SRON
Netherlands Institute for Space Research

SPEXone

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 Updates

- Updated L1C data format. This involves minor changes and bugfixes in global and variable level attributes.
- Updated CKD. Nonlinearity CKD is now much smaller and thus loading times are a shorter but otherwise no major runtime changes. The ISRF is now stored in the CKD.
- Various bugfixes. The most notable one is the correct computation of the solar model time argument (Julian day) which affects attitude quaternions and geolocation (L1B/L1C latitudes/longitudes).
- New keyword for setting the processing chain version. Example usage in either L1B or L1C YAML file:

  ```
  main:
    processing_version: 5.31 6/6/2023
  ```

  The value will then be stored as a global attribute of the L1B or L1C product.
- Option to flag bins in the South Atlantic Anomaly region. The QC (quality indicator) variable is set to 1 for those bins. It is activated by including a file that defines the SAA polygon in the L1C YAML file:

  ```
  main:
    saa_file: saa.h5
  ```

- Various algorithmic changes. None of that should be noticeable at the GSFC side but it is important to test that everything still compiles and runs correctly.

3 Installation and running

Installation and running are the same as in previous releases.

3.1 Dependencies

- GNU C++ compiler version 11
- CMake version 3.18

- NetCDF4 C and C++ libraries
- HDF5 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. Then

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

4 Running

Two example configuration files are included, one for L1A-L1B and one for L1B-L1C runs. These have the same contents as in previous releases except they demonstrate the use of the `processing_version` flag.

```
<spexone> l1b.yaml
<spexone> l1c.yaml
```

5 Files

The delivery is accessible at `https://public.spider.surfsara.nl/project/spexone/PACE/L1A-L1C/2023_12_18/`.

- `spexone_cal.tar.gz` — source code. Unpack and compile according to instructions in Sec. 3.2.
- `ckd.nc` — CKD for L1A-L1B runs.
- `l1b.yaml` — example configuration file for executing an L1A-L1B process.
- `l1c.yaml` — example configuration file for executing an L1B-L1C process.
- `saa.h5` — a file containing 60 latitudes and longitudes that define the SAA polygon.