SPEXone Level 1A to 1C Processor Release Notes

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Contents

1   Introduction

The SPEXone data processor consists of three parts: the L1A-L1B processor, the L1B-L1C processor, and a calibration key data (CKD) generator. The CKD generator uses dedicated on-ground calibration measurements to acquire the CKD. The L1A-L1B processor uses flight L1A data together with the CKD to generate L1B data. The L1B-L1C data collocates L1B data to a common geolocation grid for a predefined reference height.
The L1A-L1B processor and the CKD generator are algorithmically interlinked to ensure full consistency of the derived CKD and the calibration of the L1A data. Therefore, it has been decided to include both elements in the same software package even though the CKD generator is not required for processing flight data.

2   New features

2.1   Level 1C data format

Conform to the most recent level 1C data format as described in "The PACE Level 1c data format, DRAFT 2023/08/29".

2.2   Better code behavior when dealing with incomplete L1C data

If there are gaps in the L1A products then, instead of a hard stop with exit status 1, exit gracefully with any of the following:

- Exit code 110 — L1C file was created but there are gaps.

- Exit code 120 — large gap, no data to bin for a given L1C grid, L1C file not created.

2.3   Fallback linear algebra option

New YAML keyword `[l1b][fallback_linear_algebra]` indicates whether to call linear algebra functions from an external library or to use the ones shipped with the source code when running an L1B process. Use this option if the linear algebra library is not thread-safe. As a safety measure, this option is **enabled** by default.

2.4   Support for OCI L1C grid files

There is no need to create separate L1C grid files for SPEXone anymore. The code will read in an OCI grid file and trim it to the SPEXone size. This is controlled by the parameter `[l1c][cols_to_nadir]` which specifies the number of columns to the left and right of the nadir bin that should be kept. The default value of this parameter is $(15, 14)$. For instance, if the nadir bin, as read from the global attributes of the grid file, is 259, then columns $244, \ldots, 273$ from the grid file are used for interpolation in the L1C module of the SPEXone processor. The nadir bin in the SPEXone L1C product will be shown as 15 (same as the first value of `[l1c][cols_to_nadir]`).

3   Installation and running

3.1   Dependencies

- GNU C++ compiler version 11

- CMake version 3.18

- NetCDF C and C++ libraries

- HDF libraries

- Linear algebra library (e.g. blas and lapack or Intel MKL)

3.2   Building

Make a copy of the initial CMake cache file

```
cp initial_cache.cmake.example initial_cache.cmake
```

found in the root source directory and edit it to reflect your environment. Next, create a build directory for configuring and building the SPEXone executable. From the root directory the procedure could look like this:

```
mkdir build && cd build
cmake -C ../initial_cache.cmake -D CMAKE_BUILD_TYPE=release ..
make -j
```

Notice the `L1BC_ONLY` flag in the example cache file which is enabled by default.

4   Files

The delivery is accessible at `https://public.spider.surfsara.nl/project/spexone/PACE/L1A-L1C/2023_11_20/`.

- `spexone_cal.tar.gz` — source code. Unpack and compile according to instructions in Sec. 3.2.