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E2ES AND PROCESSOR GLOSSARY

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Updated IODD acronym for consistency	24/07/2026		
Updated Data Entity definition	24/07/2026		
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Clarified Orbit/attitude definition	24/07/2026		Sec 3.4

DISTRIBUTION

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1. INTRODUCTION

1.1. Purpose

This document defines the authoritative terminology applicable to EO Processor developments, including E2ES activities, Processor Prototypes, ATBDs, IODDs, Product Specifications and related processor documentation.

The objective of this glossary is to establish a consistent terminology across processor developments and associated engineering documentation.

1.2. Scope

The glossary originated within E2ES developments and remains consistent with Future EO OIRD terminology describing the on-board data of interest to Payload Data Processing. The terminology defined herein shall be used consistently across E2ES and Processor developments.

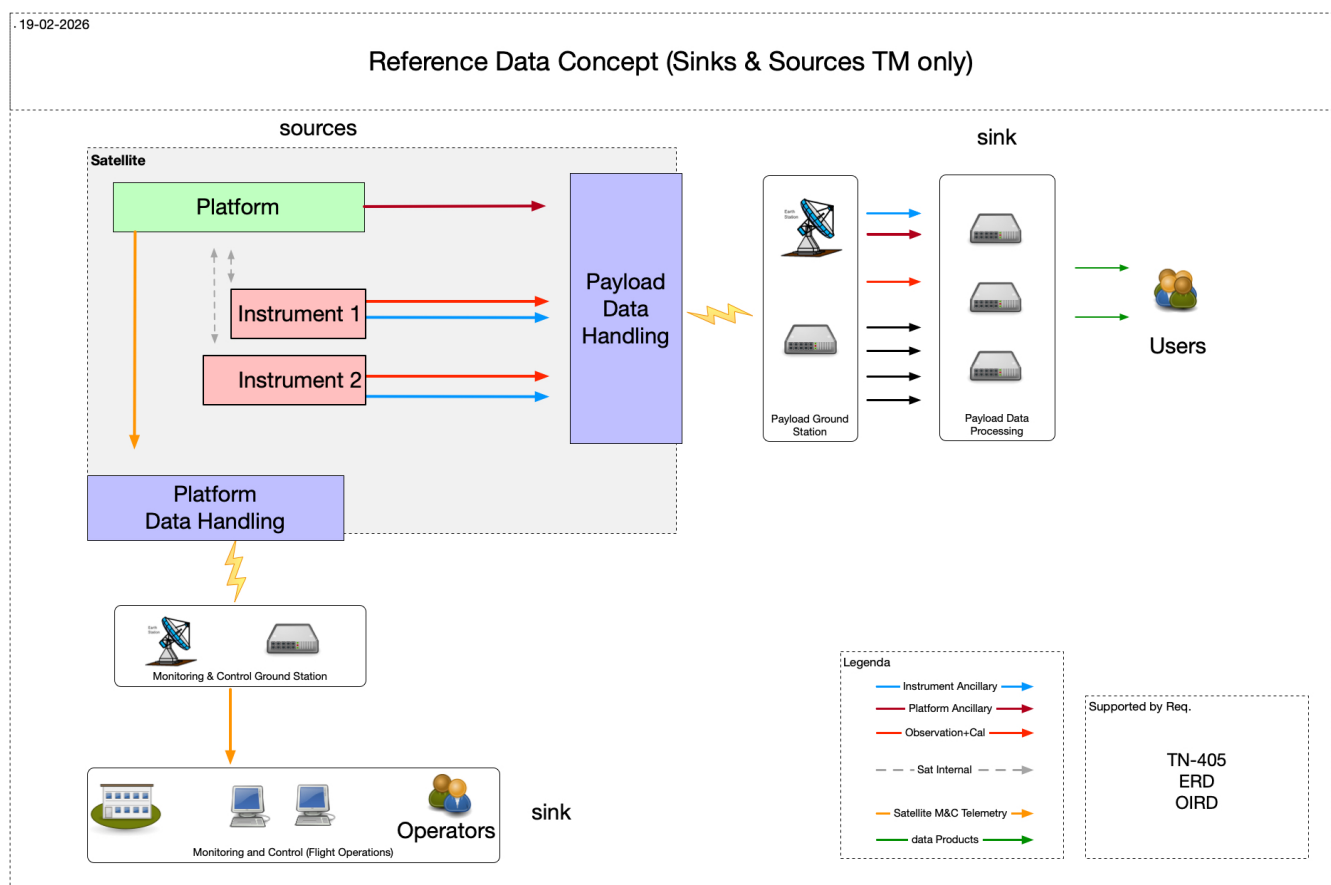


Figure 1 Reference EO Data Sources and Sinks.

1.3. Acronyms

ANC	Ancillary Data
AOCS	Attitude and Orbital Control System
APID	Application Process ID
AR	Acceptance Review
ATBD	Algorithm Theoretical Baseline Document
AUX	Auxiliary Data
BOA	Bottom Of Atmosphere
BRK	Breakpoint
CAL	Calibration Data
CCDB	Characterisation and Calibration Data Base
CCSDS	Consultative Committee for Space Data Systems
CDR	Critical Design Review
CKD	Calibration Key Data
DDF	Design Definition File
DDVP	Design Development and Validation Plan
DJF	Design Justification File
DPM	Detailed Processing Model
DU	Data Unit
E2E	End-to-End
E2ES	End-to-End Simulator
EOCFI	Earth Observation CFI Libraries
ERD	Exploitation Requirement Document
FTP	File Transfer Protocol
GM	Geometry Module
GNSS	Global Navigation Satellite System
GS	Ground Segment
HKTM	Housekeeping Telemetry
ICCDB	Instrument Characterisation and Calibration Data Base
ICD	Interface Control Document
IODD	Input/Output Data Definition Document
IPF	Instrument Processor Facility
IRF	Instrument Response Function
ISM	Instrument Simulation Module
ISP	Instrument Source Packets
KDA	Key Data Archive
KD	Key Data
L0P	Level 0 Processor
L1PP	Level 1 Prototype Processor
L1OP	Level 1 Operational Processor

L2PP	Level 2 Prototype Processor
L2OP	Level 2 Operational Processor
ODGM	On-Board Data Generation Module
OIRD	Operational Interface Requirement Document
OSS	Observation System Simulator
OSV	Orbit State Vector
PAM	Performance Assessment Module
PDGS	Payload Data Ground Segment
PFS	Product Format Specification
PFM	Platform Module
PVT	Position Velocity Time
PUS	Packet Utilisation Standard
RAW	Raw Data
SCCDB	Satellite Characterisation and Calibration Data Base
SGM	Scene Generation Module
SP	Space Packet
TDS	Test Data Set
TOA	Top Of Atmosphere
V&V	Verification and Validation

1.4. Applicable Documents

AD-01	PE-TN-ESA-GS-405 GS Inputs to on-board data architecture v2.6
AD-02	ESA-EOF-EOPGE-EOS-RS-2025-0003 EOF-EOS Exploitation Requirement Document Issue 1.2
AD-03	ESA-GEN-OPS-RS-0002 Future EO Mission OIRD Issue 2.0
AD-04	PE-ID-ESA-GS-584 EO Mission SW File Format Specs Issue 1.9
AD-05	PE-TN-ESA-GS-0001 Earth Observation File Format Standard Issue 3.0.2

1.5. Reference Documents

RD-01	PE-TN-ESA-GS-0931 ATBD template Issue 1.0
RD-02	PE-TN-ESA-GS-0932 IODD template Issue 1.0
RD-03	PE-TN-ESA-GS-402 Generic E2E simulator L1PP L2PP Req. Spec Issue 3.1
RD-04	PE-TN-ESA-GS-586 EO generic RAW and L0 specification Issue 1.3

2. TERMINOLOGY FRAMEWORK

2.1. Umbrella Terms

Certain terms in this glossary are used as umbrella terms to group together more specialised concepts. Umbrella terms are not additional data categories but represent logical aggregations used to describe the relationships between the various data types and processing concepts.

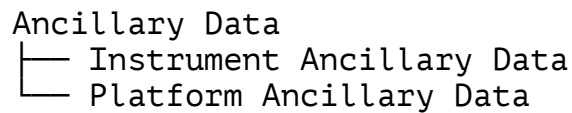
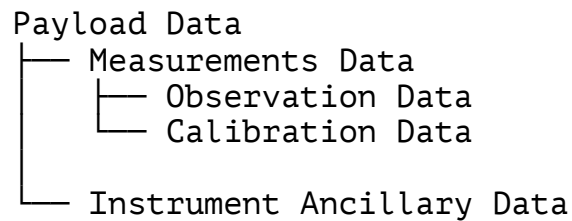
The following umbrella terms are used within this glossary:

- Payload Data
- Measurements Data
- Ancillary Data
- Calibration Products

Payload Data	Umbrella term identifying all data generated by the payload for scientific processing.
Measurements Data	Umbrella term identifying all instrument-generated measurements, including both Observation Data and Calibration Data.
Ancillary Data	Umbrella term identifying data generated in support of Payload Data processing, including both Instrument Ancillary Data and Platform Ancillary Data.
Calibration Products	Umbrella term identifying ground-generated products used by the processing chain, including both dynamic/on-line CAL products and static/off-line AUX products.

The relationships between these terms are illustrated in the hierarchy in section 2.2.

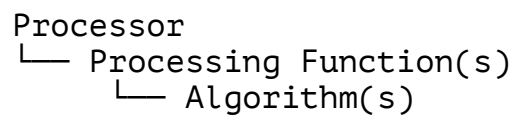
2.2. Data Hierarchy



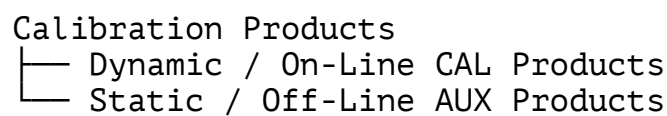
*NOTE: for avoidance of doubt the term **Payload Data** excludes:*

- *Platform Ancillary Data*
- *Housekeeping Telemetry (HKTM)*

2.3. Processor Hierarchy



2.4. Calibration Product Classification



3. GLOSSARY TERMS

3.1. System Terms

End-to-End Simulator(E2ES) A chain of software components representing the relevant Space Segment and Ground Segment functions and simulating the information flow from a reference scene through instrument measurement generation and ground processing to Level 1 and, where applicable, Level 2 products and performance assessment.

L1 E2ES An E2ES in which mission performance is assessed at Level 1 by comparing Level 1 products with the corresponding simulated instrument stimuli.

L2 E2ES An E2ES in which mission performance is assessed at Level 2 by comparing retrieved geophysical quantities in Level 2 products with the corresponding geophysical reference information used by the Scene Generation Module.

Module An executable software component that performs one or more defined functions using specified inputs and outputs.

NOTE: A Module is a software implementation concept and shall not be confused with a Processing Function as defined in [RD-01], which represents a logical processing capability independent of software implementation.

Orchestration External coordination of Module execution, including the selection of applicable inputs and configuration, the determination of execution order and timing, and the invocation of the Modules required to produce the intended outputs.

Job-order Information provided to a Processor or Module for a specific execution, identifying the applicable inputs, configuration and other execution parameters. Within the E2ES execution framework, a Job-order is physically represented as a file.

Time-based Scenario A time-ordered sequence of segments defining the simulation conditions applicable during each segment, such as instrument operating mode, target or environmental conditions. The

segments are executed in their specified temporal order through corresponding orchestration.

3.2. Documentation Terms

ATBD

In the context of EO Processor developments, the Algorithm Theoretical Baseline Document describes the processing flow, functions, algorithms, inputs, outputs, parameters and mathematical formulations required to implement the Processor.

IODD

The Input/Output Data Definition Document describes both the content and the physical realisation of the data exchanged by a Processor. It specifies the meaning of the information, its organisation, format and representation within files, products or other exchange mechanisms. It addresses both interface and content aspects and provides the detailed description of the information exchanged by the Processor and its physical realisation.

In order to support development, testing, validation and mission performance activities, the representations and formats described in the IODD may differ from those used in operational products and described in the PFS.

PFS

Product Format Specification. Describes the format of operational products produced by the Ground Segment. It differs from the IODD in that it addresses operational product implementation and distribution aspects. The geophysical and engineering parameters described in the PFS are expected to correspond to the information and processing described in the ATBD and IODD.

Operational product representations described in the PFS may differ from those described in the IODD while preserving the same underlying information content.

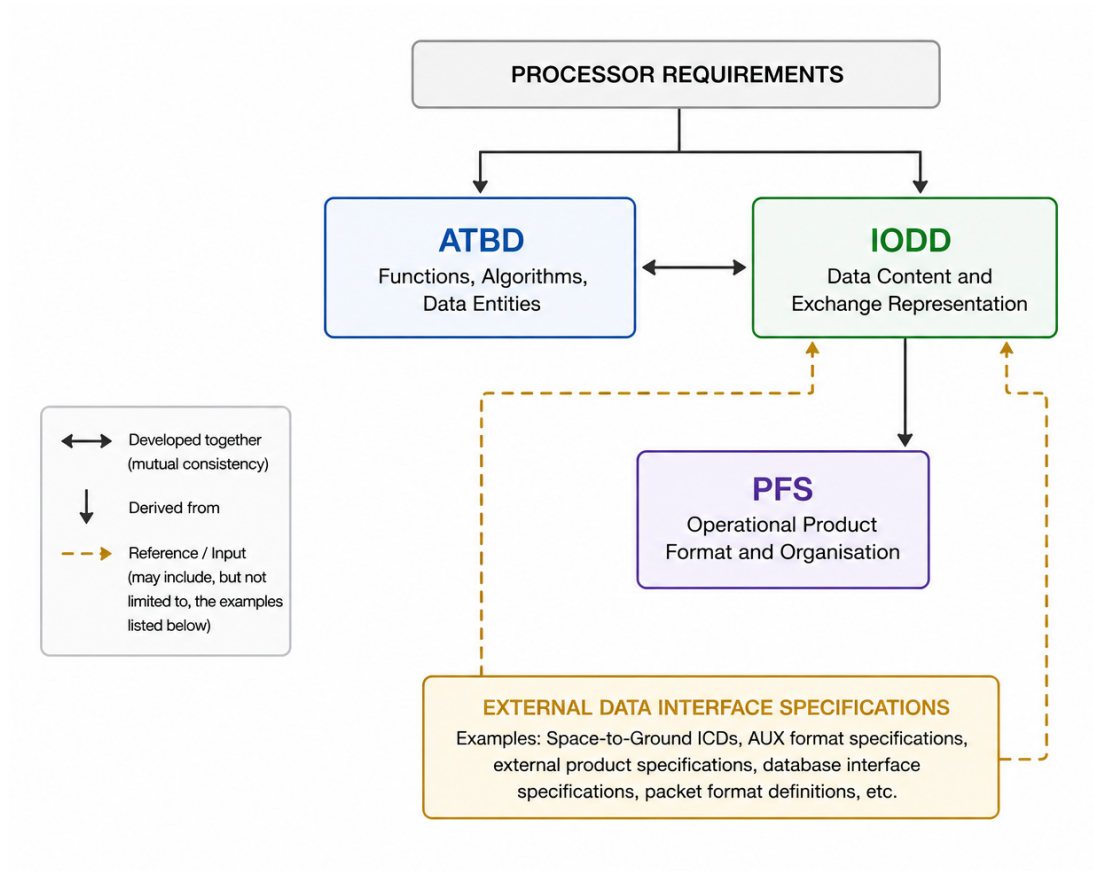


Figure 2 – Relationship between ATBD, IODD, PFS and external specifications. ATBD and IODD are developed in parallel to define processor functions, algorithms, data and their representation. The PFS describes the operational representation of the resulting products. The IODD may reference externally maintained interface and data format specifications, such as interface control documents, packet definitions or auxiliary data format specifications.

3.3. Processor and Processing Terms

Processor	Entity implementing one or more Processing Functions.
Processing Function	Logical processing step transforming defined input information into defined output information. A Processor is typically composed of one or more Processing Functions.
Algorithm	Mathematical, physical or computational method implementing all or part of a Processing Function.
Data Entity	A logical unit of information consumed, produced or exchanged by a processor. One or more Data Entities may be allocated to an interface product or file. Their organisation and physical representation are defined by the applicable IODD and, for operational products, by the applicable PFS. Such allocation and representation do not alter the logical definition of the Data Entities.
Intermediate Data	Data Entities generated, exchanged and consumed during Processor execution and not intended as external Processor inputs, external Processor outputs or delivered Products. Intermediate Data may optionally be exposed through Breakpoint files.
On-line Calibration	Calibration performed automatically as part of, or in direct association with, the nominal processing chain. The resulting calibration information is automatically generated, selected or applied without a separate operational decision for each processing execution.
Off-line Calibration	Calibration performed outside the nominal processing chain, using dedicated analyses that may include accumulated measurements, long-term trending, external information or

operator intervention. The resulting calibration information is introduced into the processing chain through a controlled update or configuration process.

Data Terms

For some data types, a short uppercase identifier is provided in parentheses after the term definition (e.g. OBS, CAL, ANC, AUX). These identifiers are used as shorthand references to the corresponding data categories throughout the documentation.

They represent terminology concepts and **shall not be interpreted as product naming fields**. Product naming conventions may use the same or different identifiers to categorise products, depending on mission-specific conventions.

Observation Data (OBS) Data Units output by the Instrument and formatted as CCSDS Space Packets exactly as generated by the Instrument when the stimuli correspond to the target to be observed in support of mission objectives.

NOTE: Typical examples include Earth radiance measurements, atmospheric spectra, radar echoes, altimeter returns or other measurements acquired in support of the mission objectives.

Measurements Data Output from the Instrument measurement chain, excluding ancillary data. Measurements Data = Observation Data + Calibration Data.

Calibration Data (CAL) Data Units output by the Instrument and formatted as CCSDS Space Packets exactly as generated by the Instrument when the stimuli are internal or external targets, or occur during special operations, used for calibration purposes.

NOTE: Typical examples include observations of internal calibration sources, lamps, diodes, black bodies, diffusers, deep-space views, lunar observations or dedicated calibration manoeuvres.

Ancillary Data (ANC) Data generated on-board in support of Payload Data. Ancillary Data includes Instrument Ancillary Data and Platform Ancillary Data.

NOTE: Ancillary Data is generated specifically to support the processing, monitoring, interpretation or geolocation of Payload Data.

Unlike HKTM, Ancillary Data is intended to be consumed by the Payload Data processing chain.

Instrument Ancillary Data

Ancillary Data generated by the Instrument in support of Payload Data processing.

NOTE: Typical examples include detector temperatures, instrument configuration parameters, exposure times, instrument modes, Control Electronics parameters, calibration wheel positions or instrument timing information.

Platform Ancillary Data

Ancillary Data generated by the Platform in support of Payload Data processing.

NOTE: Typical examples include orbit information, attitude information, GNSS measurements, AOCS data, platform temperatures and platform timing information required by the processing chain. Such data are considered Platform Ancillary Data when generated or provided to support Payload Data processing, even if similar information may also be present within HKTM streams.

Housekeeping Telemetry (HKTM) Data generated on-board and used for satellite monitoring and control purposes. HKTM is not Payload Data.

NOTE: HKTM is primarily intended for platform and instrument monitoring, commanding and operations. Typical examples include telemetry packets associated with PUS services, equipment status reports, event reports, failure reports, telecommand acknowledgements, execution reports and other monitoring and control information exchanged with the Mission Control System.

Unlike Ancillary Data, HKTM is not generated for the purpose of Payload Data processing, even though some HKTM parameters may occasionally be used for diagnostic or engineering analyses.

Payload Data

All data generated by the Payload for scientific processing. Payload Data is composed of Measurements Data and Instrument Ancillary Data. It excludes Platform Ancillary Data, HKTM and AUX.

Timing Data	Information related to timestamps, time correlation and timing accuracy. Timing information may appear in Observation Data, Calibration Data, Ancillary Data, AUX or Products.
Auxiliary Data (AUX)	Data needed by the Ground Segment to perform processing and not part of the Payload Data set. AUX products are typically generated off-line, externally supplied or maintained through engineering and operational activities. <i>NOTE: Typical examples include DEMs, land/sea masks, meteorological fields, orbit products, reference databases, calibration databases and climatological data sets.</i>
Raw Data (RAW)	Sequence of concatenated CCSDS Space Packets as transmitted on the space-to-ground RF link, with no header and no annotation.
Level 0 Product	Level 0 data files consisting of a Ground Segment header and a concatenation of CCSDS Space Packets.
Level 1 Product	Data files generated by Level 1 processing. Level 1 Products include products containing calibrated and geolocated measurement information and dynamic/on-line calibration products generated by the Level 1 processing chain.
Level 2 Product	Level 2 data files generated from Level 1 products and containing retrieved geophysical parameters.
Calibration Products	Ground-generated products used by the processing chain. Dynamic/on-line calibration products are categorised as CAL products. Static/off-line calibration products are categorised as AUX products. This categorisation is reflected in the product naming convention. <i>NOTE: The CAL and AUX identifiers are terminology categories. Their use within product names is governed by the applicable product naming convention and file format standards.</i>
Dynamic Calibration Product	Calibration Product generated or updated through <u>on-line calibration</u> and automatically applied by the processing chain. Dynamic Calibration Products are categorised as CAL products.

Static Calibration Product

Calibration Product generated or maintained through off-line calibration and introduced into the processing chain as controlled configuration information. Static Calibration Products are categorised as AUX products.

***NOTE:** “Static” does not mean immutable; a Static Calibration Product may be updated through an off-line calibration and controlled configuration process. “Dynamic” does not necessarily mean real-time, and “on-line” does not mean on-board.*

SCCDB / ICCDB / CCDB / CKD / KDA These acronyms identify, in different missions, repositories containing the data, parameters and coefficients required to process on-board measurements. The contained information may originate from design activities, characterisation campaigns, on-ground measurements, on-ground calibration activities and in-flight calibration activities. Depending on mission implementation, the information may be exchanged, distributed or implemented as CAL products, AUX products, or other mission-specific data sets.

***NOTE:** Examples include spectral calibration coefficients, radiometric calibration coefficients, detector non-linearity corrections, geometric calibration parameters and instrument design or on-ground characterisation parameters.*

Breakpoint (BRK)

Optional file containing Intermediate Data (see 3.3 above) and other information exposed for diagnosis, debugging, troubleshooting or performance assessment.

3.4. Orbit and Attitude Terms

Orbit Data

Data describing the spacecraft orbit as a function of time.

NOTE: Orbit Data may be represented using different formats (see [AD-04]), and may be provided through different product types. Examples include orbit scenarios and predicted, restituted or precise orbit products. Such products typically contain one or more Orbit State Vectors.

Position, Velocity and Time (PVT)

Information comprising a position vector and a velocity vector, expressed in a specified reference frame, together with the time to which those vectors apply. PVT information constitutes the content of an Orbit State Vector.

Orbit State Vector (OSV)

Representation of the spacecraft state at a specified time by means of Position, Velocity and Time (PVT) information. The position and velocity vectors shall be expressed in a specified reference frame, and the associated time shall be expressed using a specified time reference.

NOTE: An Orbit State Vector is a data representation, not a product type. An orbit product typically contains a time-ordered sequence of Orbit State Vectors.

Attitude Data

Data describing the orientation of the spacecraft or of a specified spacecraft reference frame as a function of time.

NOTE: Attitude Data are typically used for geolocation, pointing reconstruction and observation geometry calculations. Attitude Data may be represented using quaternions, Euler angles or other attitude representations.

Quaternion Attitude

Representation of spacecraft attitude using a quaternion that defines the rotation between two specified reference frames.

NOTE: Quaternion Attitude provides a compact and non-singular representation of attitude and is commonly used for spacecraft attitude determination and processing.

Attitude Angles

Representation of spacecraft attitude using a set of rotation angles defining the orientation between two specified reference frames.

NOTE: Common examples include roll, pitch and yaw angles. Attitude Angles are generally easier to interpret than quaternions but may be affected by representation singularities.

Attitude Definition

Description of the attitude law or pointing profile used to determine the spacecraft orientation as a function of time.

NOTE: Examples include nadir-pointing, inertial-pointing and target-tracking attitude laws. Attitude Definition describes the intended attitude behaviour over time and shall not be confused with a specific attitude representation such as quaternions or attitude angles.

Nominal Position and Attitude Data

Position, velocity and attitude information (e.g. PVTs and Quaternions) corresponding to the mission reference orbit and attitude.

Real Position and Attitude Data

Position, velocity and attitude information (e.g. PVTs and Quaternions) corresponding to the physical orbit and attitude of the platform, obtained from the nominal one plus implementation effects such as orbit control and AOCS performance.

Measured Position and Attitude Data

Position, velocity, time and attitude information obtained through the on-board measurement process generally using GNSS and AOCS data. These measurements constitute the only directly available knowledge of the spacecraft position, velocity and orientation. They may be transferred to ground and used as inputs to reconstruction processing.

NOTE: The Real Position and Attitude represent the physical state of the spacecraft, which is not directly known. Measured Position and Attitude Data provide knowledge of that state through measurement and may therefore differ from it because of measurement errors and limitations.

Reconstructed Position and Attitude Data

The PVT and quaternion corresponding to the mission orbit and attitude as computed on-ground from the measured ones plus optional corrections.

4. NORMATIVE NOMENCLATURE

To minimise ambiguities and promote a common terminology across E2ES and Processor developments, the following nomenclature shall be adopted. Deprecated terms (in *Italic*) are reported as they are still used. In future only the standardised alternative here below shall be used

ATBD	Algorithm specification of Level 1 and Level 2 processing. (do not use for Instrument Simulation or non-processing elements)
CPM	Off-Line Calibration Processor Module.
E2E	End-to-End.
E2ES	End-to-End Simulator.
GM	Geometry Module.
<i>GPP</i>	<i>Ground Processing Prototype (Deprecated: use L1PP or L2PP)</i>
IODD	Input/Output Data Definition Document. (Preferred over IODS)
<i>IODS</i>	<i>Input/Output Data Specification (Deprecated: use IODD)</i>
ISM	Instrument Simulation Module.
L1PP	Level-1 Prototype Processor.
L1OP	Level-1 Operational Processor.
L2PP	Level-2 Prototype Processor.
L2OP	Level-2 Operational Processor.
PFM	Platform Module.
ODGM	On-Board Data Generation Module.
OSS	Observation System Simulator. (Preferred over OPSI)
PAM	Performance Assessment Module. (Preferred over PEM)
PAM-L1	Performance Assessment at Level 1.
PAM-L2	Performance Assessment at Level 2.
<i>PEM</i>	<i>Performance Evaluation Module. (Deprecated: Use PAM)</i>
<i>PDD</i>	<i>Product Definition Document (Deprecated: Product Definition now in the IODD)</i>
PFS	Product Format Specification.
SGM	Scene Generation Module.

TDS

Test Data Set. Complete set of inputs, outputs, processor configuration and associated documentation.