Algorithm Theoretical Basis Document

GCOM-C/SGLI Level-2 Mosaic (G4B)

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Contents

1. Introduction

1.1 Objectives

The objective of the G4B algorithm is to make cloud-free top-of-atmosphere (TOA) radiance data from Level-2 Tile LTOA (TOA radiance) product. The temporal interval of the process is 8-day or 1-month. The spatial resolutions of the tile products are kept the same.

1.2 Development strategy

The G4B algorithm does not generate statistics of multiple observation days but stores only the data from a single observation day of the most probable clear-sly during the temporal interval period in output file. Thus, a single output file of the G4A processing contains TOA radiances of all the channels stored in the input file.

1.3 Processing targets and outputs

Processing targets of the L2 Tile mosaic (G4B) are the LTOA product with the spatial resolution of 250m. Input and output variables are summarized in Table 1.

Table. 1 List of the target products, GVs, and output types of the G4B processing

Product ID	Long Name	L2 Variables*1	Output Variables
LTOA	250m TOA radiance	Lt_VN01-11, Lt_SW01-04, Lt_TI01-02, Lt_VN08P, Lt_VN11P, Lt_PI01-02, Lt_PQ01-02, Lt_PU01-02, Sensor_azimuth, Sensor_zenith, Solar_azimuth, Solar_zenhth, Sensor_azimuth_IRS, Sensor_zenith_IRS, Solar_azimuth_IRS, Solar_zenhth_IRS, Sensor_azimuth_PL, Sensor_zenith_PL, Solar_azimuth_PL, Solar_zenhth_PL	The same as the L2 variables shown left.

*1 Lt: TOA radiance, VN: Visible and Near infrared (VNIR), SW: Shortwave infrared, TI: Thermal infrared, VN08P and VN11P: Polarization channels co-registered to the VNIR channels VN08 and VN11, PI: I component of the polarization, PQ: Q component of the polarization, PU: U component of the polarization, IRS: Infrared scanner, PL: Polarization.

Basically, the same variables are stored in the input and output files. The variables in the former are daily values whereas those in the latter are the selected values of the most probable clear-sky among the temporal interval period (8-day or 1-month).

2. Theoretical Description

2.1 Processing flow

Figure 1 indicate the flow of the G4B L2 Tile LTOA mosaic processing. Input is the L2 tile daily LTOA products with spatial resolution of 250m. Output is the 8-day or 1-month mosaic product of LTOA. The output of the G4B process contains the cloud-free mosaic data of the same L2 variables (i.e., TOA radiances and geometric angles) as those stored in the input file shown in Table 1.

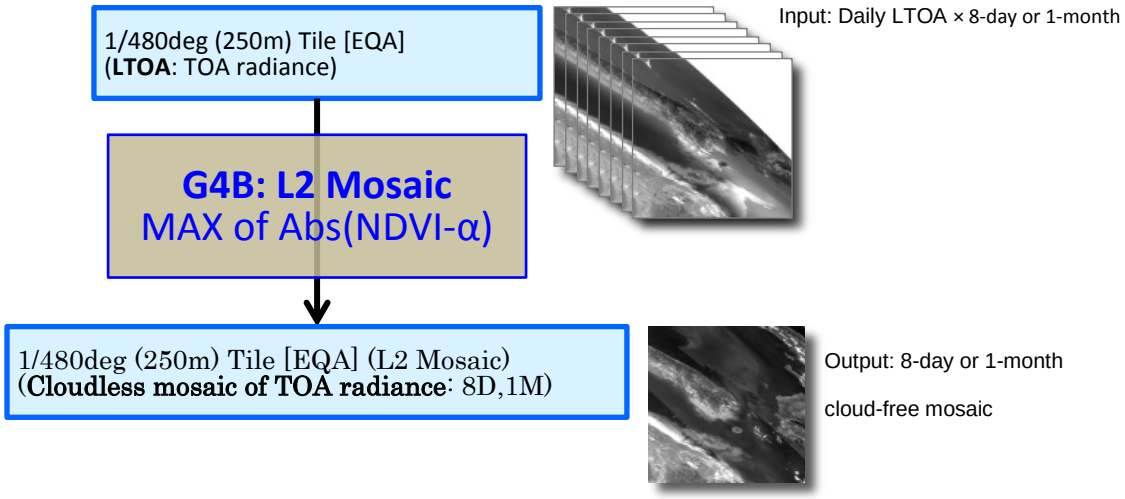


Fig. 1 Flow of the G4B L2 Tile LTOA mosaic processing

2.2 Criteria for the mosaic data selection

We employed the maximum absolute NDVI value composite method for the mosaicking process. In this method output data store the TOA radiance of a single observation day on which the value of |NDVI-α| becomes the maximum during the temporal interval (8-day or 1-month). The α is the NDVI value at which the histogram of NDVI has a peak for cloudy pixels (Currently, α of 0.028 is set in the code. We will fix the α after the launch of GCOM-C/SGLI). See also the appendix-1 for the comparison of the performances with difference mosaicking criteria.

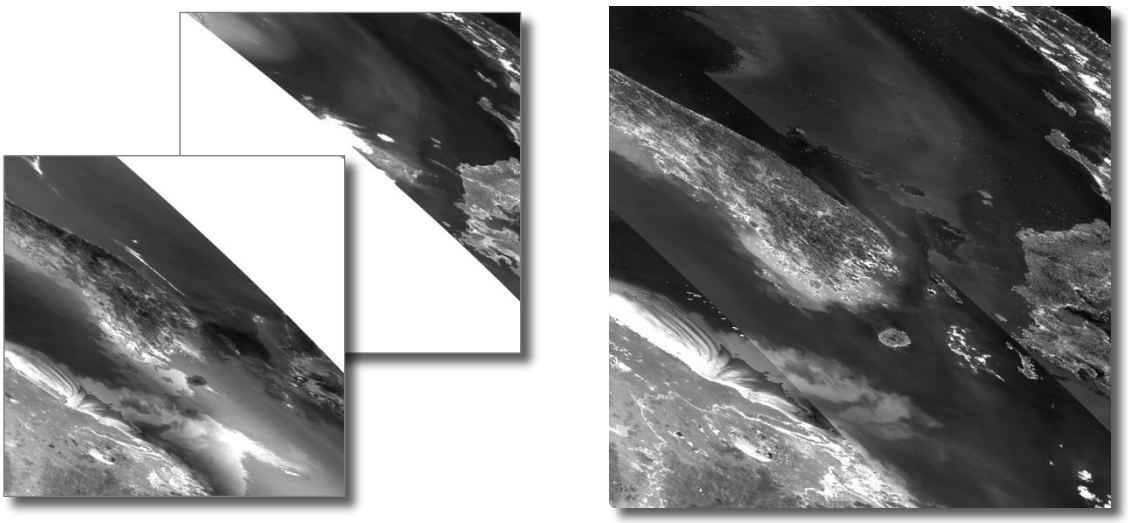
2.3 QA process

"QA_flag" currently stores the same QA_flag value of the daily input LTOA file

selected in the mosaic process.

2.4. Sample images

Figure 2 indicate sample images for the input and output of G4B processing (L2 Tile LTOA with the spatial resolution of 250m and the temporal interval is 8-day).



Input: Daily Tile LTOA × 8-days Output: 8-day Tile mosaic of LTOA

Fig. 2 Sample images of the G4B processing. (LTOA, Tile No.: 0528, 8-day)

3. Current status and remaining issues of the G4B code implementation

The G4BA process works well without system errors. Processing speed and memory size are also within the expectations. Remaining tasks are the implementation of the QA_flag for the output of quality assurance information.

Appendix 1.

Comparison of the performances with different criteria for mosaicking