



PREPARATION AND OPERATIONS OF THE MISSION PERFORMANCE  
CENTRE (MPC) FOR THE COPERNICUS SENTINEL-3 MISSION

**Product Data Format Specification - SLSTR Level 2**  
**Marine Products**



*Mission  
Performance  
Centre*



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<b>Author(s):</b>	ACRI-ST IPF Team		
<b>Approved by:</b>	Olivia Lesne, QA Manager	<b>Authorized by</b>	Frédéric Rouffi, S3 IPF Manager
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**ACRI-ST**  
**260 route du Pin Montard**  
**06904 Sophia-Antipolis, France**  
**Tel: +33 (0)492 96 75 00 Fax: +33 (0)4 92 96 71 17**  
[www.acri-st.fr](http://www.acri-st.fr)

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## TABLE OF CONTENTS

<b>1. INTRODUCTION.....</b>	<b>13</b>
1.1 Purpose and Scope.....	13
1.2 Structure of the Document .....	13
1.3 Applicable and Reference Documents.....	13
1.3.1 Applicable documents.....	13
1.3.2 Reference documents.....	14
1.4 Terms, Definitions and Abbreviated Terms.....	15
<b>2. OVERVIEW OF THE INSTRUMENT: SLSTR.....</b>	<b>3</b>
<b>3. PRODUCT OVERVIEW .....</b>	<b>3</b>
3.1 Product Tree.....	3
3.1.1 Science Product Tree .....	3
3.1.2 Browse Product Tree .....	3
3.2 Product Naming Convention .....	3
<b>4. SLSTR PRODUCT FORMAT SPECIFICATION: COMMON PART .....</b>	<b>3</b>
4.1 General Product Structure .....	3
4.1.1 Package Layout .....	3
4.1.2 Manifest file.....	3
4.1.3 Measurement Data Files and Annotation Data Files .....	3
4.2 Earth Observation Products .....	3
4.2.1 Common Annotation Data Files.....	3
<b>5. MANIFEST FILE DESCRIPTION: COMMON PART .....</b>	<b>3</b>
5.1 Metadata Section .....	3
5.2 Data Object Section .....	3
5.2.1 Common annotation Data Files .....	3
<b>6. XML SCHEMA .....</b>	<b>3</b>
<b>7. SLSTR PRODUCT FORMAT SPECIFICATION .....</b>	<b>58</b>
7.1 Earth Observation Products .....	58
7.1.1 Level 2 Product: SL_2_WCT.....	58
7.1.2 Level 2 Product: SL_2_WST.....	63
7.2 Browse Products .....	80
7.2.1 Manifest File .....	80
7.2.2 Level 2 Browse Package Description .....	80
<b>8. MANIFEST FILE DESCRIPTION .....</b>	<b>83</b>
8.1 InformationPackageMap .....	83
8.1.1 'SL_2_WCT' Level 2 Product .....	83
8.1.2 'SL_2_WST' Level 2 Product.....	87
8.1.3 'SL_2_WST_BW' L2 Browse Products.....	88
8.2 Metadata Section .....	89
8.3 Data Object Section .....	89
8.3.1 Measurement Data Files.....	89
<b>9. PRODUCT SIZE .....</b>	<b>97</b>
9.1 SLSTR Level 2 Marine products .....	98
9.1.1 SL_2_WCT.....	98
9.1.2 SL_2_WST.....	98
9.2 Browse products.....	99

## LIST OF FIGURES

Figure 3-1: SLSTR Product Tree.....	17
Figure 4-1: XFDU package.....	19

## LIST OF TABLES

<b>Table 1-1: Document Structure .....</b>	<b>13</b>
<b>Table 3-1: SLSTR Product Tree .....</b>	<b>17</b>
<b>Table 3-2: SLSTR Browse Product Tree.....</b>	<b>18</b>
<b>Table 4-1: Additional Global Attributes for SLSTR L1 and L2 files.....</b>	<b>20</b>
<b>Table 4-2: Global flags data file description.....</b>	<b>23</b>
<b>Table 4-3: Cloud word definitions .....</b>	<b>24</b>
<b>Table 4-4: Bayesian cloud word definitions.....</b>	<b>24</b>
<b>Table 4-5: Pointing word definitions.....</b>	<b>25</b>
<b>Table 4-6: Confidence word definitions.....</b>	<b>26</b>
<b>Table 4-7: Scan, Pixel and Detector Annotation data file description .....</b>	<b>27</b>
<b>Table 4-8: Full Resolution Cartesian Coordinates Annotation data file description .....</b>	<b>29</b>
<b>Table 4-9: Tie Points Cartesian Coordinates Annotation data file description .....</b>	<b>29</b>
<b>Table 4-10: Full Resolution Geodetic Coordinates Annotation data file description .....</b>	<b>31</b>
<b>Table 4-11: Tie points Geodetic Coordinates Annotation data file description .....</b>	<b>32</b>
<b>Table 4-12: Time Annotation data file description .....</b>	<b>35</b>
<b>Table 4-13: Solar and Satellite Geometry Annotation data file description .....</b>	<b>37</b>
<b>Table 4-14: Meteorological Annotation data file description .....</b>	<b>47</b>
<b>Table 5-1: Global Flags Annotation Data Object.....</b>	<b>49</b>
<b>Table 5-2: Scan, Pixel and Detector Number Annotation Data Object.....</b>	<b>50</b>
<b>Table 5-3: Full and Tie point Resolution Cartesian Coordinates Annotation Data Object .....</b>	<b>51</b>
<b>Table 5-4: Full and Tie point Resolution Geodetic Coordinates Annotation Data Object .....</b>	<b>52</b>
<b>Table 5-5: Time Annotation Data Object.....</b>	<b>53</b>
<b>Table 5-6: Solar and Satellite Geometry Annotation Data Object .....</b>	<b>54</b>
<b>Table 5-7: Meteorological Parameters Auxiliary Data Object.....</b>	<b>55</b>
<b>Table 5-8: OLQC Annotation Metadata Object .....</b>	<b>56</b>
<b>Table 7-1: SLSTR WCT Level 2 product physical composition.....</b>	<b>60</b>
<b>Table 7-2: Secondary Metadata for SLSTR products.....</b>	<b>61</b>
<b>Table 7-3: SL_2_WCT__ : N2_SST_in description .....</b>	<b>62</b>
<b>Table 7-4: SST exception word bits .....</b>	<b>62</b>
<b>Table 7-5: SLSTR WST Level 2 product physical composition.....</b>	<b>64</b>
<b>Table 7-6: Secondary Metadata for SLSTR products.....</b>	<b>65</b>
<b>Table 7-7: SL_2_WST__ L2P description .....</b>	<b>74</b>

Table 7-8: L2P file quality_level codes .....	75
Table 7-9: L2P l2p_flags bit field definitions .....	76
Table 7-10: L2P file sst_algorithm types definition .....	77
Table 7-11: L2P specific global attributes .....	78
Table 7-12 : The dual minus nadir SST difference depending on the different pixel conditions. ....	79
Table 7-13: SLSTR Browse L2 Product physical composition .....	81
Table 8-1: Information Package Map for L2 WCT SLSTR product.....	86
Table 8-2: Information Package Map for L2 WST SLSTR product .....	87
Table 8-3: Information Package Map for L2 SLSTR Browse Products .....	88
Table 8-4: SL_2_WCT Data Objects .....	92
Table 8-5: SL_2_WST Data Object .....	93
Table 8-6: SLSTR Browse Level 2 Data Object .....	95
Table 9-1: SL_2_WCT____ product size.....	98
Table 9-2: SL_2_WST____ product size .....	98

## AMENDMENT POLICY

This document shall be amended by releasing a new edition of the document in its entirety.  
The Amendment Record Sheet below records the history and issue status of this document.

### Amendment Record Sheet

ISSUE	DATE	REASON
1.0	01 Oct 2012	IPF DR1 Release
1.1	18 Dec 2012	Account for IPF DR1 and IPF DR2 update
1.2	12 Feb 2013	Change of Template
1.4	04 Dec 2013	DR2 update
1.5	24 Mar 2014	RIDs and SPRs correction update
1.6	15 May 2014	Consolidation of SLSTR PFS
1.7	30 July 2014	Information package map update
1.8	13 Oct 2014	Feedback from Validation phase
1.9	23 Nov 2014	Review the product size assessment assumptions and corresponding sizes
1.10	10 Feb 2015	Reference update, GHRSST specification update, Product size completion
	23 March 2015	Account for Agencies feedback
1.11	28 May 2015	Implementation of the launch critical changes
2.0	20 May 2016	Implementation of the Minor Changes
2.1	20 June 2016	Implementation of the RIDs correction
2.2	27 June 2016	Implementation of corrections raised at IPFP V3 TRR
2.3	25 October 2016	Minimum and maximum values of the scan number before the reset of the counter when crossing the ANX included as variable attributes in SLSTR Level 1 time_*.nc files.
2.4	27 March 2017	Update of the radiometric uncertainty long_name
2.5	02 May 2017	Addition of a specific tidal flag in L2P product in replacement of volcanic one. correction of the L2P attributes
2.6	09 Oct 2017	Documentation split into: L1, L2 land and L2 marine volumes
2.7	23 January 2018	Inclusion of the Bayesian Cloud mask; Change of SST variables attributes
2.8	20 Sept. 2019	<u>Inclusion of the first acquisition pixel number in time annotation files</u>

## **Document Change Record**

No.	Change in Issue	Description	Affected Section
1	1.1	S3IPF-372: L1 Browse format is not described in details.	
2	1.1	S3IPF-390: L1 Browse format is not described in details.	
3	1.1	S3IPF-391: editorial errors corrected in the document.	
4	1.1	S3IPF-393: reference document updated.	
5	1.1	S3IPF-414: metadata description has been moved to the Metadata specification document. Document is referenced. The list of parameters has been updated according to the DPM V2.	
6	1.1	S3IPF-450: global attributes are referred to from the "product structures" volume of the PDS.	
7	1.1	S3IPF-461: manifest name renamed to xfdumanifest.xml	
8	1.1	S3IPF-470: - Long_name will be deleted everywhere. The rule will be to use the description of the variable to fill them - Scale/offset are defined via processing parameters	
9	1.1	S3IPF-474: in met_tx.nc file, suffix <g><v> replaced with tx. Note on t_forecast presence and empty when not applicable.	
10	1.1	S3IPF-475: manifest section reviewed.	
11	1.1	S3IPF-485: global attributes are referred to from the "product structures" volume of the PDS. All justification for not including all attributes are in this document.	
12	1.1	S3IPF-507: column availability to the user removed.	
13	1.1	S3IPF-512: TOC reviewed.	
14	1.1	S3IPF-513: corrupted sections corrected.	
15	1.1	S3IPF-520: add caption to tables, correct TOC errors.	
16	1.2	Change of template	Entire document
17	1.3	S3IPF-390: secondary metadata reference for browse products removed	4.3
18	1.3	S3IPF-457: improve browse product description	4.3.3
19	1.3	S3IPF-461: manifest name renamed to xfdumanifest.safe	4.2.1, 4.3.2

No.	Change in Issue	Description	Affected Section
20	1.3	GDS/GHRSST version update (S3IPF-1381)	1.3.1
22	1.3	S3IPF-922: change manifest name in table 4-1 and link to section	4.2.1
23	1.3	S3IPF-695: AD and RD lists updated	1.3
24	1.3	S3IPF-696: include a description of the secondary metadata	4.1.2
25	1.3	S3IPF-697: Section renamed manifest file	4.2.1.2
26	1.3	S3IPF-698: Section OLQC removed	4.2.5.10
27	1.3	S3IPF-700: Reference to AD-4 removed	4.3
28	1.3	S3IPF-701: Reference to AD-4 changed to AD-3	5.2
29	1.3	S3IPF-702: Reference to AD-4 changed to AD-3	5
30	1.3	S3IPF-703: package map update	5.1.2
31	1.3	S3IPF-704: Harmonization of the L1 product sizes	7.1.1
32	1.3	S3IPF-895 and 945: description of wind_speed corrected, field source put back	4.2.3.3.1
33	1.3	S3IPF-897: description of the LST package completed	4.2.4.1
34	1.3	S3IPF-935: Reference to LS exception flag reported in product description and table moved to LST section	4.2.4.3.1
35	1.3	S3IPF-936: "Range or Value" for the biome/biome_orphan fields specified	4.2.4.3.3
36	1.3	S3IPF-937: LST_ancillary data file moved to a new section "Annotation data files"	4.2.4.3.3
37	1.3	S3IPF-946: Clarification in the description of brightness temperature : Nadir only	4.2.3.4.1
38	1.3	S3IPF-948: update description of thermal_radiation_tx variable	4.2.5.9

No.	Change in Issue	Description	Affected Section
39	1.4	<p>SLSTR Continuity:</p> <p>Modification of the grid indexation and content of some L1/common annotations files:</p> <ul style="list-style-type: none"> <li>- Quality Annotation Data files are now indexed by line, detector and integrators</li> <li>- Cartesian and geodetic files are now indexed on the image grid. Parameters associated with orphan pixels have been added</li> <li>- Time annotations provides one time stamp per line, a time offset for each columns and the time interval needed to process each line</li> </ul> <p>The indexation of orphan pixels is now similar to the one included in OLCI : one vector per line.</p> <p>The resolution of tie point grid is now equals to 1km on along-track direction and 16km on across-track one.</p> <p>The estimated size of each file has been modified accordingly</p>	4.2.1 4.2.5 7.1.1
40	1.5	Information package map and data object section update	5.1, 5.2, 5.3
41	1.6	SLSTR Continuity, Update of the Level 2 files (indexation of the orphan pixel)	4.2.2, 4.2.3, 4.2.4
42	1.6	Update of the product size	7
43	1.6	Review of all document and addition of missing information from prototype specifications	
44	1.6	Remove all TBC in the whole document	
45	1.6	Correction of the “range/value” of biome/biome_orphan	4.2.4.1.1
46	1.6	Update of AD reference	1.3.1
47	1.7	Information package map and data object section update	5.1, 5.2, 5.3
48	1.8	Add_offset associated with pixel indices should be removed as it is always equal to 0	4.2.5
49	1.8	A note has been added to underline the fact that product limits are provided as example (configurable through PCP)	4.2.2
50	1.9	Review the product size assumptions	7
51	1.9	Review the product size	7.1, 7.2
52	1.9	Correct typo	7.1.1
53	1.10	Reference update	1.3
54	1.10	GHRSST specification update	4.2.3
55	1.10	Product size completion	7

No.	Change in Issue	Description	Affected Section
56	1.10	Corrections due to the updated nominal configuration : A and B stripe are always processed instead of TDI	4.2.1.1.1 4.2.1.4.1 4.2.5
57	1.11	Addition of the Ozone parameter in the meteo annotations files	4.2.5.9
58	1.11	Addition of specific global attributes for SLSTR L1 and L2 files	4.1.3 4.2
59	2.0	Addition of new parameters in quality annotation files (Thermal and VIS-SWIR)	4.2.1.4.1 4.2.1.4.2
60	2.0	Addition of the Snow Albedo content in Meteo file	4.2.5.9
61	2.0	Addition of the dual minus nadir sst differences and of the associated nadir sst theoretical error in the L2P file	4.2.3.4.1
62	2.0	Replacement of spare in L2P_flags by volcanic aerosol	4.2.3.4.1
63	2.0	Modification of the L2P_flags and creation of the SST algorithm types parameter	4.2.3.4.1
64	2.1	S3IPF – 2197 : addition of a the filling rule for long_name and verification of the variables description.	4.2.3.4.1
65	2.1	S3IPF – 2195 = modification of the (nadir_sst_theoretical_error to uncertainty	4.2.3.4.1
66	2.1	S3IPF – 2196 = addition of the time dimension on dual_nadir_sst_difference and nadir_sst_theoretical_error	4.2.3.4.1
67	2.1	S3IPF – 2193 = inversion between ni and nj	4.2.3.4.1
68	2.1	S3IPF – 2199 = addition of a description table for dual minus nadir SST difefrence	4.2.3.4.1
69	2.1	S3IPF – 2192 = clarification of the channel dimension in the description of brightness temperature and in the comment attributes	4.2.3.4.1
70	2.1	S3IPF – 2194 = addition of flag_meanings and flag_values in the attributes of sst_algorithm_types	4.2.3.4.1
71	2.1	S3IPF – 2198 = change of the attributes of dt_analysis	4.2.3.4.1
72	2.2	Correction following the IPF V3 TRR : * correction of the fillValue and type of satellite zenith angle * addition of the channel repartition in nedt comment attributes	4.2.3.4.1
73	2.3	Minimum and maximum values of the scan number before the reset of the counter when crossing the ANX included as variable attributes in SLSTR Level 1 time_*.nc files.	4.2.5.7

No.	Change in Issue	Description	Affected Section
74	2.4	Update of the radiometric uncertainty long_name (SIIIMPC-1368)	4.2.1.5
75	2.5	Addition of a specific Tidal flag in L2P_flags ( SIIIMPC-1698)	
76	2.5	Correction of the L2P attributes	
77	2.6	Common and Level 2 Marine information are gathered in a separate document	
78	2.7	Inclusion of the Bayesian probabilities in common global flags files and in L2P file	4.2.1.1 7.1.2.4.1
79	2.7	Inclusion of the I0_scan_offset in the indices files	4.2.1.2
80	2.7	Modification of the quality_level computation and definition	7.1.2.4.1
81	2.7	Change of SST variable attributes	7.1.1.4 and 7.1.2.4.1
82	2.8	<a href="#">Addition of two parameters in time annotation files</a>	<a href="#">4.2.1.7</a>

# 1. INTRODUCTION

## 1.1 Purpose and Scope

This document aims to identify and specify the format of the Sentinel 3 SLSTR Level 2 Marine products, browse products included.

## 1.2 Structure of the Document

After this introduction, the document is divided into a number of major sections that are briefly described below:

Chapter Number	Title	Contents
1	INTRODUCTION	This section
2	OVERVIEW OF THE INSTRUMENT: SLSTR	A description of the main features and characteristics of the SLSTR instrument is provided here.
3	PRODUCT OVERVIEW	The Product Tree for SLSTR instruments and the product names convention are specified here.
4	SLSTR PRODUCT FORMAT: COMMON PART	In this section the format of each SLSTR common elements is specified. NetCDF Data Files of each product are reported in this section.
5	MANIFEST FILE: COMMON PART	In this section details for the implementation of the common part of the manifest file is provided.
6	XML SCHEMAS	In this section details of the schemas used to generate the manifest is provided.
7	SLSTR PRODUCT FORMAT SPECIFICATION	In this section the format of each SLSTR Level 2 Marine Product is specified.
8	MANIFEST FILE DESCRIPTION	In this section details for the implementation of the manifest file is provided
9	PRODUCT SIZE	In this section the size of each file composing the SLSTR products is provided.

Table 1-1: Document Structure

## 1.3 Applicable and Reference Documents

### 1.3.1 Applicable documents

The following table lists the documents with a direct bearing on the content of this document.

<b>ID</b>	<b>Document</b>	<b>Reference</b>
AD- 1	Sentinel 3 PDGS File Naming Convention	EUM/LEO-SEN3/SPE/10/0070 GMES-S3GS-EOPG-TN-09-0009, 1.4, 24/06/2016
AD- 2	Drivers for the S3 PDGS Processing Function Implementation	GMES-GSEG-EOPG-TN-11-0062, i1r7, 27/06/2014
AD- 3	Product Data Format Specification - Product Structures	S3IPF.PDS.002, Issue 1.7, 09/10/2017
AD- 4	Metadata Specification, Excel document	S3IPF.PDS.008, i3r4 – 09/10/2017
AD- 5	XML Schemas.zip – Zip file containing all the schemas used to represent the metadata	S3IPF PDS 009, i3r1 – 09/10/2017
AD- 6	Auxiliary Data Format Specification – SLSTR Level 2	S3IPF.PDS.007.3, i2r10 23/01/2018
AD- 7	Sentinel SAFE Control Book volume 1 – Core Specifications	GAEL-P264-DOC-0001-01-01, i1r1, 05/06/2012
AD-8	Product Data Format Specification – SLSTR Level 1	S3IPF.PDS.005.1, Issue 2.7, 26/01/2018
AD-9	Product Data Format Specification – SLSTR Level 2 Land	S3IPF.PDS.005.2, Issue 2.7, 23/01/2018

### 1.3.2 Reference documents

The following reference documents contain information supporting this document.

<b>ID</b>	<b>Document</b>	<b>Reference</b>
RD- 1	CCSDS 661.0-B-0 XFDU structure and construction rules	Issue Sept. 2008
RD- 2	Product Data Format Specification - Level 0	S3IPF.PDS.001, I1R8, 09/10/2017
RD- 3	Sentinel 3 Level 0, Level 1a/b/c Products Definition Part 2: Optical Products. Volume 3: SLSTR Products (SY-4)	S3-RS-RAL-SY-0003, i6r2, 23/08/2013
RD- 4	Sentinel-3 Optical products and Algorithm Definition: SLSTR Level 2 Product Definition	S3-L2-SD-05-T-RAL-PD, i2r5, 12/10/2012
RD- 5	Sentinel-3 Optical products and Algorithm Definition: SLSTR Input Output Data Definition Document	S3-L2-SD-08-T-RAL-IODD, i2r8, 08/10/2012
RD- 6	GDS 2.0 Technical Specifications, <a href="http://www.ghrsst.org/documents.htm">http://www.ghrsst.org/documents.htm</a> ,	2.0 rev 05, 09/10/2012

## **1.4 Terms, Definitions and Abbreviated Terms**

Terms, Definitions and Abbreviated Terms are identified in the common volume of the product format specifications in [AD- 3].

## 2. OVERVIEW OF THE INSTRUMENT: SLSTR

The products specified in this document refer to the processed data coming from the SLSTR instrument on-board Sentinel 3 satellite.

The Sentinel SLSTR instrument is a 11-channel radiometer configured as follows:

- 3 thermal infra-red channels at 3.7, 10.8 and 12 micron wavelengths;
- 2 fire channels at 3.7, and 10.8 micron wavelengths;
- 6 short-wave and visible channels at 2.25, 1.6, 1.375, 0.87, 0.67 and 0.55 micron wavelengths.

The instrument uses two independent scan mirrors each scanning at 200 scans per minute, but each scan measures two along-track pixels of 1 km (and eight pixels at 500 m resolution) simultaneously, thus providing 500-meter resolution in the reflectance channels.

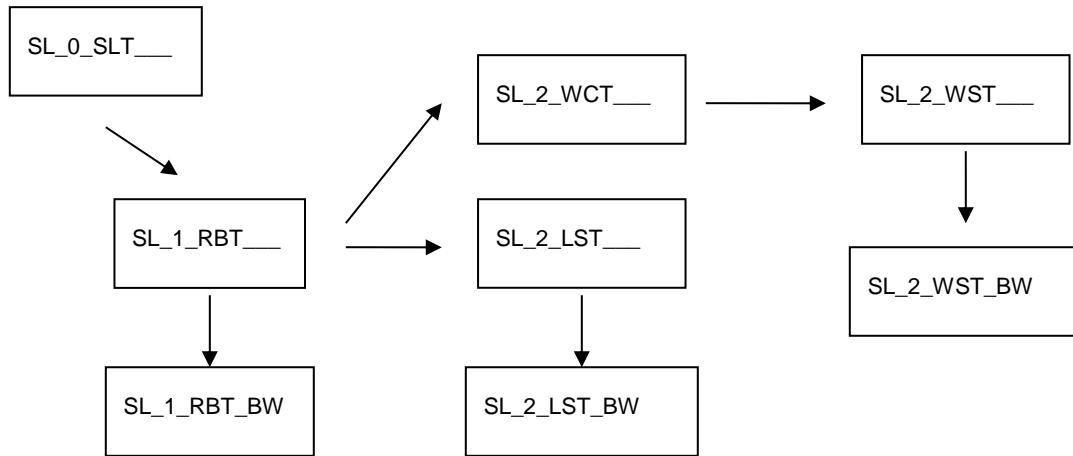
Each scan mirror is mounted at an oblique angle to its axis of rotation and directs radiation into a telescope assembly the optical axis of which is aligned parallel to the rotation axis. As the scan mirror rotates, the line of sight traces out a cone whose intersection with the Earth traces out the measurement swath of the instrument. The scan cone will intersect the Earth view, the two calibration black bodies, and the Visible Calibration (VISCAL) Unit, so that the line of sight will encounter each of these once during a complete rotation.

Radiation incident along the line of sight enters the focal plane assembly, where it is split into frequency bands corresponding to the different channels. Radiation in each channel is focussed onto a small array of detector elements, which correspond to pixels.

SLSTR is an upgraded and advanced version of the AATSR instrument on Envisat, offering a wider swath, which completely overlaps the OLCI swath, as required to produce accurate vegetation products. The SLSTR is designed for ocean and land-surface temperature observations.

### 3. PRODUCT OVERVIEW

A graphical representation of the product tree for SLSTR instrument is provided in Figure 2-1



**Figure 3-1: SLSTR Product Tree**

SLSTR L0 products are described in [RD- 2].

The Level 1 product is detailed in [AD-8] and the Level 2 Land in [AD-9].

#### 3.1 Product Tree

##### 3.1.1 Science Product Tree

The S-3 SLSTR products are summarised in [Table 2-1](#)[Table 2-1](#).

Product type	Description	Level
SL_1_RBT____	Brightness temperatures and radiances	Level 1
SL_2_WCT____	Sea Surface Temperatures (single view/ channels 2 and 3; dual view/ channels 2 and 3; aerosol-robust/ channel 3)	Level 2 Marine
SL_2_WST____	Level 2P Sea Surface Temperature (GHRSST like)	Level 2 Marine
SL_2_LST____	Land Surface Temperature geophysical parameters	Level 2 Land

**Table 3-1: SLSTR Product Tree**

### 3.1.2 Browse Product Tree

Browse Products are meant to support the analysis of quality and suitability of the optical products only. One or more browse products can be associated to each single product type.

The SLSTR Browse Product Tree is the following:

Product type	Description	Main Product	Subsampled Parameters
SL_1_RBT_BW	Quick Look of Brightness temperatures and radiances	SL_1_RBT____	<ul style="list-style-type: none"><li>• Nadir View Brightness Temperature</li><li>• Nadir View Radiance</li></ul>
SL_2_WST_BW	Quick Look of Level 2P Sea Surface Temperature (GHRSST like)	SL_2_WST____	<ul style="list-style-type: none"><li>• Sea Surface Temperature</li></ul>
SL_2_LST_BW	Quick Look of Land Surface Temperature geophysical parameters	SL_2_LST____	<ul style="list-style-type: none"><li>• Land Surface Temperature</li></ul>

**Table 3-2: SLSTR Browse Product Tree**

## 3.2 Product Naming Convention

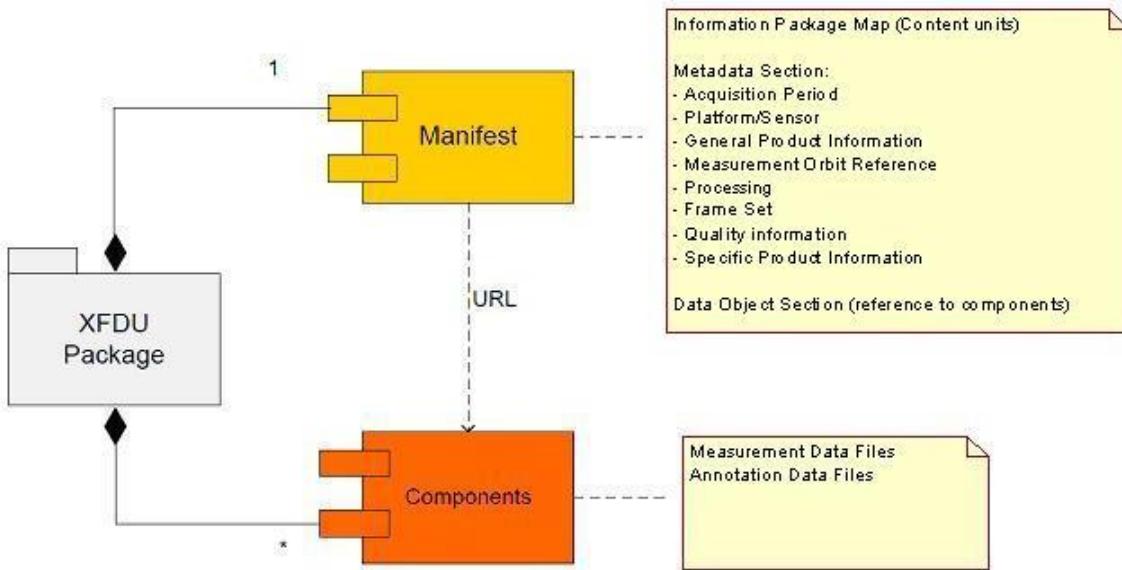
The names of the SLSTR products comply with the Sentinel 3 file naming convention according to [AD- 1].

## 4. SLSTR PRODUCT FORMAT SPECIFICATION: COMMON PART

### 4.1 General Product Structure

#### 4.1.1 Package Layout

The format of every Sentinel 3 product is described in [AD- 3]. The Product Package is sketched in [Figure 3-1](#)[Figure 3-4](#).



**Figure 4-1: XFDU package**

In the following sections, the physical composition of each package is specified for the SLSTR instrument.

According to [AD- 2], some files (measurement and annotation data files) are not generated during operations and their production can be activated by configuration of the processing chain. The column “N.O.” in the tables of the following sections indicates these “Not Operational” products.

#### 4.1.2 Manifest file

The manifest file is a set of metadata information related to the description of the product. It includes a common structure section, called primary metadata, and a specific section called secondary metadata.

##### 4.1.2.1 Primary Metadata

The primary metadata is contained in various wrapped metadata units within the Sentinel-SAFE manifest: “acquisitionPeriod”, “platform”, “generalProductInformation”, “orbitReference”, “processing”, “qualityInformation”, “frameSet” and “slstrProductInformation”.

The fields are described in [AD- 3].

#### 4.1.2.2 Secondary Metadata

The secondary metadata section contains the information specific to the instrument, level or mode applied during the processing.

#### 4.1.3 Measurement Data Files and Annotation Data Files

The format of the measurement and the annotation data files is NetCDF 4.

A NetCDF file contains dimensions, variables, and attributes, which all have both a name by which they are identified. These components can be used together to capture the meaning of data and relations among data fields in an array-oriented data set.

The global attributes defined for each netCDF file composing the products are fully defined in the common volume of the product data format specification documents named "Product structures" and referenced as [AD- 3].

##### 4.1.3.1 Common additional global attributes

Additional global attributes common to all SLSTR files are specifically defined. These attributes aims to ensure the self-containment of the dataset. There are defined in the following table and their value should be adapted according to the file.

Element name	Description	T	D
absolute_orbit_number	Absolute orbit number during which data contained within the product have been acquired	i32	1
start_time	Product start date and time (yyyy-mm-ddThh:mm:ss.ssssssZ)	S	1
stop_time	Product stop date and time (yyyy-mm-ddThh:mm:ss.ssssssZ)	S	1
comment	Miscellaneous extra information (empty)	S	1
resolution	Dataset resolution (across- and along-track) in meters unit function of the associated grid and view	S	1
start_offset	along-track position relative to ANX in pixels units, function of the associated grid and view	i32	1
track_offset	across-track position relative to SSP in pixels units function of the associated grid and view	i32	1

**Table 4-1:** Additional Global Attributes for SLSTR L1 and L2 files

## 4.2 Earth Observation Products

### 4.2.1 Common Annotation Data Files

In the following sections, the content of the common ADS (annotation datasets) is detailed. These files are common to several SLSTR L1 and L2 data products. Note however that only the considered grid are taken into account in SLSTR L2 products : i.e. SLSTR L2 LST and SLSTR L2 SST will only included annotations files dedicated to thermal 1 km grid and not the ones dedicated to Fire F1 channel or solar 500m channels.

#### 4.2.1.1 Global Flags Data File

The Global Flags Annotation Data files contain the product quality flags that are applicable across all measurement datasets sharing the same view and detector geometry. There are at most eight-ten global flag files, two-four at 1km resolution (nadir and oblique views, global one and F1 dedicated) and six up to six at 500m resolution (nadir and oblique views, "A stripe" and "B stripe" —nominal configuration— and TDI if selected). The format of each of them is identical but the array sizes and the values of some attributes differ, rows and columns could be different for A and B stripes, along track array size is dependent on the time interval defined in the Job Order.

Concerning Cloud detection, two detection approaches have been implemented and their results are included in this file

- The probabilistic Cloud detection module dedicated to LST processing chain and computed on the 1 km image grid
- The Bayesian Cloud detection module dedicated to SST processing chain and computed on the 1 km image grid

Element name	Description	Range or value	T	D
rows	Along track grid size			
columns	Across track grid size			
orphan_pixels	Maximum Number of un-regridded (orphaned) pixels on each image line			
<common global attributes>	Common global attributes (see [AD- 3] and 3.1.3.1)			
Probability_cloud_single_i<v>	Probability of cloud in pixel (single view)	[-100, 100]	i16	rows columns

Element name	Description	Range or value	T	D
_FillValue	Value indicating missing data	-32768		1
scale_factor	Scaling factor used in decoding packed data	0.005		1
add_offset	Offset used to in decoding packed data	0.5		1
comment	comment	Probability of cloud in pixel as estimated by Bayesian Cloud detection on a single view		1
<b>Probability_cloud_dual_i&lt;v&gt;</b>	<b>Probability of cloud in pixel (dual view)</b>	<b>[-100, 100]</b>	<b>i16</b>	<b>rows columns</b>
_FillValue	Value indicating missing data	-32768		1
scale_factor	Scaling factor used in decoding packed data	0.005		1
add_offset	Offset used to in decoding packed data	0.5		1
comment	comment	Probability of cloud in pixel as estimated by Bayesian Cloud detection on both views		1
<b>cloud_&lt;g&gt;&lt;v&gt;</b>	<b>Global cloud flags</b>		<b>u16</b>	<b>rows columns</b>
flag_masks	Masks for each flag bit	See Table 3-3		1
flag_meanings	Text descriptions for each flag bit	See Table 3-3		1
<b>bayes_&lt;g&gt;&lt;v&gt;</b>	<b>Bayesian cloud flags</b>		<b>u8</b>	<b>rows columns</b>
flag_masks	Masks for each flag bit	See Table 3-4		1
flag_meanings	Text descriptions for each flag bit	See Table 3-4		1
<b>pointing_&lt;g&gt;&lt;v&gt;</b>	<b>Global pointing flags</b>		<b>u8</b>	<b>rows columns</b>
flag_masks	Masks for each flag bit	See Table 3-5		1
flag_meanings	Text descriptions for each flag bit	See Table 3-5		1

Element name	Description	Range or value	T	D
<b>confidence_&lt;g&gt;&lt;v&gt;</b>	<b>Global confidence flags</b>		<b>u16</b>	<b>rows columns</b>
flag_masks	Masks for each flag bit	See Table 3-6		1
flag_meanings	Text descriptions for each flag bit	See Table 3-6		1
<b>cloud_orphan_&lt;g&gt;&lt;v&gt;</b>	<b>Orphan pixel global cloud flags</b>		<b>u16</b>	<b>rows orphan_pixels</b>
flag_masks	Masks for each flag bit	See Table 3-3		1
flag_meanings	Text descriptions for each flag bit	See Table 3-3		1
<b>bayes_orphan_&lt;g&gt;&lt;v&gt;</b>	<b>Orphan pixel Bayesian cloud flags</b>		<b>u8</b>	<b>rows orphan_pixels</b>
flag_masks	Masks for each flag bit	See Table 3-4		1
flag_meanings	Text descriptions for each flag bit	See Table 3-4		1
<b>pointing_orphan_&lt;g&gt;&lt;v&gt;</b>	<b>Orphan pixel global pointing flags</b>		<b>u8</b>	<b>rows orphan_pixels</b>
flag_masks	Masks for each flag bit	See Table 3-5		1
flag_meanings	Text descriptions for each flag bit	See Table 3-5		1
<b>confidence_orphan_&lt;g&gt;&lt;v&gt;</b>	<b>Orphan pixel global confidence flags</b>		<b>u16</b>	<b>rows orphan_pixels</b>
flag_masks	Masks for each flag bit	See Table 3-6		1
flag_meanings	Text descriptions for each flag bit	See Table 3-6		1

Table 4-2: Global flags data file description

Bit	Text code	Meaning if set	Comment
0		Visible channels cloud test	Day time only
1		1.37 $\mu$ m threshold test	Day time only
2		1.6 $\mu$ m small-scale histogram test	Day time only
3		1.6 $\mu$ m large-scale histogram test	Day time only
4		2.25 $\mu$ m small-scale histogram test	Day time only
5		2.25 $\mu$ m large-scale histogram test	Day time only
6		11 $\mu$ m spatial coherence test	
7		12 $\mu$ m gross cloud test	
8	thin_cirrus	11 $\mu$ m/12 $\mu$ m thin cirrus test	
9		3.7 $\mu$ m/12 $\mu$ m medium/high level test	
10	fog_low_stratus	11 $\mu$ m/3.7 $\mu$ m fog/low stratus test	
11		11 $\mu$ m/12 $\mu$ m view difference test	Uses both views
12		3.7 $\mu$ m/11 $\mu$ m view difference test	Uses both views
13	thermal_histogram	11 $\mu$ m/12 $\mu$ m thermal histogram test	
14		spare	
15		spare	

**Table 4-3:** Cloud word definitions

Bit	Text code	Meaning if set	Comment
0		Single view low probability threshold	Climate-quality clearing
1		Single view moderate probability threshold	Operational-quality clearing
2		Dual view low probability threshold	Climate-quality clearing
3		Dual view moderate probability threshold	Operational-quality clearing
4		spare	
5		spare	
6		spare	
7		spare	

**Table 4-4:** Bayesian cloud word definitions

Bit	Text code	Meaning if set	Comment
0	FlipMirrorAbsoluteError	flip mirror absolute error exceeds threshold	
1	FlipMirrorIntegratedError	flip mirror integrated error exceeds threshold	
2	FlipMirrorRMSError	flip mirror RMS error exceeds threshold	
3	ScanMirrorAbsoluteError	scan mirror absolute error exceeds threshold	
4	ScanMirrorIntegratedError	scan mirror integrated error exceeds threshold	
5	ScanMirrorRMSError	scan mirror RMS error exceeds threshold	
6	ScanTimeError	Scan time is inconsistent with scan count sequence	
7	Platform_Mode	platform mode	0 if nominal, else 1

**Table 4-5:** Pointing word definitions

Bit	Text code	Meaning if set	Comment
0	coastline	coastline in field of view	
1	ocean	ocean in field of view	
2	tidal	tidal zone in field of view	
3	land	land in field of view	
4	inland_water	inland water in field of view	
5	unfilled	unfilled pixel (1 if this pixel is never tested or filled)	
6		(spare)	
7		(spare)	
8	cosmetic	cosmetic fill pixel	
9	duplicate	Pixel has a duplicate	
10	day	pixel in daylight	
11	twilight	pixel in twilight	
12	sun_glint	sun glint in pixel	
13	snow	snow	
14	summary_cloud	summary cloud test	
15	summary_pointing	summary pointing	

**Table 4-6:** Confidence word definitions

#### 4.2.1.2 Scan, Pixel and Detector Annotation Data File

The scan, pixel and detector number description table contains arrays of indices which map both gridded and orphaned pixels to their original positions in the instrument measurement frame. There are at most [eight-ten](#) scan, pixel and detector number datasets, [two-four](#) at 1km resolution (nadir and oblique views, [global one and F1 dedicated](#)) and [up to](#) six at 500m resolution (nadir and oblique views, “A stripe” and “B stripe and TDI if selected). The format for each is identical but the array sizes and the values of some attributes differ, rows and columns could be different for A and B stripes, along track array size is dependent on the time interval defined in the Job Order.

Element name	Description	Range or value	T	D
rows	Along track grid size			
columns	Across track grid size			
orphan_pixels	Maximum number of un-regridded (orphaned) pixels on each image line			
<common global attributes>	Common global attributes (see [AD- 3] and 3.1.3.1)			
<b>I0_scan_offset_&lt;g&gt;&lt;v&gt;</b>	<b>Offset between scan index and corresponding ISP scan count</b>		int	1
_FillValue	Value indicating missing data	-2147483648		1
<b>scan_&lt;g&gt;&lt;v&gt;</b>	<b>Pixel scan number</b>		u16	<b>rows</b> <b>columns</b>
_FillValue	Value indicating missing data	$2^{16} - 1$		1
<b>pixel_&lt;g&gt;&lt;v&gt;</b>	<b>Gridded pixel number</b>		u16	<b>rows</b> <b>columns</b>
_FillValue	Value indicating missing data	$2^{16} - 1$		1
<b>detector_&lt;g&gt;&lt;v&gt;</b>	<b>Gridded pixel detector number</b>		u8	<b>rows</b> <b>columns</b>
_FillValue	Value indicating missing data	$2^8 - 1$		1
<b>scan_orphan_&lt;g&gt;&lt;v&gt;</b>	<b>Pixel scan number for un-regridded pixels</b>		u16	<b>rows</b> <b>orphan_pixels</b>
_FillValue	Value indicating missing data	$2^{16} - 1$		1

Element name	Description	Range or value	T	D
pixel_orphan_<g><v>	Un-regridded pixel number		u16	rows orphan_pixels
_FillValue	Value indicating missing data	$2^{16} - 1$		1
detector_orphan_<g><v>	Un-regridded pixel detector number		u8	rows orphan_pixels
_FillValue	Value indicating missing data	$2^8 - 1$		1

**Table 4-7:** Scan, Pixel and Detector Annotation data file description

#### 4.2.1.3 Full Resolution Cartesian Coordinates Annotation Data File

The Cartesian coordinates dataset contains the ortho-geolocated quasi-Cartesian coordinates x and y of the centre of each pixel in the field of view on the earth's surface, determined from a digital elevation model, where x is the across track distance on the ellipsoid, locally perpendicular to the sub-satellite track and y is the distance along the sub-satellite track.

**Important note:** By construction, the y coordinate has its origin set at the ANX point. When a PDU is generated from two IPF granules (P1 and P2) each using a different ANX points, a discontinuity occurs when crossing the ANX. To overcome this issue, the discontinuity is removed by the PDU generation processor (PUG-F) by applying the following algorithm:

1. Make the average of the Y-Coordinates of the last row of the granule P1 (Yavg1)
2. Make the average of the Y-Coordinates of the first row of the granule P2 (Yavg2)
3. Compute the offset "delta=(Yavg1-Yavg2)+DX"
4. Compute the Y-coordinates of the merged product in this way:
  - For each pixel included in a row from product P1, maintain the Y-coordinates present in the input P1 product
  - whereas for each pixel from product P2, sum "delta" to the Y-Coordinates associated with this pixel.

The dataset is generated in the image frame. The dataset is encoded in NetCDF 4. There are at most [eight ten](#) datasets, [two-four](#) at 1km resolution (nadir and oblique views, [global one and F1 dedicated](#)) and [up to](#) six at 500m resolution (nadir and oblique views, "A stripe" and "B stripe" [– nominal configuration –](#) and TDI if selected). The format of each of them is identical but the array sizes and the values of some attributes differ, along track array size is dependent on the time interval defined in the Job Order.

Element name	Description	Range or value	T	D
rows	Along track grid size			
columns	Across track grid size			
orphan_pixels	Maximum number of un-regridded (orphaned) pixels on each image line			
<common global attributes>	Common global attributes (see [AD- 3] and 3.1.3.1)			
x_<g><v>	Geolocated x (across track) coordinate of detector FOV centre	[-500000, +1000000]	i32	rows columns
standard_name	CF standard name			1
units	UDUNITS unit name	m		1
scale_factor	Scaling factor used in decoding packed data	0.01		1
add_offset	Offset used to in decoding packed data	0		1
_FILLValue	Value indicating missing data	-1000000		1
y_<g><v>	Geolocated y (along track) coordinate of detector FOV centre	[-1000000, +50000000]	i32	rows columns
units	UDUNITS unit name	m		1
scale_factor	Scaling factor used in decoding packed data	0.01		1
add_offset	Offset used to in decoding packed data	0		1
_FILLValue	Value indicating missing data	-50000000		1
x_orphan_<g><v>	Geolocated x (across track) coordinate of detector FOV centre for un-regridded pixels	[-500000, +1000000]	i32	rows orphan_pixels
standard_name	CF standard name			1
units	UDUNITS unit name	m		1
scale_factor	Scaling factor used in decoding packed data	0.01		1
add_offset	Offset used to in decoding packed data	0		1
_FILLValue	Value indicating missing data	-1000000		1
y_orphan_<g><v>	Geolocated y (along track) coordinate of detector FOV centre for un-regridded pixels	[-1000000, +50000000]	i32	rows orphan_pixels

Element name	Description	Range or value	T	D
units	UDUNITS unit name	m		1
scale_factor	Scaling factor used in decoding packed data	0.01		1
add_offset	Offset used to in decoding packed data	0		1
_FillValue	Value indicating missing data	-50000000		1

**Table 4-8:** Full Resolution Cartesian Coordinates Annotation data file description

#### 4.2.1.4 Tie points Cartesian Coordinates Annotation Data File

The Tie Points Cartesian coordinates dataset contains the quasi-Cartesian swath coordinates of the tie-points on the ellipsoid (the resolution is 1 km in the along-track direction and 16 km in the across-track one).

Element name	Description	Range or value	T	D
rows	Along track grid size			
columns	Across track grid size			
<common global attributes>	Common global attributes (see [AD- 3] and 3.1.3.1)			
x_<g><v>	Geolocated x (across track) coordinate of detector FOV centre		f64	rows columns
units	UDUNITS unit name	m		1
y_<g><v>	Geolocated y (along track) coordinate of detector FOV centre		f64	rows columns
units	UDUNITS unit name	m		1

**Table 4-9:** Tie Points Cartesian Coordinates Annotation data file description

#### 4.2.1.5 Full Resolution Geodetic Coordinates Annotation Data File

The geodetic coordinates' dataset contains the ortho-geolocated geodetic coordinates, in latitude and longitude, and the surface elevation of the centre of each pixel in the field of view on the earth's surface, determined from a digital elevation model. The dataset is generated in the image frame. The dataset is encoded in NetCDF 4. There are at most [eight-ten](#) datasets, [four two](#) at 1km resolution (nadir and oblique views, [global one](#)

| [and F1 dedicated](#)) and up to six at 500m resolution (nadir and oblique views, “A stripe” and “B stripe” – nominal configuration – and TDI if selected).  
 The format of each of them is identical but the array sizes and the values of some attributes differ, along track array size is dependent on the time interval defined in the Job Order.

Element name	Description	Range or value	T	D
rows	Along track grid size			
columns	Across track grid size			
orphan_pixels	Maximum number of un-regridded (orphaned) pixels on each image line			
<common global attributes>	Common global attributes (see [AD- 3] and 3.1.3.1)			
latitude_<g><v>	Latitude of detector FOV centre on the earth’s surface	[-90; 90]	i32	rows columns
standard_name	CF standard name	latitude		1
units	UDUNITS unit name	degrees_north		1
scale_factor	Scaling factor used in decoding packed data	1e-6		1
add_offset	Offset used to in decoding packed data	0		1
_FILLValue	Value indicating missing data	-2147483648		1
longitude_<g><v>	Longitude of detector FOV centre on the earth’s surface	[-180; 180]	i32	rows columns
standard_name	CF standard name	longitude		1
units	UDUNITS unit name	degrees_east		1
scale_factor	Scaling factor used in decoding packed data	1e-6		1
add_offset	Offset used to in decoding packed data	0		1
_FILLValue	Value indicating missing data	-2147483648		1
elevation_<g><v>	Surface elevation of detector FOV centre above reference ellipsoid	[-450; 9000]	i16	rows columns
standard_name	CF standard name	surface_altitude		1
units	UDUNITS unit name	m		1

Element name	Description	Range or value	T	D
scale_factor	Scaling factor used in decoding packed data	0.1		1
add_offset	Offset used to in decoding packed data	0		1
_FillValue	Value indicating missing data	-32768		1
latitude_orphan_<g><v>	<b>Latitude of detector FOV centre on the earth's surface associated with un-regridded pixels</b>	[ -90; 90 ]	i32	rows orphan_pixels
standard_name	CF standard name	latitude		1
units	UDUNITS unit name	degrees_north		1
scale_factor	Scaling factor used in decoding packed data	1e-6		1
add_offset	Offset used to in decoding packed data	0		1
_FillValue	Value indicating missing data	-2147483648		1
longitude_orphan_<g><v>	<b>Longitude of detector FOV centre on the earth's surface associated with un-regridded pixels</b>	[ -180; 180 ]	i32	rows orphan_pixels
standard_name	CF standard name	longitude		1
units	UDUNITS unit name	degrees_east		1
scale_factor	Scaling factor used in decoding packed data	1e-6		1
add_offset	Offset used to in decoding packed data	0		1
_FillValue	Value indicating missing data	-2147483648		1
elevation_orphan_<g><v>	<b>Surface elevation of detector FOV centre above reference ellipsoid associated with un-regridded pixels</b>	[ -450; 9000 ]	i16	rows orphan_pixels
standard_name	CF standard name	surface_altitude		1
units	UDUNITS unit name	m		1
scale_factor	Scaling factor used in decoding packed data	0.1		1
add_offset	Offset used to in decoding packed data	0		1
_FillValue	Value indicating missing data	-32768		1

**Table 4-10:** Full Resolution Geodetic Coordinates Annotation data file description

#### 4.2.1.6 Tie points Geodetic Coordinates Annotation Data Files

The Tie Points geodetic coordinates dataset contains the geodetic coordinates, in latitude and longitude, of the tie-points on the ellipsoid. The resolution of this grid is 1 km on the along-track direction and 16 km on the across-track one.

Element name	Description	Range or value	T	D
rows	Along track grid size			
columns	Across track grid size			
<common global attributes>	Common global attributes (see [AD- 3] and 3.1.3.1)			
latitude_<g><v>	Latitude of detector FOV centre on the earth's surface	[-90; 90]	f64	rows columns
standard_name	CF standard name	"latitude"		1
units	UDUNITS unit name	"degrees_north"		1
longitude_<g><v>	Longitude of detector FOV centre on the earth's surface	[-180; 180]	f64	rows columns
standard_name	CF standard name	"longitude"		1
units	UDUNITS unit name	"degrees_east"		1

Table 4-11: Tie points Geodetic Coordinates Annotation data file description

#### 4.2.1.7 Time Annotations Data File

The time coordinate dataset contains the measurement times for each image line. The main time information is the scan acquisition time associated with the sub-satellite point included on each line. Others parameters are included to be able to retrieve the exact acquisition time of each instrument pixel. The dataset is encoded in NetCDF 4. There are at most four datasets, one at 1km resolution (common for nadir and oblique views) and up to three at 500m resolution (common for nadir and oblique views, "A stripe" and "B stripe" – Nominal configuration – and TDI if selected). The format of each of them is identical but the array sizes and the values of some attributes differ along track array size is dependent on the time interval defined in the Job Order.

Element name	Description	Range or value	T	D
rows	Along track grid size			
<common global attributes>	Common global attributes (see [AD- 3] and 3.1.3.1)			
time_stamp_<g>	<a href="#">Time at which the sub-satellite point crosses the image</a> <a href="#">rowAcquisition time of the sub-satellite point included in this line</a>		i64	rows
standard_name	CF standard name	"time"		1
units	UDUNITS unit name	"microseconds since 2000-01- 01T00:00:00Z"		1
_FillValue	Default value for scan_time entry	-(2 <sup>63</sup> )		1
SCANSYNC	<a href="#">Scan period, defined as a complete rotation of the scan mirrors</a> <a href="#">consisting of exactly 3670 1km (or 7340 500m) pixel</a> <a href="#">acquisitions</a> <a href="#">Scan Period defined as a complete rotation of the scan mirrors.</a>		i32	1
units	UDUNITS unit name	us		1
PIXSYNC_<g>	<a href="#">Time sampling interval for pixels along each sca</a> <a href="#">Frequency at which</a> <a href="#">the pixels are sampled on each scan</a>		i64	1
units	UDUNITS unit name	us		1
NADIR_FIRST_PIXEL_<g>	<a href="#">First pixel acquisition in nadir view relative to SCANSYNC</a>		i32	1
OBLIQUE_FIRST_PIXEL_<g>	<a href="#">First pixel acquisition in oblique view relative to SCANSYNC</a>		i32	1
Nadir_First_scan_<g><v>	Scan number of the first Nadir scan contributing to each line	[0; 32766]	u16	rows
_FillValue	Value indicating missing data	2 <sup>16</sup> – 1		1
Nadir_Last_scan_<g><v>	Scan number of the last Nadir scan contributing to each line	[0; 32766]	u16	rows

Element name	Description	Range or value	T	D
_FillValue	Value indicating missing data	$2^{16} - 1$		1
<b>Oblique_First_scan_&lt;g&gt;&lt;v&gt;</b>	<b>Scan number of the first oblique scan contributing to each line</b>	[0; 32766]	u16	rows
_FillValue	Value indicating missing data	$2^{16} - 1$		1
<b>Oblique_Last_scan_&lt;g&gt;&lt;v&gt;</b>	<b>Scan number of the last Oblique scan contributing to each line</b>	[0; 32766]	u16	rows
_FillValue	Value indicating missing data	$2^{16} - 1$		1
<b>Nadir_Minimal_ts_&lt;g&gt;&lt;v&gt;</b>	<b>Time at SCANSYNC of the first scan contributing to each nadir image row. Acquisition time of the first nadir scan contributing to each line</b>		i64	rows
standard_name	CF standard name	"time"		1
units	UDUNITS unit name	"microseconds since 2000-01-01T00:00:00Z"		1
_FillValue	Default value for scan_time entry	-( $2^{63}$ )		1
<b>Nadir_Maximal_ts_&lt;g&gt;&lt;v&gt;</b>	<b>Time at SCANSYNC of the last scan contributing to each nadir image row. Acquisition time of the last nadir scan contributing to each line</b>		i64	rows
standard_name	CF standard name	"time"		1
units	UDUNITS unit name	"microseconds since 2000-01-01T00:00:00Z"		1
_FillValue	Default value for scan_time entry	-( $2^{63}$ )		1
<b>Oblique_Minimal_ts_&lt;g&gt;&lt;v&gt;</b>	<b>Time at SCANSYNC of the first scan contributing to each oblique image row. Acquisition time of the first oblique scan contributing to each line</b>		i64	rows
standard_name	CF standard name	"time"		1
units	UDUNITS unit name	"microseconds since 2000-01-01T00:00:00Z"		1
_FillValue	Default value for scan_time entry	-( $2^{63}$ )		1
<b>Oblique_Maximal_ts_&lt;g&gt;&lt;v&gt;</b>	<b>Time at SCANSYNC of the last scan contributing to each oblique image row. Acquisition time of the last oblique scan contributing to each line</b>		i64	rows

Element name	Description	Range or value	T	D
standard_name	CF standard name	"time"		1
units	UDUNITS unit name	"microseconds since 2000-01- 01T00:00:00Z"		1
_FillValue	Default value for scan_time entry	-(2 <sup>63</sup> )		1

**Table 4-12:** Time Annotation data file description

#### 4.2.1.8 Solar and Satellite Geometry Annotation Data File

The Solar and Satellite Geometry Annotation Data Files contain the solar and satellite azimuth and zenith angles at earth's surface and the corresponding distances to the surface, on a tie point grid. The resolution of this grid is 1 km on along-track direction and 16 km on across-track one. There are two data sets, one for the nadir and one for the oblique viewing geometries. The format of each of them is identical and it is reported in the following table.

Element name	Description	Range or value	T	D
rows	Along track grid size			
columns	Across track grid size			
<common global attributes>	Common global attributes (see [AD- 3] and 3.1.3.1)			
solar_zenith_<g><v>	<b>Solar zenith angle</b>		f32	rows columns
standard_name	CF standard name	"solar_zenith_angle"		1
units	UDUNITS unit name	"degrees"		1
solar_azimuth_<g><v>	<b>Solar azimuth angle</b>		f32	rows columns
standard_name	CF standard name	"solar_azimuth_angle"		1
units	UDUNITS unit name	"degrees"		1
solar_path_<g><v>	<b>Distance from sun to surface</b>		f32	rows columns
units	UDUNITS unit name	"m"		1
sat_zenith_<g><v>	<b>Satellite zenith angle</b>		f32	rows columns
standard_name	CF standard name	"solar_zenith_angle"		1
units	UDUNITS unit name	"degrees"		1
sat_azimuth_<g><v>	<b>Satellite azimuth angle</b>		f32	rows columns
standard_name	CF standard name	"solar_azimuth_angle"		1
units	UDUNITS unit name	"degrees"		1

Element name	Description	Range or value	T	D
sat_path_<g><v>	Distance from satellite to surface		f32	rows columns
units	UDUNITS unit name	"m"		1

**Table 4-13:** Solar and Satellite Geometry Annotation data file description

#### 4.2.1.9 Meteorological Parameters Annotation Data File

The meteorological parameters data file contains ECMWF forecast or analysis fields, regridded onto tie points. The resolution of this grid is 1 km on along-track direction and 16 km on across-track one. The dataset contains three types of field:

- single surface or near-surface values
- surface time series
- profiles

By default, the synoptic time is the time nearest to the product centre time. For near-real time products, ECMWF forecast input fields must be updated continuously, to ensure that the data in the meteorology auxiliary dataset is valid for the L1b product. For these, the analysis time is the nearest available time preceding the synoptic time.

Field t\_forecast\_tx is the time of the analysis file used to produce the forecast. It is not applicable when input product is an analysis. In this case, the field will be empty.

Element name	Description	Range or value	T	D
rows	Tie-point grid along-track array size			
columns	Tie-point grid across-track array size			
n_bound	Start/stop bounds for integrated products	2		
t_single	Synoptic time of single time fields	1		
t_series	Synoptic times of time series fields	5		
z_wind	Wind field height coordinate	1		
z_atmos	Atmospheric field height coordinate	1		
z_soil	Soil depth coordinate	1		
p_atmos	Pressure levels of profile fields	25		
<common global attributes>	Common global attributes (see [AD- 3] and 3.1.3.1)			
t_forecast_tx	For forecast parameters, the time of the analysis from which the forecast was made		i16	
standard_name	CF standard name	"time"		1
units	UDUNITS unit name	"hours since..."		1
t_single	Synoptic time of single time fields		i16	t_single
standard_name	CF standard name	"time"		1
units	UDUNITS unit name	"hours since..."		1
axis	Coordinate axis identifier	"T"		1
t_series	Synoptic times of time series fields		i16	t_series
standard_name	CF standard name	"time"		1
units	UDUNITS unit name	"hours since..."		1
axis	Coordinate axis identifier	"T"		1
bounds	Reference to "t_bound"	"t_bound"		1
t_bound	Start and stop times for integrated products		i16	t_series n_bound
standard_name	CF standard name	"time"		1

Element name	Description	Range or value	T	D
units	UDUNITS unit name	"hours since..."		1
axis	Coordinate axis identifier	"T"		1
<b>z_wind</b>	<b>Height of wind field above surface</b>		<b>i16</b>	<b>z_wind</b>
standard_name	CF standard name	"height"		1
units	UDUNITS unit name	"metre"		1
axis	Coordinate axis identifier	"Z"		1
positive	axis orientation	"up"		1
<b>z_atmos</b>	<b>Height of atmospheric field above surface</b>		<b>i16</b>	<b>z_atmos</b>
standard_name	CF standard name	"height"		1
units	UDUNITS unit name	"metre"		1
axis	Coordinate axis identifier	"Z"		1
positive	axis orientation	"up"		1
<b>z_soil</b>	<b>Depth of soil wetness level</b>		<b>f32</b>	<b>z_soil</b>
standard_name	CF standard name	"height"		1
units	UDUNITS unit name	"metre"		1
axis	Coordinate axis identifier	"Z"		1
positive	axis orientation	"down"		1
bounds	Reference to "z_bound"	"z_bound"		1
<b>z_bound</b>	<b>Soil wetness level depth bounds</b>		<b>i16</b>	<b>z_soil</b> <b>n_bound</b>
standard_name	CF standard name	"height"		1
units	UDUNITS unit name	"metre"		1
axis	Coordinate axis identifier	"Z"		1
positive	axis orientation	"down"		1
<b>p_atmos</b>	<b>Pressure level coordinates</b>		<b>i16</b>	<b>p_atmos</b>
standard_name	CF standard name	"air_pressure"		1

Element name	Description	Range or value	T	D
units	UDUNITS unit name	"Pa"		1
axis	Coordinate axis identifier	"Z"		1
sea_surface_temperature_tx	<b>Sea surface temperature</b>		f32	t_single rows columns
standard_name	CF standard name	"sea_surface_temperature"		1
units	UDUNITS unit name	"K"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"34"		1
sea_ice_fraction_tx	<b>Sea ice fraction</b>		f32	t_single rows columns
standard_name	CF standard name	"sea_ice_area_fraction"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"31"		1
u_wind_tx	<b>10m U wind component</b>		f32	t_series z_wind rows columns
standard_name	CF standard name	"eastward_wind"		1
units	UDUNITS unit name	"m s^-2"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"165"		1
v_wind_tx	<b>10m V wind component</b>		f32	t_series z_wind rows columns
standard_name	CF standard name	"northward_wind"		1
units	UDUNITS unit name	"m s^-2"		1

Element name	Description	Range or value	T	D
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"166"		1
sensible_heat_tx	<b>Integrated surface sensible heat flux</b>		f32	t_series rows columns
standard_name	CF standard name	"integral_of_surface_ downward_ sensible_heat_ flux_wrt_time"		1
units	UDUNITS unit name	"W m-2 s"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"146"		1
latent_heat_tx	<b>Integrated surface latent heat flux</b>		f32	t_series rows columns
standard_name	CF standard name	"integral_of_surface_ downward_ latent_heat_ flux_wrt_time"		1
units	UDUNITS unit name	"W m-2 s"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"147"		1
solar_radiation_tx	<b>Integrated surface solar radiation</b>		f32	t_series rows columns
standard_name	CF standard name	"integral_of_surface_ net_downward_ shortwave_ flux_wrt_time"		1
units	UDUNITS unit name	"W m-2 s"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"176"		1

Element name	Description	Range or value	T	D
thermal_radiation_tx	Integrated surface thermal radiation		f32	t_series rows columns
standard_name	CF standard name	"integral_of_surface_ net_downward_ longwave_ flux_wrt_time"		1
units	UDUNITS unit name	"W m-2 s"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"177"		1
temperature_profile_tx	Atmospheric temperature profile		f32	t_single p_atmos rows columns
standard_name	CF standard name	"air_temperature"		1
units	UDUNITS unit name	"K"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"130"		1
specific_humidity_tx	Specific humidity profile (kg/kg)		f32	t_single p_atmos rows columns
standard_name	CF standard name	"specific_humidity"		1
units	UDUNITS unit name	"kg/kg"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"133"		1
total_column_water_vapour_tx	Total column water vapour		f32	t_single rows columns
standard_name	CF standard name	"atmosphere_ water_vapor_ content"		1

Element name	Description	Range or value	T	D
units	UDUNITS unit name	"kg m-2"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"137"		1
<b>total_column_ozone_tx</b>	<b>Total column Ozone</b>		f32	<b>t_single rows columns</b>
standard_name	CF standard name	"atmospheric_mass_content_of_ozone"		1
units	UDUNITS unit name	"kg m-2"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"202"		1
<b>snow_albedo_tx</b>	<b>Snow Albedo</b>		f32	<b>t_single rows columns</b>
standard_name	CF standard name	"snow_albedo"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	TBC		1
<b>surface_pressure_tx</b>	<b>Surface pressure</b>		f32	<b>t_single rows columns</b>
standard_name	CF standard name	"surface_air_pressure"		1
units	UDUNITS unit name	"hPa"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"134"		1
<b>east_west_stress_tx</b>	<b>East-west integrated surface wind stress</b>		f32	<b>t_series rows columns</b>

Element name	Description		Range or value	T	D
	standard_name	CF standard name	"integral_of_surface_downward_eastward_stress_wrt_time"		1
	units	UDUNITS unit name	"N m-2 s"		1
	model	Model identifier (e.g. interim era analysis)	(Note 1)		1
	parameter	Parameter identifier (e.g. ECMWF GRIB code)	"180"		1
north_south_stress_tx	<b>North-south integrated surface wind stress</b>			f32	t_series rows columns
	standard_name	CF standard name	"integral_of_surface_downward_northward_stress_wrt_time"		1
	units	UDUNITS unit name	"N m-2 s"		1
	model	Model identifier	(Note 1)		1
	parameter	Parameter identifier (e.g. ECMWF GRIB code)	"181"		1
cloud_fraction_tx	<b>Fractional cloud cover</b>			f32	t_single rows columns
	standard_name	CF standard name	"cloud_area_fraction "		1
	model	Model identifier	(Note 1)		1
	parameter	Parameter identifier (e.g. ECMWF GRIB code)	"164"		1
soil_wetness_tx	<b>Volumetric Soil Water Layer 1 (SWVLevel 1)</b>			f32	t_single rows columns
	standard_name	CF standard name	"moisture_content_of_soil_layer"		1
	units	UDUNITS unit name	"m"		1
	model	Model identifier	(Note 1)		1

Element name	Description		Range or value	T	D
	parameter	Parameter identifier (e.g. ECMWF GRIB code)	"39"		1
temperature_tx	2m air temperature			f32	t_single z_atmos rows columns
	standard_name	CF standard name	"air_temperature"		1
	units	UDUNITS unit name	"K"		1
	model	Model identifier	(Note 1)		1
	parameter	Parameter identifier (e.g. ECMWF GRIB code)	"167"		1
dew_point_tx	2m dew point			f32	t_single z_atmos rows columns
	standard_name	CF standard name	"dew_point_temperature"		1
	units	UDUNITS unit name	"K"		1
	model	Model identifier	(Note 1)		1
	parameter	Parameter identifier (e.g. ECMWF GRIB code)	"168"		1
skin_temperature_tx	Skin temperature			f32	t_single rows columns
	standard_name	CF standard name	"surface_temperature"		1
	units	UDUNITS unit name	"K"		1
	model	Model identifier	(Note 1)		1
	parameter	Parameter identifier (e.g. ECMWF GRIB code)	"235"		1
snow_depth_tx	Snow liquid water equivalent depth			f32	t_single rows columns

Element name	Description	Range or value	T	D
standard_name	CF standard name	"lwe_thickness_of_snowface_snow_amount"		1
units	UDUNITS unit name	"metre"		1
model	Model identifier	(Note 1)		1
parameter	Parameter identifier (e.g. ECMWF GRIB code)	"141"		1

**Table 4-14:** Meteorological Annotation data file description

Note 1: The model attribute should contain a code to identify the source (e.g. ECWMF) and type (forecast or analysis) of the met field. For ECMWF fields, it is recommended that these codes should be "ECMWF\_F" or "ECMWF\_A".

## 5. MANIFEST FILE DESCRIPTION: COMMON PART

The purpose of this section is to describe in detail all the data sets that are included with any of the Sentinel-3 SLSTR product. Most of the description are common to all products and are therefore described in [AD-3].

Only the common parts are detailed in this section.

### 5.1 Metadata Section

See AD-3 for the metadata general description.

### 5.2 Data Object Section

The data object section of the manifest includes one data object per data object pointer. Each data object pointer is identified with its dataObjectID as defined in the dedicated information package map.

#### 5.2.1 Common annotation Data Files

Each common annotations Data File constitutes a Data Object composed as follows:

Name				Description	Data type	Occ.	Value
<b>Data Object</b>				This element references the Data Component included in the product.	U	1..*	
	<b>ID</b>			Data Component;ID	S	1	'SLSTR_FLAGS_xx_Data', where xx=AN, AO, BN, BO, CN, CO, IN, IO, <a href="#">FN</a> , <a href="#">FO</a>
	<b>byte Stream</b>			Pointer to the data Component	U	1..*	
		<b>ID</b>		Byte stream ID	S	0..1	
		<b>mimeType</b>		MIME type for the referenced Data Component	E	1	"application/x-netcdf"

Name			Description	Data type	Occ.	Value
		<b>size</b>	Size of the Data Object File	L	1	
		<b>fileLocation</b>	Description of the location of the Data component file	U	1	
		<b>locator Type</b>	Type of the file location	URL	0..1	URL
		<b>href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		“flags_xx.nc”, xx = an, ao, bn, bo, cn, co, in, io, <a href="#">fn</a> , <a href="#">fo</a>
		<b>textInfo</b>	Textual description of the Data Component	S	0..1	“Global Flags Annotation Data File”
		<b>checksum</b>	Checksum for the Data Component	U	1	
		<b>checksumName</b>		E	1	MD5

**Table 5-1:** Global Flags Annotation Data Object

Name			Description	Data type	Occ.	Value
<b>Data Object</b>			This element references the Data Component included in the product.	U	1..*	
	<b>ID</b>		Data Component;ID	S	1	'SLSTR_INDICES_xx_Data', where xx=AN, AO, BN, BO, CN, CO, IN, IO, <a href="#">FN</a> , <a href="#">FO</a>
	<b>byte Stream</b>		Pointer to the data Component	U	1..*	
		<b>ID</b>	Byte stream ID	S	0..1	
		<b> mimeType</b>	MIME type for the referenced Data Component	E	1	"application/x-netcdf"
		<b> size</b>	Size of the Data Object File	L	1	
		<b> fileLocation</b>	Description of the location of the Data component file	U	1	
		<b> locator Type</b>	Type of the file location	URL	0..1	URL
		<b> href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		"indices_xx.nc", xx = an, ao, bn, bo, cn, co, in, io, <a href="#">fn</a> , <a href="#">fo</a>
		<b> textInfo</b>	Textual description of the Data Component	S	0..1	"Scan, Pixel and Detector Number Annotation Data File"
		<b> checksum</b>	Checksum for the Data Component	U	1	
		<b> checksumName</b>		E	1	MD5

**Table 5-2:** Scan, Pixel and Detector Number Annotation Data Object

<b>Name</b>				<b>Description</b>	<b>Data type</b>	<b>Occ.</b>	<b>Value</b>
<b>Data Object</b>				This element references the Data Component included in the product.	U	1..*	
	<b>ID</b>			Data Component;ID	S	1	'SLSTR_CARTESIAN_xx_Data', where xx=AN, AO, BN, BO, CN, CO, IN, IO, TX, <a href="#">FN</a> , <a href="#">FO</a>
	<b>byte Stream</b>			Pointer to the data Component	U	1..*	
		<b>ID</b>		Byte stream ID	S	0..1	
		<b> mimeType</b>		MIME type for the referenced Data Component	E	1	"application/x-netcdf"
		<b> size</b>		Size of the Data Object File	L	1	
		<b> fileLocation</b>		Description of the location of the Data component file	U	1	
			<b> locator Type</b>	Type of the file location	URL	0..1	URL
			<b> href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		"cartesian_xx.nc", xx = an, ao, bn, bo, cn, co, in, io, tx, <a href="#">fn</a> , <a href="#">fo</a>
			<b> textInfo</b>	Textual description of the Data Component	S	0..1	"Full and TP Resolution Cartesian Coordinates Annotation Data File"
		<b> checksum</b>		Checksum for the Data Component	U	1	
			<b> checksumName</b>		E	1	MD5

**Table 5-3:** Full and Tie point Resolution Cartesian Coordinates Annotation Data Object

<b>Name</b>				<b>Description</b>	<b>Data type</b>	<b>Occ.</b>	<b>Value</b>
<b>Data Object</b>				This element references the Data Component included in the product.	U	1..*	
	<b>ID</b>			Data Component;ID	S	1	'SLSTR_GEODETIC_xx_Data', where xx=AN, AO, BN, BO, CN, CO, IN, IO, TX, <a href="#">FN</a> , <a href="#">FO</a>
	<b>byte Stream</b>			Pointer to the data Component	U	1..*	
		<b>ID</b>		Byte stream ID	S	0..1	
		<b> mimeType</b>		MIME type for the referenced Data Component	E	1	"application/x-netcdf"
		<b> size</b>		Size of the Data Object File	L	1	
		<b> fileLocation</b>		Description of the location of the Data component file	U	1	
			<b> locator Type</b>	Type of the file location	URL	0..1	URL
			<b> href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		"geodetic_xx.nc", xx = an, ao, bn, bo, cn, co, in, io, tx, <a href="#">fn</a> , <a href="#">fo</a>
			<b> textInfo</b>	Textual description of the Data Component	S	0..1	"Full and TP Resolution Geodetic Coordinates Annotation Data File"
		<b> checksum</b>		Checksum for the Data Component	U	1	
			<b> checksumName</b>		E	1	MD5

**Table 5-4:** Full and Tie point Resolution Geodetic Coordinates Annotation Data Object

Name			Description	Data type	Occ.	Value
<b>Data Object</b>			This element references the Data Component included in the product.	U	1..*	
	<b>ID</b>		Data Component;ID	S	1	'SLSTR_TIME_xx_Data', where xx=AN, BN, CN, IN,
	<b>byte Stream</b>		Pointer to the data Component	U	1..*	
		<b>ID</b>	Byte stream ID	S	0..1	
		<b> mimeType</b>	MIME type for the referenced Data Component	E	1	"application/x-netcdf"
		<b> size</b>	Size of the Data Object File	L	1	
		<b> fileLocation</b>	Description of the location of the Data component file	U	1	
		<b> locator Type</b>	Type of the file location	URL	0..1	URL
		<b> href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		"time_xx.nc"; xx = an, bn, cn, in
		<b> textInfo</b>	Textual description of the Data Component	S	0..1	"Time Annotation Data File"
		<b> checksum</b>	Checksum for the Data Component	U	1	
		<b> checksumName</b>		E	1	MD5

**Table 5-5:** Time Annotation Data Object

Name			Description	Data type	Occ.	Value
<b>Data Object</b>			This element references the Data Component included in the product.	U	1..*	
	<b>ID</b>		Data Component;ID	S	1	'SLSTR_GEOMETRY_xx_Data', where xx=TN, TO
	<b>byte Stream</b>		Pointer to the data Component	U	1..*	
		<b>ID</b>	Byte stream ID	S	0..1	
		<b> mimeType</b>	MIME type for the referenced Data Component	E	1	"application/x-netcdf"
		<b> size</b>	Size of the Data Object File	L	1	
		<b> fileLocation</b>	Description of the location of the Data component file	U	1	
		<b> locator Type</b>	Type of the file location	URL	0..1	URL
		<b> href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		"geometry_xx.nc"; xx = tn, to
		<b> textInfo</b>	Textual description of the Data Component	S	0..1	"Solar and Satellite Geometry Annotation Data File"
		<b> checksum</b>	Checksum for the Data Component	U	1	
		<b> checksumName</b>		E	1	MD5

**Table 5-6:** Solar and Satellite Geometry Annotation Data Object

<b>Name</b>				<b>Description</b>	<b>Data type</b>	<b>Occ.</b>	<b>Value</b>
<b>Data Object</b>				This element references the Data Component included in the product.	U	1..*	
	<b>ID</b>			Data Component;ID	S	1	'SLSTR_MET_TX_Data'
	<b>byte Stream</b>			Pointer to the data Component	U	1..*	
		<b>ID</b>		Byte stream ID	S	0..1	
		<b> mimeType</b>		MIME type for the referenced Data Component	E	1	"application/x-netcdf"
		<b> size</b>		Size of the Data Object File	L	1	
		<b> fileLocation</b>		Description of the location of the Data component file	U	1	
			<b> locator Type</b>	Type of the file location	URL	0..1	URL
			<b> href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		"met_tx.nc"
			<b> textInfo</b>	Textual description of the Data Component	S	0..1	"Meteorological Parameters Auxiliary Data File"
		<b> checksum</b>		Checksum for the Data Component	U	1	
			<b> checksumName</b>		E	1	MD5

**Table 5-7:** Meteorological Parameters Auxiliary Data Object

<b>Data Object</b>				This element references the OLQC Report associated to the L0 product.	U	1..*	
	<b>ID</b>			Data Component;ID	S	1	"OLQCReport"
	<b>byte Stream</b>			Pointer to the Data Component	U	1..*	
		<b>ID</b>		Byte stream ID	S	0..1	
		<b>mimeType</b>		MIME type for the referenced Data Component	E	1	"application/octetstream"
		<b>size</b>		Size of the Data Object File	L	1	
		<b>fileLocation</b>		Description of the location of the data component file	U	1	
		<b>locator Type</b>		Type of the file location	URL	0..1	URL
		<b>href</b>		Relative path of the file (in the file system) containing the referenced Data Component	S		TBD
		<b>textInfo</b>		Textual description of the Data Component	S	0..1	"On Line Quality Control Report"
		<b>checksum</b>		Checksum for the Data Component	U	1	
		<b>checksumName</b>			E	1	MD5

**Table 5-8:** OLQC Annotation Metadata Object

## **6. XML SCHEMA**

The xml schemas used to generate the product manifest are provided as separate files (see AD- 5).

## 7. SLSTR PRODUCT FORMAT SPECIFICATION

### 7.1 Earth Observation Products

#### 7.1.1 Level 2 Product: SL\_2\_WCT\_\_\_\_

This product contains the sea surface temperature datasets.

##### 7.1.1.1 Package Description

A “SL\_2\_WCT\_\_\_\_” Level 2 product is composed by 21 files: 5 containing the measurements whereas the other 15 files contain the annotation data.

In the following sections the content of the files is reported.

### 7.1.1.1 SL\_2\_WCT product summary

Product Package Type <b>SL_2_WCT</b>		<i>Description</i> Sea surface temperatures datasets			
Product Level	Diss. Timeliness	Product Category		Application Domain	Spatial Resolution
2	(NRT) (NTC)	Not Available to the user		MRT	1Km
Product Dissemination Unit N/A		Number of Package components	Number of Measurement Data Files	Number of Annotation Data Files	Number of Representation Information Files
		22 <sup>1</sup>	5	15	0
<b>Product Package Structure</b>					
<b>Manifest file (see sections 7.1.1.2 and 8 for more details)</b>					
<b>File name</b>		<b>Composition</b>			
xfdumanifest.xml		XML fields			
<b>Measurement Data files (see section 7.1.1.4 for more details)</b>					
<b>File name</b>		<b>Composition</b>			
N2_SST_in.nc		N2_SST_in, N2_SST_in_uncertainty, N2_exception_in			
N3R_SST_in.nc		N3R_SST_in, N3R_SST_in_uncertainty, N3R_exception_in			
N3_SST_in.nc		N3_SST_in, N3_SST_in_uncertainty, N3_exception_in			
D2_SST_io.nc		D2_SST_io, D2_SST_io_uncertainty, D2_exception_io			
D3_SST_io.nc		D3_SST_io, D3_SST_io_uncertainty, D3_exception_io			
<b>Annotation Data files (see section 4.2.1 for more details)</b>					
<b>File name</b>		<b>Composition</b>			
flags_in.nc		cloud_in, bayes_in, pointing_in, confidence_in, cloud_orphan_in, bayes_orphan_in, pointing_orphan_in, confidence_orphan_in			
flags_io.nc		cloud_io, bayes_io, pointing_io, confidence_io, cloud_orphan_io, bayes_orphan_io, pointing_orphan_io, confidence_orphan_io			
indices_in.nc		scan_in, pixel_in, detector_in, scan_orphan_in, pixel_orphan_in, detector_orphan_in			

<sup>1</sup> Number of Package components includes the manifest and the OLQC Report.

indices_io.nc	scan_io, pixel_io, detector_io, scan_orphan_io, pixel_orphan_io, detector_orphan_io
time_in.nc	time_stamp_i, first_scan_in, first_scan_io, [...]
geodetic_in.nc	latitude_in, longitude_in, elevation_in, latitude_orphan_in, longitude_orphan_in, elevation_orphan_in
geodetic_io.nc	latitude_io, longitude_io, elevation_io, latitude_orphan_io, longitude_orphan_io, elevation_orphan_io
cartesian_in.nc	x_in, y_in, x_orphan_in, y_orphan_in
cartesian_io.nc	x_io, y_io, x_orphan_io, y_orphan_io
geometry_tn.nc	solar Zenith_tn, solar azimuth_tn, solar path_tn, sat zenith_tn, [...]
geometry_to.nc	solar zenith_to, solar azimuth_to, solar path_to, sat zenith_to, [...]
geodetic_tx.nc	latitude_tx, longitude_tx
cartesian_tx.nc	x_tx, y_tx
met_tx.nc	t_forecast, t_single, t_series, t_bound, z_wind, z_atmos, z_soil, z_bound, p_atmos, SST, sea ice fraction, [...]
<b>Representation Information Files</b>	
<b>File name</b>	<b>Composition</b>
none	

**Table 7-1:** SLSTR WCT Level 2 product physical composition

### 7.1.1.2 Manifest File

The structure of the Manifest element is described in [AD- 3].

### 7.1.1.3 Wrapped Metadata

According to [AD- 3], Wrapped Metadata are grouped in Primary Metadata, common to all Sentinel 3 products and Secondary Metadata, specific for instrument and processing level.

Primary Metadata are described in [AD- 3].

Secondary Metadata for the SLSTR instrument are reported in **Table 7-2**. Last columns of the table indicate the applicability of Metadata fields to the processing Level.

< Complete secondary metadata is described in details in [AD- 4].  
 The content of this table will be embedded in the document when it will be finalized>

**Table 7-2: Secondary Metadata for SLSTR products**

#### 7.1.1.4 Measurement Data Files

##### 7.1.1.4.1 SLSTR Level 2 N2 Sea Surface Temperature

The single view, two channel (N2) sea surface temperature dataset contains SST, SST uncertainty and pixel exception fields. It is generated on the wide 1km measurement grid.

Element name	Description	Range or value	T	D
rows	Along track grid size			
columns	Across track grid size	1490 <sup>2</sup>		
<common global attributes>	Common global attributes (see [AD- 3] and 4.1.3.1)			
<b>SST</b>	<b>N2 sea surface temperature</b>	[-32767, 32767]	i16	<b>rows columns</b>
standard_name	CF standard name	sea_surface_skin_t emperature		1
units	UDUNITS unit name	K		1
_FillValue	Value indicating missing data	-32768		1
scale_factor	Scaling factor used in decoding packed data	0.01		1
add_offset	Offset used to in decoding packed data	273.15		1
<b>SST_uncertainty</b>	<b>N2 sea surface temperature uncertainty</b>	[0, 4000]	i16	<b>rows columns</b>
units	UDUNITS unit name	K		1
_FillValue	Value indicating missing data	-32768		1

<sup>2</sup> Note that this size is provided as an example and can be different from actual product (configurable through PCP)

Element name	Description	Range or value	T	D
scale_factor	Scaling factor used in decoding packed data	1e-03		1
add_offset	Offset used to in decoding packed data	0.0		1
exception	<b>N2 SST pixel exception flags</b>		i16	<b>rows columns</b>
standard_name	CF standard name	sea_surface_skin_t emperature status_flag		1
flag_masks	Flag masks	See Table 7-4		1
flag_meanings	Flag descriptions	See Table 7-4		1

**Table 7-3:** SL\_2\_WCT\_\_ : N2\_SST\_in description

Bit Number	Text Code	Description
0	ISP_absent	ISP absent
1	pixel_absent	Pixel absent
2	not_decompressed	Not decompressed
3	no_signal	No signal in channel
4	saturation	Saturation in channel
5	invalid_radiance	Derived radiance outside calibration
6	no_parameters	Calibration parameters unavailable
7	unfilled_pixel	Unfilled pixel
8	SST_underflow	SST underflow
9	SST_overflow	SST overflow

**Table 7-4:** SST exception word bits

#### 7.1.1.4.2 SLSTR Level 2 N3R Sea Surface Temperature

The single view, three channel aerosol-robust (N3R) sea surface temperature dataset contains SST, SST uncertainty and pixel exception fields. It is generated on the wide 1km measurement grid. Its form is identical to the N2 SST dataset in section 7.1.1.4.1.

#### 7.1.1.4.3 SLSTR Level 2 N3 Sea Surface Temperature

The single view, three channel (N3) sea surface temperature dataset contains SST, SST uncertainty and pixel exception fields. It is generated on the wide 1km measurement grid. Its form is identical to the N2 SST dataset in section 7.1.1.4.1.

#### 7.1.1.4.4 SLSTR Level 2 D2 Sea Surface Temperature

The dual view, two channel (D2) sea surface temperature dataset contains SST, SST uncertainty and pixel exception fields. It is generated on the narrow 1km measurement grid. Its form is identical to the N2 SST dataset in section 7.1.1.4.1, with the exception that the across-track dimension is equal to the oblique view swath width.

#### 7.1.1.4.5 SLSTR Level 2 D3 Sea Surface Temperature

The dual view, three channel (D3) sea surface temperature dataset contains SST, SST uncertainty and pixel exception fields. It is generated on the narrow 1km measurement grid. Its form is identical to the N2 SST dataset in section 7.1.1.4.1, with the exception that the across-track dimension is equal to the oblique view swath width.

#### 7.1.1.5 Annotation Data Files

There is no specific annotation file for SLSTR Level 2 Marine products.

### 7.1.2 Level 2 Product: SL\_2\_WST\_\_\_\_

#### 7.1.2.1 Package Description

A "SL\_2\_WST\_\_\_\_" Level 2 product is composed of one measurements data file containing the single SST field that is composited from the best-performing single-coefficient SST field plus a number of supporting data fields.

In the following sections the content of the files is reported.

### 7.1.2.1.1 SL\_2\_WST product summary

Product Package Type SL_2_WST		Description			
Product Level	Diss. Timeliness	Product Category	Application Domain	Spatial Resolution	
2	NRT NTC	Available to the user	LND	1Km	
Product Dissemination Unit Stripe		Number of Package components	Number of Measurement Data Files	Number of Annotation Data Files	Number of Representation Information Files
		3 <sup>3</sup>	1	0	0
Product Package Structure					
Manifest file (see sections 7.1.2.2 and 8 for more details)					
File name		Composition			
xfdumanifest.xml		XML fields			
Measurement Data files (see section 7.1.2.4 for more details)					
File name		Composition			
L2P.nc		lat, lon, time, channel, sea_surface_temperature [...]			
Annotation Data files					
File name		Composition			
time_in <sup>4</sup> .nc		time_stamp_i, first_scan_in, first_scan_io, [...]			
Representation Information Files					
File name		Composition			
none					

Table 7-5: SLSTR WST Level 2 product physical composition

<sup>3</sup> Number of Package components includes the manifest and the OLQC Report.

<sup>4</sup> this file is included internally to allow the combination of consecutive granules by PUG. However, in released products, this file will not be included in WST package

### 7.1.2.2 Manifest File

The structure of the Manifest element is described in [AD- 3].

### 7.1.2.3 Wrapped Metadata

According to [AD- 3], Wrapped Metadata are grouped in Primary Metadata, common to all Sentinel 3 products and Secondary Metadata, specific for instrument and processing level.

Primary Metadata are described in [AD- 3].

Secondary Metadata for the SLSTR instrument are reported in **Table 7-6**. Last columns of the table indicate the applicability of Metadata fields to the processing Level.

*< Complete secondary metadata is described in details in [AD- 4].*

*The content of this table will be embedded in the document when it will be finalized>*

**Table 7-6:** Secondary Metadata for SLSTR products

### 7.1.2.4 Measurement Data Files

#### 7.1.2.4.1 SLSTR L2P Sea Surface Temperature Measurement dataset

The SLSTR L2P SST measurement dataset follows the GHRSSST GDS 2.0 [see RD- 6] L2P dataset specification. The dataset contains a single SST field which is composed from the best-performing single-coefficient SST field in any given part of the swath, and a number of supporting data fields which provide a context for the SST field. The L2P SST dataset is generated on a wide 1km measurement grid.

Note that variables attributes are not fully described here. Following S3IPF-470, the “Long\_name” attributes have been removed from this table but it is still taken into account in the files. The rule will be to use the description of the variable to fill them.

Element name	Description	Range or value	T	D
nj	Along track grid size			
ni	Across track grid size	1500		
time	Reference time for SST file	1		

Element name	Description	Range or value	T	D
channel	Number of SLSTR infrared channels (in order= S7; S8; S9)	3		
<specific L2P global attributes>		See Table 7-11		
lat	Latitude	[-90, 90]	f32	nj ni
standard_name	CF standard name	latitude		1
units	UDUNITS unit name	degrees_north		1
comment	comment	Geographical coordinates		
lon	Longitude	[-180, 180]	f32	nj ni
standard_name	CF standard name	longitude		1
units	UDUNITS unit name	degrees_east		1
comment	comment	Geographical coordinates		
time	Time of first sea_surface_temperature entry		i32	time
standard_name	CF standard name	time		1
units	UDUNITS unit name	seconds since 1981-01-01T00:00:00Z		
comment	comment	Time of first sea surface temperature entry		
sea_surface_temperature	sea surface temperature skin temperature	[-32767s, 32767s]	i16	time nj ni
standard_name	CF standard name	sea_surface_skin_temperature		1
units	UDUNITS unit name	kelvin		1
_FILLValue	Value indicating missing data	-32768s		1
scale_factor	Scaling factor used in decoding packed data	0.01		1
add_offset	Offset used to in decoding packed data	273.15		1
depth	Approximate depth of measurement	10 micrometres		
coordinates	Reference to other coordinate variable(s)	lon lat		

Element name	Description		Range or value	T	D
comment	comment		Marine skin surface temperature		
sst_dtime	time difference from reference time		[ -32767s, 32767s ]	i16	time nj ni
units	UDUNITS unit name		seconds		1
_FillValue	Value indicating missing data		-32768s		1
scale_factor	Scaling factor used in decoding packed data		0.1		1
add_offset	Offset used to in decoding packed data		3200		1
coordinates	Reference to other coordinate variable(s)		lon lat		
comment	comment		Time plus sst_dtime to give observation time of seconds since 1981-01-01T00:00:00Z		
sses_bias	<b>Single Sensor Error Statistic bias estimate</b>		[ -127b, 127b ]	i8	time nj ni
units	UDUNITS unit name		kelvin		1
_FillValue	Value indicating missing data		-128b		1
scale_factor	Scaling factor used in decoding packed data		0.01		1
add_offset	Offset used to in decoding packed data		0		1
coordinates	Reference to other coordinate variable(s)		lon lat		
comment	comment		Bias estimate derived using the techniques described at <a href="https://www.ghrsst.org/ghrsst/tags-and-wgs/stval-wg/sses-description-of-schemes">https://www.ghrsst.org/ghrsst/tags-and-wgs/stval-wg/sses-description-of-schemes</a>		
sses_standard_deviation	<b>Single Sensor Error Statistic standard deviation estimate</b>		[ -127b, 127b ]	i8	time nj ni
units	UDUNITS unit name		K		1
_FillValue	Value indicating missing data		-128b		1
scale_factor	Scaling factor used in decoding packed data		0.01		1

Element name	Description	Range or value	T	D
add_offset	Offset used to in decoding packed data	1.27		1
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Standard deviation estimate derived using the techniques described at <a href="https://www.ghrsst.org/ghrsst/tags-and-wgs/stval-wg/sse-description-of-schemes">https://www.ghrsst.org/ghrsst/tags-and-wgs/stval-wg/sse-description-of-schemes</a>		
dt_analysis	<b>SST deviation from last analysis field</b>	[-127b, 127b]	i8	time nj ni
units	UDUNITS unit name	kelvin		1
_FillValue	Value indicating missing data	-128b		1
scale_factor	Scaling factor used in decoding packed data	0.1.		1
add_offset	Offset used to in decoding packed data	0.		1
reference	Published or web-based information that describes the data or method.	OSTIA L4 SST analysis		
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	The difference between the SST observation and the last SST analysis		
wind_speed	<b>10m wind speed</b>	[-127b, 127b]	i8	time nj ni
standard_name	CF standard name	wind_speed		1
source	Text code for the data source			
units	UDUNITS unit name	m s-1		1
_FillValue	Value indicating missing data	-128b		1
scale_factor	Scaling factor used in decoding packed data	0.2		1
add_offset	Offset used to in decoding packed data	25.4		1
height	Height of field above surface	10 m		1

Element name	Description	Range or value	T	D
source	The instrument or method that produced the data.	ECMWF		
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	These wind speeds were created by the ECMWF and represent winds at 10 metres above the sea surface		
<b>wind_speed_dtime_from_sst</b>	<b>Time difference of wind speed measurement from SST measurement</b>	<b>[-127b, 127b]</b>	<b>i8</b>	<b>time nj ni</b>
units	UDUNITS unit name	hour		1
_FillValue	Value indicating missing data	-128b		1
scale_factor	Scaling factor used in decoding packed data	0.1		1
add_offset	Offset used to in decoding packed data	0		1
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Difference in hours between the wind speed measurement and the SST observation		
<b>sea_ice_fraction</b>	<b>Fractional sea ice contamination in a pixel</b>	<b>[-100b, 100b]</b>	<b>i8</b>	<b>time nj ni</b>
standard_name	CF standard name	sea_ice_area_fraction		1
units	UDUNITS unit name	1		1
source	Text code for the data source			
_FillValue	Value indicating missing data	-128b		1
scale_factor	Scaling factor used in decoding packed data	0.005		1
add_offset	Offset used to in decoding packed data	0.5		1
source	The instrument or method that produced the data.	ECMWF		
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Fractional sea ice cover		

Element name	Description	Range or value	T	D
sea_ice_fraction_dtime_from_sst	Time difference between sea ice fraction data from SST measurement	[-127b, 127b]	i8	time nj ni
units	UDUNITS unit name	hour		1
_FillValue	Value indicating missing data	-128b		1
scale_factor	Scaling factor used in decoding packed data	0.1		1
add_offset	Offset used to in decoding packed data	0		1
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Difference in hours between the sea ice measurement and the SST observation		
aerosol_dynamic_indicator	aerosol dynamic indicator	[-127b, 127b]	i8	time nj ni
units	UDUNITS unit name	count		1
_FillValue	Value indicating missing data	-128b		1
scale_factor	Scaling factor used in decoding packed data	1		1
add_offset	Offset used to in decoding packed data	0		1
source	The instrument or method that produced the data.	Saharan Dust Index		
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Based on AATSR Saharan Dust Index		
adi_dtime_from_sst	Time difference of ADI data from SST measurement	[-127b, 127b]	u8	time nj ni
units	UDUNITS unit name	hour		1
_FillValue	Value indicating missing data	-128b		1
scale_factor	Scaling factor used in decoding packed data	0.1		1
add_offset	Offset used to in decoding packed data	0		1
coordinates	Reference to other coordinate variable(s)	lon lat		

Element name	Description	Range or value	T	D
comment	comment	Difference in hours between ADI and SST		
<b>l2p_flags</b>	<b>L2P and user-defined SST quality flags</b>	<b>[-32767s,32767s]</b>	<b>i16</b>	<b>time nj ni</b>
flag_masks	Flag masks	See Table 7-9		1
flag_meanings	Flag descriptions	See Table 7-9		1
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Flags should be used to properly interpret the data		
<b>sst_algorithm_types</b>	<b>SST algorithm types</b>	<b>see Table 7-10</b>	<b>i8</b>	<b>time nj ni</b>
coordinates	Reference to other coordinate variable(s)	lon lat		
flag_meanings	Flag descriptions	"no_retrieval; N2_retrieval; N3R_retrieval; N3_retrieval D2_retrieval D3_retrieval"		
flag_values	Flag values	0, 1, 2, 3, 4, 5		
comment	comment	"L2P sea surface temperature retrieval algorithm"		
<b>quality_level</b>	<b>SST measurement quality indicator</b>	<b>[0b,5b]</b>	<b>i8</b>	<b>time nj ni</b>
flag_values	Flag values	See Table 7-8		1
flag_meanings	Flag descriptions	See Table 7-8		1
_FillValue	Value indicating missing data	-128b		1
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Quality levels used for all GRSST SST data		
<b>satellite_zenith_angle</b>	<b>Satellite zenith angle (experimental field)</b>	<b>[-90b,90b]</b>	<b>i8</b>	<b>time nj ni</b>

Element name	Description	Range or value	T	D
standard_name	CF standard name	zenith_angle		1
units	UDUNITS unit name	angular_degree		1
_FillValue	Value indicating missing data	-128b		1
scale_factor	Scaling factor used in decoding packed data	1		1
add_offset	Offset used to in decoding packed data	0		1
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Satellite zenith angle at time of observation		
brightness_temperature <sup>5</sup>	<b>Top-of-atmosphere brightness temperature (experimental field) – from nadir view only</b>	[ -32767s, 32767s ]	i16	channel time nj ni
standard_name	CF standard name	toa_brightness_temperature		1
units	UDUNITS unit name	kelvin		1
_FillValue	Value indicating missing data	-32768s		1
scale_factor	Scaling factor used in decoding packed data	0.01		1
add_offset	Offset used to in decoding packed data	290		1
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Top of the atmosphere brightness temperature (1 <sup>st</sup> channel = S7; 2 <sup>nd</sup> = S8; 3 <sup>rd</sup> = S9)		
nedt <sup>6</sup>	<b>Top-of-atmosphere noise equivalent brightness temperature (experimental field)</b>	[ -32767s, 32767s ]	i16	channel time nj ni
units	UDUNITS unit name	kelvin		1
_FillValue	Value indicating missing data	-32768s		1

<sup>5</sup> the dimension channel is organised with S7 channel for the first vector, S8 for the second one and S9 for the third.

<sup>6</sup> the dimension channel is organised with S7 channel for the first vector, S8 for the second one and S9 for the third.

Element name	Description	Range or value	T	D
scale_factor	Scaling factor used in decoding packed data	0.001		1
add_offset	Offset used to in decoding packed data	0		1
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Top of atmosphere noise equivalent brightness temperature (1 <sup>st</sup> channel = S7; 2 <sup>nd</sup> = S8; 3 <sup>rd</sup> = S9)		
sst_theoretical_uncertainty	<b>SST total uncertainty (experimental field)</b>	[ -32767s, 32767s ]	i16	time nj ni
standard_name	CF standard name	"sea_surface_skin_temperature_s tandard_error		1
units	UDUNITS unit name	kelvin		1
_FillValue	Value indicating missing data	-32768s		1
scale_factor	Scaling factor used in decoding packed data	0.001		1
add_offset	Offset used to in decoding packed data	0		1
coordinates	Reference to other coordinate variable(s)	lon lat		
comment	comment	Theoretical uncertainty of SST		
dual_nadir_sst_difference	<b>Dual minus nadir SST difference (experimental field – see Table 7-12 )</b>	[ -32767s, 32767s ]	i16	time nj ni
units	UDUNITS unit name	kelvin		1
_FillValue	Value indicating missing data	-32768s		1
scale_factor	Scaling factor used in decoding packed data	0.001		1
add_offset	Offset used to in decoding packed data	0		1
comment	comment	Dual minus nadir SST difference stored as GHRSST experimental field		
nadir_sst_theoretical_uncertainty	<b>Nadir SST total uncertainty (experimental field)</b>	[ -32767s, 32767s ]	i16	time nj ni

Element name	Description	Range or value	T	D
units	UDUNITS unit name	kelvin		1
_FillValue	Value indicating missing data	-32768s		1
scale_factor	Scaling factor used in decoding packed data	0.001		1
add_offset	Offset used to in decoding packed data	0		1
comment	comment	Nadir SST theoretical uncertainty, supplied within the dual swath region, when dual_nadir_sst_difference available		
<b>Probability_cloud_single_i&lt;v&gt;</b>	<b>Probability of cloud in pixel (single view)</b>	<b>[-100, 100]</b>	<b>i16</b>	<b>time nj ni</b>
_FillValue	Value indicating missing data	-32768		1
scale_factor	Scaling factor used in decoding packed data	0.005		1
add_offset	Offset used to in decoding packed data	0.5		1
comment	comment	Probability of cloud in pixel as estimated by Bayesian Cloud detection on a single view		1
<b>Probability_cloud_single_io</b>	<b>Probability of cloud in pixel (single view) computed on the 1 km oblique view grid</b>	<b>[-100, 100]</b>	<b>i16</b>	<b>time nj ni</b>
_FillValue	Value indicating missing data	-32768		1
scale_factor	Scaling factor used in decoding packed data	0.005		1
add_offset	Offset used to in decoding packed data	0.5		1
comment	comment	Probability of cloud in pixel as estimated by Bayesian Cloud detection on a single view		1

**Table 7-7: SL\_2\_WST\_\_ L2P description**

	Text code	Description	Nominal conditions	

Numeric code			Probability of cloud	Others criteria	If Bayesian cloud mask are not propagated to Level 2 (i.e. $SW_{QL/bayes} = 1$ )
0	no_data	No data	<0	No data or Land pixels	not ocean, SST out of range, exceptions or no retrieval
1	cloud	Cloud Contaminated data	>0.5	SST < SSTmin; Missing Meteo data	Cloud contaminated
2	worst_quality	Worst quality of usable data	>0.2	OZA > 55	SST error overflow
3	low_quality	Low quality of usable data	>0.1	Twilight ( $87.5 < SZA < 92.5$ )	Depending on the value of SST theoretical error
4	acceptable_quality	Acceptable quality of usable data		Aerosol detected	
5	best_quality	Best quality of usable data			

Table 7-8: L2P file quality\_level codes

Bit Number	Flag_masks	Value	Flag_meanings	Description
0	1s	1	Microwave	Sensor type
1	2s	1	Land	Surface type (0 for ocean pixel)
2	4s	1	ice	Ice contamination
3	8s	1	lake	Input data over lake surface
4	16s	1	river	Input data over river
5	32s	1	tidal	Tidal flag raised over oceanic pixels
6	64s	1	cosmetic_fill	L1b pixel (in one or both views for D2, D3) was cosmetically filled
7	128s	1	day	Pixel in daylight
8	256s	1	sun_glint	Sun glint likely in pixel
9	512s	1	cloud	Cloud detected in pixel
10	1024s	1	pointing	Level 1b pointing exception
11	2048s	1	exception	Level 1b data is missing or invalid
12	4096s	1	overflow	L2P SST is out of range
13	8192s	1	aerosol_strat	stratospheric aerosol in pixel
14	16384s	1	dual_nadir_diff_sst_type	Nadir SST algorithm type used to calculate dual minus nadir SST difference. Flag is set if N3/N3R have been used to compute dual_nadir_sst_difference & nadir_sst_theoretical_error, otherwise N2 if not set

Table 7-9: L2P l2p\_flags bit field definitions

Value	Text code	Description
0	no_retrieval	SST algorithm
1	N2_retrieval	
2	N3R_retrieval	
3	N3_retrieval	

4	D2_retrieval	
5	D3_retrieval	

**Table 7-10:** L2P file sst\_algorithm types definition

Attribute name	Value
Conventions	"CF-1.6, Unidata Observation Dataset v1.0"
title	"SLSTR L2P SST dataset"
summary	"SLSTR skin sea surface temperature"
institution	"COP"
history	"TBC"
comment	"GHRSST SST L2P"
license	"TBC"
id	"COP-L2P-SLSTRA"
naming_authority	"org.ghrsst"
product_version	"1.0"
uuid	"TBC"
gds_version_id	"2.5"
file_quality_level	3s
spatial_resolution	"1 km at nadir"
sensor	"SLSTR"
Metadata_Conventions	"Unidata Dataset Discovery v1.0"
metadata_link	"N/A"
keywords	"Oceans > Ocean Temperature > Sea Surface Temperature"
keywords_vocabulary	"NASA Global Change Master Directory (GCMD) Science Keywords"
standard_name_vocabulary	"NetCDF Climate and Forecast (CF) Metadata Convention"
geospatial_lat_units	"degrees_north"
geospatial_lat_resolution	0.009f
geospatial_lon_units	"degrees_east"
geospatial_lon_resolution	0.009f
acknowledgment	"TBC"
creator_name	"TBC"
creator_email	"TBC"
creator_url	"TBC"

project	"Group for High Resolution Sea Surface Temperature"
publisher_name	"The GHRSST Project Office"
publisher_email	"ghrsst-po@nceo.ac.uk"
publisher_url	"http://www.ghrsst.org"
processing_level	"L2P"
cdm_data_type	"swath"
references	"S3IPF PDS 005 - i1r10 - Product Data Format Specification - SLSTR, S3IPF PDS 002 - i1r6 - Product Data Format Specification - Product Structures, S3IPF DPM 007 - i1r2 - Detailed Processing Model - SLSTR Level 2"
netcdf_version_id	"4.2 of Jul 5 2012 17"
date_created	"20150204T134258Z" (depends on the product)
start_time	"20130621T101013Z" (depends on the product)
time_coverage_start	"20130621T101013Z" (depends on the product)
stop_time	"20130621T101053Z" (depends on the product)
time_coverage_end	"20130621T101053Z" (depends on the product)
source	"IPF-SL-2 05.00" (depends on the IPF version)
platform	"Sentinel3A" (depends on the platform)
northernmost_latitude	58.784615 (depends on the product)
southernmost_latitude	53.229874 (depends on the product)
easternmost_longitude	18.45985 (depends on the product)
westernmost_longitude	-5.963815 (depends on the product)

Table 7-11: L2P specific global attributes

desert dust	aerosol	nadir day	oblique day	Dual minus nadir SST difference
0	0	0	0	<b>D3 - N3</b>
0	0	0	1	<b>Not computed</b>
0	0	1	0	<b>D2 - N2</b>
0	0	1	1	<b>D2 - N2</b>
0	1	0	0	<b>D3 - N3R</b>

0	1	0	1	Not computed
0	1	1	0	Not computed
0	1	1	1	Not computed
1	0	0	0	<b>D3 - N3</b>
1	0	0	1	<b>D2 - N3</b>
1	0	1	0	<b>D2 - N2</b>
1	0	1	1	<b>D2 - N2</b>
1	1	0	0	<b>D3 - N3R</b>
1	1	0	1	<b>D2 - N3R</b>
1	1	1	0	Not computed
1	1	1	1	Not computed

Table 7-12 : The dual minus nadir SST difference depending on the different pixel conditions.

## 7.2 Browse Products

A browse product consists of a collection of metadata information gathered in the xfdumanifest files and of one or more browse images. The images can represent one or several parameters or combination of parameters stored in one or several image formats.

### 7.2.1 Manifest File

The structure of the Manifest element is described in [AD-3].

#### 7.2.1.1 Wrapped Metadata

According to [AD- 3], Wrapped Metadata are grouped in Primary Metadata, common to all Sentinel 3 products.

Regarding the primary metadata: the fields are the same of the parent product, with different values for some fields (which are filled by the browse processor). There is no secondary metadata section for the browse products.

### 7.2.2 Level 2 Browse Package Description

#### 7.2.2.1 ‘SL\_2\_WST\_BW’ L2 Measurement Data Files

##### 7.2.2.1.1 SL\_2\_WST\_BW product summary

Product Package Type <b>SL_2_WST_BW</b>		Description SLSTR Browse L2 Product general structure			
Product Level	Diss. Timeliness	Product Category	Application Domain	Spatial Resolution	
2	(NRT) (NTC)	Not Available to the user			
Product Dissemination Unit N/A		Number of Package components	Number of Measurement Data Files	Number of Annotation Data Files	Number of Representation Information Files

	$\geq 3^7$	$\geq 1$	0	0
<b>Product Package Structure</b>				
<b>Manifest file (see section 7.2.1 for more details)</b>				
<b>File name</b>		<b>Composition</b>		
xfdumanifest.xml		XML fields		
<b>Measurement Data files (see section 7.2.2.3 for more details)</b>				
<b>File name</b>		<b>Composition</b>		
<scientificData>_BrwImage.<ext>		Pseudo color image referred to the scientific data indicated into the component filename		
<b>Annotation Data files</b>				
<b>File name</b>		<b>Composition</b>		
none				
<b>Representation Information Files</b>				
<b>File name</b>		<b>Composition</b>		
none				

**Table 7-13:** SLSTR Browse L2 Product physical composition

### 7.2.2.2 Package Description

The SLSTR Level 2 Browse consists of multiple pseudo colour image.

### 7.2.2.3 Measurement Data File

The Browse products contain one or more images corresponding respectively to one or more scientific data. The full list of allowed parameters is provided in the processing control parameter file description, section 12.3.2.1 in AD- 6 ("scientific Fields" container, "Field" parameter). The number of fields to process is set through the 'count' attribute.

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<sup>7</sup> Number of Package components includes the manifest and the OLQC Report.

The product may contain one or several browse images representing one or several parameters in the allowed image formats (see list of accepted formats in AD- 3 for the list)

## 8. MANIFEST FILE DESCRIPTION

The purpose of this section is to describe in detail all the data sets that are included with any of the Sentinel-3 SLSTR product. Most of the description are common to all products and are therefore described in [AD-3].

Only the IPF specific parts are detailed in this section.

### 8.1 InformationPackageMap

#### 8.1.1 ‘SL\_2\_WCT\_\_’ Level 2 Product

The Information Package Map associated to the package of the SL\_2\_WCT product is reported in the next table.

Name	Description			Data Type	Value	Occ.
contentUnit				Content Unit Type		1
ID			Identifier of the package	S	“packageUnit”	0..1
unitType			Describes the type of data referenced by this content unit	S	‘Information Package’	0..1
textInfo			Textual description of the content unit	S	‘SENTINEL-3 SLSTR Level 2 Water Product’	0..1
pdiID			Identifier of the Preservation Description;Information applicable to this content unit	S	‘processing’	1
dmdID			Identifier of the Metadata applicable to this content unit	S	In any order : "acquisitionPeriod" "platform" "orbitReference" "qualityInformation" "processing" "frameSet" "generalProductInformation" "slstrProductInformation"	1
contentUnit						1...
ID			Content unit ID	S	N2_SST_IN_Unit	1
unitType				S	‘Measurement Data Unit’	1
textInfo				S	‘Single view, 1 km grid three channel sea surface temperature’	0..1
dmdID			Attribute: Description Metadata Identifier	S		0..1
dataObject Pointer						1
	ID		Data Object pointer ID	S		0..1
	dataObject ctID		Data Object element ID	S	‘N2_SST_IN_Data’	1
contentUnit						1...
ID			Content unit ID	S	N3R_SST_IN_Unit	1
unitType				S	‘Measurement Data Unit’	1
textInfo				S	‘Single view, 1 km grid, three channel aerosol-robust (N3R) sea surface temperature’	0..1
dmdID			Attribute: Description Metadata Identifier	S		0..1

Name			Description	Data Type	Value	Occ.
		dataObject Pointer				1
		ID	Data Object pointer ID	S		0..1
		dataObject ctID	Data Object element ID	S	'N3R_SST_IN_Data'	1
contentUnit						1...
	ID		Content unit ID	S	N3_SST_IN_Unit	1
	unitType			S	'Measurement Data Unit'	1
	textInfo			S	'Single view, 1 km grid, (N3) sea surface temperature'	0..1
	dmdID		Attribute: Description Metadata Identifier	S		0..1
	dataObject Pointer					1
		ID	Data Object pointer ID	S		0..1
		dataObject ctID	Data Object element ID	S	'N3_SST_IN_Data'	1
contentUnit						1...
	ID		Content unit ID	S	D2_SST_IO_Unit	1
	unitType			S	'Measurement Data Unit'	1
	textInfo			S	'Dual view, 1 km grid, two channel (D2) sea surface temperature'	0..1
	dmdID		Attribute: Description Metadata Identifier	S		0..1
	dataObject Pointer					1
		ID	Data Object pointer ID	S		0..1
		dataObject ctID	Data Object element ID	S	'D2_SST_IO_Data'	1
contentUnit						1...
	ID		Content unit ID	S	D3_SST_IO_Unit	1
	unitType			S	'Measurement Data Unit'	1
	textInfo			S	'Dual view, 1 km grid, two channel (D2) sea surface temperature'	0..1
	dmdID		Attribute: Description Metadata Identifier	S		0..1
	dataObject Pointer					1
		ID	Data Object pointer ID	S		0..1
		dataObject ctID	Data Object element ID	S	'D3_SST_IO_Data'	1
contentUnit						1
	ID		Content unit ID	S	'SLSTR_FLAGS_xx_Unit', where xx= IN, IO	1
	unitType			S	'Annotation Data Unit'	1
	textInfo			S	'Global Flags Annotation Data Set'	0..1
	dmdID		Attribute: Description Metadata Identifier	S		0..1
	dataObject Pointer					1
		ID	Data Object pointer ID	S		0..1
		dataObject ctID	Data Object element ID	S	'SLSTR_FLAGS_xx_Data', where xx= IN, IO	1
contentUnit						1
	ID		Content unit ID	S	'SLSTR_INDICES_xx_Unit', where xx= IN, IO	1
	unitType			S	'Annotation Data Unit'	1
	textInfo			S	'Coordinates Annotation Data Set'	0..1
	dmdID		Attribute: Description Metadata Identifier	S		0..1
	dataObject Pointer					1
		ID	Data Object pointer ID	S		0..1
		dataObject ctID	Data Object element ID	S	'SLSTR_INDICES_xx_Data', where xx= IN, IO	1

Name			Description	Data Type	Value	Occ.
	contentUnit					1
		ID	Content unit ID	S	'SLSTR_GEODETIC_xx_Unit', where xx= IN, IO, TX	1
		unitType		S	'Annotation Data Unit'	1
		textInfo		S	'Coordinates Annotation Data Set'	0..1
		dmdID	Attribute: Description Metadata Identifier	S		0..1
		dataObject Pointer				1
		ID	Data Object pointer ID	S		0..1
			dataObjec tID	Data Object element ID	S 'SLSTR_GEODETIC_xx_Data', where xx= IN, IO, TX	1
	contentUnit					1
		ID	Content unit ID	S	'SLSTR_CARTESIAN_xx_Unit', where xx= IN, IO, TX	1
		unitType		S	'Annotation Data Unit'	1
		textInfo		S	'Coordinates Annotation Data Set'	0..1
		dmdID	Attribute: Description Metadata Identifier	S		0..1
		dataObject Pointer				1
		ID	Data Object pointer ID	S		0..1
			dataObjec tID	Data Object element ID	S 'SLSTR_CARTESIAN_xx_Data', where xx= IN, IO, TX	1
	contentUnit					1
		ID	Content unit ID	S	'SLSTR_TIME_IN_Unit'	1
		unitType		S	'Annotation Data Unit'	1
		textInfo		S	'Coordinates Annotation Data Set'	0..1
		dmdID	Attribute: Description Metadata Identifier	S		0..1
		dataObject Pointer				1
		ID	Data Object pointer ID	S		0..1
			dataObjec tID	Data Object element ID	S 'SLSTR_TIME_IN_Data'	1
	contentUnit					1
		ID	Content unit ID	S	'SLSTR_GEOMETRY_xx_Unit', where xx= TN, TO	1
		unitType		S	'Annotation Data Unit'	1
		textInfo		S	'Solar and Satellite Annotation Data Set'	0..1
		dmdID	Attribute: Description Metadata Identifier	S		0..1
		dataObject Pointer				1
		ID	Data Object pointer ID	S		0..1
			dataObjec tID	Data Object element ID	S 'SLSTR_GEOMETRY_xx_Data', where xx= TN, TO	1
	contentUnit					1
		ID	Content unit ID	S	'SLSTR_MET_TX_Unit'	1
		unitType		S	'Annotation Data Unit'	1
		textInfo		S	'Meteorological Parameters Auxiliary Data Set'	0..1
		dmdID	Attribute: Description Metadata Identifier	S		0..1
		dataObject Pointer				1
		ID	Data Object pointer ID	S		0..1
			dataObjec tID	Data Object element ID	S 'SLSTR_MET_TX_Data'	1

**Table 8-1:** Information Package Map for L2 WCT SLSTR product

### 8.1.2 'SL\_2\_WST\_\_\_\_' Level 2 Product

The Information Package Map associated to the package of the SL\_2\_WST product is reported in the next table.

Name				Description	Data Type	Value	Occ.
contentUnit				The information package map contains one content unit that includes the product data component included in the product.	Content Unit Type		1
	ID			Identifier of the package	S	"packageUnit"	0..1
	unitType			Describes the type of data referenced by this content unit	S	'Information Package'	0..1
	textInfo			Textual description of the content unit	S	'SENTINEL-3 SLSTR Level 2 Water Product'	0..1
	pdiID			Identifier of the Preservation Description;Information applicable to this content unit	S	'processing'	1
	dmdID			Identifier of the Metadata applicable to this content unit	S	In any order : 'acquisitionPeriod' 'platform' 'generalProductInformation' 'slstrProductInformation' 'processing' 'frameSet', 'orbitReference', 'qualityInformation'	1
	contentUnit						1...
		ID		Content unit ID	S	L2P_Unit	1
		unitType			S	'Measurement Data Unit'	1
		textInfo			S	'L2P Data Set'	0..1
		dmdID		Attribute: Description Metadata Identifier	S	In any order: 'measurementOrbitReference' 'frameSet' 'qualityInformation'	0..1
		dataObject Pointer					1
			ID	Data Object pointer ID	S		0..1
			dataObject ctID	Data Object element ID	S	'L2P_Data'	1

**Table 8-2:** Information Package Map for L2 WST SLSTR product

### 8.1.3 ‘SL\_2\_WST\_BW’ L2 Browse Products

The Information Package Map associated to the package of the SL\_2\_WST\_BW products is reported in the next table.

Name			Description	Data Type	Value	Occ
contentUnit			The information package map contains one content unit that includes the product data component included in the product.	Content Unit Type		1
	ID		Identifier of the package	S	“packageUnit”	0..1
	unitType		Describes the type of data referenced by this content unit	S	“Information Package”	0..1
	textInfo		Textual description of the content unit	S	“SENTINEL-3 SLSTR Level 2 Browse Product”	0..1
	pdiID		Identifier of the Preservation Description;Information applicable to this content unit	S	“processing”	1
	dmdID		Identifier of the Metadata applicable to this content unit	S	In any order : “acquisitionPeriod” “platform” “orbitReference” “generalInformation” “qualityInformation” “processing” “frameSet”	1
	contentUnit					1
		ID	Content unit ID	S	brwImageXXUnit, XX=01, ..., N	1
		unitType		S	“Measurement Data Unit”	1
		textInfo		S	“Pseudo Colour Image”	0..1
		dmdID	Attribute: Description Metadata Identifier	S		0..1
		dataObject Pointer				1
		ID	Data Object pointer ID	S		0..1
		dataObjectID	Data Object element ID	S	brwImageXXData, XX=01, ..., N	1

**Table 8-3: Information Package Map for L2 SLSTR Browse Products**

## 8.2 Metadata Section

See AD-3 for the metadata general description.

## 8.3 Data Object Section

### 8.3.1 Measurement Data Files

#### 8.3.1.1 "SL\_2\_WCT" Level 2 Product

Data Objects for the SLSTR SL\_2\_WCT Level 2 product are listed in the next table.

Name				Description	Data type	Occ.	Value
Data Object	ID	byte Stream	ID	mimeType	size	fileLocation	
				This element references the Data Component included in the L2 product.	U	1..*	
	<b>ID</b>			Data Component;ID	S	1	'N2_SST_IN_Data'
		<b>byte Stream</b>		Pointer to the Data Component	U	1..*	
			<b>ID</b>	Byte stream ID	S	0..1	
				MIME type for the referenced Data Component	E	1	"application/x-netcdf"
				Size of the Data Object File	L	1	
				Description of the location of the data component file	U	1	

Name			Description	Data type	Occ.	Value
		<b>locatorType</b>	Type of the file location	URL	0..1	URL
		<b>href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		"N2_SST_in.nc"
		<b>textInfo</b>	Textual description of the Data Component	S	0..1	"N2 SST Data File"
		<b>checksum</b>	Checksum for the Data Component	U	1	
		<b>checksumName</b>		E	1	MD5
<b>Data Object</b>			This element references the Data Component included in the L2 product.	U	1..*	
	<b>ID</b>		Data Component;ID	S	1	'N3R_SST_IN_Data'
	<b>byteStream</b>		Pointer to the Data Component	U	1..*	
		<b>ID</b>	Byte stream ID	S	0..1	
		<b> mimeType</b>	MIME type for the referenced Data Component	E	1	"application/x-netcdf"
		<b>size</b>	Size of the Data Object File	L	1	
		<b>fileLocation</b>	Description of the location of the data component file	U	1	
		<b>locatorType</b>	Type of the file location	URL	0..1	URL
		<b>href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		"N3R_SST_in.nc"
		<b>textInfo</b>	Textual description of the Data Component	S	0..1	"N3R SST Data File"
		<b>checksum</b>	Checksum for the Data Component	U	1	
		<b>checksumName</b>		E	1	MD5
<b>Data Object</b>			This element references the Data Component included in the L2 product.	U	1..*	

Name			Description	Data type	Occ.	Value
	<b>ID</b>		Data Component;ID	S	1	'N3_SST_IN_Data'
	<b>byte Stream</b>		Pointer to the Data Component	U	1..*	
		<b>ID</b>	Byte stream ID	S	0..1	
		<b> mimeType</b>	MIME type for the referenced Data Component	E	1	"application/x-netcdf"
		<b>size</b>	Size of the Data Object File	L	1	
		<b>fileLocation</b>	Description of the location of the data component file	U	1	
		<b>locator Type</b>	Type of the file location	URL	0..1	URL
		<b>href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		"N3_SST_in.nc"
		<b>textInfo</b>	Textual description of the Data Component	S	0..1	"N3 SST Data File"
		<b>checksum</b>	Checksum for the Data Component	U	1	
		<b>checksumName</b>		E	1	MD5
<b>Data Object</b>			This element references the Data Component included in the L2 product.	U	1..*	
	<b>ID</b>		Data Component;ID	S	1	'D2_SST_IO_Data'
	<b>byte Stream</b>		Pointer to the Data Component	U	1..*	
		<b>ID</b>	Byte stream ID	S	0..1	
		<b> mimeType</b>	MIME type for the referenced Data Component	E	1	"application/x-netcdf"
		<b>size</b>	Size of the Data Object File	L	1	
		<b>fileLocation</b>	Description of the location of the data component file	U	1	

Name			Description	Data type	Occ.	Value
		<b>locator Type</b>	Type of the file location	URL	0..1	URL
		<b>href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		“D2_SST_io.nc”
		<b>textInfo</b>	Textual description of the Data Component	S	0..1	“D2 SST Data File”
		<b>checksum</b>	Checksum for the Data Component	U	1	
		<b>checksumName</b>		E	1	MD5
<b>Data Object</b>			This element references the Data Component included in the L2 product.	U	1..*	
	<b>ID</b>		Data Component;ID	S	1	‘D3_SST_IO_Data’
	<b>byte Stream</b>		Pointer to the Data Component	U	1..*	
		<b>ID</b>	Byte stream ID	S	0..1	
		<b>mimeType</b>	MIME type for the referenced Data Component	E	1	“application/x-netcdf”
		<b>size</b>	Size of the Data Object File	L	1	
		<b>fileLocation</b>	Description of the location of the data component file	U	1	
		<b>locator Type</b>	Type of the file location	URL	0..1	URL
		<b>href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		“D3_SST_io.nc”
		<b>textInfo</b>	Textual description of the Data Component	S	0..1	“D3 SST Data File”
		<b>checksum</b>	Checksum for the Data Component	U	1	
		<b>checksumName</b>		E	1	MD5

Table 8-4: SL\_2\_WCT Data Objects

### 8.3.1.2 “SL\_2\_WST” Level 2 Product

Data Object for the SLSTR SL\_2\_WST Level 2 product is listed in the next table.

Name			Description	Data type	Occ.	Value
Data Object			This element references the Data Component included in the L2 product.	U	1..*	
	<b>ID</b>		Data Component;ID	S	1	“L2P_Data”
	<b>byte Stream</b>		Pointer to the Data Component	U	1..*	
		<b>ID</b>	Byte stream ID	S	0..1	
		<b>mimeType</b>	MIME type for the referenced Data Component	E	1	“application/x-netcdf”
		<b>size</b>	Size of the Data Object File	L	1	
		<b>fileLocation</b>	Description of the location of the data component file	U	1	
		<b>locator Type</b>	Type of the file location	URL	0..1	URL
		<b>href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		“L2P.nc”
		<b>textInfo</b>	Textual description of the Data Component	S	0..1	“L2P Data File”
		<b>checksum</b>	Checksum for the Data Component	U	1	
		<b>checksumName</b>		E	1	MD5

**Table 8-5:** SL\_2\_WST Data Object

### 8.3.1.3 ‘SL\_2\_WST\_BW’ L2 Browse Products

Data Object for SLSTR Level 2 browse products is reported in the next table.

Note: The number of image files (N) depends on the configuration set for the execution on the IPF. According to this configuration, one or more scientific fields may be processed and generate images.

Name			Description	Data type	Occ.	Value
Data Object						
			This element references the Data Component included in the L1 product.	U	1..*	
	<b>ID</b>		Data Component;ID	S	1	brwImageXXData, XX=01, ..., N
	<b>byte Stream</b>		Pointer to the Data Component	U	1..*	
		<b>ID</b>	Byte stream ID	S	0..1	
		<b> mimeType</b>	MIME type for the referenced Data Component	E	1	One value among: "image/jpeg" "image/tiff" "image/png" "image/jp2"
		<b>size</b>	Size of the Data Object File	L	1	
		<b>fileLocation</b>	Description of the location of the data component file	U	1	
		<b>locator Type</b>	Type of the file location	URL	0..1	URL
		<b> href</b>	Relative path of the file (in the file system) containing the referenced Data Component	S		One value among: “<.scientificData>_BrwImage.jpeg“ “<.scientificData>_BrwImage.tiff“ “<.scientificData>_BrwImage.png“ “<.scientificData>_BrwImage.jp2“
		<b>textInfo</b>	Textual description of the Data Component	S	0..1	“Pseudo Color Image File”
		<b>checksum</b>	Checksum for the Data Component	U	1	

Name	Description	Data type	Occ.	Value
	checksumName	E	1	MD5

**Table 8-6:** SLSTR Browse Level 2 Data Object



## 9. PRODUCT SIZE

In the following table the approximate size of each SLSTR file composing the Level 2 products over one full orbit is given.

The following table enumerates the data sets based upon the description tables in section 7. The sizes computation assume 40,000 1 km records per orbit (or 80,000 0.5km records) for the purpose of size estimates. Values for the dimensions in the above tables are taken as follows.

n\_k= 187 orphan pixels per row in the nadir 1 km view

n\_k= 112 orphan pixels per row in the oblique 1 km view

n\_k= 375 orphan pixels per row in the nadir 0.5 km view

n\_k= 225 orphan pixels per row in the oblique 0.5 km view

(number of orphans is an evaluation ~12% of the number of pixels per row)

columns (1km nadir) = 1500

columns (1km oblique) = 900

columns (0.5km nadir) = 3000

columns (0.5km oblique) = 1800

rows (1km) = 40,000

rows (0.5km) = 80,000

columns (tie points nadir, oblique) = 130

rows (tie points nadir, oblique) = 40,000

n\_det (1km) = 2

n\_det (0.5 km) = 4

n\_int = 2 parity of pixels

No file compression is applied.

## 9.1 SLSTR Level 2 Marine products

### 9.1.1 SL\_2\_WCT\_\_\_\_

Element name	Description	Size in Gbytes
xfdumanifest.xml	<b>Sentinel-SAFE product manifest</b>	
N2_SST_in.nc	1km N2 SST dataset	0,335
N3R_SST_in.nc	1km N3R SST dataset	0,335
N3_SST_in.nc	1km N3 SST dataset	0,335
D2_SST_io.nc	1km D2 SST dataset	0,201
D3_SST_io.nc	1km D3 SST dataset	0,201
flags_in.nc	Nadir 1km global flags dataset	0,601
flags_io.nc	Oblique 1km global flags dataset	0,360
indices_in.nc	Nadir 1km scan, pixel and detector number dataset	0,314
indices_io.nc	Oblique 1km scan, pixel and detector number dataset	0,188
time_in.nc	Nadir 1km time coordinate dataset	0,001
geodetic_in.nc	Nadir 1km geodetic coordinates dataset	0,628
geodetic_io.nc	Oblique 1km geodetic coordinates dataset	0,377
cartesian_in.nc	Nadir 1km Cartesian coordinates dataset	0,503
cartesian_io.nc	Oblique 1km Cartesian coordinates dataset	0,302
geometry_tn.nc geometry_to.nc	Nadir or oblique view (tie points grids) – 2 files	0,465
geodetic_tx.nc cartesian_tx.nc	x,y or Lat, Lon, tie points grid – 2 files	0,155
met_tx.nc	Meteorological parameters	1,937
<b>Total</b>		<b>6,961</b>

**Table 9-1:** SL\_2\_WCT\_\_\_\_ product size

### 9.1.2 SL\_2\_WST\_\_\_\_

Element name	Description	Size in Gbytes
xfdumanifest.xml	<b>Sentinel-SAFE product manifest</b>	
L2P.nc	L2P SST measurement dataset	<b>2.804</b>

**Table 9-2:** SL\_2\_WST\_\_\_\_ product size

## **9.2 Browse products**

Due to the type and level of compression used in the processing, the size of the browse products cannot be easily defined. Compared to the volume of data of the measurement/annotation, this size may be considered negligible.

***End of Document***