MABEL_L2A Product Data Dictionary

Date Generated : 2012-10-24T20:31:05.000000Z
Product Type: MABEL_L2A, Format Version : 1.3

Group: /

Attribute	Value
LocalGranuleID	mabel_l2a_20120402t023400_808_1.h5
ProductionDateTime	2012-10-23T19:06:55.000000Z
LocalVersionID	1
VersionID	808
InputPointer	cf_l2a_20120402t023400.ctl, tai-utc.dat, gimp30m_20120709_01.h5, gmted75_20120706_01.h5, dtu10mss_20120705_01.h5, egm96_20120705_01.h5, 12040206.hdr, 12040206.hgt, 12040206.tmp, 12040206.rh, 12040206.pwat, 12040212.hdr, 12040212.hgt, 12040212.tmp, 12040212.rh, 12040212.pwat, mabel_l1b_20120402t023400_808_1.h5, DsESDTGIMABELL2A.008.desc
RangeBeginningTime	02:34:00.000000Z
RangeEndingTime	02:35:00.000000Z
RangeBeginningDate	2012-04-02
RangeEndingDate	2012-04-02
Flight_Location	Iceland Transit
Flight_Number	20
Scenario_Number	8
identifier_product_doi_authority	http://dx.doi.org
featureType	timeSeries
ShortName	MABEL_L2A
title	MABEL L2A Elevation Data (HDF5)
comment	Data granules consist of approximately 1 minute of HDF5 data and include corrected and geolocated MABEL elevation data (in meters) measuring the elevation of each detected photon within a range window about the DEM. All measured parameters are in science units.
summary	The elevation data are the primary distribution product intended for public use and are used to create the ATLAS simulated data product. Each granule was created from a corresponding MABEL_L1B granule. The provenance metadata shows the history that created the granule.
license	http://icesat.gsfc.nasa.gov/icesat2/data/mabel/mabel_docs.php
references	http://icesat.gsfc.nasa.gov/icesat2/data/mabel/mabel_docs.php (Documentation set for this product at the ICESat-2 Website), http://icesat.gsfc.nasa.gov/icesat2/data/mabel/data/browse/index.html (Browse data for MABEL at the ICESat-2 Website)
AccessConstraints	Data may not be reproduced or distributed without including the CitationForExternalPublication for this product included in this Metadata. Data may not be distributed in an altered form without the written permission of the ICESat-2 Science Project Office at NASA/GSFC.
CitationforExternalPublication	The data used in this study were produced by the ICESat-2 Science Project Office at NASA/GSFC. The data archive site is TBD.
contributor_role	Data Originator, Investigator, Producer, Producer
contributor_name	David W. Hancock (David.W.Hancock@nasa.gov), Thomas E Neumann (thomas.neumann@nasa.gov), Thorsten Markus (thorsten.markus-1@nasa.gov), Jeffrey E Lee (Jeffrey.E.Lee@nasa.gov)
creator_name	ICESat Science Investigator-led Processing System (I-SIPS)
creator_email	David.W.Hancock@nasa.gov
publisher_name	ICESat Science Investigator-led Processing System (I-SIPS)
publisher_email	David.W.Hancock@nasa.gov
publisher_url	http://icesat.gsfc.nasa.gov/icesat2/data/mabel/data/browse/index.html
platform	ER-2 High Altitude Airborne Science Aircraft (ER-2)
instrument	Multiple Altimeter Beam Experimental Lidar (MABEL)
processing_level	L2A
date_created	2012-10-23T19:06:55.000000Z
spatial_coverage_type	Horizontal
history	2012-10-23T19:06:55.000000Z mabel_l2a Version 1.6 October 2012 MABEL L2A PGE
geospatial_lat_min	36.708121553802826
geospatial_lat_max	36.787323737666178
geospatial_lon_min	241.85259108544975
geospatial_lon_max	241.85515430608737
geospatial_lat_units	degrees_north
geospatial_lon_units	degrees_east
keywords	Earth Science > Spectral/Engineering > Infrared Wavelengths > Sensor Counts > Photons
keywords_vocabulary	GCMD Science Keywords Version 6.0
standard_vocabulary_name	CF-1.6
naming_authority	http://dx.doi.org
project	Multiple Altimeter Beam Experimental Lidar (MABEL)

project	Multiple Altimeter Beam Experimental Lidar (MABEL)
time_type	UTC
date_type	J2000
time_coverage_start	2012-04-02T02:34:00.000000Z
time_coverage_end	2012-04-02T02:35:00.000000Z
time_coverage_duration	60
source	Aircraft measurements
HDFVersion	HDF5 1.8.9
identifier_file_uuid	BBD77A8C-5FEC-4564-87C0-7021660F7361
identifier_product_doi	TBD
identifier_product_type	MABEL_L2A
identifier_product_format_version	1.3
Conventions	CF-1.6
institution	National Aeronautics and Space Administration (NASA)
l2a_format_version	1.3
l2a_format_version_desc	Version number of the L2A granule format. This number is incremented whenever a change to the format of the granule is made. This allows the data user to create code that can handle multiple versions for the L2A granule.

Group: //METADATA

Attribute	Value
description	This group contains structured, computer-parseable ECHO-style collection and inventory-level metadata.

Group: //METADATA/COLLECTIONMETADATA

Attribute	Value
DLLName	libDsESDTGlGLASPoly.001Sh.so
GranuleTimeDuration	60
SpatialSearchType	NotSupported
DataFileFormat	HDF5
ScienceMimeType	application/x-hdfeos
BrowseMimeType	application/x-hdfeos
BrowseOnlineMimeType	image/jpeg
ShortName	MABEL_L2A
LongName	MABEL L2A Elevation Data (HDF5)
CollectionDescription	Data granules consist of approximately 1 minute of HDF5 data and include corrected and geolocated MABEL elevation data (in meters) measuring the elevation of each detected photon within a range window about the DEM. All measured parameters are in science units.
VersionID	8
CitationforExternalPublication	The data used in this study were produced by the ICESat-2 Science Project Office at NASA/GSFC. The data archive site is TBD.
CollectionState	In Work
MaintenanceandUpdateFrequency	Daily
AccessConstraints	Data may not be reproduced or distributed without including the CitationForExternalPublication for this product included in this Metadata. Data may not be distributed in an altered form without the written permission of the ICESat-2 Science Project Office at NASA/GSFC.
TemporalKeyword	Day
SpatialKeyword	Global

Group: //METADATA/COLLECTIONMETADATA/AdditionalAttributes

Attribute	Value
Flightline	AdditionalAttributesContainer
identifier_product_doi	AdditionalAttributesContainer
identifier_file_uuid	AdditionalAttributesContainer
identifier_product_doi_authority	AdditionalAttributesContainer

Group: //METADATA/COLLECTIONMETADATA/AdditionalAttributes/Flightline

Attribute	Value
AdditionalAttributeDatatype	string
AdditionalAttributeDescription	The unique number based on time of day assigned to each data.
AdditionalAttributeName	Flightline
ParameterUnitsofMeasurement	flightlines
ParameterRangeBegin	0

ParameterRangeEnd	3000

Group: //METADATA/COLLECTIONMETADATA/AdditionalAttributes/identifier_file_uuid

Attribute	Value
AdditionalAttributeDatatype	varchar
AdditionalAttributeDescription	Universally unique identifier for this data product's files
AdditionalAttributeName	identifier_file_uuid

Group: //METADATA/COLLECTIONMETADATA/AdditionalAttributes/identifier_product_doi

Attribute	Value
AdditionalAttributeDatatype	varchar
AdditionalAttributeDescription	Digital object identifier that uniquely identifies this data product
AdditionalAttributeName	identifier_product_doi

Group: //METADATA/COLLECTIONMETADATA/AdditionalAttributes/identifier_product_doi/InformationContent

Attribute	Value
ParameterValue	TBD

Group: //METADATA/COLLECTIONMETADATA/AdditionalAttributes/identifier_product_doi_authority

Attribute	Value
AdditionalAttributeDatatype	varchar
AdditionalAttributeDescription	URL of the digital object identifier resolving authority
AdditionalAttributeName	identifier_product_doi_authority

Group: //METADATA/COLLECTIONMETADATA/AdditionalAttributes/identifier_product_doi_authority/InformationContent

Attribute	Value
ParameterValue	http://dx.doi.org

Group: //METADATA/COLLECTIONMETADATA/CSDTDescription

Attribute	Value
PrimaryCSDT	n-Dim Array of Records
IndirectReference	flight-lines
Implementation	HDF5
CSDTComments	Data for each flight is divided into one minute granules.

Group: //METADATA/COLLECTIONMETADATA/CollectionAssociation

Attribute	Value
MABEL_L0	CollectionAssociationContainer
MABEL_L1A	CollectionAssociationContainer
MABEL_L1B	CollectionAssociationContainer
MATLAS_L2A	CollectionAssociationContainer

Group: //METADATA/COLLECTIONMETADATA/CollectionAssociation/MABEL_L0

Attribute	Value
CollectionType	Science Associated
CollectionUse	The initial collection of time-of-flight, status and housekeeping data collected from the instrument.
ShortName	MABEL_L0
VersionID	1

Group: //METADATA/COLLECTIONMETADATA/CollectionAssociation/MABEL_L1A

Attribute	Value
CollectionType	Science Associated
CollectionUse	Data granules consist of approximately 1 minute of HDF5 data and include decommutated raw MABEL data in engineering units reformatted into HDF5. Some parameters are converted for data handling and ordering.
ShortName	MABEL_L1A
VersionID	1

Group: //METADATA/COLLECTIONMETADATA/CollectionAssociation/MABEL_L1B

Attribute	Value
CollectionType	Input
CollectionUse	Data granules consist of approximately 1 minute of HDF5 data and include MABEL range data in meters from measuring the distance from MABEL to each detected photon. Also includes reformatted GPS/IMU position/attitude information. All measured parameters are converted to science units.
ShortName	MABEL_L1B
VersionID	8

Group: //METADATA/COLLECTIONMETADATA/CollectionAssociation/MATLAS_L2A

Attribute	Value
CollectionType	Dependent
CollectionUse	Data granules consist of approximately 1 minute of HDF5 derived MABEL data that simulate ICESat-2 ATLAS geolocated elevation data in meters. All measured/simulated parameters are in science units.
ShortName	MATLAS_L2A
VersionID	1

Group: //METADATA/COLLECTIONMETADATA/ContactOrganization

Attribute	Value
Data_Originator	ContactOrganizationContainer
Archive	ContactOrganizationContainer

Group: //METADATA/COLLECTIONMETADATA/ContactOrganization/Archive

Attribute	Value
Role	Archive
HoursofService	M-F, 8:00am to 5:00pm, Eastern Time
ContactInstructions	Contact by e-mail first.
ContactOrganizationName	ICESat Science Investigator-led Processing System (I-SIPS)
StreetAddress	Code 615.0 NASA Goddard Space Flight Center 8800 Greenbelt Road
City	Greenbelt
StateProvince	Maryland
PostalCode	20771
Country	USA
TelephoneNumber	757-824-1036
TelephoneNumberType	Facsimile
ElectronicMailAddress	David.W.Hancock@nasa.gov

Group: //METADATA/COLLECTIONMETADATA/ContactOrganization/Data_Originator

Attribute	Value
Role	Data Originator
HoursofService	M-F, 8:00am to 4:30pm Eastern Time
ContactInstructions	Contact by e-mail first
ContactOrganizationName	ICESat Science Investigator-led Processing System (I-SIPS)
StreetAddress	Code 615.0 NASA Goddard Space Flight Center 8800 Greenbelt Road
City	Greenbelt
StateProvince	Maryland
PostalCode	20771
Country	USA
TelephoneNumber	757-864-1238
TelephoneNumberType	Voice
ElectronicMailAddress	David.W.Hancock@nasa.gov

Group: //METADATA/COLLECTIONMETADATA/ContactPerson

Attribute	Value
Hancock	ContactPersonContainer
Neumann	ContactPersonContainer
Markus	ContactPersonContainer
Lee	ContactPersonContainer

Group: //METADATA/COLLECTIONMETADATA/ContactPerson/Hancock

Attribute	Value
Role	Data Originator
HoursofService	M-F, 8:00am to 4:30pm. Eastern Time.
ContactInstructions	None
ContactJobPosition	Science Software Development Manager.
ContactFirstName	David
ContactMiddleName	W.
ContactLastName	Hancock
StreetAddress	Building N-159, NASA/GSFC Wallops Flight Facility.
City	Wallops Island
StateProvince	Virginia
PostalCode	23337
Country	USA
TelephoneNumber	757-824-1238
TelephoneNumberType	Voice
ElectronicMailAddress	David.W.Hancock@nasa.gov

Group: //METADATA/COLLECTIONMETADATA/ContactPerson/Lee

Attribute	Value
Role	Producer
HoursofService	M-F, 8:00am to 4:30pm Eastern Time
ContactInstructions	None
ContactJobPosition	Science Software Development Lead
ContactFirstName	Jeffrey
ContactMiddleName	E
ContactLastName	Lee
StreetAddress	NASA Wallops Flight Facility 34200 Fulton Street
City	Wallops Island
StateProvince	Virginia
PostalCode	23337
Country	USA
TelephoneNumber	757-824-1853
TelephoneNumberType	Voice
ElectronicMailAddress	Jeffrey.E.Lee@nasa.gov

Group: //METADATA/COLLECTIONMETADATA/ContactPerson/Markus

Attribute	Value
Role	Producer
HoursofService	M-F, 8:00am to 4:30pm Eastern Time
ContactInstructions	None.
ContactJobPosition	ICESat-2 Project Scientist
ContactFirstName	Thorsten
ContactLastName	Markus
StreetAddress	Code 615.0 NASA Goddard Space Flight Center 8800 Greenbelt Road
City	Greenbelt
StateProvince	Maryland
PostalCode	20771
Country	USA
TelephoneNumber	301-614-5882
TelephoneNumberType	Voice
ElectronicMailAddress	thorsten.markus-1@nasa.gov

Group: //METADATA/COLLECTIONMETADATA/ContactPerson/Neumann

Attribute	Value
Role	Investigator

HoursofService	M-F, 8:00am to 4:30pm Central Time
ContactInstructions	None
ContactJobPosition	Science Team Leader
ContactFirstName	Thomas
ContactMiddleName	E
ContactLastName	Neumann
StreetAddress	Code 615.0 NASA Goddard Space Flight Center 8800 Greenbelt Road
City	Greenbelt
StateProvince	Maryland
PostalCode	20771
Country	USA
TelephoneNumber	301-614-5923
TelephoneNumberType	Voice
ElectronicMailAddress	thomas.neumann@nasa.gov

Group: //METADATA/COLLECTIONMETADATA/DisciplineTopicParameters

Group: //METADATA/COLLECTIONMETADATA/DisciplineTopicParameters/Spectral

Attribute	Value
Engineering	DisciplineTopicParametersContainer

Group: //METADATA/COLLECTIONMETADATA/DisciplineTopicParameters/Spectral/Engineering

Attribute	Value
ECSDisciplineKeyword	Earth Science
ECSTopicKeyword	Spectral/Engineering
ECSTermKeyword	Infrared Wavelengths
ECSVariableKeyword	Sensor Counts

Group: //METADATA/COLLECTIONMETADATA/DisciplineTopicParameters/Spectral/Engineering/ECSParameter

Attribute	Value
ECSParameterKeyword	Photons

Group: //METADATA/COLLECTIONMETADATA/ECSCollection

Attribute	Value
RevisionDate	2012-06-25
SuggestedUsage	The elevation data are the primary distribution product intended for public use and are used to create the ATLAS simulated data product. Each granule was created from a corresponding MABEL_L1B granule. The provenance metadata shows the history that created the granule.
ProcessingCenter	GSFC I-SIPS
ArchiveCenter	GSFC I-SIPS
VersionDescription	Reprocessed
DatasetDisclaimerPointer	http://icesat.gsfc.nasa.gov/icesat2/data/mabel/mabel_docs.php
ECSCollectionGuidePointer	http://icesat.gsfc.nasa.gov/icesat2/data/mabel/mabel_docs.php
ECSCollectionGuidePointerComment	Documentation set for this product at the ICESat-2 Website
MiscellaneousInformationPointer	http://icesat.gsfc.nasa.gov/icesat2/data/mabel/data/browse/index.html
MiscellaneousInformationPointerComment	Browse data for MABEL at the ICESat-2 Website

Group: //METADATA/COLLECTIONMETADATA/Platform

Attribute	Value
ER-2	PlatformContainer

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2

Attribute	Value
PlatformShortName	ER-2
PlatformLongName	ER-2 High Altitude Airborne Science Aircraft
PlatformType	Aircraft

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument

Attribute	Value
MABEL	InstrumentContainer
GPS	InstrumentContainer
IMU	InstrumentContainer

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/GPS

Attribute	Value
InstrumentShortName	GPS
InstrumentLongName	Global Positioning System Receiver
InstrumentTechnique	Radionavigation
NumberofSensors	1

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/GPS/Sensor

Attribute	Value
GPS_Receiver	SensorContainer

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/GPS/Sensor/GPS_Receiver

Attribute	Value
SensorShortName	GPS Receiver
SensorLongName	Dual frequency GPS receiver
SensorTechnique	Pseudorange and carrier phase

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/IMU

Attribute	Value
InstrumentShortName	IMU
InstrumentLongName	Inertial Measurement Unit
InstrumentTechnique	Inertial Measurement
NumberofSensors	1

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/IMU/Sensor

Attribute	Value
IMU	SensorContainer

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/IMU/Sensor/IMU

Attribute	Value
SensorShortName	IMU
SensorLongName	Inertial Measurement Unit
SensorTechnique	Inertial Measurement

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL

Attribute	Value
InstrumentShortName	MABEL
InstrumentLongName	Multiple Altimeter Beam Experimental Lidar
InstrumentTechnique	Laser Altimetry and Light Detection and Radar
NumberofSensors	2

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL/Sensor

Attribute	Value
LA1064	SensorContainer
LA532	SensorContainer

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL/Sensor/LA1064

Attribute	Value
SensorShortName	LA1064
SensorLongName	Laser Altimeter 1064
SensorTechnique	Exact Measurement of Time between Transmit Pulse and receive photon.

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL/Sensor/LA1064/SensorCharacteristic

Attribute	Value
wavelength	SensorCharacteristicContainer
tof	SensorCharacteristicContainer

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL/Sensor/LA1064/SensorCharacteristic/tof

Attribute	Value
SensorCharacteristicName	tof
SensorCharacteristicDescription	detector
SensorCharacteristicDataType	varchar
SensorCharacteristicUnit	counts
SensorCharacteristicValue	0-TBD

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL/Sensor/LA1064/SensorCharacteristic/wavelength

Attribute	Value
SensorCharacteristicName	wavelength
SensorCharacteristicDescription	transmission
SensorCharacteristicDataType	varchar
SensorCharacteristicUnit	nanometer
SensorCharacteristicValue	1064 nm

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL/Sensor/LA532

Attribute	Value
SensorShortName	LA532
SensorLongName	Laser Altimeter 532
SensorTechnique	Exact Measurement of Time between Transmit Pulse and receive photon

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL/Sensor/LA532/SensorCharacteristic

Attribute	Value
wavelength	SensorCharacteristicContainer
tof	SensorCharacteristicContainer

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL/Sensor/LA532/SensorCharacteristic/tof

Attribute	Value
SensorCharacteristicName	tof
SensorCharacteristicDescription	detector
SensorCharacteristicDataType	varchar
SensorCharacteristicUnit	counts
SensorCharacteristicValue	0-TBD

Group: //METADATA/COLLECTIONMETADATA/Platform/ER-2/Instrument/MABEL/Sensor/LA532/SensorCharacteristic/wavelength

Attribute	Value
SensorCharacteristicName	wavelength
SensorCharacteristicDescription	transmission
SensorCharacteristicDataType	varchar
SensorCharacteristicUnit	nanometer
SensorCharacteristicValue	532nm

Group: //METADATA/COLLECTIONMETADATA/ProcessingLevel

Attribute	Value
ProcessingLevelDescription	Sensor Measurements
ProcessingLevelID	L2A

Group: //METADATA/COLLECTIONMETADATA/Spatial

Attribute	Value

SpatialCoverageType	Horizontal
WestBoundingCoordinate	-180.0
NorthBoundingCoordinate	90.0
EastBoundingCoordinate	180.0
SouthBoundingCoordinate	-90.0

Group: //METADATA/COLLECTIONMETADATA/StorageMediumClass

Attribute	Value
StorageMedium	Online

Group: //METADATA/COLLECTIONMETADATA/Temporal

Attribute	Value
TimeType	UTC
DateType	J2000
TemporalRangeType	Continuous Range
PrecisionofSeconds	2
EndsatPresentFlag	Y
RangeBeginningDate	2010-12-08
RangeBeginningTime	00:00:00
RangeEndingDate	2010-12-08
RangeEndingTime	00:00:00

Group: //METADATA/INVENTORYMETADATA

Attribute	Value
ShortName	MABEL_L2A
VersionID	808
RangeBeginningTime	02:34:00.000000Z
RangeEndingTime	02:35:00.000000Z
RangeBeginningDate	2012-04-02
RangeEndingDate	2012-04-02

Group: //METADATA/INVENTORYMETADATA/ECSDataGranule

Attribute	Value
LocalGranuleID	mabel_l2a_20120402t023400_808_1.h5
ProductionDateTime	2012-10-23T19:06:55.000000Z
LocalVersionID	1

Group: //METADATA/INVENTORYMETADATA/InputGranule

Attribute	Value
InputPointer	cf_l2a_20120402t023400.ctl, tai-utc.dat, gimp30m_20120709_01.h5, gmted75_20120706_01.h5, dtu10mss_20120705_01.h5, egm96_20120705_01.h5, 12040206.hdr, 12040206.hgt, 12040206.tmp, 12040206.rh, 12040206.pwat, 12040212.hdr, 12040212.hgt, 12040212.tmp, 12040212.rh, 12040212.pwat, mabel_l1b_20120402t023400_808_1.h5, DsESDTGIMABELL2A.008.desc

Group: //METADATA/INVENTORYMETADATA/ProductSpecificMetadata

Attribute	Value
Flight_Location	Iceland Transit
Flight_Number	20
Scenario_Number	8
identifier_product_doi	TBD
identifier_file_uuid	BBD77A8C-5FEC-4564-87C0-7021660F7361
identifier_product_doi_authority	http://dx.doi.org

Group: //altimetry

Attribute	Value
Description	This group contains groups of segmented altimeter-related parameters. The altimeter segment temporal length is defined by the number of laser shots specified in the metadata parameter [alt_seg_shots]. Parameters in each segment have a 1-to-1 correspondence with the parameters in other segments. For example the times with segment 2 of the time group correspond to the data within segment 2 of the hist subgroups. There is one instance of this group within this granule.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
delta_time_start	DOUBLE (UNLIMITED)	delta_time_start (time)	seconds	Elapsed seconds (since first data point in granule) at the start of this time interval	Derived (gps_seconds-gps_sec_offset)	NOT_SET
delta_time_stop	DOUBLE (UNLIMITED)	delta_time_stop (time)	seconds	Elapsed seconds (since first data point in granule) at the start of this time interval	Derived (gps_seconds-gps_sec_offset)	delta_time_start

Group: //altimetry/app_refl

Attribute	Value
Description	This group contains apparent reflectance and noise parameters arranged per channel. There is one instance of this subgroup within the Altimetry group.

Group: //altimetry/app_refl/channelxxx

Attribute	Value
Description	This group contains apparent reflectance and noise parameters for a specific channel. There is one instance of this subgroup for each channel configured on the instrument.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
app_refl	FLOAT (UNLIMITED)	app_refl (app_refl)	TBD	Relative Apparent Reflectivity	Derived (Relative Apparent Reflectivity ATBD)	delta_time_start
n_ar_photons	INTEGER (UNLIMITED)	n_ar_photons (n_ar_photons)	TBD	Number of photons used in the AR histogram computation.	Derived (Relative Apparent Reflectivity ATBD)	delta_time_start
noise_rate	FLOAT (UNLIMITED)	noise_rate (noise_rate)	NOT_SET	Per-shot Noise Rate	Derived (number of photons in the noise range window per shot)	delta_time_start
sat_flag	INTEGER (UNLIMITED)	sat_flag (sat_Flag)	NOT_SET	Apparent Reflectance Saturation Flag. flag_values: 0, 1, 2, 3 flag_meanings: not_saturated mild_saturation high_saturation ar_not_computed	Derived (Reflectivity ATBD)	delta_time_start

Group: //altimetry/dem_drm

Attribute	Value
Description	This group contains DEM and aircraft location information for each segment. The DEM elevation is derived from a computed reference track using the parameters provided by the Novatel INS/GPS to correct for aircraft motion. In addition, this group contains the elevation window filters used for accepting photons for inclusion in the photon channel groups. There is one instance of this group within the file.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
dem_flag	INTEGER (UNLIMITED)	dem_flag (dem_flag)	UNITS	Flag indicating source of DEM. 0=none, 1=GIMP, 2=GMTED2010, 3=MSS	Derived, TBD	delta_time_start
elev_bot_window	FLOAT (UNLIMITED)	elev_bot_window (elev_bot_window)	meters	Minimum elevation for altimeter-reported photons	Derived (elev_dem-DEM_RANGE_BOT_OFF)	delta_time_start
elev_dem	FLOAT (UNLIMITED)	elev_dem (elev_dem)	meters	WGS84 DEM elevation	DEM ANC File	delta_time_start
elev_geoid	FLOAT (UNLIMITED)	elev_geoid (elev_geoid)	meters	WGS84 DEM elevation	DEM ANC File	delta_time_start
elev_top_window	FLOAT (UNLIMITED)	elev_top_window (elev_top_window)	meters	Maximum elevation for altimeter-reported photons	Derived (elev_dem+DEM_RANGE_TOP_OFF)	delta_time_start
latitude_dem	DOUBLE (UNLIMITED)	lat_dem (latitude)	degrees	GPS/INS latitude used to determine location for DEM	L1A INS	delta_time_start
longitude_dem	DOUBLE (UNLIMITED)	lon_dem (longitude)	degrees	GPS/INS longitude used to determine location for DEM	L1A INS	delta_time_start
noise_bot_window	FLOAT	noise_bot_window	meters	Minimum elevation for noise rate	Derived (elev_dem-	delta_time_start

noise_bot_window	FLOAT (UNLIMITED)	noise_bot_window (noise_bot_window)	meters	Minimum elevation for noise rate calculation.	Derived (elev_dem+ NOISE_RANGE_BOT_OFF)	delta_time_start
noise_top_window	FLOAT (UNLIMITED)	noise_top_window (noise_top_window)	meters	Maximum elevation for noise rate calculation	Derived (elev_dem+NOISE_RANGE_TOP_OFF)	delta_time_start
transtime	FLOAT (UNLIMITED)	transtime (transtime)	seconds	Transit time of the laser light to photon bounce	Derived (ht_ell/(speed_light/2.0))	delta_time_start

Group: //altimetry/histogram

Attribute	Value
Description	This group contains subgroups of per-channel histograms. There is one instance of this group within the Altimetry group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
DS_Histogram_Bins	INTEGER (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET

Group: //altimetry/histogram/channelxxx

Attribute	Value
Description	This group contains subgroups of per-channel histograms. There is one instance of this group within the Altimetry group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
elev_top_hist	FLOAT (UNLIMITED)	elev_top_hist (height)	meters	Elevation height to the top bin of the altimetry histogram	Derived	delta_time_start
histogram	INTEGER (200) (UNLIMITED)	altimetry_histogram (histogram)	count	altimetry histogram - count of the number of photons in each defined elevation bin. Dimensions are time and bin_number.	Derived	delta_time_start
n_hist_shots	INTEGER (UNLIMITED)	n_hist_shots (n_points)	count	Number of shots within the histogram interval.	Derived	delta_time_start

Group: //ancillary_data

Attribute	Value
Description	This group contains attributes which describe parameters and constants used in computations described by the MABEL ATBDs.
egm96_dem_citation	The Development of the Joint NASA GSFC and NIMA Geopotential Model EGM96, F. G. Lemoine, S. C. Kenyon, J. K. Factor, R.G. Trimmer, N. K. Pavlis, D. S. Chinn, C. M. Cox, S. M. Klosko, S. B. Luthcke, M. H. Torrence, Y. M. Wang, R. G. Williamson, E. C. Pavlis, R. H. Rapp and T. R. Olson, NASA Goddard Space Flight Center, Greenbelt, Maryland, 20771 USA, July 1998.
egm96_dem_source	June 15, 2005; downloaded from http://earth-info.nga.mil/GandG/wgs84/gravitymod/egm96/egm96.html
gmted_dem_citation	Danielson, J.J., and Gesch, D.B., 2011, Global multi-resolution terrain elevation data 2010 (GMTED2010): U.S. Geological Survey Open-File Report 2011
gmted_dem_source	GMTED 7.5 arc-second GEOTIFFs; downloaded from http://http://topotools.cr.usgs.gov/GMTED_viewer.
gimp_dem_citation	Howat I.M and A. Negrete, in prep, A high-resolution ice mask for the Greenland Ice Sheet and peripheral glaciers and icecaps.
gimp_dem_source	Version 1.2 (December 16, 2011), downloaded from ftp://ftp-bprc.mps.ohio-state.edu/downloads/gdg/gimpicemask
dtu10_dem_citation	Andersen O. B, Knudsen P (2009) The DNSC08 mean sea surface and mean dynamic topography. J. Geophys. Res., 114, C11, doi:10.1029/2008JC005179, 2009. Andersen, O. B., The DTU10 Gravity field and Mean sea surface (2010) Second international symposium of the gravity field of the Earth (IGFS2), Fairbanks, Alaska.
dtu10_dem_source	DTU10MSS_1min.mss; downloaded June 22, 2012 from http://www.space.dtu.dk/English/Research/Scientific_data_and_models/downloaddata.aspx
start_gpsweek	1682
start_gpsweek_desc	GPS week number for the first data point in the granule.
end_gpsweek	1682
end_gpsweek_desc	GPS week number for the last data point in the granule.
start_gpssow	95671.147212399999
start_gpssow_desc	GPS seconds-of-week for the first data point in the granule.
end_gpssow	95714.999939200003
end_gpssow_desc	GPS seconds-of-week for the last data point in the granule.
gps_sec_offset	1017369271.1472124
gps_sec_offset_desc	Number of GPS seconds since GPS epoch (1980-01-06T00:00:00.000000Z UTC) corresponding to the first data point within the granule. Add this value to the data [delta_time] parameter to compute [gps_seconds] for each data point.
start_latitude	36.708121553802826
start_latitude_desc	Best-available latitude (product-specific) in degrees at first data point within the granule.
start_longitude	241.85259108544975
start_longitude_desc	Best-available longitude (product-specific) in degrees at first data point within the granule.
end_latitude	36.787323737666178

end_latitude	[illegible]
end_latitude_desc	Best-available latitude (product-specific) in degrees at last data point within the granule.
end_longitude	241.85259108544975
end_longitude_desc	Best-available longitude (product-specific) in degrees at last data point within the granule.
granule_beginning_time	00:00:00.000000Z
granule_beginning_time_desc	UTC time of the first data point within the granule.
granule_ending_time	02:34:59.999939Z
granule_ending_time_desc	UTC time of the last data point within the granule.
granule_beginning_date	1980-01-06
granule_beginning_date_desc	UTC date of the first data point within the granule.
granule_ending_date	2012-04-02
granule_ending_date_desc	UTC date of the last data point within the granule.
control	cf_name=cf_l2a_20120402t023400.ctl StatusLevel=539 IN_ESDT=/Volumes/san0/mabel/data/DsESDTGIMABELL2A.008.desc 1017369255.000000 1017369315.000000 IN_ANC_TAIUTC=/Volumes/san0/mabel/data/tai-utc.dat 1017369255.000000 1017369315.000000 IN_ANC_GMTED=/Volumes/san0/mabel/data/gmted75_20120706_01.h5 1017369255.000000 1017369315.000000 IN_ANC_DTU10=/Volumes/san0/mabel/data/dtu10mss_20120705_01.h5 1017369255.000000 1017369315.000000 IN_ANC_GIMP=/Volumes/san0/mabel/data/gimp30m_20120709_01.h5 1017369255.000000 1017369315.000000 IN_ANC_EGM96=/Volumes/san0/mabel/data/egm96_20120705_01.h5 1017369255.000000 1017369315.000000 UUID=BBD77A8C-5FEC-4564-87C0-7021660F7361 OUT_L2A_H5=/Volumes/san0/mabel/release_808/granules/20120402_Iceland_Transit/015900/mabel_l2a_20120402t023400_808_1.h5 1017369255.000000 1017369315.000000 808 1 IN_L1B_H5=/Volumes/san0/mabel/release_808/granules/20120402_Iceland_Transit/015900/mabel_l1b_20120402t023400_808_1.h5 1017369255.000000 1017369315.000000 808 1 IN_ANC_MET_HDR=/Volumes/san0/mabel/in_data/met/2012-04-02/12040206.hdr 1017360015.000000 1017381615.000000 IN_ANC_MET_HGT=/Volumes/san0/mabel/in_data/met/2012-04-02/12040206.hgt 1017360015.000000 1017381615.000000 IN_ANC_MET_PWAT=/Volumes/san0/mabel/in_data/met/2012-04-02/12040206.pwat 1017360015.000000 1017381615.000000 IN_ANC_MET_RH=/Volumes/san0/mabel/in_data/met/2012-04-02/12040206.rh 1017360015.000000 1017381615.000000 IN_ANC_MET_TMP=/Volumes/san0/mabel/in_data/met/2012-04-02/12040206.tmp 1017360015.000000 1017381615.000000 IN_ANC_MET_HDR=/Volumes/san0/mabel/in_data/met/2012-04-02/12040212.hdr 1017381615.000000 1017403215.000000 IN_ANC_MET_HGT=/Volumes/san0/mabel/in_data/met/2012-04-02/12040212.hgt 1017381615.000000 1017403215.000000 IN_ANC_MET_PWAT=/Volumes/san0/mabel/in_data/met/2012-04-02/12040212.pwat 1017381615.000000 1017403215.000000 IN_ANC_MET_RH=/Volumes/san0/mabel/in_data/met/2012-04-02/12040212.rh 1017381615.000000 1017403215.000000 IN_ANC_MET_TMP=/Volumes/san0/mabel/in_data/met/2012-04-02/12040212.tmp 1017381615.000000 1017403215.000000
control_desc	PGE-specific control file used to generate this granule. To re-use, replace breaks (BR) with linefeeds.

Group: //ancillary_data/apparent_reflectance

Attribute	Value
Description	The group contains parameter attributes related tothe apparent reflectance algorithm.
ar_hist_top_off	300.00000
ar_hist_top_off_desc	Meters added to the nominal elevation to define the top of the apparent reflectance histogram range window
ar_hist_bot_off	100.00000
ar_hist_bot_off_desc	Meters subtracted from the nominal elevation to define the bottom of the apparent reflectance histogram range window.
ar_noise_top_off	100.00000
ar_noise_top_off_desc	Meters added to the nominal elevation to define the top of the apparent reflectance noise range window.
ar_noise_bot_off	100.00000
ar_noise_bot_off_desc	Meters subtracted from the nominal elevation to define the bottom of the apparent reflectance noise range window.
ar_sig_top_off	15.000000
ar_sig_top_off_desc	Meters added to the nominal elevation to define the top of the apparent reflectance signal range window.
ar_sig_bot_off	10.000000
ar_sig_bot_off_desc	Meters subtracted from the nominal elevation to define the bottom of the apparent reflectance signal range window.
ar_ref_elev_span	10.000000
ar_ref_elev_span_desc	Apparent reflectance reference elevation span.
ar_ref_sPD	1.0000000
ar_ref_sPD_desc	Apparent reflectance reference signal probability of detection.
ar_ref_range	20000.000
ar_ref_range_desc	Apparent reflectance reference range.
ar_ref_energy	2.0000000
ar_ref_energy_desc	Apparent reflectance reference energy.
ar_ref_binsize	0.44968870
ar_ref_binsize_desc	Size in meters of the apparent reflectance histogram bins.
ar_ref_uPD_mild	0.60000002
ar_ref_uPD_mild_desc	Indicates that that multiple photons are received within the detector dead time for some (but not all) of the shots and the detector is saturating some and uPD is an underestimate of the number of received photons in that range bin
ar_ref_uPD_high	0.80000001
ar_ref_uPD_high_desc	Indicates that multiple photons are received within the detector dead time for some (but not all) of the shots and the detector is saturating and uPD is an underestimate of the number of received photons in that range bin.

Group: //ancillary_data/general

Group: //ancillary_data/general

Attribute	Value
Description	This group has attributes which contain general control parameters and constants.
mab_clock_freq	295.00000
mab_clock_freq_desc	Nominal MABEL clock frequency.
mab_range_conv	3.3898306
mab_range_conv_desc	MABEL range conversion factor.
mab_fcell_conv	256.00000
mab_fcell_conv_desc	MABEL fractional cell conversion factor.

Group: //ancillary_data/geolocation

Attribute	Value
Description	This group has attributes which contain geolocation control parameters and constants.
MAB_BIAS_1064	-6.6299999999999999 10.100000000000000 0.0000000000000000
MAB_BIAS_1064_desc	1064 MABEL bias coefficients (MABEL frame to IMU); roll, pitch, yaw (mrad)
MAB_BIAS_532	-6.6500000000000004 16.129999999999999 0.0000000000000000
MAB_BIAS_532_desc	532 MABEL bias coefficients (MABEL frame to IMU); roll, pitch, yaw (mrad)
IMU_BIAS	0.0000000000000000 0.0000000000000000 3141.5926535897902
IMU_BIAS_desc	IMU bias coefficients (IMU to vehicle frame); roll, pitch, yaw (mrad)
MAB_LRP_OFF	0.0000000000000000 0.0000000000000000 0.0000000000000000
MAB_LRP_OFF_desc	Laser reference point offsets; roll, pitch, yaw (mrad)
MAB_IMU_OFF	0.0000000000000000 0.0000000000000000 0.0000000000000000
MAB_IMU_OFF_desc	IMU origin ofsets; roll, pitch, yaw (mrad)

Group: //ancillary_data/histograms

Attribute	Value
Description	The group contains parameter attributes related tothe altimetry and atmosphere histograms.
alt_hist_bin_size	3.0000000
alt_hist_bin_size_desc	Size is meters of the altimetry histogram bins.
alt_hist_bin_top_off	500.00000
alt_hist_bin_top_off_desc	Meters added to the nominal elevation to define the top of the altimetry histogram range window.
alt_hist_bin_bot_off	100.00000
alt_hist_bin_bot_off_desc	Meters subtracted from the nominal elevation to define the top of the noise computation range window.
atm_hist_bin_size	30.000000
atm_hist_bin_size_desc	Size in meters of the atmosphere histogram bins.
atm_hist_bin_top_off	14000.000
atm_hist_bin_top_off_desc	Meters added to the nominal elevation to define the top of the atmosphere histogram range window.
atm_hist_bin_bot_off	1000.0000
atm_hist_bin_bot_off_desc	Meters subtracted from the nominal elevation to define the top of the atmosphere histogram range window.

Group: //ancillary_data/photon_range_window

Attribute	Value
Description	The group contains parameter attributes related tothe photon range window settings
dem_range_top_off	1000.0000
dem_range_top_off_desc	Meters added to the DEM elevation to define the top of the photon range window.
dem_range_bot_off	100.00000
dem_range_bot_off_desc	Meters subtracted from the DEM elevation to define the bottom of the photon range window.
mss_range_top_off	100.00000
mss_range_top_off_desc	Meters added to the MSS elevation to define the top of the photon range window.
mss_range_bot_off	100.00000
mss_range_bot_off_desc	Meters subtracted from the MSS elevation to define the bottom of the photon range window.
noise_range_top_off	-300.00000
noise_range_top_off_desc	Meters added to the nominal elevation to define the top of the noise computation range window.
noise_range_bot_off	5300.0000
noise_range_bot_off_desc	Meters subtracted from the nominal elevation to define the bottom of the noise computation range window.

Group: //ancillary_data/segment_sizes

Attribute	Value
Description	The group contains parameter attributes defining the sizes of each segment on the product.
alt_seg_shots	200
alt_seg_shots_desc	Number of laser shots defining an altimetry segment.
atm_seg_shots	400
atm_seg_shots_desc	Number of laser shots defining an atmosphere segment.
met_seg_shots	1000
met_seg_shots_desc	Number of laser shots defining a meteorological segment.

Group: //ancillary_data/streak_removal

Attribute	Value
Description	The group contains parameter attributes related tothe streak removal algorithm
remove_streaks_532	1
remove_streaks_532_desc	Indicates activation of streak removal algorithm.
remove_streaks_1064	0
remove_streaks_1064_desc	Indicates activation of streak removal algorithm.
streak_n	17.000000
streak_n_desc	Distance in meters between consecutive photons adequate to consider those photons not part of a streak.
streak_m	40.000000
streak_m_desc	Minimum distance in meters between start and end photons to consider consecutive photons a streak.

Group: //atmosphere

Attribute	Value
Description	This group contains groups of segmented atmosphere-related parameters. The atmosphere segment temporal length is defined by the number of laser shots specified in the metadata parameter [atm_seg_shots]. Parameters in each segment have a 1-to-1 correspondence with the parameters in other segments. For example the times with segment 2 of the time group correspond to the data within segment 2 of the hist subgroups. There is one instance of this group within this granule.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
delta_time_start	DOUBLE (UNLIMITED)	delta_time_start (time)	seconds	Elapsed seconds (since first data point in granule) at the start of this time interval	Derived (gps_seconds-gps_sec_offset)	NOT_SET
delta_time_stop	DOUBLE (UNLIMITED)	delta_time_stop (time)	seconds	Elapsed seconds (since first data point in granule) at the start of this time interval	Derived (gps_seconds-gps_sec_offset)	NOT_SET

Group: //atmosphere/histogram

Attribute	Value
Description	This group contains subgroups of per-channel histograms. There is one instance of this group within the Atmosphere group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
DS_Histogram_Bins	INTEGER (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET

Group: //atmosphere/histogram/channelxxx

Attribute	Value
Description	This group contains subgroups of per-channel histograms. There is one instance of this group within the Atmosphere group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
elev_top_hist	FLOAT (UNLIMITED)	elev_top_hist (height)	meters	Elevation height to the top bin of the atmosphere histogram	Derived	delta_time_start
histogram	INTEGER (500) (UNLIMITED)	atmosphere_histogram (histogram)	count	atmosphere histogram - count of the number of photons in each defined elevation bin. Dimensions are time and bin_number.	Derived	delta_time_start
n_hist_shots	INTEGER (UNLIMITED)	n_hist_shots (n_points)	count	Number of shots within the histogram interval.	Derived	delta_time_start

Group: //flight_parameters

Attribute	Value
Description	This group contains flight and instrument-related information provided by the MABEL instrument team within the MABEL Day-by-Day flight log.
flight_version	2012-09-20T00:00:00.000000Z 14
flight_version_desc	Version number of the ancillary flight file.
flight_number	20
flight_number_desc	Incremental flight number
scenario_number	8
scenario_number_desc	Associated mabel configuration scenario number
gps_rate	2
gps_rate_desc	Data rate of the GPS (Hz)
imu_rate	2
imu_rate_desc	Data rate of the IMU (Hz)
laser_rate	5000
laser_rate_desc	Data rate of the Laser (Hz)
flight_location	Iceland Transit
flight_location_desc	Primary location of the flight
label	20120402_Iceland_Transit
label_desc	Unique label associated with the flight
comments	Clear over Montana, Hudson Bay, and S Greenland. Also included: CPL
comments_desc	Comments from the MABEL flight team
flight_start_utc	2012-04-02T01:59:00.000000Z
flight_start_utc_desc	UTC start time of the flight in CCSDS-A format
flight_end_utc	2012-04-02T01:59:00.000000Z
flight_end_utc_desc	UTC stop time of the flight in CCSDS-A format
scenario_version	2012-10-19T00:00:00.000000Z 15
scenario_version_desc	Version number of the ancillary scenario file
scenario_utc_time	not_set
scenario_utc_time_desc	UTC start time of the scenario in CCSDS-A format
reference_channel_1064	45
reference_channel_1064_desc	Representative channel for 1064
filter_size_1064	1.5000000 4.0000000
filter_size_1064_desc	Size of 1064 filter(s)
filter_density_1064	0.49100000 0.15000001
filter_density_1064_desc	Density of the 1064 filters
fiber_1064	1 2 3 4 5 6 7 8
fiber_1064_desc	Fiber number for each 1064 channel
connector_1064	-1 1 7 -11 -7 11 -6 6
connector_1064_desc	Connector number for each 1064 channel
channel_1064	43 44 45 46 47 48 49 50
channel_1064_desc	Channel number for each 1064 channel
channel_1064_flag	0 0 0 0 0 0 0 0
channel_1064_flag_desc	Channel flag (0=processed, 1=skipped)
power_1064_mw	6.1700001 7.1199999 4.6999998 7.6700001 8.2600002 7.0599999 8.7299995 7.6700001
power_1064_mw_desc	Power for each 1064 channel (mW)
rec_power_1064_mw	2.4900000 4.4499998 2.0699999 7.4299998 7.5300002 4.3299999 9.2700005 5.6799998
rec_power_1064_mw_desc	Received power for each 1064 channel (mW)
filter_1064	0.25000000 0.25000000 0.25000000 0.49000001 0.49000001 0.25000000 0.49000001 0.49000001
filter_1064_desc	Filter for each 1064 channel
raw_energy_1064_u	0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
raw_energy_1064_u_desc	Raw energy for each 1064 channel (u)
filt_energy_1064_u	0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
filt_energy_1064_u_desc	Filtered energy for each 1064 channel (u)
path_length_1064_mm	48.000000 0.0000000 97.000000 32.000000 16.000000 81.000000 113.00000 65.000000
path_length_1064_mm_desc	Path length for each 1064 fiber (mm)
angle_1064_mrad	0.10000000 -0.10000000 -2.0999999 5.0000000 2.0999999 -5.0000000 2.0000000 -2.0000000
angle_1064_mrad_desc	Angle of each 1064 connector

angle_1064_mrad_desc	Angle of each 1064 connector
offset_on_ground_1064_m	2.0000000 -2.0000000 -42.000000 99.000000 42.000000 -99.000000 40.000000 -40.000000
offset_on_ground_1064_m_desc	Roll offset on groundfor each 1064 channel (m)
elevation_1064_mrad	1.0000000 2.0000000 2.0000000 1.5000000 1.0000000 1.5000000 1.5000000 1.5000000
elevation_1064_mrad_desc	Elevation for each 1064 connector (mrad)
offset2_on_ground_1064_m	20.000000 40.000000 40.000000 30.000000 20.000000 30.000000 30.000000 30.000000
offset2_on_ground_1064_m_desc	Pitch offset on groundfor each 1064 channel (m)
reference_channel_532	9
reference_channel_532_desc	Representative channel for 532
filter_size_532	1.5000000 2.9000001
filter_size_532_desc	Size of 532 filter(s)
filter_density_532	0.69099998 0.49000001
filter_density_532_desc	Density of the 532 filters
fiber_532	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
fiber_532_desc	Fiber number for each 532 channel
connector_532	-11 8 8 2 11 0 -4 6 -8 -2 -6 5 -5 7 4 10
connector_532_desc	Connector number for each 532 channel
channel_532	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
channel_532_desc	Channel number for each 532 channel
channel_532_flag	0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 1
channel_532_flag_desc	Channel flag (0=processed, 1=skipped)
power_532_mw	1.0800000 3.2200000 7.3499999 2.9200001 6.9200001 9.8599997 3.1900001 3.4100001 2.9900000 1.3300000 3.0899999 3.5500000 9.99999978E-03 1.3600000 3.0799999 9.99999978E-03
power_532_mw_desc	Power for each 532 channel (mW)
rec_power_532_mw	1.5900000 2.4100001 3.0100000 1.9100000 2.8900001 3.2100000 2.2600000 2.6099999 1.9800000 1.7600000 2.2300000 2.6700001 1.0900000 1.8900000 2.2100000 1.0500000
rec_power_532_mw_desc	Received power for each 532 channel (mW)
filter_532	0.25000000 0.37000000 0.69000000 0.69000000 0.69000000 0.69000000 0.49000001 0.37000000 0.37000000 0.69000000 0.37000000 0.69000000 0.69000000 0.25000000 0.37000000 0.69000000
filter_532_desc	Filter for each 532 channel
raw_energy_532_u	0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
raw_energy_532_u_desc	Raw energy for each 532 channel (u)
filtered_energy_532_u	0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
filtered_energy_532_u_desc	Filtered energy for each 532 channel (u)
path_length_532_mm	172.00000 237.00000 253.00000 75.000000 188.00000 140.00000 59.000000 221.00000 43.000000 27.000000 108.00000 204.00000 269.00000 156.00000 124.00000 92.000000
path_length_532_mm_desc	Path length for each 532 fiber (mm)
angle_532_mrad	5.0000000 0.0000000 -2.2000000 -0.20000000 -5.0000000 0.0000000 1.8000000 -2.0000000 2.2000000 0.20000000 2.0000000 -1.9000000 0.0000000 -2.0999999 -1.8000000 0.0000000
angle_532_mrad_desc	Angle of each 532 connector
offset_on_ground_532_m	99.000000 0.0000000 -44.000000 -4.0000000 -99.000000 0.0000000 36.000000 -40.000000 44.000000 4.0000000 40.000000 -38.000000 0.0000000 -42.000000 -36.000000 0.0000000
offset_on_ground_532_m_desc	Roll offset on ground of each 532 channel (m)
elevation_532_mrad	-1.5000000 0.0000000 -0.50000000 -0.50000000 -1.5000000 -1.5000000 -0.50000000 -1.5000000 -2.5000000 -2.5000000 -1.5000000 -2.0000000 0.0000000 -1.0000000 -2.5000000 0.0000000
elevation_532_mrad_desc	Elevation for each 532 connector (mrad)
offset2_on_ground_532_m	-30.000000 0.0000000 -10.000000 -10.000000 -30.000000 -30.000000 -10.000000 -30.000000 -50.000000 -50.000000 -30.000000 -40.000000 0.0000000 -20.000000 -50.000000 0.0000000
offset2_on_ground_532_m_desc	Pitch offset on ground for each 532 channel (m)
num_poi	0
num_poi_desc	Number of points-of-interest for the flight

Group: //met_corr

Attribute	Value
Description	This group contains tropospheric parameters used to correct the Novatel INS range prior to performing the geolocation of each photon. These parameters are calculated at a shot interval defined by the metadata parameter [MET_SEG_SHOTS]. There is one instance of this group within the granule

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates

delta_time	DOUBLE (UNLIMITED)	delta_time (time)	seconds	Elapsed seconds (since first data point in granule)	Derived (gps_seconds-gps_sec_offset)	NOT_SET
range_1064_dry_trop_corr	FLOAT (UNLIMITED)	range_1064_dry_trop_corr (range_1064_dry_trop_corr)	meters	Additive 1064 dry troposphere range correction	Derived (Trop ATBD)	delta_time
range_1064_wet_trop_corr	FLOAT (UNLIMITED)	range_1064_wet_trop_corr (range_1064_wet_trop_corr)	meters	Additive 1064 wet troposphere range correction	Derived (Trop ATBD)	delta_time
range_532_dry_trop_corr	FLOAT (UNLIMITED)	range_532_dry_trop_corr (range_532_dry_trop_corr)	meters	Additive 532 dry troposphere range correction	Derived (Trop ATBD)	delta_time
range_532_wet_trop_corr	FLOAT (UNLIMITED)	range_532_wet_trop_corr (range_532_wet_trop_corr)	meters	Additive 532 wet troposphere range correction	Derived (Trop ATBD)	delta_time

Group: //novatel_ins

Attribute	Value
Description	This group contains data from L1A INS files. The L1A INS is created using NOVATEL software and delivered as an L1A file. Note that this group has a extra second of data at the beginning and end of the granule to insure good interpolation data for L2A geolocation. There is one instance of this group within the granule.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
delta_time	DOUBLE (UNLIMITED)	elapsed time (time)	seconds	Elapsed seconds since first TOF data point in granule	Derived (gps_seconds-metadata.gps_sec_offset)	delta_time

Group: //novatel_ins/attitude

Attribute	Value
Description	This group contains attitude related parameters from L1A INS files. There is one instance of this group within the novatel_ins group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
heading	DOUBLE (UNLIMITED)	heading (heading)	degrees	Heading (yaw) angle computed by GPS/INS routines	L1A INS Data	delta_time
heading_sd	FLOAT (UNLIMITED)	heading_sd (heading_sd)	degrees	standard deviation of heading	L1A INS Data	delta_time
pitch	DOUBLE (UNLIMITED)	pitch (pitch)	degrees	Pitch angle computed by GPS/INS routines	L1A INS Data	delta_time
pitch_sd	FLOAT (UNLIMITED)	pitch_sd (pitch_sd)	degrees	standard deviation of pitch	L1A INS Data	delta_time
roll	DOUBLE (UNLIMITED)	roll (roll)	degrees	Roll angle computed by GPS/INS routines	L1A INS Data	delta_time
roll_sd	FLOAT (UNLIMITED)	roll_sd (roll_sd)	degrees	standard deviation of roll	L1A INS Data	delta_time

Group: //novatel_ins/flags

Attribute	Value
Description	This group contains status related parameters from L1A INS files. There is one instance of this group within the novatel_ins group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
quality_num	INTEGER (UNLIMITED)	quality_num (status)	NOT_SET	Quality factor (integer: 1=best; 6=worst)	L1A INS Data	delta_time

Group: //novatel_ins/geolocation

Attribute	Value
Description	This group contains gelocation-related parameters from L1A INS files. There is one instance of this group within the novatel_ins group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
comb_sd	FLOAT (UNLIMITED)	Combined standard deviation (deviation)	meters	Combined N, E, and Hgt standard deviation	L1A INS Data	delta_time
ht_ell	DOUBLE (UNLIMITED)	Height above ellipsoid (height)	meters	Height above WGS84 ellipsoid	L1A INS Data	delta_time

latitude	DOUBLE (UNLIMITED)	latitude (latitude)	degrees_north	Latitude, WGS84, North=+	L1A INS Data	delta_time
longitude	DOUBLE (UNLIMITED)	longitude (longitude)	degrees_east	Longitude, WGS84, East=+	L1A INS Data	delta_time

Group: //novatel_ins/location

Attribute	Value
Description	This group contains location related parameters from L1A INS files. There is one instance of this group within the novatel_ins group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
v_east	FLOAT (UNLIMITED)	v_east (velocity)	meters per second	Velocity component in the local level east axis	L1A INS Data	delta_time
v_north	FLOAT (UNLIMITED)	v_north (velocity)	meters per second	Velocity component in the local level north axis	L1A INS Data	delta_time
v_up	FLOAT (UNLIMITED)	v_up (velocity)	meters per second	Velocity component in the local level vertical axis	L1A INS Data	delta_time

Group: //novatel_ins/solar_angle

Attribute	Value
Description	This group contains solar angle related parameters from L1A INS files. There is one instance of this group within the novatel_ins group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
solar_azimuth	FLOAT (UNLIMITED)	Solar Azimuth (solar_azimuth)	degrees	Azimuth of the sun from true north, at position and time	L1A INS Data	delta_time
solar_elevation	FLOAT (UNLIMITED)	Solar Elevation (solar_elevation)	degrees	elevation of sun above horizon, at position and time	L1A INS Data	delta_time

Group: //novatel_ins/time

Attribute	Value
Description	This group contains time related parameters from L1A INS files. These parameters indicate the time of each corresponding INS parameter. There is one instance of this group within the novatel_ins group.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
gps_sow	DOUBLE (UNLIMITED)	gps seconds of week (time)	seconds	GPS seconds of week corrected for receiver clock bias	L1A INS Data	delta_time
gps_week	INTEGER (UNLIMITED)	gps week (time)	weeks	GPS week number	L1A INS Data	delta_time

Group: //photon

Attribute	Value
Description	This group contains subgroups of per-channel photon parameters. Each photon has been located by geolocation routines which account for pointing angle and aircraft roll/pitch/yaw. Preliminary ranges input to the geolocation routines have been corrected for frequency-dependent wet and dry tropospheric delays. The resulting elevations retain these corrections. There is one instance of this group within the granule. There is one instance of the photon channel subgroups for each channel configured on the instrument.

Group: //photon/channelxxx

Attribute	Value
Description	This group contains individual geolocated photons. Each photon has been located by geolocation routines which account for pointing angle and aircraft roll/pitch/yaw. Preliminary ranges input to the geolocation routines have been corrected for frequency-dependent wet and dry tropospheric delays. The resulting elevations retain these corrections. There is one instance of this subgroup for each channel configured on the instrument.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
delta_time	DOUBLE (UNLIMITED)	delta_time (time)	seconds	Elapsed seconds since first data point in granule	Derived (gps_seconds-gps_second_offset)	NOT_SET
elev	FLOAT	elev	meters	Height above the WGS84 ellipsoid	Derived	delta_time

	(UNLIMITED)	(elevation)			(Geolocation ATBD)	
flag	INTEGER_1 (UNLIMITED)	flag (flag)	NA	Undefined 1-byte Flag	Derived (TBD)	delta_time
latitude	DOUBLE (UNLIMITED)	lat (latitude)	degrees_north	Latitude, WGS84, North=+	Derived (Geolocation ATBD)	delta_time
longitude	DOUBLE (UNLIMITED)	lon (longitude)	degrees_east	Longitude, WGS84, East=+	Derived (Geolocation ATBD)	delta_time
photon_id	INTEGER_2 (UNLIMITED)	photon_id (photon_id)	NA	Photon-per-shot counter. Increments for each photon detected within a shot. Together with shot_num, forms a unique identifier for each photon. However, be aware of shot_num rollover.	Derived	delta_time
shot_num	INTEGER (UNLIMITED)	shot_number (counter)	counts	Shot Number, copied from the L1A shottag packet.	L1A Shottag packet	delta_time

Group: //quality_assessment

Attribute	Value
Description	This group contains quality assessment data which contains counters and summary statistics which can be used to assess the quality of the data

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
DS_statistics	INTEGER (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET flag_values: 1, 2, 3, 4, 5 flag_meanings: number_of_points minimum maximum average standard_deviation	NOT_SET	NOT_SET
end_of_interval	DOUBLE (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET
start_of_interval	DOUBLE (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET

Group: //quality_assessment/channel

Attribute	Value
Description	This group contains per-channel photon statistics.

Group: //quality_assessment/channel/channelxxx

Attribute	Value
Description	This group contains per-channel photon statistics.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
first_lat	DOUBLE (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET
first_lon	DOUBLE (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET
last_lat	DOUBLE (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET
last_lon	DOUBLE (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET
n_elev	INTEGER (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET
shots_w_streak	INTEGER (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET
streak_n_del	INTEGER (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET
streaklen	DOUBLE (5) (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET

Group: //quality_assessment/summary

Attribute	Value

Description	This group contains summary quality assessment information.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
elev_dem	DOUBLE (5) (UNLIMITED)	NOT_SET (NOT_SET)	NOT_SET	NOT_SET	NOT_SET	NOT_SET

Group: //tof1

Attribute	Value
Description	This group contains data specific to a TOF card. Card-specific data types includes only the Oscillator Correction data. There is one instance of this group within the granule for each TOF card in use.

Group: //tof1/osc_corr

Attribute	Value
Description	This group contains the derived l1b oscillator correction data. This correction has been applied to the l1b range data. Since the oscillator correction is TOF hardware-dependent, there is one instance of this group for each TOF card in use.

Datasets:

Label	Datatype (Dimensions)	long_name (standard_name)	units	description	source	coordinates
delta_time	DOUBLE (UNLIMITED)	Delta Time (time)	seconds	Elapsed seconds since first data point in granule	Derived (gps_seconds-metadata.gps_sec_offset)	NOT_SET
osc_corr	DOUBLE (UNLIMITED)	oscillator correction (range correction)	hertz	osc_corr is a hardware-dependent frequency-based correction for range. It is derived by computing the deltas of corresponding TOF status gps_sow and PPSTag values and using the equation provided.	Derived: (2.95d8*delta_gps_sow)/(32*delta_PPSTag)	delta_time
osc_flag	INTEGER_1 (UNLIMITED)	oscillator correction flag (flag)	NOT_SET	The osc_corr flag is use to determine if the corresponding osc_corr is within valid bounds. A non-zero value indicates the corresponding osc_corr should not be used as a range correction	Derived: set to 1 if 0.95 < osc_corr > 1.05	delta_time