Data Stewardship Maturity Report for Gridded Satellite GOES (GridSat-GOES) East and West Full Disk and CONUS Coverage, Version 1

Table 1 Legend				
Level 1	Level 2	Level 3	Level 4	Level 5
Ad Hoc	Minimal	Intermediate	Advanced	Optimal
Little or no management	Limited Management	Defined Management, partially implemented	Well-defined Management, fully implemented	Full Management, audited, measured, controlled

Table 1. Scores for the Nine DSMM Key Components at a Glance		
Preservability - 4.5	Accessibility - 4.5	Usability - 2.5
Production Sustainability - 4	Data Quality Assurance - 2	Data Quality Control/Monitoring - 1
Data Quality Assessment - 1	Transparency/Traceability - 1	Data Integrity - 4

NOAA National Centers for Environmental Information January 2020

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Cover Image: Data Stewardship Rating Diagram for Gridded Satellite GOES (GridSat-GOES) East and West Full Disk and CONUS Coverage, Version 1

Shades of green are used to represent level 1 through level 5 ratings; denoting Ad Hoc, Minimal, Intermediate, Advanced, and Optimal stages for each of the nine key components, respectively. The dark green level indicates all the practices are completely satisfied. The lighter green levels indicate only some of the practices are satisfied. The lightest green level indicates none of the practices are satisfied.

The stewardship maturity of NCEI data product, Gridded Satellite GOES (GridSat-GOES) East and West Full Disk and CONUS Coverage, Version 1, is assessed based on a reference stewardship maturity framework. The current maturity ratings of Gridded Satellite GOES (GridSat-GOES) East and West Full Disk and CONUS Coverage, Version 1 are at Level 1 or higher for all nine key components with three Level 1, two Level 2, zero Level 3, four Level 4, and zero Level 5 key components.

The National Environmental Satellite, Data, and Information Service (NESDIS) manages the Nation's civil Earth-observing satellite systems, as well as global national data bases for meteorology, oceanography, geophysics, and solar-terrestrial sciences. From these sources, it develops and disseminates environmental data and information products critical to the protection of life and property, national defense, and the national economy, energy development and distribution, global food supplies, and the development of natural resources.

Publication in the NOAA Technical Memorandum series does not preclude later publication in scientific journals in expanded or modified form. The NESDIS series of NOAA Technical Reports is a continuation of the former NESS and EDIS series of NOAA Technical Reports and the NESC and EDS series of Environmental Science Services Administration (ESSA) Technical Reports.

Copies of earlier reports may be available by contacting NESDIS Chief of Staff, NOAA/ NESDIS, 1335 East-West Highway, SSMC1, Silver Spring, MD 20910, (301) 713-3578.

ASSESSMENT REVISION HISTORY

Revision	Description	Date
V01r00	Initial Release	12/27/2021

NOAA Technical Information Series NESDIS DSMR-00241
Version 1.0

Data Stewardship Maturity Report for Gridded Satellite GOES (GridSat-GOES) East and West Full Disk and CONUS Coverage, Version 1

Lori Hager, Paul Lemieux III
NOAA's National Centers of Environmental Information (NCEI)
151 Patton Avenue, Asheville, NC 28801, (828) 271-4800

Recommended Citation

Table of Contents

List of Tables

Preface

In response to the President's Open Government Initiative and related policies, NOAA has committed to providing improved public access to all of its environmental information, to enable research and commercial innovation through ease of data discovery and use [*Casey*, 2016].

OneStop supports NOAA's efforts by leveraging existing access technologies and infusing specific innovations to provide improved discover, access, and visualization services for NOAA's data. Also, OneStop is viewed by a NESDIS as a pathfinder effort with an initial focus on selected high-priority datasets from NESDIS and other program data meeting OneStop standards, but eventually scalable across NOAA's data. Lastly, OneStop is implementing the USGEO Common Framework for Earth Observation Data and leveraging/supporting the NOAA Big Data Project (BDP) and Big Earth Data Initiative (BEDI) [*Casey*, 2016].

As with any process of improvement planning, agencies need to find out where they are in terms of their compliance to the federal regulations and what they need to do if any areas of non-compliance are identified. To this end, a unified framework would be beneficial for assessing the current stage of stewardship practices applied to individual datasets and for providing a road map that will guide future investments towards enhanced stewardship of environmental datasets. The value and quality of a dataset depends in part on the stewardship practices applied after its development and production. Therefore, a unified framework providing a holistic view of the quality of stewardship practices applied to individual datasets is beneficial to data stewards and users [*Casey*, 2016].

 The Data Stewardship Maturity Matrix (DSMM), jointly developed by domain (data management, technology, and science) subject matter experts from NOAA's National Centers for Environmental Information (NCEI) and Cooperative Institute for Climate and Satellites – North Carolina (CICS-NC), provides such a consistent framework [*Peng et al.,* 2016]. The DSMM, leveraging institutional knowledge and community practices and standards, defines a graduated maturity scale for each of nine key components of scientific data stewardship to enable a consistent assessment of the measureable stewardship practices applied to a given data set or product.

The NOAA Data Stewardship Maturity Technical Series captures stewardship maturity assessment results for individual datasets, provides consistent representation and citable documents of those assessments, ensures transparency, and allows better data quality information integration and content-based search and discovery of NOAA data.

NOAA Technical Information Series NESDIS DSMR-00241 Version 1.0

Data Stewardship Maturity Report for Gridded Satellite GOES (GridSat-GOES) East and West Full Disk and CONUS Coverage, Version 1

1. Introduction

1.1 Purpose

The purpose of this document is to describe the results of stewardship maturity assessment for NOAA Climate Data Record for Mean Layer Temperature (Upper Troposphere & Lower Stratosphere from UCAR, Version 2, utilizing the Scientific Data Stewardship Maturity Matrix or DSMM [Peng, et al, 2016]. DSMM defines levels of stewardship maturity stages for
Preservability, Accessibility, Usability, Production Sustainability, Data Quality Assurance,
Data Quality Control/Monitoring, Data Quality Assessment, Transparency/Traceability, and
Data Integrity key components. Each of these components is ranked from 'Ad hoc' to 'Optimal' (see Appendix I). This report is based on evaluation performed by NOAA OneStop metadata specialists working with Subject Matter Experts and utilizing the DSMM template [Peng, 2016].

1.2 Scope

Assessing stewardship maturity - the current state of how datasets are documented, preserved, stewarded, and made accessible publicly, is a critical step towards meeting U.S. federal regulations, organizational requirements, and user needs [Peng et al., 2016]. The goal of this document is to provide consistent and transparent stewardship maturity information to data users and decision-makers.

1.3 Dataset Abstract

The National Centers for Environmental Information in partnership with the Cooperative Institute for Climate and Satellites - North Carolina is reprocessing the GOES (Geostationary Operational Environmental Satellite) Variable (GVAR) period of record: 1994-2015. GridSat GOES represents a reformatted, remapped and calibrated GOES brightness temperatures and reflectance provided in Climate and Forecasting (CF)-compliant netCDF format. This is similar to the current GridSat-B1 CDR, but at a higher spatial and temporal resolution. The data are provided near the original spatial resolution of the infrared channels (4 km) on an equal angle grid (0.04 degrees). Data are mapped to a region spanning the view of GOES East and West (150 deg East to 5 deg East). The data are provided hourly, with all data mapping to the nearest hour. Currently, the data are limited to variables including the observations from the GOES satellites: 5 total channels. However, future efforts are planned to include some basic cloud information (cloud probability, temperature, etc.).

Other possible updates include: improved coverage by expanding the GOES inventory (currently, gaps exist in the CLASS archive) and expand to the predecessor to the GOES Imager: GOES VISSR, which would expand coverage back to the 1980s.

1.4 Document Maintenance

This document is generated and maintained by NOAA's National Centers for Environmental Information. More on policy is available at https://www.ncei.noaa.gov/.

2. Results

The data stewardship maturity assessment information is summarized in Table 1. Each component is displayed along with its corresponding score in a color-coded table.

Table 2. Dataset and Data Stewardship Maturity Assessment Metadata	
Dataset Title	Gridded Satellite GOES (GridSat-GOES) East and West Full Disk and CONUS Coverage, Version 1
Dataset Information URL	https://doi.org/10.7289/V5HM56GM
Data Provider POC (Name; Email; Affiliation)	National Centers for Environmental Information, ncei.sat. info@noaa.gov
Dataset POC (Name; Email; Affiliation)	Kenneth R. Knapp, Ken.Knapp@noaa.gov, DOC/NOAA/NESDIS/NCEI > National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce
SMM Version (Document ID and Version Number)	NCDC-CICS-SMM_0001_Rev.1 12/09/2014
SMM POC (Name; E-mail; Affiliation)	Ge Peng, ge.peng@uah.edu, University of Alabama-Huntsville
SMM Template Version (Document ID and Version Numbers)	NCDC-CICS-SMM_0001_Rev.1 v4.0 06/23/2015
SMM Template POC	Ge Peng, ge.peng@uah.edu, University of Alabama-Huntsville
SMM Assessment Version (v\<nn\>r\<mm\>, e.g., v01r00)	v02r02
SMM Assessment Date (MM/DD/YYYY)	06/08/2017
SMM Assessment POC (Name; E-mail; Affiliation)	Paul Lemieux III, paul.lemieux@noaa.gov, Earth Resources Technology, Inc.
Stewardship Maturity Ratings (each key component) (kc1/kc2/kc3/kc4/kc5/kc6/kc7/kc8/kc9)	4.5 / 4.5 / 2.5 / 4 / 2 / 1 / 1 / 1 / 4
SMM Original Assessment Date (MM/DD/YYYY)	01/27/2017
SMM Original Assessment POC (Name; E-mail; Affiliation)	Paul Lemieux III, paul.lemieux@noaa.gov, Earth Resources Technology, Inc.; Kenneth R. Knapp, Ken.Knapp@noaa.gov, DOC/NOAA/NESDIS/NCEI > National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce
SMM Last Modified Date (MM/DD/YYYY)	11/04/2021
SMM Last Modification POC (Name; E-mail; Affiliation)	Lori Hager, lori.hager@noaa.gov, CASE Consultants International
SMM Modified Date (MM/DD/YYYY)	04/23/2019
SMM Modification POC (Name; E-mail; Affiliation)	Paul Lemieux III, paul.lemieux@noaa.gov, Riverside Technology, Inc.

DSMM Key Component	Stewardship Maturity Rating, Justification, and Comments
	Table 3. Stewardship Maturity Levels and Detailed Justifications for Each of Nine DSMM Key Components for the Dataset.
Preservability	Level 4.5 • Archived by NCEI which is a NOAA designated archive compliant to NARA standards. • Metadata following ISO 19115-2. • Compliant to OIAS RM • Plans to update metadata to ISO 19115-1 at a later date and may be a pilot dataset for the OneStop initiative. Comments: No known audits on the archiving processes
Accessibility	Level 4.5 • Collection level searchable online • OneStop UI allows granule searches • THREDDS data server will be available: • New technology for OneStop search and discovery planned (i.e. ElasticSearch, Hyrax Servers, etc.) This is part of the JPSS/NPP data group that will be enhanced for OneStop readiness. • Dissemination report metrics available internally. Comments: Dissemination reports unavailable online.
Usability	Level 2.5 • Satellite user community standard NetCDF-4 data format following CF and ACDD conventions. • Documentation limited to GOES DataBook User Guides [Space Systems-Loral, 1996] and [Landecker, Gale, et al., 2005] available online here: https://goes.gsfc.nasa.gov/text/goes.databook.html and https://www.ngdc.noaa.gov/stp/satellite/goes/doc/GOES_N_Series_Databook_rev-D.pdf Comments: No known external rankings. Error estimates have not been quantified.
Production Sustainability	Level 4 • Archived by NCEI with long term financial assistance from the NOAA OneStop Project. • Product improvement process in place. New versions planned annually. Comments: No comments.
Data Quality Assurance	Level 2 • Ad Hoc and random manual quality assurance checks. • Procedure no defined or documented. Comments: No known external reviews on data quality metadata.

DSMM Key Component	Stewardship Maturity Rating, Justification, and Comments
Table 3. Stewardship Maturity Levels and Detailed Justifications for Each of Nine DSMM Key Components for the Dataset.	
Data Quality Control/ Monitoring	Level 1 ▪ No data quality control measures in place at this time. Future versions of the product will have DQ measures implemented. Comments: No data quality information in the metadata record.
Data Quality Assessment	Level 1 ▪ No algorithm documentation. ▪ No research or operational product assessments online. Comments: No data quality information in the metadata record and no metadata assessment. No known external ranking
Transparency / Traceability	Level 1 ▪ No product information available in literature. ▪ GOES DataBooks [Space Systems-Loral, 1996] [Landecker, Gale, Peng, et al., 2005] available online here: https://goes.gsfc.nasa.gov/text/goes.databook.html and https://goes.gsfc.nasa.gov/text/goes.databookn.html Comments: DOI assigned: 10.7289/V5HM56GM NCEI OID assigned:
Data Integrity	Level 4 ▪ NCEI data integrity is verified at ingest. ▪ Conforms to data integrity technology standards. ▪ NCEI does not verify checksum automatically when user requests data, but the checksum is provided for users to do their own verification. The user has to download it separately from their data download. ▪ Data integrity is monitored at ingest and if it fails then NCEI teams are automatically notified. Comments: No data signature technology available for this dataset.

3. Acknowledgment

4. References

Casey, K. (2016), The NOAA OneStop data discover and access framework project, Version:June 3, 2016. https://cdn.ioos.noaa.gov/media/2017/12/OneStop-IOOS-DMAC-03-June-2016.pdf

Peng, G. (2015) The scientific data stewardship maturity assessment model template, Version: NCDC-CICS-SMM-0001-Rev.1 v4.0 6/23/2015. doi:10.6084/m9.figshare.1211954.

Peng, G., J.L. Privette, E.J. Kearns, N.A. Ritchey, and S. Ansari (2015), A unified framework for measuring stewardship practices applied to digital environmental datasets, *Data Science Journal*, 13, 231-253, doi: 10.2481/dsj.14-049.

Peng, G., J. Lawrimore, V. Toner, C. Lief , R. Baldwin, N. Ritchey, D. Brinegar, and S. A. Delgreco (2016) assessing stewardship naturity of the global historical climatology network-monthly (GHCN-M) dataset: use case study and lessons learned, D-Lib Magazine, 22, doi:10.1045/november2016-peng.

Space Systems-Loral, (1996), GOES I-M DataBook, _Rep. DRL 101-08_, NOAA Goddard Space Flight Center, Greenbelt, MD., retrieved: https://www.ngdc.noaa.gov /stp/satellite/goes/doc/databook.pdf (Accessed 01 February 2017).

Landecker, P., Gale, M., et al, GOES-N Data Book, _Rep. CDRL PM-1-1-03_, NASA Goddard Space Flight Center, Greenbelt, MD., retrieved online: l (Accessed 01 February 2017).

Appendix I: The Scientific Data Stewardship Maturity Matrix (DSMM)

Table A1: This matrix (Version: NCDC-CICS-SMM-0001-Rev.1. 12/09/2014) describes the criterion used to evaluate data stewardship maturity for each of the nine DSMM key components [*Peng et al.*, 2015].

DSMM Component	Level 1 *Ad hoc* Little or no management	Level 2 *Minimal* Limited management	Level 3 *Intermediate* Defined management, partially implemented	Level 4 *Advanced* Well-defined management, fully implemented	Level 5 *Optimal* Full management, audited, measured, controlled
Preservability *(The state of being preservable)*	Any storage location Data only	Non-designated repository Redundancy Limited archiving metadata	Designated archive Redundancy Community-standard archiving metadata Conforming to limited archiving standards	Level 3 + Conforming to community archiving standards	Level 4 + Archiving process performance controlled, measured, and audited Future archiving standard changes planned
Accessibility *(The state of being searchable and accessible publicly)*	Not publically available person-to-person	Publically available direct file download (e.g., via anonymous FTP server) Collection or dataset level searchable online	Level 2 + Non-standard data service Limited data server performance Granule/file level searchable Limited search metrics	Level 3 + Community-standard data service Enhanced data server performance Conforming to community search metrics Dissemination report metrics defined and implemented internally	Level 4 + Dissemination reports available online Future technology and standard changes planned

Usability *(The state of being easy to use)*	Extensive product-specific knowledge required No documentation online	Non-standard data format Limited documentation (e.g., user's guide online)	Community standard-based interoperable format & metadata Documentation (e.g. source code, product algorithm document, processing or/and data flow diagram) online	Level 3 + Basic capability (e.g., subsetting, aggregating) & data characterization overall/global, e.g., climatology, error estimates) available online	Level 4 + Enhanced online capability (e.g., visualization, multiple data formats) Community metrics of data characterization (regional/cell) online External ranking
Production Sustainability *(The state of data production being sustainable and extendable)*	Ad Hoc or Not applicable To obligation or deliverable requirement	Short-term Individual PI's commitment (grant obligations)	Medium-term Institutional commitment (contractual deliverables with specs and schedule defined)	Long-term Institutional commitment Product improvement process in place	Level 4 + National or international commitment Changes for echnology planned
Data Quality Assurance *(The state of data quality being assured)*	Data quality assurance (DQA) procedure unknown or none	Ad Hoc and random QA procedure not defined and documented	DQA procedure defined and documented and partially implemented	DQA procedure well documented, fully implemented and available online with master reference data Limited data quality assurance metadata	Level 4 + DQA procedure monitored and reported Conforming to community quality metadata & standards External review

Data Quality Control/ Monitoring *The state of data quality being controlled and monitored*	None or Sampling unknown or spotty Analysis unknown or random in time	Sampling and analysis are regular in time and space Limited product-specific metrics defined & implemented	Level 2 + Sampling and analysis are frequent and systematic but not automatic Community metrics defined and partially implemented Procedure documented and available online	Level 3 + Anomaly detection procedure well-documented and fully implemented using community metrics, automatic, tracked and reported Limited quality monitoring metadata	Level 4 + Cross-validation of temporal & spatial characteristics Physical consistency check Conforming to community quality metadata & standards
Data Quality Assessment *(The state of data quality being assessed)*	Algorithm/ method/model Theoretical basis assessed (methods and results online)	Level 1 + Research product assessed (methods and results online)	Level 2 + Operational product assessed (methods and results online)	Level 3 + Quality metadata assessed Limited quality assessment metadata	Level 4 + Assessment performed on a recurring basis Conforming to community quality metadata & standards External ranking
Transparency/ Traceability *(The state of being transparent, trackable, and traceable)*	Limited product information available Person-to-person	Product information available in literature	Algorithm Theoretical Basis Document (ATBD) & source code online Dataset configuration managed (CM) Unique Object Identifier (OID) assigned (dataset, documentation, source code) Data citation tracked (e.g., utilizing Digital Object Identifier	Level 3 + Operational Algorithm Description (OAD) online, OID assigned, and under CM	Level 4 + System information online Complete data provenance online

Data Integrity	Unknown or no data ingest integrity check	Data ingest integrity verifiable (e.g, checksum technology)	(DOI) system) Level 2 + Data archive integrity verifiable	Level 3 + Data access integrity verifiable Conforming to community data integrity technology standard	Level 4 + Data authenticity verifiable (e.g., data signature technology) Performance of data integrity check monitored and reported
(The state of data integrity being verifiable)					