

# Landsat Collection 2 Level-3 Burned Area Science Product

Accurate and complete data on fire locations and burned areas are needed to quantify trends and patterns of fire occurrence, characterize drivers of fire, project future fire pattern behavior, and help with assessments of fire effects on natural and social systems. The Landsat Collection 2 (C2) Level-3 Burned Area (BA) science product is designed to identify burned areas across all ecosystems (for example, forests, shrublands, and grasslands) for Landsat 4–9 data.

The Landsat BA contains two acquisition-based raster images that represent burn classification (BC) and burn probability (BP) (fig. 1). Landsat BA is generated from Landsat C2 U.S. Analysis Ready Data Surface Reflectance and Top of Atmosphere brightness temperature data. The Landsat C2 BA science product is processed to a 30-meter spatial resolution in the Albers Equal-Area Conic projection using the World Geodetic System of 1984 (known as WGS 84) datum gridded to fixed 5,000-square meter nonoverlapping tiles (fig. 2).

## Product Availability

The Landsat C2 BA science product is available for the conterminous United States for the following date ranges:

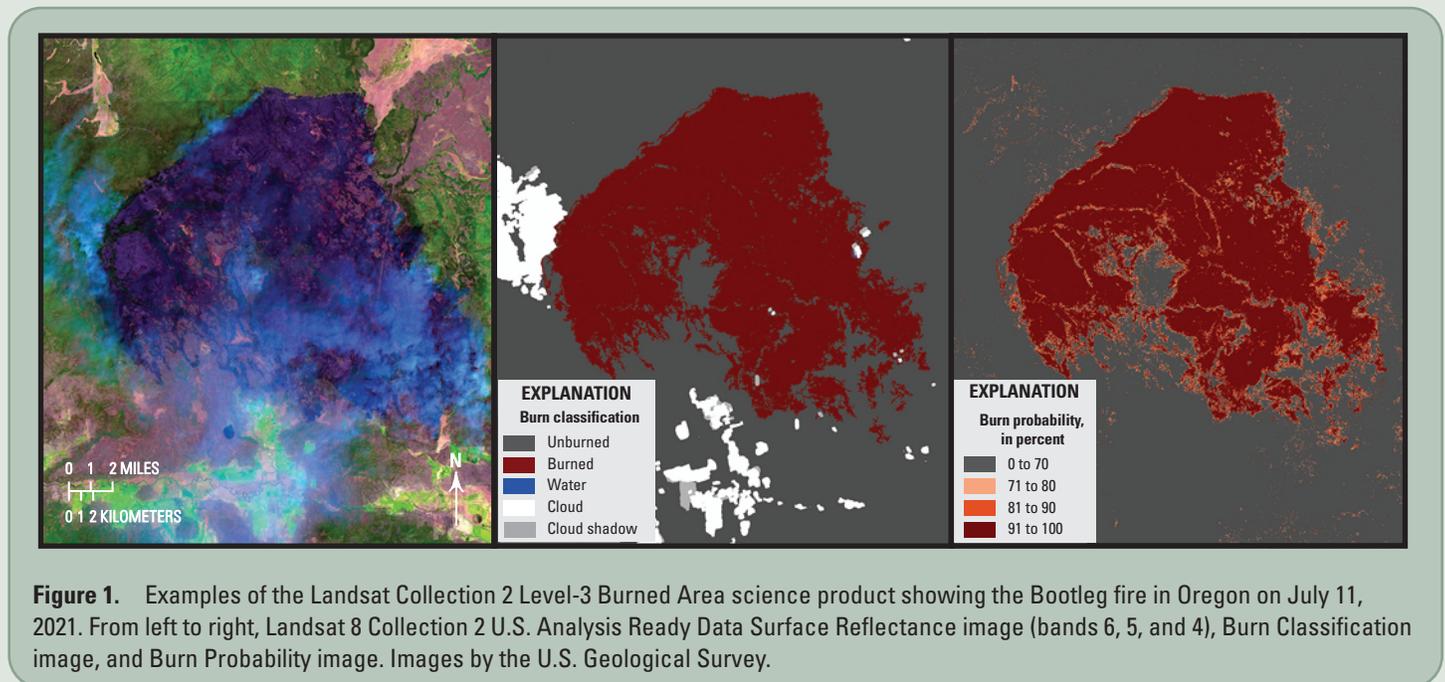
- Landsat 9 Operational Land Imager: October 2021 to present

- Landsat 8 Operational Land Imager: April 2013 to present
- Landsat 7 Enhanced Thematic Mapper Plus: July 1999 to April 2022
- Landsat 5 Thematic Mapper: March 1984 to May 2012
- Landsat 4 Thematic Mapper: March 1984 to September 1992

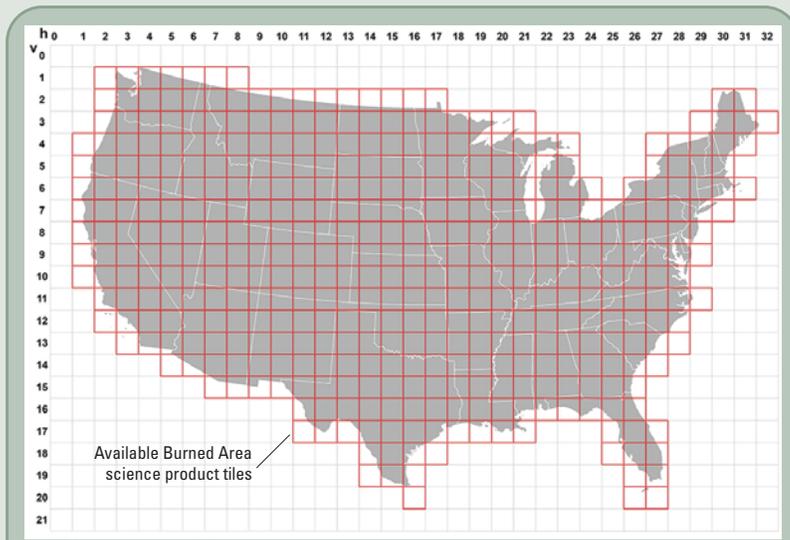
## Product Improvements

Although no major changes were made from Landsat Collection 1 to C2 BA, the following updates were made:

- A new browse file was added to the BA science product.
- A bug discovered in Landsat Collection 1 (where pixels in the top row [northern edge] and left column [western edge] of the Landsat U.S. Analysis Ready Data tiles were incorrectly classified as unburned in the BC layer) was corrected.
- The BA science product was modified to allow data to grow in a diagonal direction instead of up/down and sideways.
- The model was retrained because of the Python 3 upgrade, which caused minor differences in the outputs.



**Figure 1.** Examples of the Landsat Collection 2 Level-3 Burned Area science product showing the Bootleg fire in Oregon on July 11, 2021. From left to right, Landsat 8 Collection 2 U.S. Analysis Ready Data Surface Reflectance image (bands 6, 5, and 4), Burn Classification image, and Burn Probability image. Images by the U.S. Geological Survey.



**Figure 2.** This map shows the coverage of the Landsat 2 Level-3 Burned Area science product. Each tile represents 5,000 square miles, which are identified using a horizontal (h) and vertical (v) grid.

## Product Content

The C2 BA science product includes two acquisition-based rasters that represent BC and BP, a browse file, and the product metadata (Extensible Markup Language [or XML] and JavaScript Object Notation [or JSON] file formats). The files included in the C2 BA acquisition-based product are as follows:

- Burn Probability (raster layer): Provides the maximum per-pixel BP and is generated by comparing the current individual acquisition against composites created from seasonal average and the previous year of acquisition.  
Delivered file name: tileID\_BP.TIF
- Burn Classification (raster layer): Indicates if an area was burned by applying a threshold to the BP product.  
Delivered file name: tileID\_BC.TIF
- Browse file: A false-color composite (shortwave infrared 2/ near infrared/green), BP, and BC plots are provided as one quick-look image for visual inspection of BA performance.  
Delivered file name: tileID.png
- Metadata (Extensible Markup Language file): Metadata file.  
Delivered file name: tileID\_BA.XML

## Data Access

The Landsat C2 BA science product and Landsat C2 Analysis Ready Data are available for download from EarthExplorer (<https://earthexplorer.usgs.gov/>) and through the commercial cloud.

In EarthExplorer, the data are available under the “Landsat” category and the “Landsat Collection 2 Level-3 Science Products” or “Landsat C2 U.S. Analysis Ready Data (ARD)” subcategory and are listed as “Landsat 4-9 C2 Burned Area.”

Visit the “Landsat Data Access” web page (<https://www.usgs.gov/landsat-missions/landsat-data-access>) for additional information about commercial cloud data access and bulk download options.

## Documentation

Information about the Landsat C2 BA science product is available at <https://www.usgs.gov/landsat-missions/landsat-collection-2-level-3-burned-area-science-product>. Additional technical details about the C2 BA science product are available in the product guide and algorithm description document on this web page.

## Citation Information

The use of Landsat C2 Level-3 science products is not restricted. Although not a requirement of data use, the following citations may be used in publication or presentation materials to acknowledge the U.S. Geological Survey as a data source and to credit the original research:

Landsat Collection 2 Level-3 Burned Area Science Product courtesy of the U.S. Geological Survey.

Hawbaker, T.J., Vanderhoof, M.K., Schmidt, G.L., Beal, Y.-J., Picotte, J.J., Takacs, J.D., Falgout, J.T., and Dwyer, J.L., 2020, The Landsat Burned Area algorithm and products for the United States: *Remote Sensing of Environment*, v. 244, art. 111801, 24 p., <https://doi.org/10.1016/j.rse.2020.111801>.

Visit <https://www.usgs.gov> for more information about the U.S. Geological Survey and <https://www.usgs.gov/programs/national-land-imaging-program> for specifics about the National Land Imaging Program.

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