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Abstract ID: 102

### **The Climate Data Centre of Deutscher Wetterdienst (DWD)**

In 2009 the German meteorological service (Deutscher Wetterdienst, DWD) has started to set up a Climate Data Centre (CDC) in order to provide homogeneous access to its variety of climate data especially to users from research, educational and public institutions. CDC acts as a central point of contact to various data collections of DWD. These include observations from German weather stations and DWD's observatories, special data from hydroclimatology, agro-climatology and medical climatology, but also from international activities of DWD, such as the Global Precipitation Climatology Center (GPCC), EUMETSAT's Satellite Application Facility on Climate Monitoring (CM-SAF) or marine climatological data (ship and buoy observations) of the Global Collecting Centre for Marine Climatological Data.

Data are based on conventional surface observations over land and ocean as well as on various remote sensing methods, such as satellite observation. The major part consists of climate data from the past, but CDC will also include results from scenario calculations and projections for the future. In addition to pure observational data, CDC offers derived statistical parameters and spatial analyses as gridded datasets.

As first step, a central data catalogue provides standardised descriptions and information on data access. It follows national and international rules for the description of geo-referenced data (GDI-DE; INSPIRE). DWD has also started activities to provide data in standardised file formats. Considering the needs of different user communities, DWD decided to provide its gridded datasets in NetCDF following the Climate and Forecast Convention (CF). As users would benefit from a concerted decision of European meteorological services, we welcome any discussion of this issue.

# CDC

Climate Data Center

## The Climate Data Center of DWD

Frank Kaspar

Deutscher Wetterdienst





## Overview

- Motivation for the new Climate Data Center
- Existing data centers at DWD
- Aims & concept of CDC
- Catalogue for metadata (GeoNetwork-Opensource)
- Concepts for access to data
- Some related internal activities  
(standardized data formats and projections; digital object identifiers)





## Motivation for the new Climate Data Center

Initial situation:

- ➔ Several individual data centers exist at DWD due to a number of national and international activities of DWD
- ➔ Increasing interest from climate research community for various data.
- ➔ New national and international standards and regulation for geo-referenced data (e.g. INSPIRE)



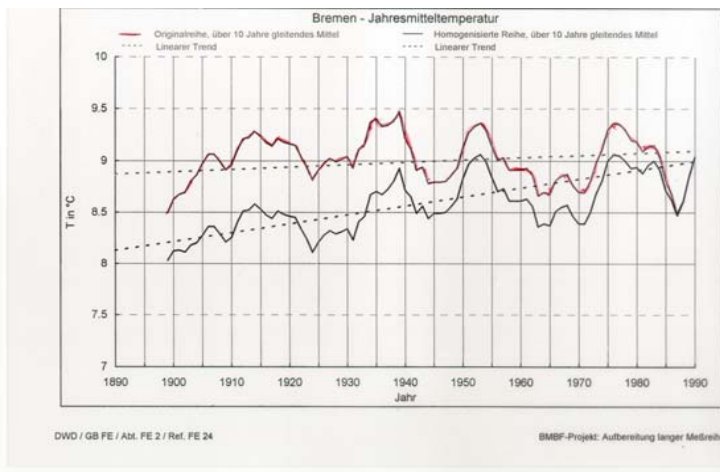


## Existing individual data centers at DWD

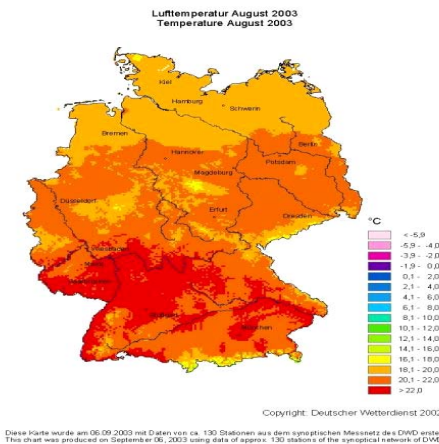


## Overview of data pools at DWD (1/6)

- DWD's National Climate Data Centre (NKDZ)
- Traditional climate data from German weather stations, based on the station network of DWD.
- Accessible via WebWerdis (Web-Based Weather Request and Distribution System)
- See talk of Johannes Behrendt (next talk)



Bremen – mean annual temperature

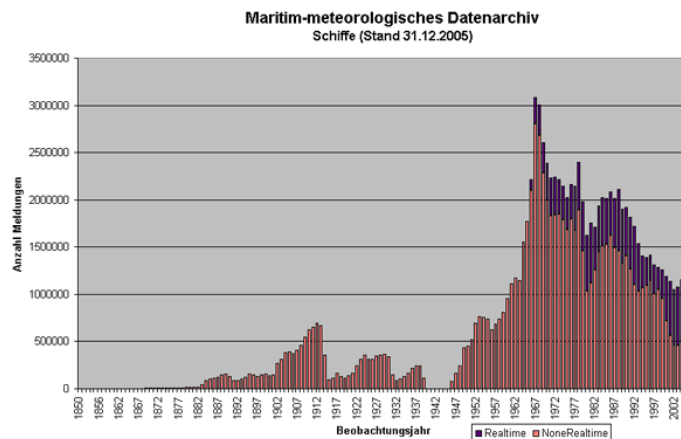


Air temperature – August 2003



## Overview of data pools at DWD (2/6)

- Global climate data from weather stations, available from the archive of world-wide CLIMAT data (freely available global data set, monthly values)
- Global marine climatological data (ship and buoy observations) of the Global Collecting Centre for Marine Climatological Data
- (Wolfgang Gloeden, member of that department, is in the audience)



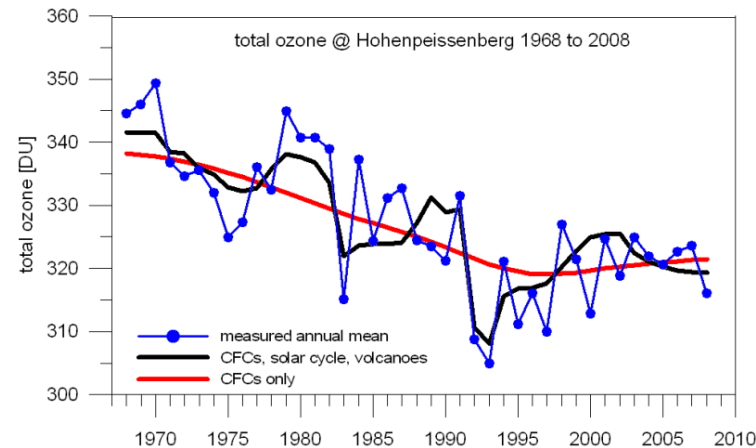
About 188 million weather observations of ships are in the DWD-archives (conditions 31.12.2008).





## Overview of data pools at DWD (3/6)

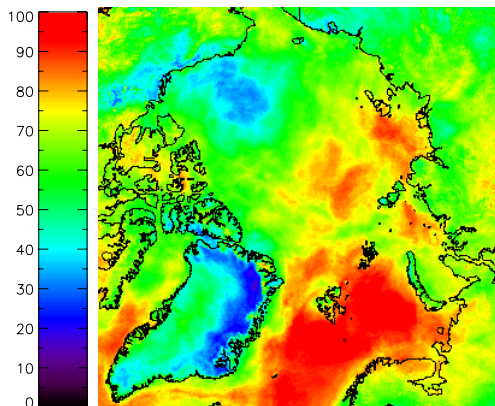
- physical data from the Lindenberg Meteorological Observatory
- air chemistry data from the Hohenpeißenberg Meteorological Observatory
- special hydroclimatological data (radar precipitation measurements, ombrometer data, ...) from Germany.
- special agro-climatological data (phenology, soil moisture, ...) from Germany
- special data for medical climatology (under construction: pollen monitoring, particulate matter, ...) for Germany.
- special climatological data for technical applications (wind data, climate factors for energy performance certificates, degree-day indices, test reference years, ...) for Germany



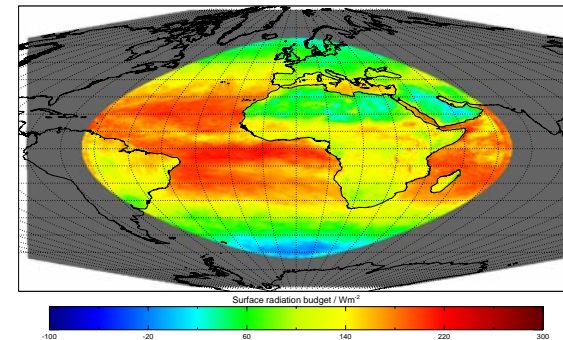


## Overview of data pools at DWD (4/6)

- Satellite Application Facility on Climate Monitoring (CM-SAF; component of EUMETSAT's ground segment):  
regional and global satellite-based climate monitoring products  
(see Poster of Kaspar et al., tomorrow).



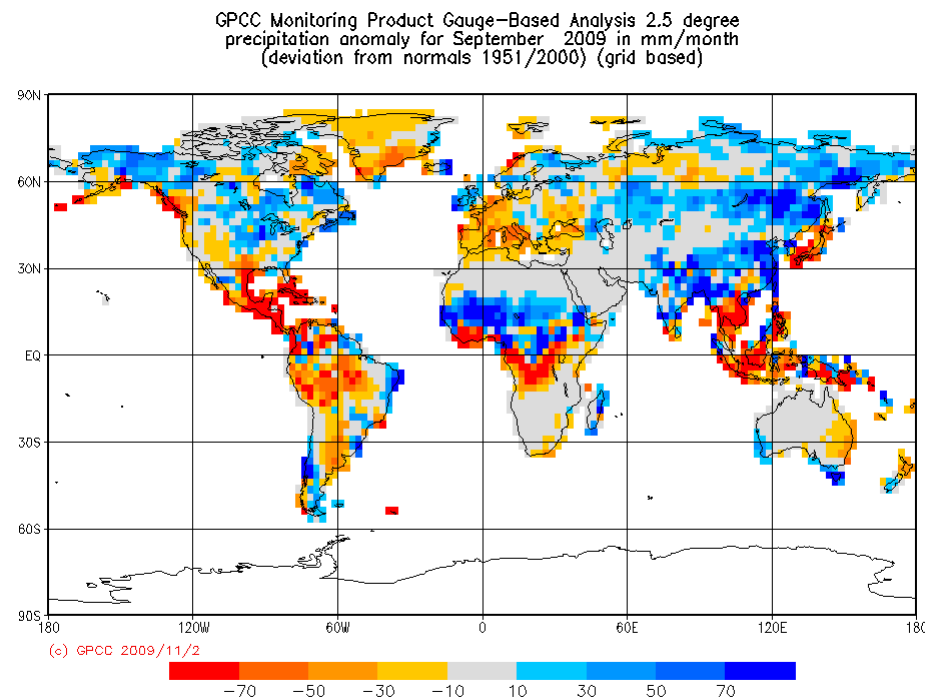
Monthly mean cloud cover June 2007 derived from AVHRR (polar orbiters)



Monthly mean surface radiation budget for September 2007 derived from Meteosat-9/SEVIRI (geostationary satellite)

## Overview of data pools at DWD (5/6)

- Global Precipitation Climatology Centre (GPCC): gridded global precipitation products





## Overview of data pools at DWD (6/6)

- data on climate change from **regional climate monitoring** activities for Germany and Europe (observed)
- data on climate change from **regional climate projections** for Germany (future, model based)





## Problems:

- All data centers with individual (technical) ways (or none at all) to access the data (ftp, direct download, online ordering, WebWerdis, ...).
- Difficult to get an overview over existing data from DWD homepage.
- Different data policy (e.g. within national and international activities; depending on user status).
- Different data formats and structures.
- ...





## Concept of the Climate Data Center





## Concept and long-term objectives of CDC

- concentration of all access possibilities to past, current and projected climate data of the DWD and other data providers
- provision of a central, uniform interface for the access to climate data
- creation of an extensive data catalogue taking account of national and international rules and standards relating to the description of geo-referenced data (GDI-DE; INSPIRE)
  
- Current focus on research and education





## Need for standardized metadata

**INSPIRE** (EU: *I*nfrastructure for *S*patial *I*nformation in the *E*uropean Community)

WMO also asks for standardized metadata for usage in their WMO Information System (WIS):

- Global Information System Centres (*GISC*)
- Data Collection und Production Centres (*DCPC*)
- National Centres (*NC*)







## First step: catalogue for Metadata based on “GeoNetwork-opensource”

- Developed and published by „Food and Agriculture Organization of the UN (FAO)“
- Editing and publishing of metadata in standardised format
- Exchange of metadata between distributed catalogues
- Direct download of data
- User management



## GeoNetwork nodes

by [Jeroen Ticheler](#) – last modified 2009-10-

List of known GeoNetwork opensource  
your node to be listed here.

Logo	Organization
	FAO GeoNetwork <a href="http://www.fao.org">http://www.fao.org</a>
<a href="#">WFP VAM-SIE Headquarters</a>	WFP VAM-SIE Headqu <a href="http://vam.wfp.org">http://vam.wfp.org</a>
	UNEP Headquarters <a href="http://www.ecomt">http://www.ecomt</a>
	OCHA GeoNetwork <a href="http://geonetwork">http://geonetwork</a>
<a href="#">WHO Headquarters</a>	WHO Headquarters <a href="http://www.who.int">http://www.who.int</a>
	CGIAR-CSI Main GeoN <a href="http://geonetwork">http://geonetwork</a>
	GEOportal <a href="http://www.geoportal.org">http://www.geoportal.org</a>

## GeoNetwork opensource provides:

- \* Immediate search access to local and distributed geospatial catalogues
- \* Up- and downloading of data, graphics, documents, pdf files and any other content type
- \* An interactive Web Map Viewer to combine Web Map Services from distributed servers around the world
- \* A randomly selected Featured Map
- \* Recently updated entries, also accessible as RSS news feeds and as GeoRSS.
- \* Online editing of metadata with a powerful template system
- \* Native support for ISO19115, FGDC and Dublin Core formatted metadata
- \* Scheduled harvesting and synchronization of metadata between distributed catalogues
- \* Fine-grained access control
- \* Group and user management
- \* Multilingual user interface

services. Developed by  
ESA and FAO.  
GEOportal uses

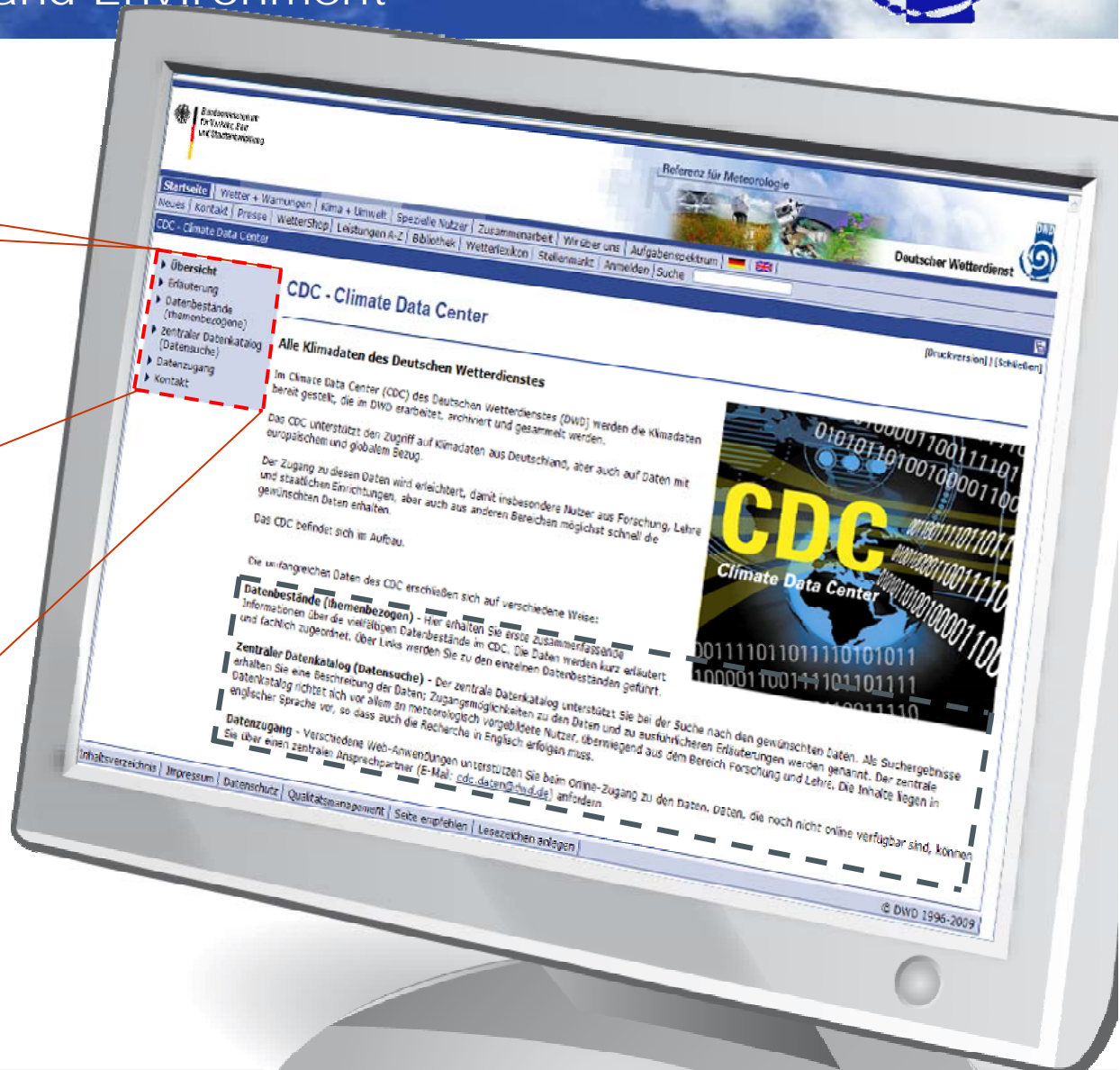




## Examples from CDC catalogue

## Homepage of CDC

- Overview
- About CDC
- Subject-related data sets
- CDC data catalogue
- Access to data
- Contact

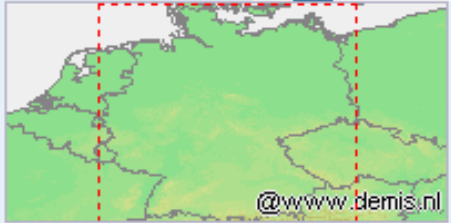




## Metadata catalogue

**CDC: THE CLIMATE DATA CENTRE OF DEUTSCHER WETTERDIENST (DWD)**


What?

Where?  [@www.demis.nl](#)  
[Open Map Viewer](#)

[Reset](#) [Advanced](#) [Options](#)


**CATEGORIES**

- data sets
- grid fields
- Other information resources
- time series at stations

**RECENT CHANGES**  [GeoRSS](#)


- time series with free access from

Aggregate Results matching search criteria : 1-10/1096 (page 1/110), Sort by

**Logo**  **TIME SERIES WITH RESTRICTED ACCESS FROM GERMAN STATIONS IN BRANDENBURG FOR "MONTHLY MEAN OF AIR TEMPERATURE (IN DEGREE C) AT NKDZ OF DEUTSCHER WETTERDIENST (DWD)"** 

**Abstract** "monthly mean of air temperature (in degree C) at NKDZ of Deutscher Wetterdienst (DWD)" time series from climate stations in Brandenburg / Germany. The time series are actualized and qualit...

**Keywords** monthly, meteorological, climatology, climate data, monthly mean of air temperature, Germany, Brandenburg

**Logo**  **TIME SERIES FROM GERMAN STATIONS FOR "MONTHLY MEANS OF AIR TEMPERATURE (HOMOGENIOUS) (IN DEGREE C) AT NKDZ OF DEUTSCHER WETTERDIENST (DWD)"** 

**Abstract** "monthly means of air temperature (homogenous) (in degree C) at NKDZ of Deutscher Wetterdienst (DWD)" time series from climate stations in Germany. The time series are actualized and quali...

**Keywords** monthly, meteorological, climatology, climate data, homogenized monthly mean of air temperature, Germany







## Example for details of metadata

Maintenance And Update Frequency	monthly
Update Scope	dataset
Dataset Set	If a time series is still active, i.e. the end date is open, then this time series will be updated at the beginning of a new month. The data value for the previous month will be added.
Descriptive Keywords	monthly (temporal).
Descriptive Keywords	meteorological , climatology , climate data , monthly mean of air temperature (theme).
Descriptive Keywords	Germany , Brandenburg (place).
Use Limitation	no conditions apply
Access Constraints	restricted
Language	English
Topic Category Code	climatology/meteorology/atmosphere

### Extent

XML Identifier	STATIONS_DWD.13874
Geographic Element	<u>Alt-Trebbin</u>

### Temporal Extent

Begin Date	1936-01-01
End Date	1939-07-01

### Extent

XML Identifier	STATIONS_DWD.00164
Geographic Element	<u>Angermünde</u>

### Temporal Extent

Begin Date	1908-06-01
End Date	2009-02-01



# Deutscher Wetterdienst

Dept. Climate and Environment



## CDC-catalogue:

→ Distribution info

The screenshot shows the CDC-catalogue interface for the Deutscher Wetterdienst. The search criteria are 'temperature' and 'Germany'. The results page shows a metadata record for a 1 km grid field covering Germany for the reference period 1901-1930. The 'Distribution info' section is highlighted with a red circle and contains the following information:

Distribution format	
Name	zipped ArcGrid
Version	---

Distribution info	
OnLine Resource	<a href="#">WebWerdis</a>
OnLine Resource	<a href="#">download zipped jpeg file</a>
Data For Download	<a href="#">download zipped ESRI ArcGrid file</a>
Interactive Map	<a href="#">get map via OGC Web Map Service</a> (OGC-WMS Server: <a href="http://vgisc.dwd.de/geoserver/wms">http://vgisc.dwd.de/geoserver/wms</a> )
View In Google Earth	<a href="#">get map via OGC Web Map Service</a>





## CDC-catalogue:

→ Regional extent, data quality

The screenshot shows a web browser window displaying a metadata entry. The entry is divided into several sections:

- Extent**:
  - Description: geographic bounding box that covers Germany and the 30 years time period
  - Geographic bounding box**: A table with four values circled in red:

North bound latitude	55.05653
West bound longitude	5.865
East bound longitude	15.03382
South bound latitude	47.27472
  - Temporal Extent**:

Begin Date	1901-01-01
End Date	1930-12-31
- Reference system info**:

Code	WGS 84
CodeSpace	World Geodetic System
- Data quality info**: A table with several rows circled in red:

Hierarchy Level	dataset
Title	INSPIRE Implementing rules laying down technical arrangements for the interoperability and harmonisation of orthoimagery
Date	2011-05-15
Date Type	publication
Explanation	See the referenced specification
Pass	true
Statement	High quality controlled
Description	Data is quality controlled according to national procedures. See quality bytes in data.
- Metadata**:

File Identifier	de.dwd.nkdz.maps.TADNMM.Year.1901.30
Language	English
Character Set	utf8



## CDC-Katalog Beispiele:

→ More metadata / point of contact

The screenshot shows a web browser window displaying a metadata record. The browser's address bar shows 'Google'. The page content is organized into several sections:

- Identification info:**
  - XML Identifier: identInfo
  - Title: 1km grid field covering Germany for TADNMM values for the reference period Year and a mean for years between 1901 and 1930
  - Date: 1931-01-01
  - Date Type: creation
  - Code: de.dwd.nkdz.maps.TADNMM.Year.1901.30
  - CodeSpace: http://www.dwd.de
  - Presentation Form: digital map
  - Other Citation Details: The dot notation recommended by WMO-CBS IPET-MI-II is used to build the code identifier
  - Abstract: This metadata record describes a 1km grid field which covers Germany. The grid consists of values for annual mean of daily minimum of air temperature for the reference period Year and a mean for years between 1901 and 1930. It is produced by Deutscher Wetterdienst. The grid can be downloaded as a zipped file in ESRI ArcGrid format or as a zipped jpeg graphic. It can be also accessed via an OGC-WMS web service (see section for distribution information). The access to the ArcGrid data is restricted to registered users. For registration please send a notification to the contact which is given in this metadata record (see section for contact information).
- Point of contact:** (This section is circled in red in the image)
  - Individual Name: Elsbeth Penda
  - Organisation Name: National Climate Data Centre of DWD
  - Voice: +49 (0) 69 8062-2958
  - Facsimile: +49 (0) 69 8062-3759
  - Delivery Point: Frankfurter Strasse 135
  - City: Offenbach
  - Postal Code: 63067
  - Country: Germany
  - Electronic Mail Address: [Elsbeth.Penda@dwd.de](mailto:Elsbeth.Penda@dwd.de)
  - OnLine Resource: <http://www.dwd.de>
  - Role: originator
- Maintenance And Update Frequency:** not planned
- Update Scope:** dataset
- Dataset Set:** Normally, the grid field will not change after its creation, except in cases when erroneous values are detected.
- Descriptive Keywords:** monthly , 30-year integration period (temporal).
- Descriptive Keywords:** meteorological , climatology , climate data , annual mean of daily minimum of air temperature , air\_temperature (theme).
- Descriptive Keywords:** Germany (place).



# Deutscher Wetterdienst

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## CDC-catalogue:

- Direct download
- Interactive map (not yet implemented)

The screenshot shows the CDC catalogue interface. At the top, there's a navigation bar with links like Home, Last results, Administration, Contact us, Links, About, Imprint, Copyright, and Help. Below that, a search bar contains the text 'temperature'. The results are displayed in a list format. Each result includes a logo, a title, an abstract, and keywords. The 'Download' and 'Interactive Map' buttons for each result are circled in red. The 'Interactive Map' button is currently disabled, indicated by a greyed-out appearance.

Aggregate Results matching search criteria : 1-10/1134 (page 1/114), Sort by Relevance

What? temperature  
Where?

Categories: data sets, grid fields, Other information resources, time series at stations

Recent Changes: GeoRSS

Satellite Application Facility on Climate Monitoring (CM-SAF) at DWD  
NKDZ grid fields



## CDC-catalogue:

→ Set of files for download

**Logo**  SET OF 1 KM GRID FIELDS COVERING GERMANY FOR TADNMM VALUES FOR THE REFERENCE PERIOD APRIL WHERE EACH ELEMENT BELONGS TO A YEAR BETWEEN 1901 AND 1910

**Abstract** This metadata record describes 1 km grid fields which cover Germany. Each grid consists of values for monthly mean of daily minimum of air temperature for the reference period April and below...

**Keywords** monthly, yearly integration period, meteorological, climatology, climate data, monthly mean of daily minimum of air temperature, air\_temperature, Germany

Metadata

**Distribution info**

**Distribution format**

Name	zipped ArcGrid
Version	---

**OnLine Resource** [WebWerdis](#)

**Data For Download**

- [download zipped ESRI ArcGrid file for year 1901](#)
- [download zipped ESRI ArcGrid file for year 1902](#)
- [download zipped ESRI ArcGrid file for year 1903](#)
- [download zipped ESRI ArcGrid file for year 1904](#)
- [download zipped ESRI ArcGrid file for year 1905](#)
- [download zipped ESRI ArcGrid file for year 1906](#)
- [download zipped ESRI ArcGrid file for year 1907](#)
- [download zipped ESRI ArcGrid file for year 1908](#)
- [download zipped ESRI ArcGrid file for year 1909](#)
- [download zipped ESRI ArcGrid file for year 1910](#)

**Identification info**

XML Identifier	identInfo
Title	Set of 1km grid fields covering Germany for TADNMM values for the reference period April where each element belongs to a year between 1901 and 1910
Date	1911-01-01
Date Type	creation
Code	de.dwd.nkdz.maps.TADNMM.April.1901-1910

## CDC-catalogue:

→ Direct download.







## CDC-catalogue:

→ **Advanced search**  
e.g. show only entries with  
downloadable data

The screenshot displays the CDC-catalogue search interface. On the left, there are input fields for Title, Abstract, Keywords, and Content info. Below these are map type options: Digital, Interactive, Hard copy, and Downloadable (which is checked and circled in red). There are also search accuracy options: Precise, Imprecise, and a radio button. The main search area features a world map with search boundaries (west bound: -180, east bound: 178.2, south bound: -88.2) and a search box containing the text "overlaps the search box". To the right, the "WHEN?" section includes search period filters (From, To, Type) and "Restrict to" options (Catalog, Group, Kind, Category). The "Options" section includes Sort by (Relevance), Hits per page (10), and Output (Full). A "Search" button is at the bottom right. Below the search area, the results section shows "Aggregate Results matching search criteria : 1-10/765 (page 1/77). Sort by Relevance". A result entry is shown with a logo, a title "SET OF 1 KM GRID FIELDS COVERING GERMANY FOR TADNMM VALUES FOR THE REFERENCE PERIOD APRIL WHERE EACH ELEMENT BELONGS TO A YEAR BETWEEN 1901 AND 1910", an abstract, and keywords. A "Download" button is circled in red. The bottom left shows "CATEGORIES" and "RECENT CHANGES" sections.

# Deutscher Wetterdienst

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The screenshot shows a Mozilla Firefox browser window displaying the 'Climate Data Centre - CDC' website. The address bar shows the URL 'http://cdc.dwd.de/catalogue/srv/en/main.home'. The main content area is titled 'Satellite-derived climate monitoring pro ...' and contains a table with columns for 'Groups', 'Publish', 'Download', 'Interactive Map', 'Featured', and 'Notify'. The 'CDC' group is selected, with checkboxes for 'Publish', 'Download', 'Interactive Map', and 'Notify' all checked. There are 'Set All' and 'Clear All' buttons for each column. A 'Submit' button is located below the table. The browser's status bar at the bottom shows 'The Clim' and 'fertig'.

Groups	Publish	Download	Interactive Map	Featured	Notify
All	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Intranet	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
CDC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**CDC-catalogue**

→ **Group-specific permissions**





### Identification info

Title *	Satellite-derived climate monitoring products for the A
Alternate title +	
Date *	2009-04-08T17:00:00 <input type="button" value="clear"/>
Date type *	Creation ▾
Edition +	
Edition date +	Date (gco:Date) ▾
Identifier +	Identifier (gmd:MD_Identifier) ▾
Cited responsible party +	
Presentation form + ☒	Digital document ▾
Series +	
Other citation details +	
Collective title +	
ISBN +	
ISSN +	
Abstract *	This set of products contains several cloud parameters (cloud fraction; cloud type; cloud top height/temperature/pressure) as well as surface albedo are derived from the Advanced Very High Resolution Radiometers (AVHRR) on-board polar-orbiting satellites. Cloud products are provided as daily and monthly means with a spatial resolution of 15km*15km (Lambert azimuthal equal area projection) on a day-to-day basis. Surface albedo is provided as weekly mean. The processing exploits AVHRR data at full spatial resolution (approx. 1.1 km
Purpose ☒	climate monitoring with operational meteorological satellites, archiving and delivery of satellite-derived climate data,
Credit +	
Status + ☒	Ongoing ▾

**CDC-catalogue**

→ **Editing Metadata**

### Point of contact + ☒

Individual name ☒	Britta Thies
Organisation name ☒	Satellite Application Facility on Climate Monitoring (at D
Position name ☒	User Help Desk
Voice + ☒	
Facsimile + ☒	
Delivery point + ☒	
City ☒	



```
<?xml version="1.0" encoding="UTF-8" ?>
- <gmd:MD_Metadata xmlns:gmd="http://www.isotc211.org/2005/gmd" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:gml="http://www.opengis.net/gml" xmlns:gts="http://www.isotc211.org/2005/gts" xmlns:gco="http://www.isotc211.org/2005/gco"
  xmlns:geonet="http://www.fao.org/geonetwork">
- <gmd:fileIdentifier>
  <gco:CharacterString xmlns:srv="http://www.isotc211.org/2005/srv" xmlns:gmx="http://www.isotc211.org/2005/gmx">d15
    f6b90907b17f</gco:CharacterString>
</gmd:fileIdentifier>
- <gmd:language>
  <gco:CharacterString>eng</gco:CharacterString>
</gmd:language>
- <gmd:characterSet>
  <gmd:MD_CharacterSetCode codeListValue="utf8" codeList="http://wis.wmo.int/2008/catalogues/draft_version_1-
    1/WMO_Codelists_ver1_1.xml#MD_CharacterSetCode" />
</gmd:characterSet>
- <gmd:contact>
- <gmd:CI_ResponsibleParty>
  - <gmd:individualName>
    <gco:CharacterString>Dr. Frank Kaspar</gco:CharacterString>
  </gmd:individualName>
  - <gmd:organisationName>
    <gco:CharacterString>Deutscher Wetterdienst (DWD)</gco:CharacterString>
  </gmd:organisationName>
  - <gmd:positionName>
    <gco:CharacterString>Member of operations team</gco:CharacterString>
  </gmd:positionName>
- <gmd:contactInfo>
  - <gmd:CI_Contact>
    - <gmd:phone>
      - <gmd:CI_Telephone>
        - <gmd:voice gco:nilReason="missing">
          <gco:CharacterString />
        </gmd:voice>
      </gmd:CI_Telephone>
    </gmd:phone>
  </gmd:CI_Contact>
</gmd:contactInfo>
</gmd:contact>
</gmd:CI_ResponsibleParty>
</gmd:contact>
</gmd:MD_Metadata>
```

**CDC-catalogue**

→ XML-output



## Conclusions: CDC catalogue

- Catalogue is based on „GeoNetwork-opensource“
- Editing of standardized metadata can be done by data providers
- Metadata in standardised format allows exchange between distributed catalogues
- Direct download of data (later: visualisation within catalogue) is possible
- Group-/user-specific permissions can be set
- These activities also support requirements of WMO Information System





## Some related activites





## Standardized file format for raster data: netcdf?

### What Is netCDF?

- NetCDF (network Common Data Form) is a set of interfaces for **array-oriented data** access and a freely-distributed collection of data access libraries for C, Fortran, C++, Java, and other languages. The netCDF libraries support a **machine-independent format for representing scientific data**. Together, the interfaces, libraries, and format support the creation, access, and sharing of scientific data.

### NetCDF data is:

- **Self-Describing**. A netCDF file includes information about the data it contains.
- **Portable**. A netCDF file can be accessed by computers with different ways of storing integers, characters, and floating-point numbers.
- **Scalable**. A small subset of a large dataset may be accessed efficiently.
- **Appendable**. Data may be appended to a properly structured netCDF file without copying the dataset or redefining its structure.
- **Sharable**. One writer and multiple readers may simultaneously access the same netCDF file.
- **Archivable**. Access to all earlier forms of netCDF data will be supported by current and future versions of the software.





**NetCDF Climate and Forecast (CF) Metadata Convention defines a standard for the internal structure of NetCDF-files, and therefore allows to build generic software tools to analyse such data.**

A screenshot of the CF Metadata website. The page has a blue header with the title 'CF Metadata' and the subtitle 'NetCDF Climate and Forecast Metadata Convention'. Below the header is a search bar and a navigation menu with links for 'home', 'documents', 'conformance', 'discussion', 'governance', and 'working groups'. A 'log in' link is also present. The main content area features a 'navigation' sidebar with a tree view of the site structure, including 'Home', 'Documents', 'Conformance', 'Discussion', 'Governance', and 'Working Groups'. The main text area is titled 'CF Metadata' and contains a paragraph describing the conventions for climate and forecast (CF) metadata, their purpose in promoting data processing and sharing, and their adoption by various projects and groups. The text mentions the NetCDF API and lists capabilities like extraction, regridding, and display.

**CF Metadata**

**NetCDF Climate and Forecast (CF) Metadata Convention**

The conventions for climate and forecast (CF) metadata are designed to promote the processing and sharing of files created with the [NetCDF API](#). The CF conventions are increasingly gaining acceptance and have been adopted by a number of [projects and groups](#) as a primary standard. The conventions define metadata that provide a definitive description of what the data in each variable represents, and the spatial and temporal properties of the data. This enables users of data from different sources to decide which quantities are comparable, and facilitates building applications with powerful extraction, regridding, and display capabilities.



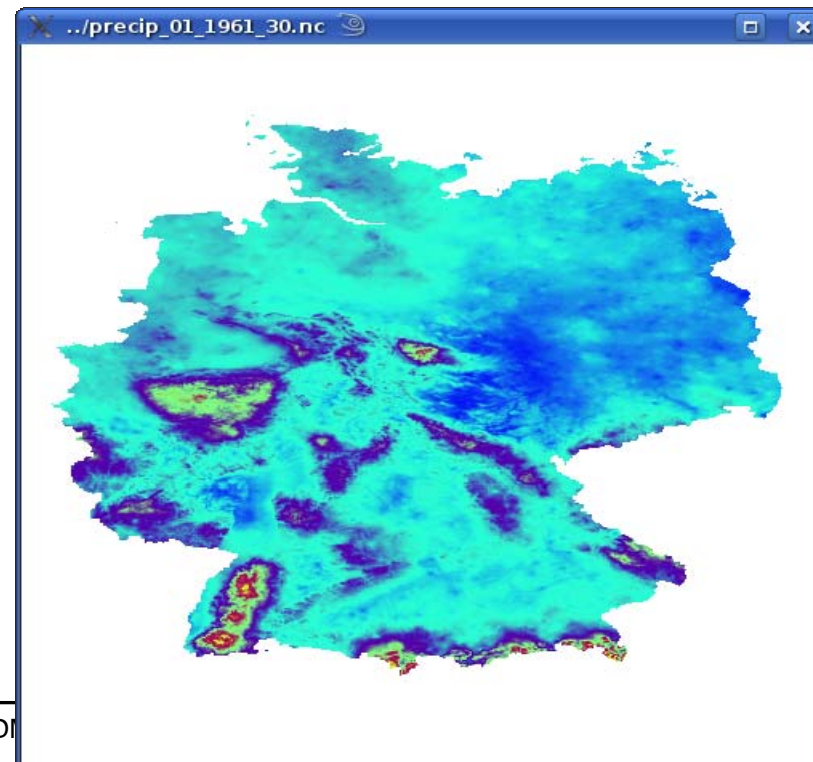
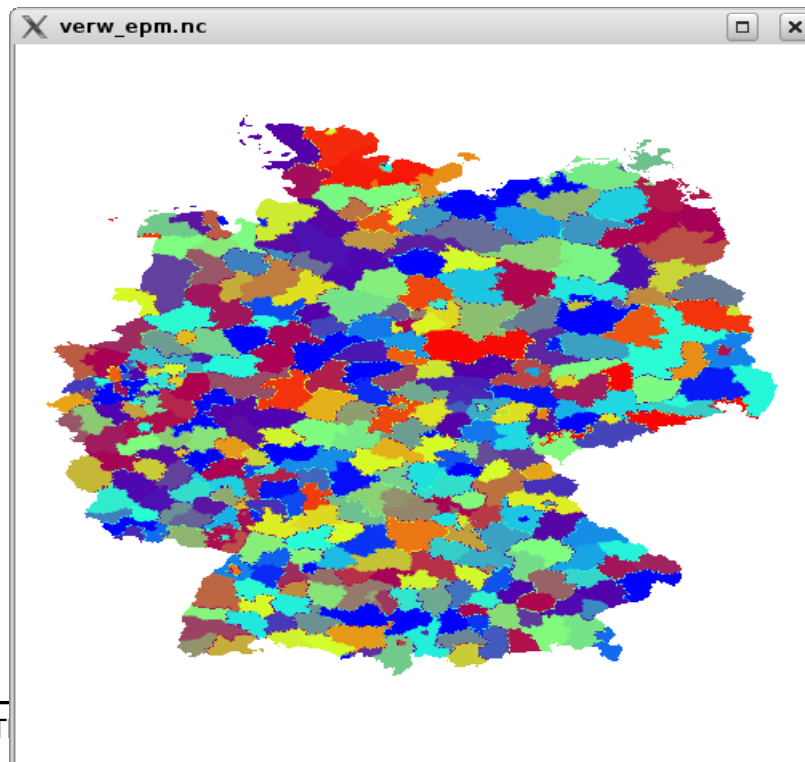


## Example for simple handling of CF-data.

- Use of 'climate data operators' for very simple implementation of file-based data analysis.
- Example : Select grid cells of an administrative unit, and calculate mean precipitation of that area.

```
cdo -eqc,27 verw_epm.nc select27.nc
```

```
cdo -fldmean -mul precip_01_1961_30.nc select27.nc fldmean27.nc
```







**Citable publication of scientific data based on 'digital object identifiers':**  
**Advantages: data are visible in library catalogue, data can be cited in scientific studies with a reliable reference, data provider guarantees that data will not change.**

The screenshot shows a search result for 'hoaps' in a library catalogue. The search interface includes a search bar with the term 'hoaps' and a 'Suchen' button. The results are displayed in a table-like format with the following details:

- Titel:** [Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data - HOAPS-3 - monthly mean](#)
- Verfasser:** [Andersson, Axel](#) ; [Bakan, Stephan](#) ; [Fennig, Karsten](#) ; [Grassl, Hartmut](#) ; [Klepp, Christian-Phillip](#) ; [Schulz, Joerg](#)
- Erschienen:** 2007-08-30
- Anbieter:** Hamburg : World Data Center for Climate (WDCC)
- Umfang:** 5990680808 Bytes.
- Anmerkung:** CreationDate: 2007-02-22
- Technische Angaben:** Format: netCDF, records separated
- Link:** [http://dx.doi.org/10.1594/WDCC/HOAPS3\\_MONTHLY](http://dx.doi.org/10.1594/WDCC/HOAPS3_MONTHLY)  
[urn:nbn:de:tib-10.1594/WDCC/HOAPS3\\_MONTHLY6](urn:nbn:de:tib-10.1594/WDCC/HOAPS3_MONTHLY6)
- Anmerkung:** Primaerdaten

Red circles highlight the provider information, the technical details, and the digital object identifiers (DOI and NBN).

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**Thank you for your attention!**

**Deutscher Wetterdienst**

