



World Meteorological Organization

Weather • Climate • Water

Elements of sustained data management solutions for climate

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Introduction

- WMO promotes collaboration among its Members to improve data rescue and data management capacities by establishing standards and best practices and by facilitating relevant implementation activities
- Overall importance of climate data rescue and efficient climate data management is being reinforced by GFCS
- Sustaining capacity building initiatives remains a considerable challenge, particularly in developing countries



Examples of WMO data standards and guidelines

Guidelines on Analysis of Extremes in a Changing Climate in Support of Informed Decisions for Adaptation, **Guide to Climatological Practices**, Manual on the GDPFS, **Guidelines on Climate Data Management**, Technical Regulations, Guidelines on Climate Data Rescue, Manual on Codes, **Guidelines on Climate Metadata and Homogenization**, Guidance on the Development of Long-term Daily Adjusted Temperature Datasets, Guidelines on the Submission of World Weather Records, The Role of Climatological Normals in a Changing Climate, Guidelines for Managing Changes in Climate Observation Programmes, Calculation of Monthly and Annual 30-Year Standard Normals, **Guide to Meteorological Instruments and Methods of Observation ...**

**Ensure compatibility and inter-operability
of data, products and systems**



Examples of WMO implementation activities worldwide

Data rescue in Uzbekistan, Rwanda, Jordan, Palestine; MEDARE

Improving data rescue and data management at Western Balkan

Assisting capacity development of NMHS Nepal

Data management approach for South American countries in the context of the regional programme PRASDES coordinated by CIIFEN

MCH installation in Western Balkan countries, Belize, Curacao etc.

Expanding CliDE implementation beyond Pacific Islands

Collaboration with AGRHYMET to upgrade CLIDATA installations in West Africa

Assistance to Eastern and Southern African countries regarding CDMS selection and implementation (SASSCAL, SADEN)



Sustaining data rescue: I-DARE

- Implementation of an international data rescue Web portal to pool together existing know how, experiences, best practices, tools and information into a consistent and well-structured single-source information package for concerned staff, interested public and donors.



Sustaining data rescue: I-DARE

Envisaged features

- Repository of digitised and to be digitised data
- Overview of past, ongoing and planned DARE activities
- DARE success stories
- Web forum
- Provision of tools
- List of DARE contact points
- Link to existing DARE web sites
- Reference to citizens science projects
- List of references
- etc.

Related effort: Update DARE Guidelines (WCDMP 55)



Sustaining data rescue: I-DARE

Status and way forward:

White paper drafted by Dutch Peter Siegmund under guidance of CCI TT DARE in March 2014

Expert review of white paper in April 2014

Endorsement by OPACE 1 Co-Chairs in May 2014

Implementation coordination by envisaged CCI ET DARE in close collaboration with IEDRO, ACRE etc.



Sustaining CDMS solutions: CDMS Specifications

- CLICOM -> 6 WMO-evaluated CDMSs -> CDMS Specifications
- CCI OPACE I, Expert Team on Climate Database Management Systems developed a CDMS Specification Document, which is currently in print
- Key authors: Bruce Bannerman, BoM, Australia and Denis Stuber, Météo-France, France



Sustaining CDMS solutions: CDMS Specifications

- The CDMS Specification Document:
 - aims to specify the functionality that is expected within a CDMS
 - follows an IT Architectural approach
 - is seen -and designed- as a 'living document'
 - is intended to be implementation neutral and supports a range of deployments from those in developing countries to ones within organisations with large computing resources



Sustaining CDMS solutions: CDMS Specifications

- The CDMS Specification Document is structured along the following functional components:
- **Governance** (e.g. data policy, governance)
- **Core IT Infrastructure** (e.g. computing infrastructure)
- **Climate Data** (e.g. Metadata, WMO standard products)
- **Climate Data Management** (e.g. data rescue, QC)
- **Climate Data Analysis** (e.g. homogenisation)
- **Climate Data Delivery Services** (e.g. data discovery)
- **Climate Data Presentation** (e.g. graphical user interface)



Sustaining CDMS solutions: CDMS Specifications

- The CDMS Specification Document classifies all components into:

required *mandatory functionality to comply with WMO standard practices*

recommended *recommended functionality to comply with current 'best practices'*

optional *optional functionality to comply with specific business needs*



Sustaining CDMS solutions: CDMS Specifications

- -> *Climate Data Management Component*
- -> *Observations Quality Control*
- -> *Quality Management*

- *References: WMO-100, WCP-85, WCDMP-60*

- *Function:* *Consistency Checks*
- *Description:* *This component covers a range of tests to ensure that inconsistent records are either rejected, or flagged for manual investigation. Examples: Is the minimum temperature lower than the maximum temperature?*
- *Classification:* *Required*



Sustaining CDMS solutions: CDMS Specifications

- -> *Climate Data Analysis Component*
- -> *Analysis*
- -> *Data Homogenisation*

- *References: WCDMP-53, COST HOME, www.climatol.eu/DARE*

- *Function:* *Data homogenisation*
- *Description:* *This component refers to the processes, software, governance and analysis of high-quality observations data and metadata used to develop high-quality homogenised time series datasets. Such datasets aim to ensure that the only variability remaining in the time series is that resulting from actual climate variability.*

- *Classification:* *Recommended*



Sustaining data management: Towards a Climate Data Management Framework for Climate

-> to ensure that high quality, timely and accessible climate data from all possible sources (land, upper-air, and marine data; including in-situ, remotely-sensed and model data) are available to support robust climate change monitoring and climate services.

Recently, stringent data management requirements for timeliness, resolution, quality, and transparency are becoming more difficult to meet because of the varying processes which underpin data and product generation from different sources.



Sustaining data management: Towards a Climate Data Management Framework for Climate

Identified challenge	Potential solution
Members run a variety of CDMSs which offer different functionalities, underpinned by heterogeneous calculation methods	Definition of WMO CDMS Specifications
Members use different methods to calculate Climatological Standard Normals	Updated definition of Standard Climatological Normals
Members apply different, if any, methods for preserving climate data	International DARE portal including provision of best-practice guidance and tools
Members apply different methods for formatting, storing and preserving climate-relevant remotely-sensed and model data	Development of climate data management requirements and procedures for remote-sensing and model data



Sustaining data management: Towards a Climate Data Management Framework for Climate

Suggested core activities include:

Update, and where necessary introduction of new technical regulations and guidance material for climate data management (e.g. WCDMP-53, WCDMP-60 etc.);

Identification of an extended range of climate data types needed to support GFCS on an operational basis;

Development and promulgation of a wide use of a commonly agreed set of standards and consistent practices for certain key data management elements including for data, metadata and related archiving facilities and information services (e.g. WMO CDMS Specification publication);

Harmonisation of terminology for data management and its elements (e.g. definition of 'climatological day')



Sustaining homogenisation initiatives: A way forward

CCI-16 (3-8 July 2014, Heidelberg, Germany) is expected to consider the establishment of a

CCI Task Team on climate time series quality control and homogenisation (TT on Homogenisation)

... in order to provide recommendations to WMO Members, based on the numerous activities undertaken, publications issued and tools developed during previous years

... *by reviewing existing work and evaluating available procedures and software, and*

... *by exploring ways to identify best performing, skilled and efficient homogenisation methods,*

... *etc.*



Sustaining homogenisation initiatives: A way forward

Homogenisation workshop series

HOMER

<http://www.climatol.eu/DARE>

CDMS Specs

TT on Homogenisation

Update WCDMP-53 'Guidelines on Climate Metadata and Homogenisation

?Homogenisation Web portal?

(Contribution to CSIS) tool box





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Thank you for your attention

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