some products do not. Some datasets do not offer checksums for any products. Products may have more than one type of checksum.

As of the latest update to this "Help," the following products have checksum information:

Dataset	**datasetAlias**	**Products and Checksum Types**
Aerial Imagery: • NAIP	naip	Full Resolution: **cksum** Compressed: **cksum**
Landsat / Landsat Collection 2 Level-1: • Landsat 8-9 OLI/TIRS C2 L1 • Landsat 7 ETM+ C2 L1 • Landsat 4-5 TM C2 L1 • Landsat 1-5 MSS C2 L1	landsat_ot_c2_l1 landsat_etm_c2_l1 landsat_tm_c2_l1 landsat_mss_c2_l1	Landsat Collection 2 Level-1 Band File: **sha512**
Landsat / Landsat Collection 2 Level-2: • Landsat 8-9 OLI/TIRS C2 L2 • Landsat 7 ETM+ C2 L2 • Landsat 4-5 TM C2 L2	landsat_ot_c2_l2 landsat_etm_c2_l2 landsat_tm_c2_l2	Landsat Collection 2 Level-2 Band File: **sha512**

Note that for Landsat scenes, it’s the secondary datasets – the individual band and metadata files – that have checksums. (As of this update, no checksums are available for .tar bundles or for browse.)

To see which types of checksums might be available for a dataset's products, use the **dataset-download-options** endpoint. The product detail includes a checksum_types[] array if applicable.

Are there other ways to obtain checksums?

For some USGS/EROS download systems, the HTTP header includes a **Content-Digest** element that contains checksum values. Currently, the only products with this information are NAIP Full Resolution and Compressed products.

What about web user interfaces?

If you would like to be able to view checksums in web applications such as EarthExplorer, GloVis, or the Bulk Download Web Application, please contact USGS EROS User Services and let us know how checksums would be useful for your situation. Currently, there are no plans to display checksums in USGS EROS web user interfaces.