ATL L1 PRODUCT DEFINITIONS

VOLUME A: NOMINAL PRODUCTS

ECGP

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DOCUMENT STATUS SHEET

Version	Date	Pages	Changes
01.00	15/05/2015	24	Version for the TRR2 First issue of the document In the first draft of the document, information related to product definition has been extracted from the original ICD and included in this document.Following changes have been implemented: • L0 Product definition moved back to ICD • Support Files definition moved back to ICD • Intermediate Data Files definition moved back to ICD • Land/Water Mask is needed as input. • New fields in output products for the height and land water mask • Dimension of some fields reviewed. • StateVector Quality added for all ATLID L1 Products • Calibration products moved to Volume B No bar changes are included because more than 30% of the document has been changed.
01.01	22/07/2015	18	Version for the TRR2 Close-out Following RIDs have been implemented: • RID-TRR2-43: Clarified that the headers are also included in the netCDF4/HDF5 datablock (sections 5.6 and 5.7). Table 5.4 updated to clarify that "calibrationParametersQuality" is not applicable for the ATL_NOM_1B • RID-TRR2-42: Sections 4 a 6 of version 01.00 removed. Subsections 7.x of version 01.00 reviewed. • RID-TRR2-47: Packaging of L0 and L1 products in a ZIP file. Additional changes: • CCDB_Redundancy field added for each acquisition time.
01.02	11/03/2016	19	Version for the AR2 Following RIDs have been implemented: • RID-AR2-: • Additional changes: • Latitude and Longitude stored as independent varaibles (instead of as a couple latlon. o SampleGeoLoc -> SampleLatitude and SampleLongitude o POSGeoLoc -> POSLatitude and POSLongitude o LOSGeoLoc -> LOSLatitude and LOSLongitude • LayerVar replaced by LayerTemperature and LayerPressure Header field names updated to be in line with the new ASD XML Library 13.4
02.00	17/03/2017	19	Interface change for the ATLID Nominal L1b product implementing EarthCARE metadata convention. Redline version generated by ESA

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. INTRODUCTION

1.1. PURPOSE

This document has been produced in the frame of the "EarthCARE Ground Processor" project and its purpose is to describe the format and content of the L1 Nominal products for the ATLID processor.

1.2. SCOPE

This document has been derived from the original ICD where all interfaces (commanding, monitoring, input and output data) were described. In this document, the information related to ATLID L1 Nominal Products has been extracted from the original ICD and has been included in this dedicated document.

2. APPLICABLE AND REFERENCE DOCUMENTS

2.1. APPLICABLE DOCUMENTS

The following documents, of the exact issue shown, form part of this document to the extent specified herein. Applicable documents are those referenced in the Contract or approved by the Approval Authority. They are referenced in this document in the form [AD.X]:

Table 2.1: Applicable Documents

Ref.	Title	Code	Version	Date
[AD.1]	Earth Observation Mission CFI Software - General Software User Manual	EO-MA-DMS-GS-0002	4.1	07/05/2010
[AD.2]	ECSIM Interface Control Document	ECSIM-DMS-TEC-ICD01-R	1.7	18/11/2008
[AD.3]	Architecture of the ESSS and ECGP	EC.TN.ASD.SY.00017	7	19/12/2014
[AD.4]	Volume 0 Products Definitions - Introduction	EC.ICD.ASD.SY.00004	8	12/12/2014
[AD.5]	Volume 1 Products Definitions - Common Products Definitions	EC.ICD.ASD.SY.00005	8	20/08/2014
[AD.6]	ESSS and ECGP Common Interface Control Document	EC.ICD.ASD.SY.00009	8	09/12/2014
[AD.7]	Requirements for the ESSS & ECGP	EC.RS.ASD.SYS.00007	8	26/05/2010
[AD.8]	ATLID ECGP Algorithm Theoretical Baseline Document	EC.TN.ASF.ATL.00034	6	27/02/2015
[AD.9]	EarthCARE PDGS Generic IPF Interface Specifications	EACA-GSEG-EOPG-TN-15-0001	1.1	13/11/2015
[AD.10]	Space Engineering - Software	ECSS-E-ST-40	C	06/03/2009
[AD.11]	Volume 2a Products Definitions – ATLID L0 Products Definitions	EC.ICD.ASD.ATL.00018	6	11/12/2014
[AD.12]	Volume 6 Products Definitions – Auxiliary Data	EC.ICD.ASD.SY.00025	6	12/12/2014
[AD.13]	Earth Explorer Ground Segment File Format Standard	PE-TN-ESA-GS-0001	2.0	03/05/2012
[AD.14]	ECGP Interface Control Document (ICD)	EC.ICD.GMV.SY.00001	02.01	22/07/2015

2.2. REFERENCE DOCUMENTS

The following documents, although not part of this document, amplify or clarify its contents. Reference documents are those not applicable and referenced within this document. They are referenced in this document in the form [RD.X]:

Table 2.2: Reference Documents

Ref.	Title	Code	Version	Date
[RD.1]	List of Acronyms and Abbreviations	EC.LI.ASD.SY.00001	4	10/01/2013
[RD.2]	Volume 2b Products Definitions – ATLID L1 Products Definitions	EC.ICD.ASD.ATL.00021	5	12/03/2012
[RD.3]	ATL L1 Product Definitions Volume B: Calibration Products	EC.ICD.GMV.ATL.00002	01.03	11/03/2016

3. TERMS, DEFINITIONS AND ABBREVIATED TERMS

3.1. DEFINITIONS

Concepts and terms used in this document and needing a definition are included in the following table:

Table 3.1: Definitions

Concept / Term	Definition

3.2. ACRONYMS

General EarthCARE abbreviations are in [RD.1]. Specific abbreviations used in this document are given below.

Acronyms used in this document and needing a definition are included in the following table:

Table 3.2: Acronyms

Acronym	Definition
ATLID	ATmospheric LIDar
BBR	EarthCARE Broadband Radiometer
CCDB	Characterisation/Calibration Database
ECGP	EarthCARE Level-1 Ground Processor
ESSS	EarthCARE Satellite System Simulator
FHN	Friedrichshafen – Germany
GERB	Geostationary Earth Radiation Budget
GUI	Graphical User Interface
HMI	Human-Machine Interface
H/W	Hardware
ICD	Interface Control Document
IMDD	Instrument Measurement Data Definition
ISP	Instrument Source Packet
LW	Long-Wave
MDS	Measurement Data Stream
MSI	MultiSpectral Imager
PCD	Product Confidence Data
PDD	Product Definition Document
PDGS	Payload Data Ground Segment
SCOE	Spacecraft Check-Out Equipment
SRDB	Spacecraft Reference Data Base
SW	Short-Wave
S/W	Software
TDS	Test Data Set
TOA	Top Of Atmosphere
TW	Total Wave
UV	Ultra-Violet
WGS	World Geodetic System

4. ATLID INSTRUMENT OVERVIEW

The Atmospheric LIDAR (ATLID) instrument measures in synergy with the Cloud Profiling Radar (CPR) vertical profiles of optically thin cloud and aerosol layers as well as the altitude of cloud boundaries.

ATLID is an atmospheric LIDAR operating in the UV range. The instrument emits short laser pulses towards the atmosphere, whereby a small part of the light is backscattered towards the instrument by aerosols or molecules, collected by a telescope and focused on a detector.

The detection chain of the instrument acquires the signal in order to determine the backscattered intensity versus arrival time, hence the distance to the observed atmosphere layer.

The laser pulses are emitted at a high repetition rate (several tens of hertz) along the ground track, such that the data from subsequent shots can be locally averaged for improving the signal-to-noise ratio.

The UV light emitted by ATLID being strongly attenuated by thick clouds, its results can be analysed in association with the radar products which provide cloud top, cloud base and ice content inside all ice clouds.

In addition, ATLID will discriminate the molecular backscatter (Rayleigh backscatter) from the aerosol and cloud particle return (Mie backscatter).

ATLID is designed to provide vertical sounding of the atmosphere from the ground up to 40 km altitude with at least 100 m vertical resolution with high resolution and accuracy. Figure 4.1 shows the ATLID measurement geometry.

Atmospheric LIDAR provides vertical profiles of physical aerosols from 0 to 40 km altitude

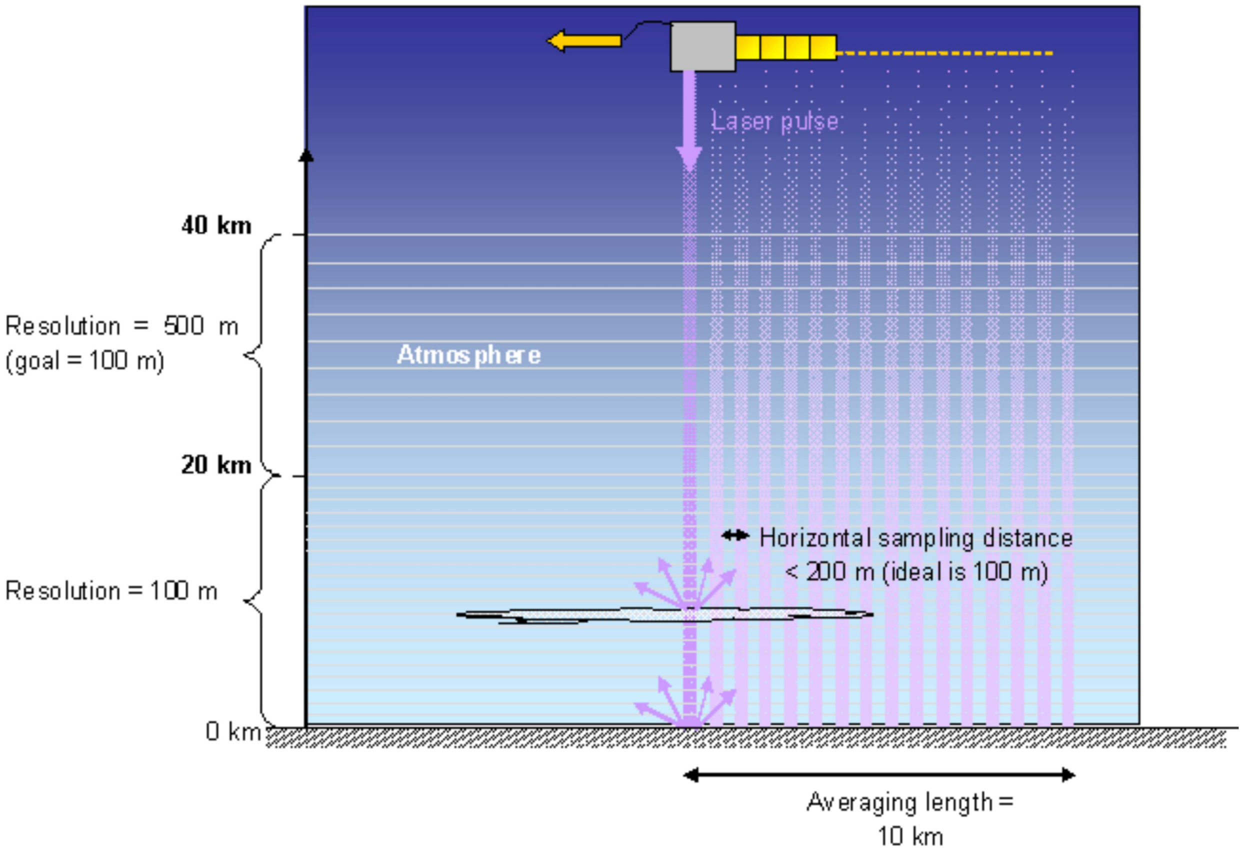

Figure 4.1: Vertical profiles

The retrieval of thin cloud optical depth and aerosols physical parameters requires the knowledge of both backscattering contributions of molecules (Rayleigh scattering) and aerosols (Mie scattering).

The measurement principle uses the fact that interaction of light with molecules or aerosols lead to different spectra. Whilst the Brownian motion of molecules induces a wide broadening of the incident light spectrum, the single scattering with an aerosol does not affect the spectrum shape of the incident light as shown in Figure 4.2 and Figure 4.3.

Interaction with molecules (left) and aerosols (right) respectively lead to broadened spectrum or unaffected spectrum shapes

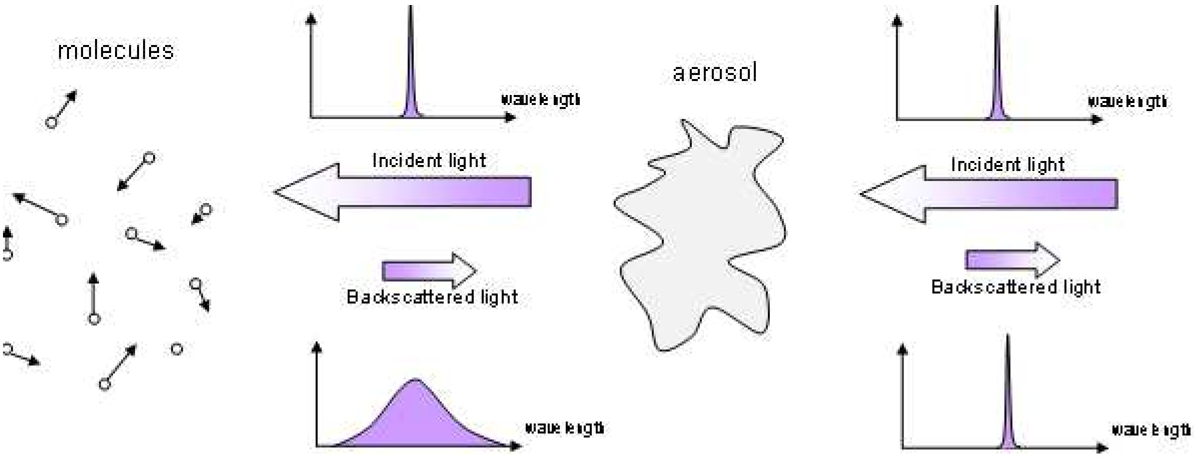

Figure 4.2: Interaction with molecules and aerosols

Analysis of atmosphere echo allows retrieving clouds top altitude as well as aerosol or molecules backscatter profile

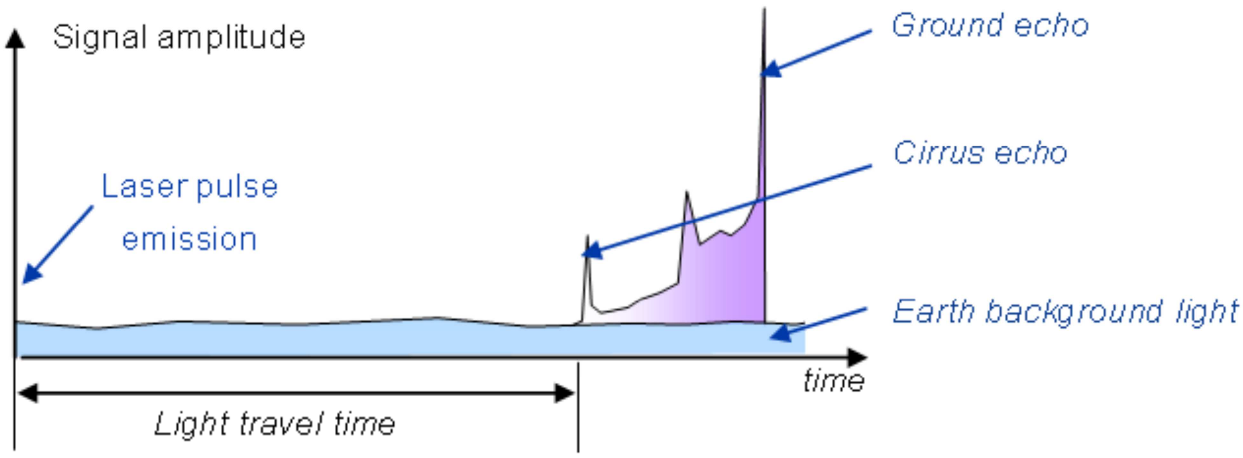

Figure 4.3: Analysis of atmosphere echo

As a consequence, a simple means of separating the contributions consists in filtering the backscattered spectrum with a high spectral resolution (HSR) filter centred on central wavelength, as depicted in Figure 4.4.

Principle of Mie/Rayleigh separation with high spectral resolution filter. Most of the Mie scattering contribution is directed towards the Mie channel whereas most of the Rayleigh scattering contribution goes to the Rayleigh channel

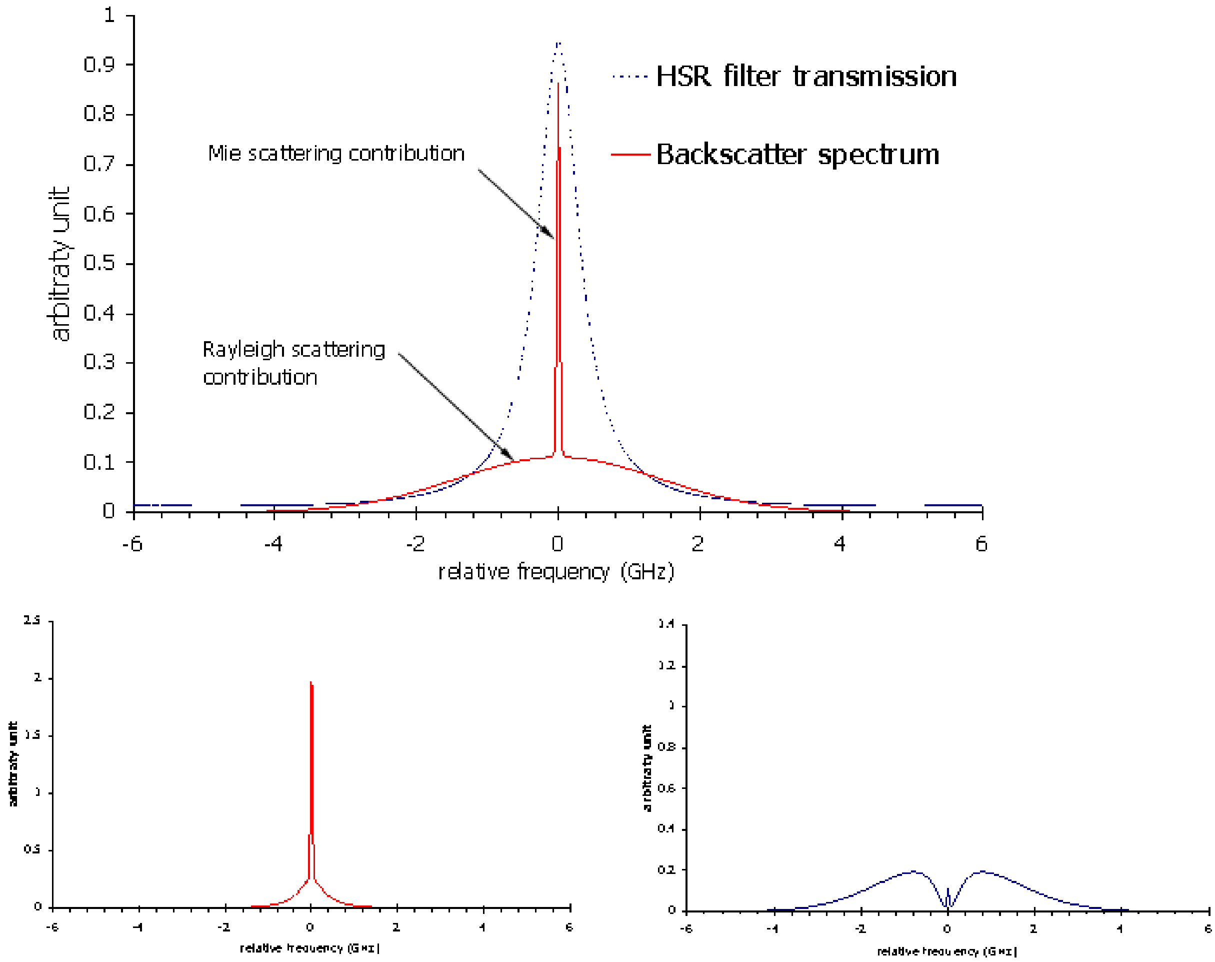

Figure 4.4: Principle of Mie/Rayleigh separation

This separation can be implemented by means of a narrow bandwidth Fabry-Perot etalon, consisting of two parallel reflective plates that act as an optical cavity. The cavity transmits a certain number of well-defined wavelengths separated by the so-called the free spectral range.

When tuned on the backscattered flux central wavelength, the etalon transmits most of the Mie scattered flux (narrow-bandwidth spectrum) and reflects most of the Rayleigh (scattered) flux. Adding a polariser and a quarter waveplate at the entrance of the etalon allows redirecting the reflected flux (Rayleigh contribution) to the Rayleigh channel.

The layout of the Fabry-Perot etalon is shown in Figure 4.5.

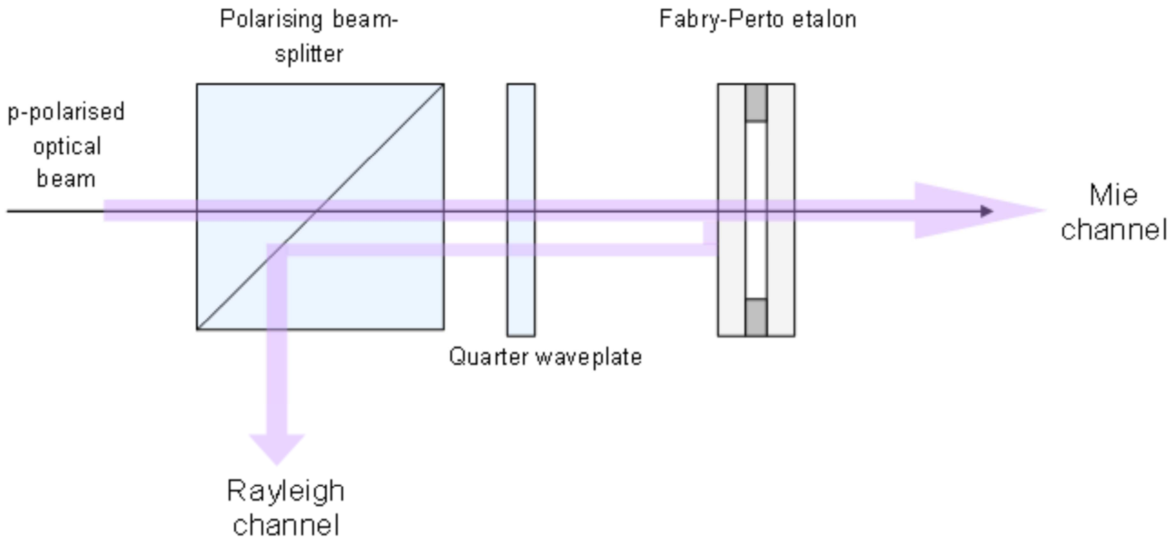

Figure 4.5: HSR filter layout example

Note: Content of current section (including text and figures) has been completely extracted from [RD.2].

5. ATLID L1 NOMINAL PRODUCTS

ATLID L1 Nominal Products are generated by the ATLID L1 Processor.

5.1. TRANSFER MECHANISM

All EarthCARE Products are composed by two physical files:

- One XML for the headers (*filemane*.HDR)
- One binary file for the records containing the data (*filename*.h5)

Both files are located into a ZIP package with the same name (i.e. *filename.ZIP)*.

5.2. FILE NAMING CONVENTION

The file naming convention for the EarthCARE Products is described in [AD.5].

5.3. DIMENSIONS

Following table contains all dimensions used in the definition of the ATLID L1 Nominal products.

Table 5.1: ATLID NetCDF Dimensions

Name	Description	N Elements	Dimension label
t	Dimension used to define variables depending on the number of samples recorded during the measurement time	variable	along_track
h1	Dimension used to define variables storing values for all atmospheric samples along the echo profile (altitude dependant). The limit has currently been set 256, but sample #255 is not a scientific sample so it has not been included. This dimension is used for raw signals only.	255	height_raw
h2	Dimension used to define variables storing values for data samples inside each profile.	253	height
bkg	This dimension is used to define variables storing couples of background estimations (Before and after echo)	2	background

5.4. SIZE AND FREQUENCY OF TRANSFERS

Being 1/8 of orbit the nominal time frame for the EarthCARE L1 products, the size of the ATLID L1 products is given for such time frame i.e. 1/8 of orbit. Following table summarises the sizes and frequency of generation of ATLID L1 Nominal products. This information has been extracted from ECGP ATL L1 V2 implementation.

Table 5.2: ATLID L1 nominal products size and frequency of transfers

MDS type	Size	Frequency of transfer	Comments
ATL_NOM_1B	1150 MB	8 per orbit.	Maximum (Co-adding factor = 1)
ATL_NOM_1B	580 MB	8 per orbit.	This is the default mode. (Co-adding factor = 2)

Different sizes of ATL_NOM_1B are due to the co-adding factor which describes how many profiles are co-added on-board the instrument before downlink. Baseline is co-adding factor 2.

5.5. DATA DEFINITION

ATLID L1 Products have different components, but there is a common structure for all of them. In this structure it is included the Fixed Product Header and the main Product Header which are identical for all products and so it is described below.

5.6. DATA STRUCTURE

ATLID L1 Products have different components, but there is a common structure for all of them. This structure is presented in the table below.

Table 5.3: L1 Product logical structure

HeaderData
FixedProductHeader
VariableProductHeader
MainProductHeader
SpecificProductHeader
ScienceData

According to the above structure, the products are physically composed by:

- Headers (FixedProductHeader and VariableProductHeader) included in the XML file
- ScienceData included in the netCDF4/HDF5 binary file (which also contains the headers)

5.7. ATL_NOM_1B

This is the nominal ATLID L1 product. It is separated in the four logical components described below.

5.7.1. ATL_NOM_1B FIXED PRODUCT HEADER

The Fixed Product Header is common for all ECGP products and is defined in Products Definitions Volume 1 [AD.5].

5.7.2. ATL_NOM_1B MAIN PRODUCT HEADER

The Main Product Header for the ATLID L1B Products is identical to the Main Product Header defined in Products Definitions Volume 1 [AD.5] but with following predefined values specific to ATLID L1B Nominal product:

- fileCategory = "ATL_"
- productType = "NOM_"
- productLevel = "1B"

5.7.3. ATL_NOM_1B SPECIFIC PRODUCT HEADER

This is the Specific Product Header for the Nominal ATLID L1B Products.

Table 5.4: ATL_NOM_1B Specific Product Header

#	Field Name	Type	Total size	Description/Value
1	NominalBRCcount	NC_INT	4	Total number of nominal Basic Repetition Cycles (echo measurements resulting from 1 or several shots depending on Number of accumulation parameter)
2	CoAlQualityCount	NC_INT	4	Total number of echoes measured with co-alignmed Basic Repetition Cycles

#	Field Name	Type	Total size	Description/Value
3	LaserTuningQualityCount	NC_INT	4	Total number of echoes measured with tuned laser Basic Repetition Cycles
4	DetectionSaturationCount	NC_INT	4	Total number of non saturated echoes
5	LaserEnergyQualityCount	NC_INT	4	Total number of echoes measured with a nominal laser energy
6	FloorEchoCount	NC_INT	4	Total number of echoes which can be used for estimation of spectral cross-talk in Rayleigh
7	GeolocalisedCount	NC_INT	4	Total number of Basic Repetition Cycles which are geographically localised
8	AtmosphParamCount	NC_INT	4	Total number of Basic Repetition Cycles where atmospheric data are succesfully interpolated
9	OffsetAssessmentValidityRay	NC_BYTE	1	Bit vector indicating the success of the offset evaluation on Ray channel
10	OffsetAssessmentValidityMie	NC_BYTE	1	Bit vector indicating the success of the offset evaluation on Mie channel
11	OffsetAssessmentValidityCro	NC_BYTE	1	Bit vector indicating the success of the offset evaluation on Cro channel
12	InsufficientFloorEchoes	NC_BYTE	1	Flag indicator for the correct progress of the Rayleigh spectral crosstalk averaging
13	RelSDspectrXtalkRay	NC_FLOAT	4	Mean over the product of the relative standart deviation of Epsilon
14	HighCleanAtmCount	NC_INT	4	Number of valid MDS packets with clean atmosphere at high altitude
15	RelSDspectrXtalkMie	NC_FLOAT	4	Mean over the product of the relative standart deviation of Khi
16	InsufficientStratoEchoes	NC_BYTE	1	Flag to identify if the product is large enough to perform moving averaging of the spectral cross-talk
17	ReferenceLaserEnergy	NC_FLOAT	4	Reference laser pulse energy used during the energy normalisation of the product
18	RedundancyConfigNb	NC_INT	4	Number of redundancy configuration in the L1b product (Note: According to the ATBD this parameter is not needed as output to the SPH so it could be removed from the SPH in future versions of the ASD XML Library. Currently it is set to 0)
19	ACDMredundancyStatus	NC_BYTE	1	Flag to identify the redundancy configuration of the ACDM (true = redundant = ACDM_B) (Note: This parameters flag is reported per ISP in the product datablock so it could be removed from the SPH in future versions of the ASD XML Library. Currently it is set to 0)
20	TXAredundancyStatus	NC_BYTE	1	Flag to identify the redundancy configuration of the TxA (true = redundant = TxA_B) (Note: This parameters flag is reported per ISP in the product datablock so it could be removed from the SPH in future versions of the ASD XML Library. Currently it is set to 0)
21	IDEredundancyStatus	NC_BYTE	1	Flag to identify the redundancy configuration of the TxA (true = redundant = TxA_B) (Note: This parameters flag is reported per ISP in the product datablock so it could be removed from the SPH in future versions of the ASD XML Library. Currently it is set to 0)

5.7.4. ATL_NOM_1B SCIENCE DATA

The ScienceData of this product is formatted as NetCDF/HDF5 file and have following fields:

Table 5.5: ATLID NOM 1B ScienceData structure

Field Name	#Dims	Dimensions	Type	Units	Description
mie_raw_signal	2	t, h1	NC_USHORT	BU	Raw data corresponding to unprocessed signal on Mie channel
rayleigh_raw_signal	2	t, h1	NC_USHORT	BU	Raw data corresponding to unprocessed signal on Rayleigh channel
crosspolar_raw_signal	2	t, h1	NC_USHORT	BU	Raw data corresponding to unprocessed signal on Crosspolar channel
mie_offset	0	–	NC_FLOAT	BU	Detection offset levels on the Mie channel
rayleigh_offset	0	–	NC_FLOAT	BU	Detection offset levels on the Rayleigh channel
crosspolar_offset	0	–	NC_FLOAT	BU	Detection offset levels on the Crosspolar channel
mie_offset_variation	1	t	NC_FLOAT	BU	Offset acquisition on the Mie channel
rayleigh_offset_variation	1	t	NC_FLOAT	BU	Offset acquisition on the Rayleigh channel
crosspolar_offset_variation	1	t	NC_FLOAT	BU	Offset acquisition on the Crosspolar channel
mie_background_signal	2	t, bkg	NC_FLOAT	BU	Background estimation before and after echo on Mie channel
rayleigh_background_signal	2	t, bkg	NC_FLOAT	BU	Background estimation before and after echo on Rayleigh channel
crosspolar_background_signal	2	t, bkg	NC_FLOAT	BU	Background estimation before and after echo on Crosspolar channel
sample_range	2	t, h2	NC_FLOAT	m	Range of altitude of each sample in raw data
sample_latitude	2	t, h2	NC_DOUBLE	deg	Latitude information for each sample (WGS84).
sample_longitude	2	t, h2,	NC_DOUBLE	deg	Longitude information for each sample (WGS84).
sample_altitude	2	t, h2	NC_FLOAT	m	Altitude corresponding to each Sample (WGS84, i.e. relative to the ellipsoid).
sensor_latitude	1	t	NC_DOUBLE	deg	Satellite latitude (WGS84)
sensor_longitude	1	t	NC_DOUBLE	deg	Satellite longitude (WGS84)
sensor_altitude	1	t	NC_FLOAT	m	Satellite altitude (WGS84, i.e. relative to the ellipsoid)
ellipsoid_latitude	1	t	NC_DOUBLE	deg	Ellipsoid latitude (WGS84, where LOS intersects the ellipsoid).
ellipsoid_longitude	1	t	NC_DOUBLE	deg	Ellipsoid longitude (WGS84, where LOS intersects the ellipsoid).
surface_elevation	1	t	NC_FLOAT	m	Surface elevation (WGS84, i.e. relative to the ellipsoid)
solar_elevation_angle	1	t	NC_FLOAT	deg	Solar Elevation Angle
land_flag	1	t	NC_BYTE	unitless	Flag which indicates 1 = land 0 = water
intersection_error_flag	1	t	NC_BYTE	unitless	Indicator specifying the status of geometric conditions of LOS. (1 = error, 0 = OK)

Field Name	#Dims	Dimensions	Type	Units	Description
layer_temperature	2	t, h2	NC_FLOAT	K	Temperature used for relative correction of spectral cross-talk on Mie channel or Rayleigh channel monitoring
layer_pressure	2	t, h2	NC_FLOAT	Pa	Pressure used for relative correction of spectral cross-talk on Mie channel or Rayleigh channel monitoring
atmospheric_interpolation_error_flag	2	t, h2	NC_BYTE	unitless	Information about the atmospheric parameter interpolation (1 = error, 0 = OK)
floor_index	1	t	NC_UBYTE	unitless	Index of the floor sample in the profile #nx
rayleigh_raw_spectral_crosstalk	1	t	NC_FLOAT	unitless	Instantaneous Spectral cross-talk parameter for the Rayleigh channel
rayleigh_raw_spectral_cross_talk_invalid_flag	1	t	NC_BYTE	unitless	Floor echo is well detected (strong echo identified, which can be used for spectral cross-talk in Rayleigh estimation). 1 = invalid, 0 = valid
rayleigh_averaged_spectral_crosstalk	1	t	NC_FLOAT	unitless	Spectral cross-talk parameter in Rayleigh channel used for crosstalk Correction
mie_averaged_spectral_crosstalk	1	t	NC_FLOAT	unitless	Spectral cross-talk parameter in Mie channel used for cross-talk correction
rayleigh_averaged_spectral_crosstalk_error	1	t	NC_FLOAT	unitless	Rayleigh channel averaged spectral cross-talk error
mie_averaged_spectral_crosstalk_error	1	t	NC_FLOAT	unitless	Mie channel averaged spectral cross-talk error
mie_spectral_crosstalk_reference_temperature	1	t	NC_FLOAT	K	Associated temperature to the Khi evaluation
mie_spectral_crosstalk_correction_factor	2	t, h2	NC_FLOAT	unitless	Relative correction of spectral cross-talk on Mie channel from relative to reference, taking into account layer temperature
rayleigh_lidar_constant_monitoring_value	1	t	NC_FLOAT	BU sr*m3	ATLID Rayleigh channel constant monitoring
mie_lidar_constant_monitoring_value	1	t	NC_FLOAT	BU sr*m3	ATLID Mie channel constant monitoring
rayleigh_relative_backscatter	2	t, h2	NC_FLOAT	unitless	Corrected raw data from cross-talk parameters on Rayleigh channel
mie_relative_backscatter	2	t, h2	NC_FLOAT	unitless	Corrected raw data from cross-talk parameters on Mie channel
crosspolar_relative_backscatter	2	t, h2	NC_FLOAT	unitless	Corrected raw data from cross-talk parameters on Crosspolar channel
rayleigh_attenuated_backscatter	2	t, h2	NC_FLOAT	1/(sr*m)	Absolute Rayleigh backscatter signal at input of instrument
mie_attenuated_backscatter	2	t, h2	NC_FLOAT	1/(sr*m)	Absolute Mie copolar backscatter signal at input of instrument
crosspolar_attenuated_backscatter	2	t, h2	NC_FLOAT	1/(sr*m)	Absolute Crosspolar backscatter signal at input of instrument
averaged_laser_energy	1	t	NC_FLOAT	mJ	Average energy over Nacc shots for the detection raw data
energy_error_flag	1	t	NC_BYTE	unitless	Status on laser energy errors (energy greater than threshold). 1 = error (insufficient energy), 0 = no error (sufficient energy)
mie_normalised_signal	2	t, h2	NC_FLOAT	BU	Energy normalised science data for Mie copolar channel.

Field Name	#Dims	Dimensions	Type	Units	Description
rayleigh_normalised_signal	2	t, h2	NC_FLOAT	BU	Energy normalised science data for Rayleigh channel.
crosspolar_normalised_signal	2	t, h2	NC_FLOAT	BU	Energy normalised science data for Mie Crosspolar channel
time	1	t	NC_DOUBLE	sec (seconds since 1 Jan 2000 00:00:00 UTC)	Considered UTC time reference for the measured profile nx (EchoProfileDate)
state_vector_quality_status	1	t	NC_INT	unitless	S/C State Vector Quality field copied from the ISP Private Science Data Header
ccdb_redundancy	1	t	NC_BYTE	unitless	Flag to identify the redundancy configuration. Bit 0 (LSB): ACDM Redundancy Selection -> 0=nominal, 1=redundant Bit 1 : TLE Redundancy Selection -> 0=nominal, 1=redundant Bit 2 : IDE Redundancy Selection -> 0=nominal, 1=redundant
rayleigh_relative_backscatter_total_error	2	t, h2	NC_FLOAT	unitless	Rayleigh channel relative backscatter total error
rayleigh_relative_backscatter_random_error	2	t, h2	NC_FLOAT	unitless	Rayleigh channel relative backscatter random error
rayleigh_relative_backscatter_systematic_along_track_error	1	h2	NC_FLOAT	unitless	Rayleigh channel relative backscatter error which is systematic along track
rayleigh_relative_backscatter_systematic_vertical_error	1	t	NC_FLOAT	unitless	Rayleigh channel relative backscatter error which is systematic with height
rayleigh_relative_backscatter_systematic_error	0	–	NC_FLOAT	unitless	Rayleigh channel relative backscatter systematic error
rayleigh_attenuated_backscatter_total_error	2	t, h2	NC_FLOAT	1/(sr*m)	Rayleigh channel attenuated backscatter total error
rayleigh_attenuated_backscatter_random_error	2	t, h2	NC_FLOAT	1/(sr*m)	Rayleigh channel attenuated backscatter random error
rayleigh_attenuated_backscatter_proportionality_error	0	–	NC_FLOAT	unitless	Rayleigh channel attenuated backscatter proportionality error
rayleigh_attenuated_backscatter_systematic_along_track_error	1	h2	NC_FLOAT	1/(sr*m)	Rayleigh channel attenuated backscatter error which is systematic along track
rayleigh_attenuated_backscatter_systematic_vertical_error	1	t	NC_FLOAT	1/(sr*m)	Rayleigh channel attenuated backscatter error which is systematic with height
rayleigh_attenuated_backscatter_systematic_error	0	–	NC_FLOAT	1/(sr*m)	Rayleigh channel attenuated backscatter systematic error
mie_relative_backscatter_total_error	2	t, h2	NC_FLOAT	unitless	Mie co-polar channel relative backscatter total error
mie_relative_backscatter_random_error	2	t, h2	NC_FLOAT	unitless	Mie co-polar channel relative backscatter random error
mie_relative_backscatter_systematic_along_track_error	1	h2	NC_FLOAT	unitless	Mie co-polar channel relative backscatter error which is systematic along track
mie_relative_backscatter_systematic_vertical_error	1	t	NC_FLOAT	unitless	Mie co-polar channel relative backscatter error which is systematic with height
mie_relative_backscatter_systematic_error	0	–	NC_FLOAT	unitless	Mie co-polar channel relative backscatter systematic error

Field Name	#Dims	Dimensions	Type	Units	Description
mie_attenuated_backscatter_total_error	2	t, h2	NC_FLOAT	1/(sr*m)	Mie co-polar channel attenuated backscatter total error
mie_attenuated_backscatter_random_error	2	t, h2	NC_FLOAT	1/(sr*m)	Mie co-polar channel attenuated backscatter random error
mie_attenuated_backscatter_proportionality_error	0	–	NC_FLOAT	unitless	Mie co-polar channel attenuated backscatter proportionality error
mie_attenuated_backscatter_systematic_along_track_error	1	h2	NC_FLOAT	1/(sr*m)	Mie co-polar channel attenuated backscatter error which is systematic along track
mie_attenuated_backscatter_systematic_vertical_error	1	t	NC_FLOAT	1/(sr*m)	Mie co-polar channel attenuated backscatter error which is systematic with height
mie_attenuated_backscatter_systematic_error	0	–	NC_FLOAT	1/(sr*m)	Mie co-polar channel attenuated backscatter systematic error
crosspolar_relative_backscatter_total_error	2	t, h2	NC_FLOAT	unitless	Mie cross-polar channel relative backscatter total error
crosspolar_relative_backscatter_random_error	2	t, h2	NC_FLOAT	unitless	Mie cross-polar channel relative backscatter random error
crosspolar_relative_backscatter_systematic_along_track_error	1	h2	NC_FLOAT	unitless	Mie cross-polar channel relative backscatter error which is systematic along track
crosspolar_relative_backscatter_systematic_vertical_error	1	t	NC_FLOAT	unitless	Mie cross-polar channel relative backscatter error which is systematic with height
crosspolar_relative_backscatter_systematic_error	0	–	NC_FLOAT	unitless	Mie cross-polar channel relative backscatter systematic error
crosspolar_attenuated_backscatter_total_error	2	t, h2	NC_FLOAT	1/(sr*m)	Mie cross-polar channel attenuated backscatter total error
crosspolar_attenuated_backscatter_random_error	2	t, h2	NC_FLOAT	1/(sr*m)	Mie cross-polar channel attenuated backscatter random error
crosspolar_attenuated_backscatter_proportionality_error	0	–	NC_FLOAT	unitless	Mie cross-polar channel attenuated backscatter proportionality error
crosspolar_attenuated_backscatter_systematic_along_track_error	1	h2	NC_FLOAT	1/(sr*m)	Mie cross-polar channel attenuated backscatter error which is systematic along track
crosspolar_attenuated_backscatter_systematic_vertical_error	1	t	NC_FLOAT	1/(sr*m)	Mie cross-polar channel attenuated backscatter error which is systematic with height
crosspolar_attenuated_backscatter_systematic_error	0	–	NC_FLOAT	1/(sr*m)	Mie cross-polar channel attenuated backscatter systematic error

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