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GEMS Application Tool

User Manual

V1.1

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1. OVERVIEW

GEMS Application Tool is a Windows/Linux-based visualization/editing/analysis tool for image and data processing support of geostationary environmental satellite (GEMS) data and domestic and foreign satellite data. In GEMS Application Tool, data can be imported from HDF, NetCDF, Binary, and Text file formats to perform image processing and visualize the processed image. In addition, various analysis editing functions such as precision/comparison analysis, synthesis processing, computational processing, filter processing, and type lab generation can be performed using the imported data.

The satellite data and environmental data currently available in the GEMS Application Tool are as follows.

Category	Product	Note
GK2 GEMS	L1C	Show/Analysis
	L2 AERAOD	Show/Analysis
	L2 CHOCHO	Show/Analysis
	L2 CLOUD	Show/Analysis
	L2 HCHO	Show/Analysis
	L2 NO2	Show/Analysis
	L2 O3T	Show/Analysis
	L2 SO2	Show/Analysis
	L2 UVI	Show/Analysis
GK2 AMI	L1B	Show/Analysis
	L2 ADPS	Show/Analysis
	L2 APPS	Show/Analysis
	L2 AVIS	Show/Analysis
	L2 CLA	Show/Analysis
	L2 CLD	Show/Analysis
	L2 CTPS	Show/Analysis
	L2 FF	Show/Analysis
	L2 QPN	Show/Analysis
	L2 RR	Show/Analysis
	L2 SCSI	Show/Analysis
	L2 SO2D	Show/Analysis
	L2 SST	Show/Analysis
	L2 VAP	Show/Analysis
TROPOMI	L2 NO2	Show/Analysis
	L2_UVAI	Show/Analysis

	L2_O3T	Show/Analysis
	L2_SO2	Show/Analysis
	L2_O3P	Show/Analysis
	L2_HCHO	Show/Analysis
	L2_CO	Show/Analysis
	L2_CH4	Show/Analysis
	L2_Cloud	Show/Analysis
	L2_TropoO3	Show/Analysis
	L2_ALH	Show/Analysis
OCO-2	LtCO2	Show/Analysis
OCO-3	LtCO2	Show/Analysis
AQUA MODIS	L2 AOD	Show/Analysis
	L3 AOD	Show/Analysis
TERRA MODIS	L2 AOD	Show/Analysis
	L3 AOD	Show/Analysis
GOSAT	L2	Show/Analysis
	L3	Show/Analysis
	L4	Show/Analysis
AIRKOREA	SO2	Analysis
	CO	Analysis
	O3	Analysis
	NO2	Analysis
	PM10	Analysis
	PM25	Analysis
AWS	Temperatures	Analysis
	WindDirection	Analysis
	WindSpeed	Analysis
	Precipitation	Analysis
	LocalPressure	Analysis
	SeaLevelPressure	Analysis
	Humidity	Analysis
AERONET	AOD	Analysis
PANDORA	Ozone	Analysis

2. SOFTWARE REQUIREMENTS

2.1 Specification Requirements

GEMS Application Tool is installed on one PC as a stand-alone software, and the minimum/recommended specifications for operation are as follows.

Category	Minimum specifications	Recommended specifications
CPU	Intel Core i3	Intel Core i5 or higher
Memory	4GB	8GB or higher
OS	Linux x64 (CentOS 7 or higher), Windows x64 (10 or higher)	

2.2 Installation

GEMS Application Tool is provided in a portable manner, and the installation is completed by unzipping the file according to the user's operating environment OS among the provided versions, and no separate installation process is required.

2.3 Beginning

Using OS Explorer, GEMS Application Tool releases the portable compression file and double-clicks GEMS Application Tool executable file with the left mouse button in the path.

2.4 The end

The program closes when the [Exit] button is selected under [File] in the software menu, the [- Exit] button is selected in the toolbar, or the [X] button in the upper right corner of the main screen.

Figure 2-1 Exit GEMS Application Tool

3. SCREEN CONFIGURATION

The software provides a GUI-based screen.

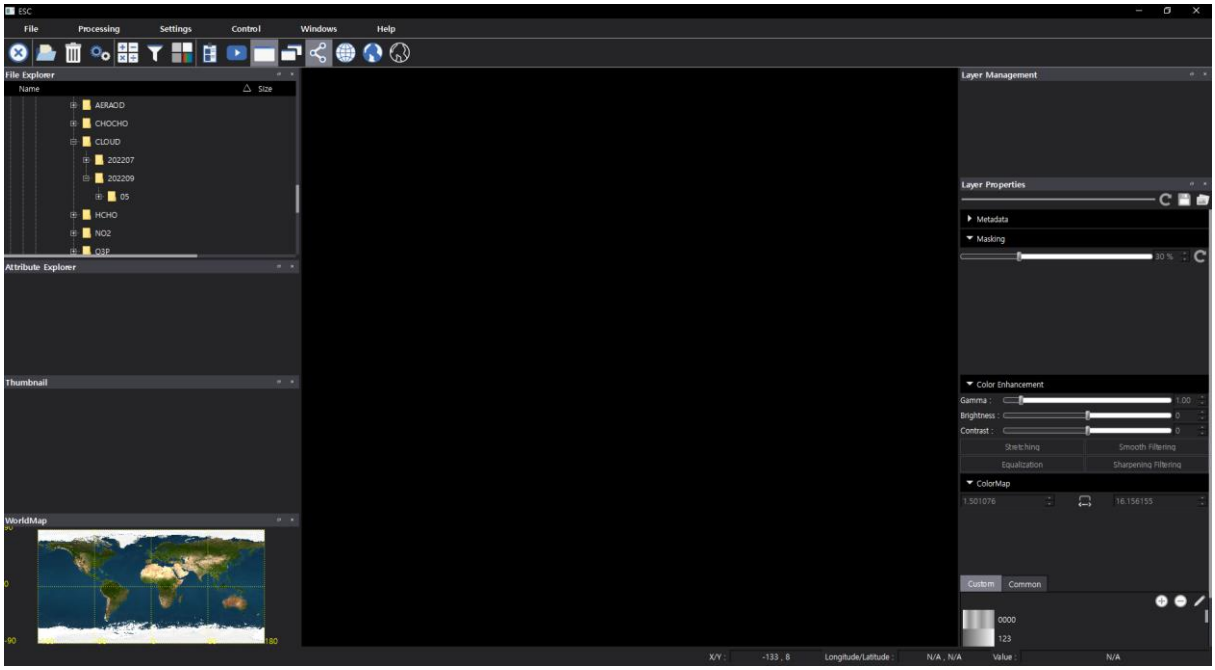


Figure 3-1 Initial screen of GEMS Application Tool

GEMS Application Tool can be freely edited at the user's convenience, except for the image display screen in the center. The secondary screen is provided in the form of a Dock screen, and if the secondary screen is closed and not visible on the screen, the screen can be displayed again under [Windows] in the menu.

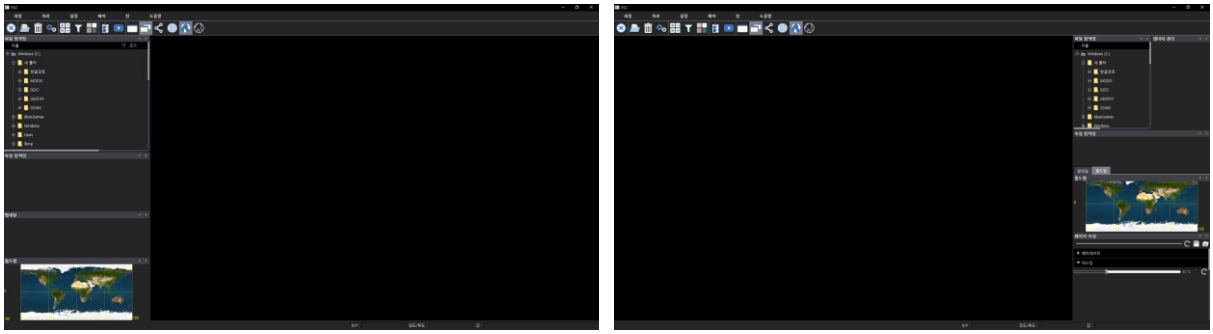


Figure 3-2 GEMS Application Tool Screen Layout

3.1 Main menu configuration

When running the software for the use of the people, the main menu is defined and configured as follows. The main menu is located at the top of the top. The main menu consists of six options: File, Processing, Settings, Control, Window, and Help. Each option in the main menu can be clicked to select or view a sub-option.

Figure 3-3 Main Menu Configuration

The sub-configuration menus in each menu are as follows.

menu	Submenu	explanation
File	Open File	Select and open input data
	Clean	Initialize the entire job
	Exit	Close software
Processing	Calculator	Open the Operations window
	Filter	Open the Filter Processing window
	RGB Composite	Open the Composite Processing window
	Timelapse	Open the Type-lapse window
	Analysis	Open the Precision/comparison Analysis window
Settings	Display Setting	Open the Display Setting
	Area Of Interest Setting	Open the Area Of Interest window
	Language	Select a language
Control	Tab View	Display tabs window
	Grid View	Display grids window
	Synchronization	Enable/Disable Synchronization
	Latitude/Longitude Line	Overlap latitude/longitude lines on images
	Background Map	Overlap background map on images
	Boundary	Superimpose borders on images
Windows	File Explorer	Display file explorer
	Attribute Explorer	Display attribute explorer
	Layer Management	Display layer management
	Layer Properties	Display Layer Properties
	Thumbnail	Display thumbnail
	WorldMap	Display worldmap
	Macro	Display macro
	Main Toolbar	Display main toolbar
Help	Manual	Open manual
	Information	Open Information

3.2 Main toolbar configuration

GEMS Application Tool provides the main action menu as a toolbar, and the items in the main toolbar provide the main function items among the functions provided in the main menu.

Figure 3-4 Main Toolbar

icon	function	icon	function
	Exit		Open File
	Clean		Display Config
	Calculator		Filter
	RGB Composite		Analysis
	Timelapse		Tab View
	Grid View		Synchronization
	Latitude/Longitude Line		Background Map
	Boundary		

3.3 Screen editing

In addition to the file menu provided by default, the task screen of the software can be replaced with the main screen according to the user's settings. The screen layout method is as follows.

3.3.1 Activate the secondary screen

① From the main menu, click the [Windows] menu
② [Windows] Click the submenu sorted under menu
- ✓ Disable on click in active state
- ✓ Activate on click in the disabled state

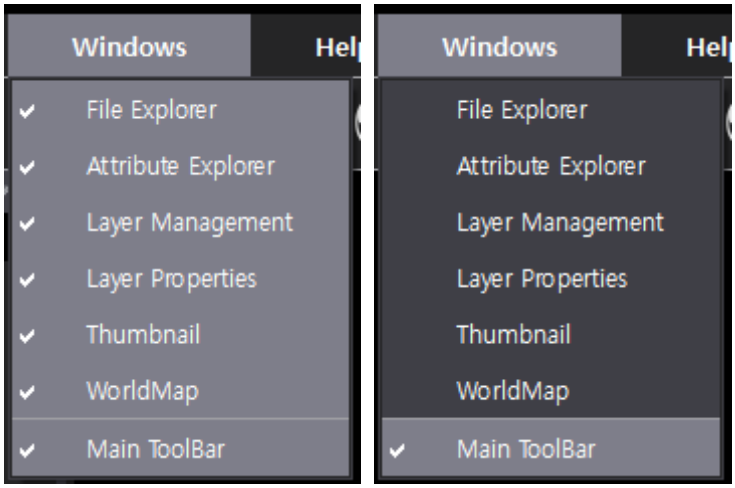


Figure 3-5 [Windows] submenu and enable/disable status screen

3.3.2 Secondary screen movement and placement

The secondary screen other than the image display screen placed in the center allows the user to move the position freely, and the moved position is maintained even if the software is restarted. The screen movement and arrangement are as follows.

① Select a secondary screen to move while holding down the left mouse button

② Move to the desired location and press the left mouse button to release

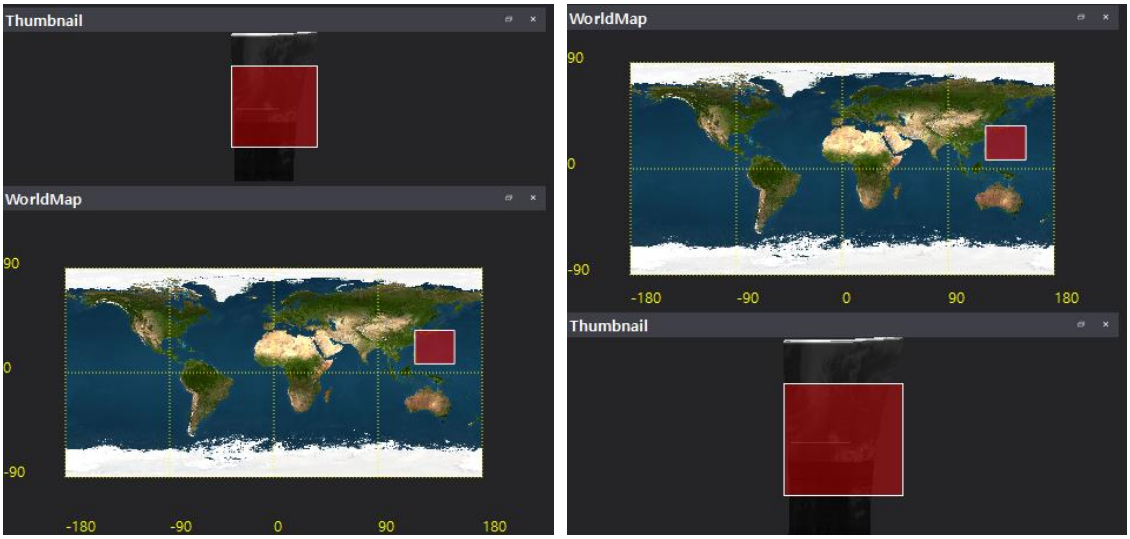


Figure 3-6 Screen Configuration Example – Move

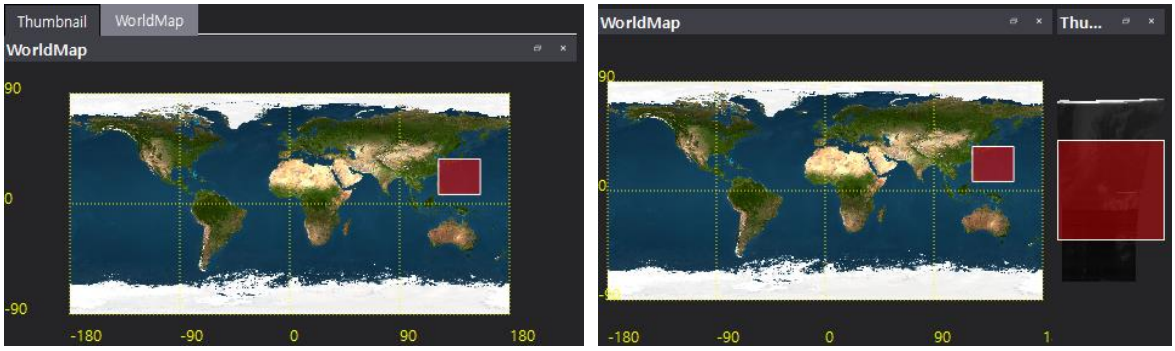


Figure 3-7 Screen Configuration Example – Layout

4. FUNCTION INTRODUCTION

4.1 Initializing a task

After loading, editing, and analyzing satellite data, it summarizes all the current work to perform new tasks and returns it to the program starting state.

4.1.1 Initialization from the menu

① Select [File] from the top menu of the main screen
② When the menu is displayed, select [Clean]

4.1.2 Initialization from the toolbar

① Select [- Clean] in the toolbar

4.2 Display management

Performs a function of performing a custom setting for the display of latitude / longitude lines, boundary lines, and background maps provided as overlapping functions on the image display screen.

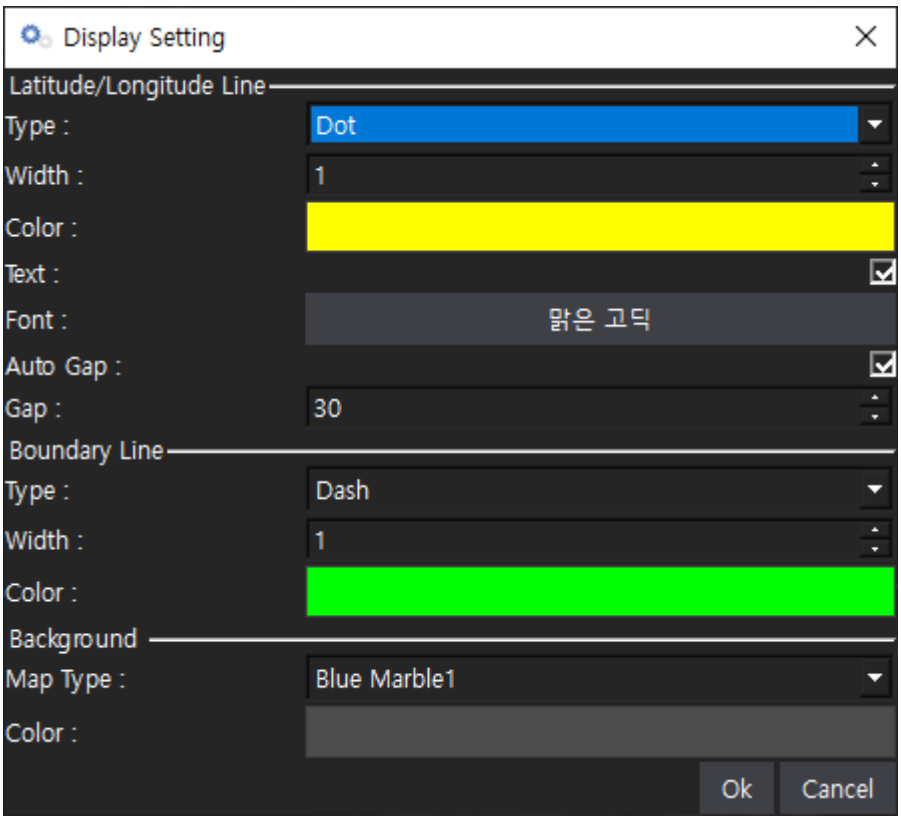


Figure 4-1 Display Management

4.2.1 Open the Display Setting from the menu

① Select [Settings] from the menu at the top of the main screen
② When the menu is displayed, select [Display Setting]

4.2.2 Open the Display Setting in Toolbar

① Select [- Display Setting] in the toolbar

4.2.3 Latitude/Longitude Lines

① Perform latitude/longitude line settings
- Type : Shape of Line

- Width: Width of the line
- Color : Color of line
- Text : Latitude/longitude text displayed
- Font : Latitude/Longitude Text Font
- Auto Gap: Whether the latitude/longitude line is automatically spaced according to zoom
- Gap : The interval value expressed during manual interval

4.2.4 Boundary

① Perform boundary settings
- Type : Shape of Line
- Width : Width of the line
- Color : Color of line

4.2.5 Background

① Perform background settings
- Map type: The shape of the map to be used as a background map

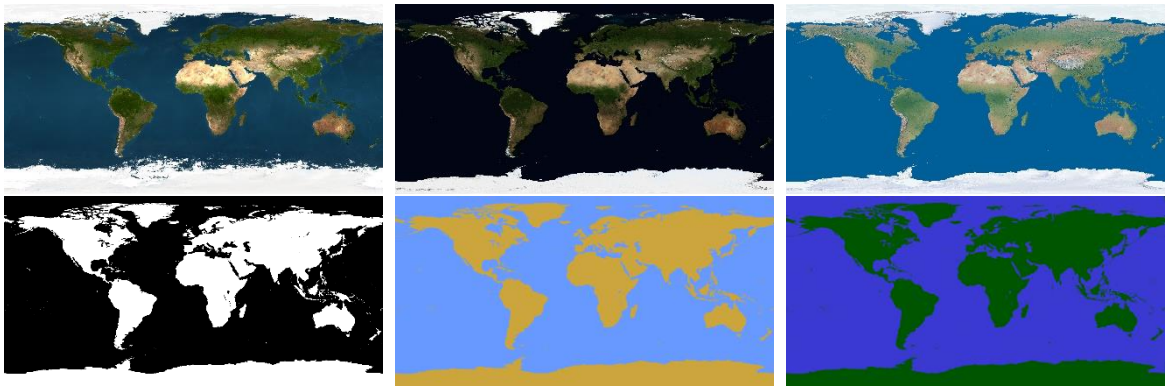


Figure 4-2 Background Map

- Color : Background color of the display

4.3 Local Disk Management

It uses data stored on the local disk and manages the path and files on the local disk through File Explorer. In file explorer, you can create folders, move folders and files, rename folders and files, and delete folders and files.

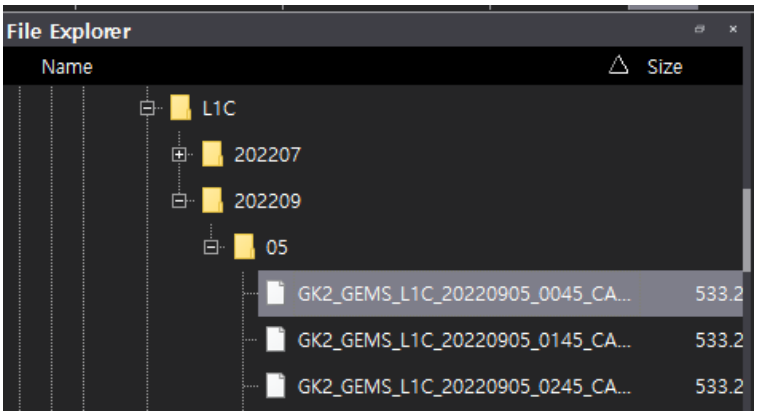


Figure 4-3 Local Disk Management

4.3.1 Create a folder

① In file explorer, select the parent folder you want to create a folder for, and then select the right mouse button
② When the menu appears, select [Create Folder]
③ Create a folder with the name NewFolderXXX

4.3.2 Move folders and files

① Select the folder and file you want to move in file explorer, select it with the left mouse button, and drag it to the folder you want to move

4.3.3 Rename folders and files

① In file explorer, select the folders and files you want to rename
② Select the [F2] button or the right mouse button on the keyboard
③ When the menu is displayed, select [Rename]
④ When rename is enabled, enter the change name

4.3.4 Display file attributes

① Select the satellite data you want to import from file explorer and double-click the left mouse button

② Display the file's attribute information in attribute explorer

4.4 Importing Resources

Satellite data is used as input data, satellite data is imported to express the properties of data, and each detailed data in satellite data is set and retrieved to display as an image.

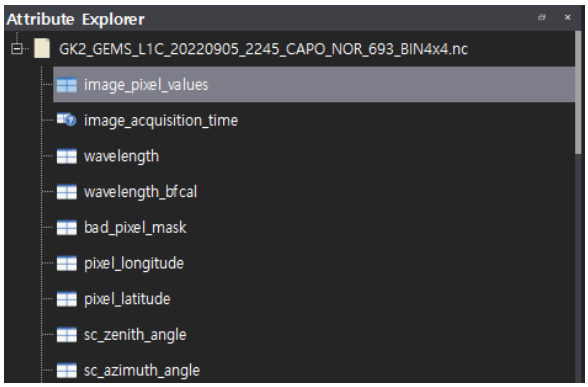


Figure 4-4 Importing Data

4.4.1 Open input data from menu

① Select [File] from the top menu of the main screen
② When the menu is displayed, select [Open File]
③ When Windows Explorer is displayed, select the file you want to load, and then select the [Open] button
④ Display the attributes of satellite data selected in attribute explorer

4.4.2 Open input data from the toolbar

① Select [- Open File] in the toolbar
② When Windows Explorer is displayed, select the file you want to load, and then select the [Open] button
③ Display the attributes of satellite data selected in attribute explorer

4.4.3 Open input data from attribute explorer

① Select the files you want to load from your operating system's File Explorer
② In attribute explorer of the software, left-select and drag the file

4.4.4 Open input data from file explorer

① Select the satellite data you want to import from file explorer and double-click the left mouse button
② Display the file's attribute information in attribute explorer

4.4.5 Remove file from attribute explorer

① Select the file item you want to remove in attribute explorer and then right-click
② When the menu appears, select [Remove]
③ The file list is removed

4.4.6 Expand item in attribute explorer

① Select the file item you want to expand in attribute explorer and then right-click
② When the menu appears, select [Expand]
③ The sublist is expanded

4.4.7 Expand all items in attribute explorer

① Select the right mouse button in attribute explorer
② When the menu appears, select [Expand all]
③ Sub-lists of the entire list in attribute explorer are expanded

4.4.8 Collapse all items in attribute explorer

① Select the right mouse button in attribute explorer
② When the menu appears, select [Collapse All]
③ Sub-lists of the entire list in attribute explorer are displayed

4.5 Image display and control

It performs the function of retrieving satellite data to generate, display, and control images.

4.5.1 Image Display

① In attribute explorer, double-click the dataset you want to display as an image

② Display dataset setting screen(only 3 demension)

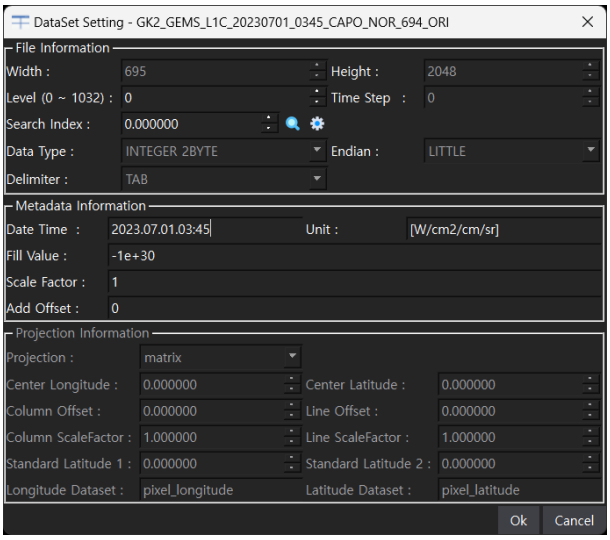


Figure 4-5 Dataset Settings

✓ File Information
- Width : Horizontal Size
- Height : Vertical Size
- Level : Data 3 dimension index
- Time Step : Data 4 dimension index
- Data Type : Data type (for Binary files)
- Endian : Endian (for Binary files)
- Delimiter : Delimiter (for Text files)

✓ Metadata Information
- Date Time : Observation date and time of satellite data
- Unit: Data unit
- Fill Value : Fill Value
- Scale Factor : Scale Factor(Digital Number->Real Value)
- Add Offset : Offset(Digital Number->Real Value)

✓ Projection Information
- Projection : Projection type
- Center Longitude: center longitude
- Center Latitude: center latitude

- Column Offset : Horizontal axis start position
- Line Offset: Vertical axis start position
- Column ScaleFactor : Horizontal scale factor(resolution or spacing)
- Line ScaleFactor : Vertical Scale Factor(resolution or spacing)
- Standard Latitude 1 : reference latitude 1(Lambert Conic)
- Standard Latitude 2 : reference latitude 2(Lambert Conic)
- Longitude Dataset : Longitude dataset
- Latitude Dataset: Latitude dataset

③ Perform settings on the dataset settings screen, and then select the [OK] button

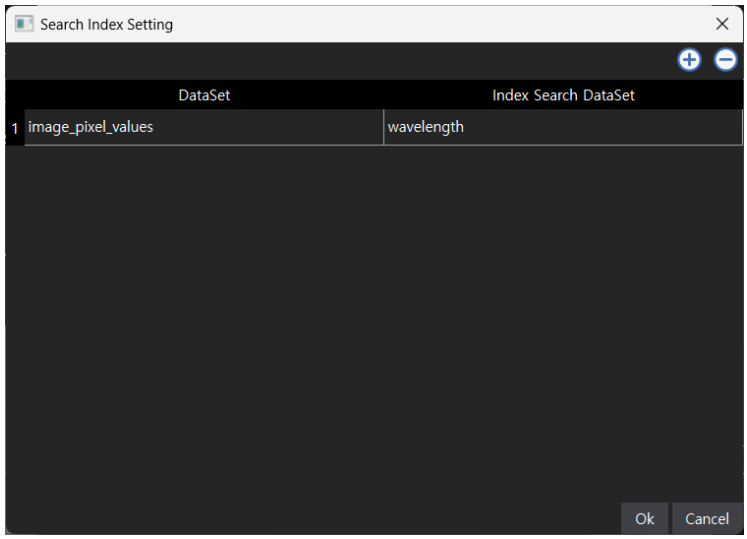
4.5.2 Search index of 3D Data

In the case of 3D data, level and index search function are activated, and index search function corresponding to the level is provided

■ Display index matching setting screen

① On the dataset settings screen, select [- Index Search Settings]

② Display the index search settings screen



■ Add an index search item

① Select the [- Add] button at the top of the list

② When an item is added, enter the name of the dataset and the name of the dataset to perform the index search

■ Remove an index search item

① Select the items you want to remove from the list

② Select the [- Remove] button at the top of the list

■ Search Index

① Enter the value you want to search on the dataset setting screen and select the [Search] button

② If there is a matching dataset, search for the latest historical value and display it

4.5.3 Zoom in/out image

■ Zoom in image using mouse

① Rotate the mouse wheel upwards on the image display screen

■ Zoom in image using the keyboard

① While the image display screen is selected, select the [+] button on the keyboard

■ Zoom out image using mouse

① Rotate the mouse wheel in a downward direction on the image display screen

■ Zoom out image using the keyboard

① While the image display screen is selected, select the [-] button on the keyboard

4.5.4 Move image

① On the image display screen, select the left mouse button and drag the mouse to the location you want to move

4.5.5 Thumbnail

① On the image display screen, select the left mouse button and drag the mouse to the location you want to move

② Change the currently visible area on the thumbnail screen

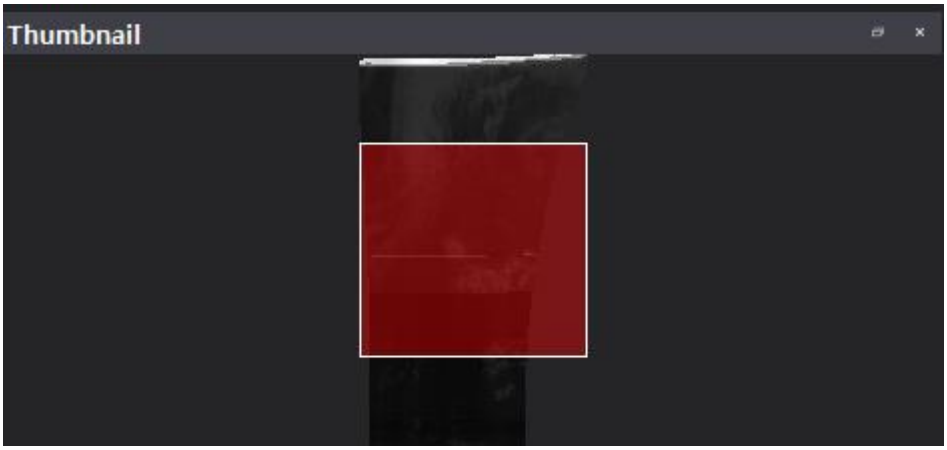


Figure 4-6 Thumbnail

③ When panning/zooming an image on a thumbnail, the same function is performed on the image display screen

4.5.6 World Map

① On the image display screen, select the left mouse button and drag the mouse to the location you want to move

② Change the area currently visible on the Worldmap screen

* The World Map function only functions on data containing map projection information

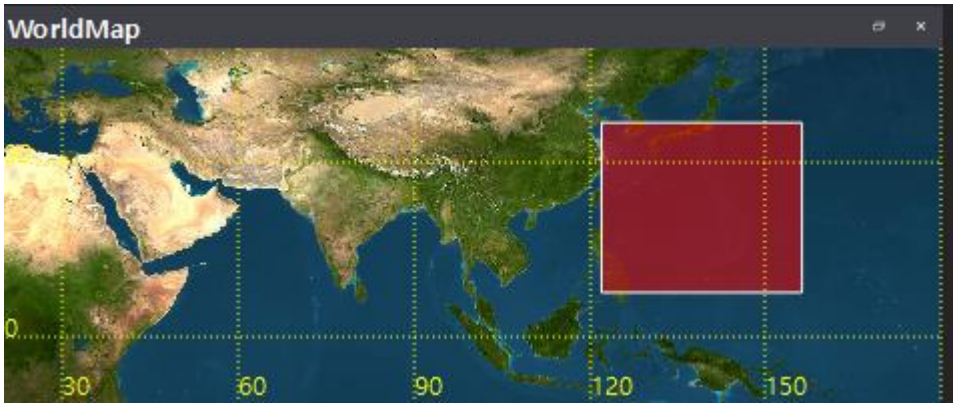


Figure 4-7 World Map

4.5.7 View the image display screen grid

① Select [- Grid View] in the toolbar

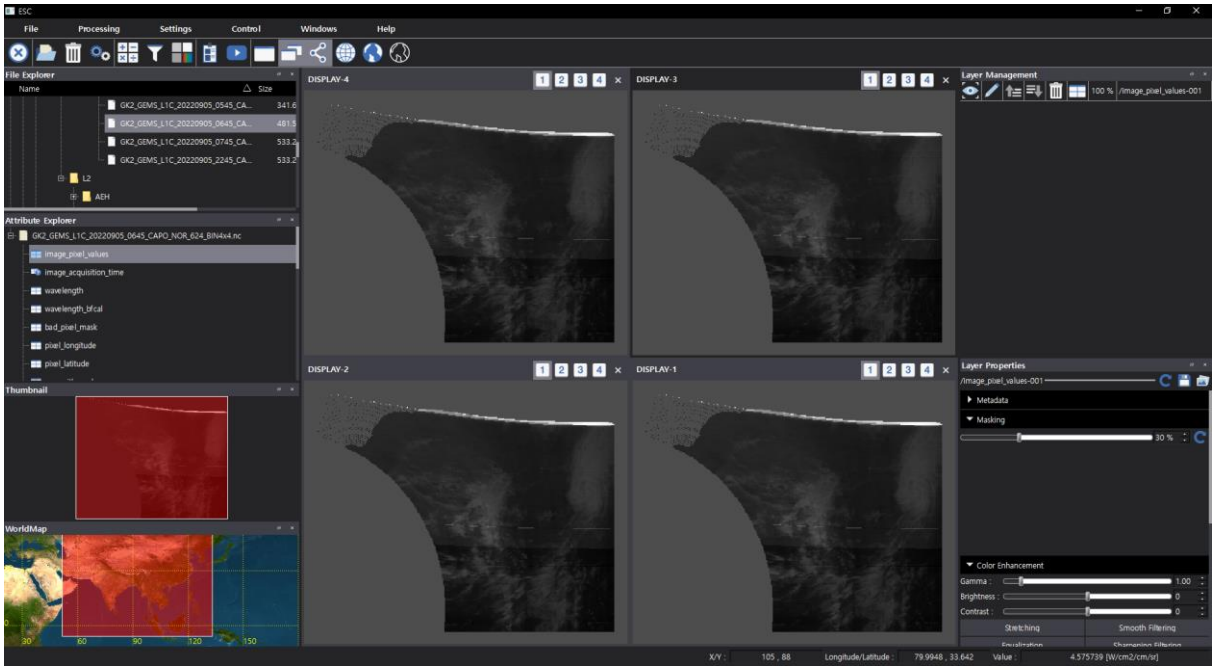


Figure 4-8 Grid View State

4.5.8 View the image display screen tab

① Select the [- Tab View] icon in the toolbar

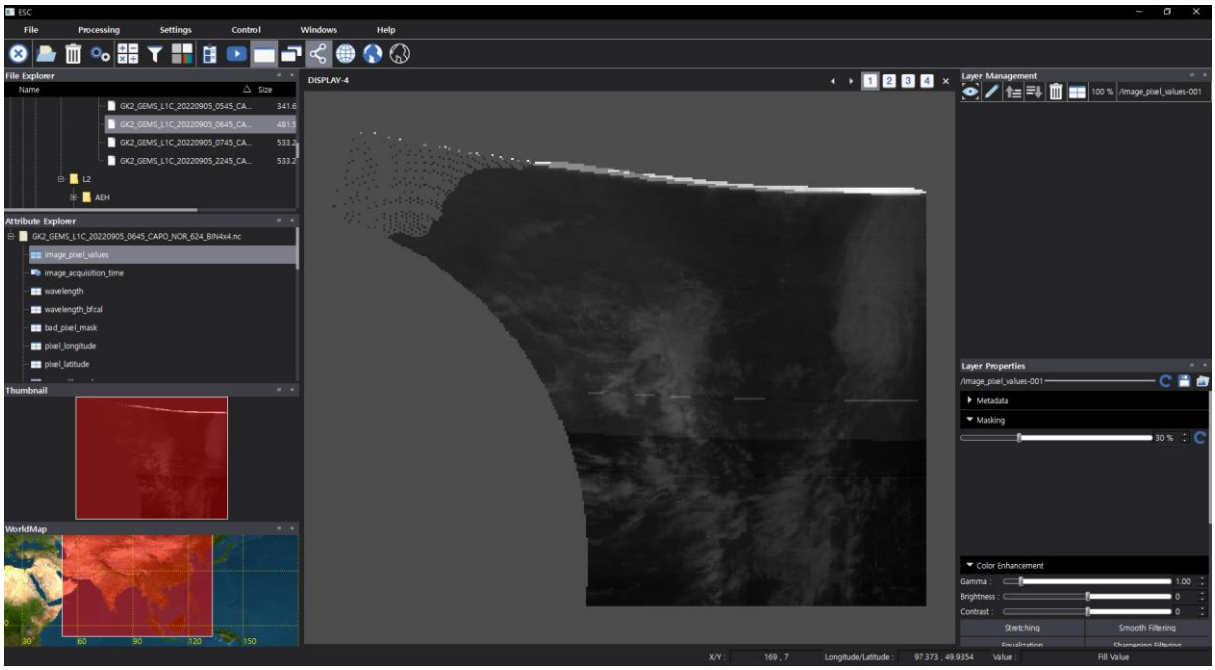


Figure 4-9 Tab View Status

4.5.9 Overlap latitude/longitude lines on images

① Select [- Latitude/Longitude Line] in the control toolbar

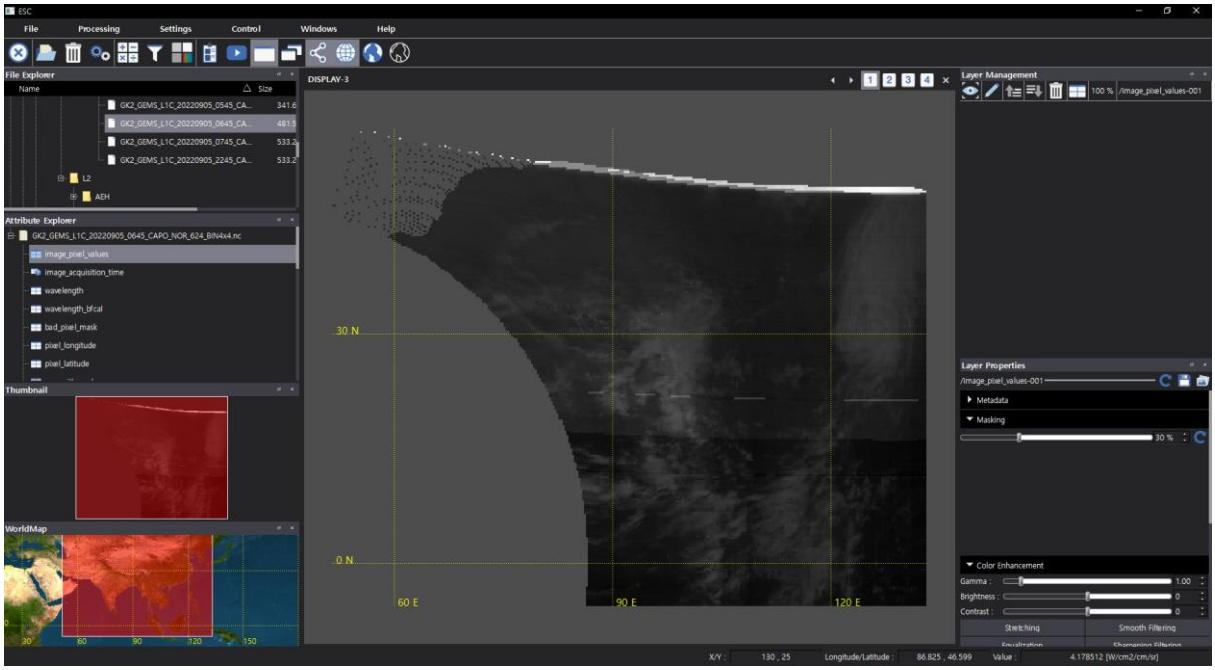


Figure 4-10 Latitude/Longitude Line Overlap

4.5.10 Overlap background map on images

① Select [- Background Map] in the control toolbar

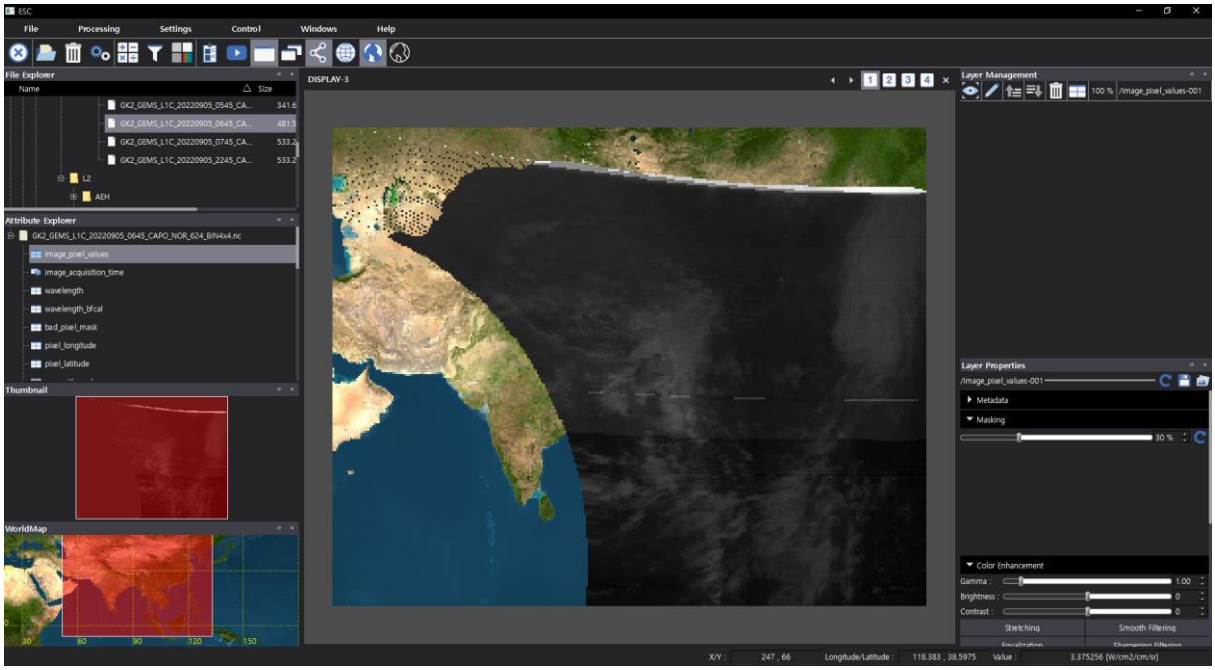


Figure 4-11 Background Map Overlay

4.5.11 Overlap borders on images

① Select [- Boundary] in the control toolbar

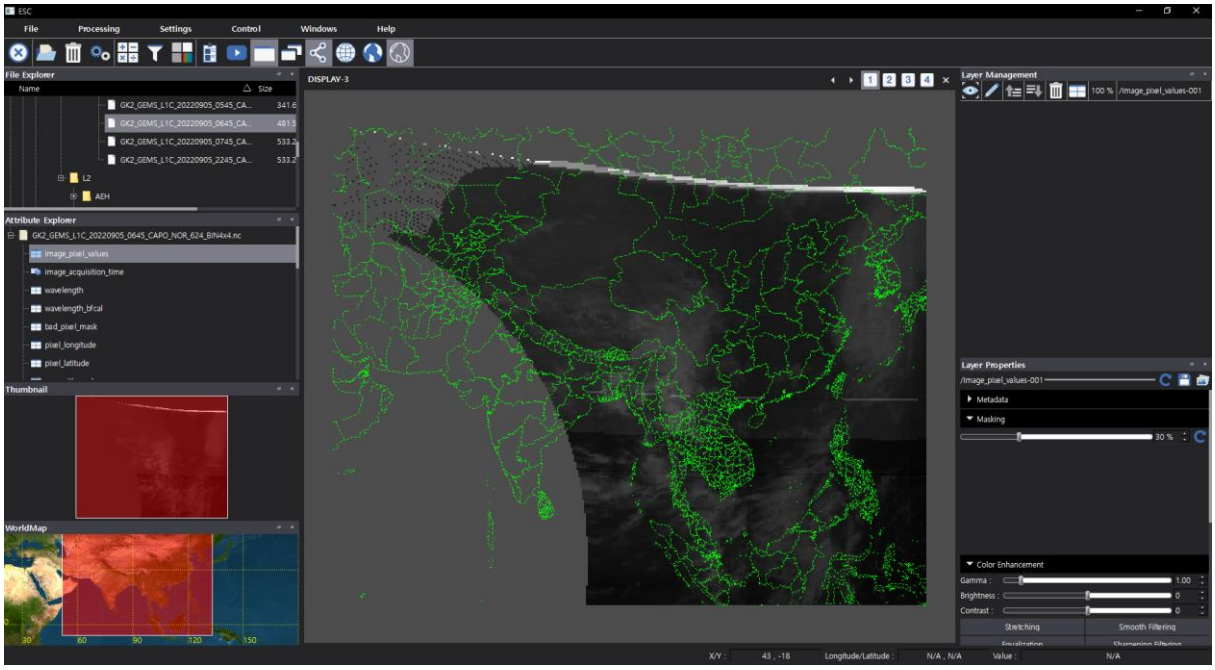


Figure 4-12 Border overlap

4.6 Synchronization

The synchronization function performs spatial synchronization for efficient analysis of the images of the image window and performs the same function when the user performs the control function of image zoom / reduction / movement.

4.6.1 Enable/disable sync

① Select [- Synchronization] in the toolbar

4.6.2 Group Management

① Select the group button at the top right of the image display screen

* Even if a sync group is set, if the sync is not activated, the sync function does not work

Figure 4-13 Synchronization - Group Management

4.7 Image Overlap

The image overlap function performs a function overlap of different images by performing spatial synchronization on one display screen.

4.7.1 Image Overlap

① In attribute explorer, double-click the dataset you want to display as an image
② Display dataset setting screen(only 3 demension)
③ Perform settings on the dataset settings screen, and then select the [OK] button
④ Select the image you want to overlay with the left mouse button in attribute explorer and drag it to the image display screen
⑤ Display dataset setting screen(only 3 demension)
⑥ Perform settings on the dataset settings screen, and then select the [OK] button

4.7.2 Manage layers

① Perform settings related to the display of layers

- : Enable/Disable
- : Selection layer
- : Move to up
- : Move to bottom
- : Remove layer
- : Edit layer data
- Transparency : Adjust layer transparency (0~100%)

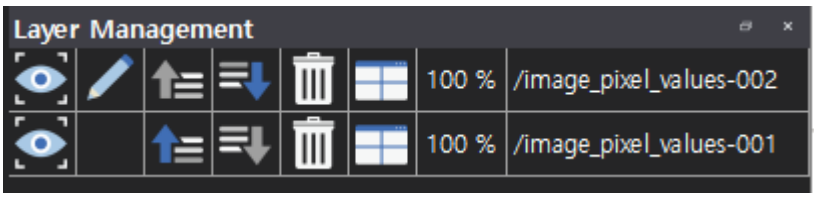


Figure 4-14 Managing Layers

4.8 Layer properties

Displays the basic metadata information of the layer and initializes the layer operation.

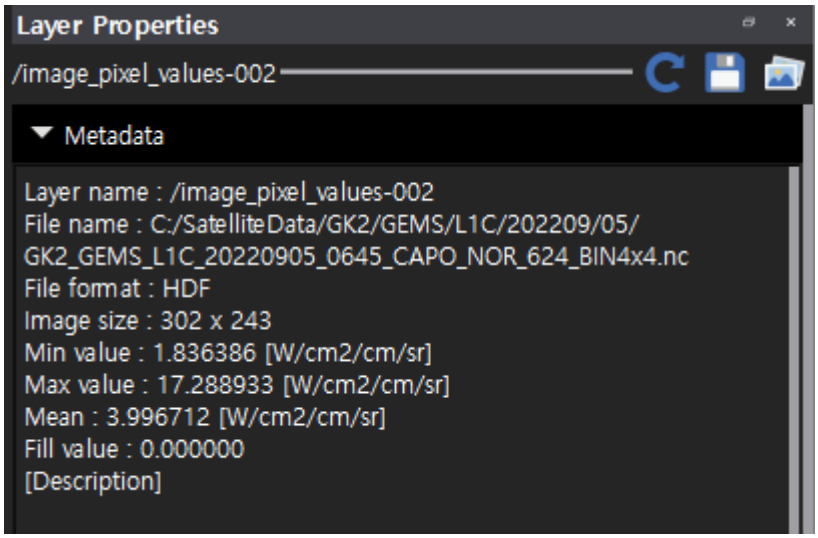


Figure 4-15 Layer Properties

4.8.1 Display metadata information

① Select the [Metadata] button in the layer properties screen
② Display metadata information

4.8.2 Initialize layers

① Select the [- Clean] button on the layer properties screen
② Initialize layer properties

4.9 Edit Color

Adjust the gamma, brightness, and contrast values of the displayed images, and perform histogram stretching, smoothing, smooth filtering, and sharpening filtering functions.

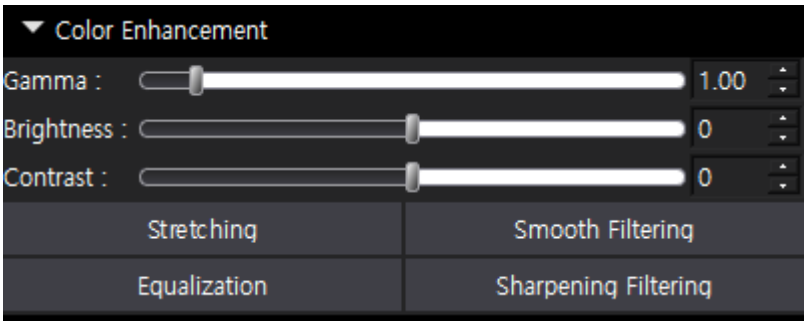
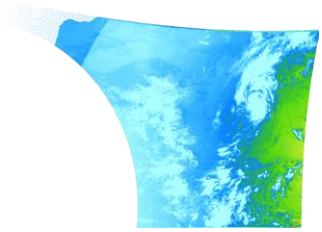
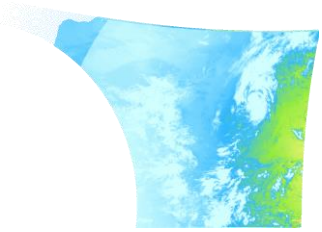


Figure 4-16 Edit Color

4.9.1 Gamma adjustment

① Enter the gamma slider or your own value

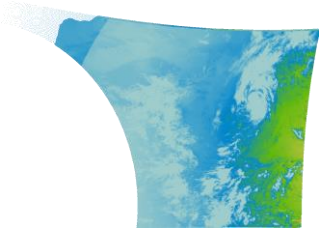

<Gamma -50>

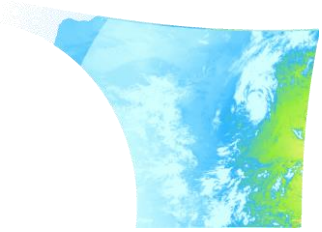

<Gamma 0>

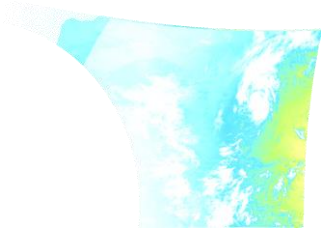
<Gamma +50>

4.9.2 Brightness adjustment

① Enter the brightness slider or your own value

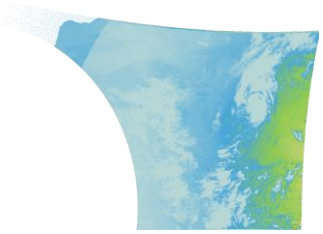

<Brightness -50>

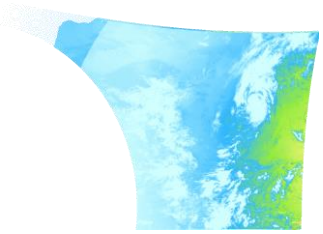

<Brightness 0>

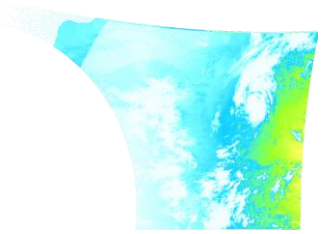

<Brightness +50>

4.9.3 Contrast adjustment

① Enter a contrast slider or a direct value

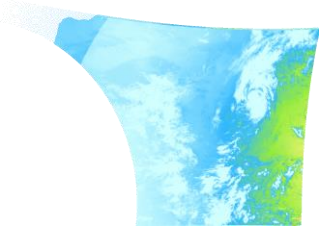

<Contrast -50>

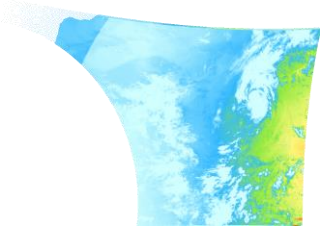

<Contrast 0>


<Contrast +50>

4.9.4 stretching

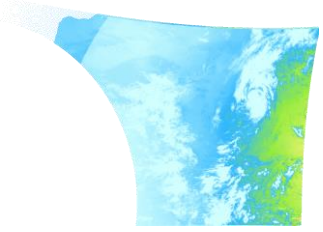
① Select the [Stretching] button

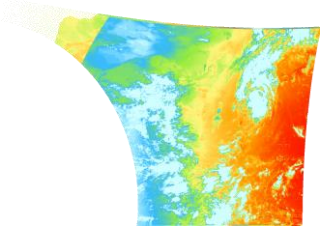

before


after

4.9.5 Equalization

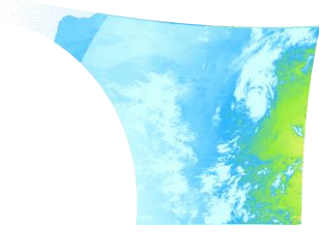
① Select the [Equalization] button

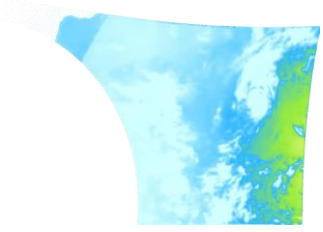

before


after

4.9.6 Smooth Filtering

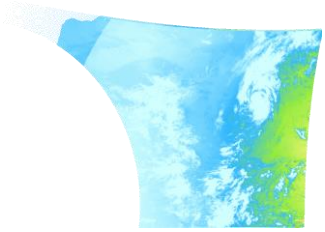
① Select the [Smooth Filtering] button


before

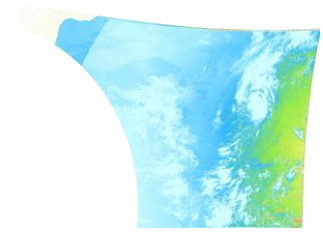

after

4.9.7 Sharpening Filtering

① Select the [Sharpening Filtering] button



before



after

4.10 Colormap

It checks the histogram distribution of the displayed image and performs the function of generating a user-defined image through the color map function.

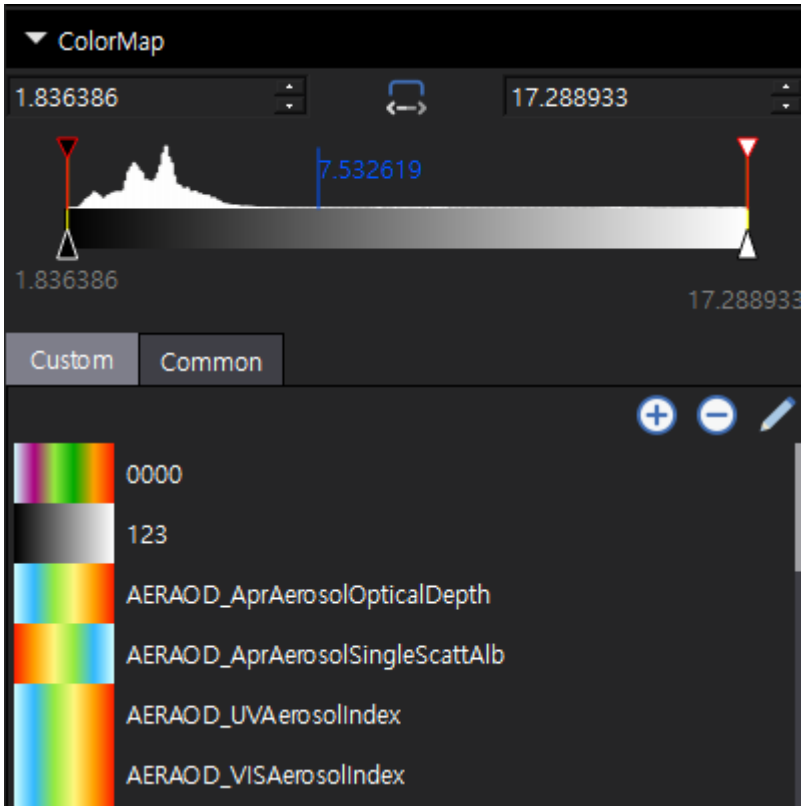


Figure 4-17 Colormap

4.10.1 Edit colormap item

■ Edit item color

① Double-click [Triangle Color Item] at the bottom of the colormap's histogram

② Check after selecting a color in the color selection window

■ Move items

① Left-select [Triangle Color Item] at the bottom of the colormap's histogram and drag it left/right

■ Add item

① Right-click the location in the colormap's histogram where you want to add an item

② Select the [Add] button from the menu

■ Remove item

① Right-click the item you want to remove from the colormap's histogram

② Select the [Remove] button from the menu

■ Equal distribution of items

① Right-click an item in the colormap's histogram

② Select the [Equal Distribution] button from the menu

■ Enable/disable gradients

① Right-click the item you want to set in the colormap's histogram

② Select the [Gradation] button from the menu

4.10.2 Adjusting color count values

① Select the left or right value of the colormap to enter a value

4.10.3 Automatically adjust color range values

① Select the [Auto Min/Max] button in the colormap

4.10.4 Adjusting the color display range

① Select [Windows] from the main menu, and then click [Color Manager]

② In the histogram of the colormap, left-select the top inverted triangle item and move it left/right

4.10.5 Color table application

① Double-click the colormap you want to load from the color list at the bottom of the colormap

4.10.6 Add custom colormap

① Select the Save button in the Customize Colormap list

② When the color map title input screen is displayed, enter the color map title and select the [OK] button

4.10.7 Remove user colormap

① Select the item you want to remove from the list of custom color maps and click the [Remove] button

② When the removal confirmation message appears, select the [OK] button

4.11 Contour

Using the data of the image, it performs the function of generating and displaying a contour according to the interval set by the user.

Figure 4-18 contour

4.11.1 Add a level

① Enter spacing on the contour screen

② Select the [- Add] button at the top of the level list

4.11.2 Remove a level

① Left click select the item you want to remove from the level list on the contour screen

② Select the [- Remove] button at the top of the level list

4.11.3 Edit Levels

① Select the item you want to edit from the level list on the contour screen and enter the level value

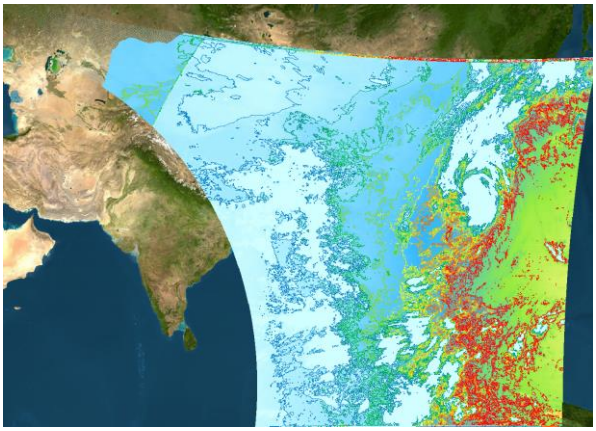
② Double-click the color item with the left mouse button

③ Check after selecting a color in the color selection window

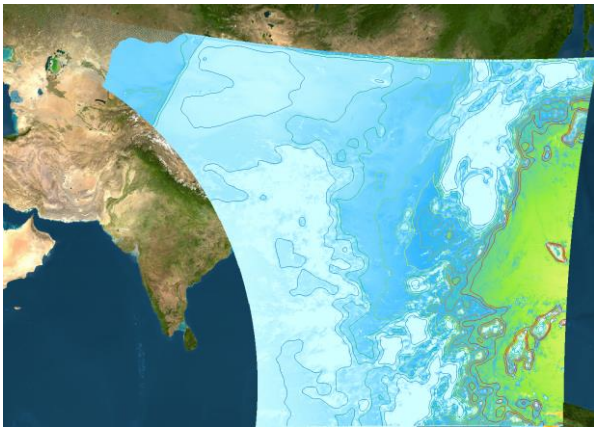
4.11.4 Contour application

① Smooth level slider or enter your own value

② [Apply] Button selection



<Smooth level 0>



<Smooth level 50>

4.12 Cloud masking

It performs the function of masking clouds by using cloud data in the displayed image. For geostationary environmental satellite (GEMS) data, cloud masking can be performed using the EffectiveCloudFraction dataset in the L evel2 Cloud output

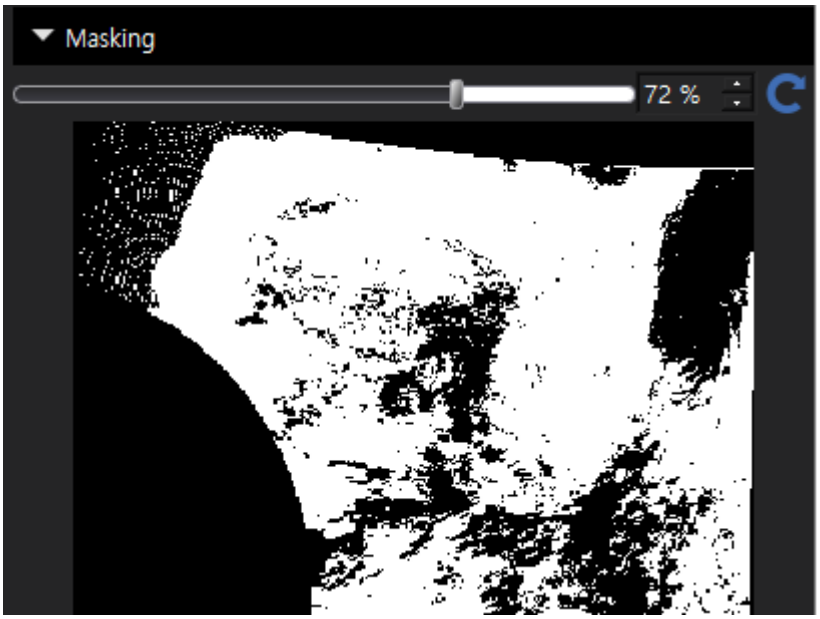
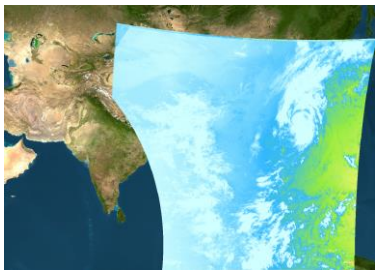
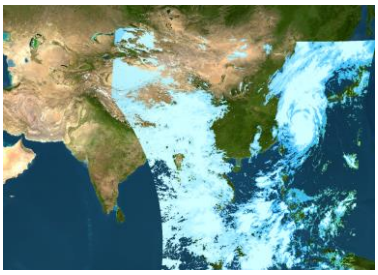


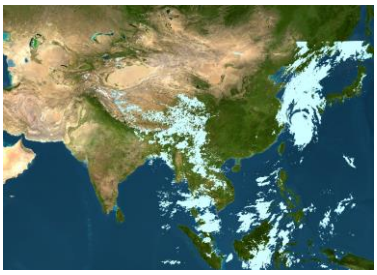
Figure 4-19 Cloud Masking

4.12.1 Cloud masking

① In attribute explorer, double-click the dataset you want to display as an image
② Display dataset setting screen(only 3 demension)
③ Perform settings on the dataset settings screen, and then select the [OK] button
④ Left-select the cloud masking dataset in the attribute explorer and drag it to the masking screen
⑤ Display dataset setting screen(only 3 demension)
⑥ Perform settings on the dataset settings screen, and then select the [OK] button


<Boundary value 0>


<Boundary value 30>


<Boundary value 100>

4.12.2 Change cloud boundary values

① On the masking screen, enter a slide or a direct value to enter the cloud boundary value

4.12.3 Remove cloud masking

① On the masking screen, select the [- Clean] button

4.13 Quality Flag

It uses the quality flag data on the displayed image to perform the function of masking or color processing. Quality flag information exists in the file for each output.

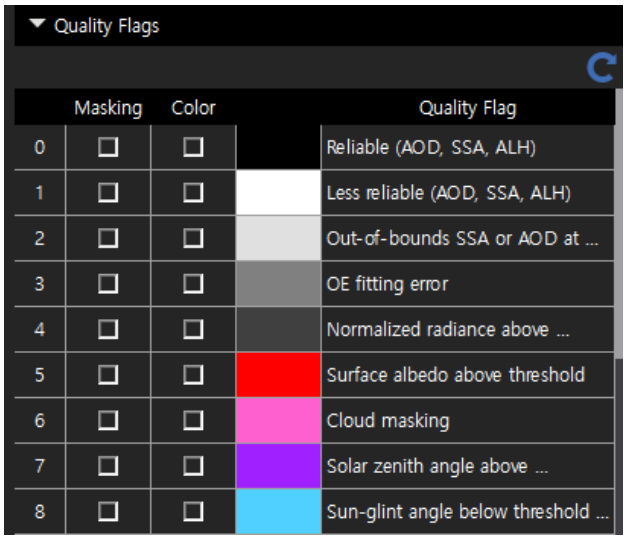


Figure 4-20 Quality Flag

4.13.1 Read quality flag

① In attribute explorer, double-click the dataset you want to display as an image with the left mouse button
② Display dataset setting screen(only 3 demension)
③ After performing the settings on the dataset setting screen, select the [OK] button
④ Select the Quality Flag dataset with the left mouse button in attribute explorer and drag it to the Quality Flag screen
⑤ Display dataset setting screen(only 3 demension)
⑥ After performing the settings on the dataset setting screen, select the [OK] button

4.13.2 Quality flag masking treatment

① In the Quality Flags list, select the checkbox of the item you want to mask to enable it
② The information corresponding to the selected flag is masked and displayed as an image

4.13.3 Quality Flag Color Processing

① Select the checkbox of the item you want to color from the Quality Flag list to activate it

② The information corresponding to the selected flag is color-processed and displayed as an image

■ Color change

① In the list of quality flags, double-click the color item of the item you want to change with the left mouse button

② Select a color in the color selection window and then confirm

4.13.4 Initialize Quality Flags

① Select the [-Default] button on the quality flag screen

4.14 Operation processing

It performs data operation processing using one or two satellite data and performs various operation processing functions such as basic mathematics, trigonometric functions, and logarithmic functions.

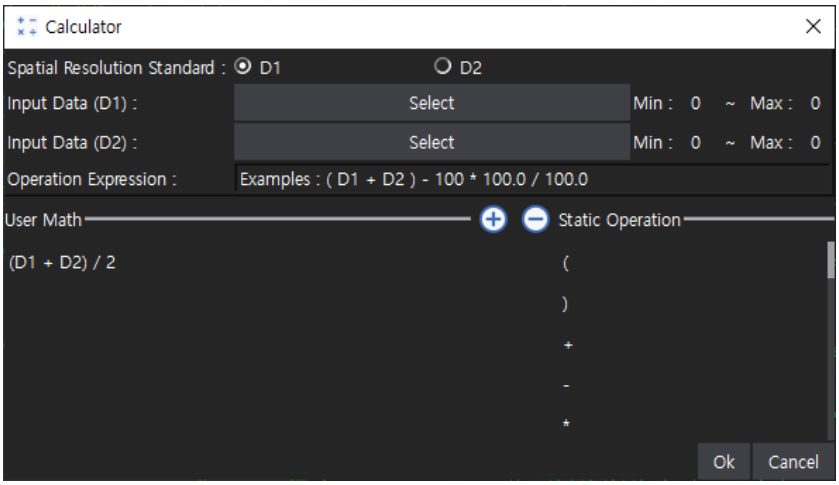


Figure 4-21 Operation Processing Settings Screen Window

4.14.1 Operation processing

① Select the [- Operation Processing] button in the toolbar

② Select spatial resolution criteria on the calculation processing screen
*Based on spatial resolution: If the width/height sizes of the two data are different, the interpolation method is performed, and the resolution is used as a reference when performing the interpolation method

③ [Select] Button selection

④ When the Property Explorer screen appears, double-click the data item with the left mouse button

⑤ Arithmetic input
Example: (D1 - D2) * (SIN(D1) – COS(D2))

⑥ The arithmetic field is marked in green, and then select the [OK] button

4.14.2 Adding User-Defined Operations Expressions

① On the calculation processing screen, enter the calculation expression, and then select the [- Add] button

4.14.3 Loading user-defined operations

① On the operation processing screen, left-click the operation expression in the user-defined operation list

4.14.4 Remove user-defined operation expressions

① Select the item you want to remove from the list of user-defined operations on the operation processing screen, and then select the [- Remove] button

4.14.5 Retrieving basic operation expressions

① On the operation processing screen, double-click the operation expression in the basic operation list

4.15 Filter Processing

It performs a filter processing function that uses satellite data to adjust the threshold of data.

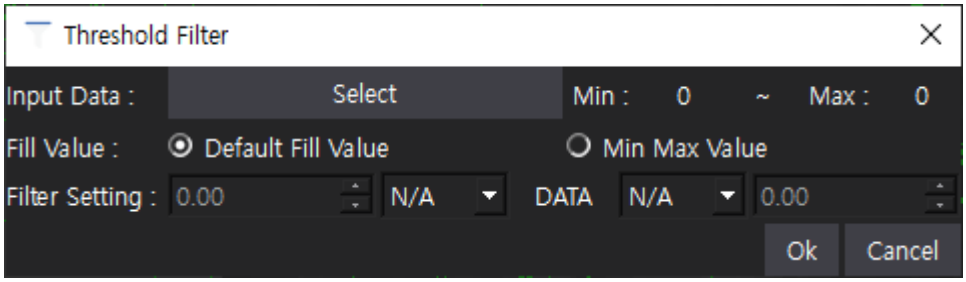


Figure 4-22 Threshold Filter

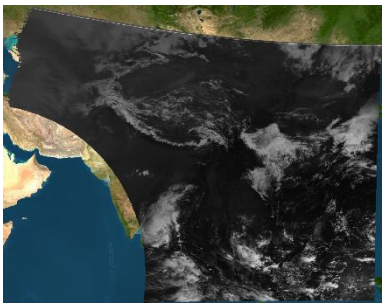
4.15.1 Filter Processing

① Select the [- Filter] processing icon in the toolbar

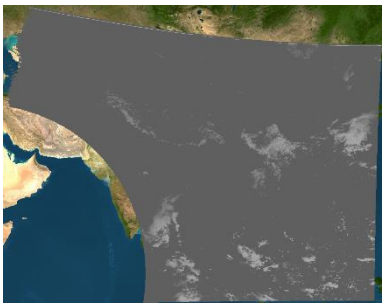
② [Select] Button selection

③ When the Property Explorer screen appears, double-click the data item with the left mouse button

④ Choose a fill value method


<Original>

<Default value>


<Min/Max Value>

- Default value: Treat as fill value of source data
- Min/Max Value: Processed as the min/max value set in the filter settings

⑤ After setting the inequality sign and threshold, select the [OK] button

4.16 RGBComposite processing

It performs the function of generating RGB images based on three images.

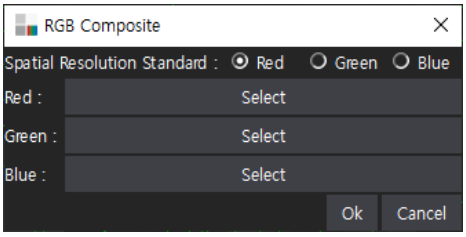


Figure 4-23 RGBComposite Processing

4.16.1 Generate RGB images

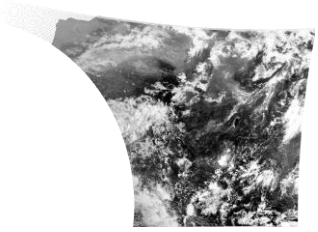
① Select the [- RGB Composite] button in the toolbar

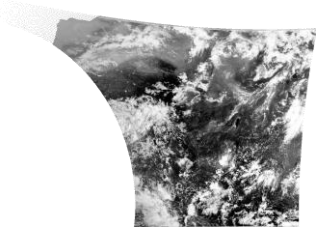
② Select spatial resolution criteria on the compositing screen
*Based on spatial resolution: If the width/height sizes of the two data are different, the interpolation method is performed, and the resolution is used as a reference when performing the interpolation method

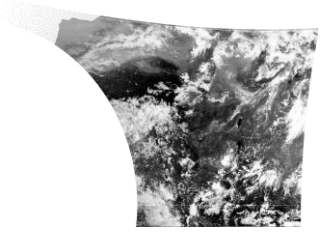
③ [Select] Button selection

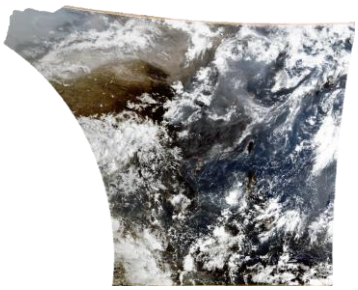
④ When the Property Explorer screen appears, double-click the data item with the left mouse button

⑤ Select all three-channel data, and then select the [OK] button


<Red Channel>


<Green Channel>


<Blue Channel>


<RGB Image>

4.17 Timelapse

Time-lapse performs the function of continuously playing back images imported and processed by the user or continuous images on the local disk and saving them in GIF form.

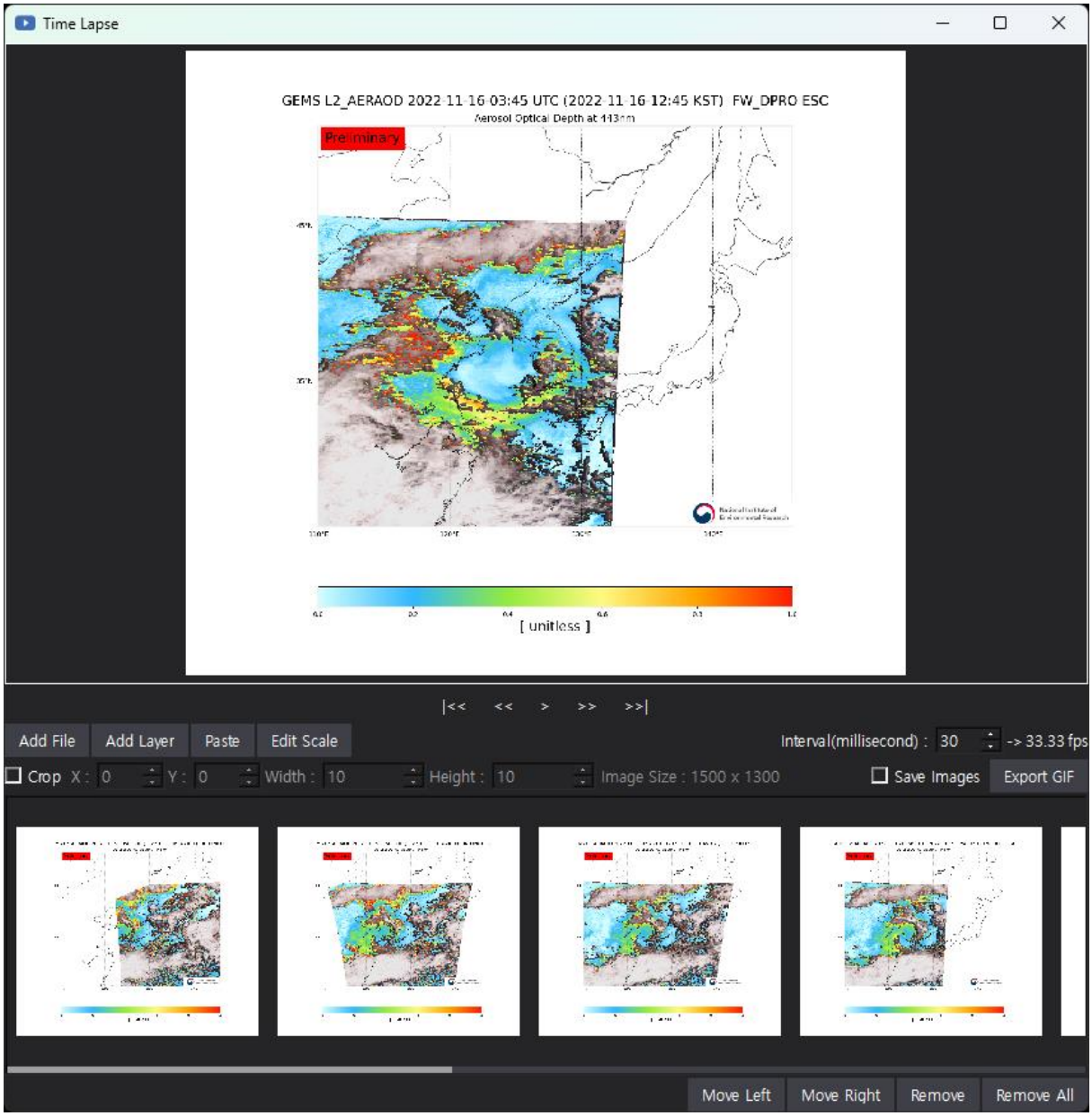


Figure 4-24 Time Lapse

4.17.1 Add a time-lapse image

① Select the [- Time Lapse] button on the toolbar

② Add image from the time-lapse screen

- Add File : Image stored on local disk

- Add layer : Image displayed by software
- Paste : The image currently stored in the clipboard
  * The image is saved on the clipboard when the [Save to Clipboard] function of GEMS Application Tool is performed, or the image file is saved on the clipboard when [Copy, Ctrl+C] the image file through the OS explorer

4.17.2 Change the order of time-lapse image

① Select the item you want to change the order of in the time-lapse list with the left mouse button
② Change the order to the left by selecting the [Move left] button at the top right of the time-lapse list
③ Change the order to the right by selecting the [Move Right] button at the top right of the time-lapse list

4.17.3 Remove time-lapse image

① Left click the item you want to remove from the timelapse list
② Select the [Remove] button at the top right of the time-lapse list

4.17.4 Remove the time-lapse all image

① Select the [Remove All] button at the top right of the timelapse list

4.17.5 Time Lapse Playback

① Perform time-lapse actions
- | <<: Go to the very beginning
- <<: Go to Previous
- >: Play
- || : Pause
- >>: Go to
- >>| : Go to the end

② Move the screen: Select with the left mouse button in the image display window and drag it to the move position
③ Zoom in screen: Rotate the mouse wheel up in the image display window
④ Zoom out screen: Rotate the mouse wheel down in the image display window
⑤ Interval : Playback speed (millisecond)

4.17.6 GIF export

① Select the [Export GIF] button on the time-lapse screen
*Save PNG file when selecting [Save images] button
② When the Save As screen is displayed, enter the path and file name, and then select the [Save] button

4.17.7 Crop and export GIF

① Select the [Crop] button on the time-lapse screen
② Activate the crop option and set it
- X : X value at the top left of the area to be cut
- Y : Y value of the upper left corner of the area to be cut
- Width : Width of the area to be cut
- Height : Height of the area to be cut

③ Select the [Export GIF] button on the time-lapse screen
*Save PNG file when selecting [Save images] button
④ When the Save As screen is displayed, enter the path and file name, and then select the [Save] button

4.18 Survey Analysis

The survey analysis function calculates and displays location information, distance, and area based on the position set by the user in the image.

4.18.1 Add location information

① Select the right mouse button on the image display screen
② Select the [Location] button from the menu
③ Select the left mouse button where you want to display location information in the image

4.18.2 Add distance information

① Select the right mouse button on the image display screen
② Select the [Distance] button from the menu
③ Select the left mouse button where you want to mark the starting point of the distance in the image
④ Select the left mouse button where you want to mark the distance end point in the image

4.18.3 Add area information

① Select the right mouse button on the image display screen
② Select the [Area] button from the menu
③ Select the left mouse button where you want to display the area starting point in the image
④ Select the left mouse button where you want to display the area midpoint in succession
⑤ Right-click to finish adding area

4.18.4 Remove survey information

① Select survey information from the image
② Select the [Delete] button on the keyboard
③ When displaying the removal confirmation message, select the [OK] button

4.18.5 Remove all survey information

① Select the [Ctrl + a] button on your keyboard
② Select the [Delete] button on the keyboard
③ When displaying the removal confirmation message, select the [OK] button

4.19 Areas of Interest

When performing an image display or analysis function, it manages the area that the user mainly analysis as an area of interest and performs the function of processing only the location.

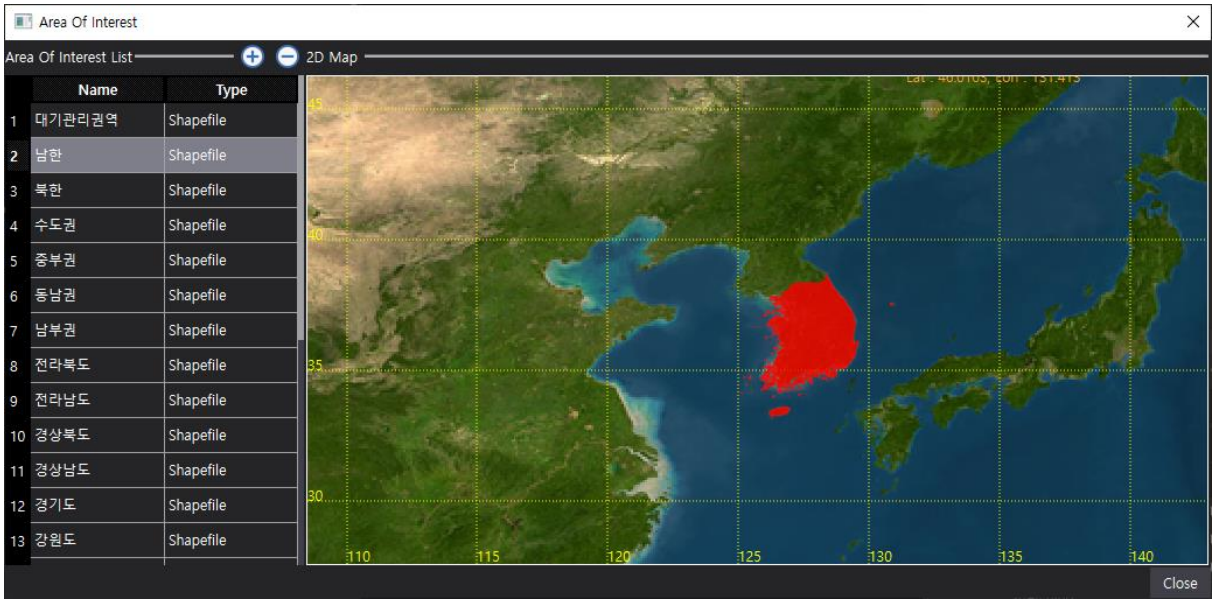


Figure 4-25 Areas of Interest

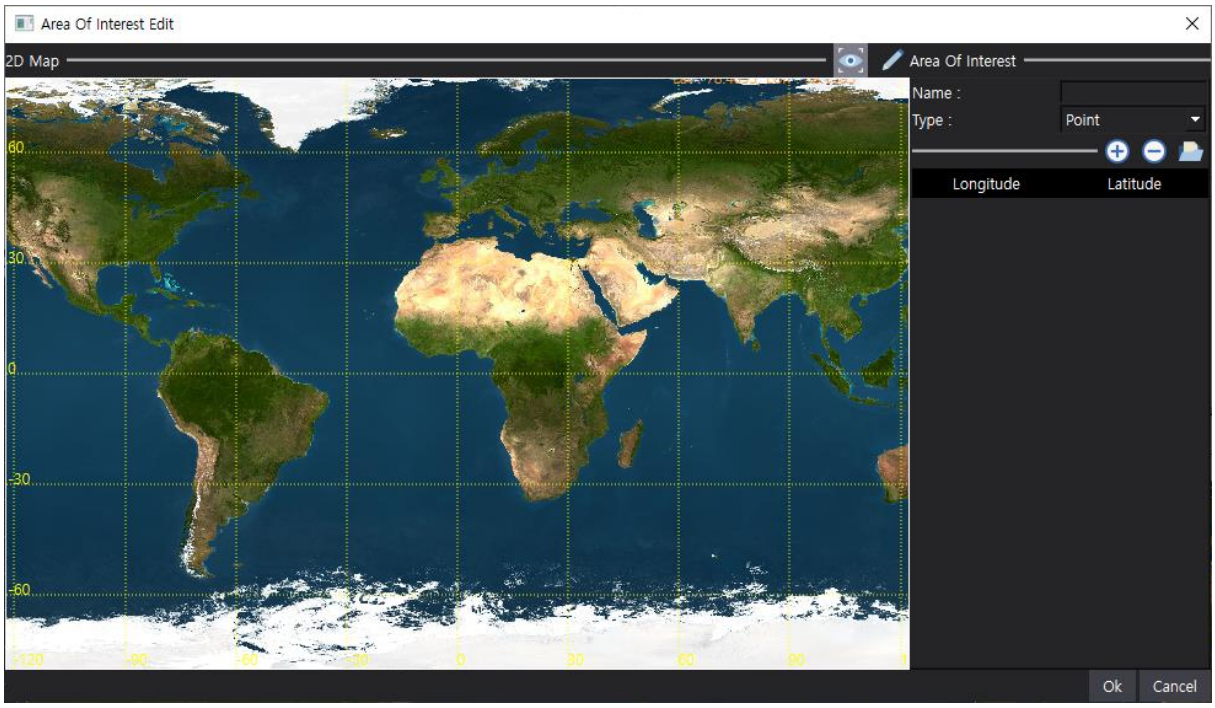
4.19.1 Add area of interest item

① Select the [Settings - Area of Interest Setting] button on the toolbar

② Select the [- Add] button on the Region of Interest screen

③ Display of area of interest editing screen

④ Select the [OK] button after setting on the Edit Region of Interest screen



- Name: Name of region of interest
- Type: Type of region of interest (Point, Line, Rectangle, Polygon)
- : View mode (use mouse to zoom in/out/move)
- : Edit mode (use the mouse to select and control the area)

4.19.2 Add area of interest using Shapefile

① Select the [-Load Shapefile] button on the Edit Area of Interest screen

② When the file selection screen is displayed, select the shp file and click the [Open] button

When the Proj4 text input screen is displayed, enter Proj4 text suitable for the selected shp file and select the [OK] button

*If map projection information is included in the Shapefile, it is automatically recognized and the Proj4 text input screen is not displayed

① Interest area information is added, and the area is displayed on the 2D map

*In the case of Shapefile, detailed editing is not possible

4.19.3 Remove area of interest entries

① Select the [Settings - Area of Interest Setting] button on the toolbar

② After selecting the item to be removed from the list of areas of interest, select the [-Remove] button

③ Select the [Confirm] button when the removal confirmation message is displayed

4.20 Change map projection

The map projection method change function performs the function of changing the original image in the form of a map projection set by the user.

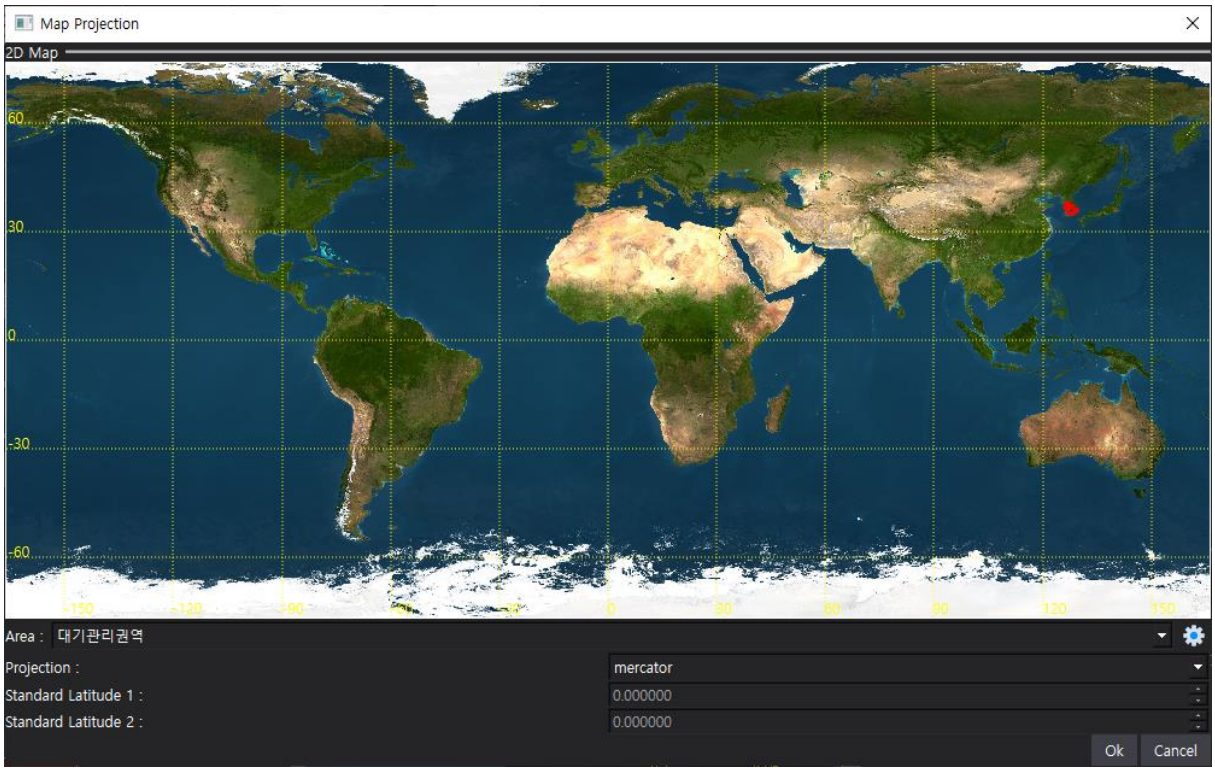
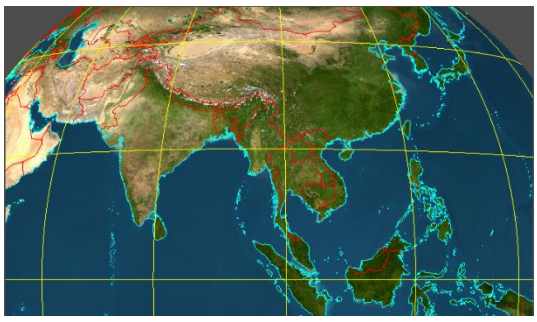
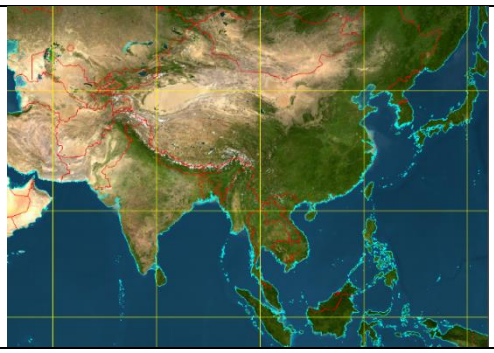
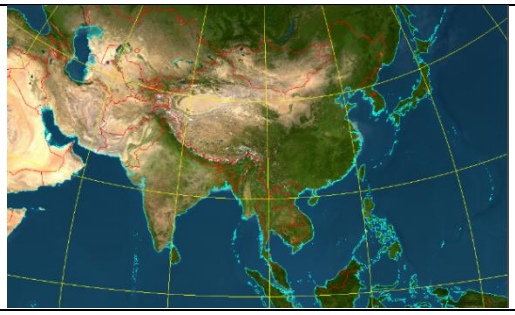
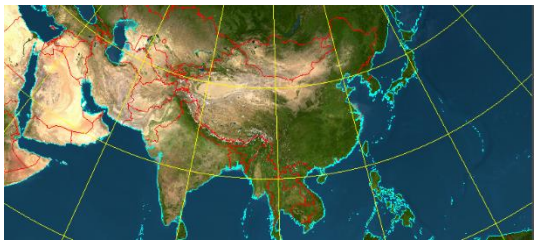


Figure 4-26 Changing the Map Projection

4.20.1 Change map projection

① Select the right mouse button on the image display screen
② Select the [Map Projection] button from the menu
③ Select the item you want to change from the area list on the map projection screen
④ Enter the map projection setting information and select the [OK] button
- Map projection: map projection type

	
<Geostationary>	<Mercator (EPSG:3857)>

	
<Polarstereo>	<Lambert Conic>

- Standard latitude 1: Latitude 1 value used in lambert_conic
- Standard latitude 2: Latitude 2 value used in lambert_conic

4.21 Vertical charts

The vertical chart performs the function of displaying a vertical line-shaped chart by calculating the average value of a specific area of multiple overlapping layers or a single layer in the form of a three-dimensional form.

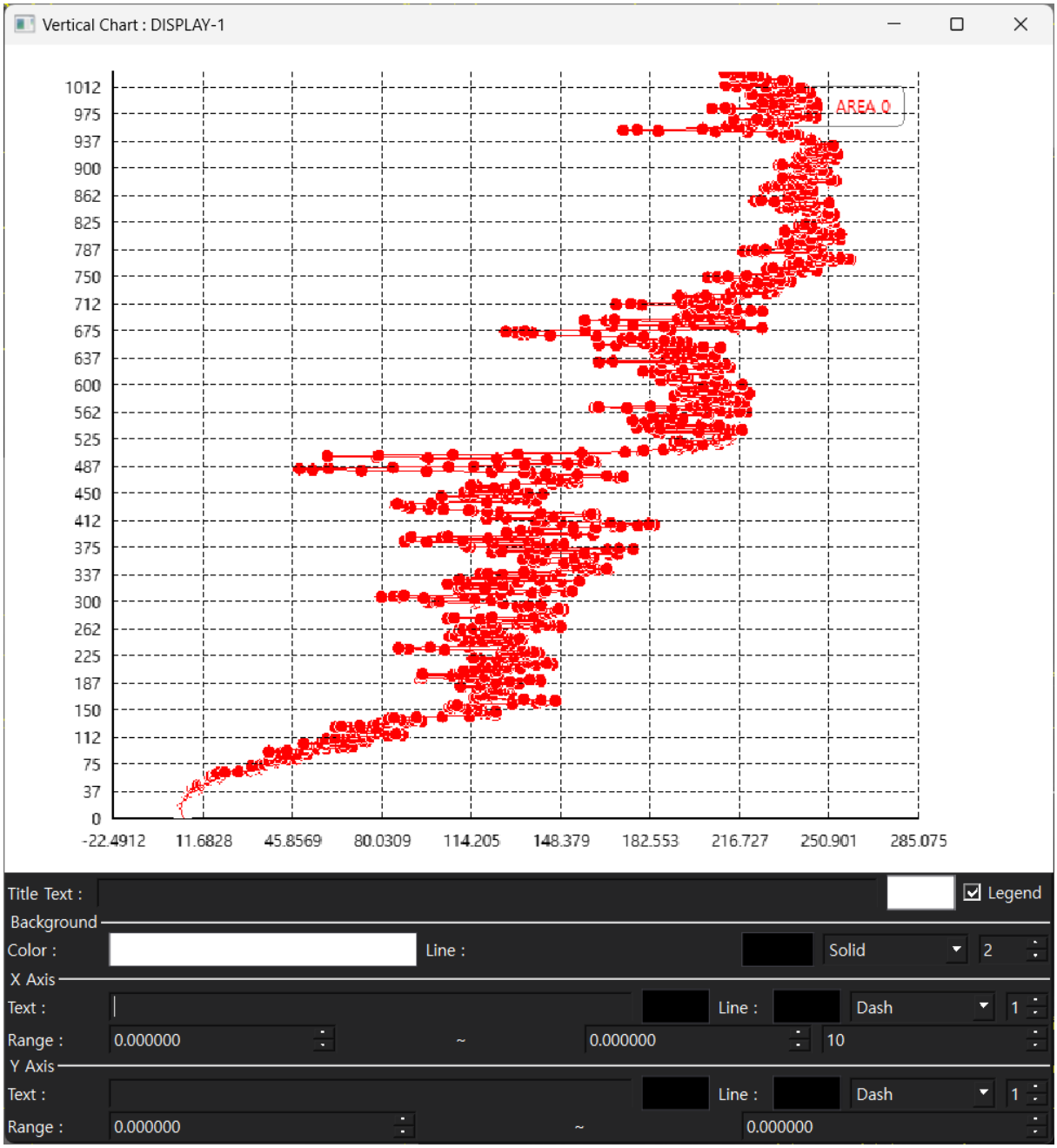


Figure 4-27 Vertical charts

4.21.1 Display of vertical charts

① Select the right mouse button on the image display screen

② Select the [Vertical Chart (Nested Layer)] or [Vertical Chart (Selected Layer)] button from the menu
- Vertical chart(overlapped layer) : Display vertical chart using layers superimposed on the current image display screen
- Vertical chart (selected layer) : If the currently selected layer is in a three-dimensional form, the vertical chart is displayed using the data

③ Select the left mouse button where you want to mark the point of the vertical chart analysis area in the image
- When selecting one point: Process the value for that point
- When selecting two points: Process the average value of the points included on the straight line of the two points
- When selecting 3 or more points: Process the average value of points included in the selected polygon

④ Right-click to exit the zone selection

4.21.2 Remove vertical chart

① Select the area item added on the image display screen
② Select the [Delete] button on the keyboard
③ When displaying the removal confirmation message, select the [OK] button

4.22 Analysis

Geostationary environmental satellites (GEMS), domestic and foreign satellites data(GK2 AMI, TROPOMI, OCO2/3, GOSAT, AQUA, TERRA), atmospheric environment data(AIRKOREA, AWS, AERONET, PANDORA) are used to perform precise/comparison analysis functions for the entire area or area of interest.

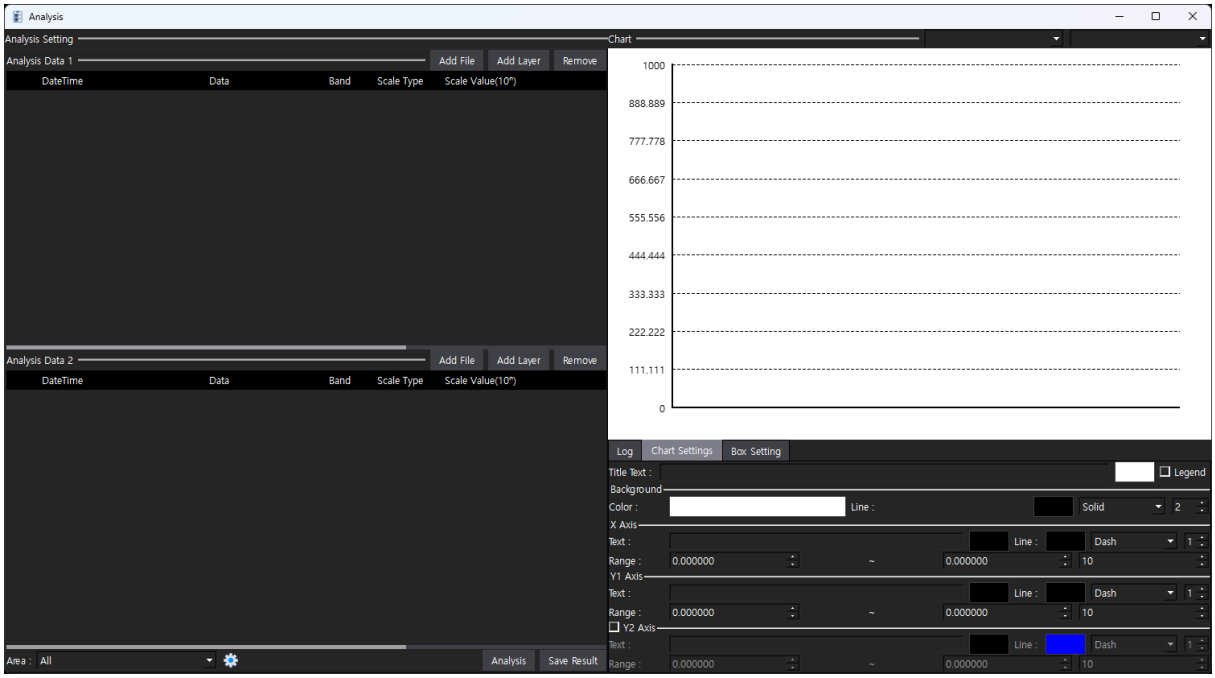


Figure 4-28 Data Storage

4.22.1 Add input data

① Select the [- Add] button from the input data list

② When the opening screen is displayed, select the file, and then select the [Open] button

*Performance degradation may occur with more input data

③ When items are displayed in the input data list, additional settings

- Date : Date/time of data
- Data : The type of data you want to import
- Band: Index for 3D data
- Scale type : Scale processing type (*, /)
- Scale value : Scale processing value

4.22.2 Remove input data

① Select the item you want to remove from the input data list, and then select the [- Remove] button

4.22.3 Precise analysis

① Select the [- Analysis] button in the toolbar

② Select an analysis area from the Analysis screen

③ Add data to Analysis data1, and then select the [Analysis] button

4.22.4 Comparison analysis

① Select the [- Analysis] button in the toolbar

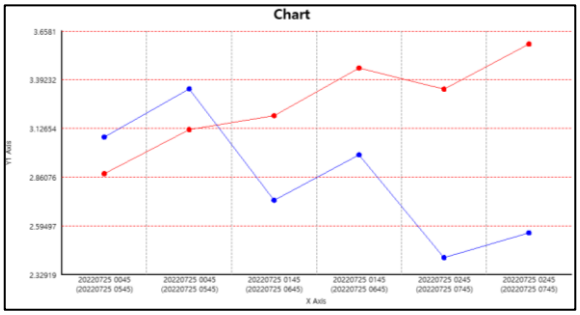
② Select an analysis area from the Analysis screen

③ Add data to analytical data1

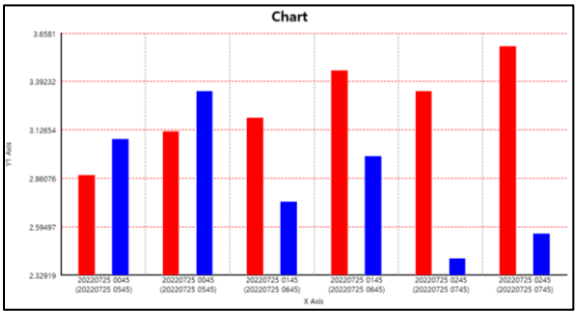
④ Add data to Analysis data2, and then select the [Analysis] button

4.22.5 Check analysis results

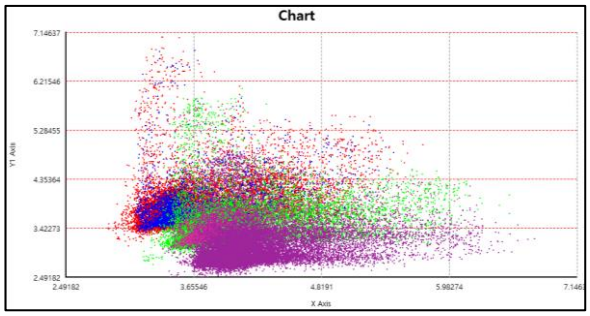
① Select a chart type at the top right of the analysis screen



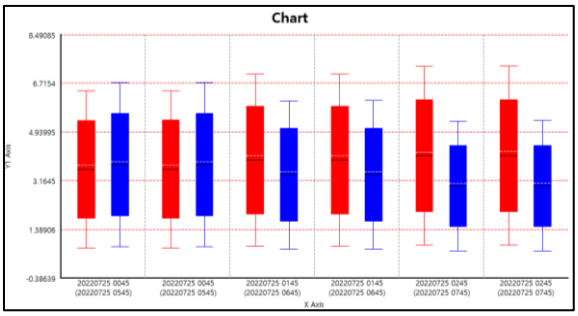
<Line chart>



<Bar chart>



<Scatter chart>



<Box chart>

② Select analysis information at the top right of the analysis screen

Item	Description	Note
Min	Minimum	Precise analysis/comparison analysis
Max	Maximum	Precise analysis/comparison analysis
Mean	Medium	Precise analysis/comparison analysis
Median	Median	Precise analysis/comparison analysis
Stdev	Standard deviation value	Precise analysis/comparison analysis
R	Correlation coefficient	Comparison analysis
MAE	Absolute mean error	Comparison analysis
MSE	Mean squared error	Comparison analysis
RMSE	Mean squared root of error	Comparison analysis
BIAS	Intercept (deflection)	Comparison analysis
SLOPE	Slope (weight)	Comparison analysis
OFFSET	The error value of the value calculated using intercept and slope and the actual value	Comparison analysis

③ Select the Chart Settings button at the bottom right of the analysis screen

④ Set the chart display method

- Title text : The text represented by the title at the top of the chart
- Title text color: Expression color of title text
- X-axis text: Text displayed as the X-axis title at the bottom of the chart

- X-axis text color : The expression color of the X-axis text
- X-axis line type : Type of X-axis dividing line
- X-axis line thickness: The thickness of the X-axis dividing line
- X-axis display range: X-axis display range
- Number of X-axis divisions: Number of divisions of X-axis
- Y1-axis text : Text displayed by the Y1-axis title on the left side of the chart
- Y1-axis text color: The display color of Y1-axis text
- Y1 axis line type: Type of Y1 axis separator line
- Y1 axis line thickness: The thickness of the Y1 axis separator line
- Y1 axis display range: Y1 axis expression range
- Number of Y1 axis divisions: Number of divisions of Y1 axis
- Y2-axis text : Text displayed by the Y2-axis title on the left side of the chart
- Y2-axis text color: Expression color of Y2-axis text
- Y2 axis line type: Type of Y2 axis separator line
- Y2-axis line thickness: The thickness of the Y2-axis dividing line
- Y2 axis display range: Y2 axis expression range
- Number of Y2 axis divisions: Number of divisions of Y2 axes

⑤ Select the box setting button at the bottom right of the analysis screen

⑥ Setting the display method of box chart

- Top of Box (%): Position at the top of the box in the box chart
- Bottom of the box (%) : The position of the bottom of the box in the box chart
- Top of Line (%) : The position of the top of the line in the box chart
- Bottom of Line (%) : The position at the bottom of the line in the box chart
- Point Top Boundary Value (%) : The top point start position of the box chart
- Point Top Spacing (%) : The interval from the start position of the top point of the box chart
- Point bottom boundary value (%) : The starting position of the bottom point in the box chart
- Point bottom spacing (%) : The interval from the starting position of the bottom point of the box chart

4.22.6 Save results

① Select the [- Analysis] button in the toolbar

② Select an analysis area from the Analysis screen

③ Set up input data and perform analytical processing

④ [Save Results] Button selection

⑤ When the Save As screen is displayed, enter the path and file name, and then select the [Save] button

4.23 Macro

When operating some functions performed by the tool, the processing history is recorded, and macros are defined using this processing history to perform the batch processing function.

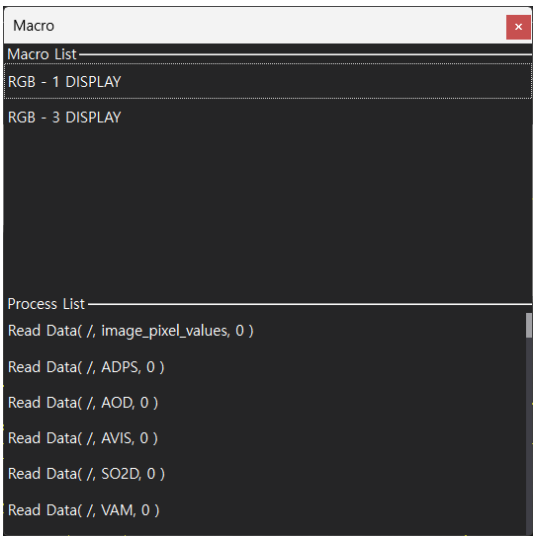


Figure 4-29 Macro

Item	Description
Read data	Read data from a file
Add layer	Add layers to your display
Operation processing	Operation processing
Filter processing	Filter processing
RGBComposite processing	RGBComposite processing
Apply colormap	Color processing using a colormap file
Set colormap range	Set the range of the colormap to process the color
Brightness	Adjust the brightness of the image
Contrast	Adjust the contrast of the image
Gamma	Adjust the gamma of the image
Histogram stretching	Image histogram stretching
Histogram equalization	Image histogram equalization
Smooth filtering	Image Smooth filtering
Sharpening filtering	Image Sharpening filtering

4.23.1 Remove process history

■ Remove process history

① Select the item you want to remove from the list of actions on the Macros screen
② Right-click selection
③ Select the [Remove] button from the menu
④ When displaying the removal confirmation message, select the [OK] button

■ Remove all process history

① Right-click in the process list on the Macro screen
② Select the [Remove All] button from the menu
③ When displaying the removal confirmation message, select the [OK] button

4.23.2 Add macro

① Right-click on the macro list on the Macros screen
② Select the [Add] button from the menu
③ Display the macro edit screen
④ Enter the macro name and macro description information
⑤ Double-click the item you want to add as a macro process item in the process history list with the left mouse button
⑥ The item is added to the macro process list and displayed

- : Move up
- : Move down
- : remove

⑦ Select the [OK] button
⑧ The macro is added to the macro list on the macro screen and displayed

4.23.3 Edit macro

① On the Macros screen, select the item you want to edit from the macro list
② Right-click selection
③ Select the [Edit] button from the menu
④ Display the macro edit screen

⑤ After performing the edit, select the [OK] button

4.23.4 Remove macro

■ Remove macro

① Select the item you want to remove from the macro list on the Macros screen

② Right-click selection

③ Select the [Remove] button from the menu

④ When displaying the removal confirmation message, select the [OK] button

■ Remove all macro

① Right-click on the macro list on the Macros screen

② Select the [Remove All] button from the menu

③ When displaying the removal confirmation message, select the [OK] button

4.23.5 Macro processing

① On the Macros screen, select the item you want to perform processing from the macro list

② Double-click the left mouse button

③ Macro processing progress

4.24 Image Storage

Performs a function of storing a working screen or an image displayed on the image display screen.

4.24.1 Save basic images (save only single-layer images)

① Select the [- Save image] button on the layer property screen
② When the Save As screen is displayed, enter the path and file name, and then select the [Save] button

4.24.2 Save edited image (save the display status of the image display screen as an image)

① Select the right mouse button on the image display screen
② Select the [Save image] button from the menu
③ When the Save As screen is displayed, enter the path and file name, and then select the [Save] button

4.24.3 Clipboard capture (save selected area to clipboard)

① Select the right mouse button on the image display screen
② Select the [Clipboard Capture] button from the menu
③ Left click and hold the start point of the capture area and drag it to the end point

4.24.4 Clipboard capture (save selected area as file)

① Select the right mouse button on the image display screen
② Select the [Clipboard Capture] button from the menu
③ Left click and hold the start point of the capture area and drag it to the end point
④ When the Save As screen is displayed, enter the path and file name, and then select the [Save] button

4.25 Data Storage

It performs a function of saving the working data displayed on the image display screen as a binary or text file.

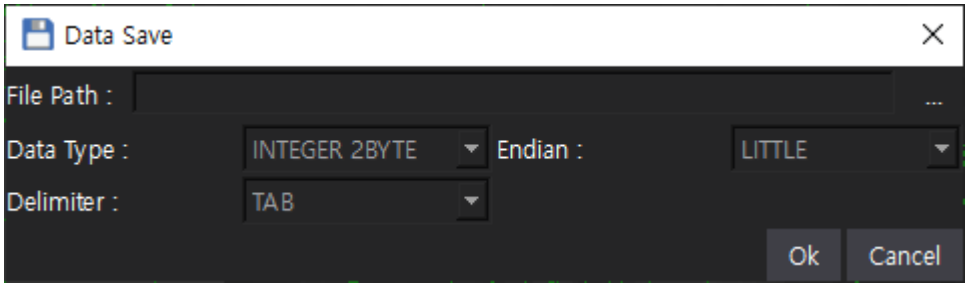


Figure 4-30 Saving Data

4.25.1 Save Binary files

① Select the [- Save Data] button on the layer property screen

② The file path of [...] Button selection

③ When the Save As screen is displayed, enter the path and file name, enter the extension, and then select the [Save] button

④ Enter the data type and endian information, and then select the [OK] button

Category	Item	Description
Data type	INTEGER 1BYTE	Integer 1-byte format
	INTEGER 2BYTE	Integer 2-byte format
	INTEGER 4BYTE	Integer 4-byte format
	INTEGER 8BYTE	Integer 8-byte format
	REAL 4BYTE	Real 4-byte format
	REAL 8BYTE	Real 8-byte format
Endian	LITTLE	data storage order LITTLE type
	BIG	data storage order BIG type

4.25.2 Save Text files

① Select the [- Save Data] button on the layer property screen

② The file path of [...] Button selection

③ When the Save As screen is displayed, enter the path and file name, enter the extension txt, and then select the [Save] button

④ Enter the separator information, and then select the [OK] button

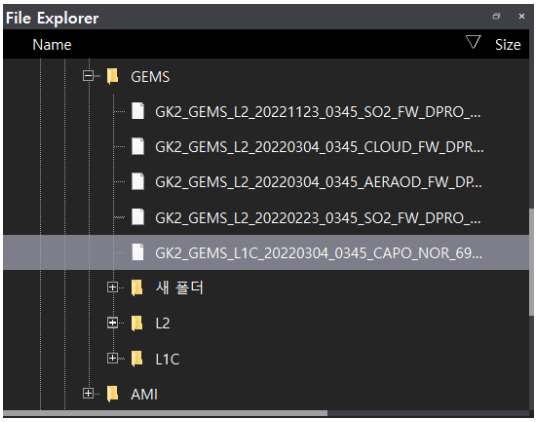
5. SCENARIO

5.1 Satellite data image display and editing analysis

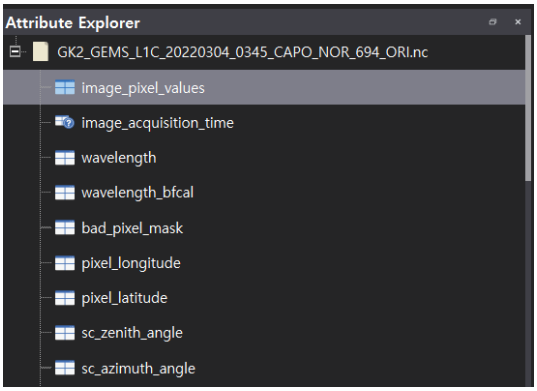
The data of the satellite data is called, the image is created, displayed on the screen, and the image is analysis by performing the function of zooming in/out/moving using the mouse.

1. Display data properties

Move to the collected satellite data path in the file search window and double-click the satellite data with the mouse.

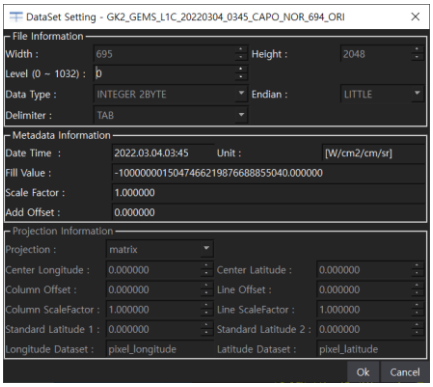


As shown in the figure below, properties are displayed in the property search window.



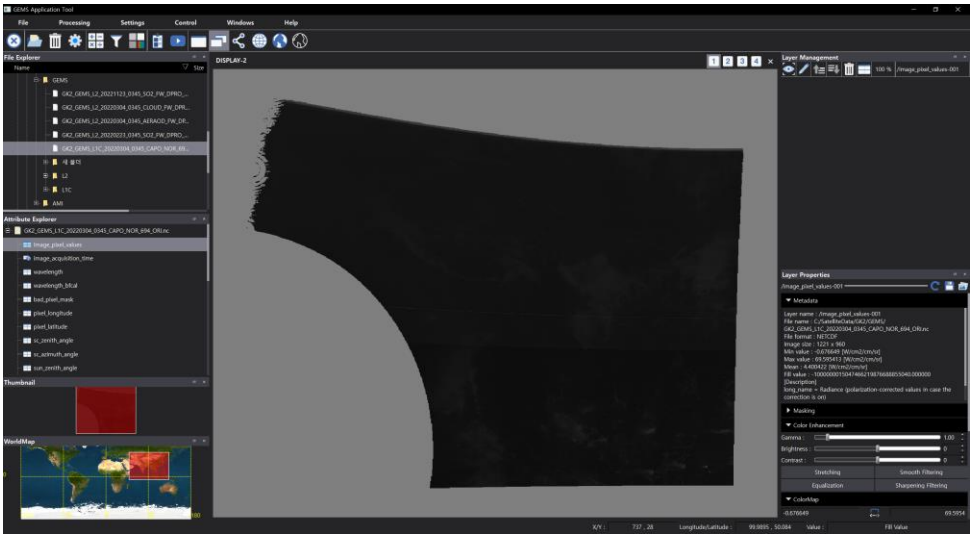
2. Data set setup and display

Double-click the dataset you want to analysis in the property search window with the left mouse button.



The dataset setting screen is displayed, and if necessary, change the setting information and select the OK button.

- In the case of GEMS satellite data, values are automatically entered

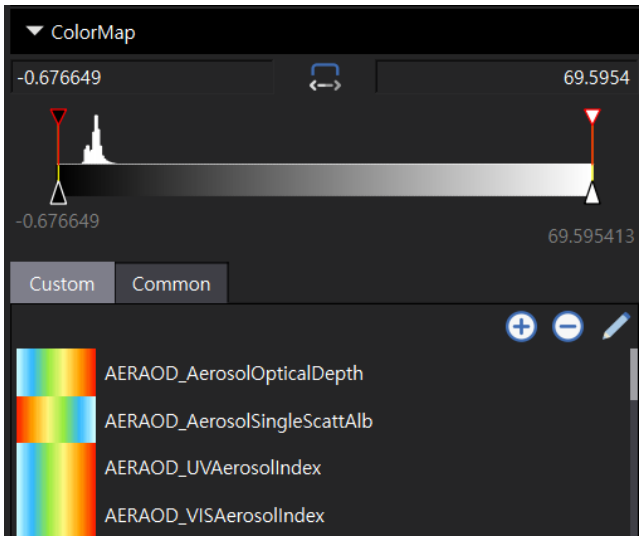


3. Image display control

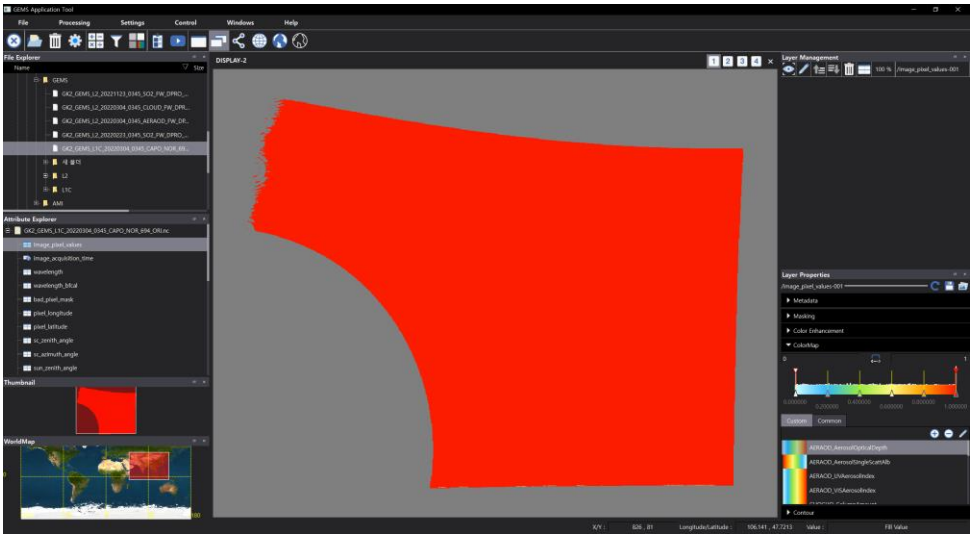
The image can be controlled using a mouse or keyboard on the image display screen.

4. Image color editing

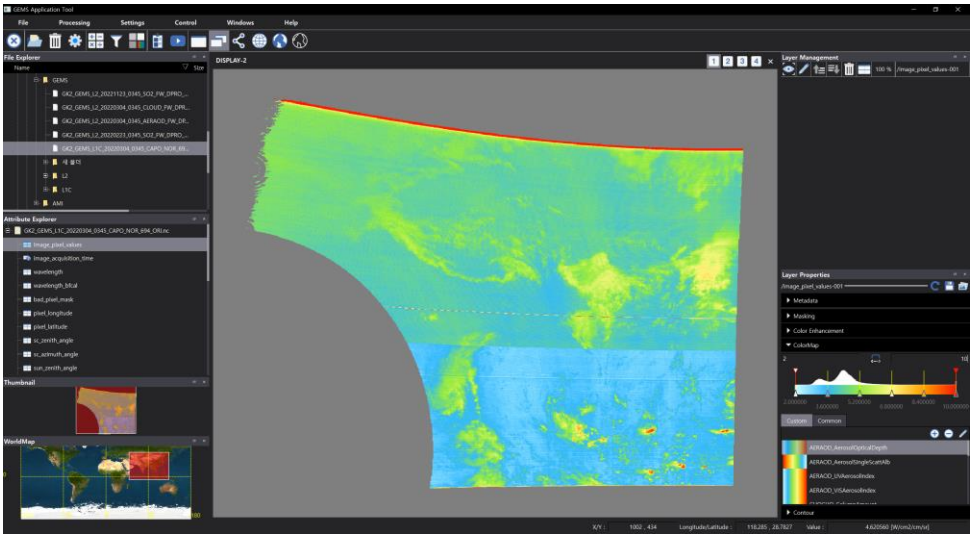
You can edit the color of the image through the color map screen of the layer properties.



Double-click the color map you want to apply from the color map list on the color map screen with the left mouse button.



After applying the color map to the image, set the minimum and maximum values of the color map according to the data to adjust the color distribution.



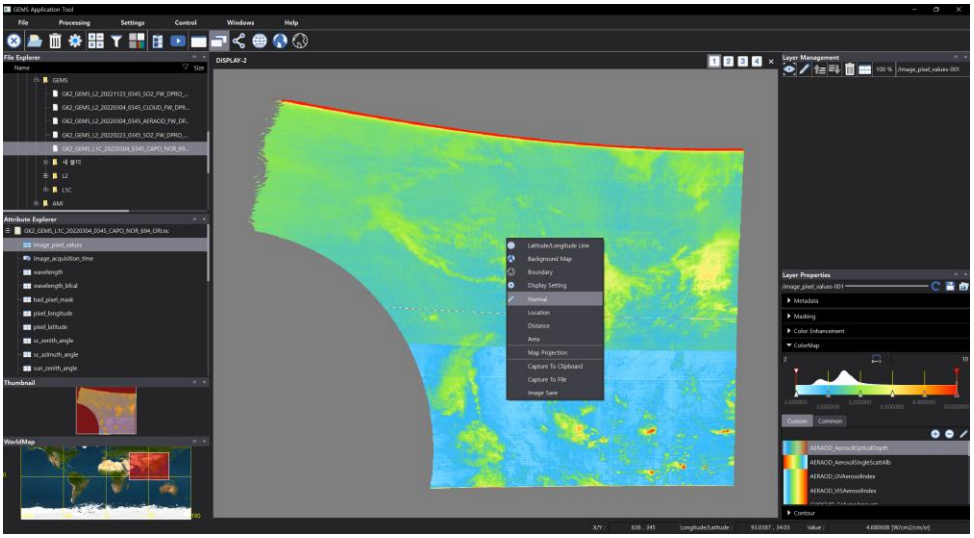
5.2 Analysis of AOI data

When analyzing satellite data, data is extracted and analysis for the area of interest to the user, not the entire area.

1. Map Projection Conversion

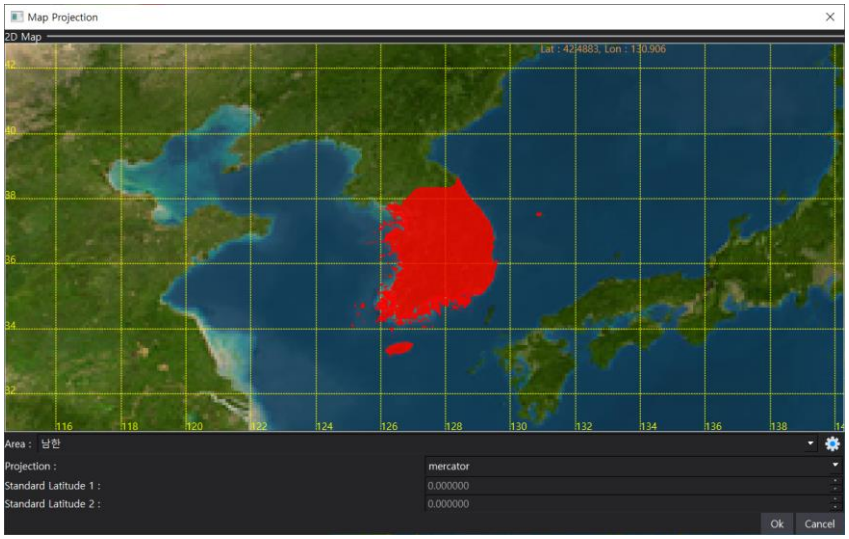
It is performed in the state where images are displayed through satellite data image display and editing scenarios.

If you select the right button of the mouse on the image display screen, the menu is displayed, and select the map projection button from the menu.



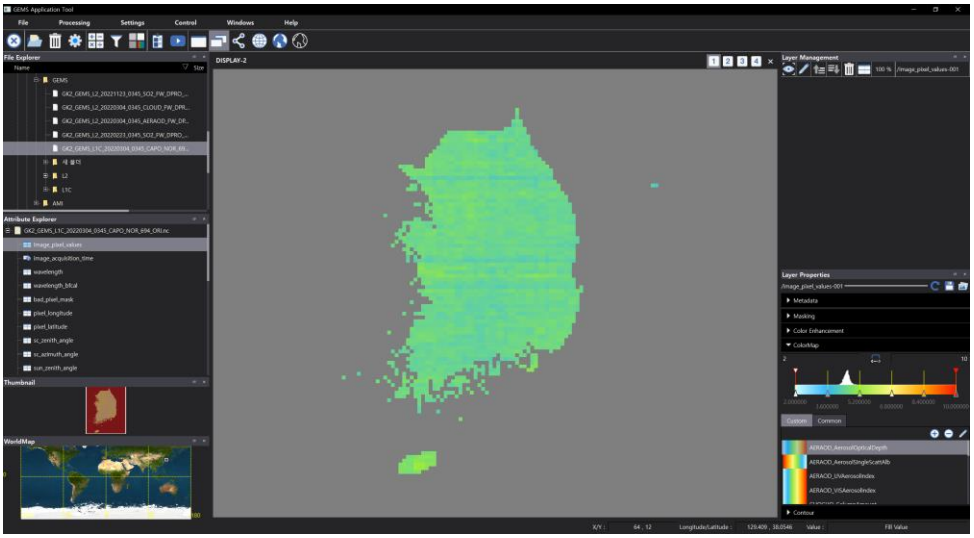
The map projection screen is displayed.

Select an area on the map projection screen and set the map projection.



Complete the settings and select the OK button.

An image of the region of interest selected by the user is displayed.

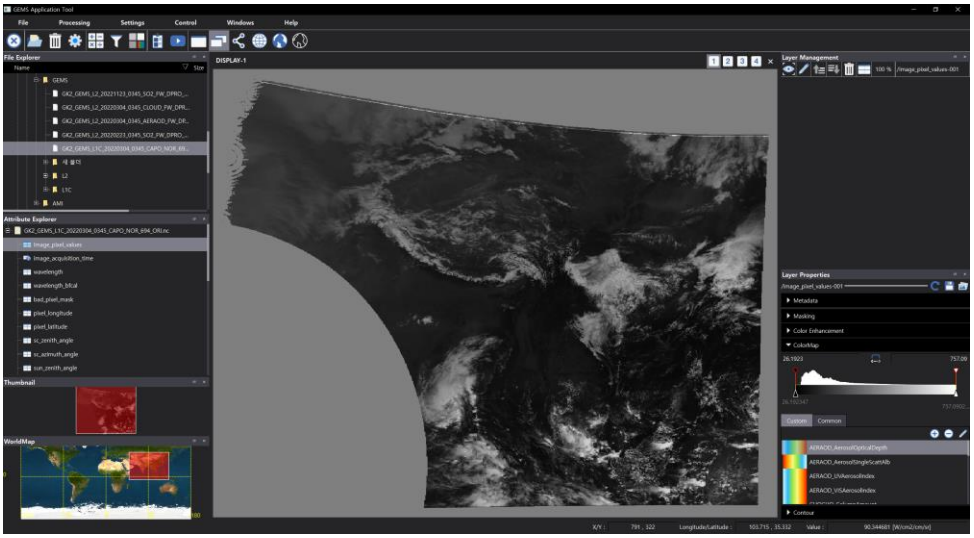


5.3 Analysis of specific values through filter processing

Efficiently analysis data by removing invalid or unnecessary data from satellite data.

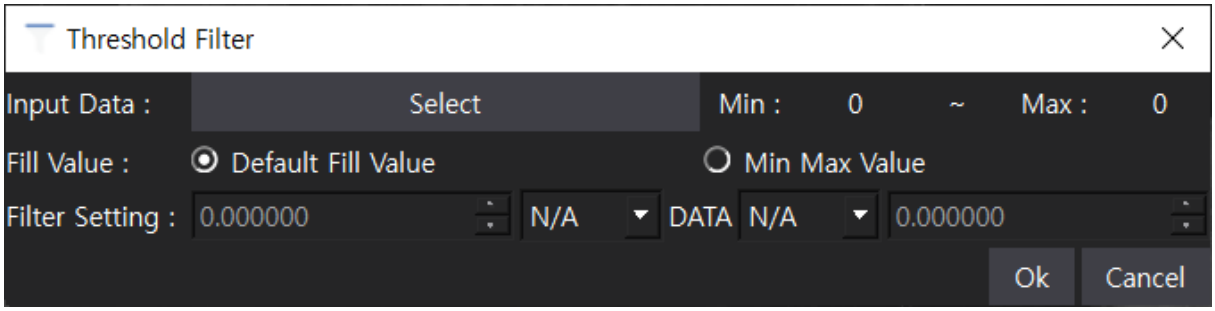
1. Image filter processing

It is performed in the state where images are displayed through satellite data image display and editing scenarios.



Select Filter Process from the menu at the top.

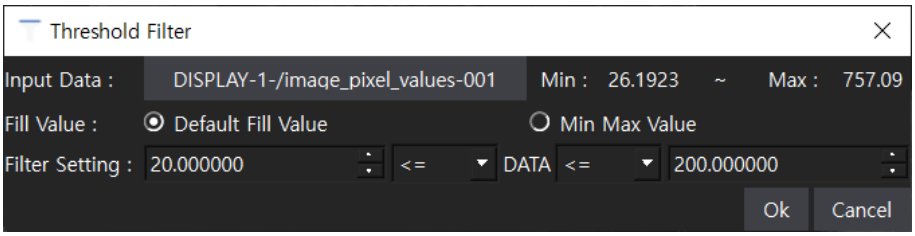
When the filter processing screen is displayed, select the data selection button of the input data.



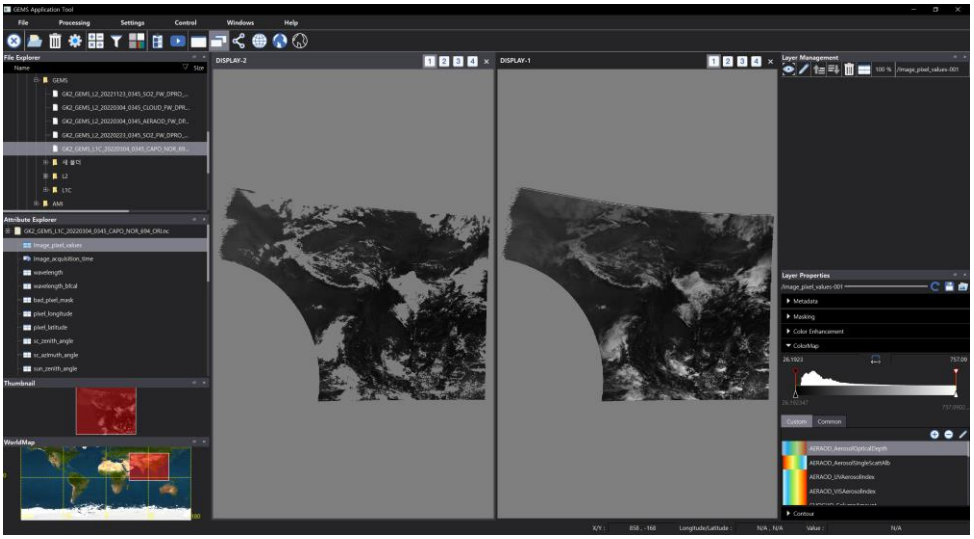
When the property explorer screen is displayed, double-click the item to be filtered with the left mouse button.

The property explorer screen is closed, and the input data items of the threshold filter screen are entered as the items selected by the user.

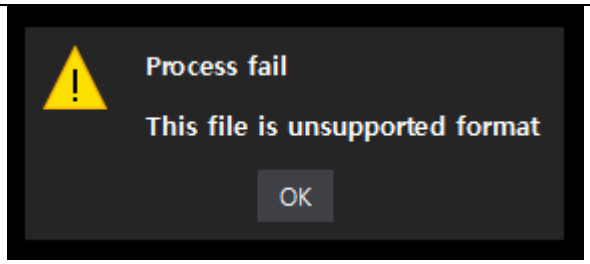
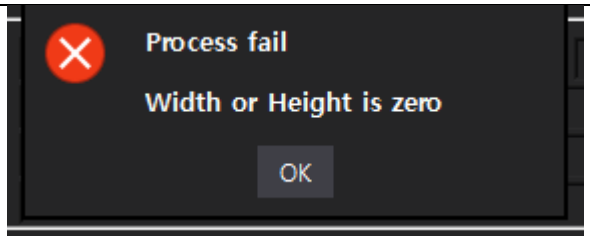
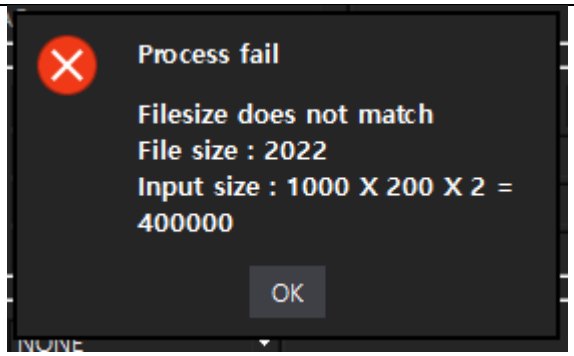
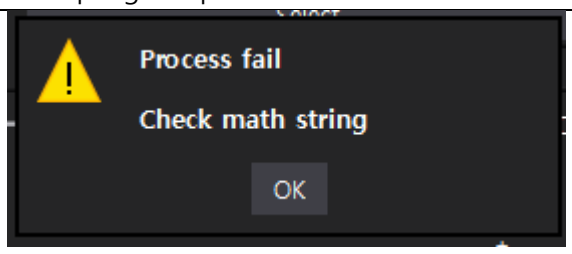
After setting the filter range by referring to the minimum/maximum value of the screen, select the OK button.

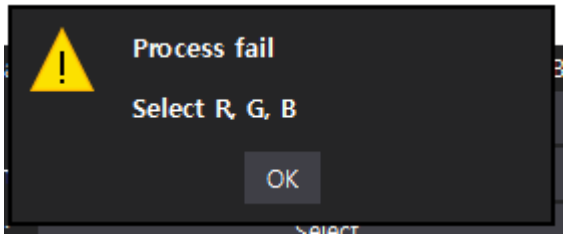


The threshold filter screen is closed, and the filter processing result image is added and displayed.



6. TROUBLESHOOTING

category	symptom	Solution
Local Disk Management	If moving/deleting/renaming some folders and files is restricted	For major directories and files related to OS , move/delete/rename functions are limited
Open File Properties	 When attempting to attribute a file, the following message is displayed:	The file is not formatted data supported by software. Official Support Data: Hdf5, NetCDF, Binary, Text
Open a dataset	 If the following message is displayed when attempting to open the dataset	When performing the setting to load the dataset, the user enters the width/height value as 0 and enters the corresponding part according to the width/height size of the actual data.
Open a dataset	 If the following message is displayed when attempting to open the dataset	If the size of the actual data file and the size of the width and height entered by the user do not match when performing the settings to load the dataset, enter the width/height size according to the actual data
Computational processing	 If the following message is displayed when attempting to process an operation	Settings for operation processing are not entered normally, check the input data, and check whether the calculation expression is entered correctly

Synthetic processing	 If the following message is displayed when attempting compositing	Settings for synthesis processing are not entered normally, check that the three channels R, G, and B are entered correctly
borderline	If the boundary line is not displayed when the boundary line is activated	Make sure the image has a map projection Verify that the SHP directory exists in the software path Inside the Shp directory. Verify that the shp file exists
World Map	If the navigation world map function does not work properly	Make sure the image has a map projection
Mouse position information	When the longitude/latitude of the mouse location information is displayed as N/A	Make sure the image has a map projection
Program terminates due to insufficient memory	When operating on some low-end PCs, the program terminates while loading data - High risk when performing vertical charts	High-resolution video cannot be processed on low-end PCs The vertical chart function cannot be performed because it uses many data at the same time