1 Introduction

1.1 Document purpose

The document presents the structure and the content of the S3ETRAC product.

1.2 S3ETRAC

The verification of the in-flight OLCI and SLSTR (reflective bands) calibration can be performed through indirect approaches such as absolute calibration over Rayleigh scattering, cross-calibration and trending over desert and snowy sites, inter-band calibration over sunglint. The indirect calibration methods are implemented in tools (e.g. MUSCLE, DIMITRI, OSCAR) which ingest data and/or statistics extracted and calculated from L1 products acquired over natural areas.

The S3ETRAC toolbox, developed and operated by ACRI-ST during the Sentinel-3 commissioning phase and within the Sentinel-3 Mission Performance Centre, allows OLCI and SLSTR L1 data extraction, pre-processing, filtering and statistics computation over pre-defined natural regions of interest, categorised by calibration purpose. The S3ETRAC output products are used as input of the calibration verification tools.

The first version of S3ETRAC will perform data extraction and statistics calculation over deserts, snowy sites and oligotrophic sites inside and outside the sunglint region. These sites have been selected for their appropriate optical properties to validate the radiometry of optical sensors: e.g. spatial and temporal radiometric stability for desert and snowy sites, maximization of the Rayleigh scattering over oceanic surface, etc.

The S3ETRAC processing is organised in several steps: (1) data pre-processing (normalization to reflectance, data quality verification, …), (2) data selection based on a series of filtering criteria (defined per site type) minimizing disturbing effects such as clouds, bad atmospheric and meteo conditions, etc., (3) statistics calculation either over the region of interest (desert, snow site) or per macro-pixel (over oceanic surface).

2 Output data format, structure and content

2.1 Format

The format of the S3ETRAC output files is netCDF_4.0.

2.2 Structure and content

2.2.1 File attributes

Element name	Description	Range or value	Type	Dimens
n_chan	Number of instrument channels	OLCI=21 SLSTR=13		1
n_view	Number of views (Nadir or forward)	OLCI=1 SLSTR=2		1
<global attributes>	Global attributes			
filename	Name of S3ETRAC netcdf file (this file)		st	1
proc_Time	Date/Time of generation of this file	YYYY-MM-DDTHH:MN:SS.SSSSSS	st	1
Proc_centre	Processing centre	GGG[1]	st	1
title	Title of extraction		st	1
tool	Name of the extraction tool	S3ETRAC	st	1
version	Version number of tool	X.Y	st	1
reference_doc	Reference to data extraction procedure	S3ETRAC ATBD/ DCT-SI/MO 2013-8379 / V2"	st	1
supplier	Name of supplier	ACRI-ST	st	1
l1b_product	Filename of L1b product used		st	1

[1] GGG are extracted from the L1B filename (see Sentinel-3 PDGS File Name Convention, ref EUM/LEO-SEN3/SPE/10/0070)

LN1 = Land OLCI Processing and Archiving Centre

LN2 = Land SLSTR and SYN Processing and Archiving Centre

LN3 = Land Surface Topography Mission Processing and Archiving Centre

MAR= Marine Processing and Archiving Centre

SVL= Svalbard Satellite Core Ground Station

platform	Platform on which sensor is mounted	S3A	st	1
sensor	Name of Sensor	OLCI, SLSTR	st	1
software_version	L1b processing version	X.Y	st	1
sensing_start_time	Sensing start time from L1b product	YYYY-MM-DDTHH:MN:SS	st	1
sensing_stop_time	Sensing stop time from L1b product	YYYY-MM-DDTHH:MN:SS	st	1
l1b_proc_time	Processing time of L1b product	YYYY-MM-DDTHH:MN:SS	st	1
calibration_adf_file	**Only for OLCI** Reference to calibration file used in L1 processing		st	1
viscal	**Only for SLSTR** Reference to viscal file		st	1
vicarious	**Only for SLSTR** Reference to calibration file containing drift corrections used		st	1
site_name	Name of the site		st	1
site_type	Type of the site	DESERT, SNOW, RAYLEIGH, GLITTER	st	1
site_description	Short description of the site		st	1
site_ne_lat	Lat coordinate of NE corner of site	Degrees north	st	1
site_nw_lat	Lat coordinate of NW corner of site	Degrees north	st	1
site_se_lat	Lat coordinate of SE corner of site	Degrees north	st	1
site_sw_lat	Lat coordinate of SW corner of site	Degrees north	st	1
site_ne_lon	Lon coordinate of NE corner of site	Degrees east	st	1
site_nw_lon	Lon coordinate of NW corner of site	Degrees east	st	1
site_se_lon	Lon coordinate of SE corner of site	Degrees east	st	1
site_sw_lon	Lon coordinate of SW corner of site	Degrees east	st	1
site_file_name	Reference to site definition file		st	1
aux_param_file_name	Reference to tool auxiliary data file(s)		st	1
comment	Commentaire		st	1

2.2.2 Variables at site level

Element name	Description	Value or Range	Type	Dimens
wavelength	Nominal channel wavelength		db	n_chan
variable	Variable name		st	1
unit	unit name	nm	st	1
band_name	Band ID number/name for channel		st	n_chan * n_view
radiometric_units	Radiometric Units for given channel	"dl", "K", "$Wm^{-2}sr^{-1}nm^{-1}$"	st	n_chan * n_view
n_site	Total number of pixels over the site		int	n_view
variable	Variable name		st	1
n_valid	Number of pixels over the site for the considered channel satisfying quality checks		int	n_chan * n_view
variable	Variable name		st	1
n_clear	Number of pixels over the site satisfying geophysical criteria		int	n_view
variable	Variable name		st	1
cloud_fraction	Cloud fraction over the site		db	n_view
variable	Variable name		st	1
unit	unit name	%	st	
n_pixels	Number of pixels for the considered channel satisfying site, quality and geophysical criteria		int	n_chan * n_view
variable	Variable name		st	1

2.2.3 Variable at record level

Element name	Description	Value or Range	Type	Dimens
group: data_<view_name>	Variables pour le group_data_<view_name>			
n_rec	Number of data records (macro-pixels)	1 for desert or snow else variable		1
rec_time	Measurement time at the record centre of the data_<view_name>		db	n_rec * n_chan
variable	Variable name		st	1
unit	Unit name	µsec since 2000-01-01 T00:00:00Z	st	1
rec_pixels	Number of pixels over record for the considered channel satisfying site, quality and geophysical criteria		int	n_rec * n_chan
variable	Variable name		st	1
rec_mean_lat	Mean latitude over selected pixels of the record, i.e. latitude of the barycenter of selected pixels inside the macro-pixel satisfying site, quality (non channel dependent) and geophysical criteria		db	n_rec
variable	Variable name		st	1
unit	Unit name	degree	st	1
rec_mean_lon	Mean longitude over selected pixels of the record, i.e. longitude of the barycenter of selected pixels inside the macro-pixel satisfying site, quality (non channel dependent) and geophysical criteria		db	n_rec
variable	Variable name		st	1
unit	Unit name	degree	st	
rec_mean_alt	Mean altitude over selected pixels of the record, i.e. altitude of the barycenter of selected pixels inside the macro-pixel satisfying site, quality (non channel		db	n_rec

	dependent) and geophysical criteria			
variable	Variable name		st	1
unit	Unit name	m	st	1
rec_mean_i	Line of the L1 product corresponding to the record mean latitude of the data_<view_name>, i.e. line of the barycenter of selected pixels inside the macro-pixel satisfying site, quality (non channel dependent) and geophysical criteria		int	n_rec
variable	Variable name		st	1
rec_mean_j	Column of the L1 product corresponding to the record mean longitude of the data_<view_name>, i.e. column of the barycenter of selected pixels inside the macro-pixel satisfying site, quality (non channel dependent) and geophysical criteria		int	n_rec
variable	Variable name		st	1
rec_mean_i_channel	Line of the L1 product corresponding to the barycenter of selected pixels inside the macro-pixel of the data_<view_name> satisfying site, quality (channel dependent) and geophysical criteria		int	n_rec * n_chan
variable	Variable name		st	1
rec_mean_j_channel	Column of the L1 product corresponding to the barycenter of selected pixels inside the macro-pixel of the data_<view_name> satisfying site, quality (channel dependent) and geophysical criteria		int	n_rec * n_chan
variable	Variable name		st	1
rec_mean_camera	**For OLCI only** Camera number of the record mean centre [rec_mean_i, rec_mean_j], i.e. Camera number of the barycenter of selected pixels inside the macro-pixel satisfying site, quality (non channel dependent) and geophysical criteria		ubyte	n_rec
variable	Variable name		st	1
rec_mean_scan	**For SLSTR only** Scan number of the record mean centre		ushort	n_rec

	[rec_mean_i,rec_mean_j] of the data_<view_name>, i.e. Scan number of the barycenter of selected pixels inside the macro-pixel satisfying site, quality (non channel dependent) and geophysical criteria			
variable	Variable name		st	1
rec_mean_pixel	**For SLSTR only** Gridded pixel number of the record mean center [rec_mean_i,rec_mean_j] of the data_<view_name>, i.e. Gridded pixel number of the barycenter of selected pixels inside the macro-pixel satisfying site, quality (non channel dependent) and geophysical criteria		ushort	n_rec
variable	Variable name		st	1
rec_mean_detector	Detector number of the record mean centre [rec_mean_i, rec_mean_j] of the data_<view_name>, i.e. detector number of the barycenter of selected pixels inside the macro-pixel satisfying site, quality (non channel dependent) and geophysical criteria		ubyte	n_rec
variable	Variable name		st	1
rec_average	Mean measurement value (reflectance, BT, normalized radiance) over record		db	n_rec * n_chan
variable	Variable name		st	1
rec_stddev	Standard deviation of measurement over record		db	n_rec * n_chan
variable	Variable name		st	1
rec_minimum	Minimum value of measurement over record		db	n_rec * n_chan
variable	Variable name		st	1
rec_maximum	Maximum value of measurement over record		db	n_rec * n_chan
variable	Variable name		st	1
mean_solar_zenith	Mean Solar zenith angle over record		db	n_rec
variable	Variable name		st	1
unit	Unit name	degree	st	
mean_solar_azimuth	Mean Solar azimuth angle over record		db	n_rec

variable	Variable name		st	1
unit	Unit name	degree	st	
mean_view_zenith	Mean View zenith angle over record		db	n_rec
variable	Variable name		st	1
unit	Unit name	degree	st	
mean_view_azimuth	Mean view azimuth angle over record		db	n_rec
variable	Variable name		st	1
unit	Unit name	degree	st	
ozone	ECMWF Ozone concentration over record		db	n_rec
variable	Variable name		st	1
unit	Unit name	kg/m²	st	
tcwv	Total Column Water Vapour over record		db	n_rec
variable	Variable name		st	1
unit	Unit name	kg/m²	st	1
p_surface	Barometric pressure at surface level over record		db	n_rec
variable	Variable name		st	1
unit	Unit name	hPa	st	1
horizontal_wind	Modulus of horizontal component of wind over record		db	n_rec
variable	Variable name		st	1
unit	Unit name	m/s	st	1