

# Monitoring and assessment of water quality by ocean color remote sensing

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# Today's Content

## □ How to use G-portal

- Registration
- Search products
- Download products

## □ SGLI-L2-SST display and mapping by python

- Retrieve physical quantity
- map projection

# What's G-portal?

Globe Portal System (G-Portal) is online dissemination service of valuable products acquired from sensors on Earth Observation Satellites of Japan Aerospace Exploration Agency (hereafter, JAXA).

<https://gportal.jaxa.jp/gpr/>

## Product Search

- Search by physical quantities
- Search by spacecrafts / sensors
- Search using saved conditions(only available to registered users)

**G-Portal**  
Globe Portal System

First of all, search the data you seek (no registration required)  
\* [Registration](#) required for download.

Search by:

- Physical quantities  
precipitation, ocean color, etc.
- Spacecraft  
spacecraft, sensor, level, etc.
- Direct download  
How to download via FTP, etc.

Login  
User registration  
For first-time users  
Product information / operation  
Tools / documents  
Support / inquiry / FAQ  
Announcement

Search this site:  
ENHANCED BY Google

日本語 ENGLISH

JAXA  
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G-Portal offers earth observation data free of charge for use in various fields.

INFO [2023/12/20] (Update) Occurance of a G-Portal System Failure and the Recovery (December 19th, 2023)  
Regarding the delay in the provision of some satellite products which we informed, the status on December 19, 2023 is shown below.

Use cases

[The 3rd] Let's visualize Land Surface Temperature products

GCOM-C/SGLI Products (Version 3) Released

# User registration

# G-portal user type

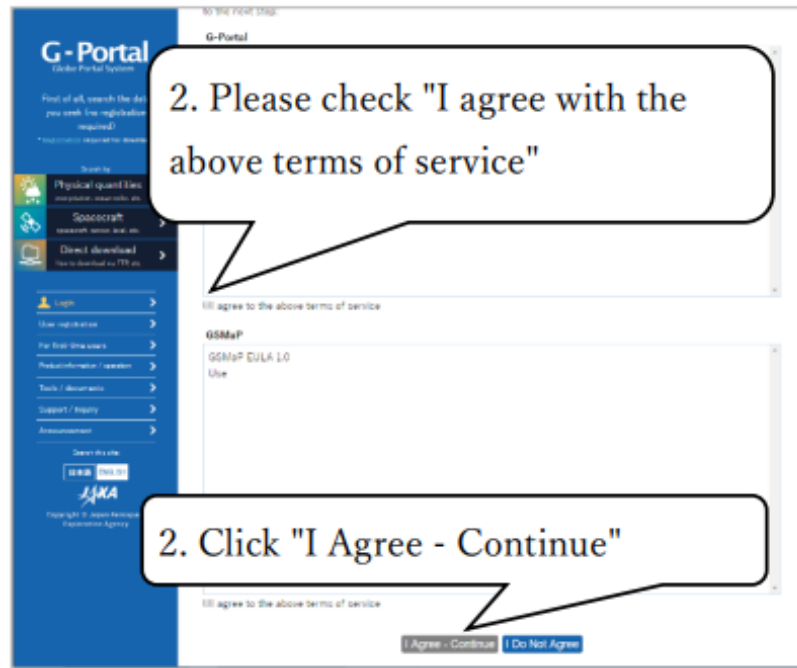
User types for G-Portal is outlined in Table. You are recommended to complete user registration first in order to acquire products without restrictions

User Type	Definition	Services Available
Guest User	Users who have not completed user registration	Search and browse data online. Note that guest users are unable to order or acquire products.
Registered User	Users who have completed user registration	Search, browse, produce, process and acquire standard products online. Acquire standard products and near real-time products directly from the FTP server.
Specified User	Register users, collaborator specially permitted by JAXA	Search, browse, produce, process and acquire standard products online. In addition to the products that registered users can download, acquire special products being available to those who are JAXA-approved directly from the SFTP server.

# User registration ①



1) Click "User registration" from the menu



2) To register a user, you must agree to the terms of use. Read through the terms and click the "I Agree – Continue" button.

The page will move to the "User Registration window".



# User registration ②

**G-Portal**  
Globe Portal System

First of all, search the data you seek (no registration required)  
\* Authentication required for download

Search by:  
Physical quantities  
Spacecraft  
Direct download

1 Terms of Use  
2 Enter registration information  
3 Confirm registration information  
4 Temporary registration completed  
5 Registration completed

**User Registration STEP2/5: G-Portal Registering User Information**

Please complete all the following items and press "Confirm Registration Information":

User account (Required):  
Password (Required):  
Password (reconfirm) (Required):  
Name (Required):  
Email address (Required):  
Email address (reconfirm) (Required):  
Organization:  
Department:  
Country:  
Language (Required):  
Purpose (Required):  
Email Delivery Preference (Required):

Japanese English  
Analysis  
Algorithm Development  
Data Validation  
Applied Research  
Education  
Calibration  
Order-made  
Other

By order By preparation

Avoid filling out forms contained in email messages that request personal information. We will never send any email requesting your user account or password.

3. Enter user registration information

3) Enter all user information to be registered (user account, password, name, email address, organization, department, country, language, purpose of use, email delivery preference).

**G-Portal**  
Globe Portal System

First of all, search the data you seek (no registration required)  
\* Authentication required for download

Search by:  
Physical quantities  
Spacecraft  
Direct download

1 Terms of Use  
2 Enter registration information  
3 Confirm registration information  
4 Temporary registration completed  
5 Registration completed

**User Registration STEP3/5: G-Portal Confirming Registration Information**

Please confirm the following items and press "Confirm Registration Information":

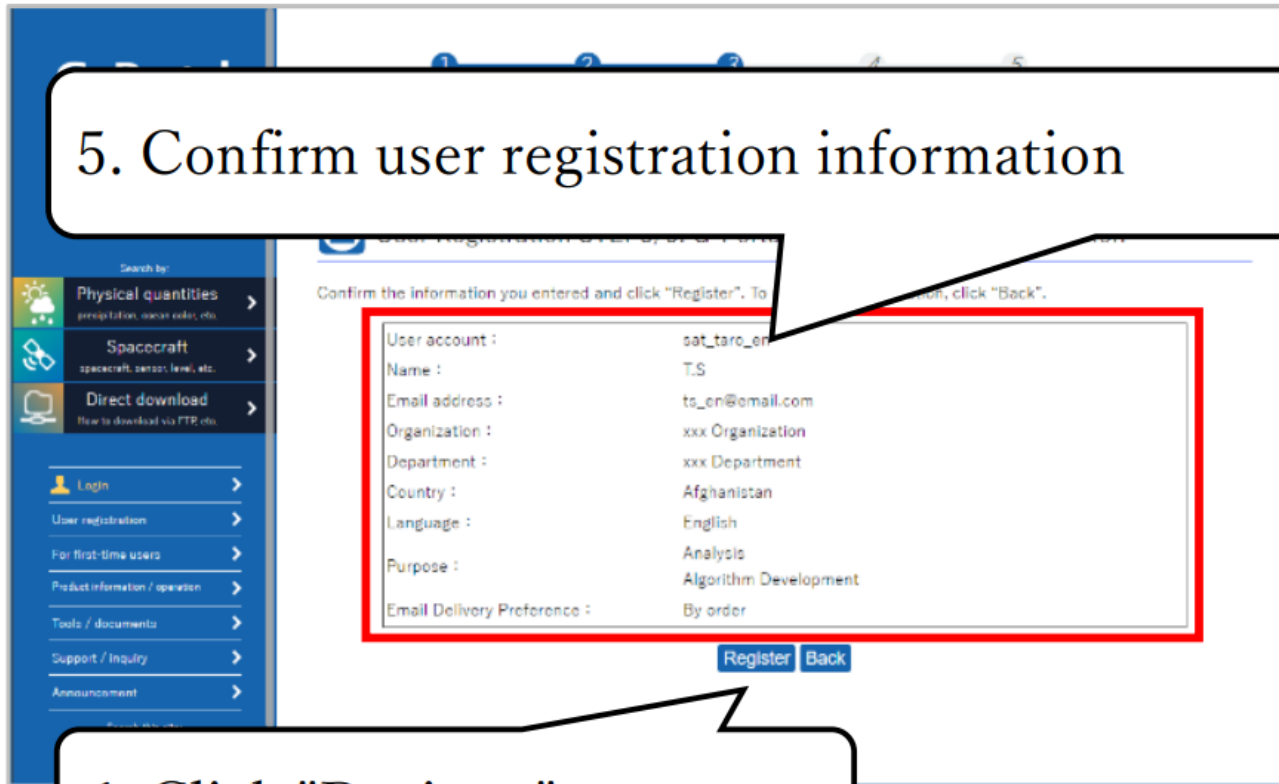
Email Delivery Preference (Required):  
Handling of email addresses:  
Be aware of phishing scams:

Next  
Cancel

4. Click "Next"

# User registration ③

## 5. Confirm user registration information



Confirm the information you entered and click "Register". To return to the previous screen, click "Back".

User account :	sat_tarc_en
Name :	T.S
Email address :	ts_en@email.com
Organization :	xxx Organization
Department :	xxx Department
Country :	Afghanistan
Language :	English
Purpose :	Analysis
	Algorithm Development
Email Delivery Preference :	By order

[Register](#) [Back](#)

## 6. Click "Register"

5) The entered user information will be displayed, so check if there is any mistake in the contents. To correct, please click the "return" button. You will return to the screen for entering user information.

6) Click the "Register" button to perform the provisional registration procedure.



# User registration ④

The screenshot shows the G-Portal interface with a progress bar at the top indicating five steps: 1. Terms of Use, 2. Enter registration information, 3. Confirm registration information, 4. Temporary registration completed, and 5. Registration completed. Step 4 is currently selected. The main content area displays the title "User Registration STEP4/5: G-Portal Temporary registration completed" and a message stating "Your registration is not yet completed." It explains that temporary registration is completed by the information entered and that an email was sent to complete the registration (STEP 5/5). A note mentions that once registration is completed, products can be downloaded. A callout box points to the progress bar and the main message.

7. tentative registration has done.

7) The temporary registration procedure is completed. "Temporary registration notification mail" will be sent to the email address you entered. Registration is completed by accessing the URL described in the mail. At the time of provisional registration, you can not log in because user registration has not been completed yet.

The screenshot shows the G-Portal interface with the same progress bar as the previous step, but now step 5, "Registration completed", is selected. The main content area displays the title "User Registration STEP5/5: G-Portal Registration completed" and a message stating "User account 'sat\_taro\_en' is successfully registered." It also includes a thank you message from G-Portal and a link to "Back to top of this service". A callout box points to the progress bar and the main message.

8. Registration has completed.

8) Access the URL included in the "Temporary registration notification mail". The final Registration window will be displayed. Your user account is sent to the email address you registered

# User registration ⑤



1) Click "login" at menu on a left pane of the top window. Appear the window for the login.

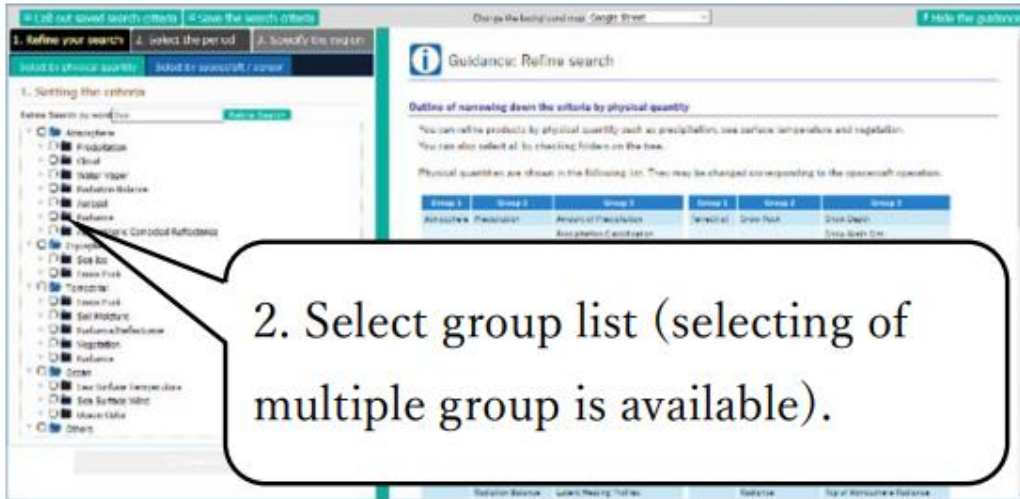
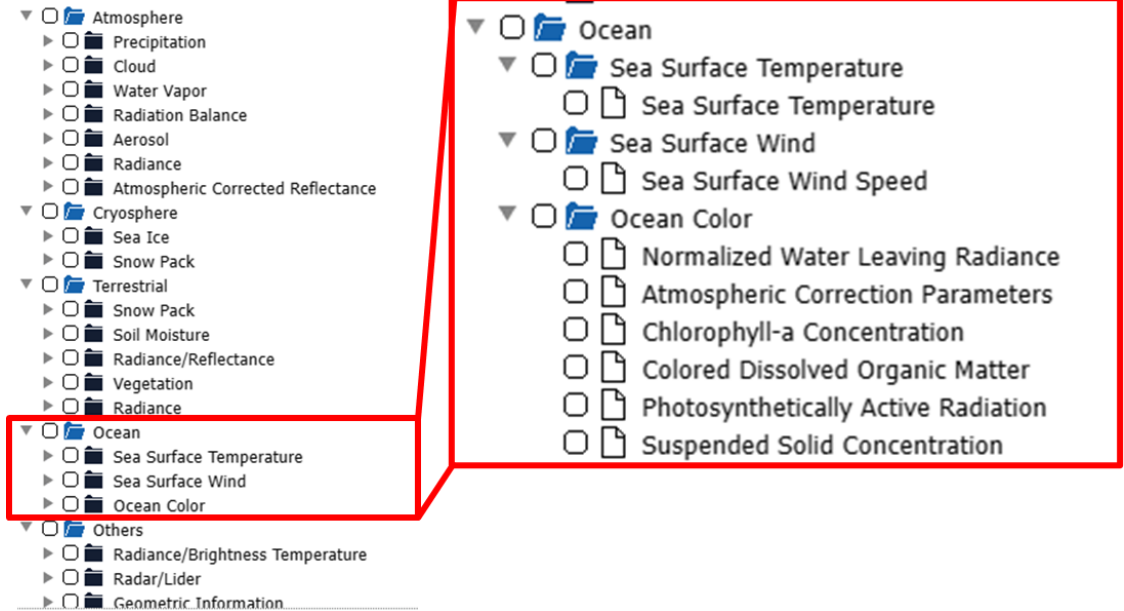


2) Input your user accounts and password as the login window is displayed. Click "login" button.

**Then, you can download satellite data from G-portal!**

# Search products

# Search by physical quantities



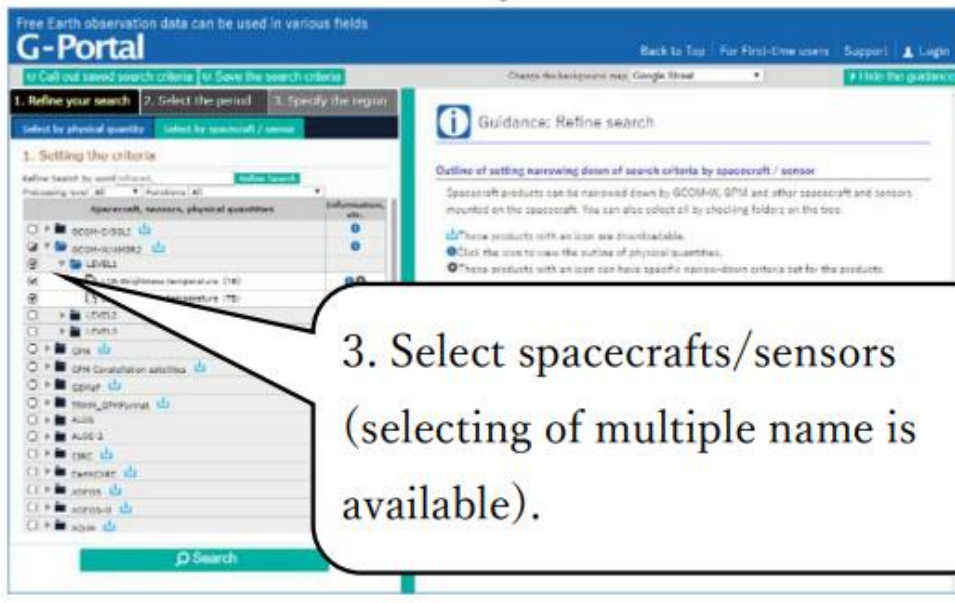
- 1) Click “search from physical quantities” left pane on the top menu and move to the search window shown the physical quantities tree.
- 2) Each category shows the group list to physical quantities to a tree format on the search window.



# Search by Spacecraft



1) Click “Search by spacecraft sensors” on the top window menu and move to search window shown spacecraft sensors tree.



## 1. Setting the criteria

Refine Search by word

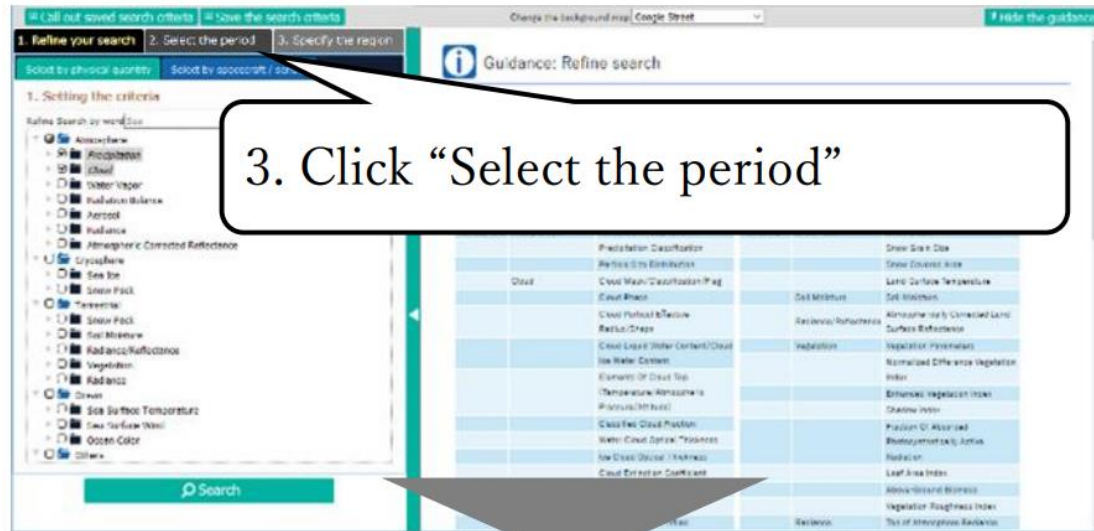
Processing level  Functions

Spacecraft, sensors, physical quantities		Information	Setting
<input type="checkbox"/>	▶ GCOM-C/SGLI		
<input type="checkbox"/>	▶ GCOM-W/AMSR2		
<input type="checkbox"/>	▶ GPM		
<input type="checkbox"/>	▶ GPM Constellation satellites		
<input type="checkbox"/>	▶ GSMaP		
<input type="checkbox"/>	▶ TRMM_GPMFormat		
<input type="checkbox"/>	▶ ALOS		
<input type="checkbox"/>	▶ ALOS-2		
<input type="checkbox"/>	▶ CIRC		
<input type="checkbox"/>	▶ ADEOS		
<input type="checkbox"/>	▶ ADEOS-II		
<input type="checkbox"/>	▶ AQUA		
<input type="checkbox"/>	▶ TRMM		
<input type="checkbox"/>	▶ JERS-1		
<input type="checkbox"/>	▶ MOS-1		
<input type="checkbox"/>	▶ MOS-1b		
<input type="checkbox"/>	▶ NASA-CMR		

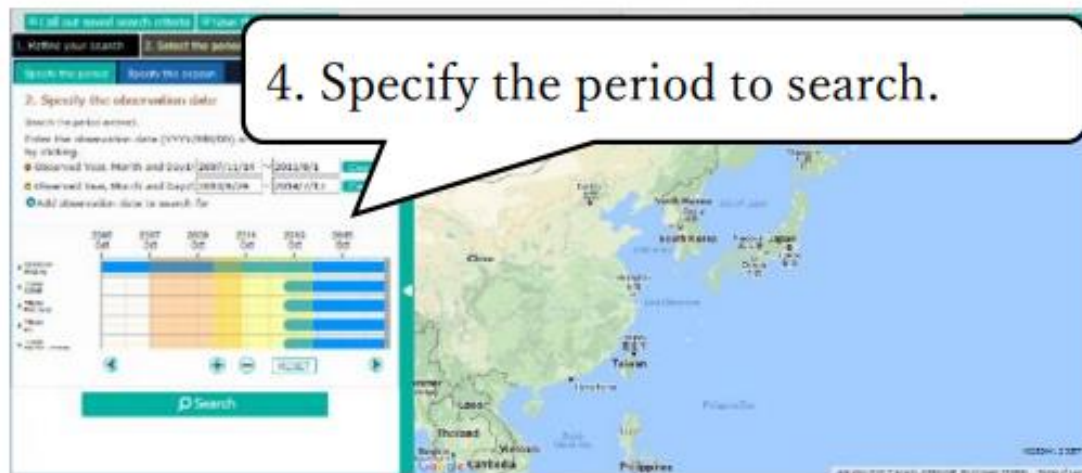
3) Check a searching satellite sensor. The detail search status show about the setting available product on the setting icon. Click the setting icon, The detail search condition input dialog is shown.



# Select Target Period



3) Click "2. Specify date " on the top of the window with checking physical quantities.



4) The left pane displaying "data range" appears. The selections are "Period" and "Season". There are three ways on "Data Range" as follow.

- Input by text
- Input from the calendar UI
- Input by bar-chart to observation period

# Select Target Area①



5) Click “3. Specify Area” on the top of a window.

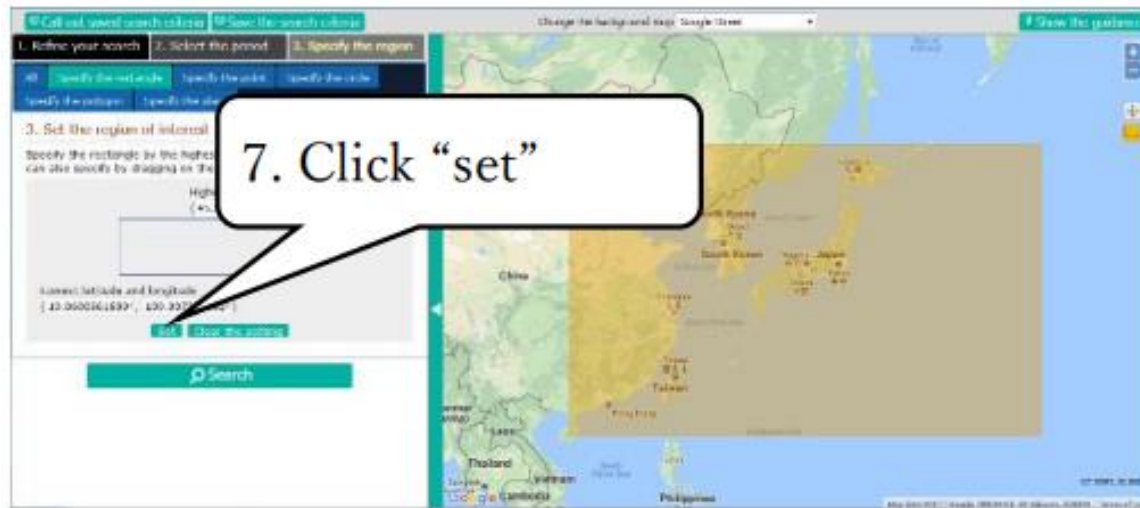
6) Appear a window specifying search field. The selections of observation area are six applications.

- specify a globe
- specify a rectangle
- specify a point
- specify a circle
- specify a polygon
- specify a place (name)

Choose a function from “text input” and “drag and drop on the map”.



# Select Target Area②



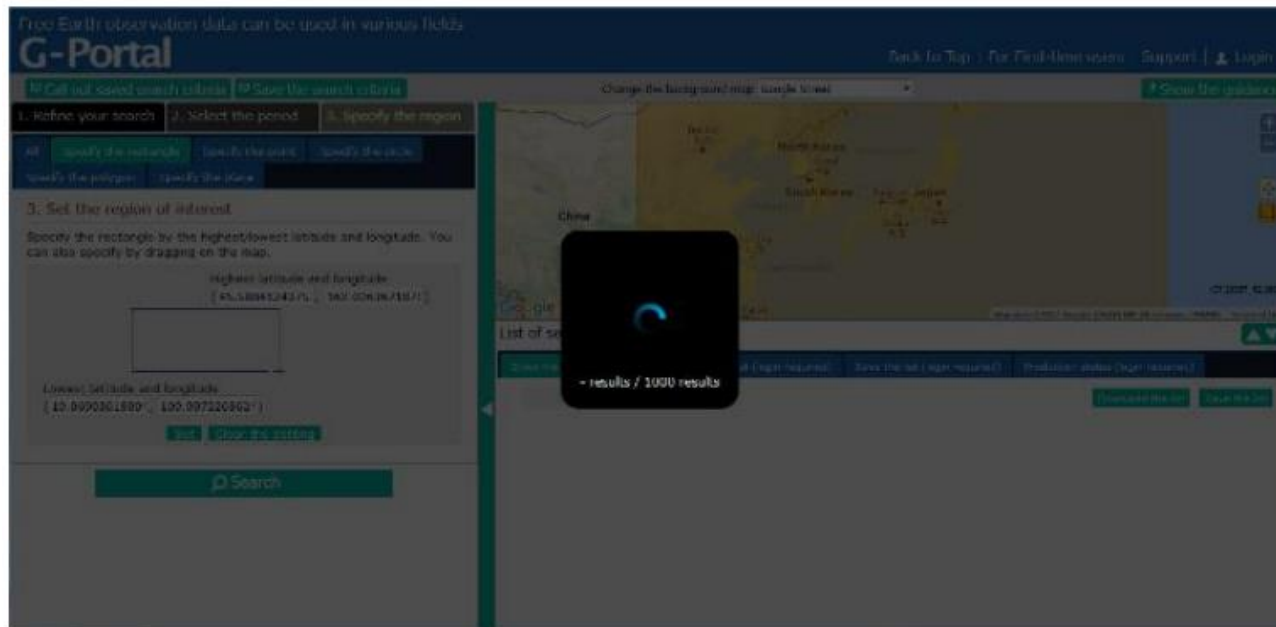
7) Click “Submit” when input the searching area by text.  
(unnecessary on drag on the map)



8) Start search by clicking “search” button on the lower part window. “Search” button can click under setting a spacecraft sensor, physical quantities and observation data.



# Search loading...



9) Loading icon and searching status are displayed during searching. “Hit number”/“Visible number”

When the system is busy, the designated area is too small, or the number of applicable data is too large  
→ Searching cannot be performed properly.  
→ This problem may be solved by expanding the target area, shortening the period of time to be covered, etc.

# Download products



## Download SST images of GCOM-C/SGLI around Japan on September 5, 2018 !

Sensor ID : GCOM-C/SGLI

Observation date : September 5, 2018

Target area : around Japan

Resolution : 250m

Orbit: Descending (Daytime image)

Filename = GC1SG1\_201809050115H04610\_L2SG\_SSTDQ\_3001.h5

1) Click the “Show the list” tab on the search results window. The search results will be displayed as a list.

Show the list (4 data)

Display thumbnail (4 data)

My List (login required)

Save the list (login required)

Production status (login required)

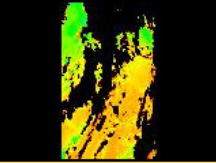
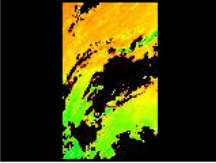
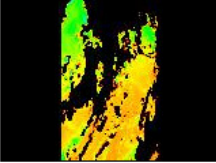
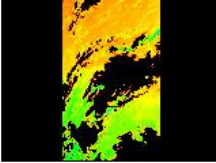
alos2 Order

Download the list

Save the list

<input type="checkbox"/>	Product	Physical quantities	Spacecraft / sensor	Observation starting date(UTC)	Observation ended date(UTC)	Details	Data manipulation		My List
<input type="checkbox"/>	L2-SST	Sea Surface Temperature	GCOM-C/SGLI	2018-09-05 01:15:06.26	2018-09-05 01:19:53.83	Details	Download	Processing	Add to My List
<input type="checkbox"/>	L2-SST	Sea Surface Temperature	GCOM-C/SGLI	2018-09-05 12:32:18.62	2018-09-05 12:37:06.20	Details	Download	Processing	Add to My List
<input type="checkbox"/>	L2-SST	Sea Surface Temperature	GCOM-C/SGLI	2018-09-05 01:15:06.20	2018-09-05 01:19:53.89	Details	Download	Processing	Add to My List
<input type="checkbox"/>	L2-SST	Sea Surface Temperature	GCOM-C/SGLI	2018-09-05 12:32:18.57	2018-09-05 12:37:06.26	Details	Download	Processing	Add to My List

2) Click the “Display thumbnail” tab on the search results window. The search results will be displayed as thumbnails.

<a href="#">Show the list (4 data)</a> <a href="#">Display thumbnail (4 data)</a> <a href="#">My List (login required)</a> <a href="#">Save the list (login required)</a> <a href="#">Production status (login required)</a>				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product	L2-SST	L2-SST	L2-SST	L2-SST
Thumbnail				
Earth physical quantity	Sea Surface Temperature	Sea Surface Temperature	Sea Surface Temperature	Sea Surface Temperature
Spacecraft / sensor	GCOM-C/SGLI	GCOM-C/SGLI	GCOM-C/SGLI	GCOM-C/SGLI
Observation starting date and time(UTC)	2018-09-05 01:15:06.26	2018-09-05 12:32:18.62	2018-09-05 01:15:06.20	2018-09-05 12:32:18.57

From this button, you can see detailed information.

# Check detailed information

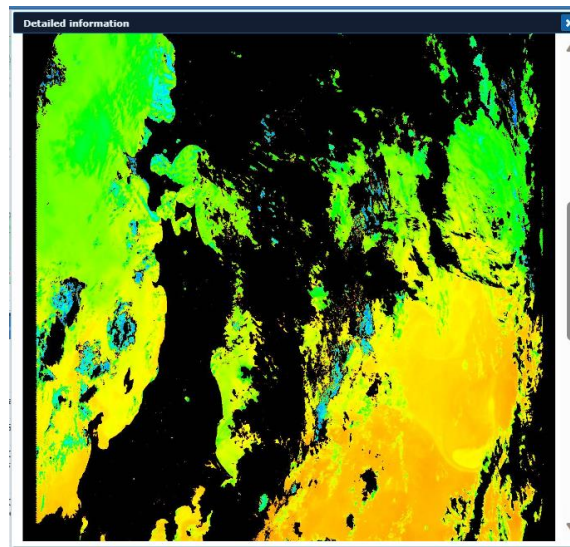
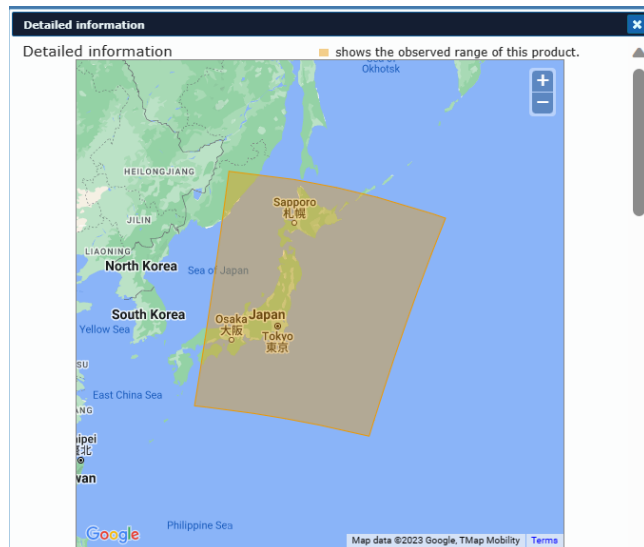


Image	Browse	! The display screen is switched by selecting.
Granule ID	GC1SG1_201809050115H04610_L2SG_SSTDQ_3001	
Processing Date (UTC)	2022-08-31 00:45:04.00	
Processing Level	L2	
Observation Starting Date (UTC)	2018-09-05 01:15:06.20	
Observation Ended Date (UTC)	2018-09-05 01:19:53.89	
Platform Short Name	GCOM-C	
Sensor	SGLI	
Sensor Operational Mode	NOMINAL	
Orbit Number	046	
Product File	<a href="https://gportal.jaxa.jp/download/standard/GCOM-C/GCOM-C.SGLI/L2.OCEAN.SST_3/2018/09/05/GC1SG1_201809050115H04610_L2SG_SSTDQ_3001.h5">https://gportal.jaxa.jp/download/standard/GCOM-C/GCOM-C.SGLI/L2.OCEAN.SST_3/2018/09/05/GC1SG1_201809050115H04610_L2SG_SSTDQ_3001.h5</a>	
Product size(MB)	50	
Product version	3	
Total Quality Code	Good	
Cloud Coverage (%)	-	
Compression	Compressed	
Physical Quantity	Sea Surface Temperature	
Product resolution	250m	
Scene number	10	
Orbit Direction	Descending	

Show the list (4 data)   Display thumbnail (4 data)   My List (login required)   Save the list (login required)   Production status (login required)   alos2 Order									
Download all products selected   Process all products selected   Bulk production   Download all products selected   Add selected products to My List									
Download the list   Save the list									
	Product	Physical quantities	Spacecraft / sensor	Observation starting date(UTC)	Observation ended date(UTC)	Details	Data manipulation		My List
<input type="checkbox"/>	L2-SST	Sea Surface Temperature	GCOM-C/SGLI	2018-09-05 01:15:06.26	2018-09-05 01:19:53.83	Details	Download	Processing	Add to My List
<input type="checkbox"/>	L2-SST	Sea Surface Temperature	GCOM-C/SGLI	2018-09-05 12:32:18.62	2018-09-05 12:37:06.20	Details	Download	Processing	Add to My List
<input type="checkbox"/>	L2-SST	Sea Surface Temperature	GCOM-C/SGLI	2018-09-05 01:15:06.20	2018-09-05 01:19:53.89	Details	Download	Processing	Add to My List
<input type="checkbox"/>	L2-SST	Sea Surface Temperature	GCOM-C/SGLI	2018-09-05 12:32:18.57	2018-09-05 12:37:06.26	Details	Download	Processing	Add to My List

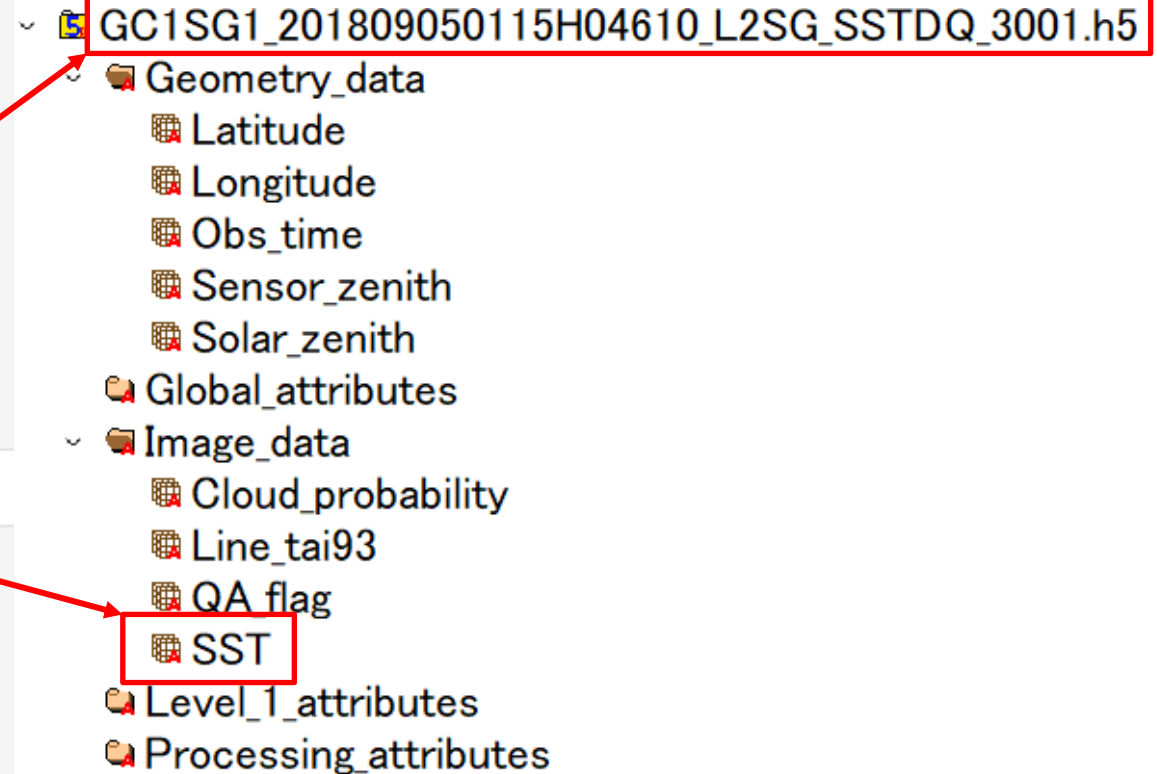
# SGLI-L2-SST display and mapping

# Data Structure and Reading

```
[ ]: #SGLI_L2_SST_mapping.py to ipynb
import h5py
import numpy as np
import matplotlib.pyplot as plt
from scipy.interpolate import griddata
%matplotlib inline
FNAME = 'GC1SG1_201809050115H04610_L2SG_SSTDQ_3001.h5'
DNAME = '/Image_data/SST'
```

```
[ ]: file = h5py.File(FNAME, 'r')
# Read SST data
Data0 = file[DNAME][:]

# Read attributes
Err_DN = file[DNAME].attrs['Error_DN']
Min_DN = file[DNAME].attrs['Minimum_valid_DN']
Max_DN = file[DNAME].attrs['Maximum_valid_DN']
Slope = file[DNAME].attrs['Slope']
Offset = file[DNAME].attrs['Offset']
```



<https://www.hdfgroup.org/downloads/hdfview/>



# Data Structure and Reading

```
[ ]: #SGLI_L2_SST_mapping.py to ipynb
import h5py
import numpy as np
import matplotlib.pyplot as plt
from scipy.interpolate import griddata
%matplotlib inline
FNAME = 'GC1SG1_201809050115H04610_L2SG_SSTDQ_3001.h5'
DNAME = '/Image_data/SST'
```

```
[ ]: file = h5py.File(FNAME, 'r')
# Read SST data
Data0 = file[DNAME][:]

# Read attributes
Err_DN = file[DNAME].attrs['Error_DN']
Min_DN = file[DNAME].attrs['Minimum_valid_DN']
Max_DN = file[DNAME].attrs['Maximum_valid_DN']
Slope = file[DNAME].attrs['Slope']
Offset = file[DNAME].attrs['Offset']
```

## Attribute of '/Image\_data/SST'

'Data\_description'  
'dim0'  
'dim1'  
'Error\_DN'  
'Land\_DN'  
'Cloud\_error\_DN'  
'Retrieval\_error\_DN'  
'Maximum\_valid\_DN'  
'Minimum\_valid\_DN'  
'Mask\_for\_statistics'  
'Slope'  
'Offset'  
'Spatial\_resolution'  
'Spatial\_resolution\_unit'  
'Unit'

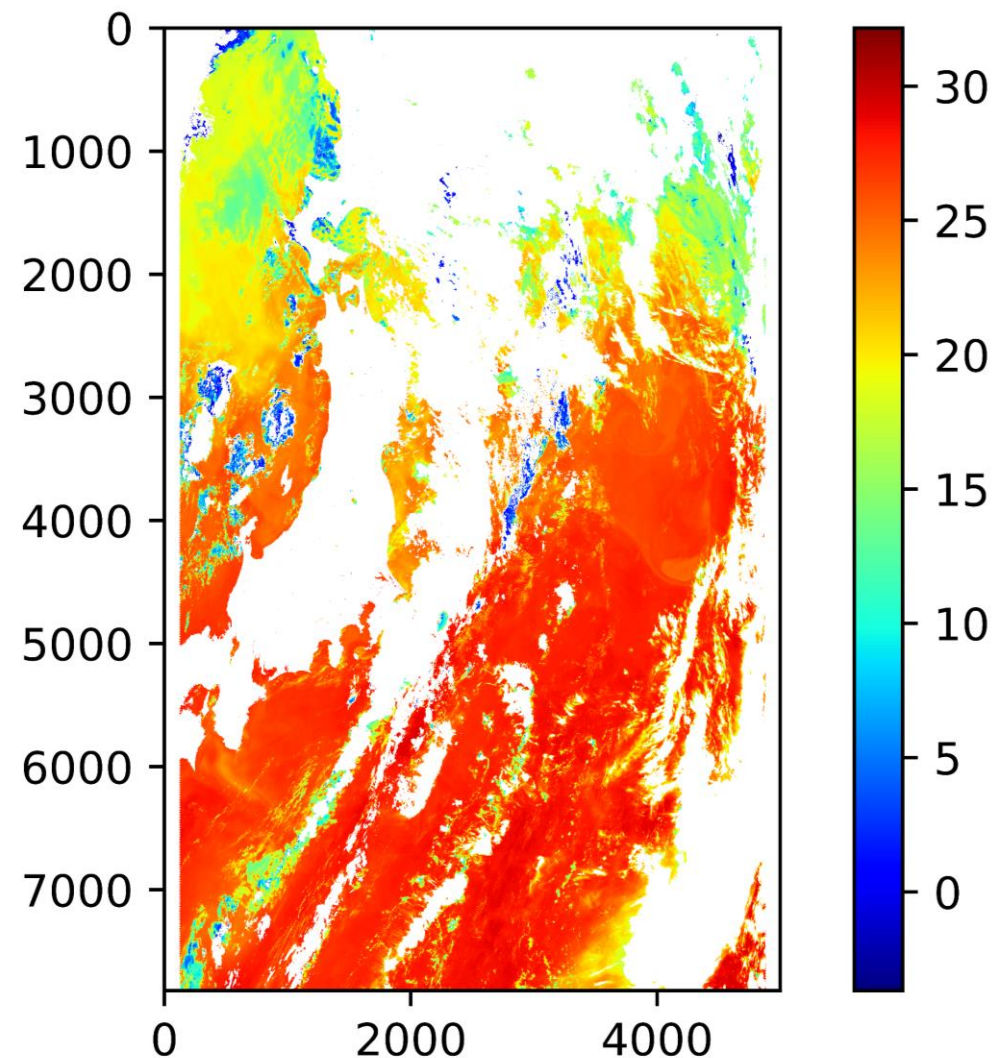
Obtain parameters  
to convert from DN  
values to physical  
quantity (SST)

# Physical quantity conversion

```
[ ]: # Data processing
Data1 = Data0.astype(float)
Data1[Data0 == Err_DN] = np.nan
Data1[(Data0 <= Min_DN) | (Data0 >= Max_DN)] = np.nan
Data1 = Slope * Data1 + Offset

# Plotting
plt.figure()
plt.imshow(Data1, cmap='jet')
plt.colorbar()
plt.savefig("figure/default.png", format="png", dpi=2000)
```

Non-conforming data is replaced by missing values (NaN) and converted to floating point



# Apply QA flags (if necessary)

```
[ ]: # Read QA_flag
QA_flag = file['/Image_data/QA_flag'][:]
possibly_cloudy = np.bitwise_and(QA_flag, 2**12, dtype=np.uint16)
acceptable = np.bitwise_and(QA_flag, 2**13, dtype=np.uint16)
good = np.bitwise_and(QA_flag, 2**14, dtype=np.uint16)

reliable = np.logical_or.reduce([good, acceptable, possibly_cloudy])

# Apply reliability mask
Data1[~reliable] = np.nan

# Plotting with reliability mask
plt.figure()
plt.imshow(Data1, cmap='jet')
plt.colorbar()
plt.savefig("figure/applying_QAflag.png", format="png", dpi=2000)
plt.show()
```

Extract and display only  
reliable data

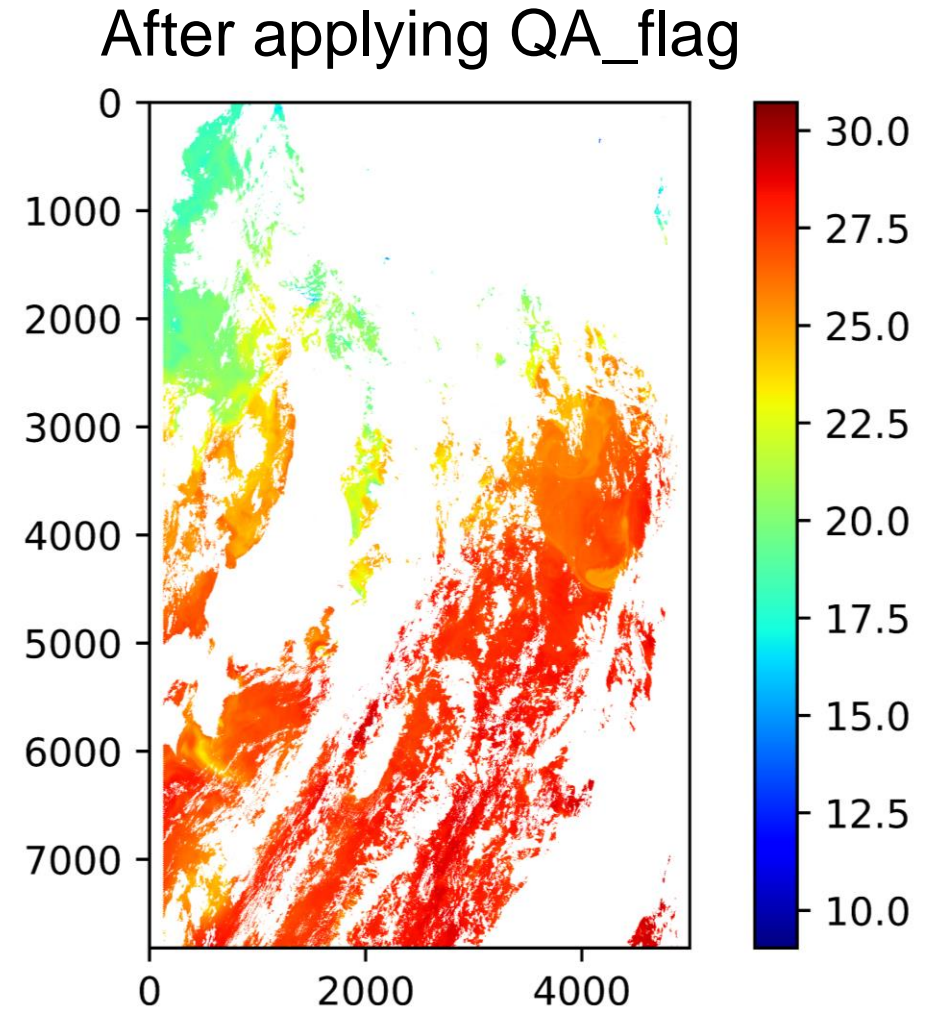
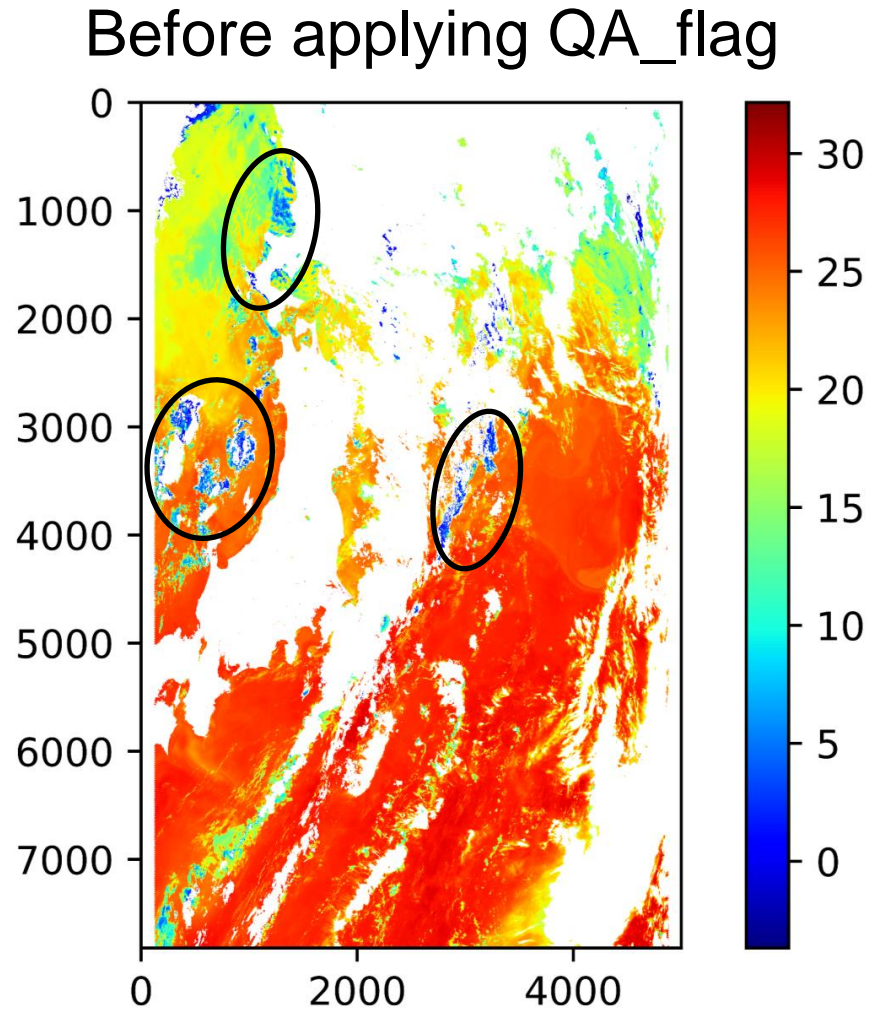
## QA\_flag of SST

Bit	Data name
0	invalid data
1	Land
2	Rejected by QC
3	Retrieval error
4	Invalid data (TIR1)
5	Invalid data (TIR2)
6	reserved
7	reserved
8	1: daytime, 0: nighttime or no visible data
9	Near Land
10	Cloudy
11	Unknown clear/cloudy
12	Possibly cloudy
13	Acceptable
14	Good
15	reserved

[https://suzaku.eorc.jaxa.jp/GCOM\\_C/data/update/Algorithm\\_SST\\_ja.html](https://suzaku.eorc.jaxa.jp/GCOM_C/data/update/Algorithm_SST_ja.html)



# Apply QA flags (if necessary)



Unreliable data near clouds are masked.

# Latitude and longitude data acquisition

```
[ ]: # Read Latitude and Longitude
Lat = file['/Geometry_data/Latitude'][:]
Lat_r = float(file['/Geometry_data/Latitude'].attrs['Resampling_interval'])
Lon = file['/Geometry_data/Longitude'][:]
Lon_r = float(file['/Geometry_data/Longitude'].attrs['Resampling_interval'])

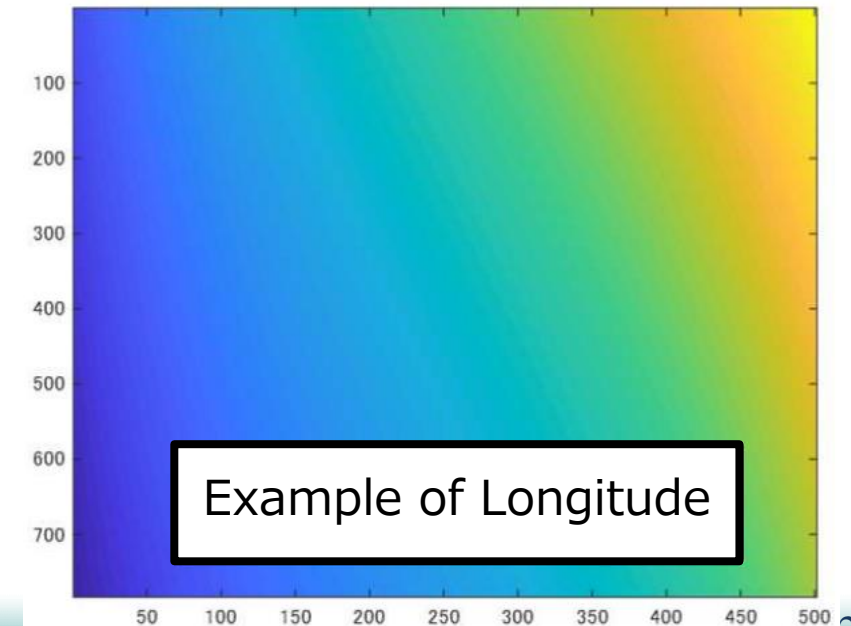
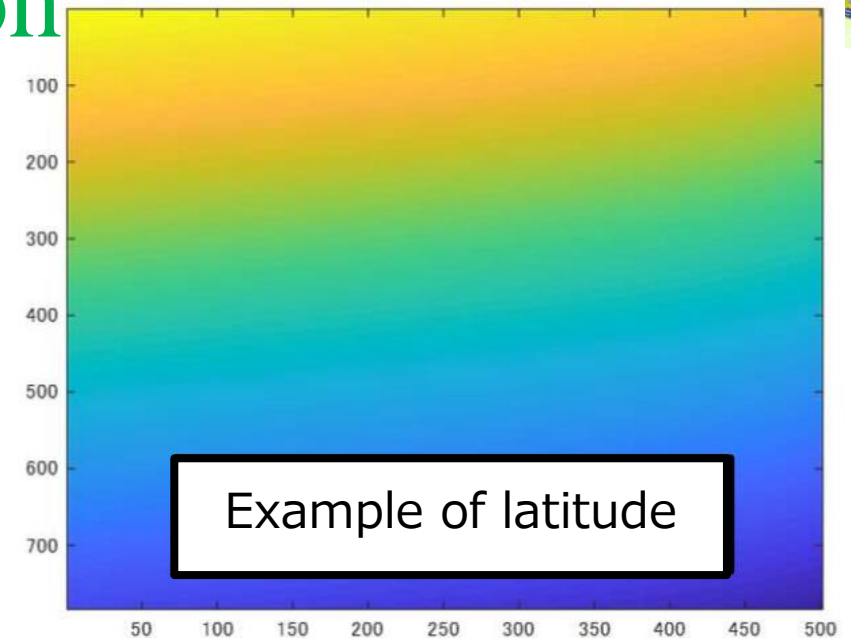
# Create meshgrid
X, Y = np.meshgrid(np.arange(1, Lat_r * Lat.shape[1] + 1, Lat_r),
                  np.arange(1, Lat_r * Lat.shape[0] + 1, Lat_r))

Xq, Yq = np.meshgrid(np.arange(1, Data0.shape[1] + 1),
                  np.arange(1, Data0.shape[0] + 1))

# Interpolate Latitude and Longitude
f_lat = griddata((X.flatten(), Y.flatten()), Lat.flatten(), (Xq, Yq), method='linear')
f_lon = griddata((X.flatten(), Y.flatten()), Lon.flatten(), (Xq, Yq), method='linear')

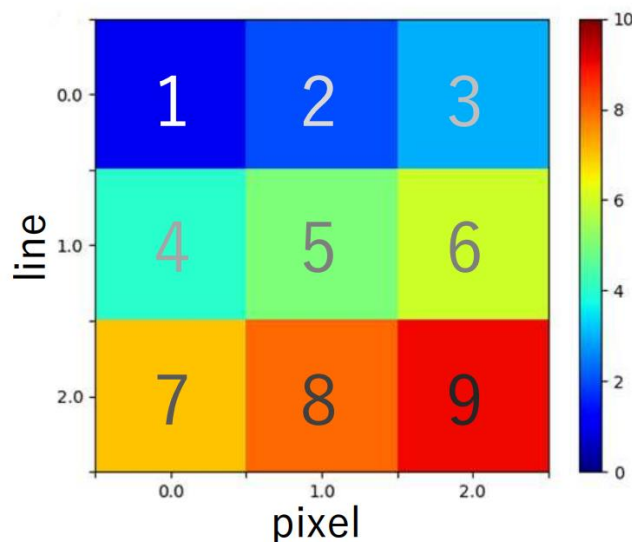
LLroi = {'Lat': f_lat,
         'Lon': f_lon}
```

GCOM-C/SGLI ocean product files contain resampled latitude and longitude values

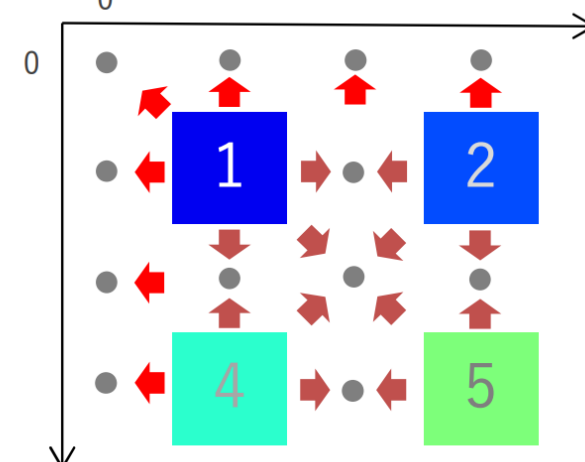
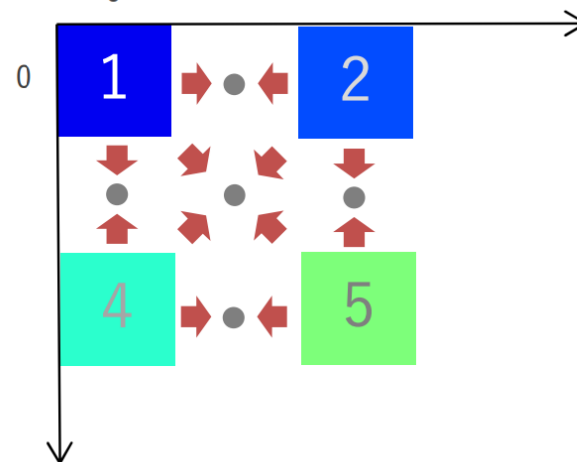
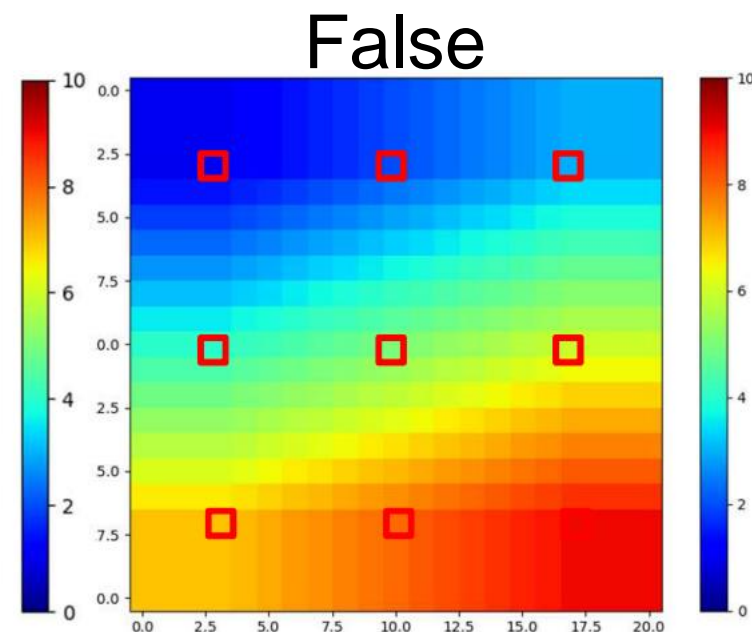
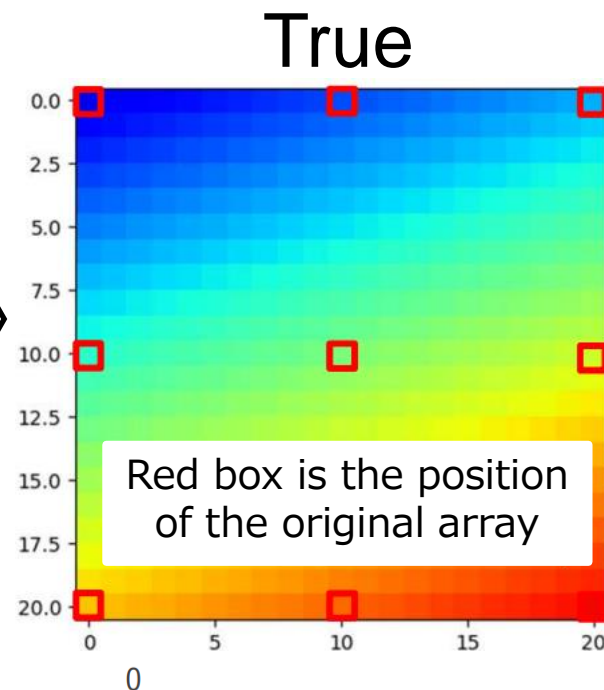




# Latitude and longitude data acquisition (note on interpolation method)



bilinear  
 Interpolation  
 (interval = 10)



Linear interpolation of adjacent  
 pixels with respect to the upper  
 left corner  
 (note that some functions may  
 result in a "false" completion  
 depending on the language and  
 function)

# Extract target data (Tokyo Bay)



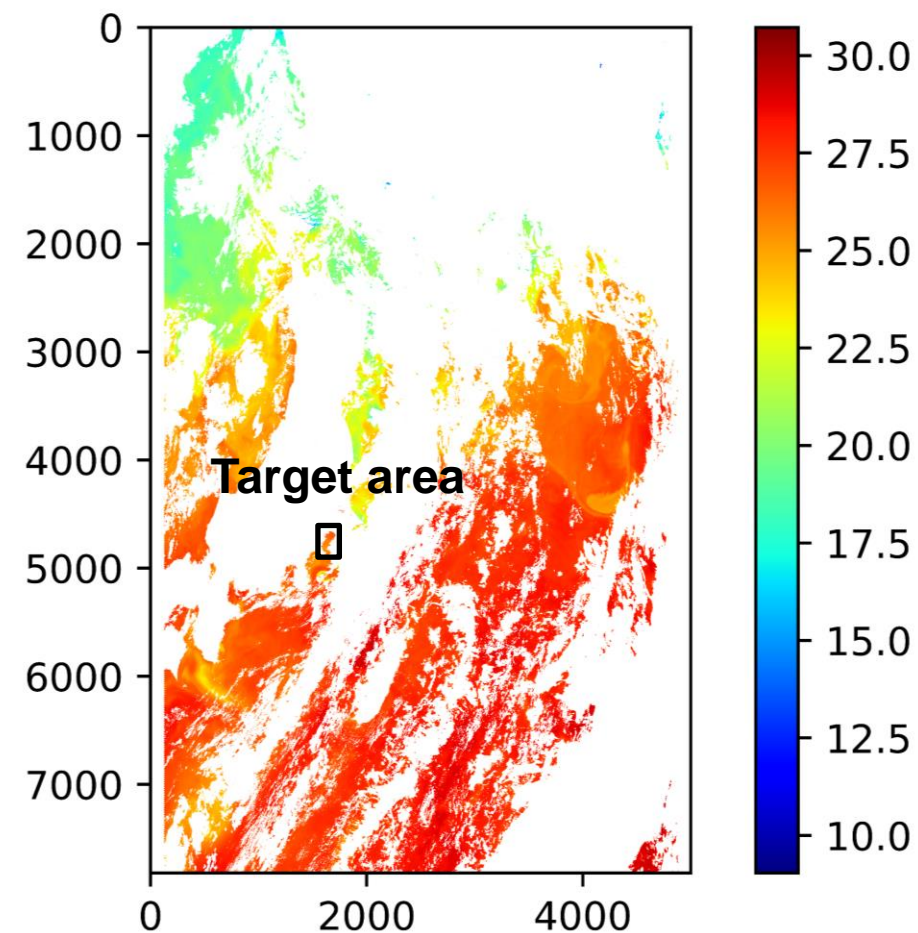
```
[ ]: # Extract some data
IDX_X = slice(4600, 4900)
IDX_Y = slice(1550, 1750)

LLroi['Lat'] = LLroi['Lat'][IDX_X, IDX_Y]
LLroi['Lon'] = LLroi['Lon'][IDX_X, IDX_Y]
Data1 = Data1[IDX_X, IDX_Y]

# ROI calculation
DDeg = 10/4800
ROI = {'LatLim': [np.min(LLroi['Lat']), np.max(LLroi['Lat'])],
       'LonLim': [np.min(LLroi['Lon']), np.max(LLroi['Lon'])]}

Latg = np.arange(ROI['LatLim'][1], ROI['LatLim'][0] - DDeg, -DDeg)
Long = np.arange(ROI['LonLim'][0], ROI['LonLim'][1] + DDeg, DDeg)

LLg = np.meshgrid(Latg, Long, indexing='ij')
```



# Mapping



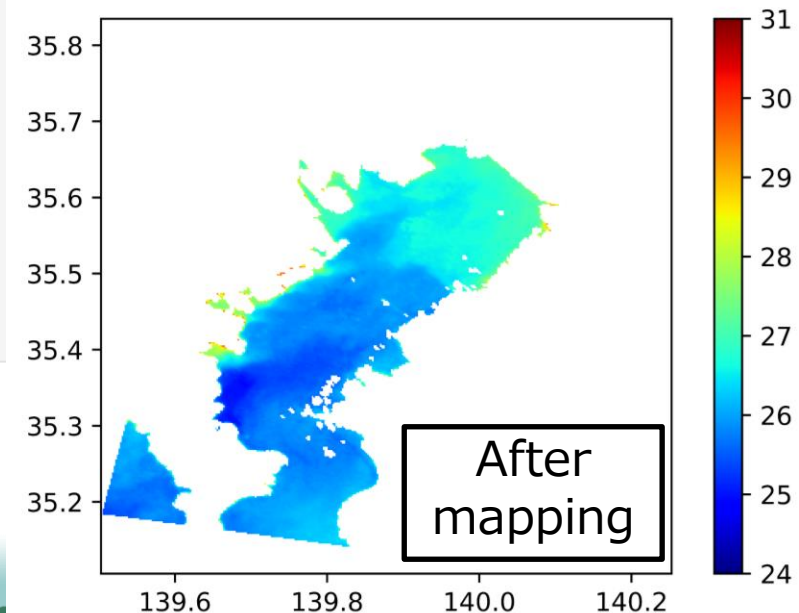
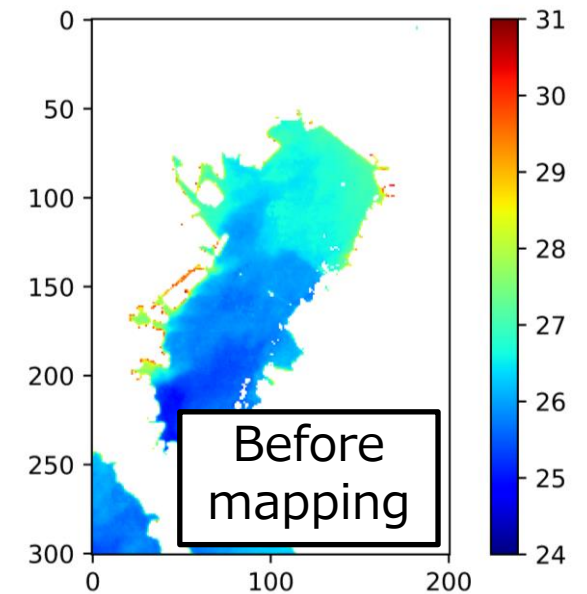
```
[ ]: # Scattered interpolation
points = np.column_stack((LLroi['Lat'].flatten(), LLroi['Lon'].flatten()))
values = Data1.flatten()

grid_lat, grid_lon = np.meshgrid(Latg, Long, indexing='ij')
grid_points = np.column_stack((grid_lat.flatten(), grid_lon.flatten()))

Data2 = griddata(points, values, grid_points, method='linear').reshape(grid_lat.shape)

# Plotting
plt.figure()
plt.imshow(Data1, vmin=24, vmax=31, cmap='jet')
plt.gca().set_aspect('equal', adjustable='box')
plt.colorbar()
plt.savefig("figure/Tokyo_bay.png", format="png", dpi=2000)

plt.figure()
plt.pcolormesh(Long, Latg, Data2, vmin=24, vmax=31, cmap='jet')
plt.gca().set_aspect('equal', adjustable='box')
plt.colorbar()
plt.savefig("figure/Tokyo_bay_mapping.png", format="png", dpi=2000)
plt.show()
```



We hope you will take advantage of the  
G-portal and GCOM-C/SGLI data!