

DOCUMENT

Sen2Three Software Release Note (SRN)

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CHANGE LOG

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Update	1	0.1	13.02.2017

CHANGE RECORD

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Reason for change	Date	Pages	Paragraph(s)
Fixes an incompatibility between Sen2Cor release 2.3.0 and Sen2Three 1.1	13 February 2017		

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1. INTRODUCTION

This document is the Software Release Note for the Sentinel-2 level 3 processor for spatio-temporal synthesis, labelled as Sen2Three.

1.1 Purpose and Scope

This document is produced in the context of the development of the Sentinel 2 level-3 processor. Its purpose is to describe the contents of the processor release 1.0.1.

1.2 Structure of the Document

This chapter gives an overview on the relevant documents.
 Chapter 2 lists the contents of this delivery
 Chapter 3 gives an evolutionary history (currently empty).
 Chapter 4 refers to the installation and setup procedure.
 Chapter 5 lists third party tools and specifies the license.

1.3 Referenced and Applicable Documents

The following is a list of documents with a direct bearing on the content of this report. Where referenced in the text, these are identified as RD.n, where 'n' is the ID in the list below:

Table 1-1: Applicable Documents

ID	Title	Reference	Date / Version
L3-ATBD	Sentinel-2 MSI - Level 3 Products Algorithm Theoretical Basis Document	S2PAD-VEGA-ATBD	18.07.2010, I2R0
L2A-ATBD	Sentinel-2 MSI - Level 2A Products, Algorithm Theoretical Basis Document	S2PAD-VEGA-ATBD	13.05.2016, I2R1
S2-PFS	GMES Space Component – Sentinel-2 Products Specification Documentation	S2-PDGS-TAS-DI-PSD	05.06.2015, V13
S2-PDD	GMES Space Component – Sentinel-2 Payload Data Ground Segment (PDGS), Product Definition Document	GMES-GSEC-EOPG-TN-09-0029	30.03.2012, I2R3
L2A-PFS	Sentinel-2 Toolbox Development Sentinel-2 MSI – Level 2A Product Format Specification	S2PAD-VEGA-TM-PFS	8.4.2016, I1R6
L2A-PDD	Sentinel-2 Toolbox Development Sentinel-2 MSI – Level 2A Product Definition	S2PAD-VEGA-PDD	1.4.2016, I4R4

Table 1-2: Reference Documents

ID	Title	Reference	Date / Version
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ID	Title	Reference	Date / Version
L3-SUM	Sentinel-2 MSI – Level 3 Processor Installation and User Manual	TBS2-L3-SUM	20.07.2016, I1R0
L3-DPM	Sentinel-2 MSI – Level 3 Detailed Processing Model Documentation	TBS2-L3-DPMD	20.07.2016, I1R0
L3-PFS	Sentinel-2 MSI – Level 3 Product Format Specification	TBS2-L3-PFS	20.07.2016, I1R0
L3-IODD	Sentinel-2 MSI – Level 3 Input Output Data Definition	TBS2-L3-IODD	20.07.2016, I1R0
L2A-SUM	Sentinel-2 MSI – Level 2A Prototype Processor Installation and User Manual	S2PAD-VEGA-SUM	13.04.2016, I2R2

1.4 Acronyms and Abbreviations

The following terms may be used in the documentation with the meanings shown.

2A-SC	Level 2A Scene Classification
2A-AC	Level 2A Atmospheric Correction
AD	Applicable Document
AOI	Area Of Interest
AOT	Aerosol Optical Thickness
ATBD	Algorithm Theoretical Basis Document
ATCOR	Atmospheric and Topographic Correction
BOA	Bottom Of Atmosphere
BRDF	Bidirectional Reflectance Distribution Function
BRF	Bidirectional Reflectance Factor
CEOS	Committee for Earth Observation Satellite
CF	Cloud Free
DAP	Data Access Portfolio Requirement Document
DEM	Digital Elevation Model
DLR	Deutsches Zentrum für Luft- und Raumfahrt
DPM	Detailed Processing Model
DTED	Digital Terrain Elevation Data
ECMWF	European Centre for Medium-Range Weather Forecasts
EMSA	European Maritime Safety Agency

ENVISAT	Environmental Satellite
EO	Earth Observation
ESA	European Space Agency
ETM	Enhanced Thematic Mapper
FP	Framework Program
GEO	Geosynchronous Earth Orbit
GEOSS	Global Earth Observation System of Systems
GIPP	Ground Image Processing Parameters
GMES	Global Monitoring for Environment and Security
GPP	Ground Prototype Processor
GPS	Global Positioning System
GRIB	Gridded Binary
GSD	Ground Sampling Distance
GSE	GMES Services Element
HDF	Hierarchical Definition Format
HITRAN	High Resolution Transmission
HR	High Resolution (10m, 20m, 60m)
IODD	Input Output Data Description
LUT	Look Up Table
MERIS	Medium Resolution Imaging Spectrometer
MODIS	MODerate resolution Imaging Spectro radiometer
MODTRAN	MODerate resolution atmospheric TRANsmission
MRD	Mission Requirement Document
MSI	Multi Spectral Imager
NA	Not Available
N/A	Not Applicable
NDSI	Normalised Difference Snow Index
NDVI	Normalized Difference Vegetation Index
NIR	Near InfraRed
NOAA	National Oceanographic American Agency
NPL	National Physical Laboratory
PDGS	Payload Data Ground Segment

PFS	Product Format Specification
QA	Quality Assurance
QA4EO	Quality Assurance Framework for Earth Observation
QC	Quality Control
QI	Quality Indicator
RD	Reference Document
RMS	Root Mean Square
RMSE	Root Mean Square Error
RTM	Radiative Transfer Model
SAA	Sun Azimuth Angle
SAFE	Standard Archive Format for Europe
Sen2Cor	Sentinel 2 Level 2A Processor for Scene Classification and Atmospheric Correction
Sen2Three	Sentinel 2 Level 3 Processor for Spatio-Temporal Synthesis
SMAC	Simplified Method for the Atmospheric Correction
SNR	Signal to Noise Ratio
SPOT	Satellite Pour l'Observation de la Terre
SRD	System Requirement Document
SRTM	Shuttle Radar Topographic Mission
SUM	Software Installation and User Manual
SWIR	Short Wave InfraRed
SZA	Sun Zenith Angle
TBC	To Be Confirmed
TBD	To Be Defined
TBW	To Be Written
TOA	Top Of Atmosphere
TOC	Top of Canopy
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VAA	View Azimuth Angle
VIS	Visible
VNIR	Visible Near InfraRed

VZA	View Zenith Angle
WGS	World Geodetic System
WV	Water Vapour



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2. SOFTWARE RELEASE OVERVIEW

2.1 Delivery List

The software and all items have been uploaded to the CS FTP server under:

uranus4.c-s.fr/vega/in

The following Items are part of this delivery:

Delivery number	Description
D1	Processor Software available in zip and compressed tar format (tar.gz)
D2	On line Help in HTML and sphinx format.
D3	Package of Level 1C Input files for usage with Sen2Cor for purpose of preparing Level 2A input products.
D4	Package of Level 2A Input files for purpose of testing the Level 3 processor.
D5	Documentation: TBS2-L3-SUM, TBS2-L3-DPM, TBS2-L3-IODD, TBS2-L3-PFS as further specified in section 1.3. Documentation in Word and PDF.

3. STATUS OF THE SOFTWARE CONFIGURATION ITEM

3.1 Evolution History

This release 1.0.1 of the Sen2Three spatio-temporal processor fixes an incompatibility with Sen2Cor release 2.3.0. Due to an upgrade of the IO routines of the Sen2Three processor (release 2.3.0 and above), which allowed to inherit the positional information from the Level 1C data, Sen2Three was no longer able to process the according Level-2A data, due to read errors of the modified Level-2A inputs. This has been fixed now. Additionally, Sen2Three is now able to inherit the positional information as received from the Level-2A inputs.

Please notice (!). This version of Sen2Cor still supports **only Version 13** of the Level 1C PSD. The upgrade to PSD V.14.1 is topic of the upcoming release V.1.1, the release is planned for spring of this year.

Editorial note: Figure 1 of the Software User's Manual is misleading. Sen2Three requires Level 2A converted input data for processing, as can be generated with Sen2Cor, V.2.3.0 and above. A direct processing of Level 1C data using Sen2Three is not possible, due to the different resolutions of the Level 1C Bands. An update of the SUM will follow with Version 1.1.

4. INSTALLATION AND SETUP

Please follow chapter 3 of [L3-SUM] for installation and setup.

5. OTHER ITEMS

5.1 Third Party Tools

Sen2Three was developed using the [Anaconda2](#) V4.0 (Python 2.7) distribution. The following third party tools are already part of the Anaconda distribution, so that a separate installation is not necessary, providing that Anaconda has been properly installed.

- Matplotlib, for the graphical preparation of the output data;
- Objectify, elementTree for XML interfacing;
- numpy, scipy for statistics and image data handling;
- pytables for a faster interfacing with the image arrays.

The interface for reading and writing the JPEG 2000 image data was realized using a customized version of the OpenJPEG library (2.1.0) as provided by the Sentinel-2 Toolbox Development ([s2tbx](#)) and the [glymur](#) interface for accessing the OpenJPEG library via python.

For the development, runtime, debug and testing environment the excellent [PyCharm](#) IDE was used. This online documentation was realized with Sphinx, which is also part of the Anaconda distribution.

5.2 License

Sen2Three is released under GPL V3 as further described in the preamble below:

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Version 3, 29 June 2007

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