

A NEW TOOL FOR SCIAMACHY LEVEL 1B TO 1C PROCESSING

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ABSTRACT

A new tool has been developed for processing SCIAMACHY Level 1b data to Level 1c. It supports various calibration options, and extraction of a subset of Level 1b data.

This SciaL1c tool is a standalone program, which replaces the earlier program delivered with EnviView. The tool is synchronised with the latest IPF version (6), and is downward compatible to earlier IPF versions.

1. INTRODUCTION

For most user applications, SCIAMACHY Level 1b data require processing to Level 1c. Until April 2006, ESA provided a level 1b to 1c tool that was developed fully independent from the data processor, via the EnviView and BEAT toolkits.

In order to shorten the software update cycle, which may be necessary as the Level 1b processing evolves, and to ensure consistency between Level 0 to 1b and Level 1b to 1c processing, ESA has initiated a development to adapt the Level 1b-to-1c software of the prototype operational processor into a user-friendly tool.

2. THE NEW SCIAL1C TOOL

The new SciaL1c tool has the following properties:

- Up-to-date algorithms, synchronised with the latest IPF version
- Downwards compatible with IPF versions 5.04 and 4.32
- Stand-alone program, replaces the earlier L1c tool delivered with EnviView
- Developed for *Linux* and *Sun Solaris OS 5.8* using the C++ language
- Common features with the earlier EnviView SciaL1c tool:
 - Command-line based utility
 - UNIX-like syntax: *SciaL1c -option1 -option2 L1b-product-name*
 - Batch processing is possible

The tool performs the following tasks:

- List all measured SCIAMACHY states on a Level 1b product
- Extract data sets from a Level 1b product – selection on:
 - Measurement time
 - Geolocation
 - Data set type (e.g. Nadir, Limb, Monitoring)
 - Refined selection options within a measurement data set (see below)
 - Batch processing is possible
- Perform Level 1b to Level 1c processing:
 - apply all default calibrations, or
 - apply only specified calibrations

A flow diagram of the tool is shown in Fig.1. Note the box “Calibration Application”, which contains the same Level 1b to 1c processing algorithms as the ESL prototype Level 1b-2 processor, thus ensuring full consistency between the tool and the latest data processing version.

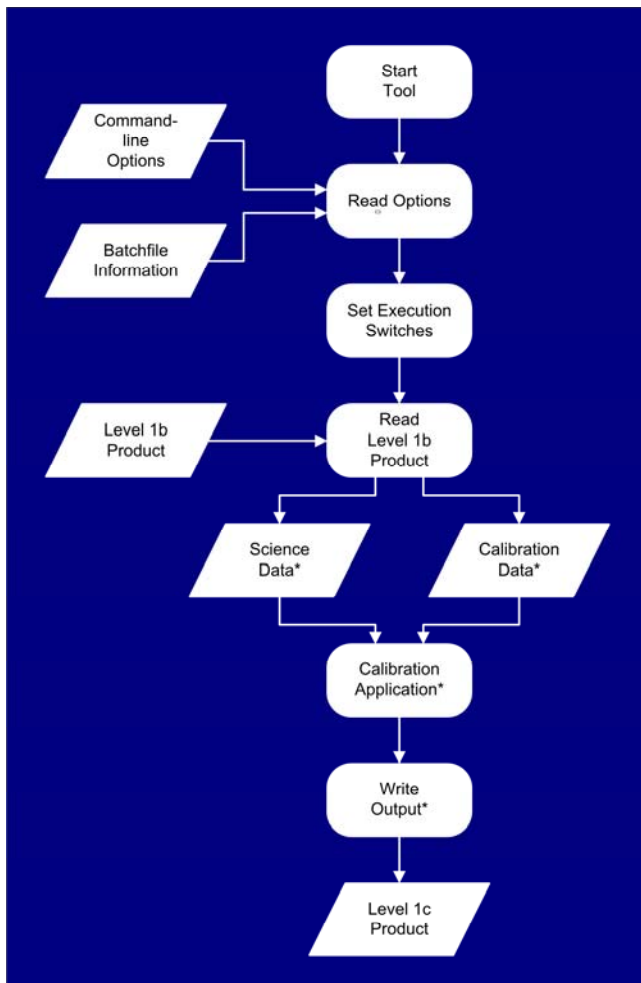


Fig. 3. Flow diagram of the SciaL1c tool. Data and processed marked by * underlie the selection process initiated by the input options. The box “Calibration Application” contains the same Level 1b-1c algorithms as used in the ESL prototype Level 1b-2 processor.

3. INPUT OPTIONS FOR THE LEVEL 1C PRODUCT

3.1 Selection options for extraction within a data set

The Envisat Level 1b data products consist of building blocks called ‘dataset’. The main types are the (Global) Annotation Data Sets and the Measurement Data Sets (MDS). In SCIAMACHY, the MDS contain the raw spectral detector data plus for each measurement calibration data for e.g. memory effect, straylight, polarisation; also the PMD measurements are kept on the product. Calibration exists of applying one or more types of these measurement calibration data to the raw spectral signals.

The SciaL1c tool enables calibration application and output of all measurements, but also of just an extracted part of the whole dataset. Extraction options are:

- Extract data containing a specific SCIAMACHY „Measurement Category“
- Extract data from user-specified clusters (spectral windows)
- Extract PMD measurements
- Extract fractional polarisation values

The definitions of Measurement Category and cluster configuration can be obtained via the SOST website, see also Section 3.3

3.2 Selection of calibrations to be applied

As default, no calibrations are applied. That is, a level 1c child product is generated which only contains data sets extracted from the Level 1b product.

Calibrations are applied using the **-cal** option, followed by a number. The following calibration options exist:

0 =	memory	- application of memory effect (channel 1-5) and non-linearity (channel 6-8)
1 =	leakage	- application of dark signal correction
2 =	ppg	- application of Pixel-to-Pixel Gain
3 =	etalon	- application of etalon correction (channels 1-5)
4 =	spectral	- application of wavelength calibration
5 =	straylight	- application of stray-light correction
6 =	polarisation	- application of polarisation correction
7 =	radiance	- application of radiometric calibration
8 =	allcal	- application of all calibrations

3.3 Syntax example

The syntax follows that of the earlier program delivered with EnviView. Until updated documentation is available, the earlier documentation of [1] can still be used for examples of the syntax.

Any combination of extraction and calibration options is allowed.

For example, let's examine the often occurring situation that a user needs spectral data from a selected wavelength region only.

To select and fully calibrate all nadir and limb data in SCIAMACHY channel 3, enter the command

```
SciaL1c -cat 1,2 -nadircluster 17,18,19,20,21,22,23 -limbcluster 13 -allcal <SCIA_L1b_product.N1>
```

The **-cat** option selects on measurement category: 1 for nadir and 2 for limb. The spectral regions have in nadir and in limb a different cluster definition, hence both are specified. The cluster definition may be found on the SOST (Sciamachy Operations Support Team) website [2] under section *EEPROM parameters/Cluster definition (Support)*. Full calibration is achieved with option **-allcal**; this is equivalent to option **-cal 8**.

4. AVAILABILITY

The new SciaL1c tool is available from the ESA website, see reference [3].

5. REFERENCES

1. J. Frerick, The SciaL1c commandline tool, ESA technical note PO-TN-ESA-GS-2307
2. SOST website: <http://172.21.150.9/projects/scops>
3. Tool website: http://envisat.esa.int/services/tools_table.html#envisat