

## Acquiring the physical values from ASCII data format

### 1. Introduction

Apart from its value as imagery, satellite data is valuable because each pixel worth of data, every piece of the physical values that form the image and what this data tells us about water temperature and ocean color, is crucial to research on the marine environment. As such, this document explains how to extract physical values from satellite data corresponding with specific points for the purpose of comparing data from on-site monitoring and satellite data matching as well as for checking the values of points for specific sea areas as desired by the user. These instructions presume that the user has a basic working familiarity with Excel.

### 2. Processing flow

Figure 1 shows the processing sequence from downloading satellite data to extracting the physical values for desired, specified points. Details for each step of the process are outlined below.

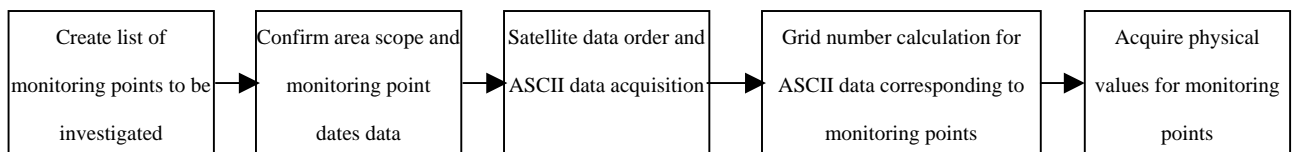


Figure 1. Processing flow for acquiring physical values.

#### (1) Creating monitoring point list

Input the data for the desired comparison -- the observed values and position information for the data taken at observation points on the ocean, whether by buoy or at set points, and satellite data points -- in an Excel spreadsheet. Chart 1 is a sample format for a chart and Figure 2 shows sampling point positions in Toyama Bay.

Chart 1. Sample data.

St.No.	Date	Latitude	Longitude	Water temp.	Water temp. by satellite
1	2006/6/13	37.4113	137.5345	17.9	
2	2006/6/13	37.3954	137.8477	17.2	
3	2006/6/13	37.2105	137.2614	17.6	
4	2006/6/13	37.2105	137.5385	18.3	
5	2006/6/13	37.2297	137.8558	16.3	
6	2006/6/13	37.0411	137.3417	17.7	
7	2006/6/13	36.9035	137.2213	19.8	

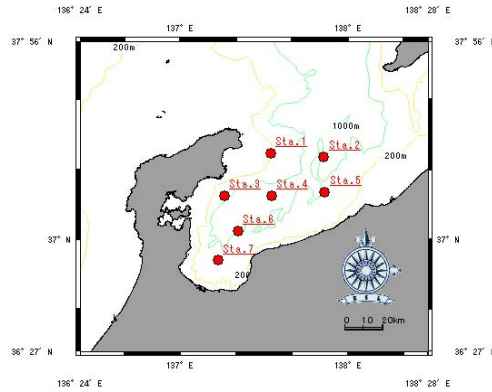


Figure 2. Sampling point positions.

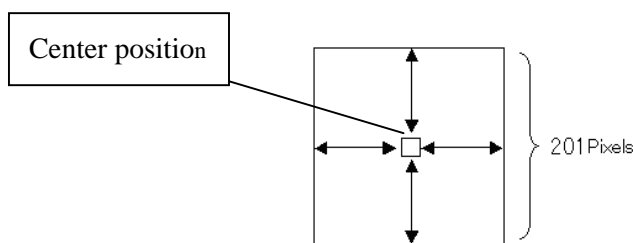
(2) Confirmation of satellite data acquisition range and dates

In order to compare the sea surface water temperature (SST) data and satellite data acquired for the sampling points, first, position information (latitude and longitude) and dates for the gathering of on-site sea surface water temperature data need to be confirmed. Here the central position for the satellite data has been set in the interior of Toyama Bay with the sample points being contained in a nearly 220 kilometer target area. Also, the acquired satellite data is NOAA SST/ND (Nighttime Day Composite) sea surface water temperature images (with a resolution of 1.1 km) set to coincide with the on-site monitoring date of June 13, 2006. Metadata pertaining to the satellite data acquired is displayed on Chart 2.

This indicates that the range from the center of this image in four directions is a range of 100 pixels (110 km).

Chart 2. Metadata for acquired satellite data.

Satellite data type	NOAA SST/ND
Date	2006/06/13
Center position of ocean area	37.725N 137.388E
Satellite data breadth	201 pixels
Satellite data height	201pixels



### (3) Satellite data order and ASCII data acquisition

For more detailed instructions on ordering specific desired satellite data please refer to the document on satellite data downloading procedures available on the Marine Environmental Protection for the Northwest Pacific Region website. The manual here provides only a cursory explanation.

#### I. Selecting image type

Here NOAA's SST/ND (Nighttime Day Composite ) is selected and the on-site monitoring period is specified for a few days before and after the period.

① Please select the data you wish to access by clicking on the image's thumbnail.

NOAA								MODIS(JAXA/TRIC)		FY-1	
RAW	TDF	Level3	SST	SST/D	SST/N	SST/ND	NDVI	CHLA	SST	RAW	MVISR

NOAA/AVHRR [Data Description](#) Terra-Aqua/MODIS [Data Description](#) FY-1/MVISR [Data Description](#)

- By moving the cursor over the thumbnail image a pop-up window will display a description of the image's data.  
- For further information about the satellites and sensors, please click on "Data Description" button.

② Please select the period you wish to search.

Last week  Last month

Year  Month  Day

Start: 2006 06 01  
End: 2006 06 28

③ Please select the cloud coverage.

all: 0 - 100 [%]  
ocean area: 0 - 100 [%]  
land area: 0 - 100 [%]

Figure 3. Selecting image type.

#### II. Setting the search area

Here the latitude and longitude settings have been input to target a nearly 220-kilometer area centering around Toyama Bay.

④ Please select the Latitude and Longitude.

Latitude-Longitude(degree)

N 38.51  
W 136.11 View map E 138.42  
S 36.47 Clear

⑤ You can specify how the results are displayed.

Return 15 results per page  
Item Thumbnail Only  
Sort Receive time Descend

Figure 4. Setting the search area.

### III. Selecting target image

Select the image for the day matching the search parameters (in this case June 13, 2006) from the thumbnail image list.

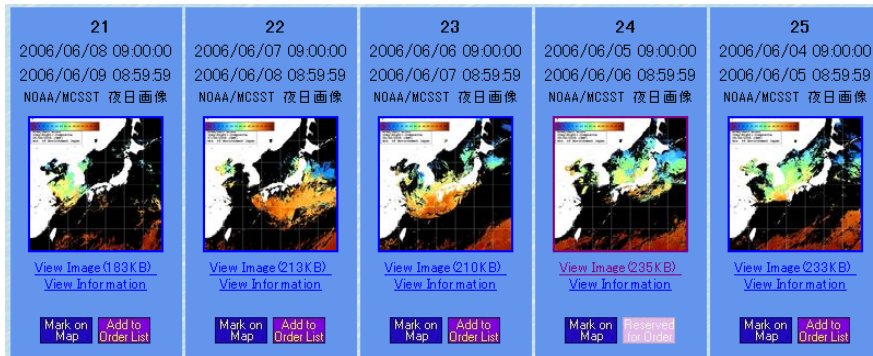


Figure 5. Selecting target image.

### IV. Setting order conditions

To obtain ASCII data, set the order conditions Output Format to ASCII, the center point to generate the image and line number (height), sample number (width) and minimum and maximum value for water temperature.

**NOAA/MCSST 1-Day Night Composite**

**Output Format criteria**

Output Format  
 Image output   
 Data output

Map method of projections

**Area criteria**

Select the center point to generate the image (Required)

Center latitude  degrees  
Center longitude  degrees

Select the center latitude and longitude to generate the image. An image which has the selected point as a center will be generated.  
Range:-180.000 to 180.000

**Select an image size (Required)**

Resolution  Km/pixel

Lines  pixel  Km

Samples  pixel  Km

Select the resolution of output image, a number of lines and samples.  
When the focus is moved to other item, the change of the entered value will be reflected to the value of the direction of an arrow.

**Other criteria**

Water temperature  degrees celsius to  degrees celsius  
The 256 Pseudo color assigns for the selected range of water temperature. It is valid only in case of image output.

Display grid line by  degrees

Display coastline by  Km

Figure 6. Setting order conditions.

## V. Execute Order

After confirming all conditions of the order, execute the order. After execution, a notification will come via e-mail indicating the ASCII data file download location allowing the desired ASCII data file to be obtained by FTP.



1  <a href="#">View Image(258KB)</a>  <a href="#">View Information</a>	Data ID	NSSTND_20060625	Selected criteria of detail		
	Dataset	NOAA/MCSST 1-Day Night Composite	Center of generating	Latitude :33.725,Longitude:137.388	
	Satellite	NOAA-17	Resolution	1.10	
		NOAA-18	Number of lines	201	
		NOAA-12	Number of samples	201	
	Receive Date	2006/06/25 09:00 (JST)	Water temperature	5degrees celsius - 30degrees celsius	
		2006/06/26 08:59 (JST)	Gridline	2degrees (red)	
	Selected criteria of output			Coastline	4Km (white)
		Output format	ascii		
		Map method of projections	rectangular		

Figure 7. Execute Order.

Figure 8 is a chart displaying the downloaded satellite imagery and overlaid chart with sampling points.

(A variety of image processing software can be used to process the overlay chart.)

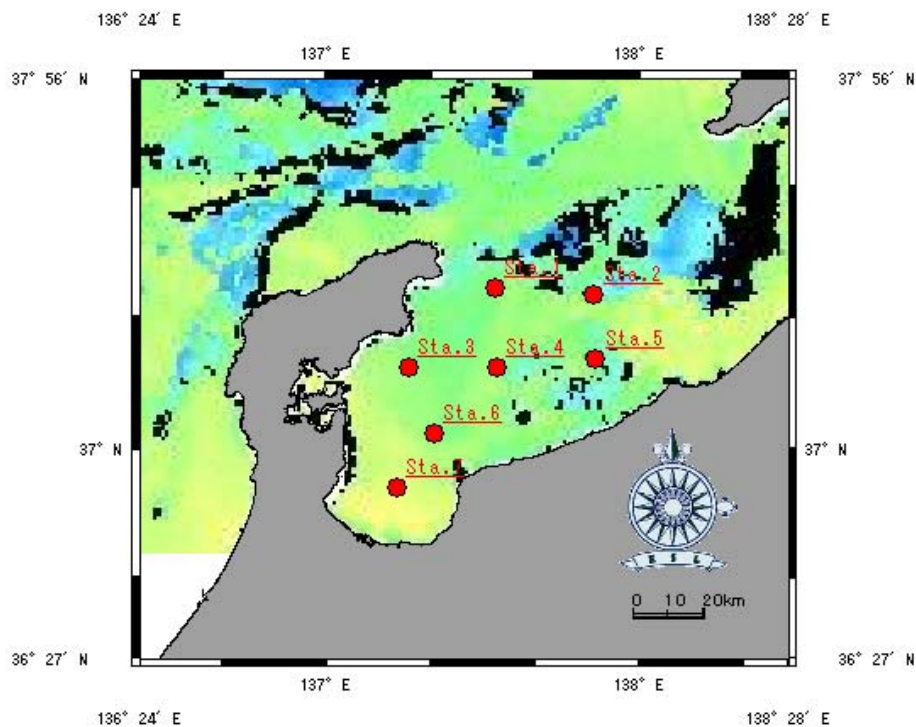


Figure 8. Sample point and satellite image.

(4) Calculating ASCII data grid numbers corresponding with sampling points

Downloaded ASCII data will contain the following two types of files for one item of data.

- 20060613\_nsstnd\_mcsst.doc (Header information relating to position and size)
- 20060613\_nsstnd\_mcsst.txt (Grid numbers and water temperature values)

Among the header information, the necessary information for setting the location of the sampling points will be shown as below in Figure 9.

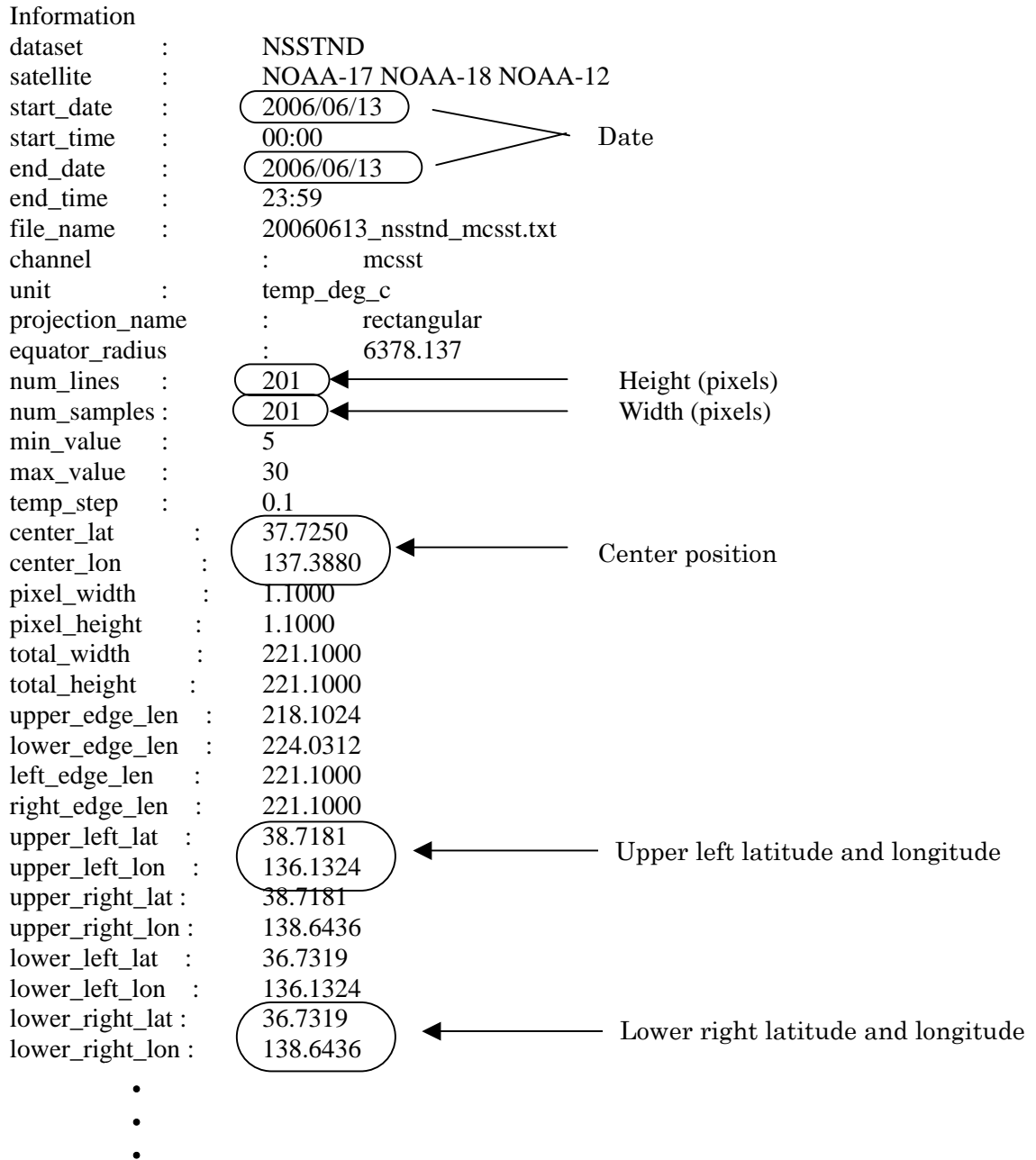


Figure 9. ASCII data header information.

Convert the latitude and longitude data for the on-site sampling points into ASCII data grid numbers as illustrated below.

(Grid number calculation formula)

$$\text{Grid line number} = (\text{Upper left latitude} - \text{Sampling point latitude}) / 1 \text{ pixel height} * 1 + 1$$

$$\text{Grid sample number} = (\text{Sampling point longitude} - \text{Upper left longitude}) / 1 \text{ pixel width} * 2 + 1$$

\*1

$$1 \text{ pixel height} = (\text{Upper left latitude} - \text{Lower right latitude}) / \text{Satellite image pixel height}$$

\*2

$$1 \text{ pixel width} = (\text{Lower right longitude} - \text{Upper left longitude}) / \text{Satellite image pixel width}$$

(Sample calculation)

Extracting the headline information necessary for calculations results in:

$$\text{Upper left latitude} = 38.7181 \quad \text{Lower right latitude} = 36.7319$$

$$\text{Upper left longitude} = 136.1324 \quad \text{Lower right longitude} = 138.6436$$

$$\text{Satellite image pixel height} = 201$$

$$\text{Satellite image pixel width} = 201$$

$$1 \text{ pixel height} = (38.7181 - 36.7319) / 201 = 0.0098816$$

$$1 \text{ pixel width} = (138.6436 - 136.1324) / 201 = 0.012494$$

$$\text{Sta.1 latitude} = 37.41133$$

$$\text{Sta.1 longitude} = 137.5345$$

$$\text{Sta.1 grid line number} = (38.7181 - 37.41133) / 0.0098816 + 1 = 133$$

$$\text{Sta.1 grid sample number} = (137.5345 - 136.1324) / 0.012494 + 1 = 113$$

(5) Obtaining the physical values corresponding with sampling points

Specific desired grid number water temperature values can be obtained from the (\*.txt) file containing grid numbers and water temperature values. Here grid line number 133 and grid sample number 113 from Sta. 1 and the ASCII data file 20060613\_nsstnd\_mcsst.txt have been used to obtain a water temperature value of 17.8°C. In this way, obtaining the Sta. satellite measured water temperatures can be used to fill in a chart such as chart 3.

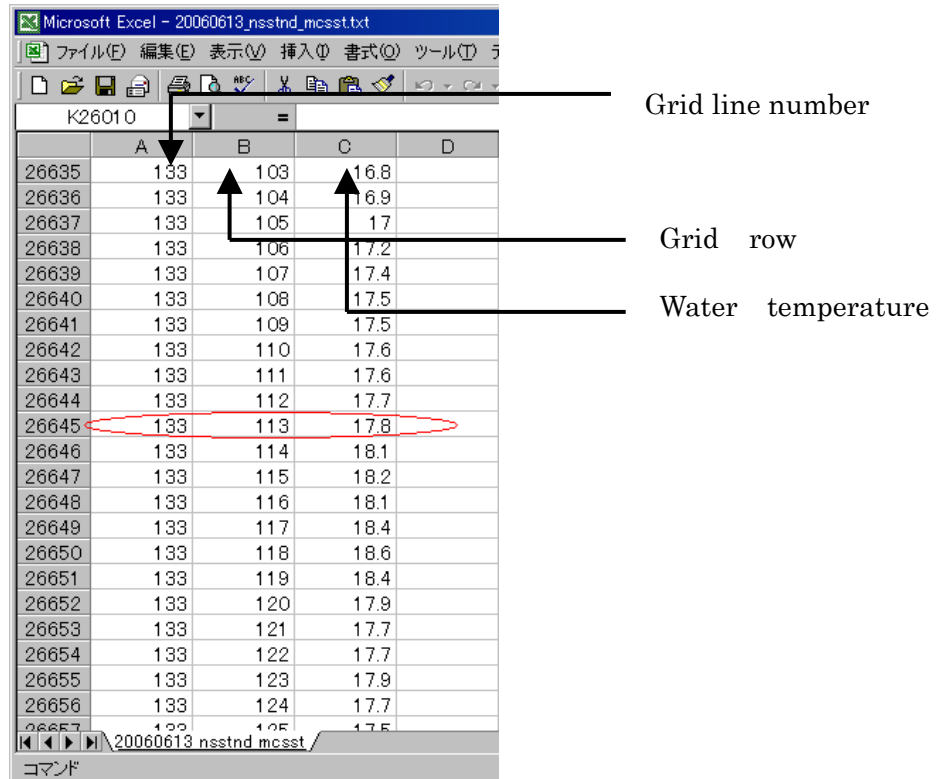


Figure 10. Physical values acquisition (water temperature values).

Chart 3. Satellite data and on-site water temperature comparison.

St.No.	Date	Latitude	Longitude	Water temp.	Water temp. by satellite
1	2006/6/13	37.4113	137.5345	17.9	17.8
2		37.3954	137.8477	17.2	No data due to cloud cover
3		37.2105	137.2614	17.6	18.1
4		37.2105	137.5385	18.3	18.5
5		37.2297	137.8558	16.3	16.2
6		37.0411	137.3417	17.7	17.9
7		36.9035	137.2213	19.8	19.5