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FLEX SIMULATED DATASET - RELEASE NOTE



APPROVAL

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CHANGE LOG

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DISTRIBUTION

Name/Organisational Unit



Table of Contents

1. Scope of the document	4
2. Acronyms.....	4
3. Reference Documentation	5
4. Dataset overview.....	6
5. Description and checksums of the dataset	8
6. Dataset access.....	11
7. Point of Contact.....	11

1. SCOPE OF THE DOCUMENT

This document describes the FLEX simulated dataset released to the FLEX user community to allow them to understand the format and content of the FLEX products prior to the launch of the mission.

2. ACRONYMS

- ADD Architecture Design Document
- ATBD Algorithms Theoretical Baseline Document
- E2ES FLEX End-to-End Simulator
- FIPS FLEX Instrument Performance Simulator
- GPP Ground Processor Prototype
- ICD Interface Control Document
- L1B Level-1B, FLORIS instrument data with geometric, spectral and radiometric characterization
- L1C Level-1C, FLORIS, S3 OLCI and S3 SLSTR data co-registered product
- L2A Level-2A, ground surface apparent reflectance, at-surface solar irradiance and retrieved atmospheric parameters
- L2B Level-2B, corresponds to the surface fluorescence emission (in radiance) and real reflectance
- L2C Level-2C, corresponds to the estimation of actual photosynthesis rate derived from L2B fluorescence products, and other associated biophysical variables
- L2P Level-2 reprojected (from instrument grid to cartographic projection)
- PDD Product Definition Document
- RPER Retrieval Performance Evaluation Report
- SAL2P Stand-Alone L1B to L2 Processor
- SGM Scene Generator Module

3. REFERENCE DOCUMENTATION

Below is the list of the documentation provided with the FLEX Simulated Dataset. The version of the documentation corresponds to the software versions used to generate the products provided in the dataset.

- RD-1: FLEX E2ES and FIPS-GPP Interface Control Document (FLX-ICD-GMV-FIPS-GPP), v2.2.2
- RD-2: SAL2P Interface Control Document (FLEXL2-ICD-006-MAG), v1.12.1
- RD-3: SGM Architectural Design Document (FLX-ADD-SGM-UVEG), v2.2.2
- RD-4: S3 Architecture Design Document (FLX-ADD-S3-DME), v2.2.0
- RD-5: FIPS-GPP Architecture Design Document (FLX-ADD-GMV-FIPS-GPP), v2.2.2
- RD-6: PAM Architecture Design Document (FLX-PAM-ADD-GMV), v2.2.1
- RD-7: FIPS-GPP Product Definition Document (FLX-PDD-EXP-GPP-0001), v3.0
- RD-8: FLORIS L1 Ground Processor Prototype ATBD (FLX-TN-FNM-INS-0007), v3.5
- RD-9: Algorithm Theoretical Basis Document of L1C (FLEXL2-ATBD-012-MAG), v1.8
- RD-10: Algorithm Theoretical Basis Document of L2A (FLEXL2-ATBD-022-FMI), v2.3
- RD-11: Algorithm Theoretical Basis Document of L2B (FLEXL2-ATBD-023-MAG), v1.7
- RD-12: Algorithm Theoretical Basis Document of L2C (FLEXL2-ATBD-014-MAG), v2.3
- RD-13: Algorithm Theoretical Basis Document of L2P (FLEXL2-ATBD-049-MAG), v1.2
- RD-14: TDS-4-V220 Release Note (TDS-FLEXE-L2RMV3.2 Release Note), v3.0
- RD-15: Retrieval Performance Evaluation Report (FLEXL2-RPER-002-MAG), v1.10
- RD-16: REPR Annex 1 Detailed Result Analysis (FLEXL2-RPER-002-MAG), v1.10

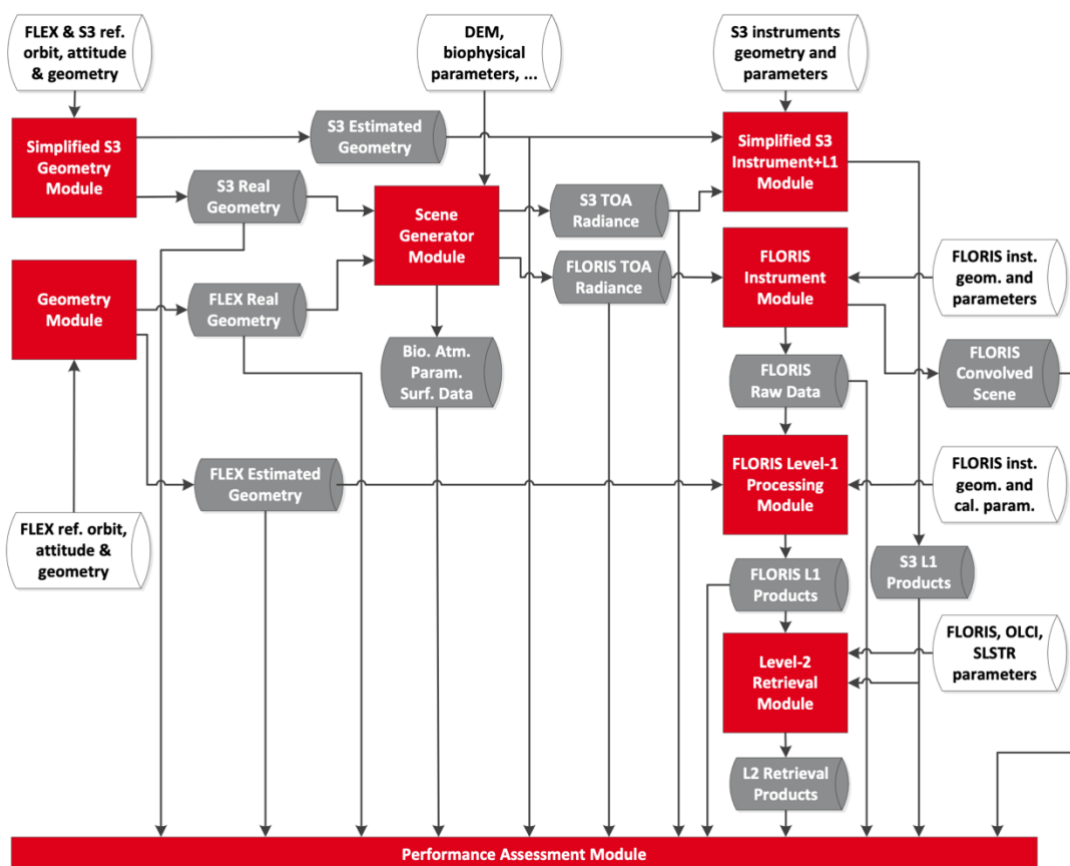
Original authors of the documentation have given a written agreement to share the documents.

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4. DATASET OVERVIEW

The products provided in this dataset were simulated with the FLEX End-to-End simulator. Figure 1 shows the relations between the different modules, with their respective input and output products. In total, the end-to-end simulator is comprised of 7 modules: the S3 Geometry Module (S3G), the Geometry Module (GM), the Scene Generator Module (SGM), the S3 Instrument Module (S3M), the FLORIS Instrument Module (ISM), the FLORIS L1B Processing Module (GPP) and the L2 Retrieval Module (L2RM).

Figure 1: Diagram of the architecture of the E2E software (from RD-6).



An end-to-end simulation comprises the following datasets:

- A set of input geophysical parameters (e.g.: surface and atmospheric parameters) and simulation parameters (e.g.: time, sun geometry, etc...) used as input to the scene generator modules. These are the inputs used to model the signal at the FLEX and Sentinel-3 instrument entrance.

- A set of outputs of the scene generator modules, typically, at space sensor simulated radiances.
- A set of simulated sensor measurements (FLEX and Sentinel-3) as Level 1B products.
- A set of retrieved geophysical parameters as Level 2A, 2B and 2C products including atmospheric retrieved parameters, surface reflectance, fluorescence, and higher-level vegetation parameters (e.g. LAI, chlorophyll concentration content).

The relevant documentation associated to these products and the software used is also provided (interface control documents, architectural design documents, algorithm theoretical baseline document, product definition documents).

The following documents describe the simulator architecture: RD-3, 4, 5, 6, 7.

Information about the format of the dataset can be found in RD-1,2.

Information about the processing algorithm can be found in the ATBDs: RD-7, 8, 9, 10, 11, 12.

5. DESCRIPTION AND CHECKSUMS OF THE DATASET

The present dataset is a subset of a larger dataset used previously for mission performance analysis. Two scenarios have been selected to constitute this new dataset. All the input and output products generated during the execution of these two scenarios in the FLEX End-to-End simulator are provided. The two input scenes provided are:

- ScV_01_Atm_03: a synthetic patch of about 20x20 km² combining five vegetation classes with 2 soil classes, resulting in 10 different surface classes.
- MPAP_06: a large synthetic scene covering the full swath of the instrument, with a width of about 150 km and a length of about 1050 km, featuring 12 different surface classes repeated in a chessboard pattern and surrounded by two strips of synthetic clouds at the edge of the swath.

A more complete description of the input scenes can be found in RD-14.

Table 1 accounts for the checksum and structure of the simulations. The output of each of the 7 modules is stored in its own directory: s3g_out (S3G), geo_out (GM), s3m_out (SGM), s3m_out (S3M), odgm_out (ODGM), ism_out (ISM), gpp_out (GPP, L1B products) and l2r_out (L2RM, L2A and L2B products). The scenarios were executed with two different FLORIS instrument simulation configurations:

- In configuration#1 or C1, data from an ideal instrument are simulated up to L1B
- In configuration#3 or C3, a fully realistic instrument is simulated including instrumental effects leading to measurement errors such as straylight, noise and other systematic and random errors
- In configuration#4 or C4: same as C3 but without the simulation and correction of the straylight effects in the instrument which can only be applied to scenes that have sufficient along track dimensions. The FLORIS L1B products generated under C3 and C4 only differ marginally (the simulated residual straylight correction errors are generally much lower than the simulated total measurement errors)

Figure 2: Description of the input classes of the Scv_01_Atm_03 scene

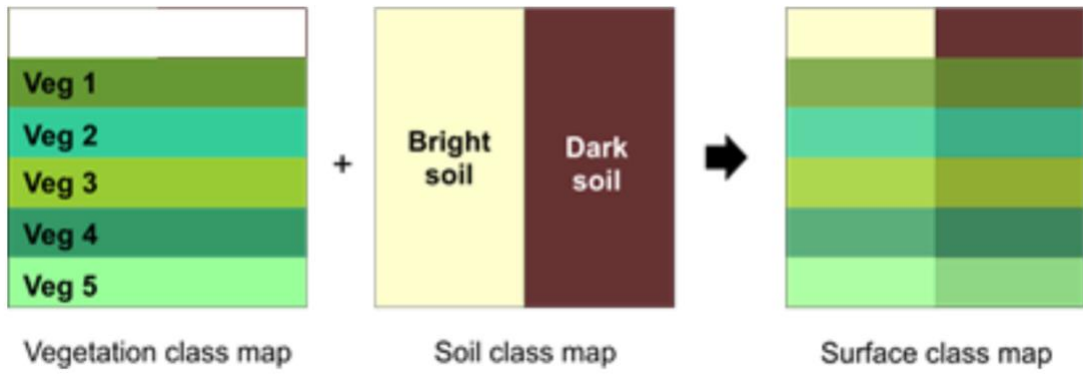


Figure 3: Description of the input classes of the MPAP_06 scene

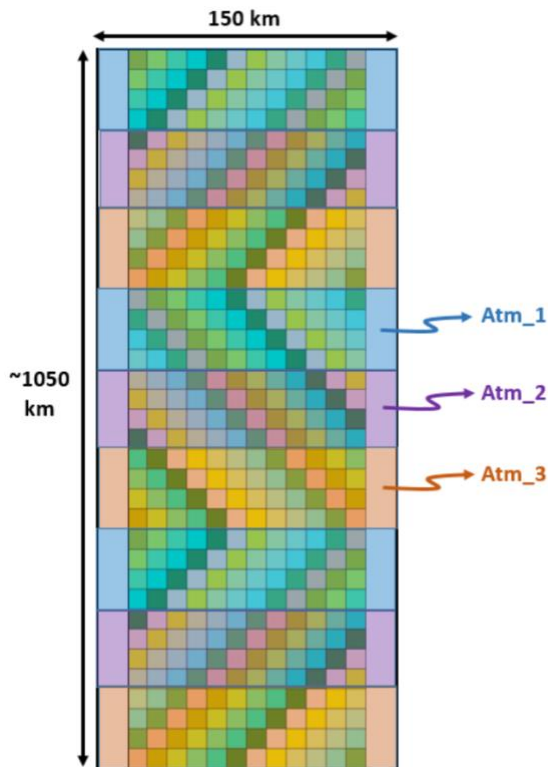


Table 1: description of the archive structures and checksums

Description of the archive	Archive checksum
<p>ScV_01_Atm3_Original.7z</p> <ul style="list-style-type: none"> ├── geo_out ├── gpp_out_C1 ├── gpp_out_C4 ├── ism_out_C1 ├── ism_out_C4 ├── l2r_out_C1 ├── l2r_out_C4 ├── odgm_out ├── s3g_out ├── s3m_out └── sgm_out <p>52 directories, 798 files 4,4GB, about 20GB unzipped</p>	<p>0aac8c3bc7fd3ce7033488a087da5064</p>
<p>MPAP_06.7z</p> <ul style="list-style-type: none"> ├── geo_out ├── gpp_out_C1 ├── gpp_out_C3 ├── ism_out_C1 ├── ism_out_C3 ├── l2r_out_C1 ├── l2r_out_C3 ├── odgm_out ├── s3g_out ├── s3m_out └── sgm_out <p>146 directories, 5323 files 124GB, about 495GB unzipped</p>	<p>e37e4a51de42c660856f4c08a8bb1d9b</p>

The archives are stored with 7z because of its good compression algorithm for large binary arrays of data. In the current version of the dataset, the directory MPAP_06/sgm_out/ does not include the instrument TOA radiance input scenes because they are very large once extracted (3,6TB).

6. DATASET ACCESS

The dataset and documentation can be downloaded on the following ESA-ESTEC FTP server:

- Login: flex-dataset
- Passwd: EJdp3QN+43fYw2
- Server: ftp.eopp.esa.int
- Protocols: FTPs // SFTP
- Path: /from_estec/flex-simulated-dataset

7. POINT OF CONTACT

Should you have further questions/inquiries about this test dataset, please contact:

aymeric.hale@esa.int (or marc.bouvet@esa.int).