

GRIME-AI User Guide
v0.0.5.9

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November 11, 2024

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DOWNLOAD USGS DATA

This feature facilitates downloads of USGS HIVIS imagery. If streamflow (stage and discharge) data are available from a co-located gauge, those are also downloaded automatically.

1. Open GRIME-AI. This may take up to a minute.

The screenshot displays the GRIME-AI application window. The top navigation bar contains icons for File, Image Set, Tools, and Help. Below this, there are tabs for NEON Sites, NEON Download Manager, USGS Sites, USGS Download Manager, Image Analysis, Sensor Data Graphs, and Google Maps (Provisional). The main content area is divided into three panels: NEON Sites, BARC, and NEON Site Products. The NEON Sites panel shows a list of sites, with 'BARC' selected. The BARC panel displays details for the Lake Barco NEON site, including its site code, name, description, type, coordinates, and state. The NEON Site Products panel lists various data products available for the site. A small window in the foreground shows a list of NEON sites and their details, including site names like 'KING - Kings Creek NEON' and 'KONA - Kona Prairie Agroecosystem NEON'.

2. Select the USGS Sites tab.

The screenshot displays the GRIME-AI application window with the USGS Sites tab selected. The top navigation bar contains icons for File, Image Set, Tools, and Help. Below this, there are tabs for NEON Sites, NEON Download Manager, USGS Sites, USGS Download Manager, Image Analysis, Sensor Data Graphs, and Google Maps (Provisional). The main content area is divided into two panels: USGS Sites and USGS Download Manager. The USGS Sites panel shows a list of sites, with 'AK_Alsek_River_at_Dry_Bay_near_Yakutat' selected. The USGS Download Manager panel displays details for the selected site, including its location, coordinates, and a list of data products. A large green arrow points to the USGS Sites tab. The bottom status bar shows the current date and time: Thursday, Oct 31, 2024 10:01:15 AKDT.

3. Select a USGS HIVIS site of interest. The latest available image and site metadata will be displayed, sometimes including information on sensor data availability.

The screenshot shows the GRIMe-At interface with the following components:

- Left Panel (Site List):** A list of USGS sites. The selected site is `AK_DANGEROUS_R_AT_HARLEQUIN_LK_OUTLET_NR_YAKUTAT_AK`.
- Right Panel (Metadata and Image):**
 - Metadata:**

```

overlayDir: https://usgs-nims-images.s3.amazonaws.com/overlay/AK_DANGEROUS_R_AT_HARLEQUIN_LK_OUTLET_NR_YAKUTAT_AK/
thumbDir: https://usgs-nims-images.s3.amazonaws.com/thumbnail/AK_DANGEROUS_R_AT_HARLEQUIN_LK_OUTLET_NR_YAKUTAT_AK/
tIDir: https://usgs-nims-images.s3.amazonaws.com/timelapse/AK_DANGEROUS_R_AT_HARLEQUIN_LK_OUTLET_NR_YAKUTAT_AK/
locus: aws
smallDir: https://usgs-nims-images.s3.amazonaws.com/T20/AK_DANGEROUS_R_AT_HARLEQUIN_LK_OUTLET_NR_YAKUTAT_AK/
FRP: jconaway@usgs.gov
createdDate: 2022-10-30T20:31:11.940Z
img: -139.019217
tz: US/Alaska
defaultPCode: 00065
modifiedDate: 2022-10-30T20:31:11.940Z
camName: Dangerous River at Harlequin Lake Outlet
camDesc: Monitoring location 15129300 is associated with a STREAM in CITY AND BOROUGH OF YAKUTAT, ALASKA. Current conditions of DISCHARGE, GAGE HEIGHT, and TEMPERATURE are available. Water data back to 2003 are available online.
This camera is telemetered by satellite and updates at approximately 17:00 UTC (+/- 60 minutes) each day.
TL_LastGeneratedDT: 2023-11-13T18:56:46.628Z
nwid: 15129300
TL_LastImageUsedDT: 2023-11-13T18:01:21.000Z
stateAbv: AK
newestImageDT: 2023-11-13T18:01:21.000Z
imgId: AK_DANGEROUS_R_AT_HARLEQUIN_LK_OUTLET_NR_YAKUTAT_AK
img: 15129300

```
 - Image:** A photograph of a river flowing through a forested area, with a USGS logo in the bottom left corner.

4. Select the USGS Download Manager tab. Three key components are highlighted below: Image count, Date range selector, and Download folder.

The screenshot shows the GRIMe-At interface with the USGS Download Manager tab selected. The following table shows the data for the selected site:

Site	Image Count	min Date	max Date	Start Date	End Date	Start Time	End Time
NE_Keamey_Outdoor_Learning_Area	88	1/1/2000	1/1/2000	10/31/2024	10/31/2024	00:00	00:00

Below the table, the Download Manager interface includes:

- Download Folder:** A text input field with a "Browse" button next to it.
- Download:** A blue button to initiate the download.

5. Click the browse button to navigate to and select a download folder location.

The screenshot shows the software interface with a table of data for 'NE_Kearney_Outdoor_Learning_Area'. A 'Select Folder' dialog box is open, showing the file explorer. A green arrow points from the 'Select Folder' button in the dialog to a text box: '2. After navigating to or creating the desired folder, click Select Folder'. Another green arrow points from the 'Browse' button in the main interface to a text box: '1. Click here to open folder explorer'.

Site	Image Count	min Date	max Date	Start Date	End Date	Start Time	End Time
NE_Kearney_Outdoor_Learning_Area	88	1/1/2000	1/1/2000	10/31/2024	10/31/2024	00:00	00:00

Download Folder:

6. Now that a download folder is selected, choose the desired date range for imagery. Currently, the Start Time and End Time options are not functional for USGS (only NEON).

The screenshot shows the software interface with the 'Start Date' field set to 10/31/2024. A calendar for October 2024 is displayed, showing the days of the month. A green box highlights the calendar with the text: '6. Now that a download folder is selected, choose the desired date range for imagery. Currently, the Start Time and End Time options are not functional for USGS (only NEON)'.

Site	Image Count	min Date	max Date	Start Date	End Date	Start Time	End Time
NE_Kearney_Outdoor_Learning_Area	88	1/1/2000	1/1/2000	10/31/2024	10/31/2024	00:00	00:00

Download Folder:

7. Click the browse button to navigate to and select a download folder location.

The screenshot shows the GRIME-AT software interface. At the top, there is a menu bar with 'File', 'Image Set', 'Tools', and 'Help'. Below the menu bar is a toolbar with various icons. The main area contains a table with the following data:

Site	Image Count	min Date	max Date	Start Date	End Date	Start Time	End Time
NE_Platte_River_near_Leshara	28	1/1/2000	1/1/2000	10/1/2024	10/2/2024	12:00	08:00

Below the table, there is a 'Download Folder' section with a text input field containing 'C:\GData\GRIME-AT_debug_test', a 'Browse' button, and a 'Download' button. A green arrow points to the 'Download' button. A green-bordered box contains the text: 'Click Download to acquire imagery and streamflow data (if available).'

8. ...

DOWNLOAD PhenoCam and NEON DATA

This feature facilitates downloads of PhenoCam imagery at NEON Aquatic-Terrestrial Interface sites. NEON data products can also be downloaded.

1. Open GRIME-AI. This may take up to a minute.

The screenshot shows the GRIME-AI application window. The 'NEON Sites' tab is active, displaying a list of sites. A small window in the foreground shows the following list of sites:

- ABBY - Abbeville NEON
- ARK - Ark River NEON
- BARC - Lake Barco NEON
- BARR - Utiqayá NEON
- BART - Bartlett Experimental Forest NEON
- BIGC - Upper Big Creek NEON
- BLAN - Blandy Experimental Farm NEON
- BLDE - Blandford Deer Creek NEON
- BLUE - Blue River NEON
- BLWA - Black Warrior River NEON
- BOVA - Caribou-Poker Creeks Research Watershed NEON
- CAR - Caribou Creek NEON
- CLBI - Lyndon B. Johnson National Grassland NEON
- COMO - Como Creek NEON
- CPER - Central Plains Experimental Range NEON
- CRAM - Crampton Lake NEON
- CUPE - Culepe NEON
- DCFS - Dakota Coteaux Field Site NEON
- DEJU - Delta Junction NEON
- DELA - Dead Lake NEON
- DSNY - Disney Wilderness Preserve NEON
- FLNT - Flint River NEON
- GRSM - Great Smoky Mountains National Park NEON
- GUAN - Guánica Forest NEON
- GUIL - Rião Yahucuas NEON
- HARV - Harvard Forest & Quabbin Watershed NEON
- HEAL - Healy NEON
- HOBP - Lower Hog Brook NEON
- JERC - The Jones Center At Ichauway NEON
- JORN - Jornada Experimental Range NEON
- KING - Kings Creek NEON
- KONA - Konza Prairie Agroecosystem NEON
- KONZ - Konza Prairie Biological Station NEON
- LAJA - Lajas Experimental Station NEON
- LECO - LeConte Creek NEON
- LENO - Lenoir Landing NEON
- LEWI - Lewis Run NEON
- LIRO - Little Rock Lake NEON
- MART - Martha Creek NEON
- MAYF - Mayfield Creek NEON
- MCDI - McDuffett Creek NEON
- MCRG - McRae Creek NEON
- MCSA - Mountain Lake Biological Station NEON
- MOAB - Moab NEON
- NIWO - Niwot Ridge NEON
- NOGP - Northern Great Plains Research Laboratory NEON
- OAES - Maricopa Klemme Range Research Station NEON
- OKSR - Okruskayik Creek NEON

2. Select the NEON Sites tab (this is currently the default tab when GRIME-AI opens).

The screenshot shows the GRIME-AI application window with the 'NEON Sites' tab selected. A green arrow points to the 'NEON Sites' tab in the navigation bar. The 'NEON Sites' panel displays a list of sites, and the 'BARC' panel shows details for Lake Barco NEON. The 'NEON Site Products' panel lists various data products.

3. Select a NEON site of interest. The latest available PhenoCam image (if available) and site metadata will be displayed. Other NEON data products will also be listed.

The screenshot shows the NEON Data Portal interface. On the left, a list of NEON sites is displayed, with 'WALK - Walker Branch NEON' selected. The central panel shows the site's metadata, including site code, name, description, type, coordinates, and domain. Below the metadata is a 'Latest Site Image' showing a field with people. On the right, a list of 'NEON Site Products' is shown, including various data products like wind speed, temperature, and aquatic plant biomass. A green dashed box highlights the metadata and products sections, with the word 'Metadata' written in green over the metadata section and 'NEON Data Products' written in green over the products section. A green arrow points from the 'WALK' site in the list to the 'Latest Site Image'.

4. Select desired data products. Hold the control (Ctrl) and click to select multiple products.

This screenshot shows the same NEON Data Portal interface as above, but with multiple data products selected in the 'NEON Site Products' list. The selected products are highlighted with a green dashed border. Green arrows point to the selected products: 'DP1.0001.001: 2D wind speed and direction', 'DP1.0002.001: Single aspirated air temperature', 'DP1.0003.001: Shortwave and longwave radiation (net radiometer)', 'DP1.0004.001: Barometric pressure', 'DP1.0005.001: Photosynthetically active radiation (PAR)', 'DP1.0006.001: Relative humidity', 'DP1.2002.001: Land-water interface images', 'DP1.2003.001: Specific conductivity in groundwater', 'DP1.2004.001: Elevation of surface water', 'DP1.2005.001: Photosynthetically active radiation at water surface', 'DP1.2006.001: Temperature (PRT) in surface water', 'DP1.2007.001: Temperature (digital thermometer) of surface water', 'DP1.2008.001: Aquatic plant bryophyte chemical properties', 'DP1.2009.001: Aquatic plant bryophyte macroalgae clip harvest', 'DP1.2010.001: Benthic microbe community composition', 'DP1.2011.001: Chemical properties of groundwater', 'DP1.2012.001: Dissolved gases in surface water', 'DP1.2013.001: Elevation of groundwater', 'DP1.2014.001: Fish electrofishing, gill netting, and fyke netting counts', 'DP1.2015.001: Macroinvertebrate metabarcoding', 'DP1.2016.001: Surface water microbe cell count', 'DP1.2017.001: Surface water microbe community composition', 'DP1.2018.001: Periphyton, seston, and phytoplankton chemical properties', 'DP1.2019.001: Periphyton, seston, and phytoplankton collection', 'DP1.2020.001: Restoration field and lab collection', 'DP1.2021.001: Riparian vegetation cover', 'DP1.2022.001: Salt-based stream discharge', 'DP1.2023.001: Benthic microbe group abundances', 'DP1.2024.001: Benthic microbe metagenome sequences', 'DP1.2025.001: Benthic microbe marker gene sequences', 'DP1.2026.001: Surface water microbe metagenome sequences', 'DP1.2027.001: Surface water microbe marker gene sequences', 'DP1.2028.001: Water quality', 'DP4.0013.001: Continuous discharge', and 'DP4.0013.001: Stream morphology map'. A green arrow also points to the 'WALK' site in the list.

5. Select the NEON Download Manager tab. Three key components are highlighted below: Image count, Date range selector, and Download folder.

The screenshot shows the NEON Download Manager interface. The main table lists sites with columns for Site, Image Count, min Date, max Date, Start Date, End Date, Start Time, and End Time. The 'Image Count' column is highlighted with a green box and an arrow pointing to it from a text box that says 'Selected image count (this may be blank initially)'. The 'Date range selector' is highlighted with a green box and an arrow pointing to it from a text box that says 'Date range selector.'. Below the table, the 'Output Folders' section has a text input field, a 'Browse' button, and a 'Download' button. The 'Download' button is highlighted with a green box and an arrow pointing to it from a text box that says 'Download folder'.

Site	Image Count	min Date	max Date	Start Date	End Date	Start Time	End Time
1 DP1.20002.001: Land-water interface images		1/1/1970	1/1/1970	11/10/2024	11/10/2024	00:00	00:00
2 DP1.20016.001: Elevation of surface water		1/1/1970	1/1/1970	11/10/2024	11/10/2024	00:00	00:00
3 DP1.20053.001: Temperature (PRT) in surface water		1/1/1970	1/1/1970	11/10/2024	11/10/2024	00:00	00:00
4 DP1.20193.001: Salt-based stream discharge		1/1/1970	1/1/1970	11/10/2024	11/10/2024	00:00	00:00
5 DP1.20267.001: Gauge height		1/1/1970	1/1/1970	11/10/2024	11/10/2024	00:00	00:00

6. A fourth feature of the NEON Download Manager is the ability to choose a daily time window for imagery download. This can significantly shorten the required download time. For example, entering 12:00 and 13:30 in the Start Time and End Time boxes will result in a download with imagery that is only from noon to 1:30 pm (e.g., about 6 images/day if images were collected at 15-minute intervals).

Start Date	End Date	Start Time	End Time
0/2024	11/10/2024	12:00	13:30
0/2024	11/10/2024	00:00	00:00
0/2024	11/10/2024	00:00	00:00
0/2024	11/10/2024	00:00	00:00
0/2024	11/10/2024	00:00	00:00

7. Click the browse button to navigate to and select a download folder location.

The screenshot shows the GRIME-Alt software interface. A 'Select Folder' dialog box is open, displaying the file explorer view for the 'GRIME-Alt_debug_test' folder. The 'Folder:' field is empty. Below the dialog box, there are 'Browse' and 'Download' buttons. A green arrow points from the 'Browse' button to a callout box containing the text: '1. Click here to open folder explorer'. Another green arrow points from the 'Select Folder' button to a callout box containing the text: '2. After navigating to or creating the desired folder, click Select Folder'.

8. Now that a download folder is selected, choose the desired date range for imagery. If desired, set the Start Time and End Time to reduce the number of images that will download.

The screenshot shows the GRIME-Alt software interface with a calendar for November 2024. The calendar is displayed over the 'min Date' and 'max Date' columns of the data table. A green arrow points from the 'Download' button to the calendar, indicating the selection of a date range for imagery.

9. Click the browse button to navigate to and select a download folder location.

The screenshot shows the GRIMe-Alt software interface. At the top, there are menu options: File, Image Set, Tools, and Help. Below the menu is a toolbar with various icons. The main area displays a table of data products. Below the table is an 'Output Folders' section with a text input field containing 'C:\GData\Walker Branch\DEMO' and two buttons: 'Browse' and 'Download'. A green arrow points to the 'Download' button. A text box with a green border contains the text: 'Click Download to acquire imagery and streamflow data (if available)'. To the right of the 'Download' button is a circular progress indicator showing 75.0% completion.

Site	Image Count	min Date	max Date	Start Date	End Date	Start Time	End Time
DP1.20002.001: Land-water interface images		1/1/1970	1/1/1970	11/7/2022	11/10/2022	12:00	13:30
DP1.20016.001: Elevation of surface water		1/1/1970	1/1/1970	11/7/2022	11/10/2022	00:00	00:00
DP1.20053.001: Temperature (PRT) in surface water		1/1/1970	1/1/1970	11/7/2022	11/10/2022	00:00	00:00
DP1.20193.001: Salt-based stream discharge		1/1/1970	1/1/1970	11/7/2022	11/10/2022	00:00	00:00
DP1.20267.001: Gauge height		1/1/1970	1/1/1970	11/7/2022	11/10/2022	00:00	00:00

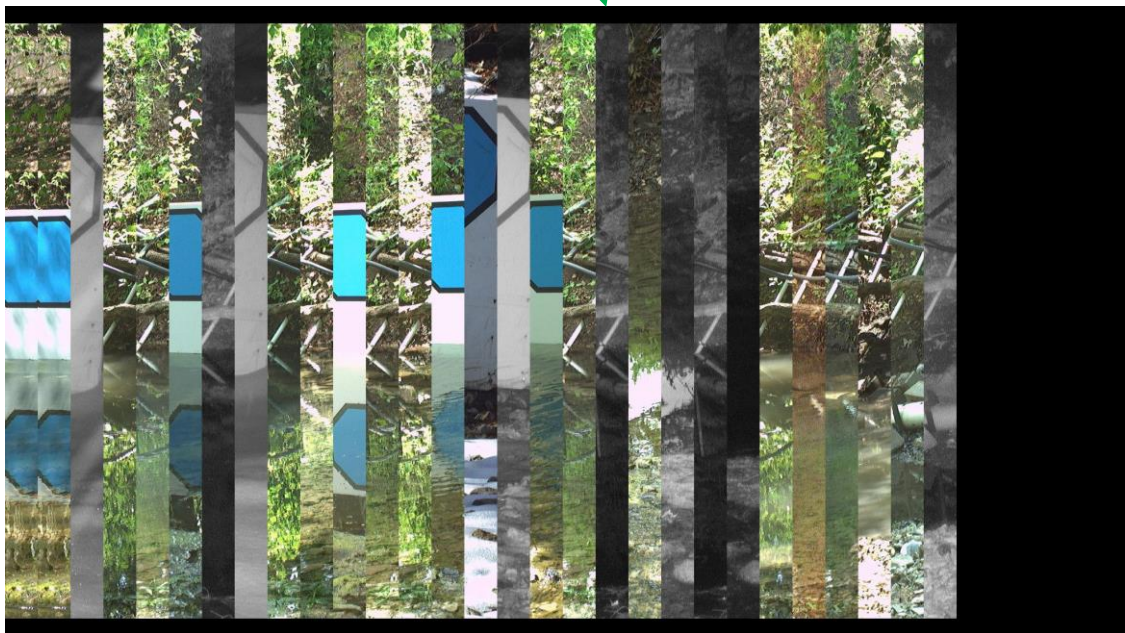
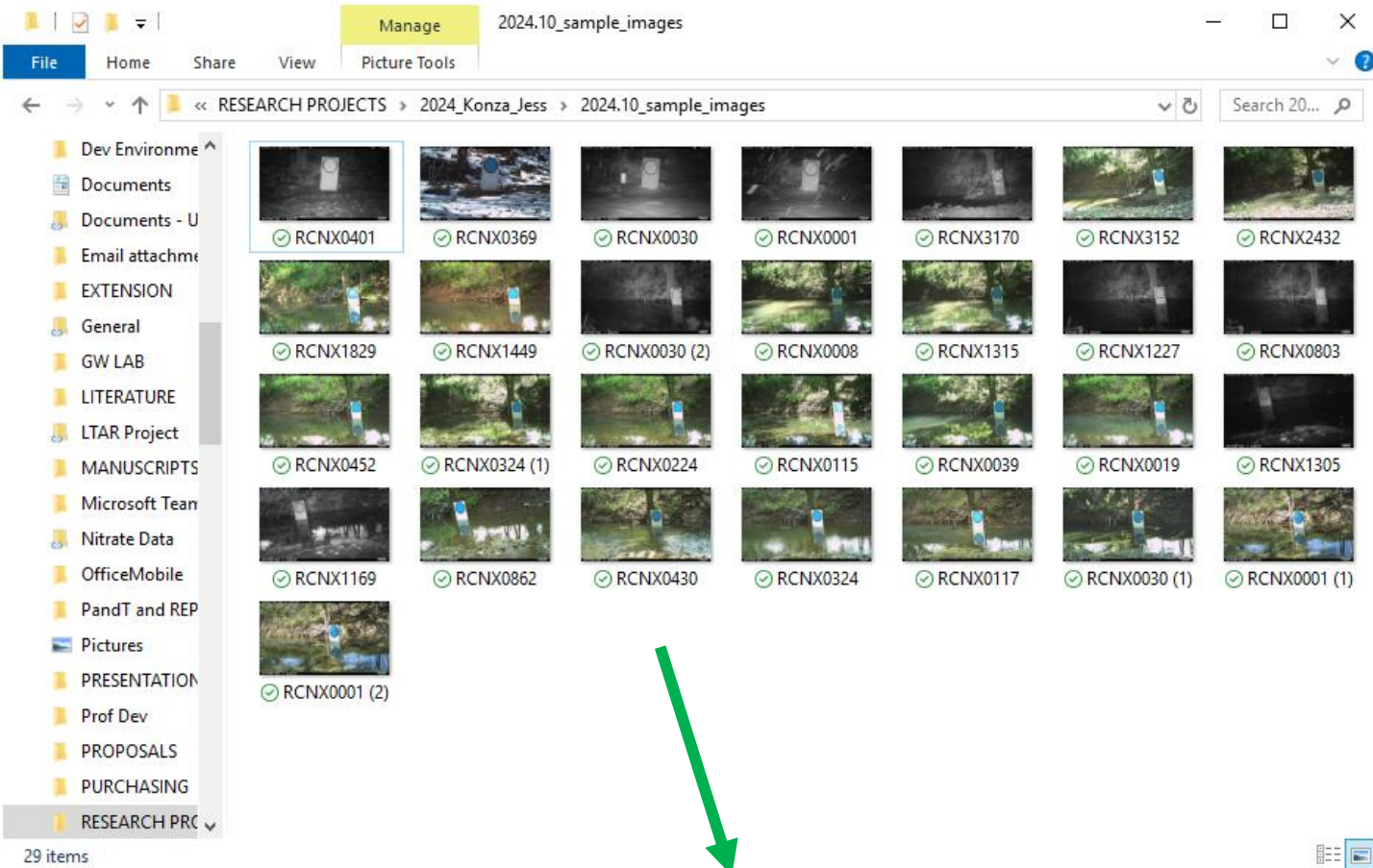
10. Data products that are available for the selected time period will appear in the selected folder location. Individual sub-folders will hold data and metadata for each product.

The screenshot shows a file explorer window with the path '(C:) > GData > Walker Branch > DEMO'. A 'Data Download' dialog box is open, showing 'Data download is complete!' and an 'OK' button. The main window displays five folders: '20016 - Elevation of surface water', '20053 - Temperature (PRT) in surface water', '20193 - Salt-based stream discharge', '20217 - Temperature of groundwater', and 'Images'. A green arrow points to the 'Images' folder. Below the main window, two sub-folders are shown. The first is '(C:) > GData > Walker Branch > DEMO > 20016 - Elevation of surface water', which contains a list of files: 'categoricalCodes_20016', 'citation_20016_RELEASE-2023', 'EOS_5_min', 'EOS_30_min', 'issueLog_20016', 'readme_20016', 'sensor_positions_20016', and 'variables_20016'. The second is '(C:) > GData > Walker Branch > DEMO > Images', which contains a grid of satellite imagery with filenames like 'NEON.D07.WALK.DP1.20002_2022_11_07_120005'.

COMPOSITE SLICE

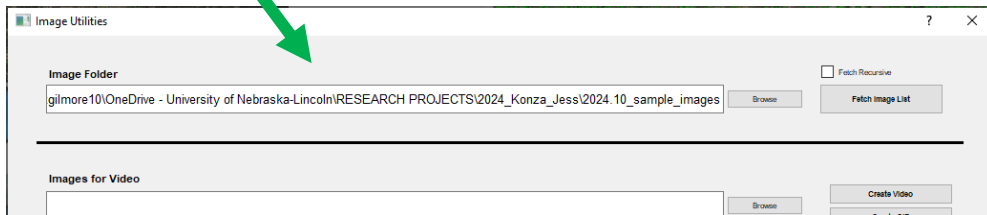
This feature will create slices of all images in a folder and assemble into composite image(s) that can be quickly reviewed for qualitative insights.

Example of original imagery in a folder (top) and a composite slice (bottom) to qualitatively explore these images for water level, location of the calibration target, etc.



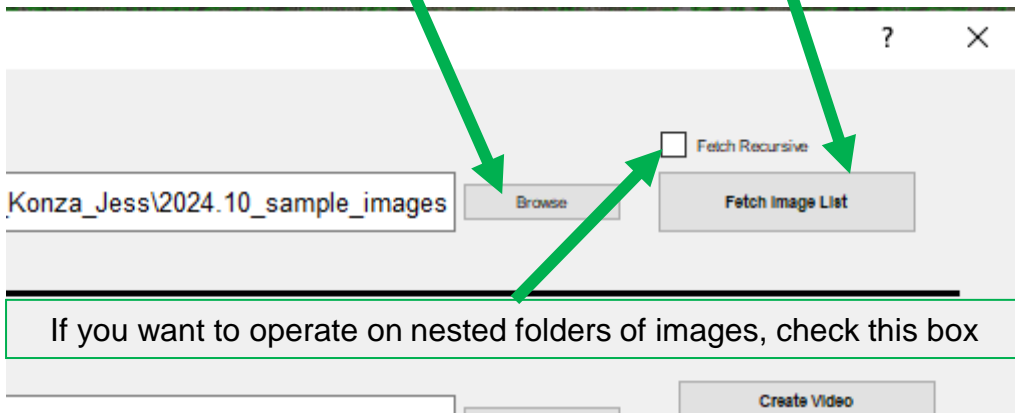
Composite images are the same size as the first image in the folder. Some black space may appear. Or, if the original image size is not large enough to hold all slices, then multiple composite images will be created..

First, you need to select a folder of images to slice. Click the Folder Operations icon in the upper left corner of GRIME-AI, then select a folder of images.



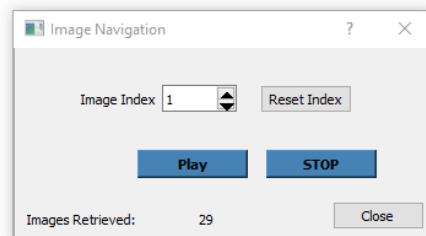
Click browse to select the folder of images

After selecting folder, click Fetch image list



If you want to operate on nested folders of images, check this box

After clicking Fetch Image List, you should see a navigation tool pop up. If you do not, be sure it's not hidden behind the main GRIME-AI window or located on another screen (if you're using multiple monitors).



Before slicing, you can manually view images in the folder.

Open the Image Analysis tab

GRIME-AI: John E. Stranzl Jr.
File Image Set Tools Help

NEON Sites NEON Download Manager USGS Sites USGS Download Manager Image Analysis Sensor Data Graphs Google Maps (Provisional)

2023-05-08 11:15:00 T 75°F

HYPERTRIF 2 COVERT RECONVX

Image Navigation ? X

Image Index 1 Reset Index

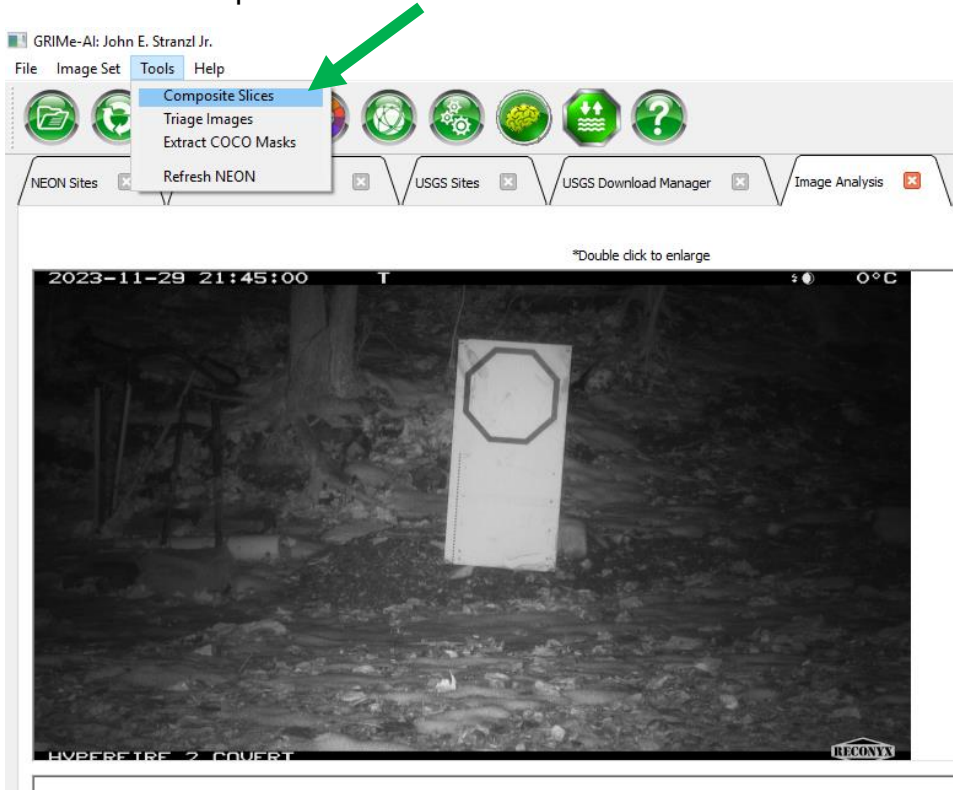
PLAY STOP

Images Retrieved: 29 Close

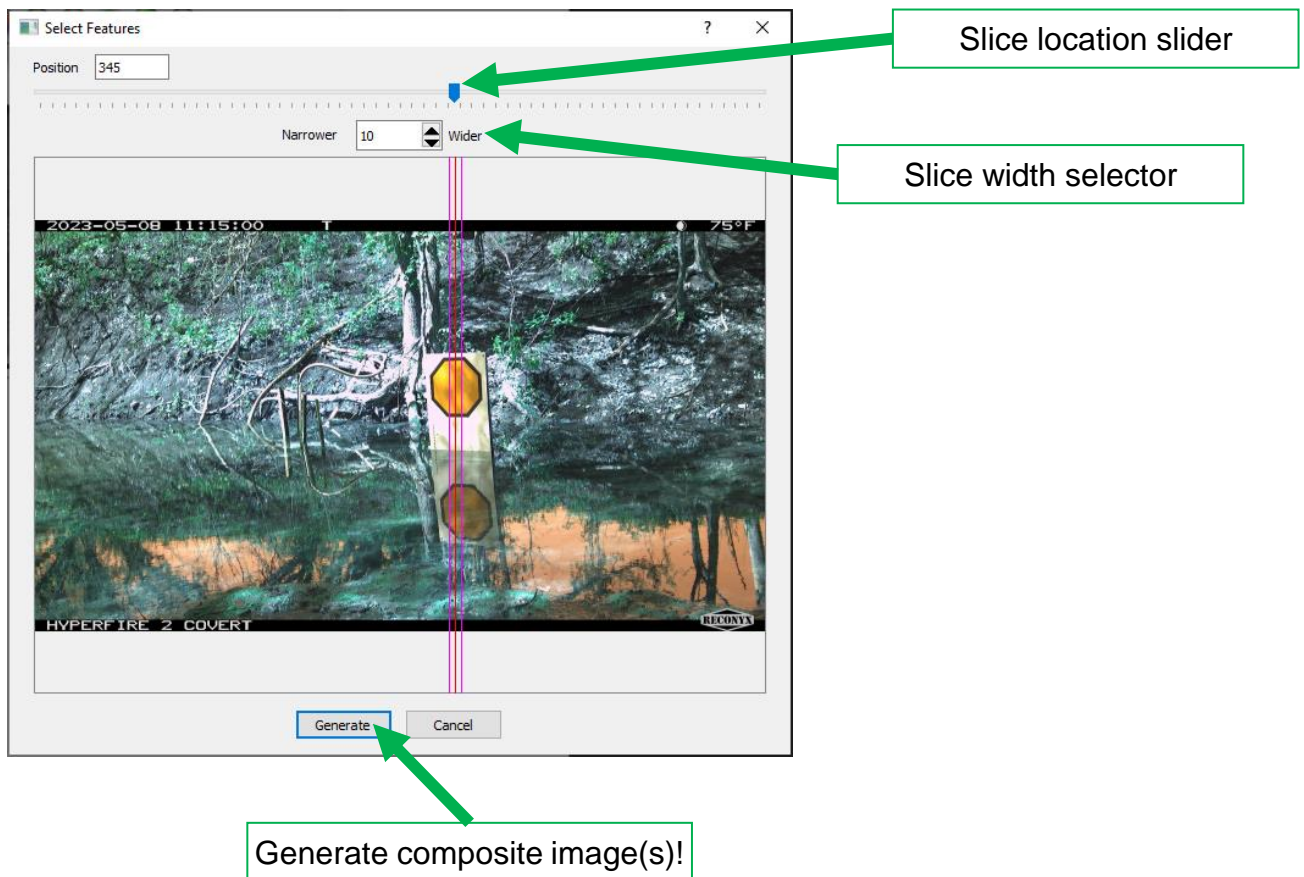
ROI Name	Ref. Image	Cur. Image	Gr
Whole Image			0.35

Use this toggle on the Image Navigation tool to click view different images. If you want to jump ahead or back, type a number in the Image Index text box.
(NOTE: Play/Stop buttons are currently in development and may not be operational.)

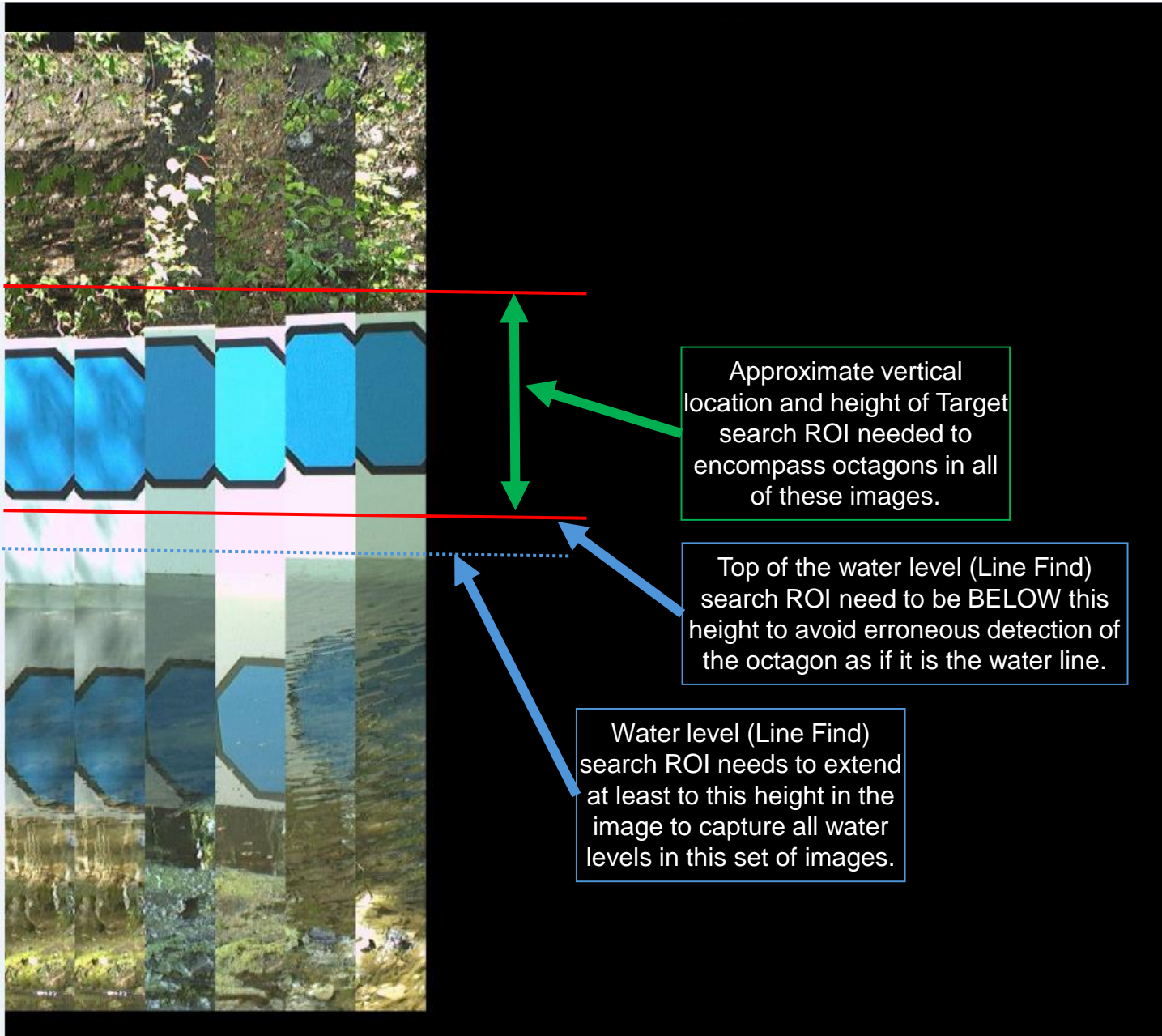
Go to the Composite Slice tool in the menu bar.



Choose the slice location and width in the Composite Slice tool.



EXAMPLE APPLICATION: Using composite image slices to determine optimal locations for calibration target search ROI and water edge (line find) ROI for use in GRIME2 software.

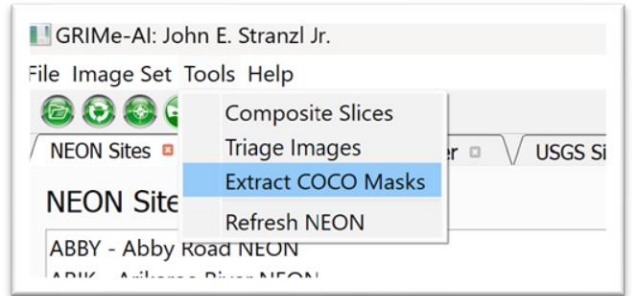


CREATE MASKS FROM A COCO FILE

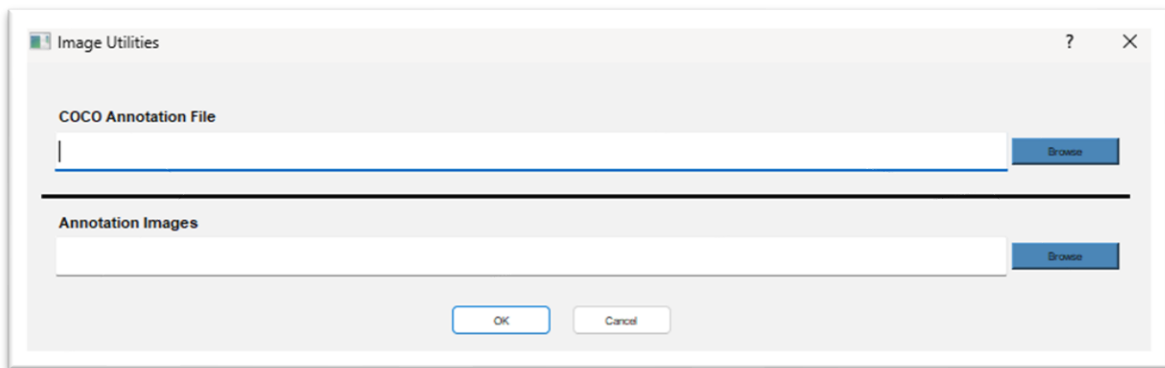
This feature will create a folder of masks from a COCO file. COCO files can be exported from annotation software (e.g., CVAT) for use with this feature.

Adding COCO Files to GRIME-AI

Navigate to the 'Extract COCO Masks' section from 'Tools' at the top of the GRIME-AI menu.



A window titled 'Image Utilities' will pop up. Select 'Browse' in the 'COCO Annotation File' section. Select a JSON file in the COCO format. Then, use 'Browse' feature for the 'Annotation Images' section. Select a folder to store the output mask.



Just like that, you should have binary masks for your COCO file!