**The ‘WMO Stewardship Maturity Matrix for Climate Data’ Template**

Document ID: WMO-SMM-CD-0003; Version: v04r02 20210604

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| **Steps for carrying out a self-evaluation of data stewardship maturity of a dataset:**   1. Download the latest **WMO** Stewardship Maturity Matrix for Climate Data **(SMM-CD)** template file from doi:10.6084/m9.figshare.7003709; 2. Go over the whole file and read the disclaimer carefully before using the template; 3. Enter dataset and relevant Point-Of-Contacts (POCs) information in the **WMO SMM-CD** metadata section; 4. Read the content of **WMO SMM-CD**; for additional background information, download and read the guide for the SMM-CD from doi: 10.6084/m9.figshare.7002482; 5. Go through each Category with its relevant Aspects, identify the stewardship practices applied to the dataset, and document your rating and justifications; 6. Obtain any additional information if necessary and, if any, restrictions should be stated; 7. Review the results and fill in the matrix cells with the defined color scheme (provided in Table I); 8. Capture the assessment results in the **WMO SMM-CD** metadata section and in the header **‘Stewardship Maturity Ratings’** for each Aspect, along with the evidences.   **Assumptions:**   * Datasets are digital environmental data products that are publicly available online. * Evaluators who use this template have a basic knowledge of or are able to obtain information about conventions or standards relevant to practices examined in each key component in the community that datasets are produced for or/and provided to. |
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| **Note:** This document aims to facilitate the use of the Stewardship Maturity Matrix for Climate Data (SMM-CD) and will be subject to formal editing and publication as WMO guidelines. |

**WMO Stewardship Maturity Matrix for Climate Data (SMM-CD) Assessment as of <MM/DD/YYYY>**

**for <Dataset Short Name>**

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| **Dataset Title** |  |
| **Dataset Information URL** |  |
| **Data Provider POC (Name; E-mail; Affiliation)** |  |
| **Dataset POC (Name; E-mail; Affiliation)** |  |
| **WMO SMM-CD Version (Document ID and Version Number)** | WMO-SMM-CD-0001-v04r01-20200529 |
| **WMO SMM-CD POC (Name; E-mail; Affiliation)** | Christina Lief; Christina.lief@gmail.com; ret.NOAA, WMO SERCOM ET-DRC, and Ge Peng; [gpeng93@gmail.com](mailto:gpeng93@gmail.com); Earth System Science Center/NASA MSFC IMPACT, The University of Alabama in Huntsville. |
| **WMO SMM-CD Template Version (Document ID and Version Numbers)** | WMO-SMM-CD-0003-v04r02-20210604 |
| **WMO SMM-CD Template POC (Name; E-mail; Affiliation)** | Christina Lief; Christina.lief@gmail.com; ret.NOAA, WMO SERCOM ET-DRC |
| **Assessment Version (v<nn>r<mm>, e.g., v01r00)** |  |
| **Assessment Date (MM/DD/YYYY)** |  |
| **Assessment POC (Name; E-mail; Affiliation)** |  |
| **Stewardship Maturity Ratings**  (each category and associated aspects) |  |
| **Original Assessment Date (MM/DD/YYYY)** |  |
| **Original Assessment POC (Name; E-mail; Affiliation)** |  |

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| **Categories and Aspects** | **Level 1**  **Ad Hoc**  **Not Managed** | **Level 2**  **Minimal**  **Limit-Managed**  **Not Defined** | **Level 3**  **Intermediate**  **Managed**  **Defined, Partially Implemented** | **Level 4**  **Advanced**  **Well-Managed**  **Well-Defined, Fully Implemented** | **Level 5**  **Optimal**  **Level 4 +**  **Measure, Controlled, Audited** |  | The Data Access category refers to the ability to locate (Discoverability) and get to the dataset in question (Accessibility), with higher levels of maturity corresponding to the ease for a potential user to find and gain access to the dataset | | | |
| **Data Access** | **WMO SMM-CD Rating and Justification or Evidence** | | **Comments** | |
| ***Discoverability*** | By personal contact only; Dataset information not discoverable. | Limited dataset information, such as scientific description of the methodology, available online. | Level 2 + minimal catalogue-level metadata; Dataset searchable online. | Level 3 + comprehensive set of collection-level discovery metadata + minimal granule metadata. | Level 4 + available on an international catalogue, prominently displayed online and routinely updated. | * **Level** | |  | |
| ***Accessibility*** | Data not available publicly; Person-to-person contact needed. | Basic online services available for data access (e.g. FTP/HTTP direct download). | Available via non-standard data services. | Standard-based interoperability data services. | Level 4 + Full capability of sub-setting, aggregation and visualization. | * **Level** | |  | |
| **Usability & Usage** | **Level 1**  **Ad Hoc**  **Not Managed** | **Level 2**  **Minimal**  **Limit-Managed**  **Not Defined** | **Level 3**  **Intermediate**  **Managed**  **Defined, Partially Implemented** | **Level 4**  **Advanced**  **Well-Managed**  **Well-Defined, Fully Implemented** | **Level 5**  **Optimal**  **Level 4 +**  **Measure, Controlled, Audited** | The Usability & Usage category describes how easily the data products may be understood and used by users and incorporated into the user’s own working environment | | | |
| **WMO SSM-CD Rating and Justification or Evidence** | | **Comments** | |
| ***Data Portability*** | Non-machine readable. | Basic machine readable. | Standards-based machine readable. | Machine independent, self-describing, interoperable format. | Level 4 + capability of providing selected community formats. | * **Level** | |  | |
| ***Documentation*** | Product information not publicly available online. | Limited online documentation (e.g., User Guide). | Document on how the data product was created and how to use it, is available online. | Comprehensive documentation based on a standard template and available online. | Level 4 + online tutorial on using and analyzing the dataset; Complete production system information available online. | * **Level** | |  | |
| ***Usage and Impact*** | No or weak citations in scientific publication in peer-review journal or as institutional reports. | Intermediate citations + referenced in local organizational climate assessment reports (e.g., by NOAA) | Strong citations + referenced in national climate assessment reports (e.g., by USGCRP). | Level 3 + referenced in international climate assessment reports (e.g., by IPCC). | Level 4 + referenced in international decision/policy making published reports (e.g., by UNFCCC, UN-ISDR, World Bank, etc.). | * **Level** | |  | |
| **Quality Management** | **Level 1**  **Ad Hoc**  **Not Managed** | **Level 2**  **Minimal**  **Limit-Managed**  **Not Defined** | **Level 3**  **Intermediate**  **Managed**  **Defined, Partially Implemented** | **Level 4**  **Advanced**  **Well-Managed**  **Well-Defined, Fully Implemented** | **Level 5**  **Optimal**  **Level 4 +**  **Measure, Controlled, Audited** | The Quality Management category encompasses quality assurance procedures including quality monitoring, quality control, and quality assessment and communication of reliability | | | |
| **WMO SSM-CD Rating and Justification or Evidence** | | | **Comments** |
| ***Quality Assurance & Control Procedure*** | Ad hoc or no data quality assurance (QA) & control (QC) procedure or information unknown. | QA/QC procedures are defined, documented, and partially implemented. | QA/QC procedures are well-defined according to community best practices, documented and fully applied. | Level 3 + provision of error statistics published or tracked with results made available online and communicated to data providers; Procedures for user feedback, improvement prioritization in place. | Level.4 + detailed analysis of errors and gaps at space-time unit level: (Station, grid-points, daily, monthly and or annual timescale, etc.); QA/QC procedure monitored; Retrospective QC. | * **Level** | |  | |
| ***Quality Assessment*** | Product quality assessment not done or done but the assessment results are not documented or not available online. | Product quality assessed; Assessment documented and published online. | Level 2 + uncertainty analysis included in the assessment and published. | Level 3 + product produced by authoritative entity. | Level 4 + product quality assessment method and results published in peer-reviewed journal. | * **Level** | |  | |
| ***Data Integrity*** | Unknown or no data integrity check. | Random data integrity check. | Data integrity verified systematically but methodology not commonly known. | Data integrity systematically verified with audit trails, and/or traceability, and following well known practices but not necessarily consistent across platforms. | All steps in data integrity check systematically verified and adhering to well-known practices. | * **Level** | |  | |
| **Data Management** | **Level 1**  **Ad Hoc**  **Not Managed** | **Level 2**  **Minimal**  **Limit-Managed**  **Not Defined** | **Level 3**  **Intermediate**  **Managed**  **Defined, Partially Implemented** | **Level 4**  **Advanced**  **Well-Managed**  **Well-Defined, Fully Implemented** | **Level 5**  **Optimal**  **Level 4 +**  **Measure, Controlled, Audited** | The Data Management category refers to the processes undertaken to ensure the data and the contextual metadata are securely archived. It covers not just the preservation of the data and metadata with appropriate safeguards, but well defined and informed governance processes to endure that the right procedures are followed at the right times by the right people. | | | |
| **WMO SSM-CD Rating and Justification or Evidence** | | | **Comments** |
| ***Preservation*** | Any storage location; Data only; Lack of systematic data backup. | Non-designated repository; Data backed up systematically. | Designated archive; Basic retention policy publicly defined. | Level 3 + conforming to community archiving standards. Comprehensive retention policy defined and implemented. | Level 4 + archiving process performance controlled, measured, and audited; Future archiving standard changes planned. | * **Level** | |  | |
| ***Metadata*** | Collection-level metadata not publicly available and/or not usable. | Limited collection-level metadata publicly available; Conforming to community-standard; Basic characteristics of dataset. | Level 2 + conforming to international standards in most aspects; limited quality and provenance metadata. | Fully compliant with international standards; Rich metadata content; Basic granule-level metadata; Support dataset provenance. | Level 4 + comprehensive granule-level metadata; Metadata quality controlled and Regularly updated | * **Level** | |  | |
| ***Governance*** | Responsibility is not defined; No person is assigned. | Responsible entity is identified; Accountability and competency are not well-defined. | Responsibility/accountability and compliance mechanisms are defined; adhere well to data management competency standards; Processes established conforming to community standards. | Level 3 + competency defined; Conforming to international standards; Auditable. | Level 4 + accountability and responsibility well-defined and fully compliant with international standards; transparent; Monitored and audited. | * **Level** | |  | |

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| **Recommended citation for the WMO SMM-CD template:**  Lief, C. and G. Peng, 2019: The WMO Stewardship Maturity Matrix for Climate Data (SMM-CD) Template. Document ID: WMO-SMM-CD-0003. Updated 2021. Version: v04r02 20210604. Figshare. doi:10.6084/m9.figshare.7003709.  **References:**  Dunn, R., Lief, C., G. Peng, and others, 2021: Stewardship Maturity Assessment Tools for Modernization of Climate Data Management. doi:10.5334/dsj-2021-007.  The SMM-CD Working Group, 2019: The Guidance Booklet on the WMO-Wide Stewardship Maturity Matrix for Climate Data. Document ID: WMO-SMM-CD-0002. Updated 2021. Version: v04r02 202010409. Figshare. doi:10.6084/m9.figshare.7002482.  The SMM-CD Working Group, 2019: A WMO-Wide Stewardship Maturity Matrix for Climate Data. Document ID: WMO-SMM-CD-0001. Updated 2020. Version: v04r00 20200529. Figshare. doi: 10.6084/m9.figshare.7006028.  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. |
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