LYRA data level working Document

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1 Introduction

The goal for data products and data level definition is to ensure both that data will be provided to the community the more efficiently as possible, and that the use and management of the data during the processing chain is optimized. As a consequence, the definition of data product and data level should be simple and clear. As a general philosophy, higher data level number mean more processing and, like a waterfall, level1 needs level0, level2 needs level1, ...

The proposed Lyra data level definition is inspired from what has been done or is being done for other irradiance instrument: SEE on TIMED, SOLSTICE and TIM on SORCE, EVE on SDO. The work done for these missions has been itself adapted from the EOS reference handbook[1].
Although, the public calibrated data for the VIRGO/SoHO instrument is called level1, in all the mission previously cited (this still in a planned phase for EVE), the level2 correponds to calibrated data at full resolution and level3 to a lower cadence calibrated data (usually 1 day, but for us 1 hour or 1 minute).
Although all data level will be public, we also follow the general habits in irradiance data by giving the preference to the distribution of calibrated irradiance.

Fig.1 shows a short view of the datalevel definition for LYRA, while more details are given in the following text.

2 BASIC DATA LEVEL

Raw Data

This is the data packets received from the telemetry ground station, without any modification. Thus data are still in LUMP format, unprocessed, uncalibrated, full resolution. all communications artifacts are retained.

[1] http:eospso.gsfc.nasa.goveos_homepagefor_scientistsdata_productsrefbook1999.php

Level0 Data

Once the data packets are received at ROB from the telemetry ground station, the data are unpacked and putted in a database, sorted by time, Lyra Channel and unit (i.e. 4 databases for each LYRA unit). These unpacked and sorted data constitute Level0 data.

Level1 Data: Lyra_yyyymmdd_l1.txt

Name	Description	Origin	storage place
TBD	Pointing information	S/C housekeeping	ROB database
...	...	...	...

Table 1: Metadata needed for the calibration of LYRA data

This level regroups all the data and metadata (that are also store in a database at ROB) necessary to produce level2 (calibrated) data file. This require thus a certain degree of coherency (still to be precised when the calibration procedure will be nearly finished). Thus, a level1 data file should contains:

specification:

- All the data of the nominal unit[2] to be calibrated: the 4 channels plus time, with same exposure time (*necessary?*) and same cadence (*necessary?*)
- All the metadata necessary to calibrate the data: the final pointing and position of the spacecraft, the LYRA housekeeping parameters (at least to check eventual problems) for the concerned period, .. to be completed.. see Tab. 1
- A keyword indicating when this file has been built and the version of the software that has been used.

When improvements will be achieve in the calibration process, the new version of the calibration software should be able to run on Level1 datafile.

Level2 data: Lyra_yyyymmdd_l2_vX.txt

The Level2 data correspond to the solar irradiance in physical units at full resolution for 1 day[3] , for the 4 channels, plus time (about 160MB for 100Hz).

[2]By nominal unit, we intend here the unit that has been chosen to produce the calibrated data. This could change in time and/or differ from the nominal unit defined before the launch or during the commissioning phase for some reasons

[3]this can be changed and files could be splitted by hour or by 4hours or whatever we prefer

The "X" in "vX" refer to the version number of the software that has been used to produce the leve2 data from level1. These data should be public on the web as fast as possible[4]

specification:

- A short text explaining what is inside the file and a reference to a more complete readme file
- Irradiance units: W/m2
- Time reference: UT
- 1 AU corrected
- Degradation Corrected
- Uncertainty: We need either a measure (quality index) of the reliability of the data, able to indicate potential problems.
- Metadata: Exposure time, Unit used , .. TDB

Level3 data: Lyra_yyyymmdd_l3_vX.txt

The Level3 data correspond to the solar irradiance in physical units at a 1mn temporal resolution for 1 day, for the 4 channels, plus time (about 28 kB for 100Hz). The "X" in "vX" refer to the version number of the software that has been used to produce the leve2 data from level1. These data should be public on the web as fast as possible[5]

specification:

- A short text explaining what is inside the file and a reference to a more complete readme file
- Irradiance units: W/m2
- Average computing method
- Standard deviation over the averaged period
- Time reference: UT
- 1 AU corrected
- Degradation Corrected

[4] 48Hmaximum?
[5] 48Hmaximum?

- Uncertainty: We need either a measure (quality index) of the reliability of the data, able to indicate potential problems.
- Metadata: Exposure time, Unit used , .. TDB

3 QUICKLOOK DATA PRODUCT

Space Weather quicklook data product

This product is still to be precised. However, it is foreseen to distribute as fast as possible[6] and through the web flare alerst and/or pseudo-calibrated time series. The idea is to provide this data product as an support to space weather forecasters. It is moreover hoped that the high cadence of the measurement will allow to identify precursors.

Aeronomy quicklook data product

This product is the result of a request from the PMOD team (Davos, CH) to dispose as fast as possible of solar irradiance spectra in order to run in near real time a mesospheric model. The solar irradiance spectrum is reconstructed from the 4 LYRA channels through statistical methods. This is a "quicklook" data product since its short time delivery constraint will force the use of non-definitive housekeeping parameters (mainly pointing and position).

4 FURTHER DATA LEVEL

It is possible to add further products that include modeling.

Level4

Definitive reconstructed spectrum.

Level5

Time series of daily solar irradiance.

[6] this means without the definitive S/C housekeeping parameters

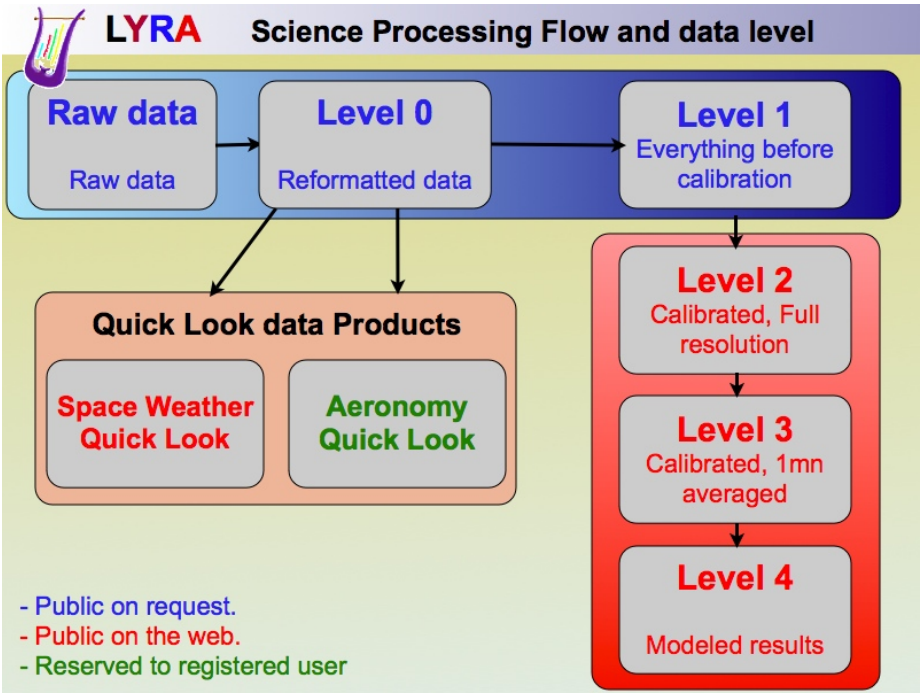

Figure 1: LYRA Data level and processing flow