EUMETSAT

MTG Test Data Package Description: FCI Level 1C Format Familiarisation

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1 TEST PACKAGE DESCRIPTION

1.1 Document Scope

This document is a test package description to be included with the delivery of the relevant test package. It details the contents of the test package and provides information about the limitations of the test package, the conformance to any relevant specifications and the intended use of the package.

1.2 Package Overview

This document is the test package description for the following test packages:

- FCI_format_familiarisation_V2.0
- FCI_format_familiarisation_For_SAFs_V1.0

The term test package is used throughout this document as a generic term referring to either test package as both packages are effectively interchangeable and contain the same set of test data:

- Format_familiarisation_V3.0

This test data contains two FCI level 1C datasets to be used for format familiarisation. The format for these test data is derived from:

- MTG Generic Format Specification, V3M
- MTG FCI Level 0 & 1 Format Specification, V3M

The term dataset refers to a number of associated files. In this case, the files of each dataset are all associated to an FCI repeat cycle.

1.3 Package Contents

This package contains the following data:

sha256sum.txt file which contains the checksums for all files in the datasets

FDHSI folder which contains a Full Disk High Spectral Imagery (FDHSI) dataset

- Full images of the Earth.
- 16 channels
- Size: 5568x5568 or 11136x11136 pixels, depending on the channel.

The dataset is divided into a number of body chunk files, a trailer chunk file, and a quick look image.

The quick look is a png file, a composite RGB image where the red component displays data from the vis_06 channel, green from vis_05, and blue from the vis_04.

HRFI folder which contains a HRFI: High Resolution Fast Imagery dataset

- LAC4 (Local Area Coverage number 4, approximately top quarter of the full Earth).
- 4 channels: (VIS 0.6, NIR 2.2, IR 3.8, IR 10.5).
- Size: 3436x11136 or 6870x22272 pixels, depending on the channel.

The dataset is divided into a number of body chunk files and a trailer chunk file. The quick look image is not provided; it would be the top quarter of the FDHSI image.

1.4 Package Usage

This packet of test data is for user familiarisation with the FCI-1C-RRAD dissemination format. It contains representative data contents only and is not generally suitable for scientific processing.

1.5 Applicable and Reference Documents

1.5.1 Applicable Documents

[FCIL1DUG] FCI L1 Dataset User Guide, EUM/MTG/USR/13/719113

1.5.2 Reference Documents

2 KNOWN LIMITATIONS

2.1 Format Issues

2.1.1 Expected Format Evolution

The format and contents of the FCI L1C dataset is not finalised and may require modifications and additions as the MTG system evolves during development. However, it is expected that the overall format and philosophy of the format will not change and that future updates will be minor. As netCDF is self-descriptive, it is expected that the impact of these changes will be minor.

2.1.2 Body Chunk Sizes

The datasets have been chunked from a complete repeat cycle dataset using a simplification that simulates the changing duration of the chunks whilst retaining a fixed, roughly swath-sized section of the reference grid. The number of reference grid rows in the body chunk and the duration of the body chunks should only be considered as a rough sizing estimate for the operational values.

2.1.3 CF Convention Conformance

The CF 1.6 and forthcoming CF 1.7 conventions do not cover the enhanced netCDF-4 constructs that are used in the MTG products such as groups, enumerated data types and unsigned data types. This means that the MTG products cannot currently conform to existing CF conventions. It is hoped that the creation of a CF 2.0 that is compatible with netCDF-4 will allow the products to be made CF compatible.

2.1.4 No Internal Compression and Internal Chunking

Currently, none of the variables in the FCI-1C-RRAD dataset have been compressed using the standard netCDF gzip compression. Additionally, no optimised chunking of large arrays has been performed.

2.1.5 No Special Internal Compression

No special internal compression is currently applied to the radiance arrays.

In order to increase compression ratios above those obtained from using the default netCDF compression, the disseminated radiances are expected to be compressed using a purpose-built charLS (lossless Jpeg) compression module. An additional software module is required for the HDF libraries at the receiver's end in order to invisibly decompress this data.

Chunks retrieved from the archive are not currently expected to have a special compression applied.

2.1.6 External gzip Compression

The actual size of the dataset is about 4.7GB, but the "tar.gz" distributed in this release only requires 1.4GB: the compressed dataset is about 30% of the uncompressed. Or inversely, the uncompressed dataset is about 3.4 times larger than the compressed. This would indicate that the compression ratio (using the gzip algorithm) to be expected in future releases could be equally efficient.

However this compression rate is not realistic because there are some exceptional considerations with respect to the test data which is delivered here. Future releases will be compressed less efficiently.

In the following description we consider that all data in this chunks is only stored in the "pixel_quality" (1 byte/pixel) and "effective_radiance" (unsigned short integers, 2 bytes/pixel) variables. In total there are 3 bytes/pixel. Attributes and other information are ignored.

"pixel_quality" variables are negligible after compression

From the 4.7GB uncompressed files, about 1/3 of the data correspond to the "pixel_quality" variables (1 byte per pixel out of 3), which is almost "0" for every chunk and every channel. These variables are very efficiently compressed, and therefore they are negligible in the compressed gzip file.

Only 12 bits out of 16 contain information in the "effective_radiance" variables

2/3 of the data (3.1GB) corresponds to "effective_radiance". It contains 2 bytes per pixel, 16 bits, but, only 12 bits (13 bits in the IR38, but we ignore it here) are meaningful, the other 4 bits are set to "0". Therefore we could expect compressed files to be 12/16=75% of the uncompressed: 2.4GB.

Several pixels are masked

An important fraction of the "effective_radiance" variables contain "NC_FILL_VALUE" because they refer to the mask of the Earth. Considering the number of pixels of the full image and the number of pixels in a circle having the same diameter as the full image (the Earth), ~21% of pixels are located in the mask and ~79% contain information. Therefore we only need 1.8GB.

Expanded pixels

We used SEVIRI data as an input to generate this dataset, and we expand it to get FCI resolution. From 1 pixel we get 2x2=4 pixels, but since this higher resolution is not real, the outcome is somehow smooth; and it must be relatively easy to compress this data.

In conclusion, after these considerations indicated here, the compressed dataset shrinks from about 1.8GB to 1.4GB, which is about 78% of the uncompressed. Or in other words, the uncompressed data is 1.3 times larger than the compressed. These are more realistic ratios.

2.1.7 Missing Root Attributes

The data discovery attributes indicating the footprint of the dataset (as specified by the NetCDF Attribute Convention for Dataset Discovery) are not currently included in the root group. They were added to the format description too late for inclusion in this version. These attributes are:

- geospatial_lat_min,
- geospatial_lat_max,
- geospatial_lon_min,
- geospatial_lon_max.

2.2 Data Content Issues

This test package is intended for format familiarisation. As such, the data contents, whilst having the broad characteristics of an operational dataset, are not meant to be used for scientific processing or validation and many of the more detailed physical characteristics of an actual FCI L1C dataset may be absent or inaccurate.

Some of the known limitations are described below.

2.2.1 Data Simulation

The FCI Earth scene data was generated from SEVIRI Level 1.5 images and used simulated values of FCI channels as proxy data. The infrared channels, i.e. at 3.8, 6.2, 7.3, 8.7, 9.6, 10.8, 12.0 and 13.4 µm, are sufficiently similar to the SEVIRI equivalents that no especial effort is required except for an adaptation of the centre wavelength. For the shortwave or ‘reflectance’ channels the same is true for the 0.6, 0.8 and 1.6 µm channels. However, the FCI channels at 0.4, 0.5, 0.9, 1.38 and 2.2 µm have no SEVIRI equivalents. Simulated values in these ‘new’ channels were generated using auxiliary data (ECMWF forecast fields), physical models (cloud radiative properties) and SEVIRI derived (cloud) properties to make informed adjustments to the SEVIRI channel nearest in radiative characteristics.

Subsequently, the FCI Earth scene simulated radiances available at SEVIRI spatial resolution were interpolated in the spatial domain (using FFT and zero padding) to the FCI grid sizes (2km, 1km and 0.5km). An FCI line-of-sight model and a simplified swath acquisition process simulated the Level 1b science data and the acquisition grids which are used by our rectification process to generate the final FCI level 1c science data

2.2.2 Horizon Effects

Some negative radiance values (outside the expected dynamic range) are present at the Earth horizon as artefacts of the current implementation of the rectification algorithm and the proxy data.

2.2.3 Swath Edge Effects

Some outlying positive radiances (outside the expected dynamic range) are present clustered along the edges of swaths as an artefact of the current implementation of the rectification algorithm.

2.2.4 OCA Limitations

Cloud products from SEVIRI used to simulate solar reflectance channels (0.4-2.2) were not available outside a view angle of greater than approximately 73^{o}. This leads to some minor discontinuities in these channels near the disk edge.

2.2.5 Space Mask Issues

A preliminary space pixel mask has been applied to the radiances to mask out space pixels. Some edge problems may be seen as indicated in the example plot below.

Figure 1: Illustration of edge problems in the space pixel mask

2.2.6 Missing Values

A number of variables and attributes do not contain values. A numerical attribute with no relevant content is set to 0. A string attribute or variable with no relevant content is set to a null string. A numerical variable with no relevant content is set to the default netCDF _FillValue for that type or the value specified in the _FillValue attribute for the variable.

2.2.7 Pixel Quality Flags

In the FDHSI dataset, the pixel quality flags are active but the great majority are set to zero as expected for good quality.

In the HRFI dataset, the pixel quality has only been set for the merged IR 3.8 channel to show where the cold channel saturated pixels have been replaced by warm channel values.

2.2.8 Artefacts in "effective_radiance" variables

Some pixels have been identified to have wrong values. They are arranged in groups, in the save row.

The following Figure 2 and Figure 3 are an example from the VIS_04 channel related to the file below.
3.0/FDHSI/W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120351_20130804120401_N_x_C_0003.nc

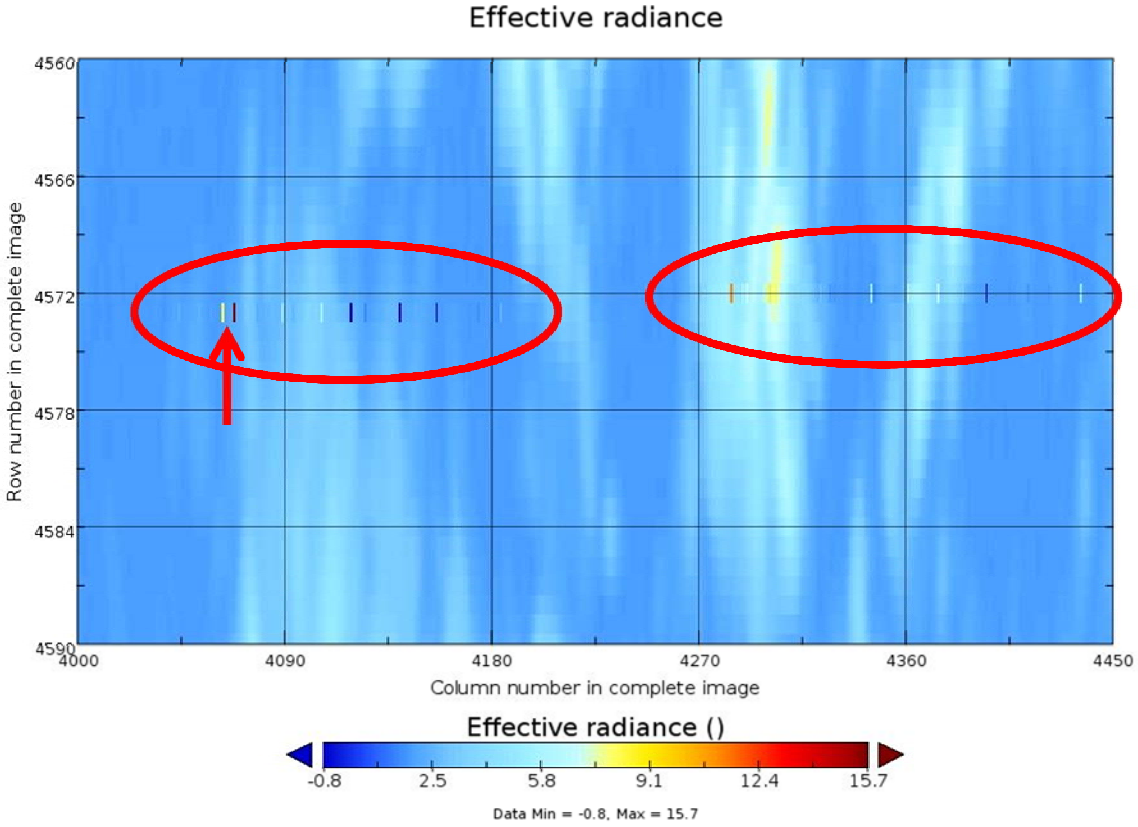

Figure 2: Note the strange pixels in rows 4572 and 4573. The arrow indicates 2 pixels that will be displayed in the Figure 3.

Dataset: W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_2013080412
Variable: effective_radiance, Effective radiance
Units:

X-Axis: Column number in complete image 0

Y-Axis: Row number in complete image 0

	4061.000	4062.000	4063.000	4064.000	4065.000	4066.000	4067.000	4068.000	4069.000	4070.000	4071.000	4072.000
4556.000	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9
4557.000	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
4558.000	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
4559.000	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
4560.000	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9
4561.000	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9
4562.000	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0
4563.000	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.1
4564.000	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.1	2.3
4565.000	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.9	2.0	2.2	2.4
4566.000	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.9	2.0	2.2	2.4
4567.000	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.9	2.1	2.2	2.5
4568.000	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.1	2.3	2.5
4569.000	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.1	2.3	2.5
4570.000	1.8	1.8	[illegible]	1.9	1.9	1.9	2.0	[illegible]	2.1	2.2	2.3	2.6
4571.000	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.4	2.7
4572.000	1.8	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.2	2.3	2.5	2.7
4573.000	1.9	1.9	8.4	2.0	2.1	2.2	2.2	15.7	2.3	2.4	2.5	2.7
4574.000	1.9	1.9	1.9	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.7
4575.000	1.9	1.9	2.0	2.0	2.2	2.3	2.3	2.4	2.4	2.4	2.5	2.6
4576.000	1.9	1.9	2.0	2.0	2.2	2.3	2.4	2.4	2.4	2.4	2.5	2.6
4577.000	1.9	1.9	2.0	2.1	2.2	2.3	2.4	2.4	2.4	2.4	2.5	2.7
4578.000	1.9	1.9	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.6	2.7
4579.000	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.4	2.4	2.5	2.6	2.8
4580.000	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.5	2.6	2.7
4581.000	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.6	2.7
4582.000	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.5	2.6
4583.000	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.5	2.7
4584.000	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.3	2.6	2.8
4585.000	2.2	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.4	2.7	3.1
4586.000	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.3	2.5	2.9	3.3
4587.000	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.6	3.0	3.4

Format: %.1f Flip Table B/T Flip Table L/R

Figure 3: These 2 red circles present the value of the pixels indicated in Figure 2 with an arrow.

3 USING THE TEST PACKAGE

3.1 What does this dataset contain?

This dataset contains the "FCI Level 1C Format Familiarisation" test data.

It encloses two datasets:

- FDHSI: Full Disk, 16 channels, low resolution.
- HRFI: LAC4 (Upper quarter of the Earth disk with Europe coverage), 4 channels, high resolution.

These datasets are presented as a series of body chunks, followed by a trailer chunk containing information derived for the full repeat cycle.

In addition, a low-resolution, RGB quick-look for the FDHSI dataset is present. This is in line with the expected browse image that will be available in the data archive.

3.2 What does each product folder contain?

Each dataset consists of multiple netCDF files with the suffix ".nc". These are listed in Appendix A.2 for the FDHSI dataset and Appendix A.3 for the HRFI dataset.

Where the name components 1 and 2 show the string CHK_BODY, these are body chunks. Between them, these files contain the complete repeat cycle. Each chunk contains a single strip of data, very wide in the East-West direction (5568, 11136 or 22272 columns), and very narrow in the North-South direction (typically about 100 rows). In this test dataset, most of the attributes and variables in the file contain default values but information is provided in the effective_radiance and pixel_quality variables. There are 70 body chunks in the FDHSI product, and 20 in the HRFI.

Where the name components 1 and 2 show the string CHK_TRAIL, this is the trailer chunk. It is a single file that comes at the end of the repeat cycle. In this test dataset, most of the attributes and variables in the file contain default values.

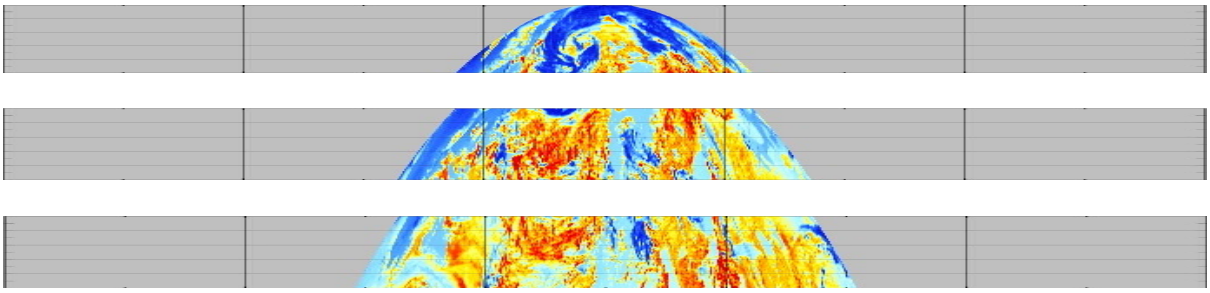

Figure 4: These 3 images are the 2nd, 3rd and 4th body chunks associated to the HRFI merged IR3.8 channel

Figure 4 presents 3 body chunks related to the HRFI IR3.8 channel. In total, this product is composed of 20 body chunks.

Note that pixels displayed in Figure 4 are not square, they are stretched because the width of each chunk (in pixels) is approximately 100 times larger than their height. These strips are actually narrower than they appear here.

Gray areas to the left and right of the colored earth are masked values. They contain the value NC_FILL_USHORT.

3.3 Checking the validity of the test package

A checksum file ("sha256sum.txt") has been generated with the command:

```
sha256sum `find ./` > sha256sum.txt
```

It is located at the top level of the delivery, together with the FDHSI and HRFI folders (see Appendix A.1).

“sha256sum” is very similar to the standard “md5sum” command, but it provides a better validation. It is available by default in multiple Unix/Linux operating systems.

This command provides a checksum for every file in the dataset (both FDHSI and HRFI, netCDF files and any other auxiliary file in the folders).

The complete set of files in the test package can be validated against their checksums using the command:

```
sha256sum --check sha256sum.txt
```

3.4 How can I display the information inside these files?

You can display the structure of the document using “ncdump” (in a Unix/Linux environment). It provides the CDL description of a netCDF file (you need to install the netCDF libraries).

```
ncdump -h FILE.nc
```

These netCDF files have been generated using the "netCDF-4 enhanced" format. Therefore they follow as well the HDF5 format. You could use standard HDF5 tools, for example hdfview.

```
file FILE.nc
hdfview FILE.nc
```

A very good tool to display netCDF files is Panoply. You can download it from NASA (http://www.giss.nasa.gov/tools/panoply/). In a Unix/Linux system, run it with the command:

```
./panoply.sh
```

The images below have been produced using Panoply but please note that an additional tool has been employed to reconstruct the full repeat cycle image from the individual body chunks. This tool is not provided as part of this test package.

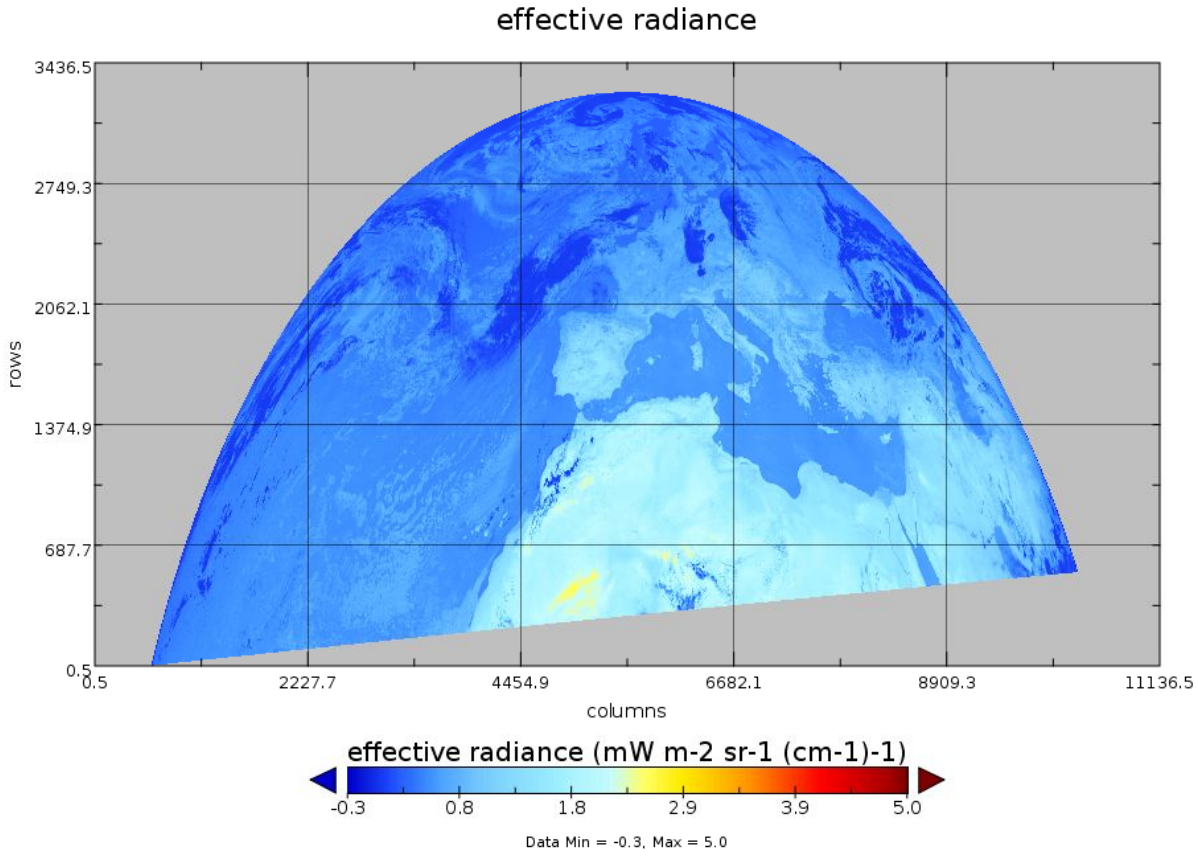

Figure 5: Example Panoply output. HRFI LAC4.

Figure 5 is the combination of the 20 body chunks related to the HRFI IR3.8 channel. Note the shape of the mask shown as gray pixels in the figure. The mask pixels are set to the NC_FILL_USHORT value in netCDF. The LAC 4 mask is elliptical like the full disk mask, but with a sloped, straight line cut-off below.

Figure 6: Example of the location of a chunk within full image.

Every chunk contains information about the location of the strip of data with respect to the full image (either FD or LAC4). These variables “start_position_row”, “end_position_row”, “start_position_column” and “end_position_column” are located in the “measured” group within each channel (vis_04, vis_05, etc.) group.

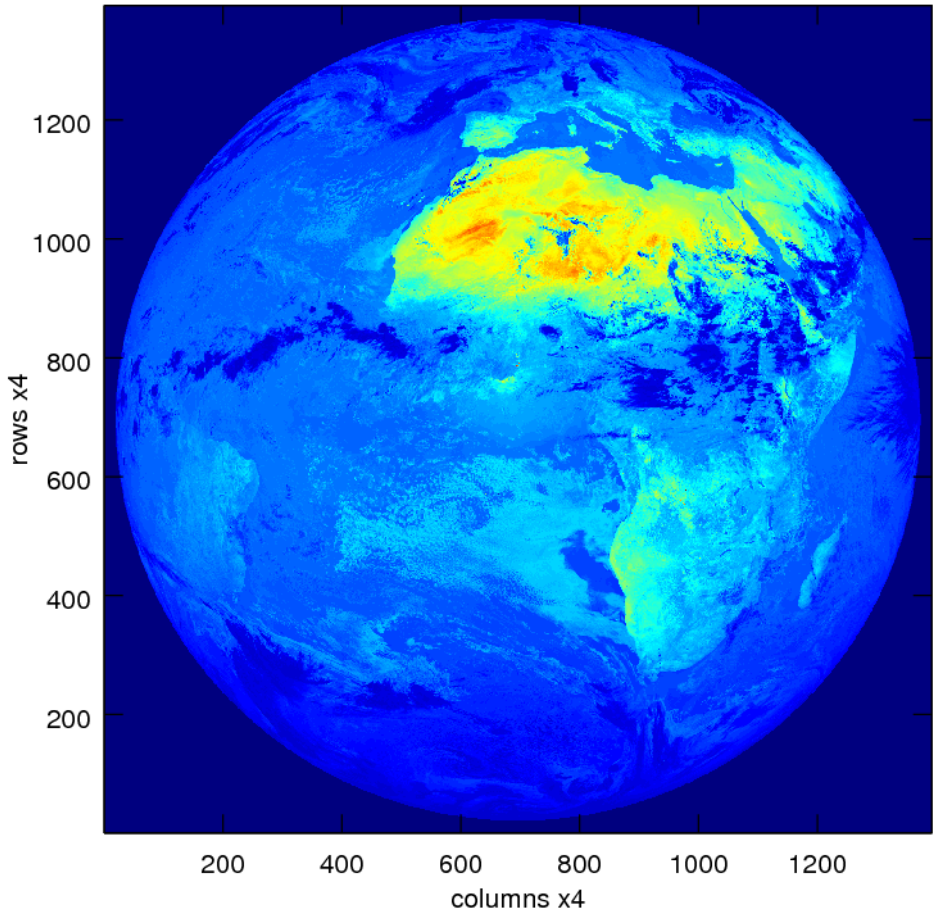

Figure 7: Example Panoply output. FDHSI, channel ir_38, full repeat cycle image.

Panoply software displays the information after correcting by its “add_offset” and “scale_factor” attributes. Therefore it displays float numbers like those in Figure 7. However, the information is stored internally as unsigned short integers, and these values could be presented as well. For example using Panoply, when the 2-dimensional array is displayed on the screen (see Figure 7 above). Click on the “Array 1” tab (seeFigure 8: Actual values of the image pixels.Figure 8 below). In the table, “NaN” refers to mask pixels (NC_FILL_USHORT values) that indicate the masked space outside edge of the Earth.

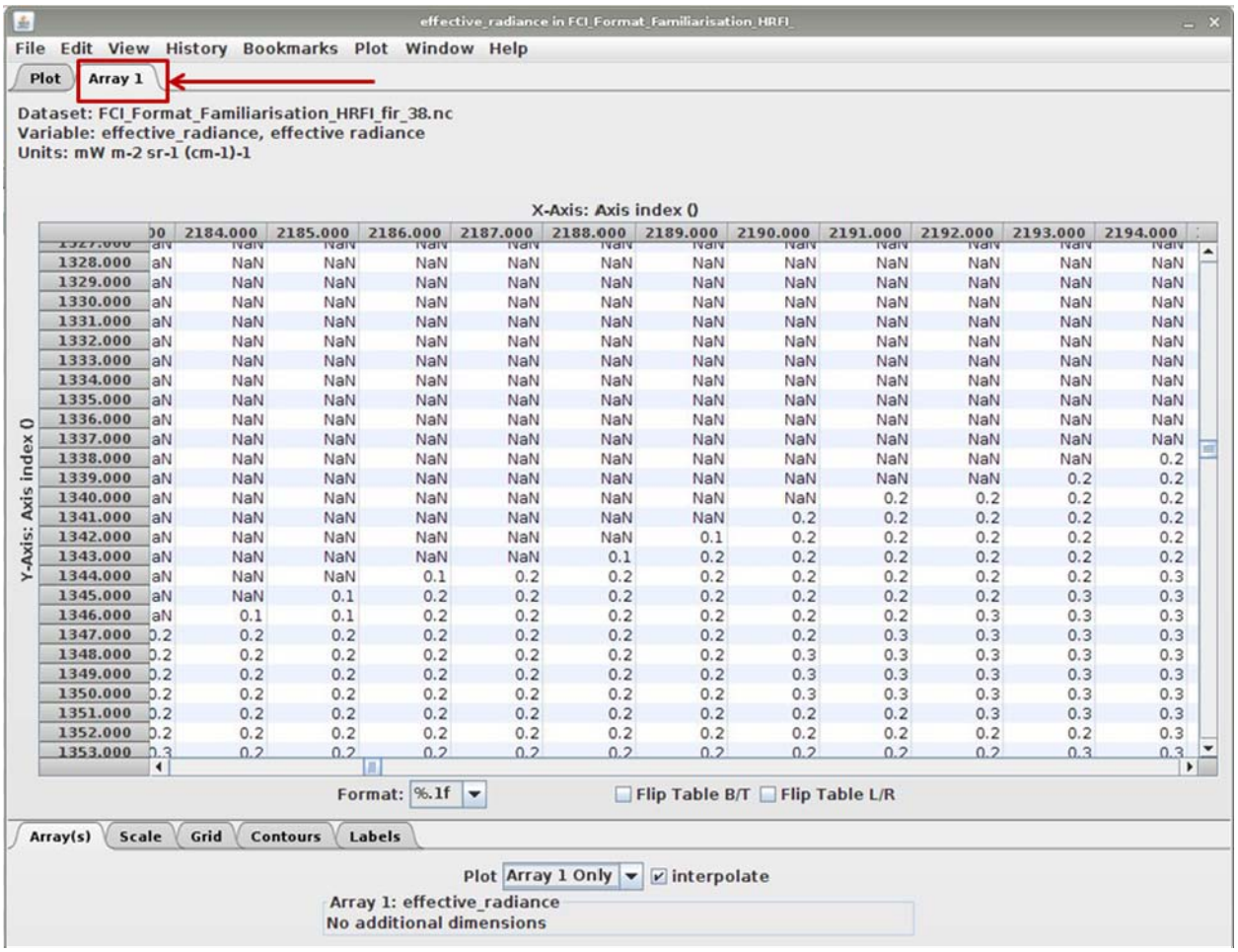

Figure 8: Actual values of the image pixels.

3.5 How can I geolocate the data?

The FCI L1C radiance data is registered to a reference grid with fixed latitude and longitude positions according to the spatial resolution of the data. In order to reduce the size of the dataset, the radiance and quality flag variables are not geolocated but instead have pixel positions within the grid. The formulae for creating the reference grid and linking pixel position to latitude/longitude position are given in the FCI L1C Dataset User Guide [FCIL1DUG]. Normally the required variables are encoded into the dataset, but for this release, you will need to retrieve the values from [FCIL1DUG].

3.6 How can I generate ncML description from a "nc" file?

ncML is the XML description of the dataset format. You can generate it using this standard tool (download the Java libraries related to netCDF from Unidata):

```
java -jar toolsUI-4.5.jar &
```

then select the "ncML" tab, open the "nc" file, and save "ncML" file.

3.7 Examining pixels in more detail

Panoply may also be used to extract the data from a netCDF into a text file that can be fed to other software tools. Figure 5 shows the “pixel_quality” data from the “ir_38” channel from a particular chunk that has been extracted to a text file and then displayed using Octave. A magnified view of the same dataset, highlighting set quality pixels is shown in Figure 10.

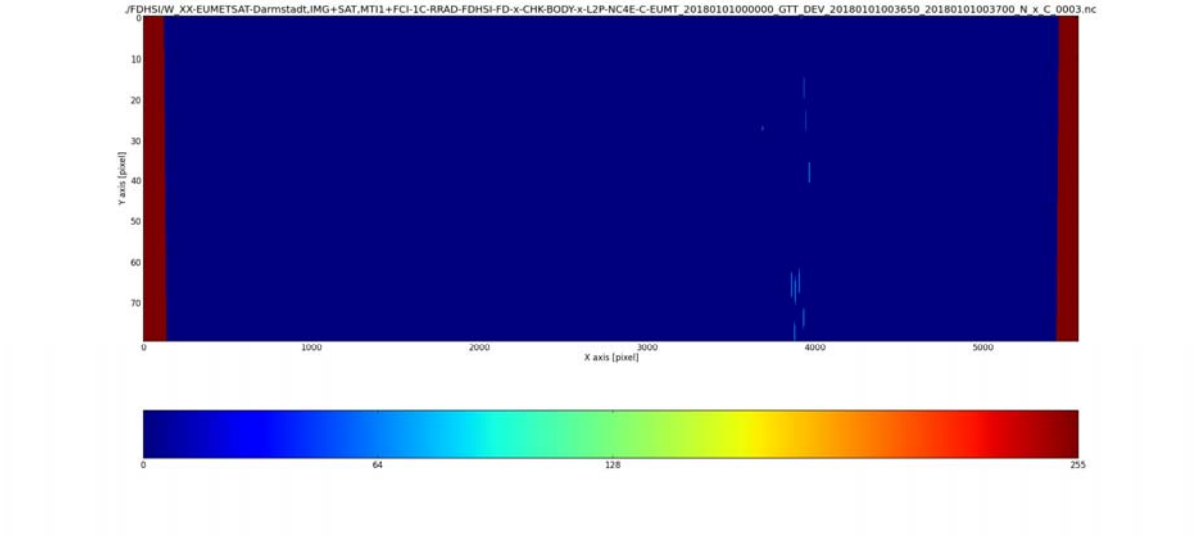

Figure 9: Plot of the “pixel_quality” variable related to the IR3.8 channel in a HRFI chunk.

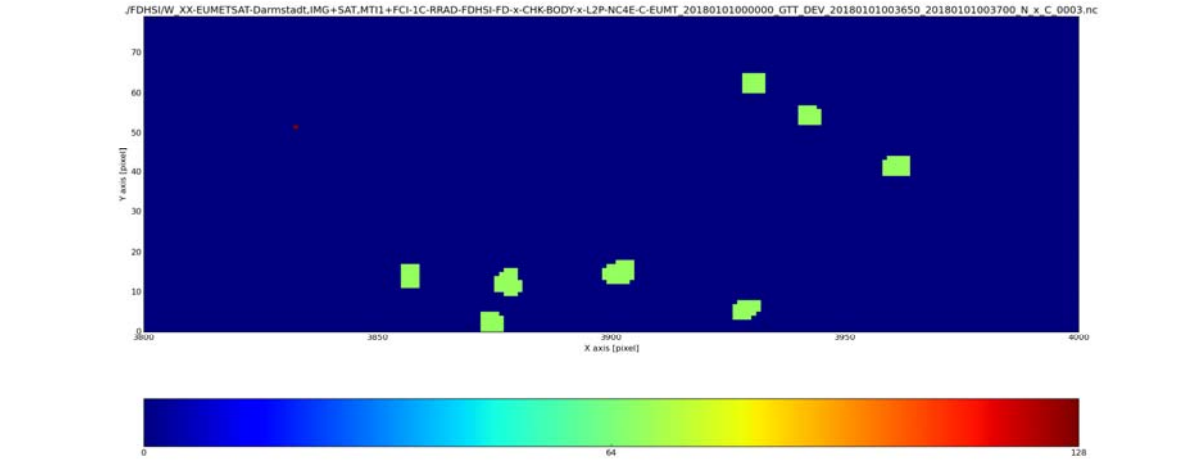

Figure 10: Zoomed region of the chunk displayed in Figure 9.

3.8 Who do I contact with questions about this test data package?

Questions about this test package should be addressed to the EUMETSAT User Service Helpdesk at:

ops@eumetsat.int.

The inclusion of “MTG FCI L1c Format User Familiarisation” in the title of the e-mail will assist in routing the question to the FCI format team.

APPENDIX A TEST PACKAGE CONTENTS

A.1 Checksum File

This is the file that contains the validity checksums for all other files in the package. It is located at the top level of the package and is called **sha256sum.txt.**

A.2 FDHSI Files

These are the files that comprise the FDHSI dataset which are located in the FDHSI directory:

A.2.1 Body Chunks

W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120000_20130804120007_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120007_20130804120014_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120014_20130804120021_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120021_20130804120029_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120029_20130804120036_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120036_20130804120044_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120044_20130804120051_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120051_20130804120059_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120059_20130804120107_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120107_20130804120115_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120115_20130804120123_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120123_20130804120131_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120131_20130804120139_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120139_20130804120147_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120147_20130804120155_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120155_20130804120204_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120204_20130804120212_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120212_20130804120221_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120221_20130804120230_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120230_20130804120238_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120238_20130804120247_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120247_20130804120256_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120256_20130804120305_N_x_C_0003.nc

W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120305_20130804120314_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120314_20130804120323_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120323_20130804120333_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120333_20130804120342_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120342_20130804120351_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120351_20130804120401_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120401_20130804120410_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120410_20130804120420_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120420_20130804120430_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120430_20130804120440_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120440_20130804120450_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120450_20130804120500_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120500_20130804120510_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120510_20130804120519_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120519_20130804120529_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120529_20130804120539_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120539_20130804120549_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120549_20130804120558_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120558_20130804120608_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120608_20130804120617_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120617_20130804120626_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120626_20130804120636_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120636_20130804120645_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120645_20130804120654_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120654_20130804120703_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120703_20130804120712_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120712_20130804120721_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120721_20130804120729_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120729_20130804120738_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120738_20130804120747_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120747_20130804120755_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120755_20130804120804_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120804_20130804120812_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120812_20130804120820_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120820_20130804120828_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120828_20130804120836_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120836_20130804120844_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120844_20130804120852_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120852_20130804120900_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120900_20130804120908_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120908_20130804120915_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120915_20130804120923_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120923_20130804120930_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120930_20130804120938_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120938_20130804120945_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120945_20130804120952_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120952_20130804121000_N_x_C_0003.nc

A.2.2 Trailer Chunk

W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-CHK-TRAIL-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120000_20130804121000_N_x_C_0003.nc

A.2.3 Quick-Look

W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD-x-QUICK-IMAGE-RGB01-L2P-PNG-C-EUMT_20130804120000_GTT_DEV_20130804120000_20130804121000_N_x_C_0003.png

A.3 HRFI Files

These are the files that comprise the HRFI dataset which are located in the HRFI directory:

A.3.1 Body Chunks

W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120000_20130804120008_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120008_20130804120017_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120017_20130804120026_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120026_20130804120035_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120035_20130804120044_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120044_20130804120053_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120053_20130804120103_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120103_20130804120112_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120112_20130804120122_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120122_20130804120132_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120132_20130804120142_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120142_20130804120152_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120152_20130804120202_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120202_20130804120211_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120211_20130804120220_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120220_20130804120230_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120230_20130804120239_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120239_20130804120247_N_x_C_0003.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120247_20130804120256_N_x_C_0003.nc

W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-BODY-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120256_20130804120305_N_x_C_0003.nc

A.3.2 Trailer Chunk

W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD-x-CHK-TRAIL-x-L2P-NC4E-C-EUMT_20130804120000_GTT_DEV_20130804120000_20130804120305_N_x_C_0003.nc