

# Burned Area Service

V1.2


For training purposes, a suitable processing job to be cloned and repeated is job #555 that maps the burned areas within the Chernobyl region of Ukraine from March / April 2020.

## Service description

This service uses Sentinel-2 optical imagery to highlight regions of potential burned areas. It compares two Sentinel-2 images, one for the start and the other from the end of time period of interest. For each of the images the service calculated the Normalised Burn Ratio (NBR). This is an index designed to highlight burnt areas in large fire zones. The formula is similar to NDVI, except that the formula combines the use of both near infrared (NIR) and shortwave infrared (SWIR) wavelengths to focus on changes in vegetation canopy structure.

The service combines the two individual NBR images to create a difference NBR (dNBR), which will highlight changes in vegetation canopy structure between the two image acquisition dates that would indicate damage that could be caused by a fire event.

## Selecting the service

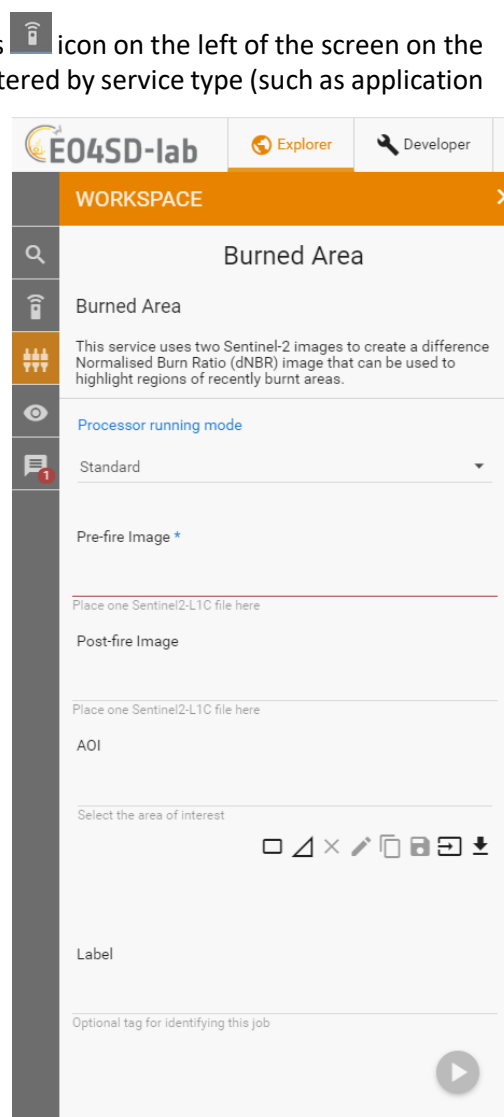
The **Burned Area** service is selected by clicking on the services  icon on the left of the screen on the *Explorer pane*. This opens up the Service list, which can be filtered by service type (such as application or processor). Scroll down or type into the search interface the name of the service and after selection the *WorkSpace* panel will open.

## Input data

The **Burned Area** service is designed to work with Sentinel-2 L1C images

## Parameters

- **Processor Running Mode:** The Processors can be run in two modes **standard** or **systematic**. Most users will just require standard processing i.e. processing of one or more products in a single processing run. For advanced users, systematic processing allows the service to be run periodically if the platform identifies input data that matches the user-defined criteria.
- **Pre-Fire Image:** this is the first Sentinel-2 image from before the fire event. Drag the input Sentinel-2 image (grabbing from the horizontal lines to the left of its name) from the Results tab at the bottom of the screen to the Input data field.
- **Post-Fire Image:** this is the second Sentinel-2 image from after the fire event. Drag the input Sentinel-2 image (grabbing from the horizontal lines to the left of its name) from the Results tab at the bottom of the screen to the Input data field.


 The screenshot shows the EO4SD-lab workspace interface. At the top, there are tabs for 'EO4SD-lab', 'Explorer', and 'Developer'. Below this is a 'WORKSPACE' header with a close button. The main content area is titled 'Burned Area'. On the left side, there is a vertical menu with icons for search, services, users, eye, and messages. The 'Burned Area' service is selected and highlighted. Below the service name, there is a description: 'This service uses two Sentinel-2 images to create a difference Normalised Burn Ratio (dNBR) image that can be used to highlight regions of recently burnt areas.' Below the description, there is a 'Processor running mode' dropdown menu set to 'Standard'. The 'Pre-fire Image \*' field is empty, with a placeholder 'Place one Sentinel2-L1C file here'. Below it is the 'Post-fire Image' field, also empty with the same placeholder. The 'AOI' field is empty with the placeholder 'Select the area of interest'. Below the AOI field is a toolbar with icons for selection, zoom, pan, and other tools. The 'Label' field is empty. At the bottom, there is an 'Optional tag for identifying this job' field and a play button icon.








- **Area of interest:** An OPTIONAL field to define an Area of Interest (AOI) to be used to create a geographic subset of the output image. The AOI can be drawn on the GeoBrowser, extracted from a shapefile uploaded by the user or selected from a previously defined AOI. Alternatively, it can be specified in the Well-Known Text (WKT) POLYGON format. An example of a valid specification is: POLYGON((-92.906633 16.190411,-92.066559 16.188383,-92.070266 15.376645,-92.907004 15.378567,-92.906633 16.190411)).
- **Label:** An OPTIONAL field for free form tagging for later identification of this processing job.

### Service Outputs

The **Burned Area** service will generate three outputs:

- A true colour composite GeoTIFF of the pre-fire Sentinel-2 image
- A true colour composite GeoTIFF of the post-fire Sentinel-2 image
- A GeoTIFF of the burned areas as identified by the service using the USGS colour scale

The burned areas are identified by the application of a threshold on the dNBR image. For easy interpretation the GeoTIFF is colour coded to indicate burned severity using the below colour scale as proposed by the United States Geological Survey (USGS).

Severity Level	dNBR range (not scaled)	
Enhanced Regrowth, high (post-fire)	-0.500 to -0.251	
Enhanced Regrowth, low (post-fire)	-0.250 to -0.101	
Unburned	-0.100 to +0.099	
Low Severity	+0.100 to +0.269	
Moderate-low Severity	+0.270 to +0.439	
Moderate-high Severity	+0.440 to +0.659	
High Severity	+0.660 to +1.300	

### Service Execution

Once all input fields have been filled in, the service is launched by clicking the round play button at the bottom right corner of the input dialogue area.

The resulting outputs GeoTIFF files can be downloaded, re-used or visualised in the Geobrowser. Further analysis can be undertaken in one of the GUI applications, such as SNAP, QGIS or Monteverdi. Soon after desired application process (e.g. QGIS) is started, a 'Go to GUI' icon appears in the job description. The desired GUI application can then be accessed by clicking this icon, which opens the GUI in another browser tab. The image below shows a burned area output, in this case from Chernobyl, Ukraine in April 2020, displayed in the GeoBrowser.

