

Viewer for observation data of GOSAT series
(VREASS)
Instruction Manual

Japan Aerospace Exploration Agency

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Contents

1. Introduction	1
2. Requirements to this application	1
2.1 Computer Requirements.....	1
2.2 Software Requirements	1
3. Install and uninstall.....	2
3.1 Installation.....	2
3.2 Add maps	2
3.3 Uninstall	3
4. Start-up / Terminate Application.....	3
5. Main screen and basic operations	5
5.1 Main screen.....	5
5.2 Basic operation.....	6
6. Register into library and delete.....	11
6.1 Register to library	12
6.2 Delete registered products.....	15
7. Display on the map.....	16
7.1 Display products	16
7.2 Change color bar	21
8. Display simple viewer	22
8.1 Simple viewer of CAI/CAI-2.....	22
8.2 Simple viewer of FTS/FTS-2 spectrum • view confirmation camera image ...	24
9. Map operation.....	26
9.1 Change the mapping method.....	26
9.2 Reference map.....	27
9.3 Scale	28
10. Setting color	29
10.1 Set color parameter for CAI/CAI-2 product on the map.....	30
10.2 Set the color for map for FTS/FTS-2	35

10.3	Set the color for map of CAI/CAI-2	38
11.	KML output	39
12.	Available products.....	39
13.	Others.....	43
13.1	Map data.....	43
13.2	Using library.....	43

1. Introduction

This document is the instruction manual explaining how to operate **Viewer** for observation data of **GOSAT** series (hereinafter, referred to as "This application").

This application is an application to display simply or to draw observation data on map of TANSO-FTS (Fourier Transform Spectrometer), TANSO-CAI (Cloud Aerosol Imager) on GOSAT (Greenhouse Gases Observing Satellite) and TANSO-FTS-2 (Fourier Transform Spectrometer 2), TANSO-CAI-2 (Cloud Aerosol Imager 2) on GOSAT-2 (Greenhouse Gases Observing Satellite-2).

2. Requirements to this application

This chapter describes requirements to this application

2.1 Computer Requirements

This application requires the following computer specification shown in Table2-1.

Table 2-1 Computer requirement to this application

Item	Recommended system requirements	Note
CPU	IntelCore i5 processor or faster	
Memory	More than 8GB	
HDD	Requires more than 2GB. (Requires another disk space to store products)	Including map data
Display	XGA(1024×768) or more More than XGA(1024×768)	

2.2 Software Requirements

This application requires the software shown in Table2-2.

Table 2-2 OS for User Application

Item	Name	Version	Note
OS	• Windows10 • MacOS 10	64bit Version	

3. Install and uninstall

This chapter shows procedures to install and uninstall this application.

3.1 Installation

Download ZIP file (VREASS_X.X.X_win_en.zip) of this application from this site, then uncompress it to create the folder VREASS_X.X.X_win_en(VREASS_X.X.X_mac_en for Mac OS).

This folder contains five folders (bin, config, lib, map, product) and Batch file named VREASS.bat (VREASS.command in MacOS).

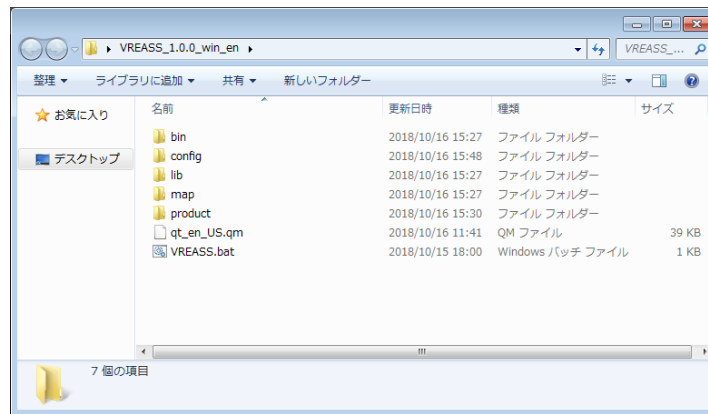


Figure 3-1 VREASS_X.X.X_win_en folder

All of bin, config, lib, map, product folder contain files which are necessary for operate this application.

3.2 Add maps

When you display observation data using this application, you can select following five types of map as its background.¹

- Mercator /NaturalEarth
- Mercator /GSIMap(Internet)
- Polar North /NaturalEarth
- Polar South /NaturalEarth

¹ When you use Mercator /GSIMap, it is mandatory to connect to internet. NaturalEarth is a site to provide world map data of the public domain.

- LatLon /NaturalEarth

These map data except Mercator GSIMap are stored in the map folder in the VREASS_X.X.X_win_en folder. Note that just after install this application, only one type of map data (LatLon/NaturalEarth) is stored and available, the other three types of maps are not stored. Therefore, when you want to use these map as a background, you need to install these map data in the map folder by yourself beforehand.

The procedure to add map data in the map folder is as follows.

Select the map data (ZIP file) you want to use from this site, then download and expand it into the map folder in the VREASS_X.X.X_win_en folder. The downloaded map data is available in this application unless you remove data from a disk. To download map data may take time and depend on your network speed.

3.3 Uninstall

When you want to uninstall this application, you remove the root folder VREASS_X.X.X_win_en from a disk. All data in the VREASS_X.X.X_win_en folder are removed.

4. Start-up / Terminate Application

Double click VREASS.bat in the VREASS_X.X.X_win_en folder to start this application. (VREASS.command for Mac OS)

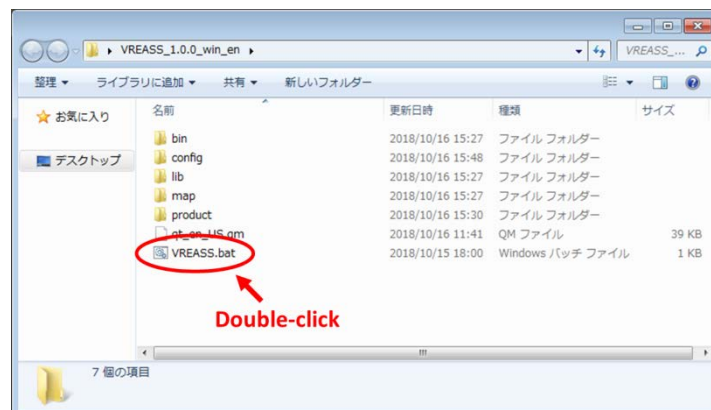


Figure 4-1 Start-up VREASS

When the program starts, the main screen will be displayed.

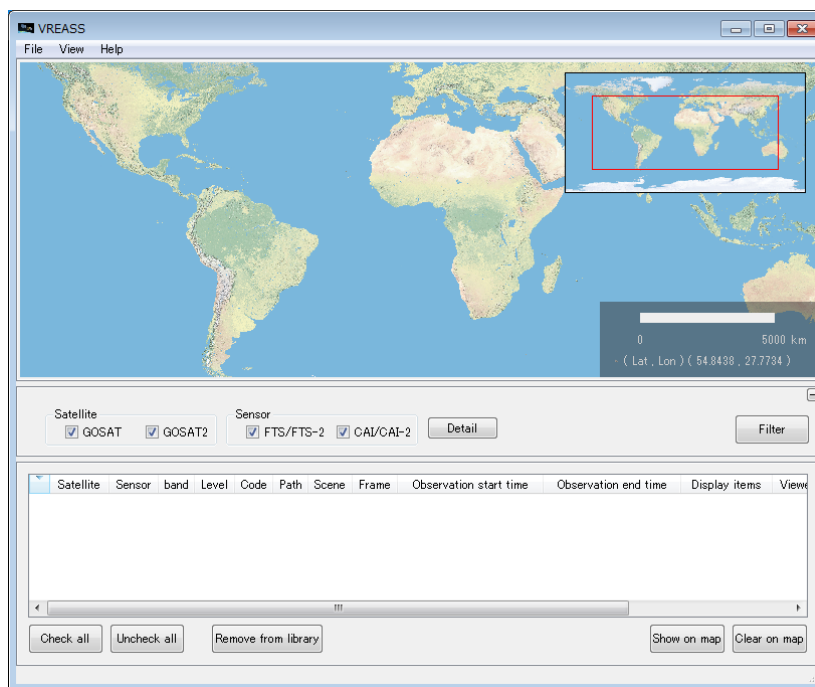



Figure 4-2 Main screen

When you want to terminate this program, click “file” menu to display pull-down menu at the top left of the main screen and then select “end” at the bottom in the pull-down menu, Or click  at the top right of the main screen.

5. Main screen and basic operations

5.1 Main screen

The main screen consists of a map display part and a product list part as shown in Figure5-1.

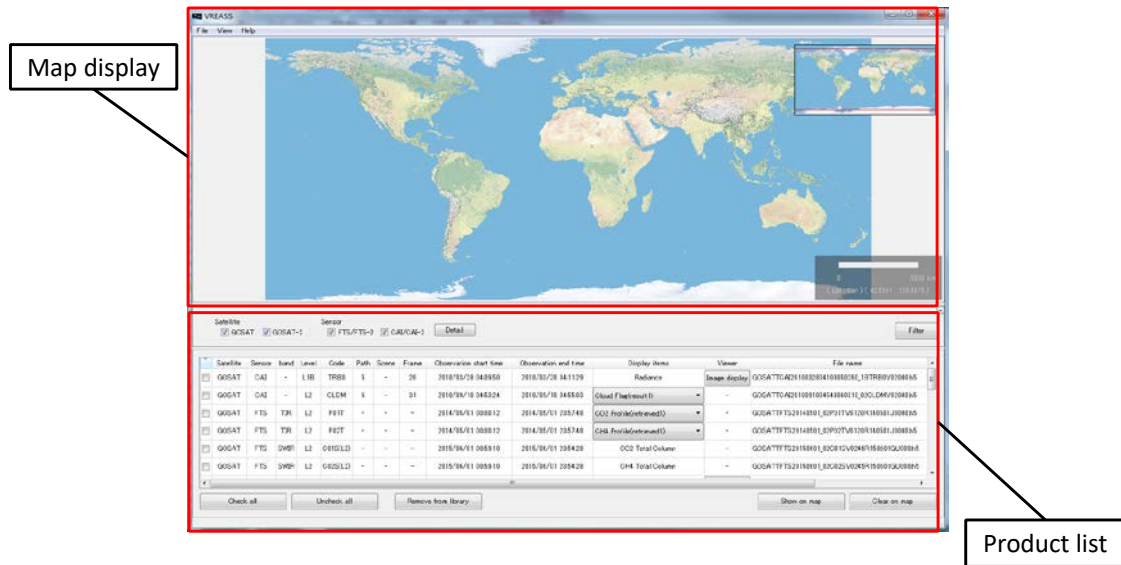


Figure 5-1 Main screen

As shown in Figure5-2, the main screen has 3 menus, main menu at the top of this screen, the condition setting part at the middle and the display / clear the map and the product selection / deletion button at the bottom.

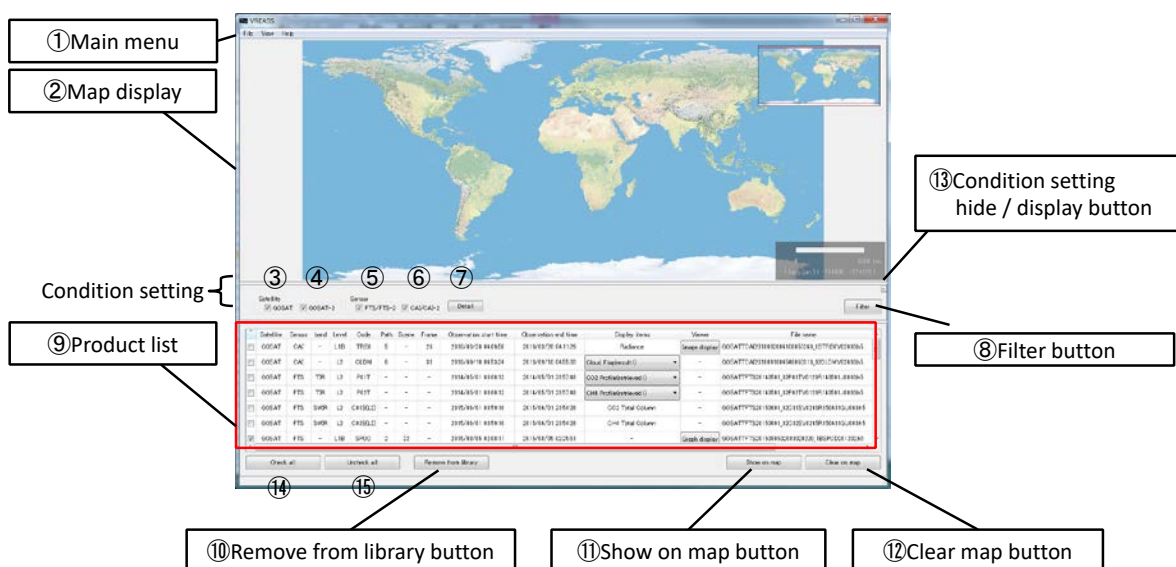


Figure 5-2 Details of main screen

Basic operations of items ① to ⑮ shown in Figure 5-2 are explained in the following section 5.2

5.2 Basic operation

① Main menu

Main menu consists of three items, file, display setting, and help. When click on them, pull-down menus depending on these selections are displayed. Table 5-1 shows menus of each pull-down menu and their operation when they are clicked.

Table 5-1 Main menu / Items of the pull-down menu and their actions

Item		Actions
File		—
	Register to Library	Display product registration sub screen. See section 6.1
	KML output	Display save file dialog. See section 11
	Exit	Terminate this application.
View		—
	Map	Change background map image. You can select the map from the below sub menu. If the map name is not displayed, corresponding map data is necessary to add. If you want to add, refer to section 3.2
	Mercator/NaturalEarth	Change background map image to Mercator (NE edition.).
	Mercator/GSIMap(Internet)	Change background map image to Mercator (GSIMap edition).
	Pola North/NaturalEarth	Change background map image to Pola North (NE edition.).
	Pola South/NaturalEarth	Change background map image to Pola South (NE edition.).
	LatLon/NaturalEarth	Chage background map image to LatLon (NE edition.).
	Reference map	Switch to hide or display reference map. Refer to section 5.3 for the procedure.
	Scale	Switch to hide or display scale. Refer to section 5.3 for the procedure.
	Color bar	The below sub menu will be displayed only when pseudo-color image is displayed.
	Hide	Hide color bar on map.
	Code	Display color bar specified by the code name.

	Color setting	Display the screen to set color.
	Help	—
	Manual	Display the instruction manual of this application (PDF file).
	Version	Display version information.

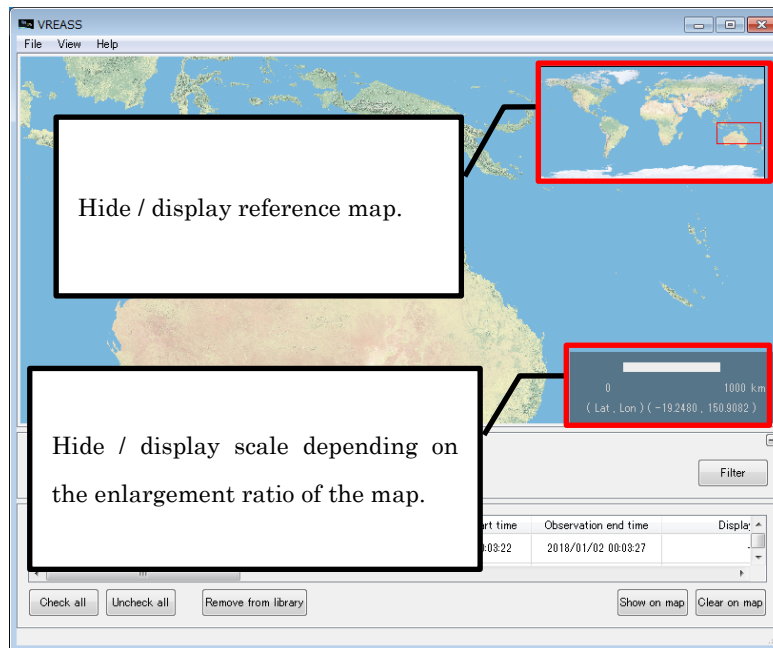


Figure 5-3 Function of hide/ display of reference map and scale

② Map display parts

The function and operation of map display parts are as follows.

- Displays world map. (For more details about the operation of changing maps, reference map and scale, refer to Chapter 9)
- Image can be scaled by the mouse wheel, and can be moved the display position by dragging mouse.
- The product (observation data) of the specified sensor is displayed on the map. (For more details about displaying on map, refer to Chapter 7)
- By right-clicking FTS/FTS-2 observation point on map, the symbol of pointed position is highlighted (turned to red) and “view” button is displayed.(as shown in Figure 5-4) Then clicking the “view” button, viewer screen of Spectrum/view confirmation camera image is displayed. (For more details about operations of Simple viewer, refer to Chapter 8)
- This screen cannot call plurally viewer screen of Spectrum/view confirmation camera image

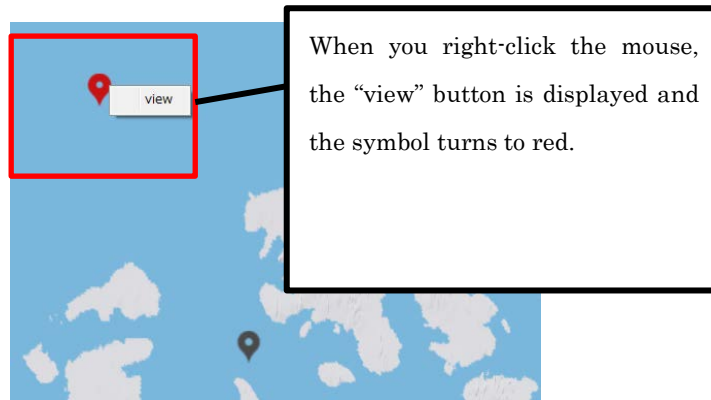


Figure 5-4 Right-click of the mouse on FTS/FTS-2 observation point

③ GOSAT checkbox

Check this box when you want to limit GOSAT Products to display the product list.

④ GOSAT-2 checkbox

Check this box when you want to limit GOSAT-2 Products to display the product list.

⑤ FTS/FTS-2 checkbox

Check this box when you want to limit FTS/FTS-2 Products to display the product list.

⑥ CAI/CAI-2 checkbox

Check this box when you want to limit CAI/CAI-2 Products to display the product list.

⑦ Button to set detail condition

When you want to set observation period, processing level, and path number to limit displaying condition, click this button to display the dialog to set detail conditions. (As shown in Figure 5-5)

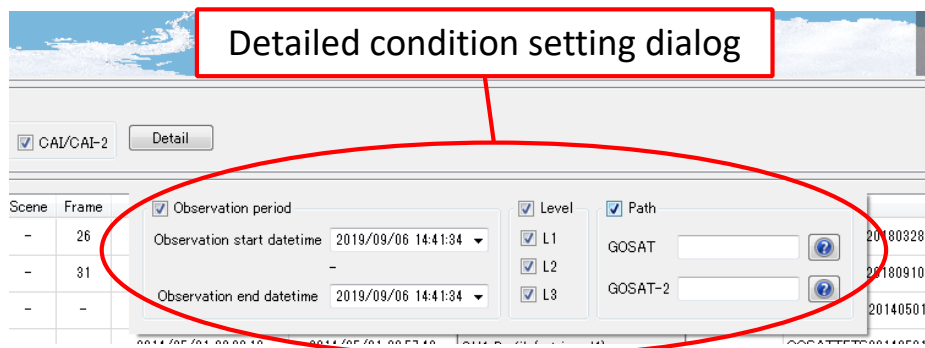



Figure 5-5 Dialog to set detail condition

Click the checkbox “observation period”, “processing level”, “path number” which you want to set and enter their details into the dialog. When you click  button, the explanations about the path number is displayed.

⑧ Filter button

After setting detail condition through ③ to ⑥ and ⑦, registered products are searched under this condition and then displayed the searching result.

⑨ Product list

Display the list of registered products information. These products can be displayed on the map by “Show on map button” ⑪. (Refer to Chapter 7)

⑩ Remove from library button

Display the dialog to confirm to delete products from library, and if you select “yes”, products which product selection check boxes are checked, products are deleted and also disappeared from the product list. (See Chapter 6)

⑪ Display on map button

Observation data whose product selection boxes are checked in product list is displayed on the map. And corresponding lines of mapped products in the product list are painted to pale blue.

⑫ Clear map button

Products displayed on the map are all cleared and corresponding products in the product list return to original color.

⑬ Condition setting hide/display button

If you click this button, the dialog to set condition is hidden or displayed.

⑭ All check button

Click this button to set all checkbox ON in the product list.

⑮ Uncheck all button

Click this button to set all checkbox OFF in the product list.

6. Register into library and delete

Observation data of GOSAT and GOSAT-2 which can be available in this application are called product. Available products in this application are listed in Table6-1.

Table 6-1 GOSAT/GOSAT-2 available product list

Satellite	Sensor	Level	BAND or FWD/BWD	Product		Mapping display contents	Simple Viewer display contents
				Code	Description		
GOSAT	FTS	L1B	-	(Note 1)	L1B Data	Observation points display →	Spectrum / View confirmation camera image
					L2	SWIR	C01S(L2)
		C02S(L2)	CH4 column amount				
		C03S	H2O column amount				
		L2	TIR	P01T	CO2 Concentration Profile	Pseudo-Color image	-
				P02T	CH4 Concentration Profile		
	L3	SWIR	C01S(L3)	Global CO2 distribution	Pseudo-Color image	-	
			C02S(L3)	Global CH4 distribution			
	CAI	L1B	-	TRB0	L1B Data	RGB / Pseudo-Color image	Image
				L2	-	CLDM	cloud flag
		L3	-	TRCL	Global radiance distribution	RGB image	-
TRCF				Global reflectance distribution	Pseudo-Color image		
NDVI				Normalized Difference Vegetation Index			
GOSAT-2	FTS-2	L1B	SWIR	(Note 1)	L1B Product	Observation points display →	Spectrum / View confirmation camera image
			TIR			View confirmation camera image	View confirmation camera image
			Common				
		L2	SWIR	SWPR	Chlorophyll Fluorescence and Proxy-method Product	Pseudo-Color image	-
				SWFP	Column-averaged Dry-air Mole Fraction Product		
			TIR	TCAP	Cloud and Aerosol Property Product		
	TTGP			Temperature and Gas Profile			
	CAI-2	L1A	FWD	OBSM	L1A Product	RGB / Pseudo-Color image	Image
			BWD				
		L1B	FWD	CL1B	L1B Product	RGB / Pseudo-Color image	Image
			BWD				
		L2	FWD	CLDD	Cloud	Pseudo-Color image	-
			BWD		Discrimination Product		
-			AERP	Aerosol Property Product			

FTS / FTS-2 : Fourier Transform Spectrometer SWIR : Short-Wave InfraRed TIR : Thermal InfraRed

CAI / CAI-2 : Cloud and Aerosol Imager FWD : Forward BWD : Backward

Note 1 : Code differs depending on operational mode. Table 12-2 shows the list of codes corresponding to the operational modes.

Table 6-2 Operation mode of FTS/FTS-2 L1B product to display and code

Satellite	Sensor	Level	Product	
			Code	Operation Mode
GOSAT	FTS	L1B	OB1D	Observation mode I Sunshine observation data
			OB1N	Observation mode I Shade observation data
			OB2D	Observation mode I Sunshine observation data
			SPOD	Specific observation mode Sunshine observation data
			SPON	Specific observation mode Shade observation data
GOSAT-2	FTS-2	L1B	OB1D	Sunshine observation mode
			OB1N	Shade observation mode
			OB2D	Sunshine observation mode other than full observation
			OB2N	Sunshine observation mode other than Full observation

6.1 Register to library

Products are required to register as “managed data” to be available in this application. This registration is called “registration to library”. This registration can be done by clicking the sub-menu “Add to library” in main menu and using sub screen of library registration shown in Figure 6-1.

When you register products to library, you can register products one by one or register them all at once. This selection can be done by specifying two tabs, “Select file” or “Select directory” in sub menu.

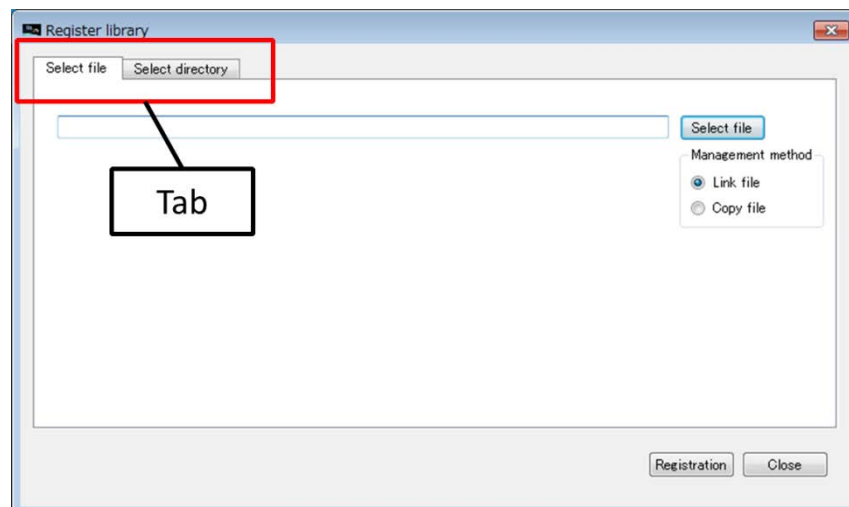


Figure 6-1 Register library Sub screen

(1) Select file

When you want to register products to library one by one, use this tab. After select “Select files” tab, you specify or select buttons as shown in Figure6-2.

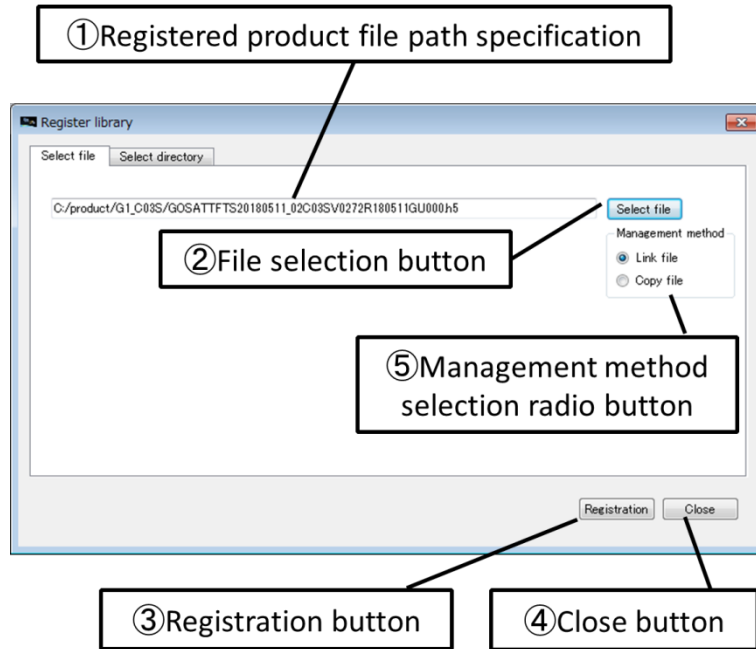


Figure 6-2 Register to Library (file select)

Explain the above buttons ①~⑤ and their action are shown in Table6-3

Table 6-3 Buttons and their actions

No	Button	Description and their actions
①	Registered product file path selection	Specify the file path of the product to register.
②	File selection button	File selection dialog is displayed.
③	Registration button	Query to confirm is displayed. When you select “Yes”, the product file specified in ① is registered.
④	Close button	The screen is closed.
⑤	Management method select radio button	If you want to use the specified original product, check “Link file”. And if you want to use the copied product , check “Copy file” to copy the product into management directory.

(2) Select directory

When you want to register all products in a directory to library at once, use this tab. After select “Select Directory” tab, you specify or select buttons shown in Figure6-3.

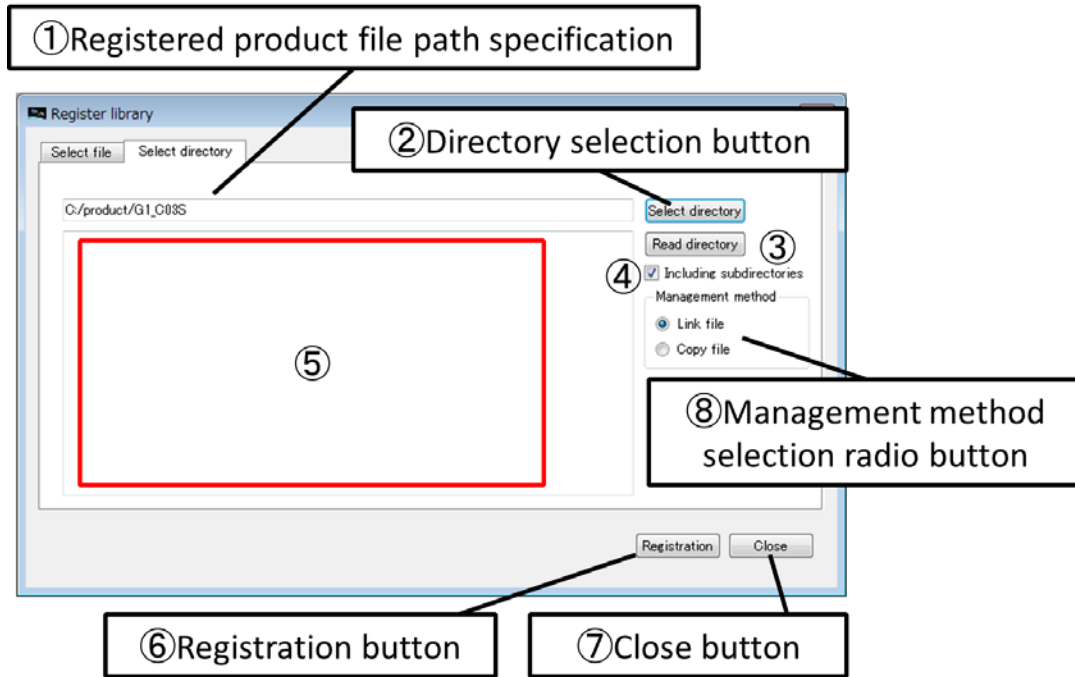


Figure 6-3 Register to Library (select directory)

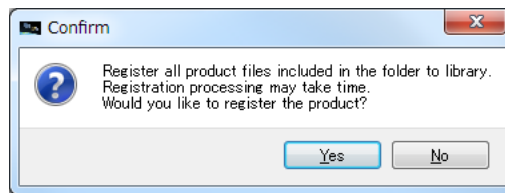
Explain the above buttons ①~⑧ and their action shown in Table6-4

Table 6-4 Buttons and their actions

No	Item	Descriptions and their actions
①	Registered product file path selection	The directory path containing the product file to register is displayed.
②	Directory selection button	Select directory dialog is displayed.
③	Read directory button	Get product file list of specified directory ①, and display on the area marked in ⑤.
④	Subdirectory checkbox	If you want the product list of the specified directory including sub-directories, use this checkbox after selecting ③.
⑤	Product list	The registered products list is displayed.

⑥	Registration button	The dialog to confirm is displayed. When you select “Yes”, the product file specified in ① is registered.
⑦	Close button	The screen is closed.
⑧	Management method selection radio button	If you want to use the specified original product, check “Link file”. And if you want to use the copied product, check “Copy file” to copy the product into management directory

When you proceed to register products, the below query is displayed, and click Yes to execute to register or No to not to execute.

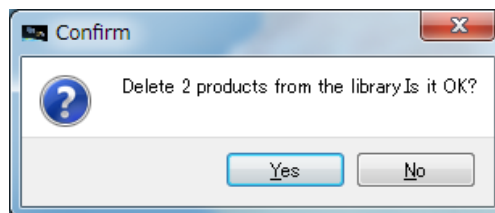


6.2 Delete registered products

If you want to delete registered product, you can delete it with following procedure.

- Check selection check box of products which you want to delete in the products list in main screen.
- Click registration delete button in the bottom of main screen.

Then if you proceed to delete registered products, the below query is displayed. And click Yes to execute to delete, and No not to execute to delete.



7. Display on the map

7.1 Display products

If you want to display the selected product on the map, you select product in the product list on the main screen and check its “product selection check box”. Then click “Display map” button in the right bottom of main screen.

While products are displayed on the map, lines of corresponding products in the product list are painted to pale blue.

If you want to erase products on the map, click the button “clear the map”, then all products displayed on the map part will be erased. And the line of corresponding product in the product list turns back to original white.

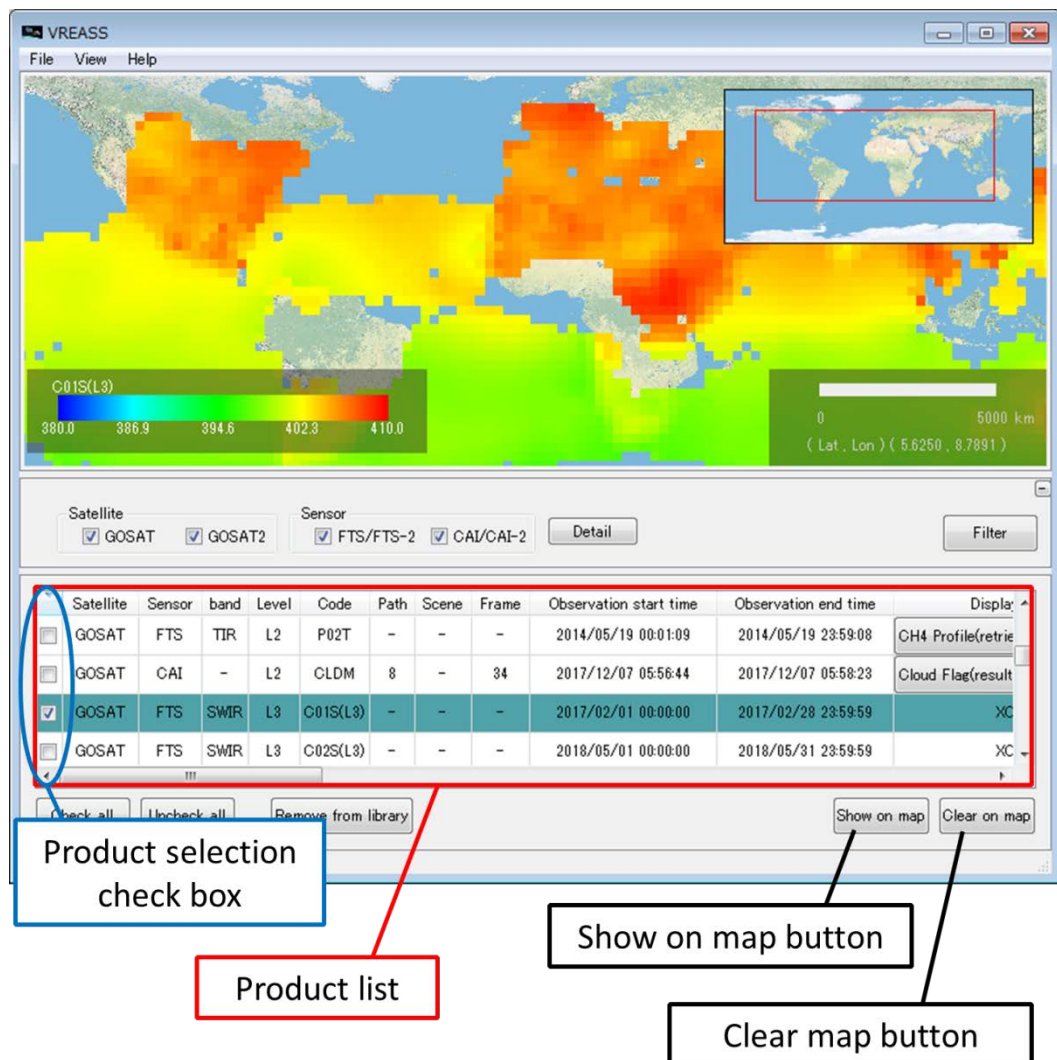


Figure 7-1 Product list and Show on map, Clear map button

Explain items in the product list and their actions are shown in Table7-1.

Table 7-1 Explanation of items in product list

Item	Explanation and their actions	
Product selection checkbox	Check this checking box, you can select product to display on map. (Check this when you delete registered product also.)	
Satellite	Satellite name, GOSAT or GOSAT-2.	
Sensor	Sensor name (CAI/CAI-2/FTS/FTS-2).	
Band	Band name (SWIR/TIR) or FWD (forward-looking) / BWD (backward-looking). In the case of not both, '-' is displayed.	
Level	Processing level.(L1A/L1B/L2/L3)	
Code	Product code or operation mode.	
Path	Path number. For products which don't have path number, '-' is displayed.	
Scene	Scene number. For products which don't have scene number, '-' is displayed.	
Frame	Frame number. For products which don't have frame number, '-' is displayed.	
Observation start time	Observation start time in data part in the product is displayed with year, month, day, hour, minute, second. If products only have year,month,day, here will be displayed as such.	
Observation end time	Observation end time in data part in the product is displayed with year, month, day, hour, minute, second. If products only have year,month,day, here will be displayed as such.	
Display items	If selected product has detail items to display further, combo box is displayed. And you select details from this box, the selected details will be displayed on the map. The detail items in the combo box will be shown in Table7-2.	
Viewer	For following products, "Display Image" or "Display Graph" button is displayed. If button is clicked, simple viewer screen is displayed and product image is projected on it. To display the simple view scree is explained in Chapter 8.	
	Product name to display	Sort of image to be displayed
	CAI L1B data	CAI Image
	FTS L1B data	Images of spectrum and view confirmation camera
	CAI-2 L1A product	CAI-2 Image
	CAI-2 L1B product	CAI-2 Image
FTS-2 L1B product	Images of spectrum and view confirmation camera	
File name	The product file name is displayed.	

You can sort the data of the list by clicking the title of each item.

Table 7-2 Combo box item list (1 / 2)

Code	Product name	Combo box item
P01T	L2 CO2 density profile (TIR)	CO2 Profile(Retrieved layer1~28)
P02T	L2 CH4 density profile (TIR)	CH4 Profile(Retrieved layer1~22)
CLDM	L2 Cloud Flag	Cloud Flag(Result of reflectance test)
		Cloud Flag(Result of reflectance ratio test)
		Cloud Flag(Result of NDVI test)
		Cloud Flag(Result of ratio of reflectance ratio test)
TRCF	L3 Global Reflectance	Band1 Reflectance(Land)
		Band2 Reflectance(Land)
		Band3 Reflectance(Land)
		Band4 Reflectance(Land)
		Band1 Reflectance(Ocean)
		Band2 Reflectance(Ocean)
		Band3 Reflectance(Ocean)
		Band4 Reflectance(Ocean)
CLDD	GOSAT-2 TANSO-CAI-2 L2 Cloud Identifier Product	Solar Reflectance(FWD)
		Solar Reflectance Ratio(FWD)
		NDVI (FWD)
		Desert(FWD)
		Solar Reflectance(BWD)
		Solar Reflectance Ratio(BWD)
		NDVI(BWD)
		Desert(BWD)

Table 7-2 Combo box item list (2 / 2)

Code	Product name	Combo box item
AERP	GOSAT-2 TANSO-CAI-2 L2 Aerosol Property Product	Aerosol Optical Thickness(Wave length 550 nm) (Land)
		Aerosol Optical Thickness (Wave length 1600nm) (Land)
		Aerosol Optical Thickness (Wave length 550 nm) (Ocean)
		Aerosol Optical Thickness (Wave length 1600nm) (Ocean)
		Angstrom Index
		Black Carbon Mass Ratio
		PM2.5
SWPR	GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy method Product	XCO2
		XCH4
		XCO
SWFP	GOSAT-2 TANSO-FTS-2 SWIR L2 Column Average Gas Concentration Product	XCO2
		XCH4
		XCO
		XH2O
TCAP	GOSAT-2 TANSO-FTS-2 TIR L2 Cloud and Aerosol Property Product	Result of Cloud identification by Threshold Method
		Result of Cloud identification by Slicing Method
		Result of Cloud identification by Split window Method
TTGP	GOSAT-2 TANSO-FTS-2 TIR L2 Temperature and Gas Concentration Profile Product	Degree of freedom of temperature profile
		CO2 profile
		CH4 profile
		H2O profile

7.2 Change color bar

Color bar in the left bottom of the map display part shows the range of data value as color.

If you want display multiple products, click “Setting display” and move cursor over “color bar” in the pull-down menu and click the product code to display, you can display color bar for the selected product. And if select “hide”, you can erase it.

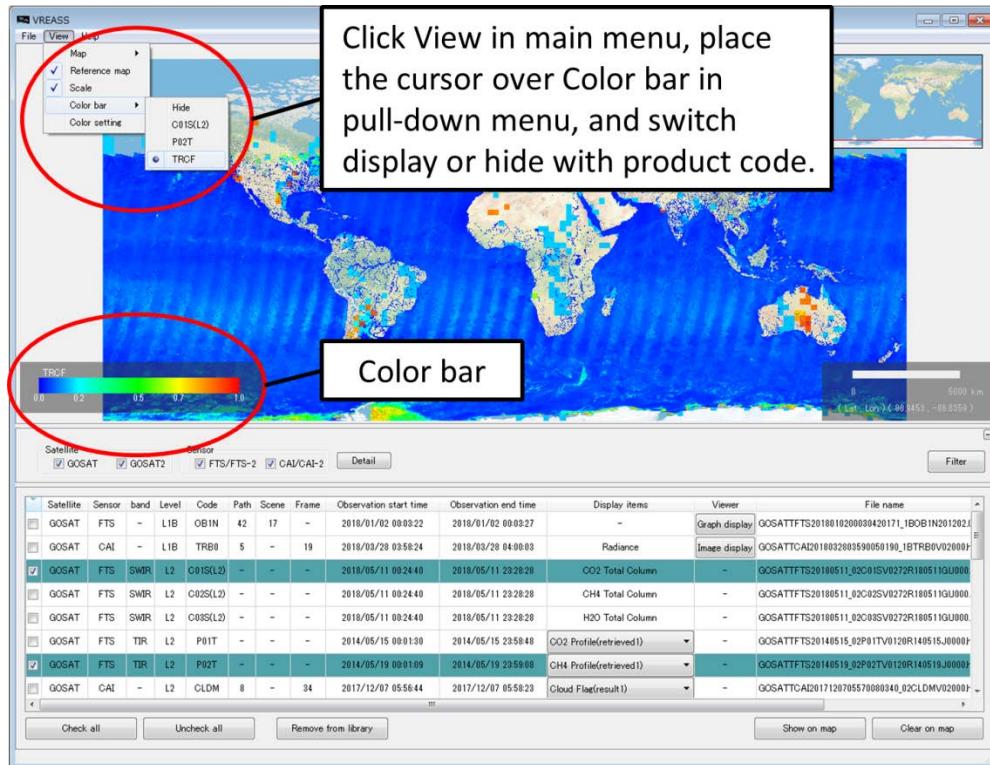


Figure 7-4 Change color bar

8. Display simple viewer

The following product can be displayed on the simple viewer.

- GOSAT CAI L1B data
- GOSAT FTS L1B data
- GOSAT-2 CAI-2 L1A product
- GOSAT-2 CAI-2 L1B product
- GOSAT-2 FTS-2 L1B product

There are menus to “Display Image” to display CAI/CAI-2 image and “Display Graph” to display spectrum of FTS/FTS-2 · View confirmation camera image in the simple viewer. After above products are displayed on the product list, the button “Display image” or “Display graph” is displayed in the column “Viewer”, and click these button, the simple viewer for each product is displayed.

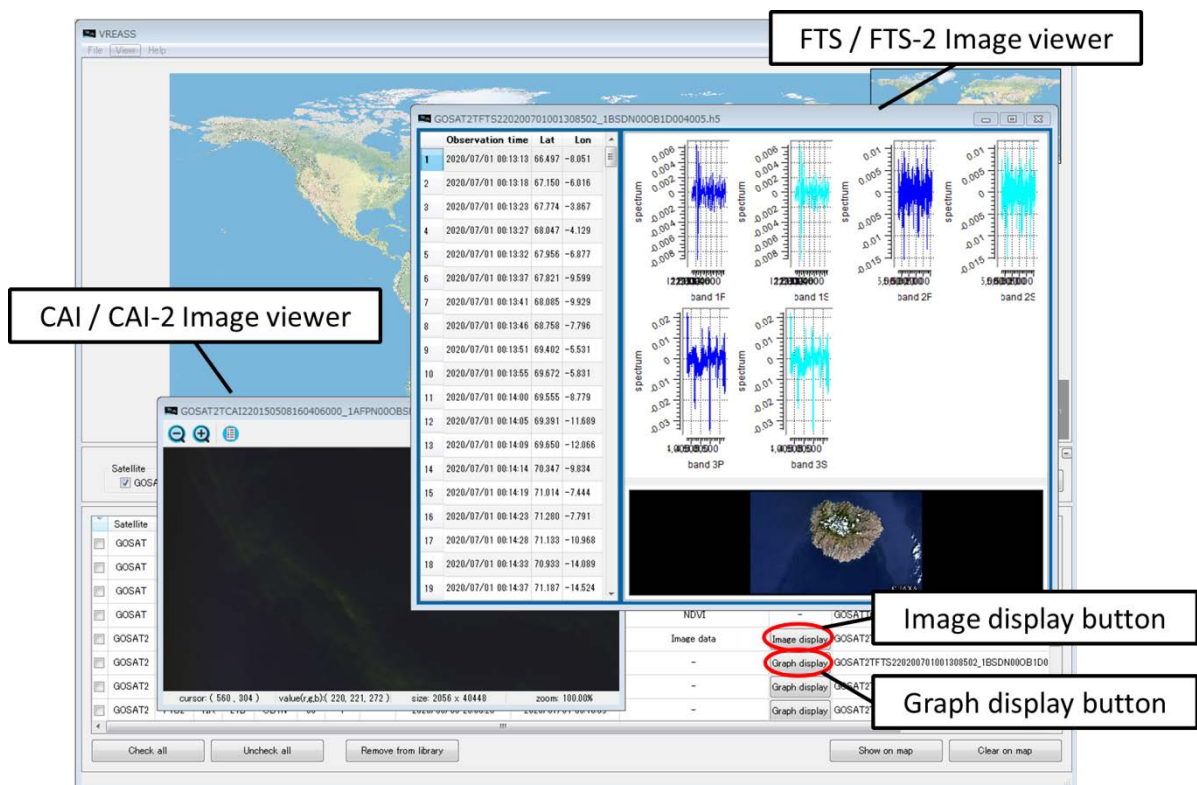


Figure 8-1 Simple Viewer

8.1 Simple viewer of CAI/CAI-2

Image viewer of CAI/CAI-2 is to display images of GOSAT CAI L1B data and GOSAT-2 CAI-2 L1A/L1B products.

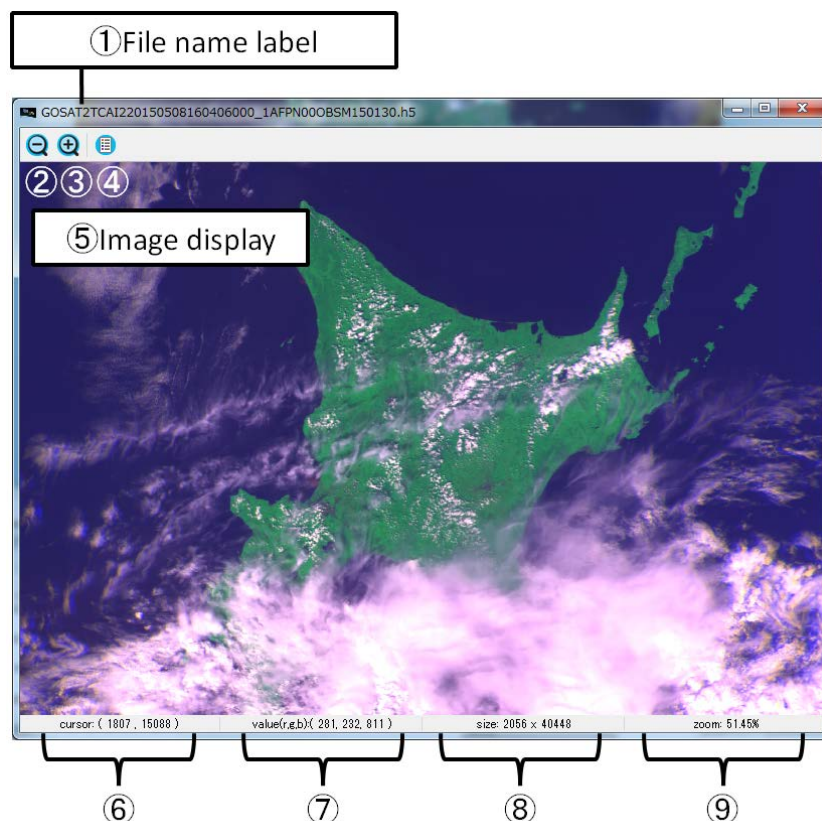


Figure 8-2 CAI/CAI-2 Image Viewer

Table 8-1 Explanation items of CAI / CAI-2 Image Viewer and actions

No	Item	Explanation and their actions
①	File name label	Product name on Image Viewer.
②	Zoom-out	Zoom-out the image.
③	Zoom-in	Zoom-in the image.
④	Color setting tool	Click this button, color setting screen is displayed. This screen is also displayed when you click “View” and then click “Color setting” in the pull-down menu in “View”. The operation procedure of Color setting is shown in Chapter 10.
⑤	Display Image	Composite observation data of the product to RGB and display. You can zoom-in and zoom-out the image by mouse wheel, and move it by dragging mouse.
⑥	Position	The position(X, Y) on the cursor is displayed.
⑦	Value	The value of image data on the cursor is displayed for each band.
⑧	Image size	The size of the image is displayed.
⑨	Enlargement ratio	The enlargement ratio of the image is displayed.

8.2 Simple viewer of FTS/FTS-2 spectrum · view confirmation camera image

Simple viewer of FTS/FTS-2 · view confirmation camera image is to display images of GOSAT FTS L1B data and GOSAT-2 FTS-2 L1B product.

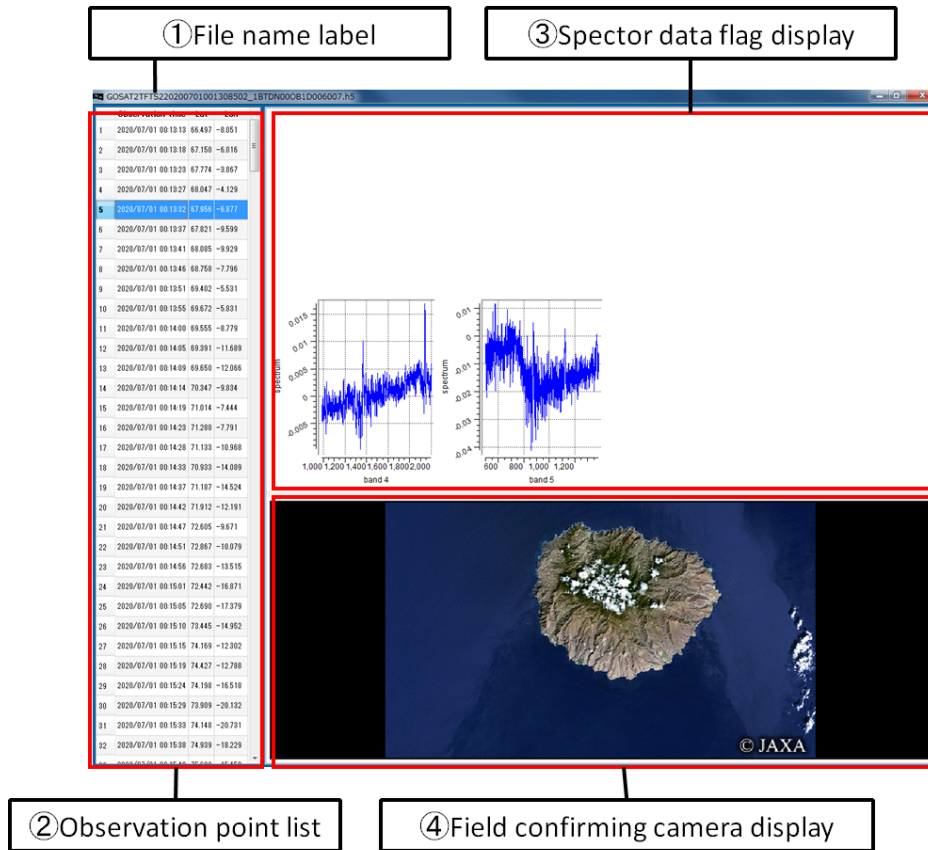


Figure 8-3 FTS/FTS-2 Spectrum/view confirmation camera image viewer

Table 8-2 Explanation items of FTS/FTS-2 Spectrum/view confirmation camera image viewer and actions

No	Item	Explanation and their actions
①	File name label	The product file name.
②	Observation point list	The observation data stored in the product file is listed. The display items are as follows. • Observation time / Latitude (Lat) / Longitude (Lon) When the point on map is right-clicked, the corresponding list links to the map.
③	Spectrum data flag display	Spectral data of all bands at the observation point selected in Observation point list is displayed on a graph.
④	View confirmation camera display	The view confirmation camera image at the observation point selected in the observation point list is displayed. When images to display are plural, they are displayed side by side, and when there is no view confirmation camera image, nothing is displayed.

9. Map operation

9.1 Change the mapping method

You can select the following 5 projections for the map behind image.

- Mercator /NaturalEarth
- Mercator /Geospatial Information Authority of JAPAN(Connect to internet)
- Polar Stereo (North Hemisphere)/ NaturalEarth
- Polar Stereo (South Hemisphere)/NaturalEarth
- Equal Latitude/Longitude /NaturalEarth

To change the map projection, click “Set to display” in main menu to display pulldown menu, and move the cursor over “change map” and then click the name of map. The following example shows to select Mercator /NaturalEarth. (If map data is not installed, the name of map is not displayed on the menu. If you want to add map data, please refer to section 3.2 for the procedure.)

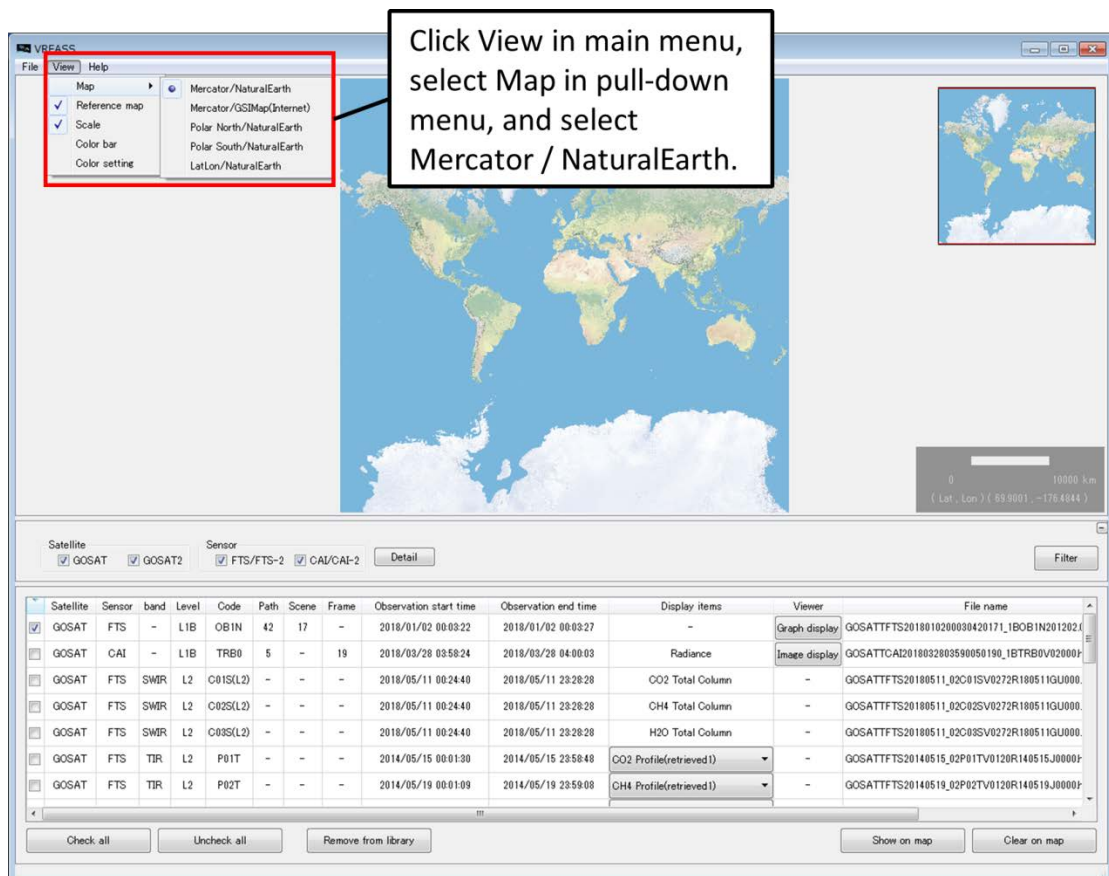


Figure 9-1 Operation of selecting map display

9.2 Reference map

The reference map shows where the place is on the whole map. The reference map can be displayed or hidden by clicking the “reference map” in the pulldown menu which is displayed by clicking “Set display” in main menu.

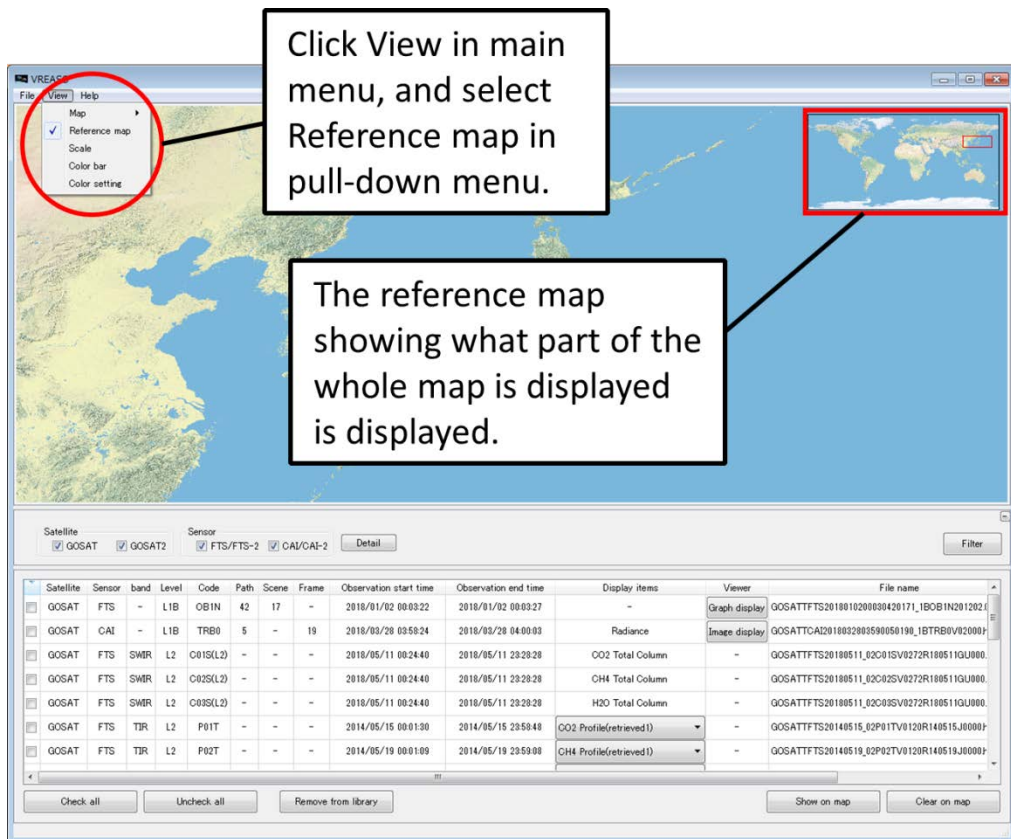


Figure 9-2 Reference map operation

10. Setting color

The color indicating digital values of product on viewer and map display part can be changeable by the setting of parameter. The menu to set parameters for color can be displayed by clicking “set color” in the pulldown menu which is displayed by clicking “Set display” in main menu.

The sub menu has two tabs to set parameter for color, one is to set color parameter for product on map and the other is that for viewer screen as shown in Figure10-1

Change menu by selecting tab.

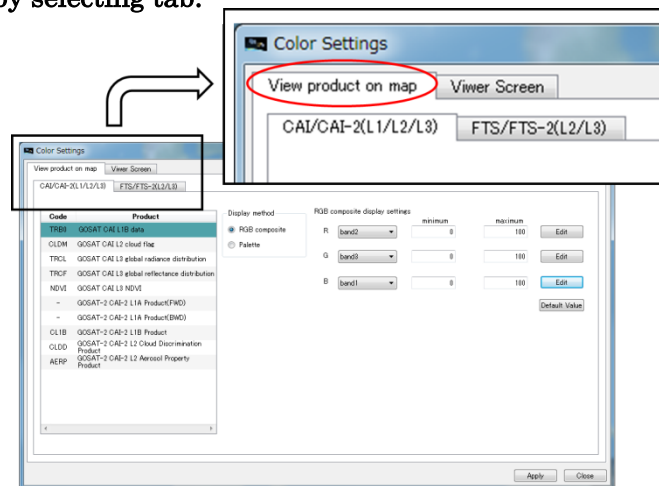


Figure 10-1 Tab to set parameter for color (“View product on map” and “Viewer Screen”)

The tab “View product on the map” has further tabs to select products “CAI/CAI-2(L1/L2/L3)” of CAI/CAI-2 product or “FTS/FTS-2”(L2/L3)”, of FTS/FTS-2 as shown Figure10-2.

Change menu by tab selection

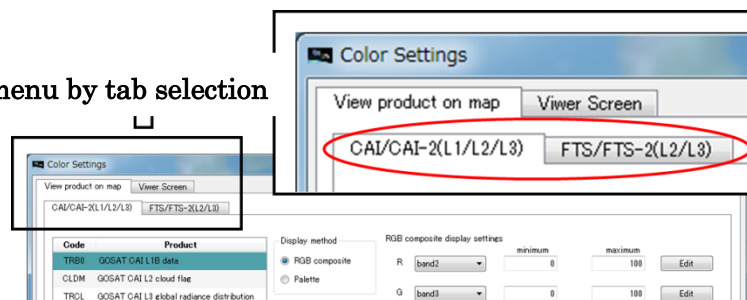
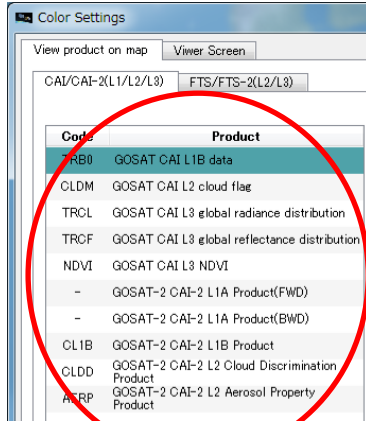


Figure 10-2 Tab in Color setting screen (“CAI/CAI-2(L1/L2/L3)” and “FTS/FTS-2(L2/L3)”)

10.1 Set color parameter for CAI/CAI-2 product on the map

When you want to adjust color for CAI/CAI-2 product, you select tab “CAI/CAI-2(L1/L2/L3)” in tab “View product on map” of Color settings menu.



Product list

In products list, if you select the following product, the menu to select display RGB composite image or pseudo color image

- GOSAT CAI L1B data
- GOSAT-2 TANSO-CAI-2 L1A product (FWD)
- GOSAT-2 TANSO-CAI-2 L1A product (BWD)
- GOSAT-2 TANSO-CAI-2 L1B product

If you select the radio button “RGB composite” in “display method” at the center menu, the menu to assign bands to RGB is displayed.

Example of GOSAT CAI L1B → RGB composite

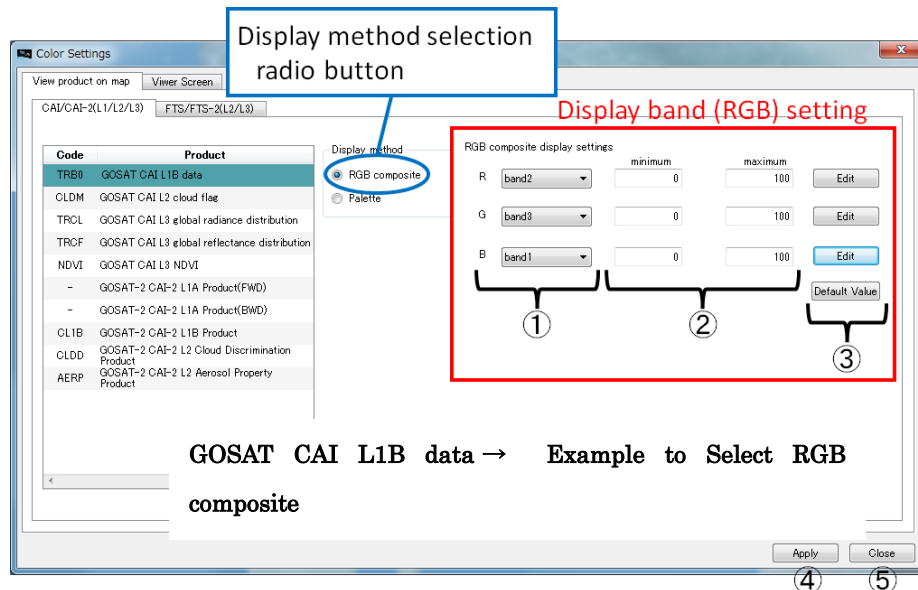


Figure 10-3 Display band (RGB) setting

Table 10-1 shows the explanation of items ①~⑤ framed in red and their actions in Figure10-3.

Table 10-1 Explanation of items and their actions

No	Item	Explanation and their actions
①	Select Band	Assign bands to RGB. Bands displayed in the combo box following your selection.
②	Setting display range	To display CAI/CAI-2 image, their DN values is digitized to 256 steps, you assign the minimum/maximum value of DN for 0 and 256.
③	Default	Use the default minimum/maximum of DN values for every band.
④	Apply	Apply your color setting.
⑤	Close	Close color setting screen. When you click it before clicking Apply button, query to confirm is displayed.

If you select the radio button “palette” in “display method” at the center menu, the menu to assign color for pseudo color is displayed.

Example GOSAT CAI L1B data → Psuedo color

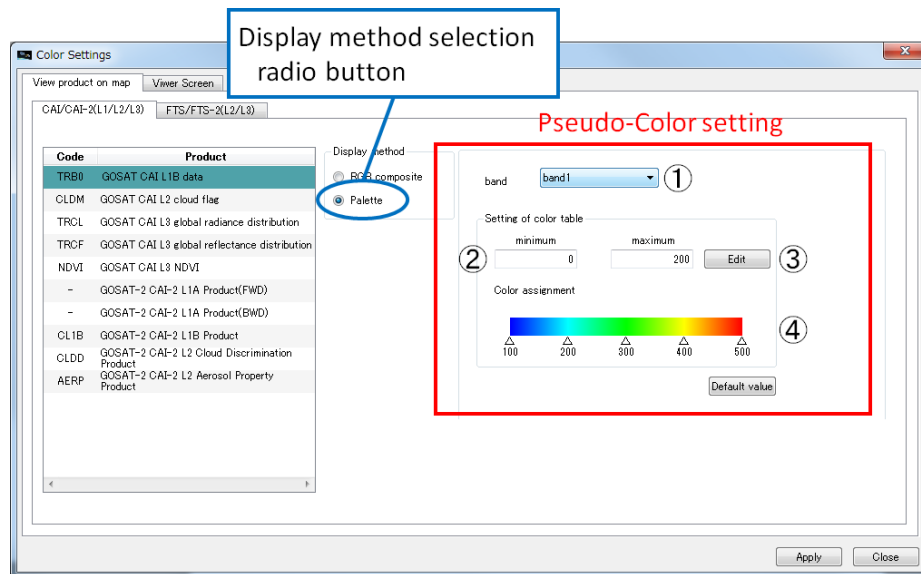


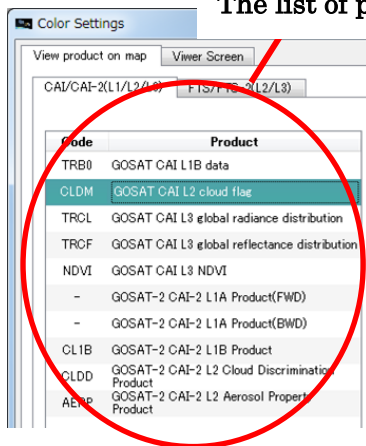
Figure 10-4 Pseudo-Color setting

Table 10-2 shows the explanation of items ①~④ framed in red and their actions in Figure10-4.

Table 10-2 Explanation items and their actions

No	Item	Explanation and their actions
①	Pseudo-Color setting Select band	Assign the band to be pseudo-colored.
②	Range setting to display	Click “Edit” button ③ to activate to assign color range for every band. And then assign the minimum and maximum values for color.
③	Edit button	Click the button, the dialog to assign values for color is displayed.
④	Color bar setting button	When pseudo color images are displayed, the used color scale, its minimum/maximum/intermediate value, is displayed. To avoid the saturation of color you can use to assign intermediate value for scale. You can slide the intermediate value marked Δ and the marked value appears just below Δ . You can use to specify up to 3 intermediate values.

The list of product



When you select the following product from the list of product, the screen to set the color for cloud is displayed.

- GOSAT L2 cloud flag
- GOSAT-2 TANSO-CAI-2 L2 Cloud Discrimination Product

Figure10-5 shows the explanation about setting color for cloud.

Example of selecting cloud flag of GOSAT L2

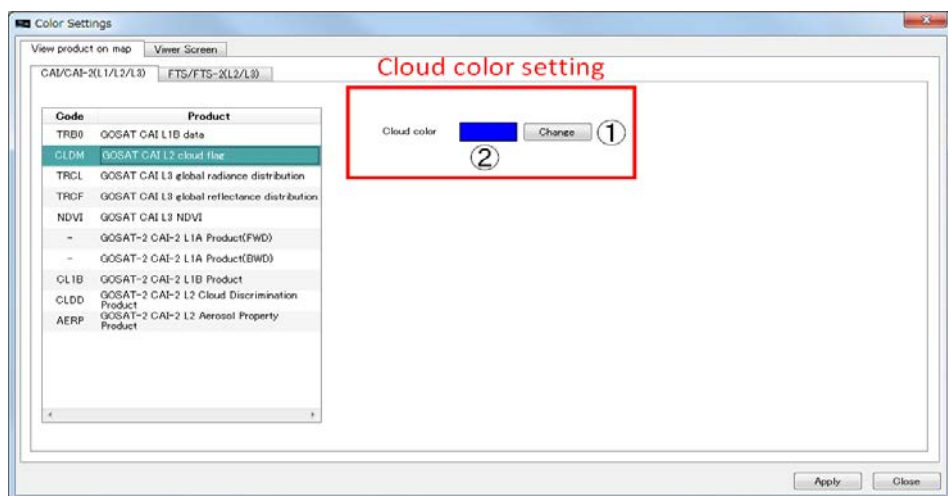


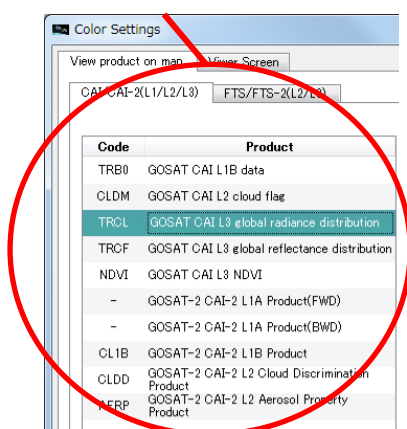
Figure 10-5 Cloud color setting

Table 10-3 shows the explanation of items ①~② framed with red and their actions in Figure10-5.

Table 10-3 Explanation of items and their actions

No	Item	Explanation and their actions
①	Change	Color dialog is displayed.
②	Color label for Cloud	The color you specified by button ① is displayed in the label ②. The specified color is used to show cloud existence in the 2-valued image.

The list of product



In the selection list of product, if you select the following product, the menu to set to display band (RGB) is displayed.

- GOSAT L3 global radiance distribution

Figure10-6 shows the menu to set to display band.

Example of GOSAT L3 global radiance distribution

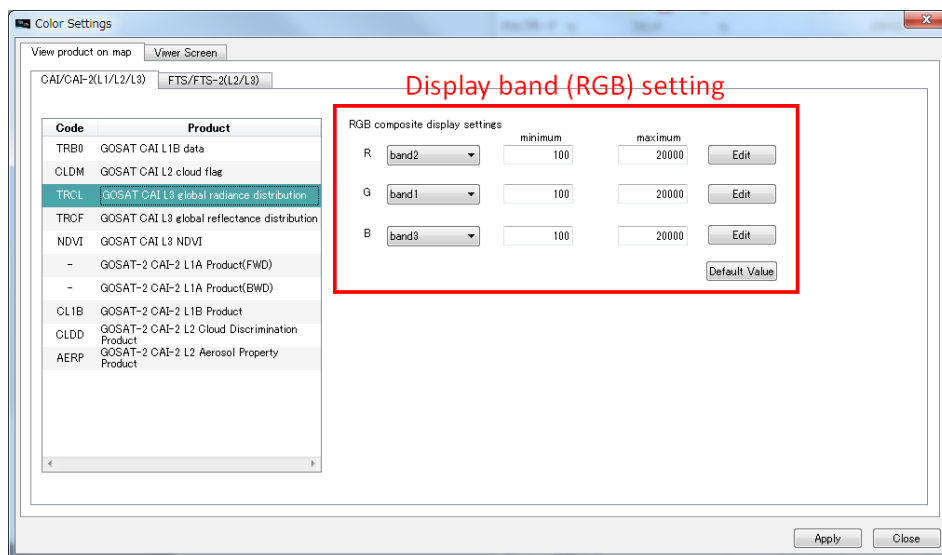
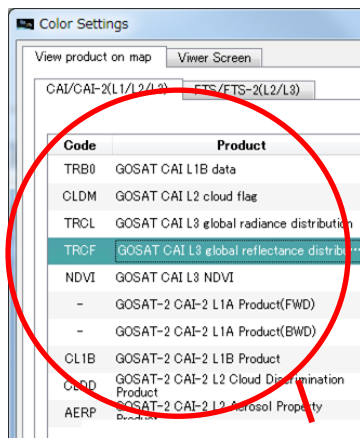


Figure 10-6 Display band (RGB) setting

Operations of the menu to set to display band (RGB) framed in red in Figure10-6 is the same as Table10-1.



In the selection list of product, if you select the following product, the list of displaying items and the menu to set pseudo color are displayed.

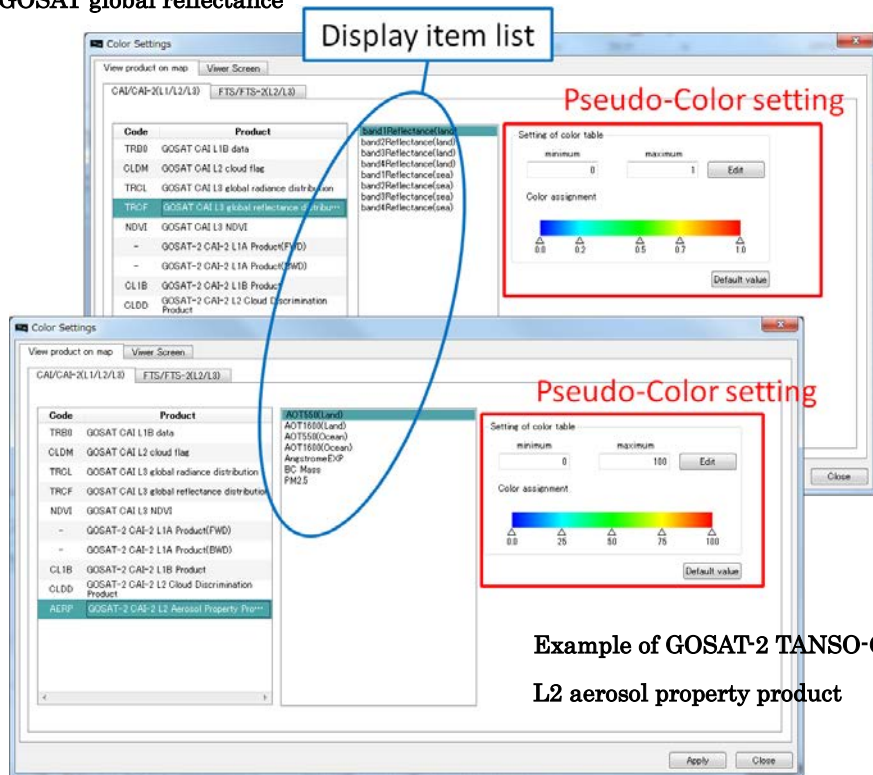
- GOSAT global reflectance distribution
- GOSAT-2 TANSO-CAI-2 L2 aerosol property product

Figure10-7 shows the list of displaying items and the menu to set pseudo color.

The list of product

In displaying items list at the center, data in the selected product to be able to display with pseudo color are shown. You select items from this list and set its color in right menu framed by red as shown in Figure10-7.

Example of GOSAT global reflectance



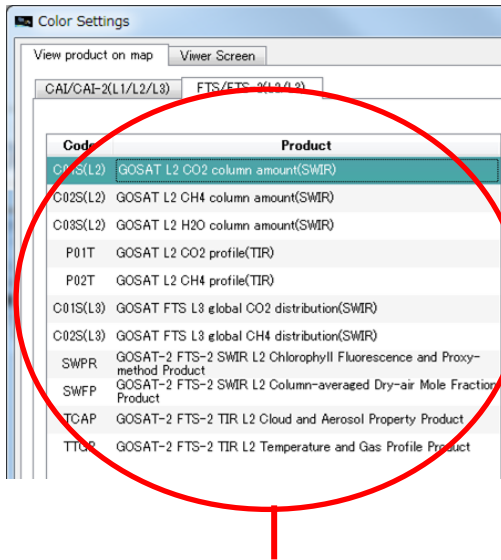
Example of GOSAT-2 TANSO-CAI-2 L2 aerosol property product

Figure 10-7 Display item list and Pseudo-Color setting

Operations of the menu to set pseudo color framed in red in Figure10-7 are the same as Table10-2.

10.2 Set the color for map for FTS/FTS-2

If you want to adjust the color for FTS/FTS-2, you select the tab “FTS/FTS-2” in the menu to set color.



The list of product

In the selection list of product, if you select the following product, the menu to set pseudo color is displayed.

- GOSAT L2 CO2 Column amount(SWIR)
- GOSAT L2 CH4 Column amount(SWIR)
- GOSAT L2 H2O Column amount(SWIR)
- GOSAT L2 CO2 profile(TIR)
- GOSAT L2 CH4 profile(TIR)
- GOSAT L3 global CO2 Column amount(SWIR)
- GOSAT L3 global CH4 Column amount(SWIR)

Figure10-8 shows the menu to set pseudo color.

Example of GOSAT L2 CO2 Column amount (SWIR)

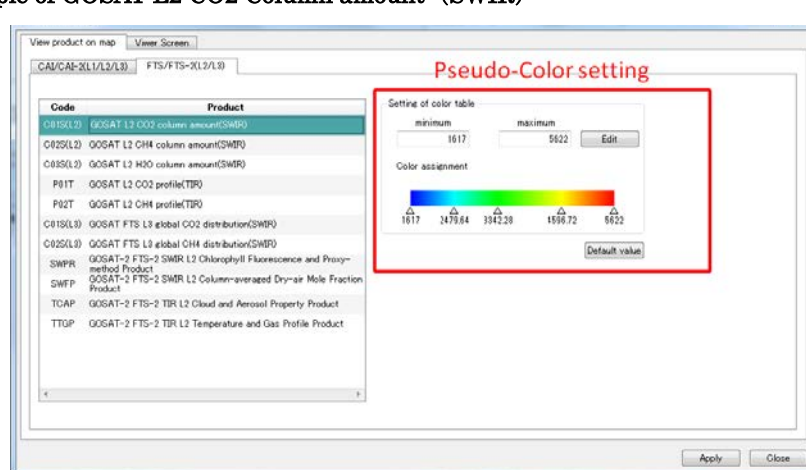
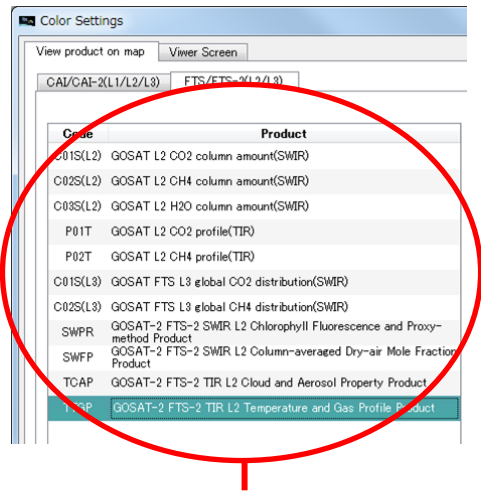


Figure 10-8 Pseudo-Color setting

Operations of the menu to set pseudo color framed in in Figure10-8 are the same as Table10-2.



The list of product

In the selection list of product, if you select the following product, the list of displaying items and the menu to set pseudo color are displayed.

- GOSAT-2 TANSO-FTS-2 SWIR L2 chlorophyll Fluorescence and Proxy method product
- GOSAT-2 TANSO-FTS-2 SWIR L2 column-averaged Dry-air Mole Fraction product
- GOSAT-2 TANSO-FTS-2 TIR temperature and Gas Profile product

Figure10-9 shows the list of items to display and the menu to set pseudo color are displayed.

GOSAT-2 TANSO-FTS-2

Example of SWIR L2 chlorophyll Fluorescence and Proxy method product

Example of SWIR L2 column-averaged Dry-air Mole Fraction product

Example of TIR temperature and Gas Profile product

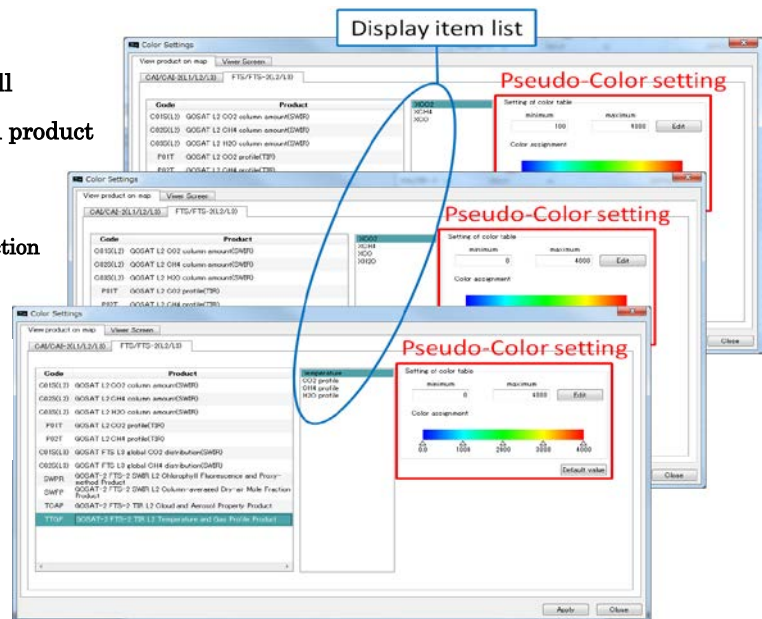
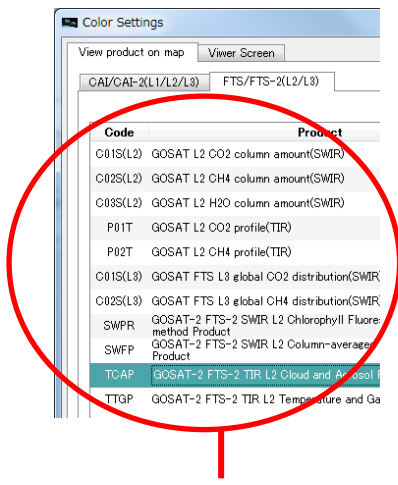


Figure 10-9 Display item list and Pseudo-Color setting

Operations to set pseudo color within the red frame in Figure10-9 are the same as Table10-2.



The list of product

In the selection list of product, if you select the following product, the list of displaying items and the menu to set the color for cloud displayed.

- GOSAT-2 TANSO-FTS-2 TIR L2 Cloud and Aerosol Property Product

Figure10-10 shows the menu to set cloud color.

Example of GOSAT-2 TANSO-FTS-2 TIR L2 cloud and aerosol property product.

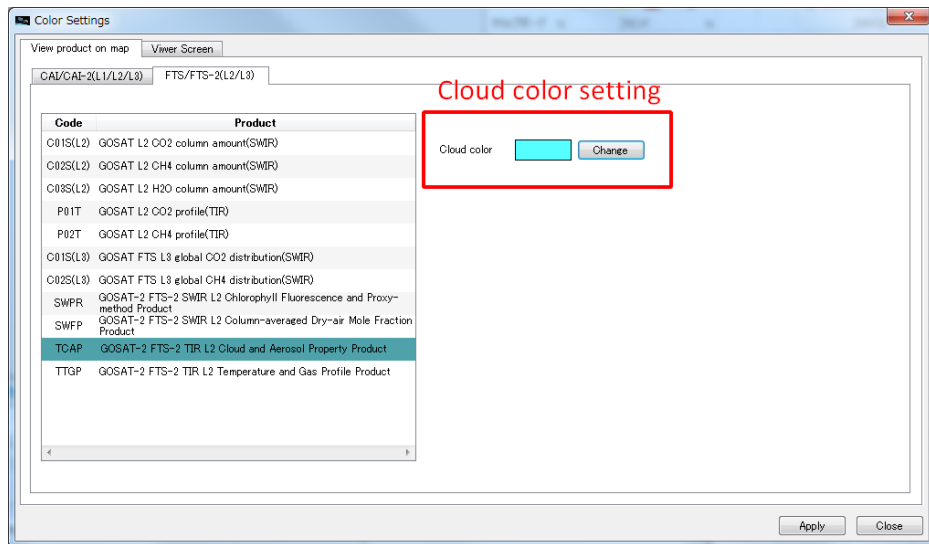


Figure 10-10 Cloud color setting

Operations to set pseudo color within the red frame in Figure10-10 are the same as Table10-3.

10.3 Set the color for map of CAI/CAI-2

If you want to adjust the color in CAI/CAI-2 viewer, you select the tab “Viewer Screen” in the menu to set color.

Change the screen by clicking tab

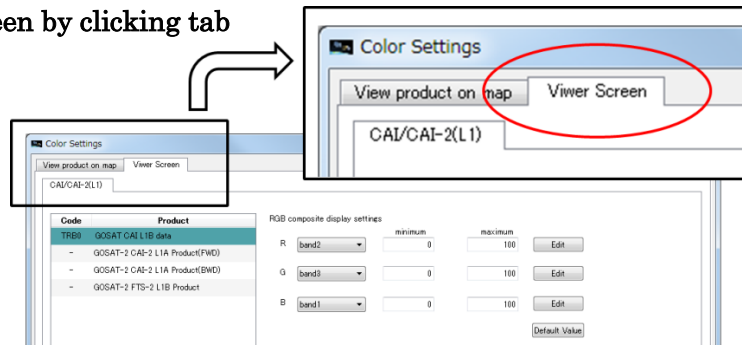


Figure 10-11 Tabs to change to color setting screen (“Viewer Screen”)

If you click tab “Viwer Screen”, the screen shown in Figure10-12 is displayed, you select product to adjust color from the product list in the left product lift. And then you assign color to display in the right menu to set display band (RGB).

Example of GOSAT CAI L1B

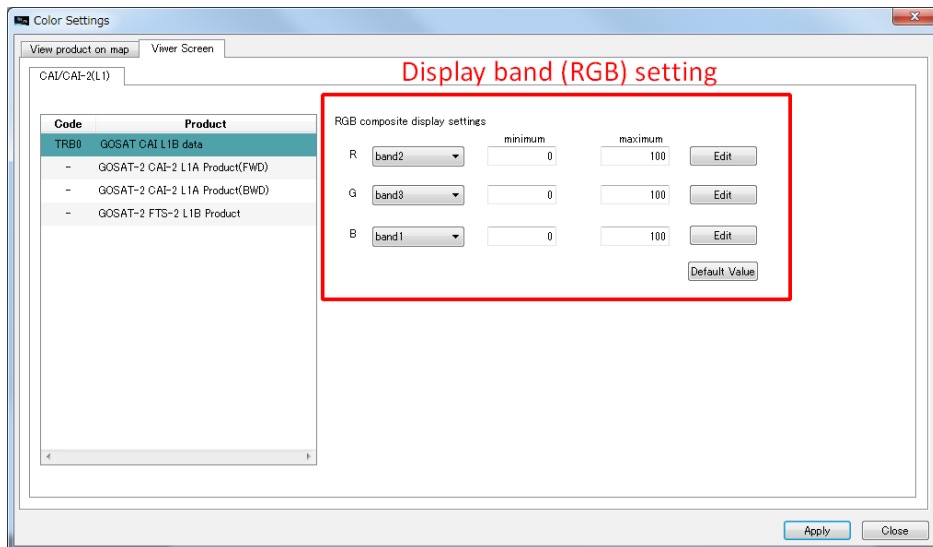


Figure 10-12 Assign band to color RGB to display in “View Screen”

Operations of the menu to assign color to band in Figure10-12 are the same as Table10-1.

11. KML output

This application can output the observation points of FTS L1B data/FTS-2 L1B product on the map to kml file

When you output kml file, you click “output kml file” in the pulldown menu which is displayed by clicking the main menu “file”. Then the screen to output kml file is displayed as shown in Figure11-1, you specify the location to store and after setting the name of file to store and click “save” button.

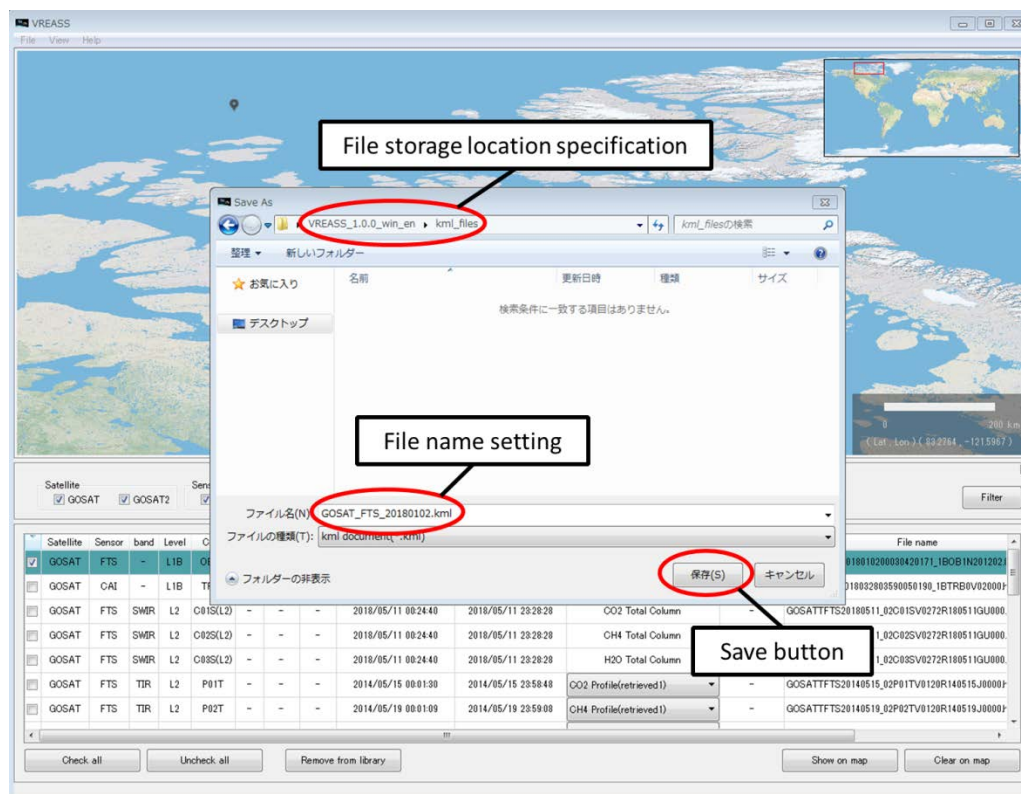


Figure 11-1 KML output screen

12. Available products

The available products of this application are listed in Table12-1 and Table12-2.

Table 12-1 Target product and display contents list (1/3)

Satellite	Sensor	Level	BAND or FWD/BWD	Version	Product		Mapping display contents	Simple Viewer display contents	
					Code	Description			
GOSAT	FTS	L1B	—	V201	(Note 1)	L1B data	Observation points display →	Spectrum/ View confirmation camera image	
		L2	SWIR	V02	C01S(L2)	CO2 column amount	Pseudo-Color image	—	
					C02S(L2)	CH4 column amount			
					C03S	H2O column amount			
		TIR	V01	P01T	CO2 Concentration Profile	Pseudo-Color image	—		
				P02T	CH4 Concentration Profile				
		L3	SWIR	V02	C01S(L3)	Global CO2 distribution	Pseudo-Color image	—	
					C02S(L3)	Global CH4 distribution			
		CAI	L1B	—	V02	TRB0	L1B data	RGB/ Pseudo-Color image	Image
	L2		—	V02	CLDM	Cloud flag	Pseudo-Color image	—	
	L3		—	V02	TRCL	Global radiance distribution	RGB image	Pseudo-Color image	—
					TRCF	Global reflectance distribution			
					NDVI	Vegetation Index			

FTS/FTS-2 : Fourier Transform Spectrometer SWIR : Short-Wave Infrared TIR : Thermal Infrared

CAI/CAI-2 : Cloud and Aerosol Imager FWD : Forward BWD: Backward

Note1 : The code depends on the operation mode. The correspondence of operation mode and cod is listed in Tble12-2.

Table 12-1 Target product and display contents list (2/3)

Satellite	Sensor	Level	BAND or FWD/BWD	Version	Product		Mapping display contents	Simple Viewer display contents
					Code	Description		
GOSAT-2	FTS-2	L1B	SWIR	V100	(Note 1)	L1B Product	Observation points display →	Spectrum/ view confirmation camera image
			TIR					
			Common				View confirmation camera image	View confirmation camera image
		L2	SWIR	TBD	SWPR	Chlorophyll Fluorescence and Proxy-method Product	Pseudo-Color image	—
					SWFP			
			TIR	TBD	TCAP	Cloud and Aerosol Property Product		
		TTGP	Temperature and Gas Profile					

FTS/FTS-2 : Fourier Transform Spectrometer SWIR : Short-Wave Infrared TIR : Thermal Infrared

Note1 : The code depends on the operation mode. The correspondence of operation mode and cod is listed in Tble12-2.

Table 12-1 Target product and display contents list (3/3)

Satellite	Sensor	Level	BAND or FWD/BWD	Version	Product		Mapping display contents	Simple Viewer display contents
					Code	Description		
GOSAT-2	CAI-2	L1A	FWD	V100	OBSM	L1A Product	RGB/ Pseudo-Color image	Image
			BWD					
		L1B	FWD	V03	CL1B	L1B Product	RGB/ Pseudo-Color image	Image
			BWD					
		L2	FWD	TBD	CLDD	Cloud Discrimination Product	Pseudo-Color image	—
			BWD					
—	AERP	Aerosol Property Product						

CAI/CAI-2 : Cloud and Aerosol Imager FWD : Forward BWD: Backward

Table 12-2 FTS/FTS-2 L1B List of display product operational mode and code

Satellite	Sensor	Level	Product	
			Code	Operation Mode
GOSAT	FTS	L1B	OB1D	Observation mode I Sunshine observation data
			OB1N	Observation mode I Shade observation data
			OB2D	Observation mode I Sunshine observation data
			SPOD	Specific observation mode Sunshine observation data
			SPON	Specific observation mode Shade observation data
GOSAT-2	FTS-2	L1B	OB1D	Sunshine observation mode
			OB1N	Shade observation mode
			OB2D	Sunshine observation mode other than full observation
			OB2N	Sunshine observation mode other than Full observation

13. Others

13.1 Map data

This application uses GSI (Geospatial Information Authority of Japan) map (tile).

13.2 Using library

This application uses Qt5.9.