SCOT USER MANUAL

SMOSL1OP-SCOT

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DOCUMENT STATUS SHEET

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1.0	19-09-2008	52	Creation
1.1	19-12-2008	73	Version updated for CDR V3 close-out containing the following RIDs: • RC0059:Arm-A, B and C identified in section 5.4.2 • RC0060: Clarification regarding the DFT of the L1b Fourier components added in section 5.4.7 • RC0061;Clarification about snapshot bias and scene bias statistic plots added in sections 5.4.11 and 0 • RC0062: Explanation about the capability to select a range of snapshots added in section 5.3.2.2.3.
1.4	29-09-2009	61	Version update for SCoT v1.0 Delivery • Environment variables and setup • Linux operating system added • DPGS format: Add an explanation regarding the possible changes needed in case of changes in the schemas and product format and how the tool is affected • L1b statistics plots: Add an explanation in section 5.4 Plot Types Description of outputs generated • Plot range: Add an explanation to specify that the range selection is enabled when this option is acceptable for the type of product, otherwise it is disable. Describe when the plot range is referring to snapshots and DSRs • Output folder: Add an explanation with the types of outputs generated. • Improve the description of the plot types. For example in level 1b, xi, eta plots specify which is represented in the plot: the real part, imaginary or the amplitude. • Include a description regarding the “Swath” option in the L1c extractor an in the graphical tool • Update the obsolete parts.
1.3	15-05-2009	64	Updates in the document regarding: • Range of snapshots for L1A and L1B statistical plots. Section 5.3.2.2.3. • Added BT_Counter Analysis Utility. Section 5.3.3.1. • Clarifications made about the two delivered versions: compiled and source code. Section 5.2. • Clarifications make about the usage and default values of SCoT settings. Section 5.3.1.2.
1.4	29-09-2009	64	Version update for SCoT v1.1 delivery • No need to specifiy the path to be added for CECV • Plots for NIR-R Reference Noise Temperature
1.5	06-04-2011	64	Document updated according to the DPGS v3.5 product changes: • TLM MIRA1A • CRSX1A • ANIR1A Matlab version updated to v7.5.
1.6	03-05-2011	64	Minor update on the gcc version. It is set back to gcc v3.4.5.
1.7	14-10-2011	66	Document updated according to the DPGS v5.0.0 product changes: • CRSX1A Included DME logos and contacts.
1.8	13-04-2012	73	Document updated according to the DPGS v5.5.0 product changes:

Version	Date	Pages	Changes
			• CRSX1A New product file supported according to the DPGS v5.5.0 product changes: • CSTX1A Review of the chapters 5.4.11. 5.4.12. Improved the explanation of the implemented computation. Included the global variable “non_common_IDs!

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1. INTRODUCTION

1.1. PURPOSE

This document describes the usage of the SMOS Comparison Tool. The goal of this software is to produce comparison plots, statistics and histograms between two SMOS products of the same type.

1.2. SCOPE

This document has been developed within the frame of the SMOS L1-OP project by the GMV development team. It is intended to be as an analysis tool within the SMOS Calibration and Expertise Centre CEC.

1.3. DEFINITIONS AND ACRONYMS

1.3.1. DEFINITIONS

Concepts and terms used in this document and needing a definition are included in the following table:

Table 1 Definitions

Concept / Term	Definition

1.3.2. ACRONYMS

Acronyms used in this document and needing a definition are included in the following table:

Table 2 Acronyms

Acronym	Definition
SCoT	SMOS Comparison Tool

2. REFERENCES

2.1. APPLICABLE DOCUMENTS

The following documents, of the exact issue shown, form part of this document to the extent specified herein. Applicable documents are those referenced in the Contract or approved by the Approval Authority. They are referenced in this document in the form [AD.X]:

Table 3 Applicable documents

Ref.	Title	Code	Version	Date
[AD. 1]	SMOS L1OP Software Verification and Validation Plan	SO-PL-GMV-GS-4303	3.1	Dec 19th 2008
[AD. 2]	SMOS L1OP V3 Implementation assumption baseline ESA	XSMS-GSEG-EOPG-TN-08-0011	2.1	July 10th 2008
[AD. 3]	SMOS L1 Product Specifications	SO-TN-IDR-GS-0005	5.4	Sep 5st, 2008
[AD. 4]	SCoT System test Specification	SO-TP-GMV-GS-4304	1.0	Sep 19th , 2008

2.2. REFERENCE DOCUMENTS

The following documents, although not part of this document, amplify or clarify its contents. Reference documents are those not applicable and referenced within this document. They are referenced in this document in the form [RD.X]:

Table 4 Reference documents

Ref.	Title	Code	Version	Date
[RD. 1]	DPGS Acronyms	SO-TN-IDR-GS-0010	1.9	March 2nd 2007

3. DESCRIPTION OF THE USER MANUAL

3.1. TYPICAL READERS CHARACTERISTICS

This manual is addressed to all the users of the SMOS Comparison Tool (SCoT) interested in comparing two SMOS products of the same type generated with the same schema version for Data Blocks (DBL) (for instance generated after a re-run or with different configuration parameters or processor versions). These may include CEC personnel, the scientific community involved in SMOS and those involved in L1OP vs. L1PP cross-validation activities.

A Basic knowledge of Matlab is desirable.

4. DELIVERY PACKAGE DIRECTORY STRUCTURE

4.1. DIRECTORY STRUCTURE FOR SOURCE CODE VERSION

./L1C_Extractor:
Makefile
SCoT.exe
set_scot_environment.sh
xml_rw_api.usr_conf.xml

./L1C_Extractor/includes:
SCoT_file_handler.h
SCoT_l1c_defines.h
SCoT_l1c_file_handler.h
SCoT_l1c_utilities.h

./L1C_Extractor/includes/xml_rw_api/headers:
xml_rw_api.h
xrwBasicTypes.h
xrwCommon.h
xrwCore.h
xrwError.h
xrwFad.h
xrwGenerator.h
xrwInterpreter.h
xrwQuery.h

./L1C_Extractor/src:
SCoT.c
SCoT_file_handler.c
SCoT_file_handler.o
SCoT_l1a_file_handler.c
SCoT_l1a_utilities.c
SCoT_l1c_file_handler.c
SCoT_l1c_file_handler.o
SCoT_l1c_utilities.c
SCoT_l1c_utilities.o
SCoT.o

./Matlab_Tools:
gSCoT_About.fig
gSCoT_About.m
gSCoT.fig
gSCoT.m
gSCoT_Settings.fig
gSCoT_Settings.m
pathdef.m
SCoT.m

./Matlab_Tools/img:
dme_gmv_logo.jpg
esa_logo.jpg
gmv_logo.jpg
smos_logo.jpg

./Matlab_Tools/Matlab_v7_5/common:
correctNaNfromVector.m
getPrintExtension.m

get_product_format.m
initSCoT.m
match_Grid_Point_ID.m
match_Grid_Point_ID_full.m
matchVector.m
plot_differential_linear_format.m
plotField.m
plotGridValue.m
plot_linear_format.m
plot_scatter_format.m
plotSingleVector.m
replace_in_script.m
setFigure.m
setProductNames.m
setWindowState.m
TraceLog.m

./Matlab_Tools/Matlab_v7_5/l1a:
compareL1aBreakpoint.m
FWF_visib_reconstructor.m
generateANIR1A_per_snapshot_plots.m
generateANIR1A_snapshot_plots.m
generateCRSX1A_per_snapshot_plots.m
generateCRSX1A_snapshot_plots.m
generateCSTX1A_per_snapshot_plots.m
generateCSTX1A_snapshot_plots.m
generateMIR_SC_TAR_X1A_per_snapshot_plots.m
generateMIR_SC_TAR_X1A_snapshot_plots.m
generateMIR_SC_TAR_X1A_statistichs.m
generateTLM1AplotsFromTxtFiles.m
generateTLM_MIRA1A_plots.m
generateUAVX1A_per_snapshot_plots.m
generateUAVX1A_snapshot_plots.m
LICEF_positions.txt
MIR_ANIR1A_file_handler.m
MIR_CRSX1A_file_handler_V2.m
MIR_CRSX1A_file_handler_V346.m
MIR_CRSX1A_file_handler_V350.m
MIR_CRSX1A_file_handler_V500.m
MIR_CRSX1A_file_handler_V550.m
MIR_CRSX1A_file_handler_V3.m
MIR_CSTX1A_file_handler_V550.m
MIR_SC_TAR_X1A_file_handler.m
MIR_UAVX1A_file_handler.m
plot_baselines_in_MIRAS.m
plot_CRS_PS_V2.m
plot_CRS_PS_V350.m
plot_CRS_PS_V500.m
plot_CRS_PS_V550.m
plot_CRS_PS_V3.m
plot_CST_PS_V550.m
plot_CRS_V2.m
plot_CRS_V346.m
plot_CRS_V500.m
plot_CRS_V550.m
plot_CRS_V3.m
plot_CST_V550.m
plot_LICEF_parameter.m
plotMatrixField.m

plotNIR_BT.m
plotNIR_Field.m
plotNIR_Field_v2.m
TLM_MIRA1A_file_handler.m
visib_recontructor.m

./Matlab_Tools/Matlab_v7_5/l1b:
generateSC_D1B_per_snapshot_plots.m
generateSC_D1B_snapshot_plots.m
generateSC_D1B_statistics.m
generateSC_F1B_per_snapshot_plots.m
generateSC_F1B_snapshot_plots.m
generateSC_F1B_statistics.m
generateSC_X1B_per_snapshot_plots.m
generateSC_X1B_snapshot_plots.m
MIR_SC_X1B_file_handler.m
plot_scatter_format_function.m
UVW.txt

./Matlab_Tools/Matlab_v7_5/l1c:
generateBWXX1C_plots.m
generateMIR_SCXX1C_per_snapshot_plots.m
generateMIR_SCXX1C_swath_plots.m
generateSCXX1C_plots.m
getProductAndMode.m
l1c_science_differential_statistics.m
l1c_science_snapshot.m
l1c_science_statistics.m
MIR_BWXX1C_file_handler.m
MIR_SCXX1C_file_handler.m
plot_differential_linear_format_temp.m
plot_scatter_format_temp.m
SCoTDifferentialStatistics.m

4.2. DIRECTORY STRUCTURE FOR COMPILED VERSION

./L1C_Extractor:
SCoT.exe
set_scot_environment.sh
xml_rw_api.usr_conf.xml

./Matlab_Tools/glnxa64/gSCoT:
gSCoT
gSCoT.ctf
gSCoT_main.c
gSCoT_mcc_component_data.c
gSCoT.prj
img
mccExcludedFiles.log
readme.txt
run_gSCoT.sh

./Matlab_Tools/glnxa64/gSCoT/img:
dme_gmv_logo.jpg
esa_logo.jpg
gmv_logo.jpg
smos_logo.jpg

./Matlab_Tools/glnxa64/MCRInstaller:
extractCTF
MCRInstaller.bin
unzip

5. PREREQUISITES, COMPILATION AND PRODUCT INSTALLATION

5.1. L1C EXTRACTOR

In order to do any L1c plots this program needs to be run first. This extractor was developed in C++ and needs to be compiled and run in a Unix system. For L1b and L1a plots only the Matlab functions are needed.

5.1.1. SOFTWARE REQUIREMENTS

The following software needs to be installed in the target machine in order to use the L1c extractor:

- Operating System: Red Hat Linux EE 4.4 64 bits
- C++ compiler: gcc 3.4.5 (http://gcc.gnu.org/gcc-3.4/).
- General Software Library (GSL) 1.8 (ftp://193.146.123.163/smos/software)
- XML RW API Linux 64 04_02_02 (ftp://193.146.123.163/smos/software).
- XML RW API schemas v04_07_09 (ftp://193.146.123.163/smos/software).
- Xerces 2.7 Linux 64 ((http://xml.apache.org/xerces2-j/)

In some cases it may work with other versions of the mentioned software but it is not guaranteed.

5.1.2. COMPILATION AND ENVIRONMENT SETUP

1 Decompress the delivery package in the desired path.
   a. Unzip ScoT_vv_rr.zip
2 Setup the environment variables updating the set_scot_environment.sh script:
   export GSL_PATH=""
   export XERCES_PATH=""
   export XML_RW_API_PATH=""
   export XML_RW_API_HOME=""
3 Launch the updated script containing the environment variables and compile the tool:
   a. source ./set_scot_environment.sh
   b. make

This will build executable file SCoT.exe for L1c data extractor in the SCoT root directory from where it can be launched so that installation is not required.

5.1.3. INSTALLATION

No installation needed. It can be launched from the SCoT root directory.

5.2. MATLAB TOOLS

This tool generates comparison plots between two SMOS products by either reading an L1a or L1b product or by reading the files generated by the L1C extractor.

At this point, a distinction must be done between two delivery modes: Compiled version and full source code version.

Compiled version does not allow access the source code, but permits the comparison between two products using the GUI (Graphical User Interface).

Full source code version is supported by a Matlab installation, and it allows access to the source code, in order to create new scripts calling the SCoT functions, just as an API. GUI is also available.

5.2.1. SOFTWARE REQUIREMENTS

For the compiled version of SCoT, it is needed to install the MCR (Matlab Component Runtime) which allows to execute the compiled version of the SCoT. In this case, a Matlab license is not needed.
The MCR is specific for each gSCoT version and it is provided with every release.

For the full source code versions, the following software needs to be installed:

- Operating System: tested on Linux, but may work over Windows and MacOSX.
- Matlab 7.5 (with corresponding license).
- Matlab Geolocation toolbox

The tool might work in other Matlab versions but this is not guaranteed. Note that Matlab frequently presents incompatibilities not only for running code in older versions for which it was developed but also to run it in newer versions.

5.2.2. COMPILATION

No compilation is needed. The source code is launched from within the Matlab environment.

5.2.3. INSTALLATION FROM SOURCE CODE DELIVERY

This version of the software package is intended to be installed at ESA CEC facilities.

1 Copy the Matlab_v_7_5 directory to, for instance, the Matlab Work directory.
2 Copy the files gSCoT.m , gSCoT.fig, gSCoT_About.fig, gSCoT_About.m, gSCoT_Settings.fig and gSCoT_Settings.m and “img” folder in the same folder to be able to use the GUI (need to be accessible from Matlab).

5.2.4. INSTALLATION FROM COMPILED VERSION

This version is oriented to standard users.

5.2.4.1. Linux

Over Linux Operating System (tested over RHEL 5.5):

1. Install the Matlab Component Runtime. It requires root privileges.

   ```
   [root@machine]$ ./MCRInstaller.bin
   ```

That will launch a Java GUI that will guide you through the installation. Please note the installation directory (it should be /opt/MATLAB/Matlab_Component_Runtime/v77). At this point, no more root privileges are needed.

2. For launching gSCoT, run the script using the following command:

   ```
   [user@machine]$ ./run_gSCoT.sh /opt/MATLAB/Matlab_Component_Runtime/v77 gSCoT
   ```

   In case the Matlab Component Runtime is installed at a different directory, replace /opt/MATLAB/Matlab_Component_Runtime/v77 by the equivalent path.

5.2.4.1.1. Possible Problems

LibXP dependency

Description:
LibXp.so.6 not found when launching gSCoT
Solution:
Install libXp packet (rpm if RHEL).

Setting Enforcement

Description:
Error returned “cannot restore segment prot after reloc: Permission denied”

Solution:
Log as root user and disable enforcement. Type

```
[root@machine]$/usr/sbin/setenforce 0
```

5.3. OPERATIONS

5.3.1. OVERVIEW

SCoT is a series of tools to generate comparison plots between two SMOS products of the same type. Each plot is saved as a “jpg” file and displayed in the screen.

For L1a and L1b Matlab functions are used under the Matlab environment to generate the plots. These functions read directly the Data Block of the products to be compared. In L1c, due to performance reasons, it is needed to run first an executable L1c extractor that produces text files that are read by the relevant Matlab function.

There are four families of plots:

- **Telemetry Matrix Plots**: Represents in a compact way all the values for a given field.
- **Snapshot Plots**: One plot is produced for each snapshot or DSR. These are available for fields with many values for a given snapshot.
- **Per Snapshot Plots**: These plots represent a single value against the Snapshot ID or DSR. These plots are available for fields with a single value for each Snapshot ID or DSR.
- **Statistics Plots**: These plot represent statistical parameters (mean, maximum etc) against the Snapshot ID or DSR. These plots are available for all L1c parameters where many values are associated to a single Snapshot ID and therefore a Per Snapshot Plot is not possible.
- **Geolocated Plots**: These plots represent parameters over a world map referenced in latitude and longitude.

Section 5.4 describes in detail all the plot types.

To launch a Matlab function it is necessary to run the Matlab environment and in the command line of the Matlab Workspace type the name of the function followed by its arguments separated by commas:

```
functioname(argument1, argument2)
```

All string inputs (filenames, output paths etc) are surrounded by simple quotation marks. The file names entered as inputs must have either an absolute path or a relative path to a directory found in the Matlab Path. The Mathlab Path can be changed in File/Set Path menu or using function “path”. For

any function it is possible to type “help *functionname*” to obtain function interface help. Please notice that any manipulation of the Matlab environment means using the full source code version.

Section 5.3.2 and 5.3.2provides information on the interface of L1a and L1b, and browse L1c plotting functions and section 5.3.3 explains how to use the L1c executable extractor.

5.3.1.1. Output directory and log file

For each execution SCoT creates automatically a directory into the specified output directory name with the next convention:

*PlotType_YYYYXXDD*T*HHMMSS*

Where

- PlotType is the kind of plot type executed (SCIF1B, SCI1A, UAV1A, CRS1A_per_snapshot…)
- YYYY: is the year of the start of execution.
- XX: is the month of the start of execution.
- DD: is the day of the start of the execution.
- HH: is the hour of the start of the execution.
- MM: is the minute of the start of the execution.
- SS: is the second of the start of the execution.

Inside the directory the next contents can be found:

- JPEG/PNG/BMP plots (if selected).
- Log file named with the convention: LOG_SCoT_*type_YYYYXXDD*T*HHMMSS,* with the same meaning as above.
- Fig folder where the original figures in Matlab are stored so they can be retrieved and manipulated.

5.3.1.2. Environnement variables

5.3.1.2.1. Print resolution

This variable can be set at the “Global Settings” dialog of the GUI. Section 5.3.2.4

SCoT can print the figures in any resolution specified in dpi (dots per inch). To change it the next command need to executed prior to any SCoT execution

```
>>global print_resolution
>>print_resolution = x;
```

Where x is the desired resolution of the plots. Coherent values are ‘-r100’, ‘-r200’, ‘-r300’.
Default resolution is set to 300 dpi. If no resolution is set, SCoT uses default resolution.

5.3.1.2.2. Print format

This variable can be set at the “Global Settings” dialog of the GUI. Section 5.3.2.4

SCoT can print the figures in several formats: JPEG, PNG and BMP.

To select one of these ones, type the next commands in the Matlab command line:

```
>>global print_format
>>print _format = x
```

Being x :

- '-djpeg' for JPEG plots.
- '-dpng' for PNG plots.
- '-dbmp' for BMP plot.
- '-none' if no plot is desired. In this case only 'fig' files are generated.

5.3.1.2.3. DPGS format

This variable can be set at the "Global Settings" dialog of the GUI. Section 5.3.2.4

SCoT can read product in DPGS V2, DPGS V3, DPGS V3.4.6, DPGS V3.5 and DPGS V5.0.0 formats. The default value is assumed to be V5.5.0 format. To set the DPGS VXXX format, the next commands need to be typed before any SCoT execution.

```
>>global DPGS_format;
>>DPGS_format = 'VXXX';
```

SCoT only reads data blocks according to specifications of product formats in DPGS V2, DPGS V3, DPGS V3.4.6, DPGS V3.5, DPGS V5.0.0 and DPGS V5.5.0. This means that any change in the header will not affect the normal operation, though changes in the data block may cause the program to crash or get dummy values.

5.3.1.2.4. The 'non_common_IDs' flag

This variable can be set as ENABLE by selecting the check box "Include Non-Common IDs" which became available for the following comparison mode:

Level 1C: Science per snapshot

For all the other comparison modes for all the levels this global variable is set to the default value of DISABLE. This global variable is not being used at all by all those comparison modes.

To set the non_common_IDs, the next commands need to be typed before any SCoT execution.

```
>>global non_common_IDs;
>>non_common_IDs = x;
```

Being x :

- 0 for DISABLE the "Include Non-Common IDs" mode.
- 1 for ENABLE the "Include Non-Common IDs" mode.

5.3.1.2.5. Task name

This variable can be set at the “Global Settings” dialog of the GUI. Section 5.3.2.4

It exist the possibility of defining a task name for the set of output plots to be produced. This task name will appear as a heading in the plot and also in the name of the generated files.

5.3.2. SCOT GRAPHICAL USER INTERFACE

gSCoT (Graphical SMOS Comparison Tool) is a GUI for Matlab that is intended to ease the management of SCoT. Selecting input files, output folder, selecting the plots, displaying the graphical results, and even manipulate them is possible with this GUI.

5.3.2.1. Launching the interface

1. For the compiled version, just run the run_gSCoT script using the following command:

   ```
   [user@machine]$ ./run_gSCoT.sh /opt/MATLAB/Matlab_Component_Runtime/v77 gSCoT
   ```

   In case the Matlab Component Runtime is installed at a different directory, replace /opt/MATLAB/Matlab_Component_Runtime/v77 by the equivalent path.

2. For source code version, to launch the interface, change the current directory to the one where you have copied the gSCoT files (gSCoT.m and gSCot.fig) and then run

   ```
   >>gSCoT
   ```

5.3.2.2. MAIN Dialog

gSCoT main look-and-feel is presented below:

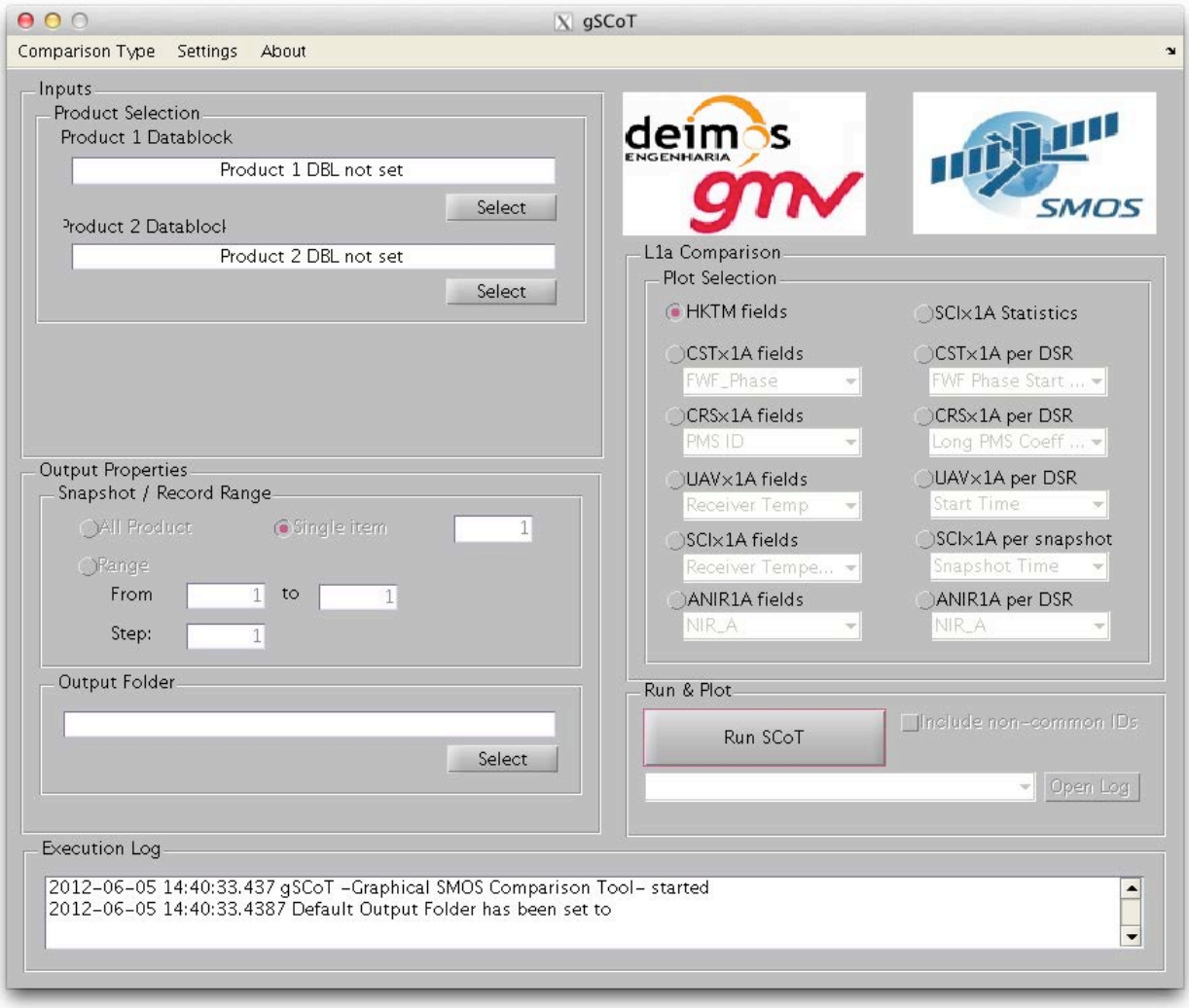

Figure 1. gSCoT GUI main dialog

5.3.2.2.1. MENU

The main menu is situated in the upper side of the main dialog and permits the following:

- Selection between the different levels (Level 1A, level 1B and level 1C) for the comparison.
- Comparison parameters set-up.
- Launch the about dialog.

5.3.2.2.2. Input selection

Depending on the level the input can be either products (data blocks) or text files, previously generated with the L1C SCoT extractor. The interface automatically re-configurates allowing the suitable selection, depending on the selected plot type.

Product Input

Initially the file input boxes are empty. Data blocks can be selected and browse by clicking over the "Select" button. A browse dialog will appear.

Figure 2. Product Input

The dialog is tuned to admit only Datablock files

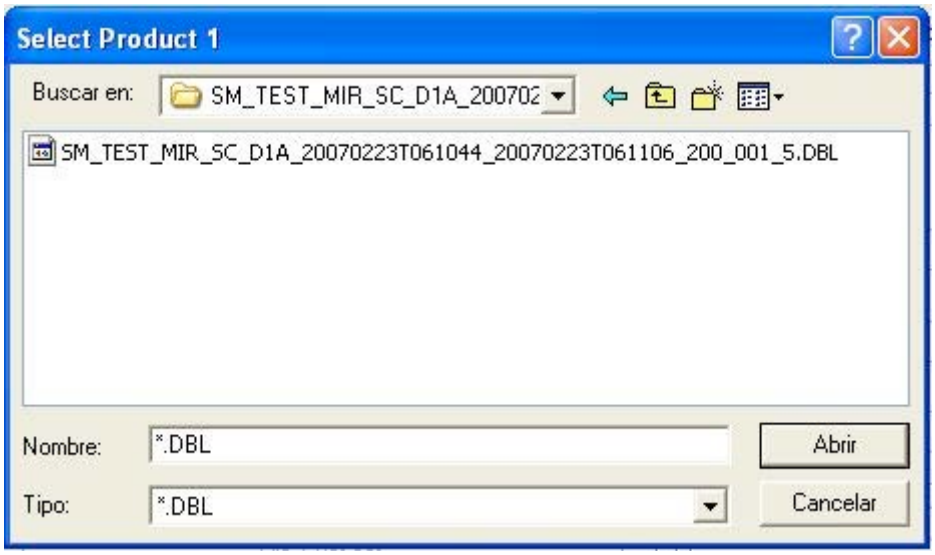

Figure 3. Selection Dialog.

Once the product is correctly set, the complete path will appear in the text box inside the input-file box.

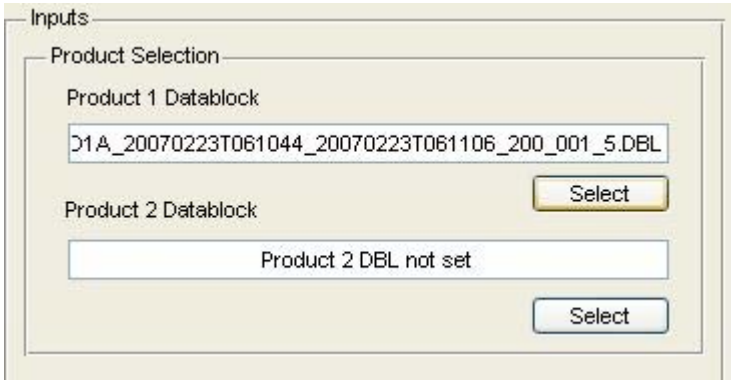

Figure 4. Product selected

Text File input

The procedure is the same, but in this case the filters are set to admit only text files (.txt) which start with file1, file2 or diff, in order to ease the input process.

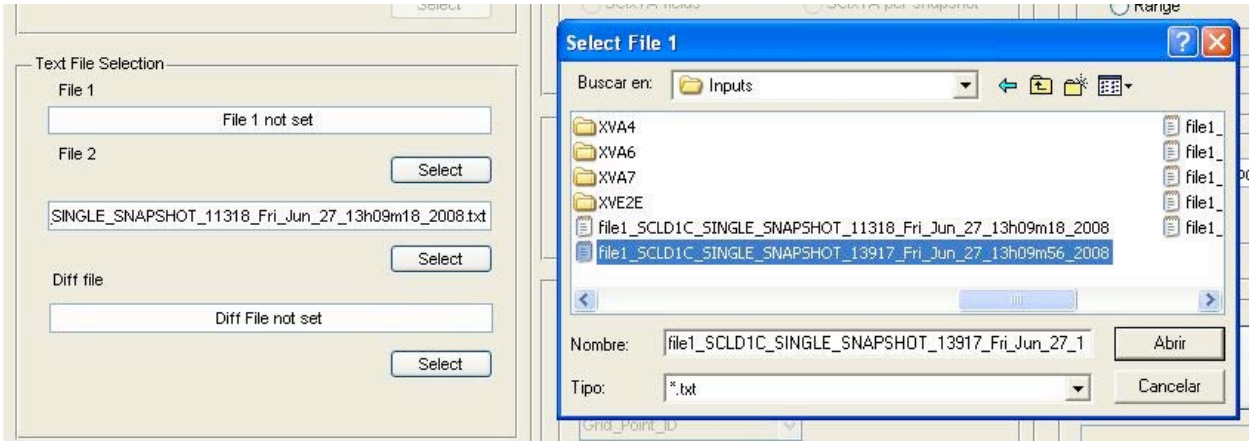

Figure 5. Text file input dialog

Paths are writable, this means that cut and paste, as well as path modification are allowed, without need of launching the selection dialog.

5.3.2.2.3. Selecting the comparison range

Here the range of DSR that are desired to be compared is entered. Please notice the following:

- For calibration and telemetry products this range is referred to the DSR number (the snapshot concept is not applicable).
- For science 1A and L1B, the snapshot ID is the key of the range selection.
- For science statistics L1A and L1B, plotting all the product is also available.

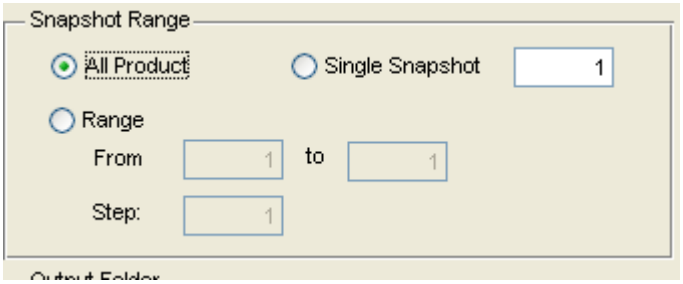

Figure 6. Comparison range menu

In case of full-polarization, several plots with the same snapshot ID and different polarizations are created.

The step is the number of DSR/snapshots to be skipped in the comparison.

Not all the plots allow the insertion of a DSR/snapshot range. The plots for which the range is valid are

- CRSx1A
- CSTx1A
- UAVx1A
- ANIRx1A
- SCIx1A / TARx1A
- SCIx1A / TARx1A statistics
- SCIx1B / TARx1B

HKTM and 'per snapshot' plots do not allow range insertion.

5.3.2.3. Selecting the Output folder

The output folder can be also accessed via dialog.

Figure 7. Output directory selection dialog.

Default output folder

There is an option of setting a default output folder, so gSCoT can directly access to it and there is no need to navigate through the destination each time gSCoT or ScoT have to be run.

To set the default folder

```
>> global default_output_folder
>> default_output_folder = DesiredPath;
```

Where *DesiredPath* is the complete path to the folder that needs to be set.

5.3.2.3.1. Plot type and field selection

L1a Plot types that can be displayed through SCoT are

- HKTM
- CRSx1A fields
- CRSx1A per snapshot
- CSTx1A fields
- CSTx1A per snapshot
- UAVx1A fields
- UAVx1A per snapshot
- SCIx1A
- SCIx1A per snapshot
- ANIR1A fields
- ANIR1A per snapshot

These plots are accessible using the L1a panel. Moreover, selectable fields can be plotted using the menu that activates when each plot mode is selected (according to sections in 4.).

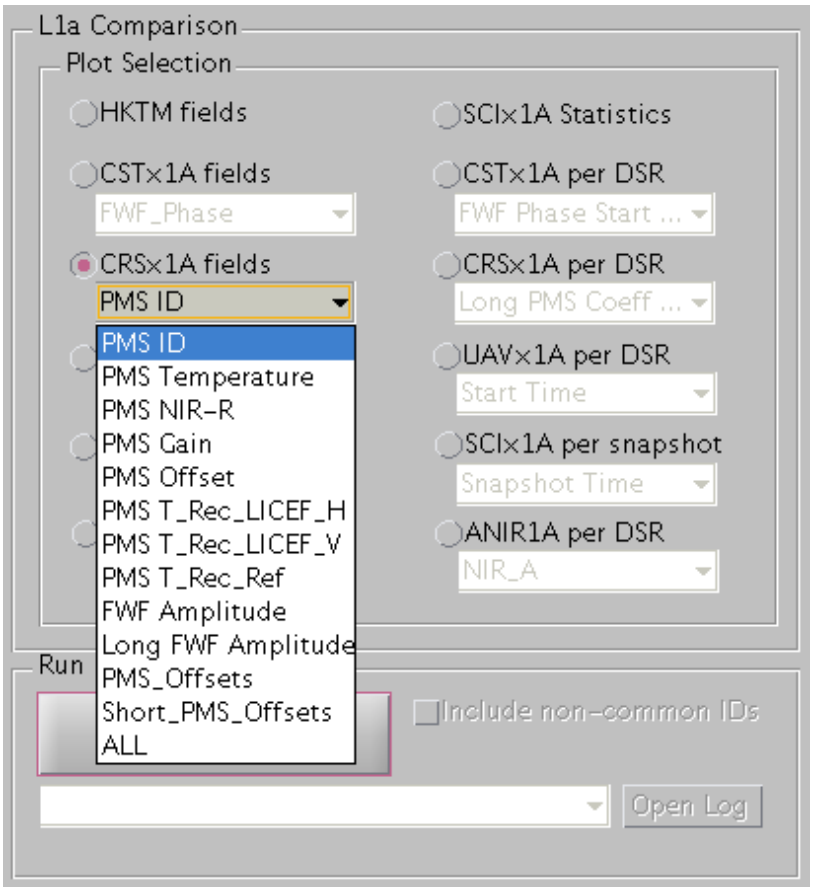

Figure 8. Field selection menu

Only HKTM does not admit field selection.

Science products can be entered either in dual or full-pol, since SCoT automatically detects which one has to be processed.

5.3.2.3.2. Execution Log

Log informs about the state of the interface, products correctly set or not set, why ScoT cannot be run, etc…

Important:

- gSCoT log does NOT include SCoT log, this information can be retrieved apart.
- Do not operate the GUI (gSCoT) while running SCoT, since Matlab confusions may appear and interface may crash.

Figure 9. GUI execution log

5.3.2.3.3. Run & Browse

SCoT can be run once the parameters are set correctly clicking over the “Run SCoT” button.

Execution log will warn the user not to operate the GUI while running. However, output traces can be read in real-time in the Matlab common command line. This information is also present in the SCoT logs.

Once ScoT has finished, plots can be browsed, displayed and manipulated using SCoT. The next message is shown in Execution Log: “SCoT finished with no errors”. The figure browser menu is activated, displaying the last plots executed by SCoT

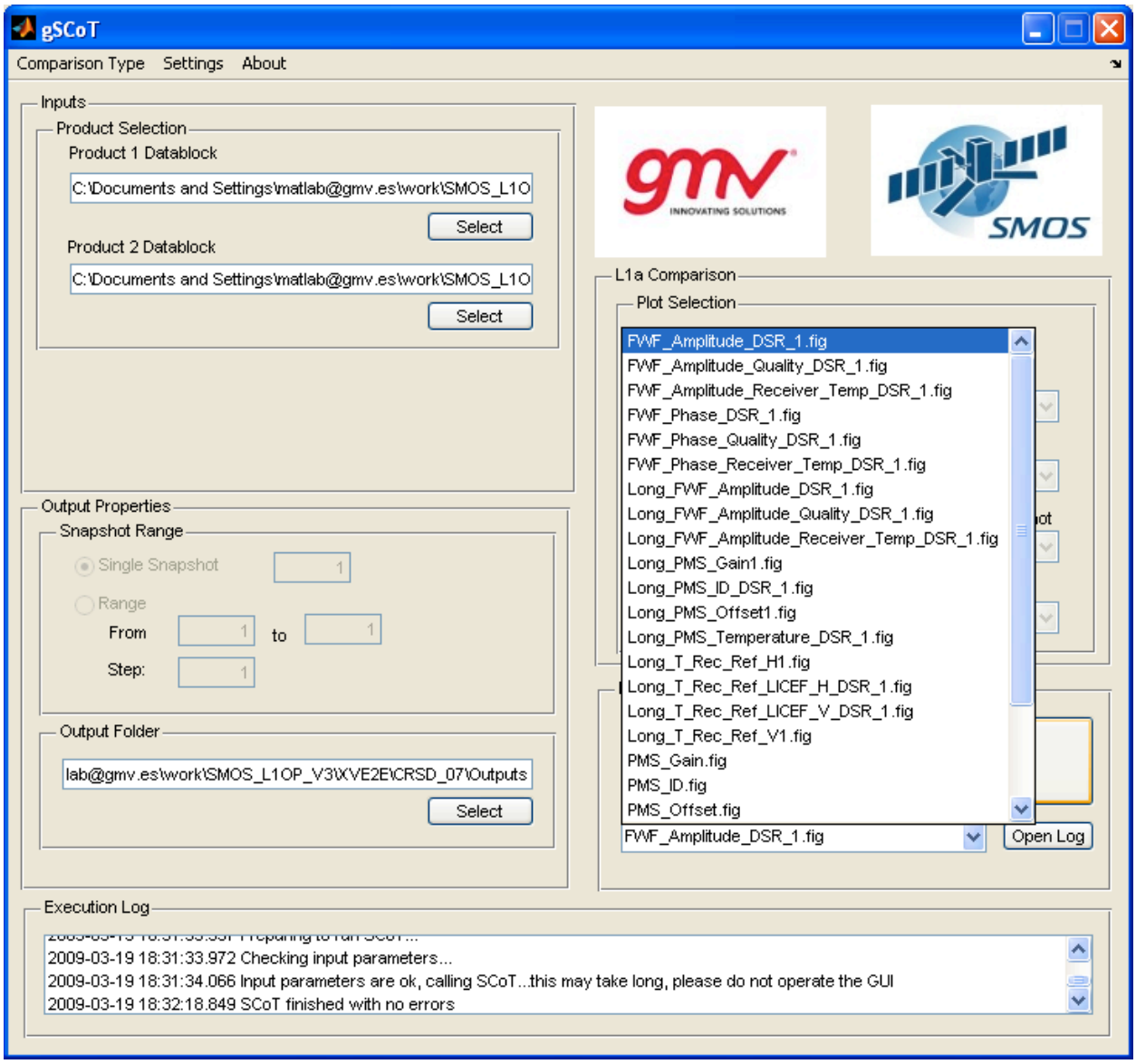

Figure 10. Selection of plots after succesful execution

After selecting one plot a new figure will be launched allowing the user manipulation (zoom, rotation, value retrieval etc...)

Also SCoT log can be read by clicking the “open log” button. Text file will be shown in standard Matlab editor.

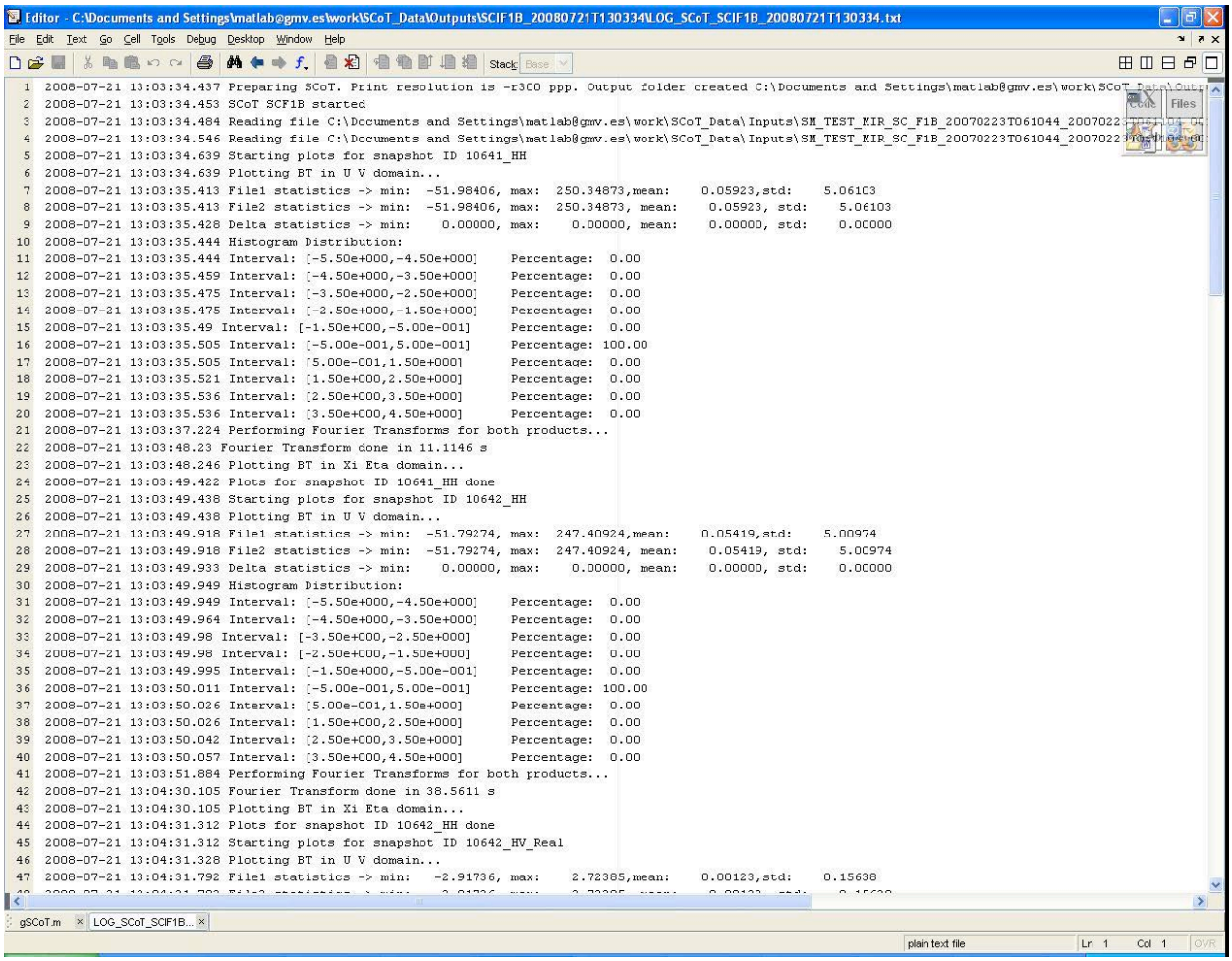

Figure 11. ScoT output log

5.3.2.4. Parameters set-up dialog

Through the main menu in the main dialog can be accessed the set-up dialog.

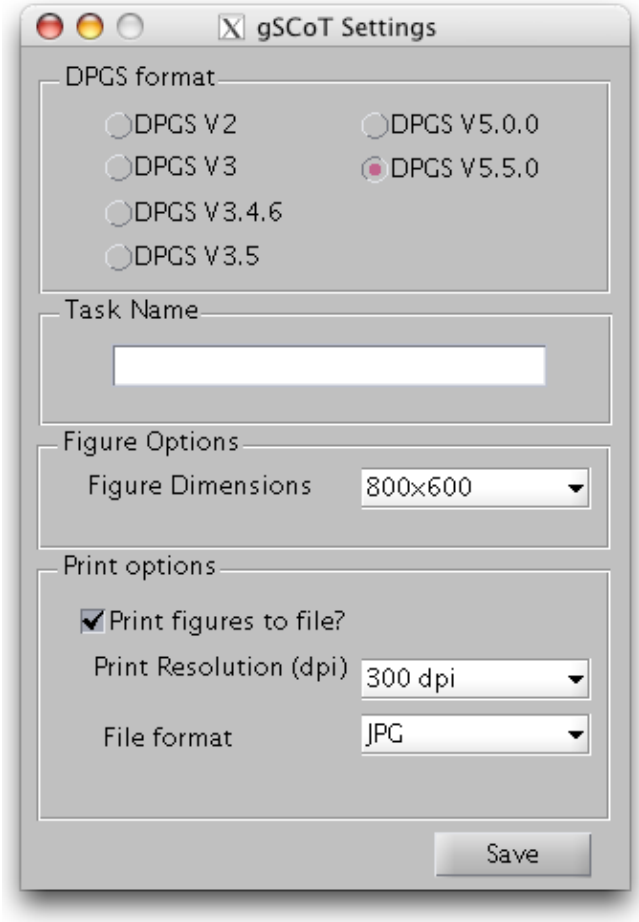

Figure 12. Global Settings dialog.

5.3.2.4.1. DPGS format

User can choose between V2, V3, V3.4.6, V3.5, V5.0.0 and V5.5.0 product formats. Please notice that SCoT is not sensitive to changes in the header but only in the datablock. Schemas are not read by SCoT, so, any change in the datablock will mean a new update.

5.3.2.5. Task name

The task name can be defined for the set of output plots, it will appear in the heading of each plot and also in the name of the generated file (if any).

5.3.2.5.1. Figure dimensions

User can select the dimensions of the output figure that is generated, when it is displayed on the screen.

5.3.2.5.2. Print format

Here it can be selected if no stored files are desired, but only figures. If file export option is checked the resolution and driver can be selected as well.

5.3.2.6. About dialog

Basic information about this software

Figure 13. About Dialog.

5.3.3. L1C EXTRACTOR

Due to performance reasons L1c products are not read directly by Matlab but an extractor implemented in C++ is used first to generate a several text files which are the input to the Matlab functions. This extractor is an executable file called SCoT.exe.

To run it, the script *set_scot_environment.sh* has to be run first:
source ./set_scot_environment.sh

There are several operation modes called:

- SINGLE_SNAPSHOT
- STATISTICS
- ALL_PRODUCT
- SWATH

The use of these operation modes is summarised in the following tables:

Mode	Single Snapshot for one product
Description	Generation of a file with data for one single snapshot
Call	SCoT.exe *product_name_with_path* SINGLE_SNAPSHOT *snapshot_id*

Output file name	file_SC*xx*1C_SINGLE_SNAPSHOT_ *snapshot_id_date.*txt

Mode	Single Snapshot for two products
Description	Generation of a file with deltas between to products for a single snapshot
Call	SCoT.exe *product_name_with_path_1 product_name_with_path_2* SINGLE_SNAPSHOT *snapshot_id*
Output file names	file1_SC*xx*1C_SINGLE_SNAPSHOT_ *snapshot_id_creation_date.*txt file2_SC*xx*1C_SINGLE_SNAPSHOT_ *snapshot_id_creation_date.*txt

Mode	Statistics for one product
Description	Generates three files: file1_SC*xx*1C_STATISTICS_*creation_date.txt*: Contains statistics for each field in each snapshot of product 1: mean value, standard deviation, minimum value and maximum value.
Call	SCoT.exe *product_name_with_path_1 product_name_with_path_2* STATISTICS
Output file name	file_SC*xx*1C_STATISTICS_*creation_date.txt*

Mode	Statistics for two products
Description	Generates three files: file1_SC*xx*1C_STATISTICS_*creation_date.txt*: Contains statistics for each field in each snapshot of product 1: mean value, standard deviation, minimum value and maximum value. file2_SC*xx*1C_STATISTICS_*creation_date.txt:* The same as the previous case but with product 2. diff_SC*xx*1C_STATISTICS_*creation_date.txt:* Contains statistics about the differences between product 1 and 2. For each snapshot and field the differences are computed between each grid point in the two products. Then the following quantities are computed: mean of the differences, standard deviation of the differences, minimum of the differences, maximum of the differences
Call	SCoT.exe *product_name_with_path_1 product_name_with_path_2* STATISTICS
Output file names	file1_SC*xx*1C_STATISTICS_*creation_date.txt* file2_SC*xx*1C_STATISTICS_*creation_date.txt* diff_SC*xx*1C_STATISTICS_*creation_date.txt*

Mode	All Product for one product
Description	Generates a text file with the whole Data Block of the product.
Call	SCoT.exe *product_name_with_path_1*ALL_PRODUCT
Output file name	file_SC*xx*1C_ALL_PRODUCT_ *snapshot_id_creation_date.*txt

Mode	All Product for two products
Description	Generates two text files with the each with the whole Data Block of one product

Call	SCoT.exe *product_name_with_path_1 product_name_with_path_2* ALL_PRODUCT
Output file names	file1_SC*xx*1C_ALL_PRODUCT_ *snapshot_id_creation_date*.txt file2_SC*xx*1C_ALL_PRODUCT_ *snapshot_id_creation_date*.txt

Mode	Swath
Description	Generates two text files with the each with the swath fields of each product.
Call	SCoT.exe *product_name_with_path_1 product_name_with_path_2* SWATH
Output file names	swath1_SC*xx*1C_ALL_PRODUCT_ *snapshot_id_creation_date*.txt swath2_SC*xx*1C_ALL_PRODUCT_ *snapshot_id_creation_date*.txt

The operation modes to generate the files needed to generate the plots using the Matlab functions are "SINGLE_SNAPSHOT for two products" and "STATISTICS for two products". The remaining operation modes are provided only as extra functionalities for other purposes different from the generation of plots by the SCoT tools. Once the text files have been generated these are copied to the machine where SCoT is installed and the it is used to produce the L1c plots.

5.3.3.1. BT Counter analysis utility

In order to compare the BT Counter in L1OP against L1PP inside V3 cross-validation activity, a functionality was requested that could justify that each time there is a different BT_Counter in L1OP and L1PP inside a product, the products are analysed and the different BT elements lay in the Border Field of view (setting the BFOV to 30 KM).

The current functionality takes around 3 days to analyse 1/2 orbit L1c product, however it is available for users.

It analyses all grid points in L1c and identifies the BT counters that are not equal. Whenever a BT counter is different, the L1OP and L1PP products are inspected to identify which snapshot produced a grid point, which is not in the other product, and to identify if this grid point is flagged to be in the Border FOV (as flagged in the L1c flags).

With this information, two tables are generated with the following information (one analysing loss of measurements in L1PP with respect to L1OP and the other file analysing the loss of measurements in L1OP with respect to L1PP) :

Column_1: GridPoint ID.
Column_2: Latitude.
Column_3: Longitude.
Column_4: Total Measurements (BT_Counter field).
Column_5: Loss Measurements but in the border field of view.
Column_6: Loss Measurements but is not in the border field of view.

The tables are sorted to print the highest value of pixels out of the border field of view at the top of the table, so it immediate to check if any pixel was identified out of the BFOV by inspecting the first line of each file.

Mode	CHECK_MEASUREMENTS
Description	Generates two text files with the analysis of the pixels which present a different BT_Counter value of each product.
Call	SCoT.exe *product_name_with_path_1 product_name_with_path_2* CHECK_MEASUREMENTS
Output file	file1_SC*xx*1C_CHECK_MEASUREMENTS_ *creation_date*.txt

names	file2_SC*xx*1C_CHECK_MEASUREMENTS_ *creation_date*.txt

5.4. PLOT TYPES DESCRIPTION

5.4.1. SNAPSHOT - MATRIX FIELD PLOTS

Each image file gives information about one field in one snapshot. These plots are available for fields where a magnitude is associated to each baseline such us the Calibrated Visibilities in products MIR_SCD1A.

The upper-left corner represents the product 1 to be compared, the upper-right corner the product 2. Over each of these plots it is written the title of the plot that may include the filed name, snapshot number or DSR number and the polarisation. In the bottom-left corner it is plotted the differences between both. For these plots x and y axis are the 72 LICEFs and in the right-bottom corner it is shown the histogram of the differences. The mean of the deviation and the Standard Deviation is also given over the histogram.

For these matricial plots, the upper diagonal part of the matrix is the real part and the below the diagonal part is the imaginary part.

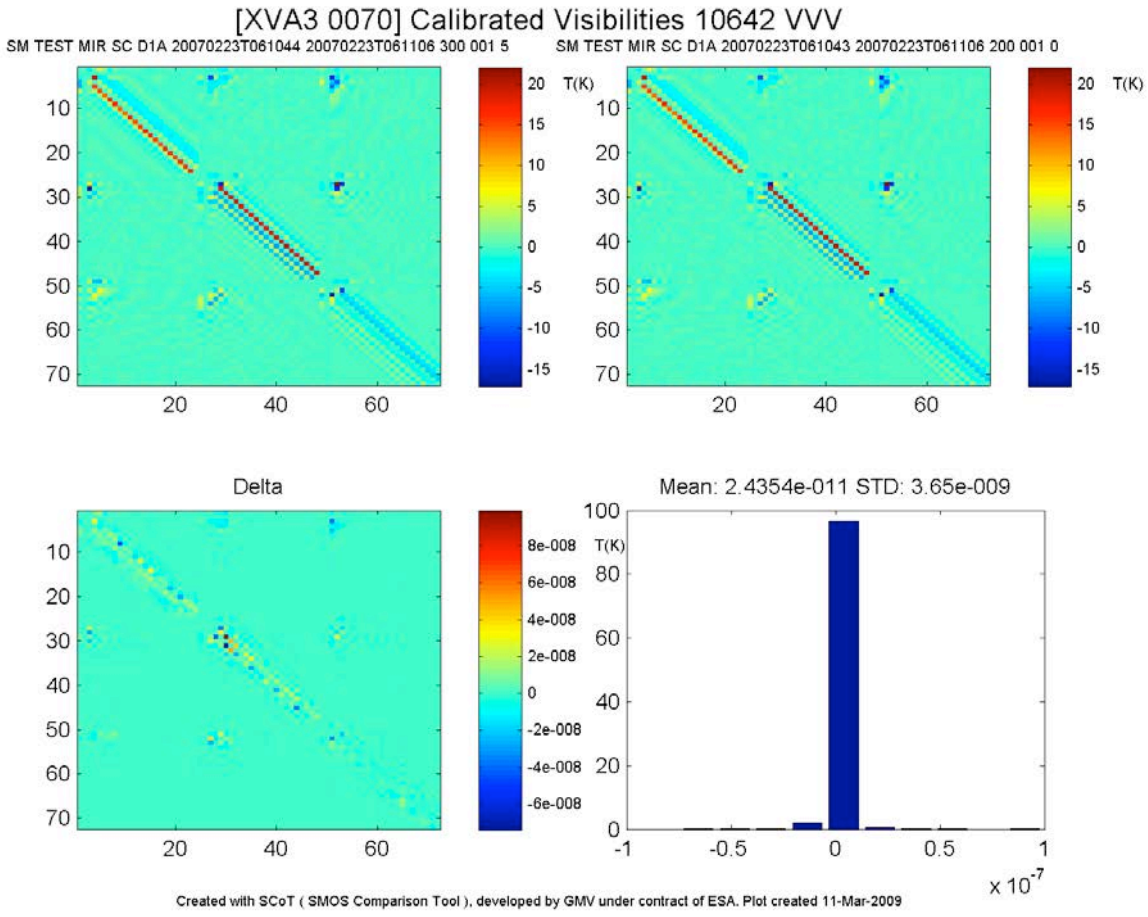

Figure 14. Matrix Plot example

5.4.2. SNAPSHOT - LICEF PARAMETER PLOTS

Each image file gives information about one field in one snapshot. These plots are available for fields where a magnitude is associated to each LICEF such as the Receiver temperatures.

The upper-left corner represents the product 1 to be compared, the upper-right corner the product 2. Over each of these plots it is written the title of the plot that may include the filed name, snapshot number or DSR number and the polarisation. In the bottom-left corner it is plotted the differences between both. In the right-bottom corner it is shown the histogram of the differences. The mean of the deviation and the Standard Deviation is also given over the histogram.

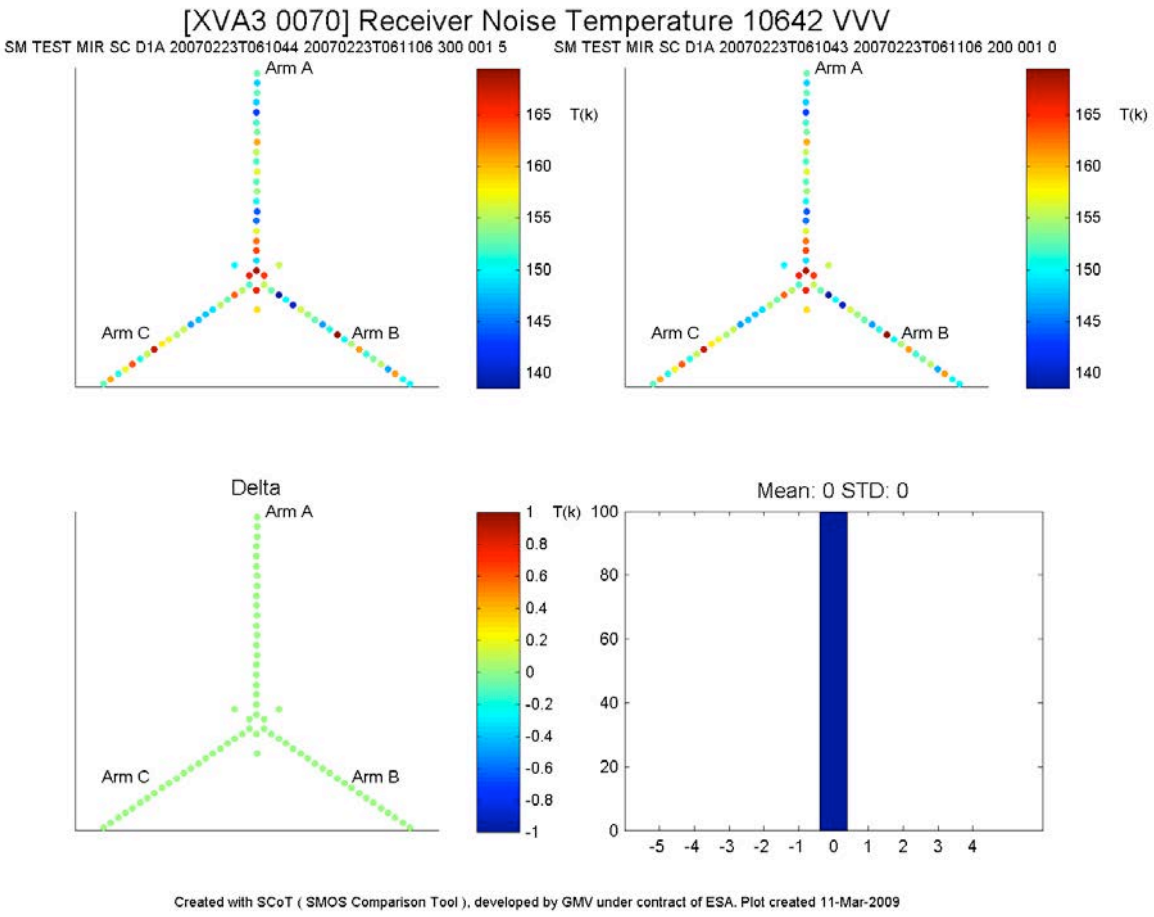

Figure 15. MIRAS layout based plot

5.4.3. SNAPSHOT – NIR BT PLOTS

Each image file corresponds to DSR.

The first row corresponds to file1, the second row to file2 and the third one to the delta between both products.

The first column contains information for NIR_AB, the second column for NIR_BC, the third one for NIR_CA.

Each subplot represents the values T_H (temperature under horizontal mode), T_V (temperature under vertical mode) and T3, T4 (full-pol stokes parameters).

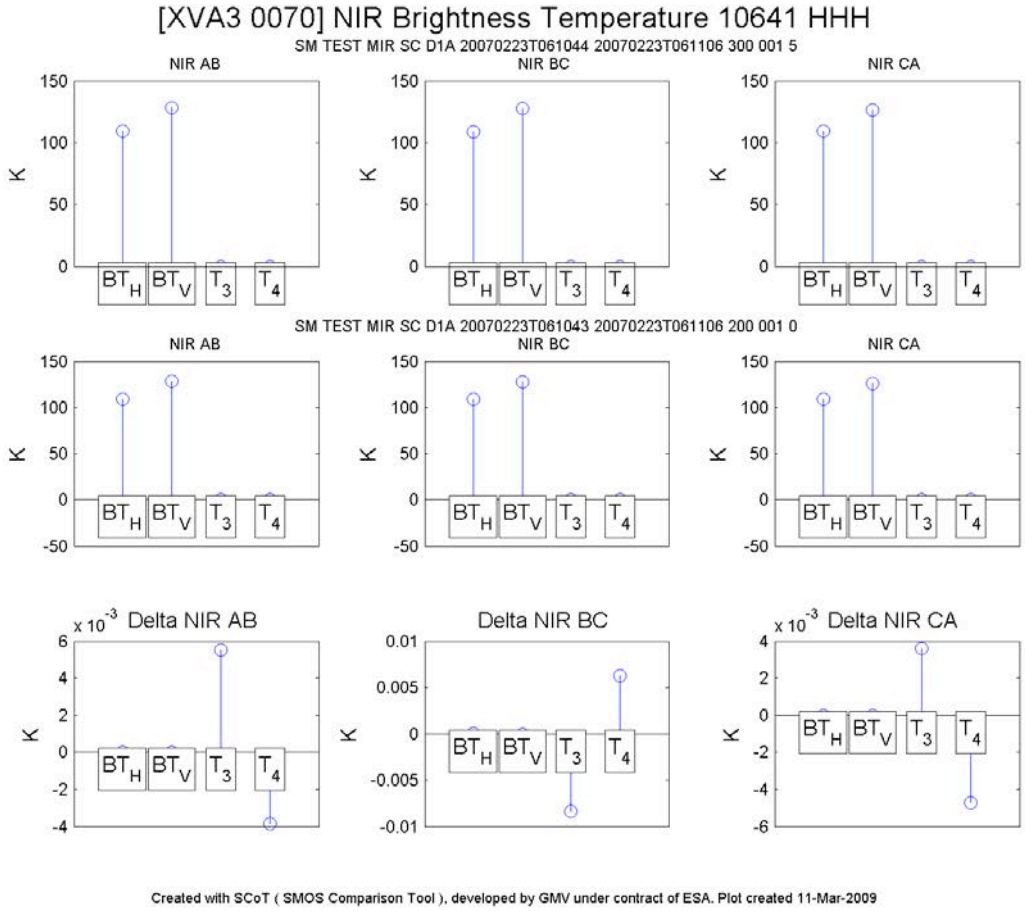

Figure 16. NIR BT plot

5.4.4. SNAPSHOT – NIR FIELD PLOTS

Each image file corresponds to DSR.

The first row corresponds to file1, the second row to file2 and the third one to the delta between both products.

The first column contains information for NIR_AB, the second column for NIR_BC, the third one for NIR_CA.

Each subplot represent the values, whatever they mean, tagged in abcisa

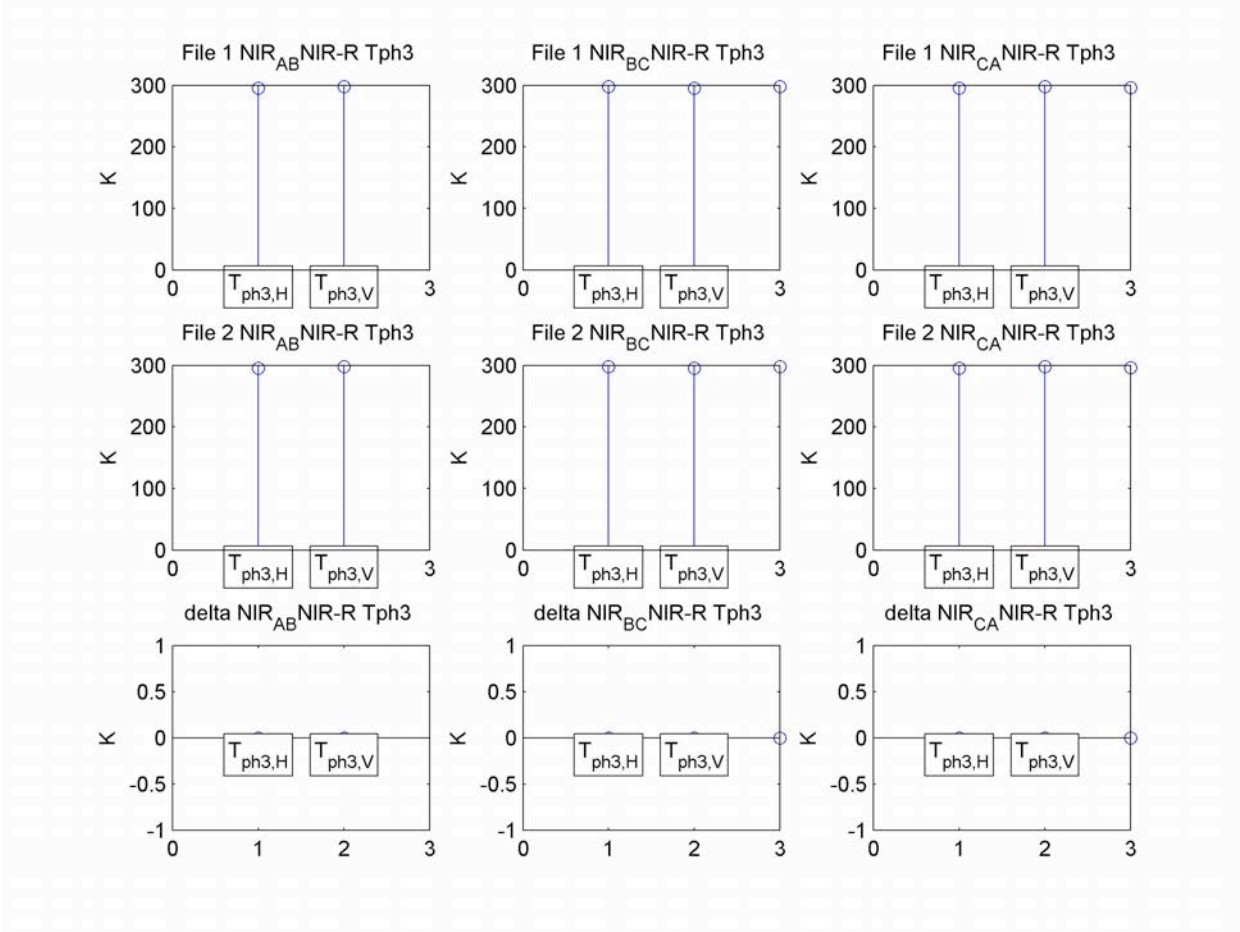

Figure 17. NIR parameter plot

5.4.5. TELEMETRY PLOTS

TLM_MIR1A products contain two types of fields: the ones which are composed just for one item and the ones who have at least more than one.

Images files concerning one item fields have three plots: In the first plot “x”axis represents the Snapshot OBET and “y” axis the field under study, we can observe two lines (blue and read) one for each product to be compared. The second plot represents the difference between the two files. In the third plot corner it is shown the histogram of the differences. The mean of the deviation and the Standard Deviation are also given over the histogram.

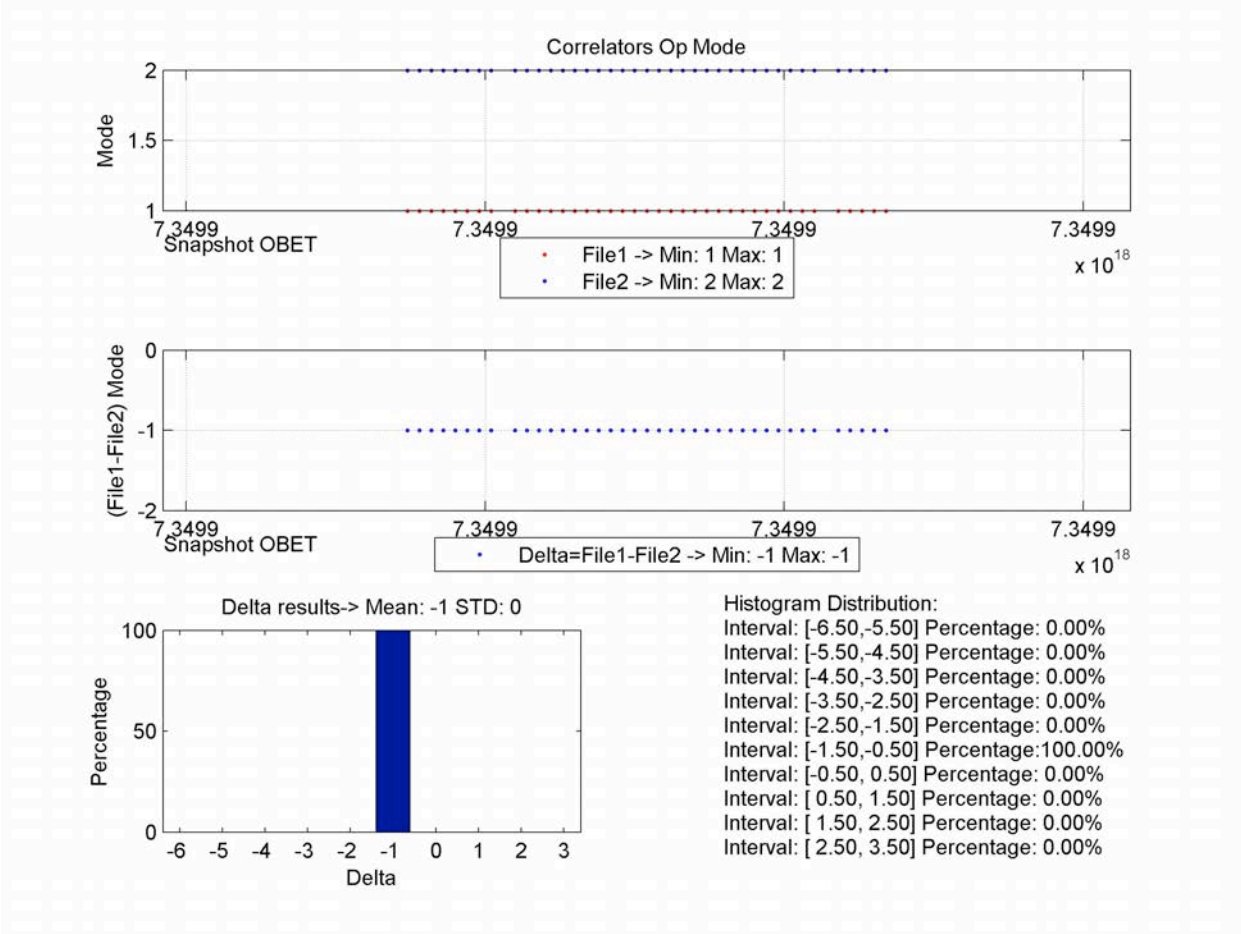

Figure 18. Telemetry plot, one dimension vector.

Images files concerning more than one item fields have four plots: The upper-left corner plot represents the product 1 to be compared, the upper-right corner plot the product 2. Over each of these plots it is written the title of the plot that includes the filed name. In the bottom-left corner it is plotted the differences between both. In this three cases “x” axis represents the number of items we have inside the field plotted and “y” axis the number of DSR.

In the right-bottom corner it is shown the histogram of the differences. The mean of the deviation and the Standard Deviation is also given over the histogram.

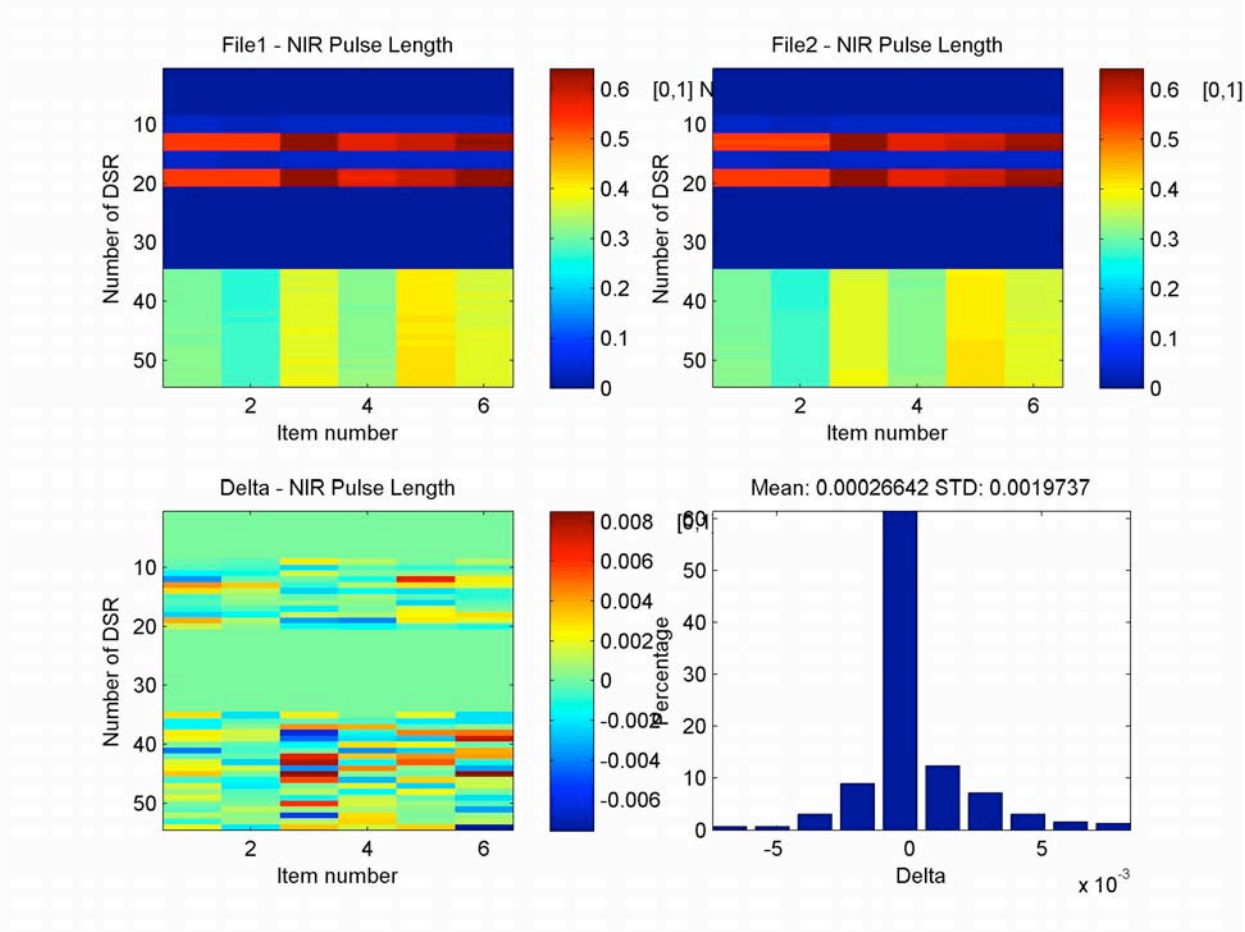

Figure 19. Telemetry plot, 2D vector.

5.4.6. SNAPSHOT – U,V PLOTS (L1B)

This type of plot is used for Scene BT Fourier field. Each image gives information about one snapshot at a time.

The upper-left corner represents the product 1 to be compared, the upper-right corner the product 2.. In the bottom-left corner it is plotted the differences between both. The “x” axis and “y” axis represents the “U” and “V” coordinates (Fourier domain). In the right-bottom corner it is shown the histogram of the differences. The mean of the deviation and the Standard Deviation is also given over the histogram.

As it is obvious, the full star is plotted.

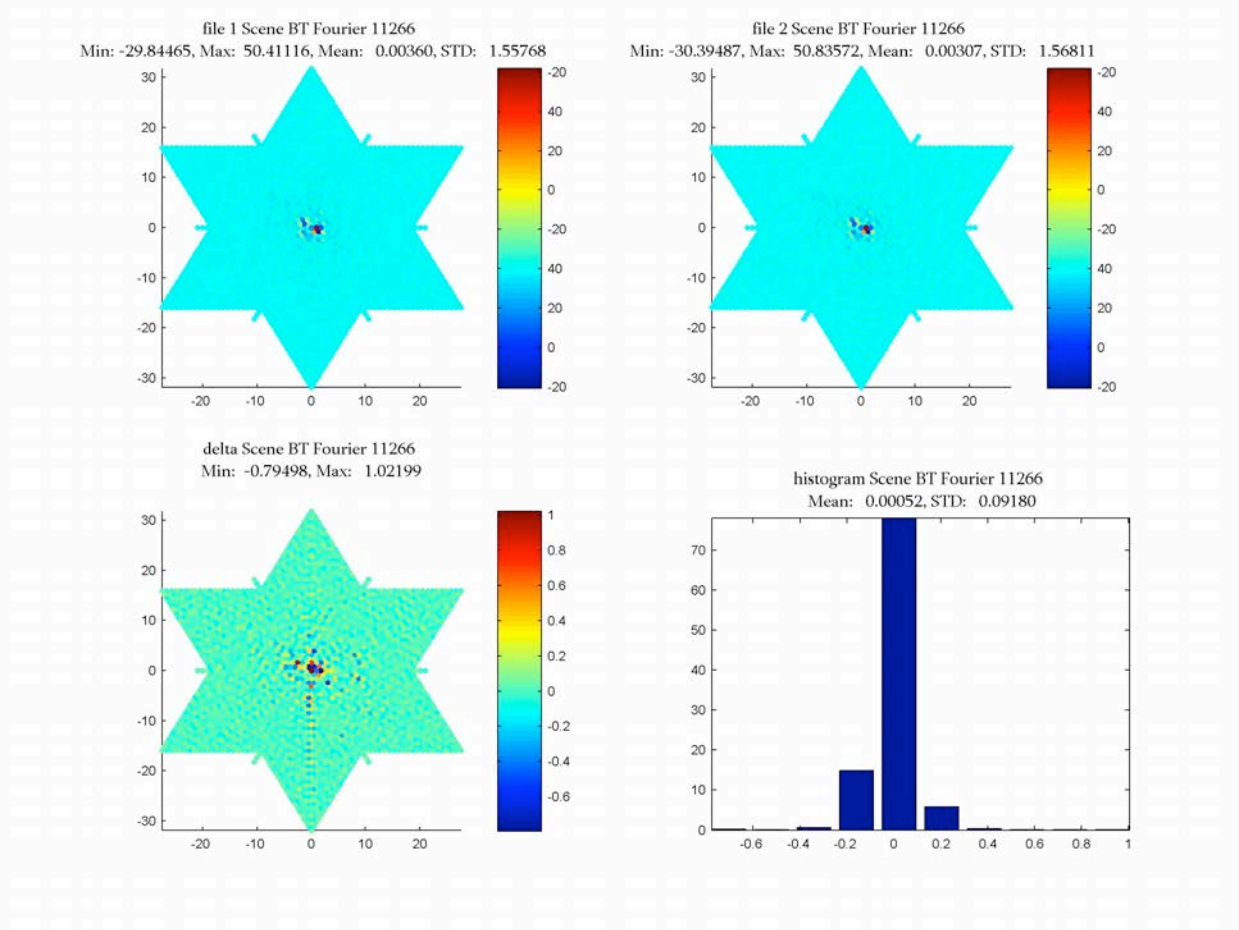

Figure 20. Star domain L1B plot.

5.4.7. SNAPSHOT – XI,ETA PLOTS (L1B)

This plot represents the Discrete Fourier Transform of the L1b Fourier components in the antenna frame to convert Scene BT Fourier field from U-V domain to Xi-Eta domain. The x axis represents the Xi coordinate and the y axis represents the Eta coordinate. In order to do this an Inverse Fourier Transform is done using the same algorithm than a L1c processor would do.

For dual polarization, the value plotted in the xi-eta domain is the brightness temperature itself. For full-polarization, several figures are generated, one for brightness temperature, another for HV real and a last one for HV imaginary.

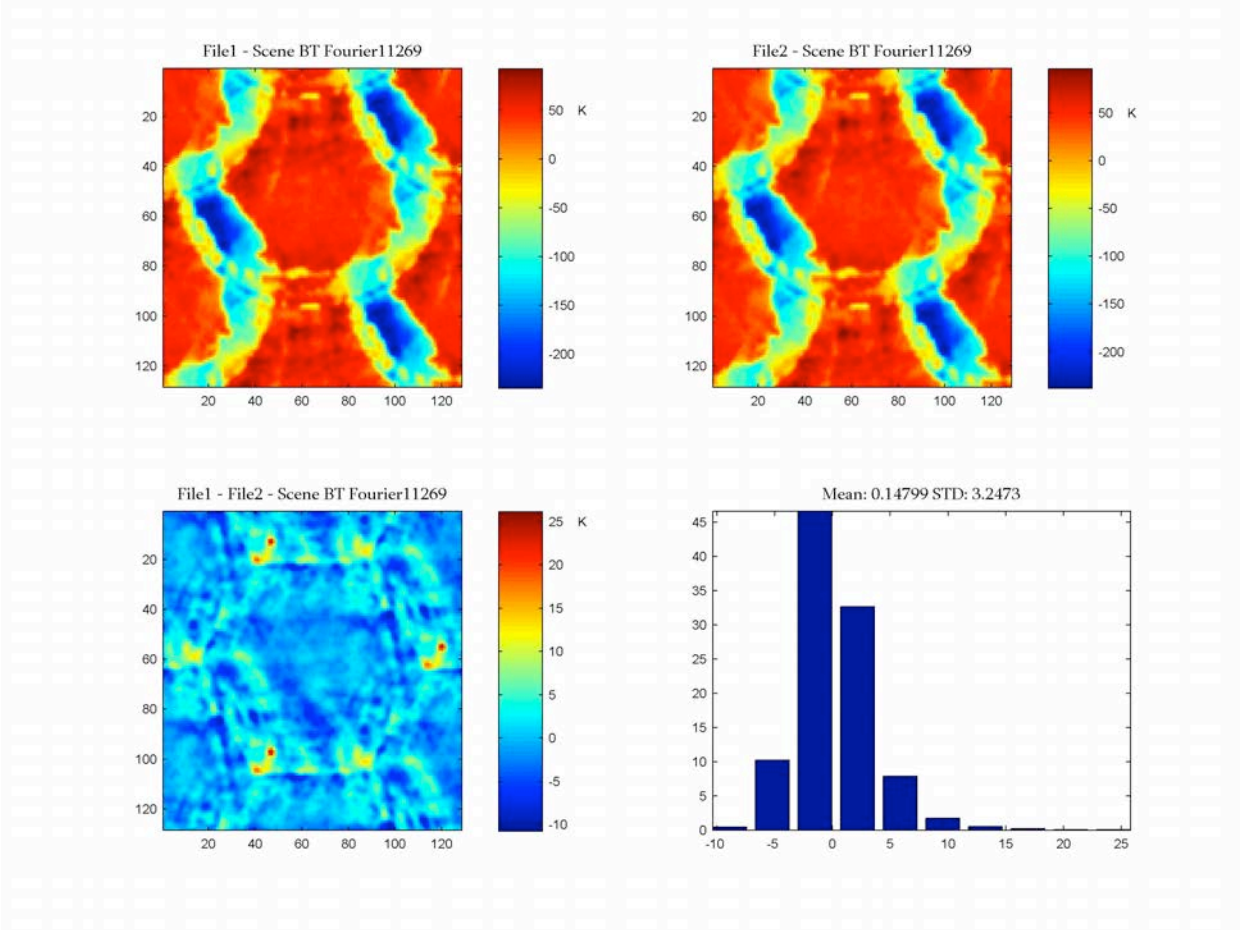

Figure 21. Xi-Eta domain L1B plot.

5.4.8. STATISTICAL PLOTS

This plot show per polarization which is the delta between two fields in a product, they could be either Maximum Error, Mean Error or STD of error.

The title presents the task name (if defined) , the field plotted and the polarisation that is compared.

Please notice, that if no polarization is specified, the whole product is compared, without taking into account polarization or real/imaginary part (as it occurs for L1B statistical plots, where the full-star is compared).

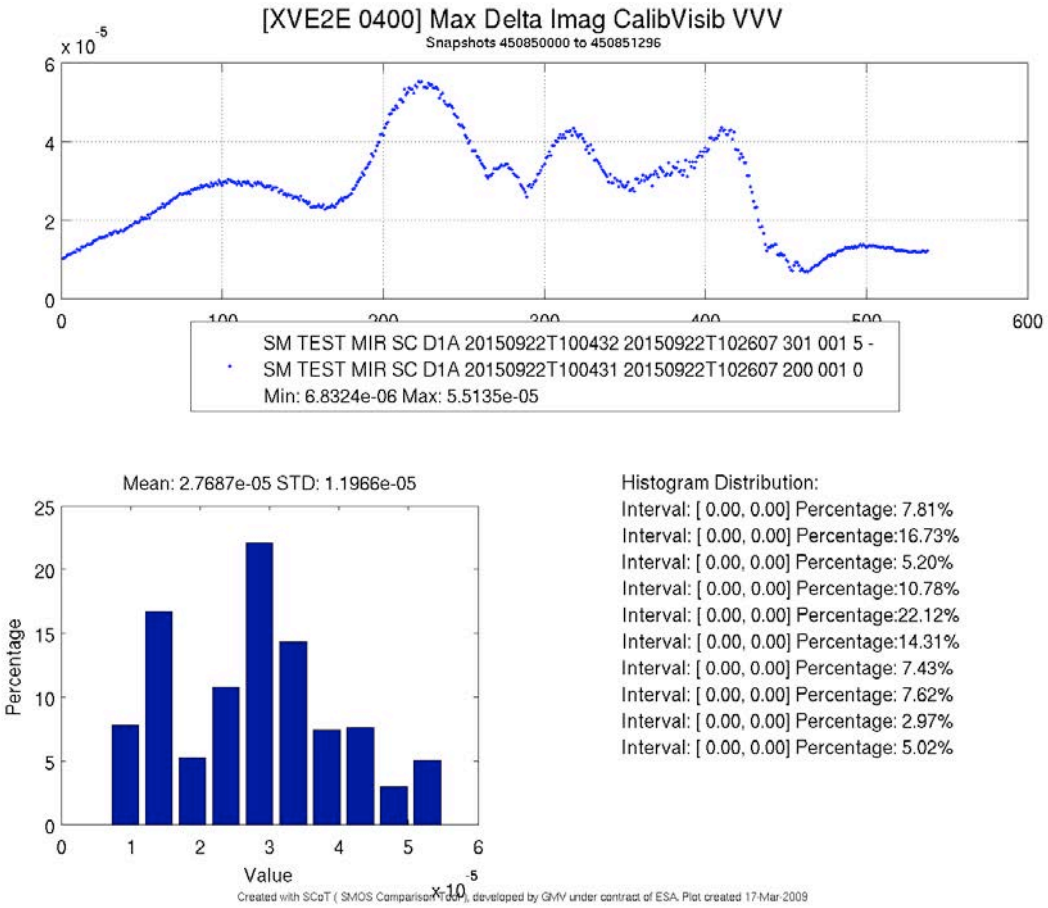

Figure 22. Statistical plot

5.4.9. PER SNAPSHOT PLOTS

This type of plot gives information for one field for the whole product.

It is available for fields with a single value for each DSR. In the upper part it is represented in red the first product of he comparison and in blue the second. The “y” axis represents the desiredfield field and the “x” axis may be, depending on the product, the snapshot id, the DSR number or an index after matching the two products (it is properly labelled in each case). In the middle part it is represented the differences and in the bottom part the histogram of the differences.

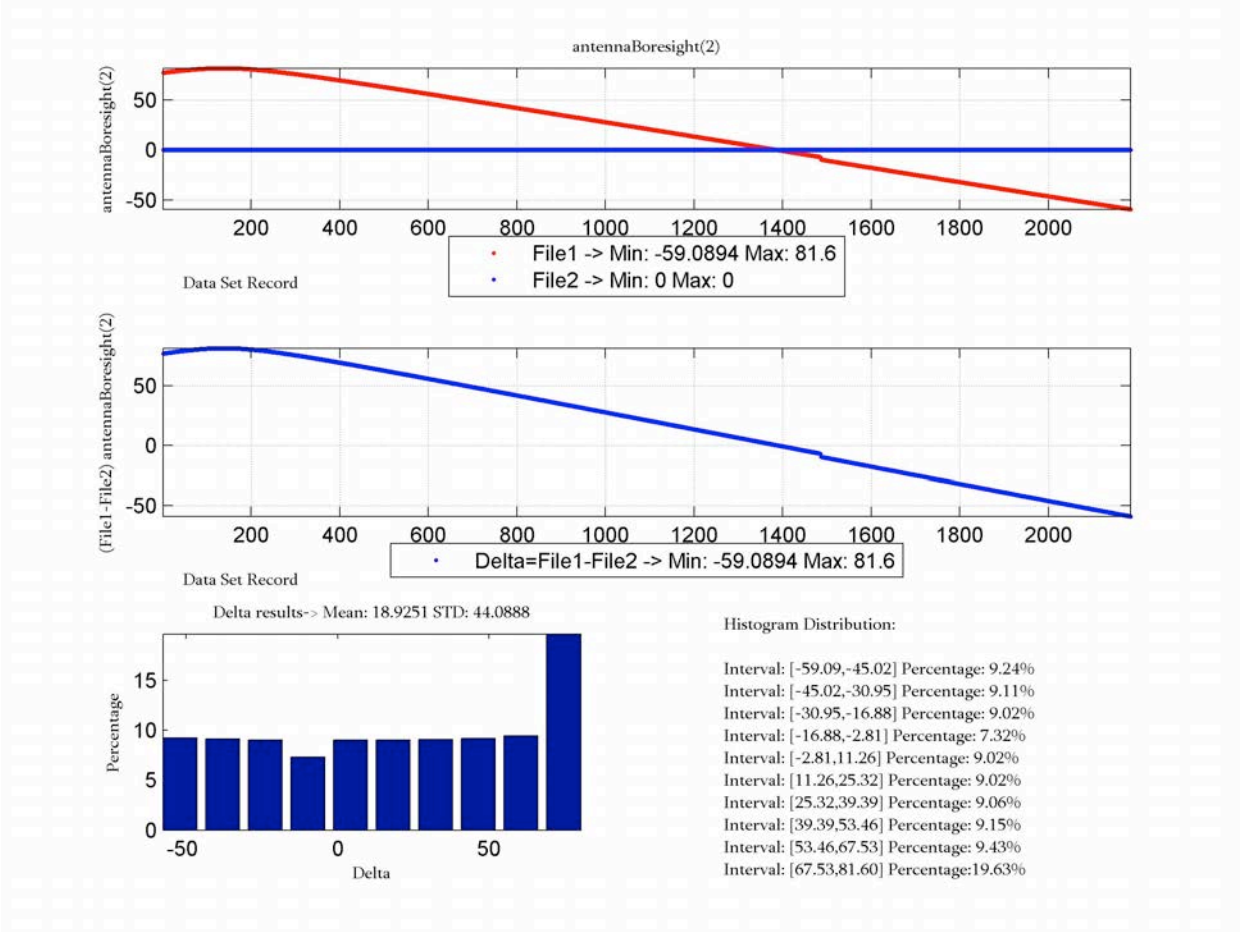

Figure 23. Per snapshot plot

HECC XXXX NOVO MODO!

The 'Science per Snapshot' comparisons perform by default the comparison between Snapshots with the same Snapshot_ID value. This is the nominal working mode since SCoT v3.5 If the user want to enable the comparison between all the Snapshots available in both products,

5.4.10. SINGLE SNAPSHOT PLOTS (L1C)

These plots represent an L1c magnitude for one snapshot. The x coordinate is the longitude and the y coordinate the latitude and the colour represents the value of the magnitude.

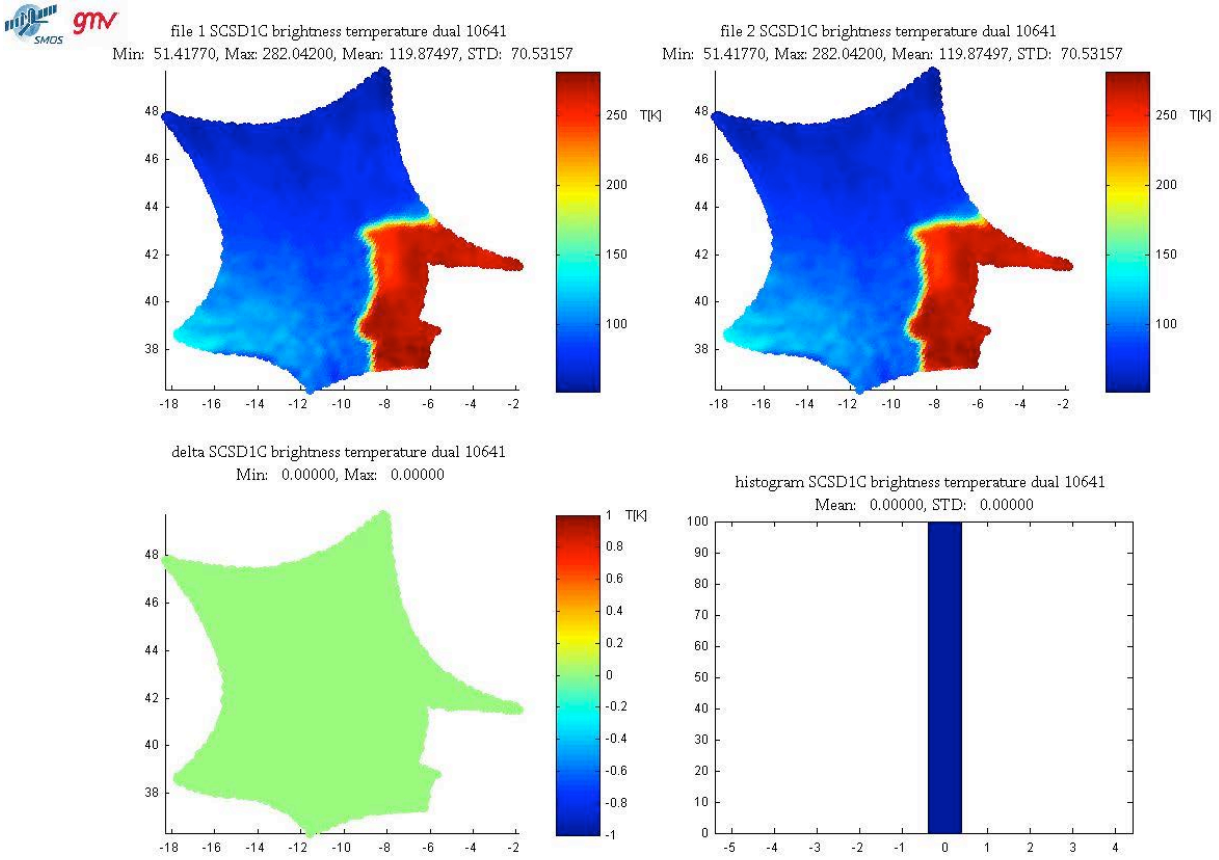

Figure 24. Single snapshot plot

5.4.11. SNAPSHOT-BIAS STATISTICS PLOTS (L1C)

These plots give statistic parameters for each snapshot of the independent reference file and test file. The delta plot presents the differences between the previous plots.. There is one image file for each field type and each statistic parameter (maximum, minimum, mean and standard deviation)

The upper plot represents these magnitudes for each snapshot in the two products. Each product is represented in a different colour. The statistic parameters are:

- Max: Maximum value from all the grid points of the snapshot (one value per product)
- Min: Minimum value from all the grid points of the snapshot (one value per product)
- Mean: Mean value of all the grid points of the snapshot (one value per product)
- STD: Standard deviation of the grid points of the snapshot (one value per product)

The bottom plot represents the differences between the statistic parameters of the two products. They are:

- Max: Difference of the maximum value of the two previous plots
- Min: difference of the minimum value of the two previous plots
- Mean: Difference of the mean value of the two previous plots
- STD: Difference of the standard deviation value of the two previous plots

Finally, there is a histogram of the differences.

Note that the bottom plot represents the <u>difference of the statistic parameter</u> (the statistic parameter computed using all grid points in the snapshot) whereas in Scene-bias plots it is represented the statistic parameter of the differences (the differences between the same grid point in the two products).

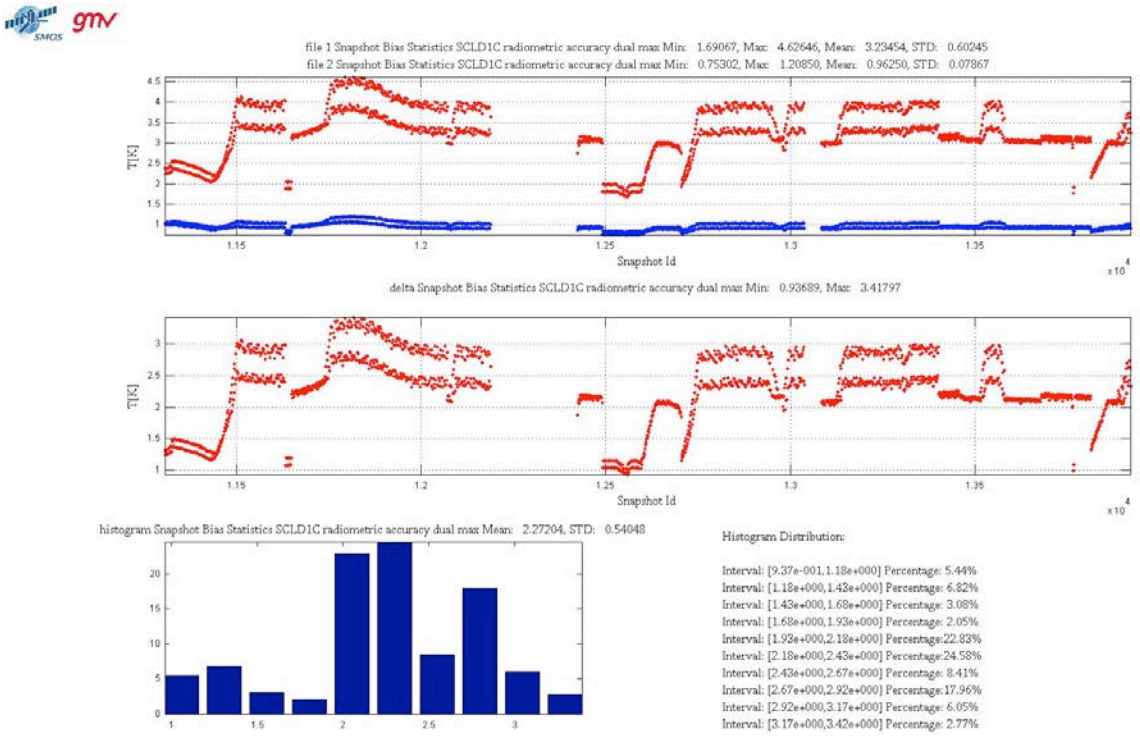

Figure 25. Snapshot bias plot

The SCoT produces plots for each of the following parameters:

- bt_dual_min
- bt_dual_max
- bt_dual_mean
- bt_dual_std
- bt_full_real_min
- bt_full_real_max
- bt_full_real_mean
- bt_full_real_std
- bt_full_imag_min
- bt_full_imag_max
- bt_full_imag_mean
- bt_full_imag_std
- radiometric_accuracy_dual_min
- radiometric_accuracy_dual_max
- radiometric_accuracy_dual_mean
- radiometric_accuracy_dual_std
- radiometric_accuracy_full_min
- radiometric_accuracy_full_max
- radiometric_accuracy_full_mean

- radiometric_accuracy_full_std
- incidence_angle_min
- incidence_angle_max
- incidence_angle_mean
- incidence_angle_std
- azimuth_angle_min
- azimuth_angle_max
- azimuth_angle_mean
- azimuth_angle_std
- faraday_rotation_angle_min
- faraday_rotation_angle_max
- faraday_rotation_angle_mean
- faraday_rotation_angle_std
- geometric_rotation_angle_min
- geometric_rotation_angle_max
- geometric_rotation_angle_mean
- geometric_rotation_angle_std
- footprint_axis_1_min
- footprint_axis_1_max
- footprint_axis_1_mean
- footprint_axis_1_std
- footprint_axis_2_min
- footprint_axis_2_max
- footprint_axis_2_mean
- footprint_axis_2_std

The '_max' type parameters are computed according the following pseudo code description:

```
parameter.max = parameter[0];
for( i = pixel_list.begin(); i != pixel_list.end(); i++ )
{
   parameter.max = max( parameter.max, parameter[i] );
}
```

The '_min' type parameters are computed according the following pseudo code description:

```
parameter.min = parameter[0];
for( i = pixel_list.begin(); i != pixel_list.end(); i++ )
{
   parameter.min = min( parameter.min, parameter[i] );
}
```

The '_mean type parameters are computed according the following pseudo code description:

```
for( i = pixel_list.begin(); i != pixel_list.end(); i++ )
{
   parameter.mean += parameter[i];
}
```


parameter.mean /= number_of_pixels;

The '_std' type parameters are computed according the following pseudo code description:

```
for( i = pixel_list.begin(); i != pixel_list.end(); i++ )
{
   parameter.std += pow( parameter[i] – parameter.mean, 2 );
}
parameter.std /= sqrt( parameter.std / ( number_of_pixels – 1) );
```

SCENE BIAS STATISTICS PLOTS (L1C)

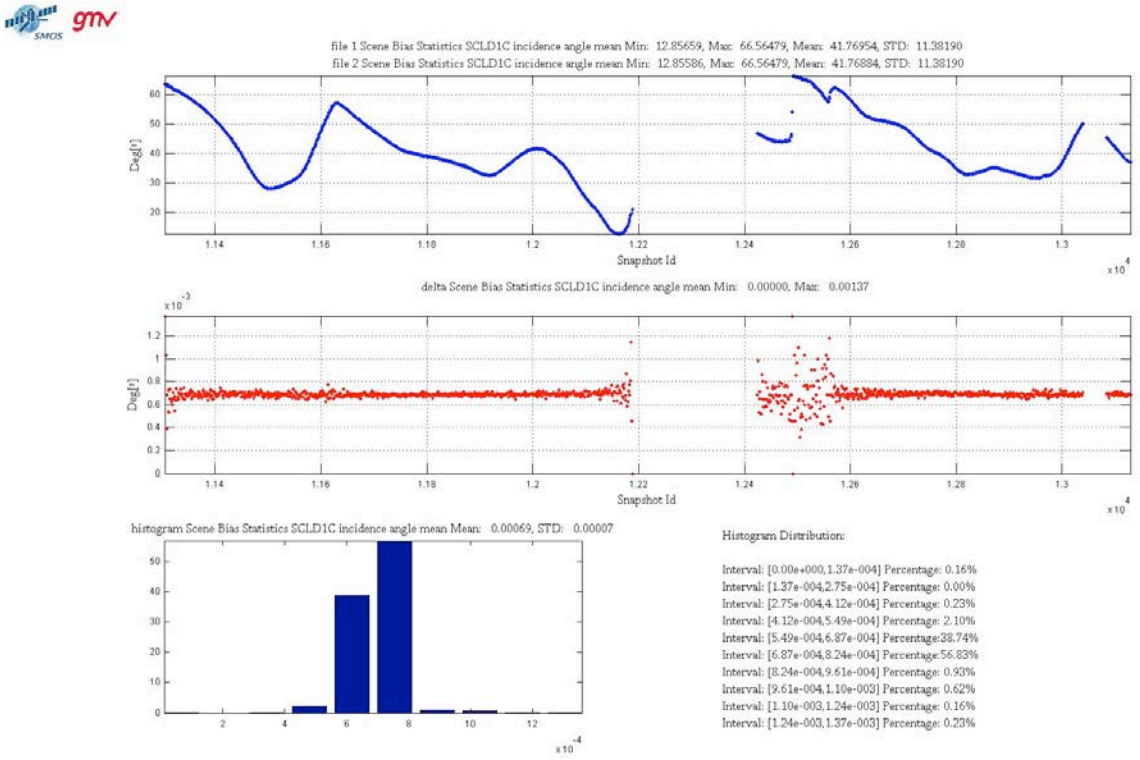

Figure 26. Scene bias plot

The upper plot is the same for Snapshot-bias plots, Therefore it is explained in the previous section. In any case, this plot will be removed from SCoT tool in the scene-bias plots in order to avoid misunderstandings

The bottom plot represents the statistic parameter per snapshot of the differences of all then matching pixels between the two products being compared. First it is computed the differences of each grid point value in product 1 with each grid point value in product 2 per snapshot then it is computed the mean difference, maximum difference, minimum difference and standard deviation of the difference. These statistical parameters can be defined as:

- Max: Maximum of the difference
- Min: Minimum value of the difference
- Mean: Mean value of the difference
- STD: Standard deviation of the difference

Note that the bottom plot represents the statistic parameter of the differences (the differences between the same grid point in the two products) whereas Snapshot-bias plots represent the difference of the statistic parameter (the statistic parameter computed using all grid points in the snapshot).

The SCoT produces plots for each of the following parameters:

- bt_dual_min
- bt_dual_max
- bt_dual_mean
- bt_dual_std
- bt_full_real_min
- bt_full_real_max
- bt_full_real_mean
- bt_full_real_std
- bt_full_imag_min
- bt_full_imag_max
- bt_full_imag_mean
- bt_full_imag_std
- radiometric_accuracy_dual_min
- radiometric_accuracy_dual_max
- radiometric_accuracy_dual_mean
- radiometric_accuracy_dual_std
- radiometric_accuracy_full_min
- radiometric_accuracy_full_max
- radiometric_accuracy_full_mean
- radiometric_accuracy_full_std
- incidence_angle_min
- incidence_angle_max
- incidence_angle_mean
- incidence_angle_std
- azimuth_angle_min
- azimuth_angle_max
- azimuth_angle_mean
- azimuth_angle_std
- faraday_rotation_angle_min
- faraday_rotation_angle_max
- faraday_rotation_angle_mean
- faraday_rotation_angle_std
- geometric_rotation_angle_min
- geometric_rotation_angle_max
- geometric_rotation_angle_mean
- geometric_rotation_angle_std
- footprint_axis_1_min
- footprint_axis_1_max
- footprint_axis_1_mean
- footprint_axis_1_std
- footprint_axis_2_min
- footprint_axis_2_max
- footprint_axis_2_mean

- footprint_axis_2_std

The '_max' type parameters are computed according the following pseudo code description:

```
parameter.max = parameter[0];
for( i = pixel_list.begin(); i != pixel_list.end(); i++ )
{
   parameter.max = max( parameter.max, parameter[i] );
}
```

The '_min' type parameters are computed according the following pseudo code description:

```
parameter.min = parameter[0];
for( i = pixel_list.begin(); i != pixel_list.end(); i++ )
{
   parameter.min = min( parameter.min, parameter[i] );
}
```

The '_mean type parameters are computed according the following pseudo code description:

```
for( i = pixel_list.begin(); i != pixel_list.end(); i++ )
{
   parameter.mean += parameter[i];
}
parameter.mean /= number_of_pixels;
```

The '_std' type parameters are computed according the following pseudo code description:

```
for( i = pixel_list.begin(); i != pixel_list.end(); i++ )
{
   parameter.std += pow( parameter[i] – parameter.mean, 2 );
}
parameter.std /= sqrt( parameter.std / ( number_of_pixels – 1) );
```

5.4.12. GEOLOCATED PLOTS

Value is plotted over a world map, tagged with longitude and latitude. An histogram is also represented, containing the information about the values in the plot.

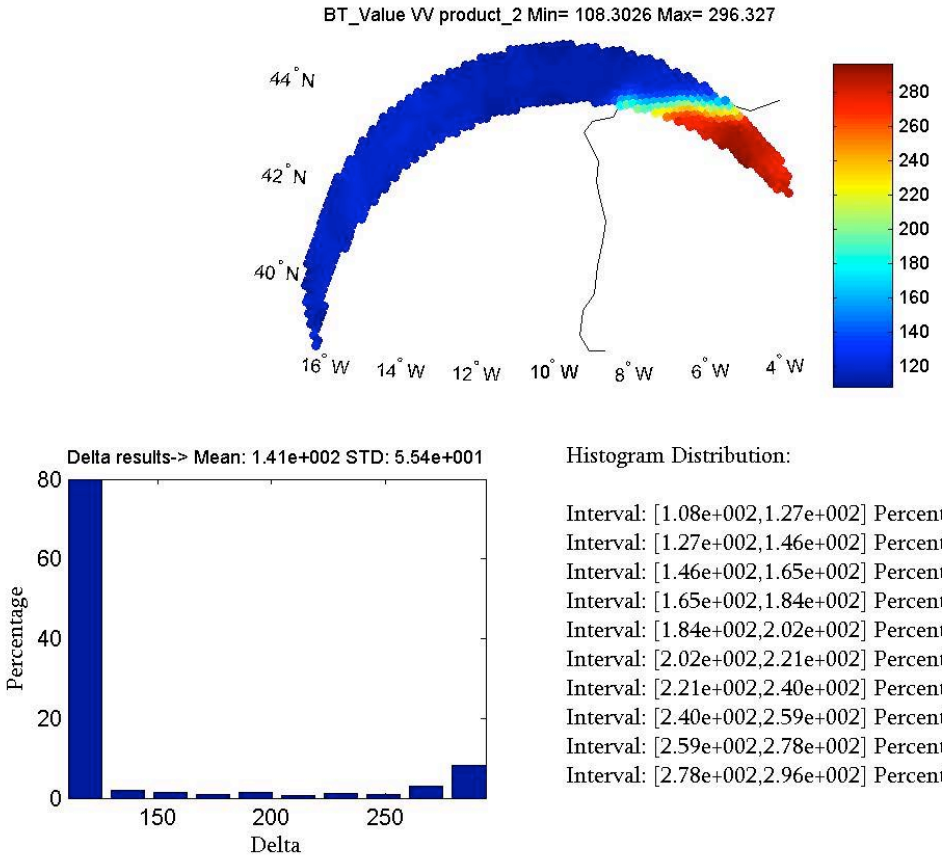

Figure 27. Geolocated plot

6. ANNEXES

6.1. ANNEX1: SCOT MATLAB CALLS

6.1.1. L1A MATLAB FUNCTIONS

6.1.1.1. generateMIR_SC_TAR_X1A_snapshot_plots

6.1.1.1.1. Description

Generates SNAPSHOT plots comparing two products of type MIR_SC_D1A, MIR_SC_F1A, MIR_TARD1A or MIR_TARF1A. All fields for which these type of plots are available can be plotted.

6.1.1.1.2. Prototype

```
[error_code]=
generateMIR_SC_TAR_X1A_snapshot_plots(DataBlockNameAndPath_1,DataBlockNameAnd
Path_2, OutputPath, SnapshotID_range FieldName)
```

6.1.1.1.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

SnapshotID_range: Snapshot id range in Matlab notation. It will be created one plot for each snapshot within the range. It is advised to limit the number of snapshots to be plotted to limit the execution time and the number of plots.

Example of single snapshot: 10400

Example of a continuous range: 10400:10450

Example of range in steps of 5: 10400:5:10450

FieldName: Field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available

- Calib_Visib
- Receiver_Temp
- Sys_Temp
- Receiver_Noise_Temp
- NIR_Brightness_Temp

6.1.1.1.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.1.5. Example:

```
generateMIR_SC_TAR_X1A_snapshot_plots('SM_TEST_MIR_SC_D1A_20070223T062102_200
70223T070525_201_001_5.DBL',
'SM_TEST_MIR_SC_D1A_20070223T062102_20070223T070525_001_002_0.DBL',
'C:\temp',11261:11264, 'NIR_Brightness_Temp')
```

6.1.1.1.6. Output Plot Types

- Snapshot - Matrix field Plots

- Snapshot - LICEF Parameter Plots
- Snapshot – NIR BT Plots

6.1.1.2. generateMIR_SC_TAR_X1A_per_snapshot_plots

6.1.1.2.1. Description

Generates PER_SNAPSHOT plots comparing two products of type MIR_SC_D1A, MIR_SC_F1A, MIR_TARD1A or MIR_TARF1A

6.1.1.2.2. Prototype

```
[error_code]= generateMIR_SC_TAR_X1A_per_snapshot_plots
(DataBlockNameAndPath_1,DataBlockNameAndPath_2, OutputPath, FieldName)
```

6.1.1.2.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

FieldName: Field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available
- Snapshot_Time: Plots days, seconds and microseconds
- days
- seconds
- microseconds
- Snapshot_ID
- Snapshot_OBET
- Correlator_Layer
- Snapshot_Order
- Pol_Mode
- Antenna_Boresight

6.1.1.2.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.2.5. Example:

```
generateMIR_SC_TAR_X1A_per_snapshot_plots('SM_TEST_MIR_SC_D1A_20070223T061044
_20070223T061106_200_001_5.DBL',
'SM_TEST_MIR_SC_D1A_20070223T061044_20070223T061106_001_003_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results', 'ALL')
```

6.1.1.2.6. Output Plot Types

- Per Snapshot Plots

6.1.1.3. generateCRSX1A_snapshot_plots

6.1.1.3.1. Description

Generates SNAPSHOT plots comparing two products of type MIR_CRSD1A, MIR_CRSU1A. All fields for which this type of plots are available can be plotted. DPGS formats V2, V3, V3.4.6, V3.5 and V5.0.0

are supported. First, the environment variable DPGS_format must be set to 'V2', 'V3', 'V3.4.6', 'V3.5', 'V5.0.0' or 'V5.5.0' in each case.Prototype

```
[error_code]=
generateCRSX1A_snapshot_plots(DataBlockNameAndPath_1,DataBlockNameAndPath_2,
OutputPath, DSR_ID_range ,FieldName)
```

6.1.1.3.2. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

DSR_ID_range: Data set record range in Matlab notation. It will be created one plot for each data set record within the range. It is advised to limit the number of DSRs to be plotted to limit the execution time and the number of plots.

Example of single snapshot: 1

Example of a continuous range: 1:15

Example of range in steps of 5: 1:5:15

FieldName: The fields to plot depend on the DPGS format version.

For DPGS V2, field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available
- PMS_ID
- Temperature
- Gain
- Offset
- T_Rec_Ref_LICEF_H
- T_Rec_Ref_LICEF_V
- FWF_Origin
- FWF_Origin_Quality
- Receiver_Temp
- Long_PMS_ID
- Long_Temperature
- Long_Gain
- Long_Offset
- Long_T_Rec_Ref_LICEF_H
- Long_T_Rec_Ref_LICEF_V

For DPGS V3 fields to be plotted are the following:

- ALL: plots all the fields
- PMS: plots all the fields with only one DSR (Cons_PMS_Coefficients)
- Long_PMS: plots all the fields with more than one DSR (Cons_Long_PMS_Coefficients)
- PMS_ID
- Temperature
- Gain
- Offset
- T_Rec_Ref_LICEF_H
- T_Rec_Ref_LICEF_V
- T_Rec_Ref: plots T_Rec_Ref_LICEF_H and T_Rec_Ref_LICEF_V
- FWF_Amplitude: plots all fields within Cons_FWF_Amplitude
- Long_FWF_Amplitude: plots all fields within Cons_Long_FWF_Amplitude
- FWF_Phase: plots all fields within Cons_FWF_Phase

For DPGS formats V3.4.6 and V3.5, fields to be plotted are the following:

- ALL: plots all the fields
- PMS: plots all the fields with only one DSR (Cons_PMS_Coefficients)
- Long_PMS: plots all the fields with more than one DSR (Cons_Long_PMS_Coefficients)
- PMS_ID
- Temperature
- NIR_R
- Gain
- Offset
- T_Rec_Ref_LICEF_H
- T_Rec_Ref_LICEF_V
- T_Rec_Ref: plots T_Rec_Ref_LICEF_H and T_Rec_Ref_LICEF_V
- FWF_Amplitude: plots all fields within Cons_FWF_Amplitude
- Long_FWF_Amplitude: plots all fields within Cons_Long_FWF_Amplitude
- FWF_Phase: plots all fields within Cons_FWF_Phase

For DPGS formats V5.0.0 and V5.5.0, fields to be plotted are the following:

- ALL: plots all the fields
- PMS: plots all the fields with only one DSR (Cons_PMS_Coefficients)
- Long_PMS: plots all the fields with more than one DSR (Cons_Long_PMS_Coefficients)
- Short_PMS_Offset: plots all the fields with more than one DSR (Cons_Long_PMS_Coefficients)
- PMS_ID
- Temperature
- NIR_R
- Gain
- Offset
- T_Rec_Ref_LICEF_H
- T_Rec_Ref_LICEF_V
- T_Rec_Ref: plots T_Rec_Ref_LICEF_H and T_Rec_Ref_LICEF_V
- FWF_Amplitude: plots all fields within Cons_FWF_Amplitude
- Long_FWF_Amplitude: plots all fields within Cons_Long_FWF_Amplitude
- FWF_Phase: plots all fields within Cons_FWF_Phase

Note that shared fields such as "PMS_ID", “Temperature”, etc., are plotted both for Cons_PMS_Coefficients and Cons_Long_PMS_Coefficients.

6.1.1.3.3. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.3.4. Example:

```
generateCRSX1A_snapshot_plots('SM_TEST_MIR_CRSD1A_20070227T073013_20070227T09
3701_200_001_5.DBL',
'SM_TEST_MIR_CRSD1A_20070227T073013_20070227T093701_001_003_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results',1,'Gain')
```

6.1.1.3.5. Output Plot Types

- Snapshot - Matrix field Plots
- Snapshot - LICEF Parameter Plots

6.1.1.4. generatCRSX1A_per_snapshot_plots

6.1.1.4.1. Description

Generates PER_SNAPSHOT plots comparing two products of type CRSx1A. DPGS format V2, V3, V3.4.6, V3.5, V5.0.0 and V5.5.0 are supported, prior setting the DPGS_format variable.

6.1.1.4.2. Prototype

```
[error_code]= generateCRSX1A_per_snapshot_plots
(DataBlockNameAndPath_1,DataBlockNameAndPath_2, OutputPath, FieldName)
```

6.1.1.4.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

FieldName: For DPGS V2, the available fieldnames are the following. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available
- AmplPhase_Start_Time: Plots days, seconds and microseconds of AmplPhase start time.
- AmplPhase_Start_Time_Days: Plots days of AmplPhase start time.
- AmplPhase_Start_Time_Seconds: Plots seconds of AmplPhase start time.
- AmplPhase_Start_Time_Microseconds: Plots microseconds of AmplPhase start time.
- AmplPhase_Stop_Time: Plots days, seconds and microseconds of AmplPhase stop time.
- AmplPhase_Stop_Time_Days: Plots days of AmplPhase stop time.
- AmplPhase_Stop_Time_Seconds: Plots seconds of AmplPhase stop time.
- AmplPhase_Stop_Time_Microseconds: Plots microseconds of AmplPhase stop time.
- AmplPhase_CorrelatorLayer: Plot Correlator Layer of AmplPhase.
- AmplPhase_Samples: Plot Samples of AmplPhase.
- AmplPhase_TimeFromANX: Plot Time from ANX of AmplPhase.
- PMS_Coeff_Start_Time: Plots days, seconds and microseconds of Cons_PMS_Coefficients start time.
- PMS_Coeff_Start_Time_Days: Plots days of Cons_PMS_Coefficients start time.
- PMS_Coeff_Start_Time_Seconds: Plots seconds of Cons_PMS_Coefficients start time.
- PMS_Coeff_Start_Time_Microseconds: Plots microseconds of Cons_PMS_Coefficients start time.
- PMS_Coeff_Stop_Time: Plots days, seconds and microseconds of Cons_PMS_Coefficients stop time.
- PMS_Coeff_Stop_Time_Days: Plots days of Cons_PMS_Coefficients stop time.
- PMS_Coeff_Stop_Time_Seconds: Plots seconds of Cons_PMS_Coefficients stop time.
- PMS_Coeff_Stop_Time_Microseconds: Plots microseconds of Cons_PMS_Coefficients stop time.
- PMS_Coeff_Samples: Plot Samples of Cons_PMS_Coefficients.
- PMS_Coeff_TimeFromANX: Plot Time from ANX of Cons_PMS_Coefficients.
- Long_PMS_Coeff_Start_Time : Plots days, seconds and microseconds of Cons_PMS_Coefficients start time.
- Long_PMS_Coeff_Start_Time_Days: Plots days of Cons_Long_PMS_Coefficients start time.
- Long_PMS_Coeff_Start_Time_Seconds: Plots seconds of Cons_Long_PMS_Coefficients start time.
- Long_PMS_Coeff_Start_Time_Microseconds: Plots microseconds of Cons_Long_PMS_Coefficients start time.
- Long_PMS_Coeff_Stop_Time: Plots days, seconds and microseconds of Cons_Long_PMS_Coefficients stop time.

- Long_PMS_Coeff_Stop_Time_Days: Plots days of Cons_Long_PMS_Coefficients stop time.
- Long_PMS_Coeff_Stop_Time_Seconds: Plots seconds of Cons_Long_PMS_Coefficients stop time.
- Long_PMS_Coeff_Stop_Time_Microseconds: Plots microseconds of Cons_Long_PMS_Coefficients stop time.
- Long_PMS_Coeff_Samples: Plot Samples of Cons_Long_PMS_Coefficients.
- Long_PMS_Coeff_TimeFromANX: Plot Time from ANX of Cons_Long_PMS_Coefficients.

For DPGS V3 and V3.4.6, the available plots are:

- ALL: plots all fields
- LongPMS_Start_Time
- LongPMS_Stop_Time
- LongPMS_Samples
- LongPMS_TimeFromANX
- LongPMS_QualityInformation
- FWF_Amplitude_Start_Time
- FWF_Amplitude_Stop_Time
- FWF_Amplitude_Samples
- FWF_Amplitude_TimeFromANX
- FWF_Amplitude_CorrelatorLayer
- FWF_Amplitude_QualityInformation
- FWF_Phase_Start_Time
- FWF_Phase_Stop_Time
- FWF_Phase_Samples
- FWF_Phase_TimeFromANX
- FWF_Phase_CorrelatorLayer
- FWF_Phase_QualityInformation

For DPGS V3.5, the available plots are:

- ALL: plots all fields
- LongPMS_Start_Time
- LongPMS_Stop_Time
- LongPMS_Samples
- LongPMS_TimeFromANX
- LongPMS_QualityInformation
- FWF_Amplitude_Start_Time
- FWF_Amplitude_Stop_Time
- FWF_Amplitude_Samples
- FWF_Amplitude_TimeFromANX
- FWF_Amplitude_CorrelatorLayer
- FWF_Amplitude_QualityInformation
- FWF_Phase_Start_Time
- FWF_Phase_Stop_Time
- FWF_Phase_Samples
- FWF_Phase_TimeFromANX
- FWF_Phase_CorrelatorLayer
- FWF_Phase_QualityInformation
- L0_Unlock_Start_Time
- L0_Unlock_Stop_Time

- L0_Unlock_CMN_Id

For DPGS V5.0.0, the available plots are:

- ALL: plots all fields
- LongPMS_Start_Time
- LongPMS_Stop_Time
- LongPMS_Samples
- LongPMS_TimeFromANX
- LongPMS_QualityInformation
- FWF_Amplitude_Start_Time
- FWF_Amplitude_Stop_Time
- FWF_Amplitude_Samples
- FWF_Amplitude_TimeFromANX
- FWF_Amplitude_CorrelatorLayer
- FWF_Amplitude_QualityInformation
- FWF_Phase_Start_Time
- FWF_Phase_Stop_Time
- FWF_Phase_Samples
- FWF_Phase_TimeFromANX
- FWF_Phase_CorrelatorLayer
- FWF_Phase_QualityInformation
- L0_Unlock_Start_Time
- L0_Unlock_Stop_Time
- L0_Unlock_CMN_Id
- Cons_Short_PMS_Offset_Start_Time
- Cons_Short_PMS_Offset_Stop_Time
- Cons_Short_PMS_Offset_Samples
- Cons_Short_PMS_Offset_PMS_ID
- Cons_Short_PMS_Offset_Temperature
- Cons_Short_PMS_Offset_Offset
- Cons_Short_PMS_QualityInformation
- Cons_PMS_Offset_Start_Time
- Cons_PMS_Offset_Stop_Time
- Cons_PMS_Offset_Samples
- Cons_PMS_Offset_TimeFromANX
- Cons_PMS_Offset_PMS_ID
- Cons_PMS_Offset_Temperature
- Cons_PMS_Offset_Offset
- Cons_PMS_Offset_QualityInformation
-

For DPGS V5.5.0, the available plots are:

- ALL: plots all fields
- LongPMS_Start_Time
- LongPMS_Stop_Time
- LongPMS_Samples
- LongPMS_TimeFromANX
- LongPMS_QualityInformation
- FWF_Amplitude_Start_Time
- FWF_Amplitude_Stop_Time

- FWF_Amplitude_Samples
- FWF_Amplitude_TimeFromANX
- FWF_Amplitude_CorrelatorLayer
- FWF_Amplitude_QualityInformation
- Cons_Short_PMS_Offset_Start_Time
- Cons_Short_PMS_Offset_Stop_Time
- Cons_Short_PMS_Offset_Samples
- Cons_Short_PMS_Offset_PMS_ID
- Cons_Short_PMS_Offset_Temperature
- Cons_Short_PMS_Offset_Offset
- Cons_Short_PMS_QualityInformation
- Cons_PMS_Offset_Start_Time
- Cons_PMS_Offset_Stop_Time
- Cons_PMS_Offset_Samples
- Cons_PMS_Offset_TimeFromANX
- Cons_PMS_Offset_PMS_ID
- Cons_PMS_Offset_Temperature
- Cons_PMS_Offset_Offset
- Cons_PMS_Offset_QualityInformation

6.1.1.4.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.4.5. Example:

```
generateCRSX1A_per_snapshot_plots(SM_TEST_MIR_CRSD1A_20070223T061012_20070223
T061039_001_001_0.DBL ',
‘SM_TEST_MIR_CRSD1A_20070223T061012_20070223T061039_001_001_0.DBL’,
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results', 'ALL')
```

6.1.1.4.6. Output Plot Types

- Per Snapshot Plots

6.1.1.5. generatCSTX1A_per_snapshot_plots

6.1.1.5.1. Description

Generates PER_SNAPSHOT plots comparing two products of type CSTx1A. DPGS format V5.5.0 is supported, prior setting the DPGS_format variable.

6.1.1.5.2. Prototype

```
[error_code]= generateCSTX1A_per_snapshot_plots
(DataBlockNameAndPath_1,DataBlockNameAndPath_2, OutputPath, FieldName)
```

6.1.1.5.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

FieldName: For DPGS V5.5.0, the available fieldnames are the following. It must be one of the following (it is case insensitive):

- ALL: plots all fields
- FWF_Phase_Start_Time
- FWF_Phase_Stop_Time
- FWF_Phase_Samples
- FWF_Phase_TimeFromANX
- FWF_Phase_CorrelatorLayer
- FWF_Phase_QualityInformation
- L0_Unlock_Start_Time
- L0_Unlock_Stop_Time
- L0_Unlock_CMN_Id

6.1.1.5.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.5.5. Example:

```
generateCSTX1A_per_snapshot_plots(SM_TEST_MIR_CSTD1A_20070223T061012_20070223
T061039_001_001_0.DBL ',
‘SM_TEST_MIR_CSTD1A_20070223T061012_20070223T061039_001_001_0.DBL’,
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results', 'ALL')
```

6.1.1.5.6. Output Plot Types

- Per Snapshot Plots

6.1.1.6. generateUAVX1A_snapshot_plots

6.1.1.6.1. Description

Generates SNAPSHOT plots comparing two products of type MIR_UAVD1A, MIR_UAVU1A. All fields for which these type of plots are available can be plotted.

6.1.1.6.2. Prototype

```
[error_code]=
generateUAVX1A_snapshot_plots(DataBlockNameAndPath_1,DataBlockNameAndPath_2,
OutputPath, DSR_range ,FieldName)
```

6.1.1.6.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

DSR_range: Data set record range in Matlab notation. It will be created one plot for each data set record within the range. It is advised to limit the number of DSRs to be plotted to limit the execution time and the number of plots.

Example of single snapshot: 1

Example of a continuous range: 1:15

Example of range in steps of 5: 1:5:15

FieldName: Field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available
- Offset

- Receiver_Temp

6.1.1.6.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.6.5. Example:

```
generateUAVX1A_snapshot_plots('SM_TEST_MIR_UAVD1A_20070227T212010_20070227T23
0208_200_001_5.DBL',
'SM_TEST_MIR_UAVD1A_20070227T212010_20070424T230208_001_003_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results',1, 'ALL')
```

6.1.1.6.6. Output Plot Types

- Snapshot - Matrix field Plots
- Snapshot - LICEF Parameter Plots

6.1.1.7. generateUAVX1A_per_snapshot_plots

6.1.1.7.1. Description

Generates PER SNAPSHOT plots comparing two products of type MIR_UAVD1A, MIR_UAVU1A. All fields for which these type of plots are available can be plotted.

6.1.1.7.2. Prototype

```
[error_code]=
generateUAVX1A_per_snapshot_plots(DataBlockNameAndPath_1,DataBlockNameAndPath
_2, OutputPath,FieldName)
```

6.1.1.7.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

FieldName: Field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available
- Start_Time: plots start time days, seconds and microseconds
- Start_Time_Days: plots start time days
- Start_Time_Seconds: plots start time seconds
- Stop_Time: plots stop time days, seconds and microseconds
- Stop_Time_Days: plots stop time days
- Stop_Time_Seconds: plots stop time seconds
- Correlator_Layer: plots correlator layer
- Samples: plots samples field

6.1.1.7.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.7.5. Example:

```
generateUAVX1A_per_snapshot_plots('SM_TEST_MIR_UAVD1A_20070227T212010_2007022
7T230208_200_001_5.DBL',
'SM_TEST_MIR_UAVD1A_20070227T212010_20070424T230208_001_003_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results' 'ALL')
```


6.1.1.7.6. Output Plot Types

Per Snapshot plots

6.1.1.8. generateANIR1A_snapshot_plots

6.1.1.8.1. Description

Generates SNAPSHOT plots comparing two products of type MIR_ANIR1A. All fields for which these types of plots are available can be plotted.

6.1.1.8.2. Prototype

```
[error_code]=
generate_ANIR1A_snapshot_plots(DataBlockNameAndPath_1,DataBlockNameAndPath_2,
OutputPath, DSR_range ,FieldName)
```

6.1.1.8.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

DSR_range: Data set record range in Matlab notation. It will be created one plot for each data set record within the range. It is advised to limit the number of DSRs to be plotted to limit the execution time and the number of plots.

Example of single snapshot: 1

Example of a continuous range: 1:15

Example of range in steps of 5: 1:5:15

FieldName: Field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available
- NIR_A: plots all fields of NIR-A vector
- NIR_R: plots all fields of NIR-R vector
- NIR_A_Expected_BT
- NIR_A_Observed_Antenna_BT
- NIR_A_T_Noise_Cal
- NIR_A_T_Phu
- NIR_A_T_Ph1
- NIR_A_T_Ph3
- NIR_A_T_Ph67 : plots Tph6 and Tph7
- NIR_R_Observed_BT
- NIR_R_T_Noise_Cal_Ref
- NIR_R_T_Phu
- NIR_R_T_Ph1
- NIR_R_T_Ph3
- NIR_R_T_Ph67 : plots Tph6 and Tph7
- Cross_Coupling_Factor
- Leakage_Factor

If DPGS format is V3.5, the following field names can also be plotted:

- Average_NIR_A: plots all fields of Average NIR-A vector
- Average_NIR_R: plots all fields of Average NIR-R vector
- Average_NIR_A_Expected_BT
- Average_NIR_A_Observed_Antenna_BT

- Average_NIR_A_T_Noise_Cal
- Average_NIR_A_T_Phu
- Average_NIR_A_T_Ph1
- Average_NIR_A_T_Ph3
- Average_NIR_A_T_Ph67: plots average Tph6 and Tph7
- Average_NIR_R_Observed_BT
- Average_NIR_R_T_Noise_Cal_Ref
- Average_NIR_R_T_Phu
- Average_NIR_R_T_Ph1
- Average_NIR_R_T_Ph3
- Average_NIR_R_T_Ph67: plots averageTph6 and Tph7
- Average_Cross_Coupling_Factor
- Average_Leakage_Factor

6.1.1.8.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.8.5. Example:

```
generateANIR1A_snapshot_plots('SM_TEST_MIR_ANIR1A_20070227T212010_20070227T23
0208_200_001_5.DBL',
'SM_TEST_MIR_ANIR1A_20070227T212010_20070424T230208_001_003_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results',1, 'ALL')
```

6.1.1.8.6. Output Plot Types

- NIR field plots

6.1.1.9. generateMIR_ANIR1A_per_snapshot_plots

6.1.1.9.1. Description

Generates PER_SNAPSHOT plots comparing two products of MIR_ANIR1A

6.1.1.9.2. Prototype

```
[error_code]= generateMIR_ANIR1A_per_snapshot_plots
(DataBlockNameAndPath_1,DataBlockNameAndPath_2, OutputPath, FieldName)
```

6.1.1.9.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlock9NameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

FieldName: Field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available
- NIR_A: plots all fields of NIR_A vector
- NIR_R: plots all fields of NIR_R vector
- NIR_A_Start_Time: plots days, seconds and microseconds of NIR-A start time.
- NIR_A_Start_Time_Days
- NIR_A_Start_Time_Seconds
- NIR_A_Start_Time_Microseconds

- NIR_A_Stop_Time: plots days, seconds and microseconds of NIR-A stop time.
- NIR_A_Stop_Time_Days
- NIR_A_Stop_Time_Seconds
- NIR_A_Stop_Time_Microseconds
- NIR_A_Samples
- NIR_A_CorrelatorLayer
- NIR_R_Start_Time: plots days, seconds and microseconds of NIR-R start time.
- NIR_R_Start_Time_Days
- NIR_R_Start_Time_Seconds
- NIR_R_Start_Time_Microseconds
- NIR_R_Stop_Time: plots days, seconds and microseconds of NIR-R stop time.
- NIR_R_Stop_Time_Days
- NIR_R_Stop_Time_Seconds
- NIR_R_Stop_Time_Microseconds
- NIR_R_Samples
- NIR_A_Quality_Information
- NIR_R_Quality_Information

If DPGS format is V3.5, the following field names can also be plotted:

- Average_NIR_A_Quality_Information
- Average_NIR_R_Quality_Information
- Average_NIR_A
- Average_NIR_R
- Average_NIR_A_Start_Time
- Average_NIR_A_Start_Time_Days
- Average_NIR_A_Start_Time_Seconds
- Average_NIR_A_Start_Time_Microseconds
- Average_NIR_A_Stop_Time
- Average_NIR_A_Stop_Time_Days
- Average_NIR_A_Stop_Time_Seconds
- Average_NIR_A_Stop_Time_Microseconds
- Average_NIR_A_Samples
- Average_NIR_A_CorrelatorLayer
- Average_NIR_R_Start_Time
- Average_NIR_R_Start_Time_Days
- Average_NIR_R_Start_Time_Seconds
- Average_NIR_R_Start_Time_Microseconds
- Average_NIR_R_Stop_Time
- Average_NIR_R_Stop_Time_Days
- Average_NIR_R_Stop_Time_Seconds
- Average_NIR_R_Stop_Time_Microseconds
- Average_NIR_R_Samples

6.1.1.9.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.9.5. Example:

```
generateMIR_ANIR1A_per_snapshot_plots(SM_TEST_MIR_ANIR1A_20121116T171914_2012
1116T173746_001_001_0.DBL',
SM_TEST_MIR_ANIR1A_20121116T171914_20121116T173746_001_001_5.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results', 'ALL')
```

6.1.1.9.6. Output Plot Types

- Per Snapshot Plots

6.1.1.10. generateTLM_MIRA1A_plots

6.1.1.10.1. Description

Generates plots comparing two products of type TLM_MIRA1A. All fields are covered by this function

6.1.1.10.2. Prototype

```
[error_code]= generateTLM_MIRA1A_plots (
DataBlockNameAndPath_1,DataBlockNameAndPath_2, OutputPath)
```

6.1.1.10.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared
DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared
OutputPath: Output path

6.1.1.10.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.10.5. Example:

```
generateTLM_MIRA1A_plots('SM_TEST_TLM_MIRA1A_20070223T062100_20070223T070525_
200_001_5.DBL',
'SM_TEST_TLM_MIRA1A_20070223T062102_20070223T070525_001_001_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results')
```

6.1.1.10.6. Output Plot Types

- Per Snapshot Plots
- Snapshot - Matrix field Plots

6.1.1.11. generateMIR_SC_TAR_X1A_statistichs

6.1.1.11.1. Description

Generates plots comparing two products of type MIR_TARx1A and MIR_SC_x1A in a statistical way. It computes for every snapshot the following parameters for each vector field inside:

- Maximum Error
- Mean Error (mean of the delta between two vectors)
- STD of error (std of the delta between two vectors

One plot type per polarization mode is created: 2 for dual-pol products and 8 for full-pol products. The fields that are analyzed are the following:

- Calibrated Visibilities
- Receiver Temperatures
- System Temperatures

- Receiver Noise Temperatures
- NIR Brightness Temperature H
- NIR Brightness Temperature V
- NIR Brightness Temperature T3
- NIR Brightness Temperature T4

6.1.1.11.2. Prototype

```
[error_code] = generateMIR_SC_TAR_X1A_statistichs
(aDataBlockNameAndPath_1,aDataBlockNameAndPath_2, aRange, aOutputPath )
```

6.1.1.11.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

aRange: Snapshot id range in Matlab notation. It will be created one plot for each snapshot within the range. It is advised to limit the number of snapshots to be plotted to limit the execution time and the number of plots.

Example of single snapshot: 10400

Example of a continuous range: 10400:10450

Example of range in steps of 5: 10400:5:10450

If the range is outside the snapshots contained inside the product a message error will be shown. If the input range is bigger than the range that the product contains, all missing snapshots will be shown in the execution log.

Range starting at –1 is accepted, in this case SCoT will interpret this as the whole product to be compared.

OutputPath: Output path

6.1.1.11.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.1.11.5. Example:

```
generateMIR_SC_TAR_X1A_statistichs
('SM_TEST_MIR_SC_D1A_20070223T061044_20070223T061044_200_002_5.DBL',
'SM_TEST_MIR_SC_D1A_20070223T061044_20070223T061044_001_003_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results',10641:10660)
```

6.1.2. L1B MATLAB FUNCTIONS

6.1.2.1. generateSC_X1B_snapshot_plots

6.1.2.1.1. Description

Generates SNAPSHOT plots comparing two products of type MIR_SC_D1B,_TARD1B, MIR_SC_F1B, or MIR_TARF1B.

Scene_BT_Fourier field for which these type of plots are available can be plotted.

6.1.2.1.2. Prototype

```
[error_code]= generateSC_X1B_snapshot_plots
(DataBlockNameAndPath_1,DataBlockNameAndPath_2, OutputPath, SnapshotID_range
FieldName)
```

6.1.2.1.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

SnapshotID_range: Snapshot id range in Matlab notation. It will be created one plot for each snapshot within the range. It is advised to limit the number of snapshots to be plotted to limit the execution time and the number of plots.

Example of single snapshot: 10400

Example of a continuous range: 10400:10450

Example of range in steps of 5: 10400:5:10450

FieldName: Field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- 'ALL': This plots all fields for which this type of plot is available (in this case is only available the Scene_BT_Fourier) or 'Scene_BT_Fourier'

6.1.2.1.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.2.1.5. Example:

```
generateSC_X1B_snapshot_plots('SM_TEST_MIR_SC_D1B_20070223T061044_20070223T06
1044_200_002_5.DBL',
'SM_TEST_MIR_SC_D1B_20070223T061044_20070223T061044_001_003_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results',10641, 'ALL')
```

6.1.2.1.6. Output Plot Types

- Snapshot – u,v Plots
- Snapshot – xi, eta Plots

6.1.2.2. generateSC_X1B_per_snapshot_plots

6.1.2.2.1. Description

Generates PER_SNAPSHOT plots comparing two products of type MIR_SC_D1B, MIR_TARD1B, MIR_SC_F1B or MIR_TARF1B.

6.1.2.2.2. Prototype

```
[error_code]= generateSC_X1B_per_snapshot_plots
(DataBlockNameAndPath_1,DataBlockNameAndPath_2, OutputPath, FieldName)
```

6.1.2.2.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

OutputPath: Output path

FieldName: Field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available
- 'SnapTime_Days'
- 'SnapTime_Seconds'
- 'SnapTime_Microsec'
- 'Snapshot_ID'
- 'Snapshot_OBET'
- 'X_Position'
- 'Y_Position'
- 'Z_Position'
- 'X_Velocity'
- 'Y_Velocity'
- 'Z_Velocity'
- 'Vector_Source'
- 'Q0'
- 'Q1'
- 'Q2'
- 'Q3'
- 'Flags'
- 'antennaBoresight_1'
- 'antennaBoresight_2'

- 'Accuracy'
- 'Physical_Temperatures_STD'
- 'Average_System_Temperatures'
- 'LICEF_Status_H'
- 'LICEF_Status_V'
- 'CMN_NIR_Status'
- 'Foreign_Sources_Flags'
- 'Direct_Sun_Pos_xi'
- 'Direct_Sun_Pos_eta'
- 'Reflected_Sun_Pos_xi'
- 'Reflected_Sun_Pos_eta'
- 'Direct_Moon_Pos_xi'
- 'Direct_Moon_Pos_eta'
- 'Direct_Sun_BT'

6.1.2.2.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.2.2.5. Example:

```
generateSC_D1B_per_snapshot_plots('SM_TEST_MIR_SC_D1B_20070223T061044_2007022
3T061044_200_002_5.DBL',
'SM_TEST_MIR_SC_D1B_20070223T061044_20070223T061044_001_003_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results', 'ALL')
```

6.1.2.2.6. Output Plot Types

Per Snapshot Plots

6.1.2.3. generateMIR_SC_TAR_X1B_statistichs

6.1.2.3.1. Description

Generates plots comparing two products of type MIR_TARx1B and MIR_SC_x1B in a statistical way. It computes for every snapshot the following parameters for each vector field inside:

- Maximum Error
- Mean Error (mean of the delta between two vectors)
- STD of error (std of the delta between two vectors

Only one plot is shown, containing the parameters for real and imaginary part (full star domain). Only fourier coefficients are analysed.

6.1.2.3.2. Prototype

```
[error_code] = generateMIR_SC_TAR_X1B_statistichs
(aDataBlockNameAndPath_1,aDataBlockNameAndPath_2, aRange, aOutputPath )
```

6.1.2.3.3. Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared

DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared

aRange: Snapshot id range in Matlab notation. It will be created one plot for each snapshot within the range. It is advised to limit the number of snapshots to be plotted to limit the execution time and the number of plots.

Example of single snapshot: 10400

Example of a continuous range: 10400:10450

Example of range in steps of 5: 10400:5:10450

If the range is outside the snapshots contained inside the product a message error will be shown. If the input range is bigger than the range that the product contains, all missing snapshots will be shown in the execution log.

Range starting at –1 is accepted, in this case SCoT will interpret this as the whole product to be compared.

OutputPath: Output path

6.1.2.3.4. Return:

0 if no error where produced and a negative number otherwise.

6.1.2.3.5. Example:

```
generateMIR_SC_TAR_X1B_statistichs
('SM_TEST_MIR_SC_D1B_20070223T061044_20070223T061044_200_002_5.DBL',
'SM_TEST_MIR_SC_D1B_20070223T061044_20070223T061044_001_003_0.DBL',
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results',10641:10660)
```

6.1.3. L1C MATLAB FUNCTIONS

All L1c plots are generated using the same function: generateSCXX1C. This function will determine by its inputs the type of plot to generate. All four L1c science products are supported (MIR_SCLD1C, MIR_SCSD1C, MIR_SCLF1C, MIR_SCSF1C). This function will generate a set of image files with the plots as well as a report in HTML format.

The input files to this function is not the original product but the text files generated by the L1c extractor described in 5.3.3. The exact inputs depend on the type of plots to be generated and are described in the next section.

6.1.3.1. L1c Single Snapshot generation

The input files are the output files of the L1c extractor run in “Single Snapshot for two products” mode.
It is launched as:

generateSCXX1C (file1, file2, output_path)

Where:
file1: file1_SC*xx*1C_SINGLE_SNAPSHOT_ *snapshot_id_creation_date.*txt
file1: file1_SC*xx*1C_SINGLE_SNAPSHOT_ *snapshot_id_creation_date.*txt
output_path: Output path

6.1.3.2. L1c Snapshot-Bias Statistics generation

The input files are the output files of the L1c extractor run in “Statistics for two products” mode.
It is launched as:

generateSCXX1C (file1, file2, output_path)

Where:
file1 file1_SC*xx*1C_STATISTICS_*creation_date.txt*
file1: file2_SC*xx*1C_STATISTICS_*creation_date.txt*
output_path: Output path

For an explanation of the Snapshot-Bias plots and Scene-Bias plots and their differences see sections 5.4.10 and 0.

6.1.3.3. L1c Scene-Bias Statistics generation

The input files are the output files of the L1c extractor run in “Statistics for two products” mode.
It is launched as:

generateSCXX1C (file1, file2, file3, output_path)

Where:
file1 file1_SC*xx*1C_STATISTICS_*creation_date.txt*
file1: file2_SC*xx*1C_STATISTICS_*creation_date.txt*
file3: diff_SC*xx*1C_STATISTICS_*creation_date.txt*
output_path: Output path

For an explanation of the Snapshot-Bias plots and Scene-Bias plots and their differences see sections 5.4.10 and 0.

6.1.3.4. L1c Swath generation

Generates plots of swath fields: latitude, longitude, altitude (in linear mode) and geo-located plots of Grid Point Mask and BT counter. Launched as:

generateMIR_SCXX1C_swath_plots(aFile1,aFile2, aOutputPath)

Where:
aFile1: Path and name of the swath file of the first product to be compared

aFile2: Path and name of the swath file of the second product to be compared
OutputPath: Output path

For an explanation of the swath plots and Scene-Bias plots and their differences see sections 5.4.10 and 0.

6.1.3.5. L1C Browse products plots

Description

Generates plots comparing two products of type MIR_BWSD1C, MIR_BWSF1C, MIR_BWLD1C, MIR_BWLF1C. All fields for which these type of plots are available can be plotted.

Prototype

```
[error_code]= generateBWXX1C_plots
(DataBlockNameAndPath_1,DataBlockNameAndPath_2, OutputPath,FieldName)
```

Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared
DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared
OutputPath: Output path
FieldName: Field name to be plotted or ALL to plot all. It must be one of the following (it is case insensitive):

- ALL: This plots all fields for which this type of plot is available
- Grid_Point_ID
- Grid_Point_Mask
- BT_Data: plots all fields contained into BT_Data
- Flags
- BT_Value
- Radiometric_Accuracy_of_Pixel
- Azimuth_Angle
- Footprint_Axis1
- Footprint_Axis2

Return:

0 if no error where produced and a negative number otherwise.

Example:

```
generateBWXX1C_plots
('SM_TEST_MIR_BWSD1C_20070223T061043_20070223T061106_001_001_0.DBL',
'SM_TEST_MIR_BWSD1C_20070223T061043_20070223T061106_001_001_0.DBL' ,
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results',1, 'ALL')
```

Output Plot Types

- Geolocated snapshot plots.

6.1.3.6. L1C Per Snapshot plots

Description

Generates plots comparing non-vector fields of two products of type MIR_SCSD1C, MIR_SCSF1C, MIR_SCLD1C, MIR_SCLF1C. All field of Swatch DataSet are plotted.

Prototype

```
[error_code]= generateMIR_SCXX1C_per_snapshot_plots
(DataBlockNameAndPath_1,DataBlockNameAndPath_2, OutputPath )
```

Inputs

DataBlockNameAndPath_1: Path and name of the datablock of the first product to be compared
DataBlockNameAndPath_2: Path and name of the datablock of the second product to be compared
OutputPath: Output path

As default it plots all the fields in the Swath Data Set.

Return:

0 if no error where produced and a negative number otherwise.

Example:

```
generateMIR_SCXX1C_per_snapshot_plots
('SM_TEST_MIR_SCSD1C_20070223T061043_20070223T061106_001_001_0.DBL',
'SM_TEST_MIR_SCSD1C_20070223T061043_20070223T061106_001_001_0.DBL' ,
'C:\MATLAB71\work\Matlab_v7_1\products\comparison_results',1)
```

Output Plot Types

Linear plots.

END OF DOCUMENT

