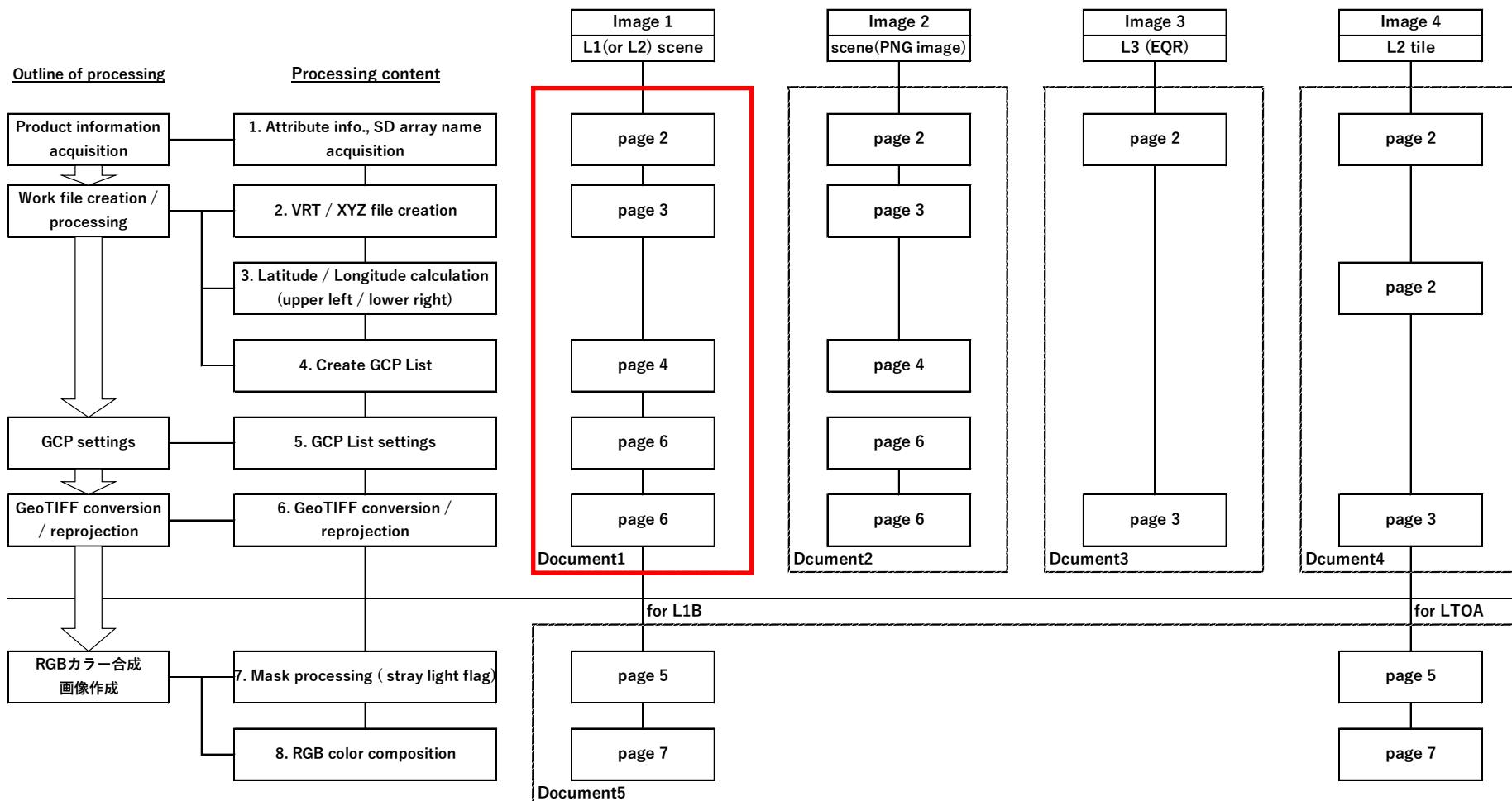


【Image 1】 Conversion of L2 IWPR (Chlorophyll-a concentration etc.) (Sensor Hardware Coordinate)

Here is an example of GeoTIFF conversion of L2 scene images.

GeoTIFF conversion flow



【Image 1】 Conversion of L2 IWPR (Chlorophyll-a concentration etc.) (Sensor Hardware Coordinate)

Product information acquisition

1) SD array name acquisition

The following is an example using OSGeo4W Shell which is installed when QGIS is installed on Windows.

Go to the directory where the image data is saved and enter the file name after the gdalinfo command as shown below to get the SD array name.

On Linux, it can be used in terminal applications, but GDAL must be installed.

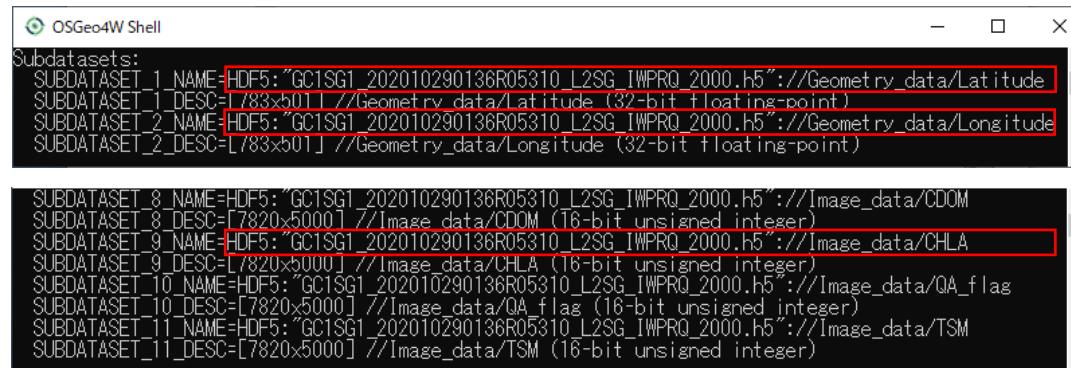


C:\Users\Y\Documents\YData>gdalinfo GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5

OSGeo4W Shell window showing the gdalinfo command output. The file name 'GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5' is highlighted in red. A red arrow points from this highlighted text to the label 'Image file name' located below the window.

Image file name

Use the information in the red frame of SUBDATASET_1_NAME, SUBDATASET_2_NAME, and SUBDATASET_9_NAME at the bottom of the displayed information.



OSGeo4W Shell window showing detailed gdalinfo output for the image file. The output lists several subdatasets, each with a name and description. The names highlighted in red are:

- SUBDATASET_1_NAME=HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Geometry_data/Latitude
- SUBDATASET_1_DESC=[783x501] //Geometry_data/Latitude (32-bit floating-point)
- SUBDATASET_2_NAME=HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Geometry_data/Longitude
- SUBDATASET_2_DESC=[783x501] //Geometry_data/Longitude (32-bit floating-point)
- SUBDATASET_8_NAME=HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Image_data/CDOM
- SUBDATASET_8_DESC=[7820x5000] //Image_data/CDOM (16-bit unsigned integer)
- SUBDATASET_9_NAME=HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Image_data/CHLA
- SUBDATASET_9_DESC=[7820x5000] //Image_data/CHLA (16-bit unsigned integer)
- SUBDATASET_10_NAME=HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Image_data/QA_flag
- SUBDATASET_10_DESC=[7820x5000] //Image_data/QA_flag (16-bit unsigned integer)
- SUBDATASET_11_NAME=HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Image_data/TSM
- SUBDATASET_11_DESC=[7820x5000] //Image_data/TSM (16-bit unsigned integer)

【Image 1】 Conversion of L2 IWPR (Chlorophyll-a concentration etc.) (Sensor Hardware Coordinate)

Work file creation / processing

2) VRT / XYZ file creation

Create an ASCII Gridded XYZ file for latitude (Latitude) and longitude (longitude), and a VRT file for chlorophyll-a concentration (CHLA).

The image displays three separate OSGeo4W Shell windows, each showing a command-line interface for running the `gdal_translate` tool.

- Top Window:** Shows the command: `C:\$Users\$ \$Documents\$Data>gdal_translate -of xyz HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Geometry_data/Latitude out_latitude.xyz`.
 - Output file format:** `-of xyz`
 - Information of "SUBDATASET_1_NAME" acquired by gdalinfo:** `HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Geometry_data/Latitude`
 - Output file name:** `out_latitude.xyz`
- Middle Window:** Shows the command: `C:\$Users\$ \$Documents\$Data>gdal_translate -of xyz HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Geometry_data/Longitude out_longitude.xyz`.
 - Output file format:** `-of xyz`
 - Information of "SUBDATASET_2_NAME" acquired by gdalinfo:** `HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Geometry_data/Longitude`
 - Output file name:** `out_longitude.xyz`
- Bottom Window:** Shows the command: `C:\$Users\$ \$Documents\$Data>gdal_translate -of VRT -a_srs EPSG:4326 HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Image_data/CHLA out_CHLA.vrt`.
 - Output file format:** `-of VRT`
 - Input file reference coordinate system:** `-a_srs EPSG:4326`
 - Information of "SUBDATASET_9_NAME" acquired by gdalinfo:** `HDF5:"GC1SG1_202010290136R05310_L2SG_IWPRQ_2000.h5"://Image_data/CHLA`
 - Output file name:** `out_CHLA.vrt`

【Image 1】 Conversion of L2 IWPR (Chlorophyll-a concentration etc.) (Sensor Hardware Coordinate)

Work file creation / processing

3) Create GCP List

GDAL has a limit on the number of GCPs you can use. Create a GCP List (thinned data) to be used in the VRT file from the ASCII Gridded XYZ files of latitude and longitude.

※With 100 pixels thinned out for the scene, the latitude and longitude are linear and an error of about 0.01° occurs.

- a) Combine latitude and longitude files into one file using Excel etc.

Longitude file (ASCII Gridded XYZ)

	A	B	C	D
1	0.5	0.5	118.0549	
2	1.5	0.5	118.1267	
3	2.5	0.5	118.1979	
4	3.5	0.5	118.2686	
5	4.5	0.5	118.3386	

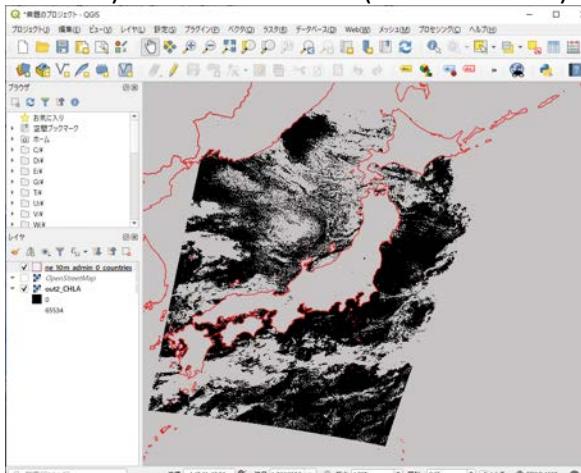
Latitude file (ASCII Gridded XYZ)

	A	B	C	D
1	0.5	0.5	46.45106	
2	1.5	0.5	46.44683	
3	2.5	0.5	46.44259	
4	3.5	0.5	46.43835	
5	4.5	0.5	46.43409	

	A	B	C	D	E
1	0.5	0.5	118.0549	46.45106	
2	1.5	0.5	118.1267	46.44683	
3	2.5	0.5	118.1979	46.44259	
4	3.5	0.5	118.2686	46.43835	
5	4.5	0.5	118.3386	46.43409	

Reference:

Superposition of images processed by thinning (100 pixel intervals) and Natural Earth (10m countries)



b) Create GCP thinned data

The following is an example of an Excel function.

	A	B	C	D	E	F	G	H	I
1	0.5	0.5			129.9253	46.45106			
2	100.5	0.5			130.6173	46.4084			
3	200.5	0.5			131.2574	46.36517			
4	300.5	0.5			131.8531	46.32166			
5	400.5	0.5			132.4105	46.27807			

Thinning interval

$$=(A1-0.5)*10+0.5$$

$$=(B1-0.5)*10+0.5$$

$$=(C1-0.5)*10+0.5$$

$$=(D1-0.5)/100-ROUNDDOWN((D1-0.5)/100,0)>0, "N", "Y")$$

$$=IF((C1-0.5)/100-ROUNDDOWN((C1-0.5)/100,0)>0, "N", "Y")$$

$$=IF(AND(G1="Y",H1="Y"),"Y","N")$$

The table is as follows

	Pixel direction output classification					Line direction output classification			Output classification
	A	B	C	D	E	F	G	H	I
1	0.5	0.5	0.5	0.5	129.9253	46.45106	Y	Y	Y
2	1.5	0.5	10.5	0.5	129.9971	46.44683	N	Y	N
3	2.5	0.5	20.5	0.5	130.0683	46.44259	N	Y	N
4	3.5	0.5	30.5	0.5	130.1389	46.43835	N	Y	N
5	4.5	0.5	40.5	0.5	130.2089	46.43409	N	Y	N

Use the filter function to set the value in column I to "Y" only.

	A	B	C	D	E	F	G	H	I
1	0	0	0	0	129.92	46.451	Y	Y	Y
11	10.5	0.5	100.5	0.5	130.6173	46.4084	Y	Y	Y
21	20.5	0.5	200.5	0.5	131.2574	46.36517	Y	Y	Y
31	30.5	0.5	300.5	0.5	131.8531	46.32166	Y	Y	Y
41	40.5	0.5	400.5	0.5	132.4105	46.27807	Y	Y	Y

【Image 1】 Conversion of L2 IWPR (Chlorophyll-a concentration etc.) (Sensor Hardware Coordinate)

Work file creation / processing

3) Create GCP List

Copy the filtered values from column C to column F on a separate sheet.

	A	B	C	D
1	0.5	0.5	129.9253	46.45106
2	100.5	0.5	130.6173	46.4084
3	200.5	0.5	131.2574	46.36517
4	300.5	0.5	131.8531	46.32166
-	---	---	---	---

- c) b) Add the following columns A, B, D, F, H, and J to the thinned data and save it as a CSV file.

	A	B	C	D	E	F	G	H	I	J
1	<GCP Id="" Pixel=	0.5	Line=	0.5	X=	129.9253235	Y=	46.45106125	/>	
2	<GCP Id="" Pixel=	100.5	Line=	0.5	X=	130.6173401	Y=	46.40840149	/>	
3	<GCP Id="" Pixel=	200.5	Line=	0.5	X=	131.2574005	Y=	46.36516571	/>	
4	<GCP Id="" Pixel=	300.5	Line=	0.5	X=	131.8530731	Y=	46.32165527	/>	
5	<GCP Id="" Pixel=	400.5	Line=	0.5	X=	132.4105225	Y=	46.27806854	/>	

Column A : <GCP Id=""

Column B : Pixel=

Column D : Line=

Column F : X=

Column H : Y=

Column J : />

Open the saved csv file with a text editor such as Notepad.

```
"<GCP Id="" Pixel=.5,Line=.5,X=129.9253235,Y=46.45106125,/>
<GCP Id="" Pixel=100.5,Line=.5,X=130.6173401,Y=46.40840149,/>
<GCP Id="" Pixel=200.5,Line=.5,X=131.2574005,Y=46.36516571,/>
<GCP Id="" Pixel=300.5,Line=.5,X=131.8530731,Y=46.32165527,/>
<GCP Id="" Pixel=400.5,Line=.5,X=132.4105225,Y=46.27806854,/>
<GCP Id="" Pixel=500.5,Line=.5,X=132.9347992,Y=46.23453522,/>
<GCP Id="" Pixel=600.5,Line=.5,X=133.4301453,Y=46.19113541,/>
```

- ・ 「<」 → 「<」
- ・ 「,,,」 → 「'''□」 □ : space
- ・ 「,」 → 「=」
- ・ 「,」 → 「"□」

Use "Replace" to convert as shown on the right.

The GCP list is complete.

```
<GCP Id="" Pixel="0.5" Line="0.5" X="129.9253235" Y="46.45106125" />
<GCP Id="" Pixel="100.5" Line="0.5" X="130.6173401" Y="46.40840149" />
<GCP Id="" Pixel="200.5" Line="0.5" X="131.2574005" Y="46.36516571" />
<GCP Id="" Pixel="300.5" Line="0.5" X="131.8530731" Y="46.32165527" />
<GCP Id="" Pixel="400.5" Line="0.5" X="132.4105225" Y="46.27806854" />
<GCP Id="" Pixel="500.5" Line="0.5" X="132.9347992" Y="46.23453522" />
<GCP Id="" Pixel="600.5" Line="0.5" X="133.4301453" Y="46.19113541" />
```

【Image 1】 Conversion of L2 IWPR (Chlorophyll-a concentration etc.) (Sensor Hardware Coordinate)

GCP settings

4) GCP List settings

After adding information such as latitude / longitude file to the VRT file of chlorophyll-a concentration (CHLA) converted in 2) with Notepad etc., overwrite and save it.

< Before addition >

```
<MDI key="Processing_attributes_Input_files">GC1SG1_202010290136R05310_L2SG_NMLRQ
<MDI key="Processing_attributes_Processing_organization">JAXA/GCOM-C science project
<MDI key="Processing_attributes_Processing_result">Good</MDI>
<MDI key="Processing_attributes_Processing_UT">20201029 17:55:46</MDI>
</Metadata>
<VRTRasterBand dataType="UInt16" band="1">
  <Metadata>
    <MDI key="Image_data_CHLA_Data_description">Chlorophyll-a concentration (CHLA)
    <MDI key="Image_data_CHLA_Dim0">line grids</MDI>
    <MDI key="Image_data_CHLA_Dim1">Pixel grids</MDI>
    <MDI key="Image_data_CHLA_Error_DN">65535 </MDI>
  </Metadata>
```



Added
<GCPList>
</GCPList>
tags

```
<MDI key="Processing_attributes_Input_files">GC1SG1_202010290136R05310_L2SG_NMLRQ
<MDI key="Processing_attributes_Processing_organization">JAXA/GCOM-C science project
<MDI key="Processing_attributes_Processing_result">Good</MDI>
</Metadata>
<GCPList>
  <GCP Id="" Pixel="0.5" Line="0.5" X="129.9253235" Y="48.45106125" />
  <GCP Id="" Pixel="100.5" Line="0.5" X="130.6173401" Y="46.40840149" />
  <GCP Id="" Pixel="200.5" Line="0.5" X="131.2574005" Y="46.36516571" />
  <GCP Id="" Pixel="300.5" Line="0.5" X="131.8530731" Y="46.32165527" />
  :
  :
  <GCP Id="" Pixel="4800.5" Line="7800.5" X="141.9359589" Y="27.31313896" />
  <GCP Id="" Pixel="4900.5" Line="7800.5" X="142.41938878" Y="27.21240425" />
  <GCP Id="" Pixel="5000.5" Line="7800.5" X="142.9401398" Y="27.10183144" />
</GCPList>
<VRTRasterBand dataType="UInt16" band="1">
  <Metadata>
    <MDI key="Image_data_CHLA_Data_description">Chlorophyll-a concentration (CHLA)
    <MDI key="Image_data_CHLA_Dim0">line grids</MDI>
    <MDI key="Image_data_CHLA_Dim1">Pixel grids</MDI>
    <MDI key="Image_data_CHLA_Error_DN">65535 </MDI>
  </Metadata>
```

< After addition >

GeoTIFF conversion / reprojection

5) GeoTIFF conversion / reprojection

Use the GDALWARP command to convert the VRT file edited in 4) to GeoTIFF and reproject it to EPSG: 4326.

Output file format	output file reference coordinate system	Margins due to projection (nodata)
C:\\$Users\\$...\$Documents\\$Data>gdalwarp -of GTiff -t_srs EPSG:4326 -tps -dstnodata 65535 out_CHLA.vrt out2_CHLA.tif		
Input file name	Output file name	Applying GCP List

< Output file display example in QGIS >

