



MERIS Glint Software User Manual

Version 1.1

12 January 2010

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Chapter 1

Introduction

1.1 Scope

This document is the software user manual (SUM) for the MERIS Glint processor.

1.2 Objectives

The scientific algorithms for glint correction have been implemented in a processor which is available as a plugin for the BEAM toolbox. This user manual gives a description of the software, i.e. how to install, how to use the graphical and command-line interfaces, and the input/output products of the processor.

The GLINT processor basically consists of two main parts:

- FLINT: The algorithm to compute glint reflection at 865 nm from glint at SWIR and TIR bands of AATSR
- AGC: The atmosphere and glint correction algorithm

The FLINT computation is optional and provides a 'FLINT value' (the Glint reflection) as additional neural net input used by the AGC. The AGC can also be run standalone without FLINT input. The FLINT algorithm requires overlapping MERIS/AATSR L1b products as input, the AGC only needs a MERIS product.

1.3 Reader Level

This specification is mainly written for the following audiences:

- BEAM Application users
- MERIS scientists

This user manual specifications assume that the reader is familiar with basic concepts in using the BEAM software and its integrated processors.

1.4 Acronyms and Nomenclature

1.4.1 Acronyms

- BC - Brockmann Consult

- ESA - European Space Agency
- ESTEC - European Space Technology and Research Centre
- SUM - Software User Manual

1.4.2 Nomenclature

1.5 Reference Documents

- [1] Preusker, R., and J. Fischer: Glint estimation in the NIR and SW infrared bands of MERIS and AATSR using AATSR measurements in the thermal infrared. FLINT ATBD, Version 0.9, 12 March 2009.
- [2] Doerffer, R.: Atmosphere and Glint Correction Project Atmospheric and Glint Correction. AGC ATBD, Version 1.0, 01 September 2008.

Chapter 2

Software Installation

2.1 The MERIS Glint Processor as BEAM plugin

As a BEAM plugin, the MERIS Glint processor needs the following software to be installed in advance:

- BEAM, version 4.6 or 4.6.1

The BEAM software can be obtained from the BEAM download page (www.brockmann-consult.de/beam).

The GLINT software delivery consists of four jar files: the AGC and FLINT main modules and adjusted BRR (Bottom of Rayleigh Reflectance) and SDR (Surface Directional Reflectance) modules, which provide additional Java classes used by GLINT.

- flint-processor-1.1.jar
- meris-glint-1.1.jar
- beam-meris-brr-2.0.3-SNAPSHOT.jar
- beam-meris-sdr-2.1-SNAPSHOT.jar

These files need to be copied into the 'modules' folder of the BEAM installation (Figure 2.1). Note that existing versions of these jar files need to be replaced/overwritten. There should not be more than one jar file for each of these modules in the 'modules' folder!

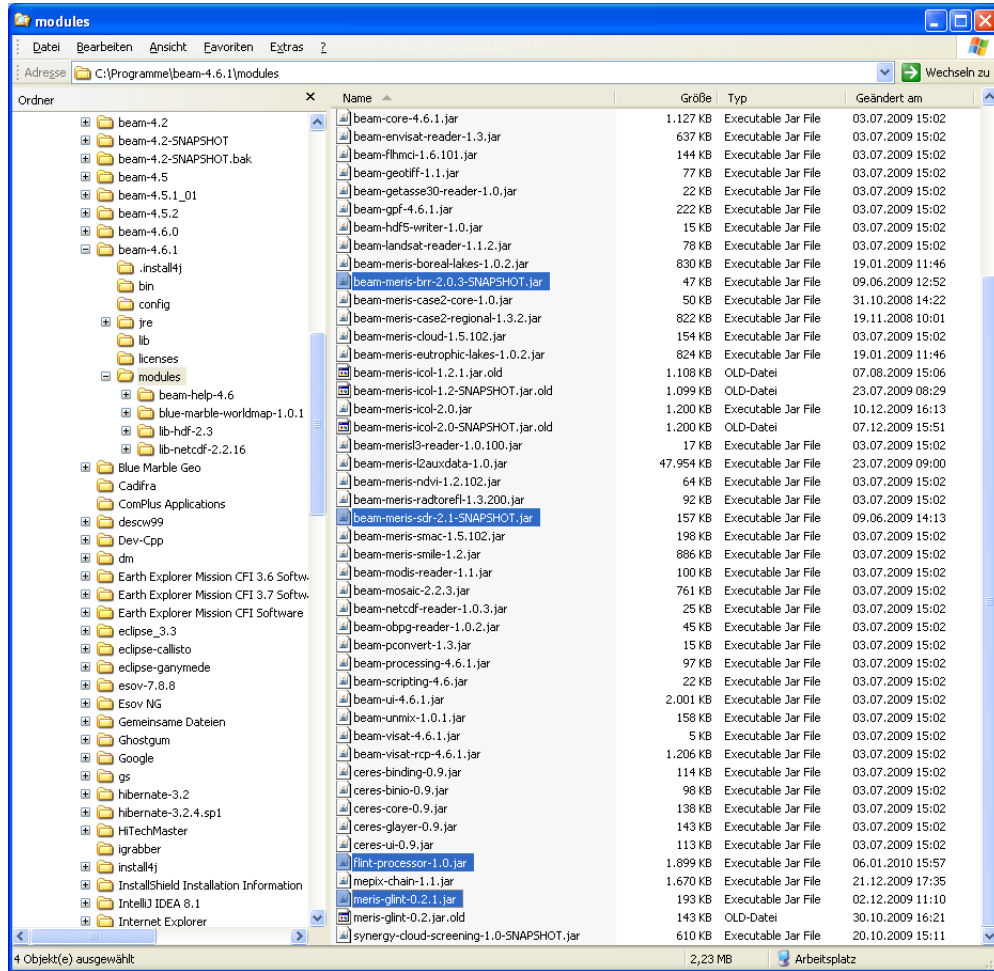


Figure 2.1: Installation of MERIS Glint Processor jar files in BEAM modules folder (shown for Windows XP)

2.2 Additional Requirements

There are no additional requirements to run the MERIS Glint Processor.

Chapter 3

MERIS Glint Products

3.1 Input Products

The MERIS GLINT processor requires as input:

- MERIS L1b product (mandatory for both FLINT and AGC parts)
- AATSR L1b product (mandatory if a Glint value from the FLINT processor shall be used in the GGAC algorithm, otherwise not needed).

The FLINT computation is performed for the overlapping areas of the MERIS/AATSR scenes. For the areas covered by MERIS only, just the AGC computation is provided.

3.2 Output Products

3.2.1 Standard Quantities

The GLINT output product provides the following standard quantities:

- tau550 (Spectral aerosol optical depth at 550nm)
- tau778 (Spectral aerosol optical depth at 778nm)
- tau865 (Spectral aerosol optical depth at 865nm)
- btsm (Total suspended matter scattering)
- atot (Absorption at 443 nm of all water constituents)
- ang443/865 (Aerosol Angstrom coefficient)

3.2.2 Optional Quantities

The GLINT output product provides the following optional quantities (as defined by the user):

- TOSA Reflectances (MERIS bands 1-10, 12, 13)
- Water Leaving Reflectances (MERIS bands 1-10, 12, 13)
- Path Reflectances (MERIS bands 1-10, 12, 13)
- Downwelling Irradiance Transmittances (MERIS bands 1-10, 12, 13)

The output product can be saved in standard BEAM DIMAP format.

Chapter 4

MERIS Glint Processor Interface

The GLINT processor graphical user interface(GUI) is invoked if the Tools menu entry 'Glint Correction (MERIS/(A)ATSR)...' is selected in Visat. The GLINT GUI is represented by one main dialog, which consists of the following main components:

4.1 I/O Parameters Tab Pane

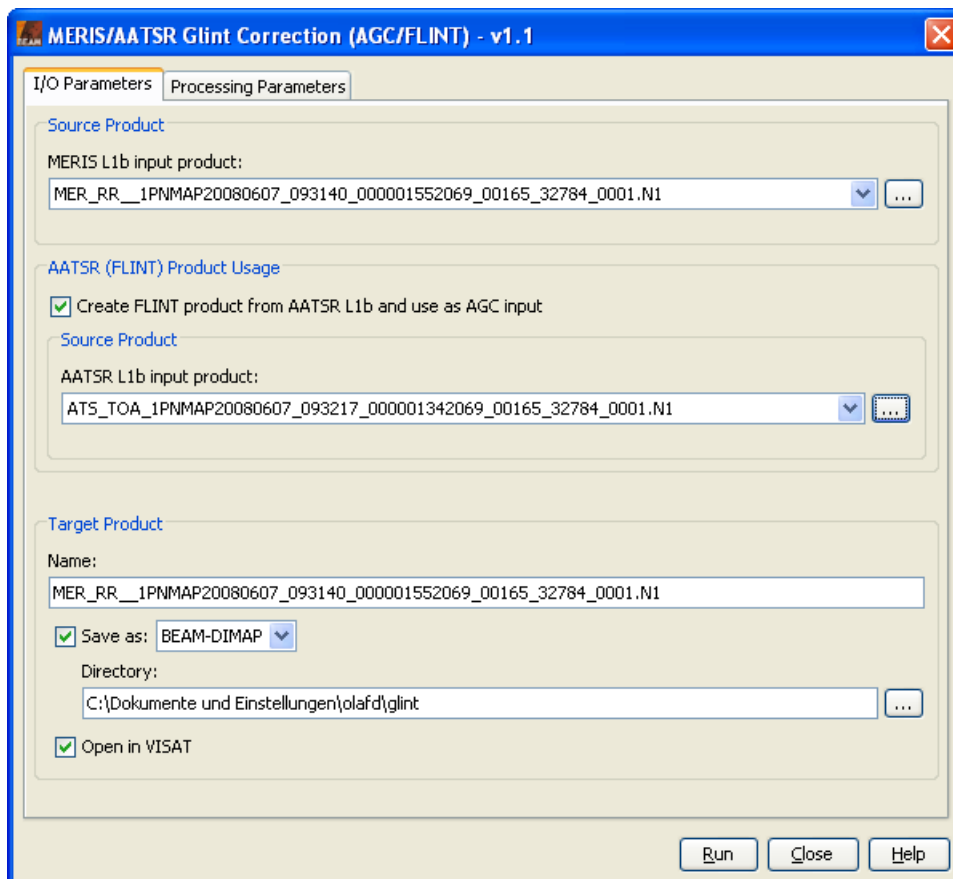


Figure 4.1: I/O Parameters Tab Pane

This tab pane consists of the following components:

- Source product file (MERIS L1b): Select the MERIS input product file by either typing the product path into the text field or by pressing the file selection button to invoke a standard file dialog.
- Checkbox 'Create FLINT product from AATSR L1b and use as AGC input': Select this checkbox if FLINT algorithm shall be processed.
- Source product file (AATSR L1b): Select the AATSR input product file by either typing the product path into the text field or by pressing the file selection button to invoke a standard file dialog. This component is enabled only if checkbox 'Create FLINT product...' is selected, otherwise disabled.
- Output product file: Select the Glint output product file by either typing the product path into the text field or by pressing the file selection button to invoke a standard file dialog.
- Output product format and target directory:
 - 'Save as': If this checkbox is selected, the output product will be saved to disk.
 - Output product format: Select one of the available output product formats.
 - Select the output product directory by either typing the product path into the text field or by pressing the file selection button to invoke a standard file dialog.
- 'Open in Visat': If this checkbox is selected, the output product is opened in Visat after successful processing.

4.2 'Processing Parameters' Tab Pane

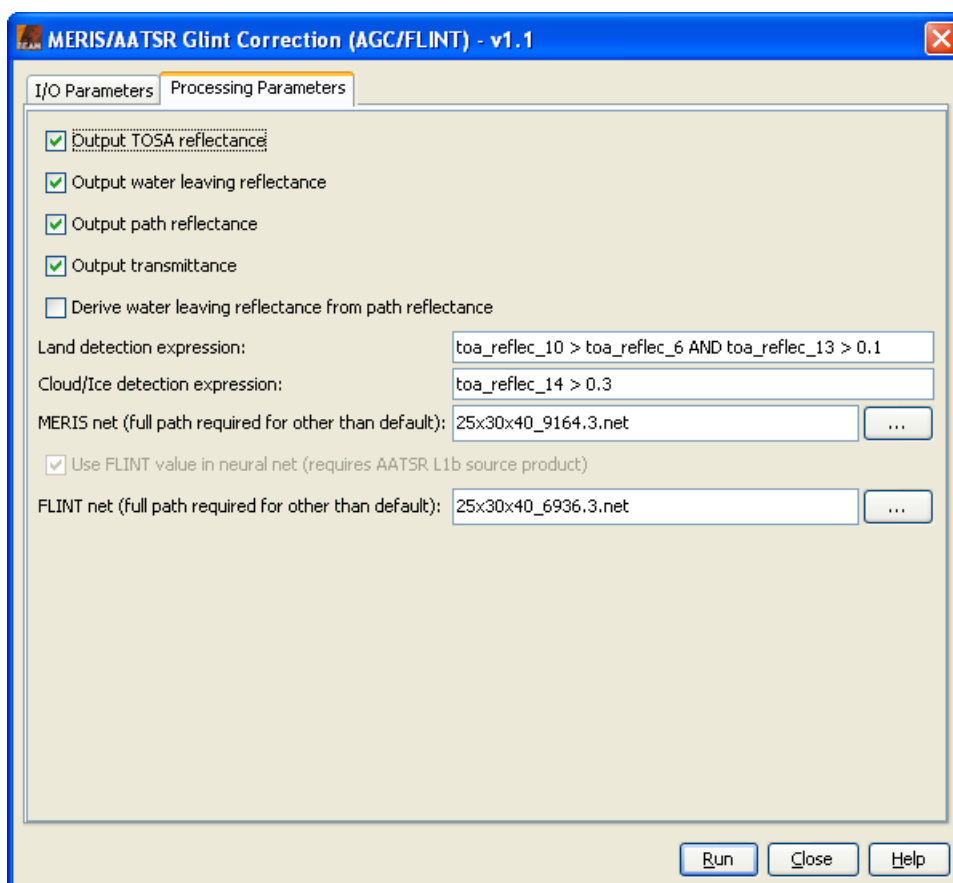


Figure 4.2: 'Processing Parameters' Tab Pane

This tab pane consists of the following components:

- 'Output TOSA reflectance': This checkbox toggles the output of TOSA reflectances.
- 'Output water leaving reflectance': This checkbox toggles the output of water leaving reflectances.
- 'Output path reflectance': This checkbox toggles the output of path reflectances.
- 'Output transmittance': This checkbox toggles the output of downwelling irradiance transmittances.
- 'Derive water leaving reflectance from path reflectance': This checkbox switches between computation of water leaving reflectance from path reflectance and direct use of neural net output.
- 'Land detection expression': The arithmetic expression used for land detection.
- 'MERIS net (leave empty to use default)': The file of the atmospheric net to be used instead of the default neural net in case of AGC-only computation.
- 'Use FLINT value in neural net (requires AATSR L1b source product)': Toggles the usage of a FLINT value in AGC neural net. Note that this checkbox is purely informative and always disabled. It is automatically triggered by the checkbox 'Create FLINT product...' in the I/O Parameters Tab Pane.
- 'FLINT net (leave empty to use default)': The file of the atmospheric net to be used instead of the default neural net in case of both FLINT and AGC computation. This component is enabled only if the checkbox 'Create FLINT product...' in the I/O Parameters Tab Pane has been selected, otherwise disabled.

4.3 Control Buttons

From all Glint Processor tab panes, the following control buttons can be accessed:

- 'Run': If this button is clicked, the processor will start the computations.
- 'Close': If this button is clicked, the Glint Processor dialog is closed.
- 'Help': If this button is clicked, this manual is displayed as online help.

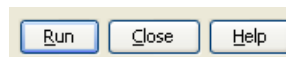


Figure 4.3: Glint Processor control buttons

4.4 Processing from command line

Since the Glint Processor makes use of the BEAM graph processing framework, it can be used also as a command line tool outside BEAM-VISAT. The graph processing is invoked by the command

- `{BEAM-INSTALL-DIR}/bin/gpt`

To obtain general help on the graph processing, use the command

- `{BEAM-INSTALL-DIR}/bin/gpt -h`

Specific help on the MEPIX processor, can be obtained with

- `{BEAM-INSTALL-DIR}/bin/gpt -h Meris.GlintCorrection`

In this case, information on the usage and a list of all available parameters are given (see Figure 4.4).

```

C:\WINDOWS\system32\cmd.exe
>gpt -h Meris.GlintCorrection
Usage:
  gpt Meris.GlintCorrection [options]
Description:
  MERIS atmospheric correction using a neural net.
Source Options:
  -SmerisProduct=<file>    The MERIS Lib input product.
                          This is a mandatory source.
  -SaatsrProduct=<file>   The AATSR Lib input product.
                          This is an optional source.
Parameter Options:
  -PderiveRwFromPath=<boolean>  Switch between computation of water leaving reflectance from path reflectance
                                Default value is 'false'.
                                Toggles the output of downwelling irradiance transmittance.
                                Default value is 'true'.
  -PoutputTosa=<boolean>        Toggles the output of TOSA reflectance.
                                Default value is 'true'.
  -PpatNetMeris=<file>         The file of the atmospheric net to be used instead of the default neural net.
                                Toggles the output of water leaving irradiance reflectance.
                                Default value is 'true'.
  -PpatNetFlint=<file>        The file of the atmospheric net to be used instead of the default neural net.
                                Factor to adjust radiances
                                Default value is '1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0'.
                                The arithmetic expression used for land detection.
                                Default value is 'toa_reflec_10 > toa_reflec_6 AND toa_reflec_13 > 0.0475'.
                                This is a mandatory parameter.
                                Value must not be empty.
  -PradianceAdjustmentFactors=<double,double,double,...>  Toggles the output of water leaving path reflectance.
                                Default value is 'true'.
                                Toggles the usage of a FLINT value in neural net.
                                Default value is 'false'.
  -PLandExpression=<string>    The arithmetic expression used for cloud/ice detection.
                                Default value is 'toa_reflec_14 > 0.2'.
                                This is a mandatory parameter.
                                Value must not be empty.
  -PoutputPath=<boolean>
  -PuseFlint=<boolean>
  -PcloudIceExpression=<string>
Graph XML Format:
  <graph id="someGraphId">
    <node id="someNodeId">
      <operator>Meris.GlintCorrection</operator>
      <sources>
        <merisProduct>${merisProduct}</merisProduct>
        <aatsrProduct>${aatsrProduct}</aatsrProduct>
      </sources>
      <parameters>
        <deriveRwFromPath>boolean</deriveRwFromPath>
        <outputTransmittance>boolean</outputTransmittance>
        <outputTosa>boolean</outputTosa>
        <atnoNetMeris>file</atnoNetMeris>
        <outputReflec>boolean</outputReflec>
        <atnoNetFlint>file</atnoNetFlint>
        <radianceAdjustmentFactors>double, double, double, ...</radianceAdjustmentFactors>
        <landExpression>string</landExpression>
        <outputPath>boolean</outputPath>
        <useFlint>boolean</useFlint>
        <cloudIceExpression>string</cloudIceExpression>
      </parameters>
    </node>
  </graph>
  
```

Figure 4.4: Glint Processor command line processing