



NOAA Data and Publications Citation Procedural Directive

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I. Purposes

Data and publications citation enables information consumers to properly refer to data and publications used in research or as inputs to models, assessments, or derived products. At

NOAA, data stewards and librarians may assign unique and persistent identifiers to data and publications retained, produced or otherwise managed by NOAA. Data citation is similar in many respects to the long-established convention of citing publications, and is an evolving but increasingly important scientific practice.

This Procedural Directive establishes the requirements for obtaining persistent identifiers, known as a Digital Object Identifiers or 'DOI', for data archived at the NOAA National Centers for Environmental Information (NCEI) ¹ and publications deposited in the holdings of the NOAA Central Library. It describes the content for related landing pages providing dataset information and access instructions, and guidance for citing NOAA data and publications by internal and external users. This Directive discusses the purpose and syntax of these identifiers, appropriate levels of granularity for a data collection, how to obtain a DOI, and the recommended data citation format.

The benefits of associating persistent identifiers with NOAA data include:

- To support traceability and scientific reproducibility through direct, unambiguous connection to data used in derived products and results.
- To enable acknowledgement or credit for data producers, data distributors, and other contributors in the data production and stewardship process.
- To encourage submission of data and satisfactory metadata to the NOAA National Centers for Environmental Information for long-term preservation, as required by NOAA policy.
- To encourage submission of publications and satisfactory metadata to the NOAA Central Library for long-term access, as required by NOAA policy.
- To track data impact through references in scientific literature.
- To enable gathering additional bibliometric information regarding how data are being used.
- To improve NOAA's ability to catalog its data holdings.

II. Scope

This Directive applies to:

- Digitally formatted environmental data archived at NCEI.
- Publications archived at the NOAA Central Library.
- Data managers at NCEI and library staff at the NOAA Central Library.
- NOAA or non-NOAA data producers or publication authors who wish to obtain a NOAA digital object identifier (DOI).

¹ NCEI includes the organizations previously referred to as National Climatic Data Center (NCDC), National Geophysical Data Center (NGDC), and National Oceanographic Data Center (NODC) or collectively the NOAA National Data Centers.

- NOAA or non-NOAA data and information consumers of data which have been assigned a NOAA DOI.

III. Authority

This Directive is issued by the NOAA Environmental Data Management Committee (EDMC), with the approval of the NOAA Chief Information Officer (CIO) Council and the NOAA Observing System Council (NOSC), pursuant to the authorities granted in NOAA Administrative Order (NAO) 212-15, *Management of Environment Data and Information*.²

IV. Directive

Participants

1. Any interested party³ **may** request that a persistent identifier be assigned to a NOAA archival dataset or NOAA publication.
 - 1.1. Requests to assign a Digital Object Identifier (DOI) for data shall may be sent to the NCEI Data Citation Working Group at NCEI.DOI@noaa.gov or requested when data are submitted to NCEI.
 - 1.2. Requests to assign a DOI for a NOAA publication shall be sent to the NOAA Library at NOAA.repository@noaa.gov.
 - 1.3. When there is uncertainty about which email is most appropriate, send requests for a DOI to NOAA.data.ids@noaa.gov.
 - 1.4. Requesting a DOI is optional.
 - 1.5. Not all DOI requests will necessarily be granted.
 - 1.6. A DOI may be assigned at a different level of granularity than requested, *at the discretion of NCEI or the NOAA Library*.

Identifier syntax

This Directive defines the syntax, eligibility, granularity, and other characteristics of NOAA dataset and publication identifiers and their citation.

2. The DOI standard (ISO 26324⁴) shall be used for NOAA data and publication identifiers.⁵
 - 2.1. NOAA shall maintain an agency-wide license from a DOI registrar to mint DOIs and shall renew the license annually until this provision is rescinded. The annual cost of the NOAA DOI license shall be borne by NESDIS as the Line Office supporting the NCEI.
 - 2.2. A NOAA DOI shall be structured as a numeric prefix (assigned to NOAA by the DOI registrar) followed by a suffix comprising an arbitrary sequence of letters and digits.
 - 2.2.1. NOAA DOIs shall not be structured to contain the names of organizations,

² [NOAA Administrative Order 212-15](#)

³ An "interested party" may be the data provider, NOAA staff or any non-NOAA individual who would like to use a durable digital identifier for a publication or data.

⁴ ISO 26324:2012, [Information and documentation — Digital object identifier system](#)

⁵ DOIs are currently being issued by over 5000 naming authorities (including publishers and science data centers), with over 55 million DOIs assigned as of 2012 to datasets, books, and other digital objects.

programs, observing systems, or data.

- 2.2.2. A DOI shall be considered a "NOAA DOI" only if it is created using the officially-recognized NOAA Digital Object Identifier registrar service and the data or publication meets the requirements outlined in this Directive.⁶

Citing data and publications

NOAA individuals and NOAA projects that use NOAA data and publications, such as in a research paper, a derived product, a model assimilation, or a policy decision, shall be required to cite the data or publications used.

3. If a DOI has been assigned, the citation shall include the DOI and shall follow the citation guidance provided in the landing page for the data, or include the equivalent information in a specific citation format that has been mandated by the journal or publication.⁷
 - 3.1. If a DOI has not been assigned, the citation shall include at least the data or publication title/name, creator/author, publisher, date of access, and subset used (if applicable).⁸
 - 3.2. Non-NOAA users of NOAA data and publications are strongly encouraged to cite NOAA resources in the manner described above.

Data Identifiers

Eligibility: The NOAA National Centers for Environmental Information, may, at their discretion and in consultation with data producers/providers, issue NOAA data DOIs for data managed by and deemed within the scope of NCEI archival repository holdings.

4. Long-term preservation and documentation shall be required prior to receiving a NOAA data DOI.
 - 4.1. Data shall be archived at NCEI to be eligible to receive a NOAA DOI.
 - 4.2. Data shall have a comprehensive metadata record that complies with the NOAA Data Documentation Procedural Directive⁹ and NCEI best practices.
 - 4.3. Metadata for data shall include an image that is related to the content of the data, as established by NCEI.

Data identifier assignment: NCEI shall designate personnel who have the authority to issue and manage DOIs and to decline requests for DOIs if eligibility criteria are not met. This group is referred to as the NCEI Data Citation Working Group.

5. When a NOAA data DOI is assigned, NCEI shall update the metadata record to include the

⁶ The prefix for a NOAA DOI is defined by the registrar that has the current contract for providing DOIs to NOAA. Consequently, the prefix for NOAA DOIs may periodically change if a new registrar is selected, but in no case will an existing DOI prefix change as a result of a registrar vendor change.

⁷ Example: dataset 10.7289/V5CR5R8P includes this citation guidance: "Cite as: National Geophysical Data Center, British Geological Survey (2009): World Magnetic Model 2010. National Geophysical Data Center, NOAA. doi:10.7289/V5CR5R8P [access date]."

⁸ Data users are encouraged to request assignment of a DOI to data of interest by contacting the NOAA Data Citation Working Group at NOAA.Data.IDs@noaa.gov

⁹ See the [list of NOAA Procedural Directives](#)

DOI and the recommended citation text.

- 5.1. NOAA data DOIs shall be assigned the object type "dataset" during the DOI registration process.
- 5.2. When a NOAA data DOI has been assigned, NCEI personnel shall notify relevant individual(s) or organization(s) listed as creators or providers of the data.
- 5.3. Any DOIs for data issued by a NOAA project under a separate license, even if that license was funded by NOAA, shall be considered project-specific DOIs rather than NOAA DOIs.¹⁰
- 5.4. Datasets submitted for archiving at NOAA that have previously been assigned a DOI by another organization shall be handled as described or referenced in Appendix A.

Data identifier scope: The level of granularity at which a NOAA data DOI is assigned shall be at the discretion of NCEI. A data DOI may be assigned at a different level of granularity than requested and shall be established in collaboration with data authors/producers to the extent possible.

6. DOIs shall generally be assigned at as coarse a level as possible. That is, data comprising many small components shall generally be assigned a single DOI rather than one per component.
 - 6.1. Data components that differ only in time or in space (latitude, longitude, elevation, and depth) shall generally be aggregated under a single DOI (e.g., a single DOI would be assigned to measurements that are archived as individual monthly files).
 - 6.2. Datasets that are continuously updated (e.g., from automated sensors) shall be assigned a single DOI rather than broken into multiple intervals with separate DOIs.
 - 6.3. Additional guidance referenced in Appendix A regarding granularity shall be considered when assigning DOIs.

Landing pages: NCEI shall ensure that each NOAA data DOI resolves to a human-readable landing page at an internet-accessible address which provides basic information about the data and links to additional metadata and the actual data.

7. NOAA data DOIs shall not resolve directly to numeric data (that is, the DOI will reference a human readable landing page, which will then reference the actual numeric data).
 - 7.1. DOIs shall be resolvable using the mechanism established by the [International DOI Foundation](#).¹¹
 - 7.2. NCEI shall update the landing page address with the DOI registrar when data are moved.
 - 7.3. Dataset landing pages shall be automatically produced from the metadata record by NCEI.
 - 7.4. Landing pages shall include a link to the actual metadata record required by 2.2.
 - 7.5. Landing pages shall include links or instructions for accessing data (unless data have been retired from the archive).

¹⁰ Data producers are strongly encouraged to use the NOAA DOI license in collaboration with NCEI.

¹¹ Example: the NOAA DOI 10.25921/5c0a-a242 can be resolved by following the URL <https://doi.org/10.25921/5c0a-a242>, which leads to the current address of the landing page for that dataset.

7.6. Landing pages shall include guidance on how to cite the data.

Data identifier permanence: NOAA data DOIs shall persist for as long as the NOAA National Centers for Environmental Information or their successor organizations, exist.

8. NCEI shall maintain the corresponding landing page in perpetuity.

8.1. Data that have been retired from NOAA archival repository holdings shall continue to have a landing page, which shall include an explanation of the data removal.

Reserving Data Identifiers

To align this Directive with other NOAA Procedural Directives, NCEI may agree to create a DOI for archived data but not release the DOI or data, which shall be referred to as a 'reserved DOI', as allowed by the related Data Access Procedural Directive and the Data Sharing Procedural Directive.

Federal data sources: A reserved DOI and access to those data from a Federal source may be limited to no more than 12 months, as defined in the Data Access PD.

Contract, Cooperative Institute, Grantee, or other non-Federal data sources: A reserved DOI and access to those data from a grantee/contract/CI source may be limited to no more than 24 months, as defined in the Data Sharing PD.

Caveats to requesting a reserved data DOI from NCEI:

9. The following caveats apply when requesting a reserved DOI from NCEI.

9.1. Without exception, data getting a NOAA DOI must be under archival control at NCEI prior to minting the DOI. The foundation of the EDMC Data management directives is that "data are archived at NCEI" prior to getting a DOI.

9.2. Prior to creating a reserved DOI, the rationale for not providing access to data with a reserved DOI must be documented such that NCEI Archive Branch, Data Access Branch and Customer Engagement staff can understand and explain why data cannot be accessed.

9.3. Unless data for which a reserved DOI is created meet one of the exempted classes identified in the Freedom of Information Act (FOIA), NCEI must make it clear to the data provider that data not being made publicly accessible will be released if NCEI receives a FOIA request for those data, with or without a DOI.

9.4. Data from a Federal source cannot be withheld from access "solely for the purpose of being the first to publish" per the NOAA Data Access PD.

9.5. A request for longer than 12 or 24 months must follow the waiver process defined in Appendix A, which is in the respective PDs.

Publication Identifiers

Eligibility: The NOAA Central Library may, at their discretion and in consultation with document authors, issue DOIs for publications meeting the following criteria:

- Must be a NOAA Publication;
- Must be submitted to the NOAA Institutional Repository or in the Library's electronic holdings (please see the [NOAA IR Document Policy](#) for a full list of publications that are accepted for inclusion);

- Must be a final version (drafts are not eligible for DOI assignments).
10. Long-term preservation and documentation shall be required prior to receiving a NOAA publication DOI.
 - 10.1. A document must have sufficient bibliographic metadata, as defined by the NOAA Central Library, prior to receiving a NOAA publication DOI.
 - 10.2. A document must be deposited in the NOAA Institutional Repository or in the Library's electronic holdings.

Publication Identifier Assignment: NOAA Library shall designate personnel who have the authority to issue and manage publications DOIs and to decline requests for DOIs if eligibility criteria are not met.

11. When a NOAA publication DOI is assigned, NOAA Library shall update the metadata record to include the DOI and the recommended citation text.
 - 11.1. Publication DOIs shall be assigned the object type "text" during the DOI registration process.
 - 11.2. Documents which have already received a DOI from another publisher (journal articles in particular) shall not be assigned a NOAA publication DOI.
 - 11.3. Publication DOIs shall resolve to the actual document or to a landing page describing and linking to the document.
 - 11.4. NOAA Central Library shall ensure the resolvability and persistence of DOIs they assign.

Publication identifier scope: The level of granularity at which a NOAA publication DOI is assigned shall be at the discretion of NOAA Library. A publication DOI may be assigned at a different level of granularity than requested and shall be established in collaboration with publication authors to the extent possible.

12. Publication DOIs shall generally be assigned at as coarse a level as possible.
 - 12.1. The NOAA Library will always assign for NOAA Technical Memorandum and NOAA Technical Report series publications.
 - 12.2. Submitters of other types of documents may request a publication DOI via the Library's Institutional Repository Submission form.

Landing pages: NOAA Central Library shall ensure the resolvability of DOIs they assign.

Publication identifier permanence: NOAA Central Library shall ensure the persistence of DOIs they assign.

Reserving Publication Identifiers

13. The NOAA Central Library may agree to create a reserved DOI for a publication that has not yet been deposited in the Library's Institutional Repository (IR).
 - 13.1. Interested parties may request a reserved DOI via the NOAA Central Library DOI Request Form.
 - 13.2. Individuals request identifiers with the intent of embedding the link within the document.
 - 13.3. Documents are submitted through normal procedures (IR Submission Form or NOAA Repository email at noaa.repository@noaa.gov)
 - 13.4. The NCL reserves the right to cancel a reserved publication DOI if 120 days have elapsed since the request was initiated and the publication has not been submitted to the NOAA IR.

V. Responsibilities

- [NOAA Data Citation Working Group](#): Act as an advisory panel for the overall process of managing NOAA digital object identifiers.
- NOAA National Centers for Environmental Information: Ensure long-term maintenance and availability of landing pages, metadata, and data.
- [NCEI Data Citation Working Group](#): Receive requests for NOAA data DOI assignment; respond to questions; assign identifiers to selected data; notify data providers of newly-assigned DOIs.
- NOAA Central Library: Assign identifiers to selected publications; collect metrics on citation of NOAA DOIs in publications.
- [NOAA Central Library publications working group](#): Receive requests for NOAA publication DOI assignment; respond to questions; assign identifiers to selected publications; notify publications providers of newly-assigned DOIs.
- NOAA data producers: If requesting dataset identifier(s), understand requirements in this Directive and receive assigned identifier(s), and provide data and comprehensive metadata as outlined in this Directive.
- NOAA users of NOAA data: Cite data used in projects and results, including the assigned DOI if available. Inform data stewards (producers and NCEI) of data without identifiers about this Directive.
- NOAA users of non-NOAA data (to the extent possible): Cite external data in a manner similar to NOAA data, including identifier if available.
- NOAA Environmental Data Management Committee (EDMC): Support implementation, tracking, and maintenance of this Directive.
- NESDIS headquarters: Provide funding for annual license for DOI issuance.

VI. Management and Ownership

This Procedural Directive is issued and managed by the NOAA Environmental Data Management Committee. The Directive will be reviewed at least every 3 years and revised as needed by the EDMC or a designated work team.

VII. Intended Audience

This directive applies to NOAA and non-NOAA data providers using NCEI archival services and/or NOAA Library repository services, to NOAA users of NOAA data, the NOAA Central Library, and to the NOAA National Centers for Environmental Information.

VIII. Implementation Date

This EDMC Procedural Directive shall take effect on March 29, 2021.

Not all archived data collections may receive an identifier. NCEI and the Library will assign identifiers to their holdings as needed, based on available resources and prioritization.

IX. Grandfather Exemption and Waiver Option

There is no exemption to the core requirements for receiving an identifier (e.g., archival acceptance and satisfactory metadata record). However, NCEI and the NOAA Central Library shall have flexibility to prioritize data and publications for identifier assignment and to exclude low-priority data/publications.

Data producers are not required to seek identifiers for their data.

Publications published (or submitted for publication) prior to the effective date of this Directive shall not be required to retroactively add citations for data. Future publications based on data that have not been issued identifiers shall not be required to amend the data citations therein if identifiers are issued to data after publication or submission.

X. Performance Objectives and Measurements

Metrics regarding usage and citation of NOAA-issued data identifiers will be collected and reported.

- Effective immediately upon issuance of this directive, the number of NOAA data DOIs assigned¹² shall be reported at least quarterly to EDMC and to the NOAA Office of the Chief Information Officer for inclusion in agency Open Government metrics reporting.
- Statistics regarding citation of NOAA publication DOIs shall be collected by NOAA Central Library and shall be reported at least quarterly to EDMC.
- NCEI and/or the NOAA Central Library may fulfill these usage reporting requirements by making these metrics available to the EDMC via an automated dashboard.

XI. Definitions

Terminology from NAO 212-15

Environmental data: Recorded and derived observations and measurements of the physical, chemical, biological, geological, and geophysical properties and conditions of the oceans, atmosphere, space environment, sun, and solid earth, as well as correlative data such as socio-economic data, related documentation, and metadata. Numerical model outputs are included in this definition. Digital audio or video recordings of environmental phenomena (such as animal sounds or undersea video) are included in this definition.

Data Producer: Individuals or groups who are responsible for creating, managing or submitting environmental data to NOAA National Centers for Environmental Information and/or the NOAA Central Library.

Data Stewards: individuals who are responsible for establishing, maintaining, and being accountable for the quality, integrity, documentation, and preservation of environmental data under their purview.

¹² Information available automatically from [this NCEI dashboard page](#).

Other definitions

Identifier: unique combination of letters, numbers or symbols based on an agreed-upon system or pattern. A data identifier is analogous to an International Standard Book Number (ISBN) or a Universal Product Code (UPC).

DOI: Digital Object Identifier.

NESDIS: National Environmental Satellite Data and Information Service.

XII. Frequently Asked Questions (FAQs)

General questions about this directive may be sent to the NOAA Data Citation Working Group at NOAA.Data.IDs@noaa.gov.

- Specific questions about the process for obtaining a NOAA data DOI or to request a data DOI may be sent to the NCEI Data Citation Working Group at ncei.doi@noaa.gov.
- Specific questions about the process for obtaining a NOAA publication DOI or to request a publication DOI may be sent to the NOAA Library Publication Citation Working Group at noaa.repository@noaa.gov.

XIII. Approval

This Directive (version 2.0) was approved on March 29, 2021 by the NOAA Environmental Data Management Committee.

Tony LaVoi, NOAA Chief Data Officer

XIV. Appendices

Appendix A: Additional Guidance and Resources for Data Citation

In general, NCEI and the NOAA Central Library will not assign an additional DOI for environmental data or a publication for which a DOI already exists.

Community Resources

- Federation of Earth Science Information Providers: [ESIP data provider guidelines](#)
- DataCite.org: [DataCite's Why cite data? page](#)
- The Dataverse Network Project: [Dataverse Network Project data citation guidance](#)
- The Digital Object Identifier System: [DOI System FAQ page](#)
- Digital Curation Center: [Digital Curation Center data citation guidance](#)