CEOS-ARD - Optical - Nighttime Light Surface Radiance

CEOS Analysis Ready Data (CEOS-ARD) are satellite data that have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort and interoperability both through time and with other datasets.

Product Family Specification: Optical, Nighttime Light Surface Radiance (NLSR)

Version: 1.1-draft

Applies to: Data collected with nighttime light sensors operating in the VIS/NIR wavelengths. These typically operate with ground sample distance and resolution in the order of 10-1000m; however, the Specification is not inherently limited to this resolution.

Document History

Not available yet

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Glossary

CEOS-ARD
: Committee on Earth Observation Satellites - Analysis Ready Data

DOI
: Digital Object Identifier

NIR
: Near Infrared

NLSR
: Nighttime Light Surface Radiance

SI
: International System of Units, internationally known by the abbreviation SI (from French Système international d’unités)

VIS
: Visible

Introduction

What are CEOS Analysis Ready Data (CEOS-ARD) products?

CEOS-ARD products have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort. These products would be resampled onto a common geometric grid (for a given product) and would provide baseline data for further interoperability both through time and with other datasets.

CEOS-ARD are intended to be flexible and accessible products suitable for a wide range of users for a wide variety of applications, particularly time series analysis and multi-sensor application development. They are also intended to support rapid ingestion and exploitation via high-performance computing, cloud computing and other future data architectures. They may not be suitable for all purposes and are not intended as a *replacement* for other types of satellite products.

When can a product be called CEOS-ARD?

The CEOS-ARD branding is applied to a particular product once:

- that product has been assessed as meeting CEOS-ARD requirements by the agency or other entities responsible for production and distribution of the product, and
- that the assessment has been peer reviewed by the relevant CEOS team(s).

Agencies or other entities considering undertaking an assessment process should consult the CEOS-ARD Governance Framework or contact ard-contact@lists.ceos.org.

A product can continue to use CEOS-ARD branding as long as its generation and distribution remain consistent with the peer-reviewed assessment.

What is the difference between Threshold and Goal?

Threshold (or: minimum) requirements are the **minimum** that is needed for the data to be analysis ready. This must be practical and accepted by the data producers.

Goal (or: desired) requirements (previously referred to as “Target”) are the ideal; where we would like to be. Some providers may already meet these.

Products that meet all *threshold* requirements should be immediately useful for scientific analysis or decision-making.

Products that meet *goal* requirements will reduce the overall product uncertainties and enhance broad-scale applications. For example, the products may enhance interoperability or provide increased accuracy through additional corrections that are not reasonable at the *threshold* level.

Goal requirements anticipate continuous improvement of methods and evolution of community expectations, which are both normal and inevitable in a developing field. Over time, *goal* specifications may (and subject to due process) become accepted as *threshold* requirements.

Requirements

WARNING: The requirement numbers below are not stable and may change or may be removed at any time. Do **not** use the numbers to refer back to specific requirements! Instead, use the textual identifier that is provided in brackets directly after the title.

1. General Metadata

These are metadata records describing a distributed collection of pixels. The collection of pixels referred to must be contiguous in space and time. General metadata should allow the user to assess the *overall* suitability of the dataset, and must meet the requirements listed below.

1.1. General Metadata: Traceability

Identifier: `meta.metadata-traceability`

Threshold requirements:

None

Goal requirements:

Data must be traceable to SI reference standard.

Notes:

1. Relationship to Section "Radiometric and Atmospheric Corrections: Measurement Uncertainty". Traceability requires an estimate of measurement uncertainty.
2. Information on traceability should be available in the metadata as a single DOI landing page.

2. Source Metadata

These are metadata records describing (detailing) **each** acquisition (source data) used to generate the ARD product. This may be one or mutliple acquisitions.

2.1. Source Metadata: Example Requirement

Identifier: `src.example`

This is an example requirement.

Threshold requirements:

This is a threshold requirement.

Goal requirements:

This is a goal requirement.

Notes:

1. This is a note.

3. Product Metadata

Information related to the CEOS-ARD product generation procedure and geographic parameters.

3.1. Product Metadata: Example Requirement

Identifier: `prd.example`

This is an example requirement.

Threshold requirements:

This is a threshold requirement.

Goal requirements:

This is a goal requirement.

Notes:

1. This is a note.

4. Per-Pixel Metadata

The following minimum metadata specifications apply to each pixel. Whether the metadata are provided in a single record relevant to all pixels or separately for each pixel is at the discretion of the data provider. Per-pixel metadata should allow users to discriminate between (choose) observations on the basis of their individual suitability for applications.

4.1. Per-Pixel Metadata: Example Requirement

Identifier: `pxl.example`

This is an example requirement.

Threshold requirements:

This is a threshold requirement.

Goal requirements:

This is a goal requirement.

Notes:

1. This is a note.

5. Radiometric and Atmospheric Corrections

The following requirements must be met for all pixels in a collection. The requirements indicate both the necessary outcomes and the minimum steps necessary to be deemed to have achieved those outcomes. Radiometric corrections must lead to a valid measurement of surface reflectance.

5.1. Radiometric and Atmospheric Corrections: Measurement Uncertainty

Identifier: `rac.measurements-uncertainty`

Note: In current practice, users determine fitness for purpose based on knowledge of the lineage of the data, rather than on a specific estimate of measurement uncertainty.

Threshold requirements:

None

Goal requirements:

An estimate of the certainty of the values is provided in measurement units.

Notes:

1. This is a requirement for SI traceability. See also Section “General Metadata: Traceability”.
2. Information on measurement uncertainty should be available in the metadata as a single DOI landing page.

6. Geometric Corrections

The geometric corrections are steps that are taken to place the measurement accurately on the surface of the Earth (that is, to geolocate the measurement) allowing measurements taken through time to be compared. This section specifies any geometric correction requirements that must be met in order for the data to be analysis ready.

6.1. Geometric Corrections: Example Requirement

Identifier: `gcor.example`

This is an example requirement.

Threshold requirements:

This is a threshold requirement.

Goal requirements:

This is a goal requirement.

Notes:

1. This is a note.

References

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