Implementation of CARD4L requirements in Sentinel-2 products

CARD4L
THRESHOLD Requirements

European Space Agency

THRESHOLD Specifications on "General Metadata"

#	Item	Threshold	Comments
1.1	Traceability	Not required	
1.2	Metadata machine readability	**YES**	
1.3	Data Collection Time	**YES**	
1.4	Geographical area	**YES**	
1.5	Coordinate reference system	**YES**	
1.6	Map Projection	**YES**	Information is listed in the tile metadata.
1.7	Geometric correction methods	Not required	
1.8	Geometric accuracy of the data	Not required	
1.9	Instrument	**YES**	
1.10	Spectral bands	**YES**	
1.11	Sensor Calibration	Not required	
1.12	Radiometric Accuracy	Not required	
1.13	Algorithms	**YES**	
1.14	Ancillary data	**YES**	Ancillary data are listed in the metadata but no DOI is used.
1.15	Processing chain provenance	Not required	
1.16	Data access	**NOT compliant**	Requirement: The metadata identifies the location from where the product can be retrieved, expressed as a DOI. Note 1: Manual and offline interaction action (e.g. log in) may be required.
1.17	Overall Data quality	Not required	

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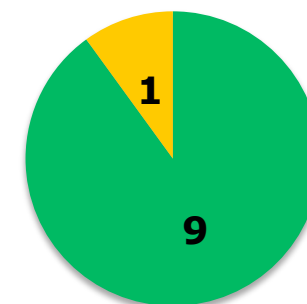There are multiple distribution channels for Sentinel-2 products (DHUS, CopHUB, Amazon, etc.)

THRESHOLD Specifications on "General Metadata"

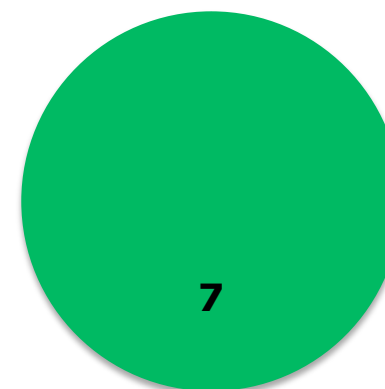| #	Item	Threshold	Comments
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1.16	Data access	**NOT compliant**	Requirement: The metadata identifies the location from where the product can be retrieved, expressed as a DOI. Note 1: Manual and offline interaction action (e.g. log in) may be required.
1.17	Overall Data quality	Not required	

7 Not required

9/10 COMPLIANT

1/10 NOT COMPLIANT

- ■ COMPLIANT
- ■ NOT COMPLIANT

THRESHOLD Specifications on "Per-pixel Metadata"

#	Item	Threshold
2.1	Metadata machine readability	**YES**
2.2	No data	**YES**
2.3	Incomplete testing	**YES**
2.4	Saturation	**YES**
2.5	Cloud	**YES**
2.6	Cloud Shadow	**YES**
2.7	Land/Water mask	Not required
2.8	Snow/ice mask	Not required
2.9	Terrain Shadow Mask	Not required
2.10	Terrain occlusion	Not required
2.11	Illumination and viewing geometry	**YES**
2.12	Aerosol optical depth parameters	Not required

5 Not required

7/7 COMPLIANT

7

■ COMPLIANT

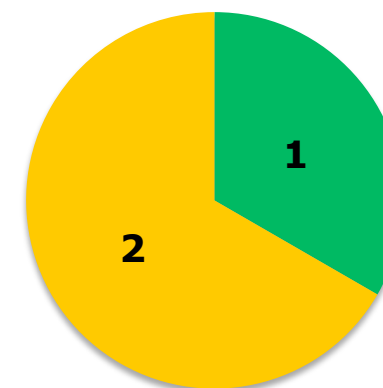# THRESHOLD Specifications on "Radiometric and Atmospheric corrections"

#	Item	Threshold	Comments
3.1	Measurement	**YES**	
3.2	Measurement uncertainty	Not required	
3.3	Measurement Normalization	Not required	
3.4	Directional Atmospheric Scattering	**NOT compliant**	Corrections are applied for aerosols and molecular (Rayleigh) scattering: **YES** ATBD, PSD, etc. are online but there is no DOI in the metadata
3.5	Water vapour corrections	**Not compliant**	Corrections are applied for water vapour: **YES** ATBD, PSD, etc. are online but there is no DOI in the metadata
3.6	Ozone Correction	Not required	

3 Not required
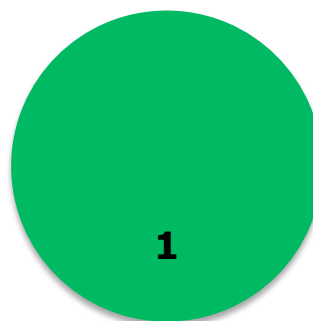
1/3 COMPLIANT

2/3 NOT COMPLIANT

■ COMPLIANT   ■ NOT COMPLIANT

THRESHOLD Specifications on "Geometric corrections"

#	Item	Threshold
4.1	Geometric correction	**YES <u>in Q2 2019</u>**

1/1 COMPLIANT

1

■ COMPLIANT

European Space Agency
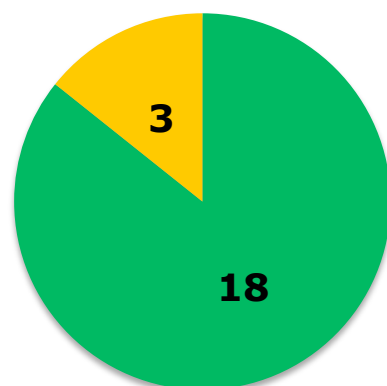
THRESHOLD Specifications - OVERVIEW

COMPLIANT NOT COMPLIANT

- **"General Metadata":**   9/10

- **"Per-pixel metadata":** 7/7

- **"Radiometric and atmospheric corrections":**   1/3

- **"Geometric corrections":**   1/1

CARD4L
TARGET / DESIRED Requirements

European Space Agency

TARGET/DESIRED Specifications on "General Metadata"

#	Item	Target/Desired	Comments
1.1	Traceability	YES	
1.2	Metadata machine readability	NO	
1.3	Data Collection Time	NO	
1.4	Geographical area	NO	
1.5	Coordinate reference system	YES	
1.6	Map Projection	YES	
1.7	Geometric correction methods	NO	There is technical documentation online. No DOI is used.
1.8	Geometric accuracy of the data	NO	There is technical documentation online. No DOI is used.
1.9	Instrument	?	
1.10	Spectral bands	YES	The Excel table is online.
1.11	Sensor Calibration	NO	
1.12	Radiometric Accuracy	NO	There is technical documentation online. No DOI is used.
1.13	Algorithms	YES	
1.14	Ancillary data	Partially	TBD with new DEM in Q2 2019.
1.15	Processing chain provenance	?	
1.16	Data access	NO	
1.17	Overall Data quality	YES	

TARGET/DESIRED Specifications on "General Metadata" - FEEDBACK

#	Item	Target/Desired	Comments
1.1	Traceability	NO	Requirement: Data must be traceable to SI reference standard.
1.2	Metadata machine readability	NO	
1.3	Data Collection Time	NO	
1.4	Geographical area	NO	
1.5	Coordinate reference system	YES	
1.6	Map Projection	YES	
1.7	Geometric correction methods	NO	
1.8	Geometric accuracy of the data	NO	
1.9	Instrument	?	Requirement: As threshold, but including a reference to the relevant CEOS Missions, Instruments and Measurements Database record.
1.10	Spectral bands	YES	
1.11	Sensor Calibration	NO	
1.12	Radiometric Accuracy	NO	
1.13	Algorithms	YES	
1.14	Ancillary data	Partially	
1.15	Processing chain provenance	?	Requirement: The metadata include a detailed description of the processing steps used to generate the product, including the versions of software used, giving full transparency to the users.
1.16	Data access	NO	
1.17	Overall Data quality	YES	Requirement: Machine-readable metrics describing the overall quality of the data are included in the metadata, at minimum the cloud cover extent, i.e.: proportion of the observations over land (c.f. ocean) affected by non-target phenomena, e.g. cloud and cloud shadows.

Callout (1.1): More details on this requirement would be appreciated

Callout (1.8): This requirement is not clear.

Callout (1.13/1.14): There is technical documentation online covering this. Would an option be to include a DOI in the metadata?

Callout (1.17): Description of this requirement seems to focus only on clouds. Should "Overall data quality" not be a broader concept covering more aspects?

TARGET/DESIRED Specifications on:

- ## "Per-pixel Metadata"

#	Item	Target/Desired
2.1	Metadata machine readability	NO
2.2	No data	YES
2.3	Incomplete testing	YES
2.4	Saturation	YES
2.5	Cloud	Partially. No DOI.
2.6	Cloud Shadow	Partially. No DOI.
2.7	Land/Water mask	Partially. No DOI.
2.8	Snow/ice mask	Partially. No DOI.
2.9	Terrain Shadow Mask	NO
2.10	Terrain occlusion	NO
2.11	Illumination and viewing geometry	NO
2.12	Aerosol optical depth parameters	//

- ## "Radiometric and Atmospheric corrections"

#	Item	Target/Desired	Comments
3.1	Measurement	YES	
3.2	Measurement uncertainty	NO	
3.3	Measurement Normalization	NO	
3.4	Directional Atmospheric Scattering	NO	
3.5	Water vapour corrections	NO	
3.6	Ozone Correction	NO	Data is corrected for ozone: **YES** Relevant metadata must be provided under 1.8 and 1.9: **YES** Metadata references: Technical documentation available online but no DOI.

- ## "Geometric Correction"

#	Item	Target/Desired
4.1	Geometric correction	TBD

Thank you for your kind attention!

Q&A?

European Space Agency